

LABORATORY REPORT

July 15, 2010

Data Coordinator
Environmental Health & Engineering, Inc.
117 Fourth Avenue
Needham, MA 02494

RE: 17131

Dear Data Coordinator:

Enclosed are the results of the samples submitted to our laboratory on June 19, 2010. For your reference, these analyses have been assigned our service request number P10-126.

All analyses were performed according to our laboratory's NELAP approved quality assurance program. The test results meet requirements of the current NELAP standards, when applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein. Your report contains 22 pages.

Columbia Analytical Services, Inc. is certified by the California Department of Health Services, NELAP Laboratory Certificate No. 15CA; Arizona Department of Health Services, Certificate No. AZ0694; Florida Department of Health, NELAP Certificate No. E871020; New Jersey Department of Environmental Protection, NELAP Laboratory Certification ID #0000000000; New York State Department of Health, NELAP NY Lab ID No: 11221; Oregon Environmental Laboratory Accreditation Program, NELAP ID: CA20007; The American Industrial Hygiene Association, Laboratory #101661; United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP), Certificate No. L10-3; Pennsylvania Registration No. 68-03307; TX Commission of Environmental Quality, NELAP ID T104704413-09-TX; Minnesota Department of Health, Certificate No. 11495AA; Washington State Department of Ecology, ELAP Lab ID: C946. Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact me for information corresponding to a particular certification.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

Columbia Analytical Services, Inc.



Kate Aguilera
Project Manager

Client: Environmental Health & Engineering, Inc.
Project: 17131

CAS Project No: P1002126

CASE NARRATIVE

The samples were received intact under chain of custody on June 19, 2010 and were stored in accordance with the analytical method requirements. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Hydrogen Sulfide in Air (H₂S) Analysis

The samples were prepared in accordance with CAS AQL 110 for hydrogen sulfide in air and analyzed by colorimetric method using a spectrophotometer.

The results of analyses are given in the attached laboratory report. Analyses are intended to be considered in their entirety, and Columbia Analytical Services (CAS) is not responsible for utilization of less than the complete report.

VOID

SAMPLE CROSS-REFERENCE

<u>SAMPLE #</u>	<u>CLIENT SAMPLE ID</u>	<u>DATE</u>	<u>TIME</u>
P1002126-001	111377	6/18/10	00:00
P1002126-002	111378	6/18/10	00:00
P1002126-003	111379	6/18/10	00:00
P1002126-004	111380	6/18/10	00:00
P1002126-005	111381	6/18/10	00:00
P1002126-006	111382	6/18/10	00:00
P1002126-007	111393	6/18/10	00:00
P1002126-008	111394	6/18/10	00:00
P1002126-009	111395	6/18/10	00:00
P1002126-010	111396	6/18/10	00:00
P1002126-011	111397	6/18/10	00:00
P1002126-012	111398	6/18/10	00:00
P1002126-013	111296	6/18/10	00:00
P1002126-014	111297	6/18/10	00:00
P1002126-015	111298	6/18/10	00:00
P1002126-016	111299	6/18/10	00:00
P1002126-017	111300	6/18/10	00:00
P1002126-018	111301	6/18/10	00:00
P1002126-019	111311	6/18/10	00:00
P1002126-020	111312	6/18/10	00:00
P1002126-021	111313	6/18/10	00:00
P1002126-022	111314	6/18/10	00:00
P1002126-023	111315	6/18/10	00:00
P1002126-024	111316	6/18/10	00:00
P1002126-025	111326	6/18/10	00:00
P1002126-026	111327	6/18/10	00:00
P1002126-027	111328	6/18/10	00:00
P1002126-028	111329	6/18/10	00:00
P1002126-029	111330	6/18/10	00:00
P1002126-030	111331	6/18/10	00:00
P1002126-031	111341	6/18/10	00:00
P1002126-032	111342	6/18/10	00:00
P1002126-033	111343	6/18/10	00:00
P1002126-034	111344	6/18/10	00:00
P1002126-035	111345	6/18/10	00:00
P1002126-036	111346	6/18/10	00:00

VOID

FROM: Environmental Health and Engineering, Inc.
117 Fourth Avenue
Needham, MA 02494-2725

P1002126

TO: COLUMBIA

Please send invoices to ATTN: Accounts Payable
Please send reports to ATTN: Data Coordinator

In all correspondence regarding this matter, please refer to EH&E Project # 17131

The cost of this analysis will be covered by EH&E Purchase Order # 17131

For EH & E Data Coordinator - URGENT DATA

SAMPLE ID	SAMPLE TYPE	ANALYTICAL METHOD/NUMBER	OTHER (Time/Date/Vol.)
① 111377	AIR	^{H₂S} UNIDENTIFIED ANALYSIS CH₄	13 D 23H 30M
② 111378			
③ 111379			
④ 111380			
⑤ 111381			
⑥ 111382			
⑦ 111393			14 D 10M
⑧ 111394			
⑨ 111395			
⑩ 111396			
⑪ 111397			
⑫ 111398			
⑬ 111296			13 DAYS
⑭ 111297			
⑮ 111298			
⑯ 111299			

VOID

Special instructions:

- Standard turn around time
- Rush by _____ date/time
- Other _____
- Fax results 781-247-4305
- RETURN SAMPLES
- Electronic transfer - datacoordinator@ehinc.com
- Additional report recipient dbaker@ehinc.com

