

9/12/17

Mr. Mitch Little
Hellman & Associates
11913 W Interstate 70 Frontage Rd N
Wheat Ridge, CO 80033

H2S Analysis by GC-FPD

Dear Mr. Little,

APT Laboratory Services was delivered six gas phase samples in foil lined Tedlar bags on September 8, 2017. An H2S analysis was performed by APT on September 11, 2017, utilizing a modified ASTM Method D5504. A three-point calibration was performed on a HP 5890 gas chromatograph equipped with a flame photometric detector. Samples were analyzed in triplicate for hydrogen sulfide and a post calibration check was performed to show the stability of the instrument. All calibrations and sample results are enclosed. A summary of the results is shown below.

Hellman & Associates – H2S by GC-FPD, September 11, 2017	
Sample	H2S Conc. (ppm)
Horsetail 07E-WH-0611-170908	28.2
Horsetail 07E-WH-0634-170908	76.1
Horsetail 07W-NorthESeparator-170908	40.4
Horsetail 07W-SouthESeparator-170908	41.6
Horsetail 07W-SouthETreater-170908	63.0
Horsetail 07W-NorthFSeparator-170908	26.2

Modified ASTM D5504 Results

We look forward to being of service to Hellman & Associates in the future. Please call me with any questions or comments at (303) 420-5949 or (800) 268-6213.

Regards,



Daniel Williams
Asst Director of Laboratory Services

APT Project: LWTO7117

DENVER OFFICE
5530 Marshall Street
Arvada, CO 80002
(303) 420-5949
FAX (303) 420-5920
(800) 268-6213



Hellman & Associates

Wheat Ridge, CO

9/11/2017

Modified ASTM D5504: Determination of Gaseous Reduced Sulfur Compounds using Gas Chromatography

Initial Three-Point Calibration										
Low Level Calibration Standard										
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average		OK?
		RT	AC	RT	AC	RT	AC	RT	AC	
Hydrogen Sulfide	20.25	2.014	108115.1	2.013	112767.9	2.012	114154.9	2.013	111679	Y
Mid Level Calibration Standard										
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average		OK?
		RT	AC	RT	AC	RT	AC	RT	AC	
Hydrogen Sulfide	40.50	2.012	328349.2	2.012	338058.4	2.012	353522.3	2.012	339977	Y
High Level Calibration Standard										
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average		OK?
		RT	AC	RT	AC	RT	AC	RT	AC	
Hydrogen Sulfide	81.00	2.012	1424823.7	2.012	1394280	2.012	1438843.6	2.012	1419316	Y

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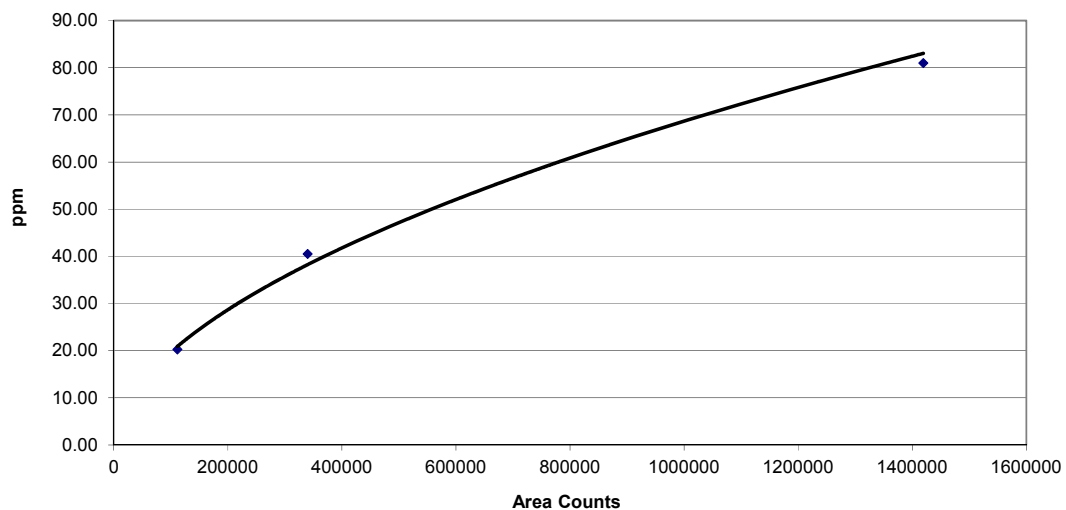
Modified ASTM D5504: Determination of Gaseous Reduced Sulfur Compounds using Gas Chromatography

