Table of Contents: ARI Job AYO5

Client: Apex Labs

Project: A6C1124

AJ
Signature

May-26-2016
Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

April 14, 2016

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

RE: Project: A6C1124
ARI Job No.: AYO5

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: AYO5

Enclosures

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

Chain of Custody Documentation

ARI Job ID: AYO5

SUBCONTRACT ORDER AY05

Apex Laboratories

A6C1124

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 Embankmebnt-010 (0-3.5)

Sample Name: 5237-160329-DC-EMB010 **Soil** **Sampled: 03/29/16 10:15** (A6C1124-02)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/12/16 17:00	04/12/16 10:15	
Containers Supplied: (E)4 oz Glass Jar			

Soil Embankmebnt-010 (0-3.5)

Sample Name: 5237-160329-DC-EMB005 **Soil** **Sampled: 03/29/16 10:35** (A6C1124-04)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/12/16 17:00	04/12/16 10:35	
Containers Supplied: (E)4 oz Glass Jar			

Soil Embankmebnt-010 (0-3.5)

Sample Name: 5237-160329-DC-EMB004 **Soil** **Sampled: 03/29/16 11:15** (A6C1124-06)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/12/16 17:00	04/12/16 11:15	
Containers Supplied: (E)4 oz Glass Jar			

Soil Embankmebnt-010 (0-3.5)

Sample Name: 5237-160329-DC-EMB001 **Soil** **Sampled: 03/29/16 12:00** (A6C1124-08)

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

Standard TAT

Released By 3/31/16 Date — UPS (Shipper) — Received By — Date

Released By — UPS (Shipper) — Date — Received By — 4-1-16 @ 1200 Date

AY05 : 00003

SUBCONTRACT ORDER

Apex Laboratories

A6C1124

Soil Embankmebnt-010 (0-3.5)

Sample Name: 5237-160329-DC-EMB013 **Soil** **Sampled: 03/29/16 13:15** (A6C1124-10)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/12/16 17:00	04/12/16 13:15	
Containers Supplied:			
(E)4 oz Glass Jar			

Soil Embankmebnt-010 (0-3.5)

Sample Name: 5237-160329-DC-EMB014 **Soil** **Sampled: 03/29/16 13:40** (A6C1124-12)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/12/16 17:00	04/12/16 13:40	
Containers Supplied:			
(E)4 oz Glass Jar			

Soil Embankmebnt-010 (0-3.5)

Sample Name: 5237-160329-DC-EMB017 **Soil** **Sampled: 03/29/16 14:25** (A6C1124-14)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/12/16 17:00	04/12/16 14:25	
Containers Supplied:			
(E)4 oz Glass Jar			

Soil Embankmebnt-010 (0-3.5)

Sample Name: 5237-160329-DC-EMB020 **Soil** **Sampled: 03/29/16 15:10** (A6C1124-16)

Analysis	Due	Expires	Comments
Sulfide, Total by PSEP (376.2) (SUB)	04/12/16 17:00	04/12/16 15:10	
Containers Supplied:			
(E)4 oz Glass Jar			

Released By: Susan Judd Date: 3/31/16 — Received By: UPS (Shipper) Date:

Released By: UPS (Shipper) Date: — Received By: [signature] Date: 4-1-16 1300

AY05 : 00004

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Apex

COC No(s): _____ NA

Assigned ARI Job No: AY05

Project Name: _____

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Tracking No: 1Z X47201213950G 1527 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): 1.4

Time: _____

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: D005276

Cooler Accepted by: TR Date: 4-1-16 Time: 1300

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: _____

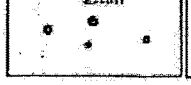
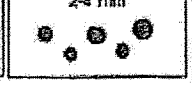
Samples Logged by: TR Date: 4-1-16 Time: 1438

***** 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 Air Bubbles ~2mm	Peabubbles 2-4 mm	LARGE Air Bubbles > 4 mm
		

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: AYO5

Case Narrative

Client: Apex Laboratories
Project: A6C1124
ARI Job No.: AYO5

Sample Receipt

Analytical Resources, Inc. (ARI) accepted eight soil samples on April 1, 2016 under ARI job AYO5. The cooler temperature measured by IR thermometer following ARI SOP was 1.4°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: AYO5
Client: Apex Labs
Project Event: A6C1124
Project Name: N/A

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	5237-160329-DC-EMB010	AYO5A	16-5352	Soil	03/29/16 10:15	04/01/16 13:00
2.	5237-160329-DC-EMB005	AYO5B	16-5353	Soil	03/29/16 10:35	04/01/16 13:00
3.	5237-160329-DC-EMB004	AYO5C	16-5354	Soil	03/29/16 11:15	04/01/16 13:00
4.	5237-160329-DC-EMB001	AYO5D	16-5355	Soil	03/29/16 12:00	04/01/16 13:00
5.	5237-160329-DC-EMB013	AYO5E	16-5356	Soil	03/29/16 13:15	04/01/16 13:00
6.	5237-160329-DC-EMB014	AYO5F	16-5357	Soil	03/29/16 13:40	04/01/16 13:00
7.	5237-160329-DC-EMB017	AYO5G	16-5358	Soil	03/29/16 14:25	04/01/16 13:00
8.	5237-160329-DC-EMB020	AYO5H	16-5359	Soil	03/29/16 15:10	04/01/16 13:00

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Data Reporting Qualifiers

Effective 2/14/2011

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).