Each signatory please return one copy of this form to the above address

Relinquished by: [Signature] of Environmental Health & Engineering, Inc. Date: 6/18/10
 Received by: [Signature] of (company name) CIA Date: 6/18/10 1050
 Relinquished by: _____ of (company name) _____ Date: _____
 Received by: _____ of (company name) _____ Date: _____
 Relinquished by: _____ of (company name) _____ Date: _____
 Received by: _____ of (company name) _____ Date: _____
 Lab Data
 Received by: _____ of Environmental Health & Engineering, Inc. Date: _____

FROM: Environmental Health and Engineering, Inc.
117 Fourth Avenue
Needham, MA 02494-2725

P1002126

TO: COLUMBIA

Please send invoices to ATTN: Accounts Payable
Please send reports to ATTN: Data Coordinator

In all correspondence regarding this matter, please refer to EH&E Project # 17131

The cost of this analysis will be covered by EH&E Purchase Order # 17131

For EH & E Data Coordinator - URGENT DATA

SAMPLE ID	SAMPLE TYPE	ANALYTICAL METHOD/NUMBER	OTHER (Time/Date/Vol.)
17 111300	AIR	H ₂ S ANALYSIS	∅
18 111301			∅
19 111311			13D 23H 50M
20 111312			
21 111313			
22 111314			
23 111315			∅
24 111316			∅
25 111326			13D 23H 10M
26 111327			
27 111328			
28 111329			
29 111330			∅
30 111331			∅
31 111341			13D 23H 40M
32 111342			

VOID

Special instructions:

- Standard turn around time
- Rush by _____ date/time
- Other _____
- Fax results 781-247-4305
- RETURN SAMPLES
- Electronic transfer - datacoordinator@ehinc.com
- Additional report recipient bakere@ehinc.com

Each signatory please return one copy of this form to the above address

Relinquished by: [Signature] of Environmental Health & Engineering, Inc. Date: 6/18/10
 Received by: W. Tamara of (company name) CMS Date: 6/18/10 1050
 Relinquished by: _____ of (company name) _____ Date: _____
 Received by: _____ of (company name) _____ Date: _____
 Relinquished by: _____ of (company name) _____ Date: _____
 Received by: _____ of (company name) _____ Date: _____
 Lab Data
 Received by: _____ of Environmental Health & Engineering, Inc. Date: _____

FROM: Environmental Health and Engineering, Inc. 117 Fourth Avenue Needham, MA 02494-2725 P1002126

TO: COLUMBIA

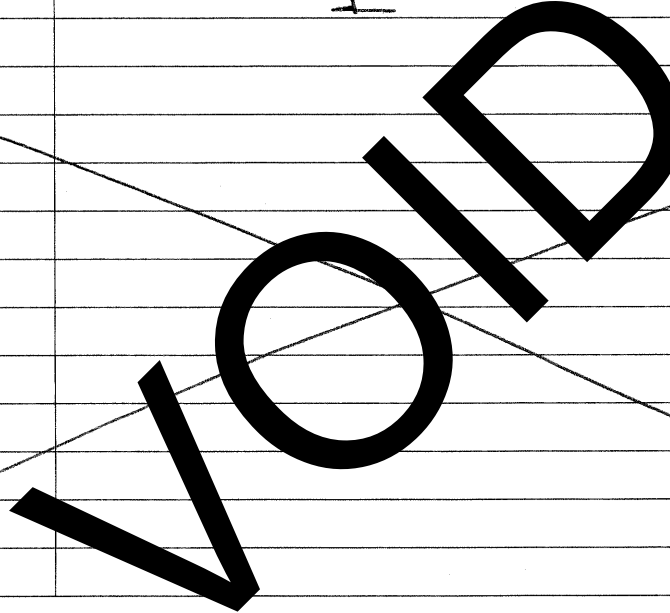
Please send invoices to ATTN: Accounts Payable Please send reports to ATTN: Data Coordinator

In all correspondence regarding this matter, please refer to EH&E Project # 17131

The cost of this analysis will be covered by EH&E Purchase Order # 17131

For EH & E Data Coordinator - URGENT DATA []

Table with columns: SAMPLE ID, SAMPLE TYPE, ANALYTICAL METHOD/NUMBER, OTHER:Time/Date/Vol. Rows 33-36 contain handwritten data for H2S analysis.



Special instructions:

- Standard turn around time [x] Rush by [] Other [] Fax results 781-247-4305 [] RETURN SAMPLES [] Electronic transfer - datacoordinator@eheinc.com [x] Additional report recipient bbaker@ehemc.com

Each signatory please return one copy of this form to the above address

Relinquished by: [Signature] of Environmental Health & Engineering, Inc. Date: 6/18/10 Received by: [Signature] of (company name) CUS Date: 6/18/10 1050

Columbia Analytical Services, Inc.
Sample Acceptance Check Form

Client: Environmental Health & Engineering, Inc.