Power Regression Calculations

$$\text{conc} = A \cdot \text{area}^B$$

Hydrogen Sulfide					
Certified ppm	Average AC	Power Regression Statistics			ppm from curve
		R ²	A	B	
20.25	111679	0.9964	0.03818	0.542501	20.91
40.50	339977				38.25
81.00	1419316				83.05

Hydrogen Sulfide





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Modified ASTM D5504: Determination of Gaseous Reduced Sulfur Compounds using Gas Chromatography

Sample Analysis									
Horsetail 07E-WH-0611-170908									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	2.011	190912.7	2.012	197814.8	2.011	192280.6	2.011	193669	Y 28.19
Horsetail 07E-WH-0634-170908									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	2.011	1192008.6	2.011	1226338	2.011	1203401	2.011	1207249	Y 76.07
Horsetail 07W-NorthESeparator-170908									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	2.011	373873.1	2.011	381089	2.01	370302.1	2.011	375088	Y 40.35
Horsetail 07W-SouthESeparator-170908									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	2.011	390672.8	2.011	409241.1	2.011	392597.2	2.011	397504	Y 41.64
Horsetail 07W-SouthETreater-170908									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	2.011	879117.3	2.01	852951.9	2.011	822498.6	2.011	851523	Y 62.95
Horsetail 07W-NorthFSeparator-170908									
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average		
	RT	AC	RT	AC	RT	AC	RT	AC	OK? ppm
Hydrogen Sulfide	2.011	169513.7	2.01	167598.7	2.01	171100.4	2.010	169404	Y 26.21



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Wheat Ridge, CO

9/11/2017

Modified ASTM D5504: Determination of Gaseous Reduced Sulfur Compounds using Gas Chromatography

Quality Assurance													
Recovery / Spike (mid-level calibration gas to the sample probe)													
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average			Triplicate OK?	Recovery OK?	Audit OK?
		RT	AC	RT	AC	RT	AC	RT	AC	ppm			
Hydrogen Sulfide	40.50	2.011	360649.2	2.011	376633.4	2.012	374382.8	2.011	370555	40.08	Y	Y	Y

CHAIN OF CUSTODY RECORD - Shipping Receipt

Temperature on Receipt _____

AIR POLLUTION TESTING
5550 MARSHALL ST.
ARVADA, CO 80002
TEL: (303) 426-5949
F: (303) 426-5949

Record all of the unit temperatures, unit pressures, collection dates and ambient conditions.

PROJECT CODE

Project Manager

Mitchell Hill

CHAIN OF CUSTODY #

CLIENT NAME

TELEPHONE # / FAX #

Page 1 of 1

ADDRESS

DATE

CONTRACT/PURCHASE/QUOTE #

CITY

STATE

ZIP CODE

SITE CONTACT

LAB CONTACT

LAB NUMBER

CARRIER / WAYBILL #

SITE NAME

WELL ID & SAMPLE

Cylinder #

Unit Temperature (°F)

Unit Pressure (psf)

Ambient T (°F)

Ambient P (psf)

Date Collected

Sampler's Initials

Analysis Method

Horse tail
07E-WH-0611-170908

Horse tail

07E-WH-0634-170908

Horse tail

07W-North E Separator-170908

Horse tail

07W-South E Separator-170908

Horse tail

07W-South E Treater-170908

Horse tail

07W-North E Separator-170908

Notes:

1. Reinspected By: MTH BTH

09/01/17

10:15

1. Received By:

2. Received By:

Date

Time

2. Reinspected By:

09/01/17

10:15

2. Received By:

3. Received By:

Date

Time

3. Reinspected By:

09/01/17

10:15

3. Received By:

Comments:

Date

Time

Comments:

Date

Time