AY05 : 00009

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

M2 The sample contains PCB congeners that do not match any standard Aroclor pattern. The PCBs are identified and quantified as the Aroclor whose pattern most closely matches that of the sample. The reported value is an estimate.

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)**

AY05 : 00010

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

AY05:00011

Analytical Method Information

Printed: 05/26/2016 12:58 pm

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

AY05 : 00012

General Chemistry Analysis
Report and Summary QC Forms

ARI Job ID: AYO5

SAMPLE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Client ID: 5237-160329-DC-EMB010
ARI ID: 16-5352 AYO5A

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/05/16 040516#1	SM2540G	Percent	0.01	69.24
Sulfide	04/04/16 040416#1	SM4500-S2D	mg/kg	1.44	< 1.44 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: DO
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Client ID: 5237-160329-DC-EMB005
ARI ID: 16-5353 AYO5B

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/05/16 040516#1	SM2540G	Percent	0.01	71.45
Sulfide	04/04/16 040416#1	SM4500-S2D	mg/kg	1.39	< 1.39 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: JW
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Client ID: 5237-160329-DC-EMB004
ARI ID: 16-5354 AYO5C

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/05/16 040516#1	SM2540G	Percent	0.01	72.53
Sulfide	04/04/16 040416#1	SM4500-S2D	mg/kg	1.38	< 1.38 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: QV
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Client ID: 5237-160329-DC-EMB001
ARI ID: 16-5355 AYO5D

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/05/16 040516#1	SM2540G	Percent	0.01	73.55
Sulfide	04/04/16 040416#1	SM4500-S2D	mg/kg	1.35	< 1.35 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: JL
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Client ID: 5237-160329-DC-EMB013
ARI ID: 16-5356 AYO5E

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/05/16 040516#1	SM2540G	Percent	0.01	73.31
Sulfide	04/04/16 040416#1	SM4500-S2D	mg/kg	1.34	< 1.34 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: Q
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Client ID: 5237-160329-DC-EMB014
ARI ID: 16-5357 AYO5F

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/05/16 040516#1	SM2540G	Percent	0.01	74.64
Sulfide	04/04/16 040416#1	SM4500-S2D	mg/kg	1.34	< 1.34 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Client ID: 5237-160329-DC-EMB017
ARI ID: 16-5358 AYO5G

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/05/16 040516#1	SM2540G	Percent	0.01	71.02
Sulfide	04/04/16 040416#1	SM4500-S2D	mg/kg	1.40	< 1.40 U

RL Analytical reporting limit
U Undetected at reported detection limit

SAMPLE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: QD
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Client ID: 5237-160329-DC-EMB020
ARI ID: 16-5359 AYO5H

Analyte	Date	Method	Units	RL	Sample
Preserved Total Solids	04/05/16 040516#1	SM2540G	Percent	0.01	69.30
Sulfide	04/04/16 040416#1	SM4500-S2D	mg/kg	1.43	< 1.43 U

RL Analytical reporting limit
U Undetected at reported detection limit

REPLICATE RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized:
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: 03/29/16
Date Received: 04/01/16

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: AYO5A Client ID: 5237-160329-DC-EMB010					
Preserved Total Solids	04/05/16	Percent	69.24	70.41	1.7%

LAB CONTROL RESULTS-CONVENTIONALS
AY05-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: Q
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: NA
Date Received: NA

Analyte/Method	QC ID	Date	Units	LCS	Spike Added	Recovery
Sulfide SM4500-S2D	PREP	04/04/16	mg/kg	7.19	7.19	100.0%

METHOD BLANK RESULTS-CONVENTIONALS
AYO5-Apex Labs

ANALYTICAL RESOURCES INCORPORATED

Matrix: Soil
Data Release Authorized: AO
Reported: 05/26/16

Project: NA
Event: A6C1124
Date Sampled: NA
Date Received: NA

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

AYO5:00024

General Chemistry Raw Data
Analyst Notes and Raw Data

ARI Job ID: AYO5

Analytical Resources, Incorporated
Analytical Chemists and Consultants

TOTAL / VOLATILE SOLIDS (TS/TVS) BENCHSHEET

(ZnOAc Preserved) (A)

Analyst: (W)	Date: 3-5-16	Oven ID: DH	Muffle ID: N/A	Balance ID: 1123230597
Time in Oven: 12:34	Time Out of Oven: 9:44		Elapsed Time (> 12 Hrs):	