Work order: P1002126

Project: 17131

Sample(s) received on: 06/19/10

Date opened: 06/19/10

by: MZAMORA

Note: This form is used for all samples received by CAS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

- | | <u>Yes</u> | <u>No</u> | <u>N/A</u> |
|--|-------------------------------------|-------------------------------------|-------------------------------------|
| 1 Were sample containers properly marked with client sample ID? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 Container(s) supplied by CAS ? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 Did sample containers arrive in good condition? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 Was a chain-of-custody provided? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Was the chain-of-custody properly completed? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 6 Did sample container labels and/or tags agree with custody papers? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Was sample volume received adequate for analysis? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 Are samples within specified holding times? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 Was proper temperature (thermal preservation) of cooler at receipt adhered to? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Cooler Temperature <u>2</u> °C Blank Temperature _____ °C | | | |
| 10 Was a trip blank received? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Trip blank supplied by CAS: _____ | | | |
| 11 Were custody seals on outside of cooler/Box? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Location of seal(s) _____ Sealing Lid? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were signature and date included? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were seals intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were custody seals on outside of sample container? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Location of seal(s) _____ Sealing Lid? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were signature and date included? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were seals intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 12 Do containers have appropriate preservation according to method/SOP or Client specified information? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Is there a client indication that the submitted samples are pH preserved? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Were VOA vials checked for presence/absence of air bubbles? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Does the client/method/SOP require that the analyst check the sample pH and <u>if necessary</u> alter it? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 13 Tubes: Are the tubes capped and intact? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Do they contain moisture? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 14 Badges: Are the badges properly capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Are dual bed badges separated and individually capped and intact? | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1002126-001.01	Passive (Radiello H2S)					
P1002126-002.01	Passive (Radiello H2S)					
P1002126-003.01	Passive (Radiello H2S)					
P1002126-004.01	Passive (Radiello H2S)					
P1002126-005.01	Passive (Radiello H2S)					

Explain any discrepancies: (include lab sample ID numbers): _____

Chain of Custody is missing time collected _____

*Required pH: Phenols/COD/NH3/TOC/TOX/NO3+NO2/TKN/T.PHOS, H2SO4 (pH<2); Metals, HNO3 (pH<2); CN (NaOH or NaOH/Asc Acid) (pH>12); Diss. Sulfide, NaOH (pH>12); T. Sulfide, NaOH/ZnAc (pH>12) RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

COLUMBIA ANALYTICAL SERVICES, INC.

RESULTS OF ANALYSIS

Page 1 of 1

Client: Environmental Health & Engineering, Inc.
 Client Project ID: 17131

CAS Project ID: P1002126

Hydrogen Sulfide

Test Code: CAS AQL 110
 Instrument ID: P-UV-Vis-01
 Analyst: Sue Anderson
 Sampling Media: Radiello Tube(s)
 Test Notes: DE


Date(s) Collected: 6/18/10
 Date Received: 6/19/10
 Date Extracted: 6/21/10
 Date Analyzed: 6/21/10
 Desorption Volume: 0.010 Liter(s)

Client Sample ID	CAS Sample ID	Sampling Time Minutes	Dilution Factor	Result ng/Sample	Result µg/m³	MRL µg/m³	Result ppbV	MRL ppbV	Data Qualifier
111377	P1002126-001	20130	1.0	1,500	1.1	0.28	0.78	0.20	
111378	P1002126-002	20130	1.0	980	0.7	0.28	0.50	0.20	
111379	P1002126-003	20130	1.0	1,100	0.8	0.28	0.59	0.20	
111380	P1002126-004	20130	1.0	920	0.7	0.28	0.48	0.20	
111381	P1002126-005	NA	1.0	< 380	NA	NA	NA	NA	
111382	P1002126-006	NA	1.0	< 380	NA	NA	NA	NA	
111393	P1002126-007	20170	1.0	< 380	ND	0.27	ND	0.20	
111394	P1002126-008	20170	1.0	< 380	ND	0.27	ND	0.20	
111395	P1002126-009	20170	1.0	< 380	ND	0.27	ND	0.20	
111396	P1002126-010	20170	1.0	1,000	0.79	0.27	0.57	0.20	
111397	P1002126-011	NA	1.0	< 380	NA	NA	NA	NA	
111398	P1002126-012	NA	1.0	< 380	NA	NA	NA	NA	
111296	P1002126-013	18720	1.0	1,900	1.4	0.30	0.65	0.21	
111297	P1002126-014	18720	1.0	1,300	0.89	0.30	0.64	0.21	
111298	P1002126-015	18720	1.0	1,400	1.1	0.30	0.75	0.21	
111299	P1002126-016	18720	1.0	650	0.50	0.30	0.36	0.21	
111300	P1002126-017	NA	1.0	< 380	NA	NA	NA	NA	
111301	P1002126-018	NA	1.0	< 380	NA	NA	NA	NA	
111311	P1002126-019	20150	1.0	1,400	0.99	0.27	0.71	0.20	
111312	P1002126-020	20150	1.0	1,900	1.2	0.27	0.88	0.20	
111313	P1002126-021	20150	1.0	1,800	1.3	0.27	0.93	0.20	
111314	P1002126-022	20150	1.0	3,200	2.3	0.27	1.7	0.20	
111315	P1002126-023	NA	1.0	< 380	NA	NA	NA	NA	
111316	P1002126-024	NA	1.0	< 380	NA	NA	NA	NA	
111326	P1002126-025	20110	1.0	1,900	1.3	0.28	0.96	0.20	
111327	P1002126-026	20110	1.0	1,700	1.3	0.28	0.90	0.20	
111328	P1002126-027	20110	1.0	3,000	2.2	0.28	1.5	0.20	
111329	P1002126-028	20110	1.0	18,000	13	0.28	9.2	0.20	
111330	P1002126-029	NA	1.0	< 380	NA	NA	NA	NA	
111331	P1002126-030	NA	1.0	< 380	NA	NA	NA	NA	
111341	P1002126-031	20140	1.0	720	0.52	0.28	0.37	0.20	
111342	P1002126-032	20140	1.0	650	0.47	0.28	0.33	0.20	
111343	P1002126-033	20140	1.0	750	0.54	0.28	0.39	0.20	
111344	P1002126-034	20140	1.0	4,000	2.9	0.28	2.1	0.20	
111345	P1002126-035	NA	1.0	< 380	NA	NA	NA	NA	
111346	P1002126-036	NA	1.0	< 380	NA	NA	NA	NA	
Method Blank	P100621-MB	NA	1.0	< 380	NA	NA	NA	NA	
Method Blank	P100621-MB	NA	1.0	< 380	NA	NA	NA	NA	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.

NA = Not applicable.

DE = Results reported are corrected for desorption efficiency.

Verified By: 

Date: 6/30/10

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COLUMBIA ANALYTICAL SERVICES, INC.

RESULTS OF ANALYSIS

PAGE 1 OF 1

Client: Environmental Health & Engineering, Inc.
Client Sample ID: Duplicate Lab Control Sample
Client Project ID: 17131

CAS Project ID: P1002126
 CAS Sample ID: P100621-LCS,
 P100621-DLCS

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary

Test Code: CAS AQL 110
Instrument ID: P-UV-Vis-01
Analyst: Sue Anderson
Sampling Media: Radiello Tube(s)
Test Notes:

Date Sampled: NA
 Date Received: NA
 Date Analyzed: 6/21/10
 Volume(s) Analyzed: NA

Compound	Spike Amount LCS / DLCS mg/L	Result		% Recovery		Acceptance Limits	Relative Percent Difference	RPD Limit	Data Qualifier
		LCS mg/L	DLCS mg/L	LCS	DLCS				
Hydrogen Sulfide	0.834	0.784	0.774	94	93	80-110	1	20	

VOID

Service Request#: 2126 2040

Prep Run #: 113963

Run #: 205884

BATCH #1 page 103

Ref #	Concentration ug/L of H ₂ S	Exp. Date
519-041910096	417000	10/19/10
524-041910066	475000	10/19/10
524-06-11001	--	6/21/11

Reagents	Reference or Lot #	Exp. Date	Coloring Solution
Ferric Chloride	519-09300903	9/28/10	10 mL Ferric Cl + 50 mL Amino Sulfuric prepared prior to coloring step
Amino Sulfuric radiello Tube	524-04191001 OK samples exact supplied	10/19/10	
	1010787	9/28/10	

Standardization	Ref#	Concentration	Exp. Date
A. Iodine Solution	519-08060904	0.0287	11/30/10
B. Na ₂ S ₂ O ₃ Solution	519-08120902A	0.0287	10/31/10

DE = 0.915 I₂ 25 mLs
 mg H₂S = [(A_{Vol} x Aconc) - (B_{Vol} x B_{conc})] x 16000 x 1.069 Na₂S₂O₃ titration:
 18.45 mLs (stock)
 17.10 mLs (ICV/CCV)

Calibration Curve:

Sample ID	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Result ug/L (ppb)	Result ng/sample	Result H ₂ S ppbV**	Result ug/m ³ ***	Corr. Coeff
ICB	--	--	--	0.000	-2.80 / 235				
ICV 950 ^{ug} /L	--	--	--	0.000	834	1668			0.9999822017
MB1	0.010	--	0.005	0.005	0.530	1.059			DE & TEMP CORRECTED
MB2	--	--	0.005	0.005	5.14 / 235	2383			
UCS 834 ^{ug} /L	--	--	0.005	0.500	783	8567			
DUS J	--	--	0.005	0.494	770	8463			
2126-1.01	--	--	0.005	0.094	17465	1515.28	0.78	1.09	
-2.01	--	--	0.005	0.063	8938	976.82	0.51	0.70	
-3.01	--	--	0.005	0.072	103.68	1133.14	0.59	0.82	
-4.01	--	--	0.005	0.058	84.61	924.71	0.48	0.67	
-5.01	--	--	0.005	0.005	-2.80 / 235	2383			

*Concentration after blank subtraction (AS APPLICABLE)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

Prepped By: [Signature]
 Analyzed By: [Signature]
 Reviewed By: [Signature]

Date: 6/21/10 @ 1250
 Date: 6/21/10 @ 1350
 Date: 6/23/10

TEMP CONVERSION = (K / 298) * 298

95%
 94% } 1%
 90% } 10%

Service Request#: 2126 2040 Prep Run #: 113963 Run #: 205884
 BATCH #1 page 2 of 3

Ref #	Concentration ug/L of H ₂ S	Exp. Date
Sulfide Stock	324-0419005B 417000	10/19/10
Sulfide ICV/CCV	524-0419006B 475000	10/19/10
2N NaOH Solution	524-062100V --	6/21/11

Reagents	Reference or Lot #	Exp. Date	Coloring Solution
Ferric Chloride	519-04800903	9/28/10	10 mL Ferric Cl + 50 mL Amino Sulfuric prepared prior to coloring step
Amino Sulfuric	524-0419001	10/19/10	
radiello Tube	09157	11/20/10	