Dry at 104 °C (12-24 hrs) then combust at 550 °C for 30 min. Record Weights to 4 places

TS (%) calculated as:
Final Dry Weight (g) = (Dry Weight – Tare Weight)
TS = (Final Dry Weight) / (Grams Sample – Tare Weight)

TVS (mg/kg dry weight) calculated as:
Final Ash Weight (g) = (Minimum Ash Weight – Tare Weight)
TVS (mg/kg) = [(Dry Weight – Ash Weight) / (Dry Weight) * 1,000,000
If Ash Weight > Dry Weight then "Check for Error"
If Dry Weight – Ash Weight < 0.001 < (1/Dry Weight) * 1,000,000

Cal Weight ID		CV-02	CV-02	CV-02	CV-02	CV-02		CV-02	CV-02	CV-02
Date & Time:		4-5-16 11:56	4-5-16 10:01	4-6-16 10:02						
Cal Weight (10.0000):		10.0000 (W)	10.0000 (W)	10.0000 (A)						
Sample ID	Dish #	Sample	Tare	Dry Weight 104°C			Dry Weight	Ash Weight 550°C		
				1	2	3	grams	1	2	3
BLANK	1	Ø	1.1247	1.1246						
A405 A1	2	6.6143	1.1569	4.9358						
MA1	3	6.5521	1.1506	4.9538						
B1	4	6.9683	1.1284	5.3012						
C1	5	6.4261	1.1497	4.9768						
D1	6	6.5631	1.0949	5.1167						
E1	7	6.5198	1.1118	5.0764						
F1	8	6.8561	1.0984	5.3961						
G1	9	6.5329	1.0896	4.9555						
H1	10	6.9427	1.1232	5.1559						
A406 A1	11	6.4126	1.0854	4.9029						
MA1	12	6.8207	1.1336	5.5211						
B1	13	6.8375	1.1451	4.9383						
C1	14	6.7209	1.0803	4.9308						
D1	15	7.4518	1.1438	5.8661						
E1	16	7.2274	1.1525	4.7065						
F1	17	6.4437	1.1541	4.3608						
G1	18	7.7895	1.1270	5.1793						
H1	19	7.7771	1.1496	5.4082						
I1	20	7.6391	1.0944	5.0906						
J1	21	6.7518	1.1079	5.2229						
K1	22	7.4532	1.1131	5.5417						
					3-5-16 (W)					

A405 : 00025

Conventionals Distillation and Digestion Log

Analytical Resources, Incorporated

Method: **Sulfide, PSEP, Solid**

Matrix: **Soil**

Analyst: RLM

Prep Date, Time: 4/4/16 11:34

Sample Preparation Log

Reagents, Equipment

HCl+Al: D604196

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		
LCS					E000991	1000
AY06	A1		5.014			
	A1dup		5.031			
	A1ms		5.098		E000991	1000
	B1		5.091			
	C1		5.019			
	D1		5.015			
	E1		5.055			
	F1		5.053			
	G1		5.016			
	H1		5.014			
	I1		5.013			
	J1		5.087			
	K1		5.019			
AY05	A1		5.025			
	B1		5.027			
	C1		5.003			
	D1		5.019			
	E1		5.091			
	F1		5.007			
	G1		5.016			
	H1		5.035			

RLM
4/4/16

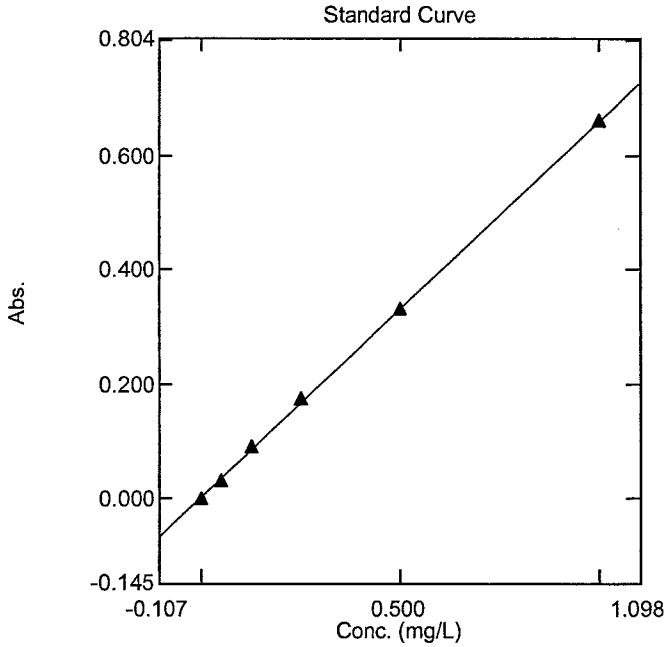
Revision: 0005 7/1/2015

Date Printed: 4/4/2016

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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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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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	

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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							

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[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: CAL / KM

Bi-iodate ID: ~~E002371~~ 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