Standardization	Ref#	Concentration	Exp. Date
A. Iodine Solution	519-08060904	0.028 N	11/30/10
B. Na ₂ S ₂ O ₃ Solution	519-08120902A	0.012 N	10/31/10

DE = 0.915
 mg H₂S = [(A_{val} x Aconc) - (B_{val} x B_{conc})] x 16000 x 1.069
 L 10 mls of Sulfide Solution

Calibration Curve:

Sample ID	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Result ug/L (ppb)	Result ng/sample	Result H ₂ S ppbV**	Result ug/m ³ ***
10 mL aliquot of each Prep run		NA						
ug/L (ppb)		0						
Abs. @ 665 nm		0.000						
2126-6.01	0.010	-	0.005	0.023	121 / 135	1383	4.020	10.28
CCV1 950 9/L	-	-	-	0.004	-2.1 / 135	1383	4.020	10.28
CCV1	-	-	-	0.000	24.2 / 135	1383	4.020	10.28
2126-7.01	0.010	-	0.005	0.022	24.2 / 135	1383	4.020	10.28
-8.01	-	-	-	0.018	21.1 / 135	1383	4.020	10.28
-9.01	-	-	-	0.070	1098.41	1098.41	0.57	0.79
-10.01	-	-	-	0.005	2.80 / 135	1383		
-11.01	-	-	-	0.005	2.80 / 135	1383		
-12.01	-	-	-	0.074	106.86	1167.88	0.65	0.91
-13.01	-	-	-	0.073	105.27	1150.51	0.64	0.89
-14.01	-	-	-					

*Concentration after blank subtraction (AS APPLICABLE)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

Prepped By: [Signature] Date: 6/21/10 @ 1250
 Analyzed By: [Signature] Date: 6/21/10 @ 1350
 Reviewed By: [Signature] Date: 6/23/10

Service Request#: 2126 2010

Prep Run #: 113963

Run #: 205884

BATCH # / Page 303

Ref #	Concentration ug/L of H ₂ S	Exp. Date
Sulfide Stock 524-0419/005B	47500	10/19/10
Sulfide ICVCCV 524-0419/006B	47500	10/19/10
2N NaOH Solution 524-0621/001	--	6/21/11

Reagents	Reference or Lot #	Exp. Date	Coloring Solution
Ferric Chloride	519-043009/03	9/28/10	10 mL Ferric Cl + 50 mL Amino Sulfuric
Amino Sulfuric	524-0419/001	10/19/10	prepped prior to coloring step
radiello Tube	04187	9/20/10	

Standardization	Ref#	Concentration	Exp. Date
A. Iodine Solution	519-08060904	0.050 N	11/30/10
B. Na ₂ S ₂ O ₃ Solution	519-08120902A	0.050 N	10/31/10

DE = 0.915

mg H₂S = [(A_{Vol} x Aconc) - (B_{Vol} x B_{conc})] x 16000 x 1.069
 L 10 mls of Sulfide Solution

Calibration Curve:

Sample ID	Extract Volume (L)	Blank Subtraction Abs.	Absorbance @ 665 nm	Result ug/L (ppb)	Result ng/sample	Result H ₂ S ppbV**	Result ug/m ³ ***
2126-15.01	0.010	0.005	0.008	834	1668	0.76	1.05
2126-16.01	0.010	0.005	0.013	0.530	1055	0.36	0.50
2126-9509/6	0.010	0.005	0.044	124.34	1358.95	0.57	0.79
2126-9509/6	0.010	0.005	0.572	59.18	646.79		
2126-9509/6	0.010	0.005	0.000	473.09			
2126-9509/6	0.010	0.005	0.034				
2126-9509/6	0.010	0.005	0.568				
2126-9509/6	0.010	0.005	0.000				

*Concentration after blank subtraction (CAS APPLICABLE)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

Prepped By: [Signature]
 Analyzed By: [Signature]
 Reviewed By: [Signature]

Date: 6/21/10 @ 1350
 Date: 6/21/10 @ 1350
 Date: 6/23/10

Service Request#: 2126

Prep Run #: 113964

Run #: 265885

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BATCH #2

Ref #	Concentration ug/L of H ₂ S	Exp. Date
519-08060902	41700	10/19/10
519-08120902A	47500	10/19/10
519-06211001	--	6/21/11

Standardization	Ref#	Concentration	Exp. Date
A. Iodine Solution	519-08060902	0.028 N	11/30/10
B. Na ₂ S ₂ O ₃ Solution	519-08120902A	0.010 N	10/13/10

Calibration Curve:

Sample ID	Extract Volume (L)	Dilution	Blank Subtraction Abs.	Absorbance @ 665 nm	Result ug/L (ppb)	Result ng/sample	Result H ₂ S ppbV**	Result ug/m ³ ***
ICB2	--	NA	--	0.002	0.135	1668	0.99982217	
ICV2	--	0	--	0.570	834	2085		
ICV2	--	0.000	--	0.002	0.530	1055		
MB2-2	--	--	--	0.002	0.38	1383		
LC2	--	--	--	0.498	0.38	1383		
DL2	--	--	0.002	0.498	785	8585		
2126-17.01	0.010	--	--	0.572	8076	8828		
-18.01	--	--	--	0.004	8076	4383		
-19.01	--	--	--	0.002	280	4383		
-20.01	--	--	--	0.083	125.93	1376.32	0.71	0.99
-21.01	--	--	--	0.102	156.13	1706.35	0.88	1.23
	--	--	--	0.107	164.08	1793.20	0.93	1.29

10 mL aliquot of each Prep run
 ug/L (ppb)
 Abs. @ 665 nm

mg H₂S = [(A_{val} x A_{conc}) - (B_{val} x B_{conc})] x 16000 x 1.069
 L 10 mls of Sulfide Solution

10 mL Ferric Cl + 50 mL Amino Sulfuric prepared prior to coloring step
 1/2 25 mLs
 Na₂S₂O₃ titration: 184.5 mls (stock) / 1712 mls (ICV/CCV)

DE = 0.915
 DE = (A_{val} x A_{conc}) - (B_{val} x B_{conc})

Corr. Coeff 0.99982217

TEMP (CONV) = (K/273) 3.8

ACTOR = (K/273) 3.8

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

Prepped By: [Signature] Date: 6/21/10 @ 1300
 Analyzed By: [Signature] Date: 6/21/10 @ 1420
 Reviewed By: [Signature] Date: 6/23/10

Service Request#: 2126

Prep Run #: 113964

Run #: 205885

BATCH #2

page 2 of 3

Ref #	Concentration ug/L of H ₂ S	Exp. Date
519-019005A	47000	10/19/10
519-0419006B	475000	10/19/10
519-06211001	--	6/21/11

Reagents	Reference or Lot #	Exp. Date	Coloring Solution
Ferric Chloride	519-0930903	9/28/10	10 mL Ferric Cl + 50 mL Amino Sulfuric prepped prior to coloring step
Amino Sulfuric	519-0419006 <i>check supplied</i>	10/19/10	
radiello Tube	107 09187 <i>SPARTANES</i>	9/20/10	

Standardization	Ref#	Concentration	Exp. Date
A. Iodine Solution	519-0800904	0.082 N	11/30/10
B. Na ₂ S ₂ O ₃ Solution	519-08120902A	0.250 N	10/31/10

$mg\ H_2S = [(A_{val} \times A_{conc}) - (B_{val} \times B_{conc})] \times 16000 \times 1.069$
 L 10 mis of Sulfide Solution
 $i = 25$ mLs
 $DE = 0.915$

Calibration Curve:

Sample ID	Extract Volume (L)	Dilution	Blank Subst. Abs.	Absorbance @ 665 nm	Corrected Abs.*	Result ug/L (ppb)	Result ng/sample	Result H ₂ S ppbV**	Result ug/m ³ ***
2126-23.01	0.010	-	0.002	0.18	0.186	292.22	3200.17	1.65	2.31
24.01	-	-	0	0.172	0.177	90.6			
25.01	-	-	0	0.077	0.080	135			
26.01	0.010	-	0.002	0.066	0.069	135	1383	0.96	1.34
27.01	-	-	0	0.005	0.003	135	1383	0.90	1.26
28.01	-	-	0	0.117	0.109	6.44	1862.68	1.55	2.16
29.01	-	-	0	0.104	0.102	159.31	1741.09	9.19	12.8
30.01	-	-	0	0.176	0.174	273.74	2991.73		
				1.025	1.023	1623.10	1733.81		
				0.005	0.003	196	1383		
				0.006	0.004	3.55	1383		

10 mL aliquot of each Prep run
 ug/L (ppb)
 Abs. @ 665 nm
 Corrected Abs.*
 Blank Subst. Abs.
 Dilution
 Extract Volume (L)
 Sample ID
 Result H₂S ppbV**
 Result ug/m³***
 Corr. Coeff

20150
25
20110

0.99952217
DE = 0.915
95%

*Concentration after blank subtraction (AS APPLICABLE)
 Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

Prepped By: *[Signature]*
 Analyzed By: *[Signature]*
 Reviewed By: *[Signature]*

Date: 6/21/10 @ 1300
 Date: 6/21/10 @ 1420
 Date: 6/23/10

Service Request#: 2126

Prep Run #: 113964

Run #: 205885

BATCH #2 page 3 of 3

Concentration	Ref #	Exp. Date
ug/L of H ₂ S		
Sulfide Stock	524-049005B	417000
Sulfide ICVCCV	524-0491005B	475000
2N NaOH Solution	524-0621001	--

Reagents	Reference or Lot #	Exp. Date	Coloring Solution
Ferric Chloride	519-09300903	9/28/10	10 mL Ferric Cl + 50 mL Amino Sulfuric
Amino Sulfuric	524-0491001	10/19/10	prepared prior to coloring step
radiello Tube	LOT # 09187	9/20/10	

Standardization	Reff#	Concentration	Exp. Date
A. Iodine Solution	519-08060904	0.028	11/30/10
B. Na ₂ S ₂ O ₃ Solution	519-08120902A	0.02	10/31/10

$DE = 0.915$

$mg\ H_2S = [(A_{vol} \times A_{conc}) - (B_{vol} \times B_{conc})] \times 16000 \times 1.069$

$L = 10$ mls of Sulfide Solution

$V_2 = 25$ mls

$Na_2S_2O_3$ titration: 18.45 mls (stock) 1.710 mls (ICV/CCV)

Calibration Curve:

Sample ID	Extract Volume (L)	Dilution	Blank Subtract Abs.	Absorbance @ 665 nm	Result ug/L (ppb)	Result ng/sample	Result H ₂ S ppbV**	Result ug/m ³ ***
2126-31.01	0.010	—	0.002	0.112	55.54	716.27	0.37	0.52
2126-32.01	0.010	—	0.002	0.139	64.18	646.79	0.33	0.47
2126-33.01	—	—	—	0.580	—	—	—	—
2126-34.01	0.010	—	0.002	0.001	0.20/100	0.40/100	0.9999	822/17
2126-35.01	—	—	—	0.047	834	1668	2085	
2126-36.01	—	—	—	0.236	0.530	1055	1309	
2126-37.01	—	—	—	0.005	—	—	—	
2126-38.01	—	—	—	0.006	—	—	—	
2126-39.01	—	—	—	0.568	—	—	—	
2126-40.01	—	—	—	0.000	—	—	—	

*Concentration after blank subtraction (AS APPLICABLE)

Comments: **H₂S in ppbV = ng H₂S / (0.096 ng/ppb · min) x time in minutes; ***ug/m³ = ppbV H₂S x (34.09 MW of H₂S / 24.46 gas constant)

Prepped By: [Signature]

Analyzed By: [Signature]

Reviewed By: [Signature]

Date: 6/21/10

Date: 6/21/10

Date: 6/23/10

8/16/09 519-08060904 0.0282N IODINE SOLN
Purchased BDH LOT 9141
EXP: 11/30/10

141

6/09 519-08060903 A → E ISE FILLING SOLN
PURCHASED
THERMO SCIENTIFIC LOT Code: NNW1
EXP: 8/6/10

* DID NOT LOG ON 8/6/09 Added 8/11/09

6/10/09 519-08110901 IC02 ELVENT
100ml 519-04060901 (10x conc elvent; EXP: 4/6/10) ↑ IL
W/DI. DEGASSED.
EXP: 8/25/09

8/11/09 519-08110902 1412 $\mu\text{mol/L}$ / cm^3 ICV/CCV Soln 2009
0.7456g KCl (EMD LOT # 194.29; EXP: 12/7/2014)
↑ IL W/DI H₂O
EXP: 8/11/10

1/12/09 519-08120901 A → B 5000 PM 503 Std's
PURCHASED HACH (16, 10ml ampules)
LOT A9218
EXP: 8/30/10

1/12/09 519-08120902 A & B 0.0250N $\text{Na}_2\text{S}_2\text{O}_3$ Soln
PURCHASED
EMD LOT # 9098
EXP: 10/31/10

1/12/09 519-08120903 REFERENCE ELECTRODE FILLING SOLN
PURCHASED THERMO ORION 900061 (Received 8/7/09)
LOT CODE: MP1 P/N: 223228-A01 (ELECTRODE)
EXP: 8/7/10

1/13/09 519-08130901 MBTH Soln for O₃-AIR
1.00g MBTH (ALDRICH LOT 54696EK; EXP: 8/7/14) ↑ 200ml W/DI.
PLUS 4ml conc H₂SO₄ (EMD: 470570, EXP: 9/13/10)
EXP: 8/14/09

18

9/30/09 519-09300902 1000 PPM SO₃
 SV 0.1607g Na₂SO₃ (Mallinckrodt; H25469 exp: 8/11/14)
 EXP: 9/30/10 100ml w/ DI

9/30/09 519-09300903 Ferric Chloride Sol'n (FOR H₂S ANALYSIS)
 SV 100.00g FeCl₃·6H₂O + 40ml DI H₂O
 EXP: 9/30/10 (Mallinckrodt: 5029 A11595 EXP: 9/28/11)

9/30/09 519-09300904 Sulfuric Dilution Sol'n (FOR H₂S ANALYSIS)
 SV 40ml Conc H₂SO₄ (EMD 47050; EXP: 9/13/12)
 EXP: 9/30/10

10/1/09 519-10010901 Amine Solution (FOR H₂S ANALYSIS)
 SV ADD 125ml Conc H₂SO₄ (EMD 47050; EXP: 9/13/12) TO 500ml DI.
 LET COOL. THEN ADD 3.75g (N,N-Dimethyl-1-p-Phenylethylamine)
 (SIGMA ALDRICH CHEMICAL ANALYTICAL 1051363386 EXP: 8/7/11)
 TO COOLED SULFURIC MIXTURE AND DISSOLVE ONCE DISSOLVED BRING UP TO 500ml w/ 1:1 H₂SO₄
 Store in amber glass in dark.
 EXP: 10/29/09

10/2/09 519-10020901 1000 PPM SO₃ Solution
 SV 0.1591g (Na₂SO₃) (JT Baker 410627; EXP: 8/31/14) 100ml
 w/ DI H₂O
 EXP: 4/02/10
 8/10/2/09

10/2/09 519-10020902 1000 PPM SO₃ Solution
 SV 0.1607g Na₂SO₃ (Mallinckrodt; H25469 EXP 8/11/14)
 ↑ 100ml w/ DI H₂O
 EXP: 4/02/10

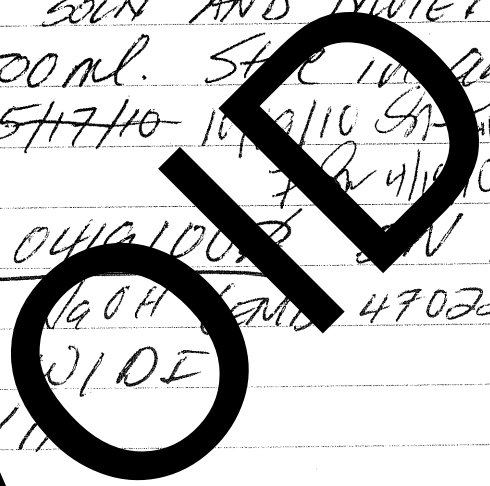
4/16/10 524-04161001 0.1 N H₂SO₄
 JW 5.6 ml CONC H₂SO₄ (EMD 47050, EXP: 9/13/10)
 ↑ 2L W/DI H₂O
 EXP: 9/13/10

4/19/10 524-04191001 Amine Soln
 JW Add 12.5 ml CONC H₂SO₄ (EMD 97050; EXP: 9/13/10) TO
 5 ml DI H₂O. LET COOL
 DISSOLVE 3.375g 4-AMINO-N,N-DIMETHYLANILINE (FLUKA
 ANALYTICAL; LOT 1363386; EXP: 8/7/14) IN COOLED
 SULFURIC SOLN AND NOTE W/ 1:1 (H₂SO₄:DI) ^{COOL}
 UP TO 500 ml. STORE IN AMBER GLASS
 EXP: 5/17/10 10/19/10 5/19/10 4/19/10

4/19/10 524-04191002 0.1 N NaOH
 JW 4.00g NaOH (EMD 47022713; EXP: 10/11/12)
 ↑ 2L DI H₂O
 4/19/10

4/19/10 524-04191002 Saturated Na₂S for stock (H₂S)
 JW WASHED SODIUM SULFIDE CRYSTALS (EMD 4820930
 EXP: 8/11/14) IN VOA VIAL W/ ~20ml DI H₂O
 EXP: 10/19/10

4/19/10 524-04191003 Saturated Na₂S FOR STOCK (H₂S)
 JW WASHED SODIUM SULFIDE CRYSTALS (JTBAKER 09598; EXP: 8/6/14)
 IN VOA VIAL W/ ~20ml DI H₂O
 EXP: 10/19/10



changed to 0.1
 due to mistake easier
 to fix this
 one than all

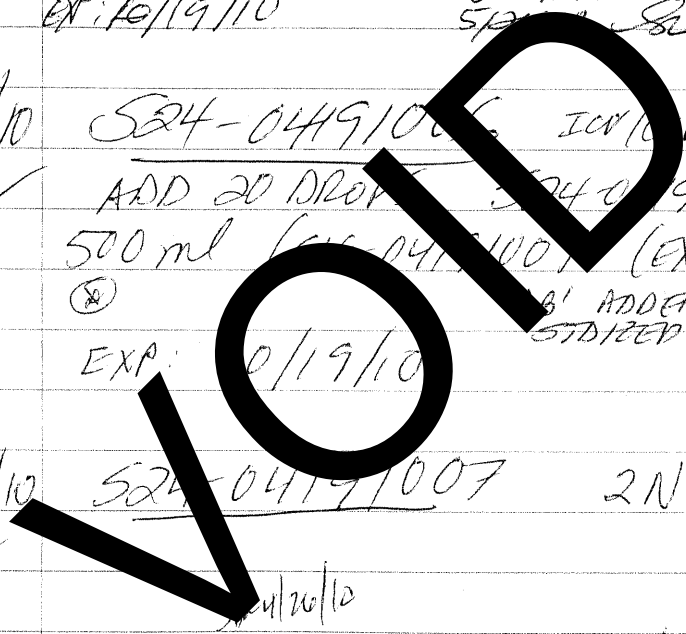
4/19/10 S24-04191004 0.1N H₂SO₄
 JW 5.6ml Conc H₂SO₄ (END 47050 EXP: 9/13/10)
 92L W/DI
 EXP: 9/13/10

4/19/10 S24-04191005 stock Sulfide Soln (H₂S radiell)
 JW ADD 20 DROPS S24-04191003 (EXP: 10/19/10) to
 500ml S19-04191002 (EXP: 4/19/11)
 Note: Standardize prior to each USE to determine
 true concentration
 EXP: 10/19/10 'B' ADDED 20 more drops & stirred
 5/24/10 JW

4/19/10 S24-04191006 IONIC Sulfide Soln (H₂S radiell)
 JW ADD 20 DROPS S24-04191002 (EXP: 10/19/10) to
 500 ml (S19-04191001) (EXP: 4/19/11)
 Note: 'B' ADDED 20 more drops then
 STIRRED 5/24/10 JW
 EXP: 10/19/10

4/19/10 S24-04191007 2N NaOH (see previous page)
 JW

4/26/10 S24-04261001 IONIC Cr 6+ TV=0.579ppm
 0.5ml (S19-04090904) (TV=115.8ppm; EXP: 12/2010) ↑
 100 ml W/DI H₂O
 EXP: 5/10/10



6/18/10

JW

524-06181002 0.1N H₂SO₄5.6ml conc H₂SO₄ (EMD 47050; EXP: 9/11)↑ 2L W/DI H₂O

EXP: 9/13/10

6/21/10

JW

524-06211001

2N NaOH

4.01g NaOH (EMD 47022713B; EXP: 10/11)

↑ 2L W/DI H₂O

EXP: 6/21/11

VOID