



DENVER, SALT LAKE CITY

8/27/15

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

### H<sub>2</sub>S Analysis by GC-FPD

Dear Mr. Little & Mr. Snyder,

APT Laboratory Services was delivered seven gas phase samples in foil lined Tedlar bags on August 21, 2015. An H<sub>2</sub>S analysis was performed by APT on August 21, 2015, 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 – H <sub>2</sub> S by GC-FPD, August 21, 2015	
Sample	H <sub>2</sub> S Conc. (ppm)
RZ081815-01	27.7
CH081815-02	24.3
RZ081915-01	26.6
RZ081915-02	29.0
RZ081915-03	20.1
RZ081915-04	26.4
RZ081915-05	19.4

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,

A handwritten signature in black ink, appearing to read "Daniel Williams".

Daniel Williams  
Asst Director of Laboratory Services

APT Project: LWT05104

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



DENVER, SALT LAKE CITY

Hellman & Associates

Wheat Ridge, CO

8/21/2015

EPA Method 18: Determination of Gaseous Organic Compounds using Gas Chromatography

Initial Three-Point Calibration								
Low Level Calibration Standard								
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average AC OK?
Hydrogen Sulfide	12.55	1.927	12003.5	1.932	11558.7	1.93	11995.2	1.930 11852 Y
Mid Level Calibration Standard								
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average AC OK?
Hydrogen Sulfide	50.20	1.928	124567.6	1.93	117193.3	1.931	123388.3	1.930 121716 Y
High Level Calibration Standard								
Cpd ID	Conc. (ppm)	Inj. 1		Inj. 2		Inj. 3		Average AC OK?
Hydrogen Sulfide	125.50	1.926	504179.2	1.93	507292.1	1.925	500150.7	1.927 503874 Y



DENVER, SALT LAKE CITY

Hellman & Associates

Wheat Ridge, CO

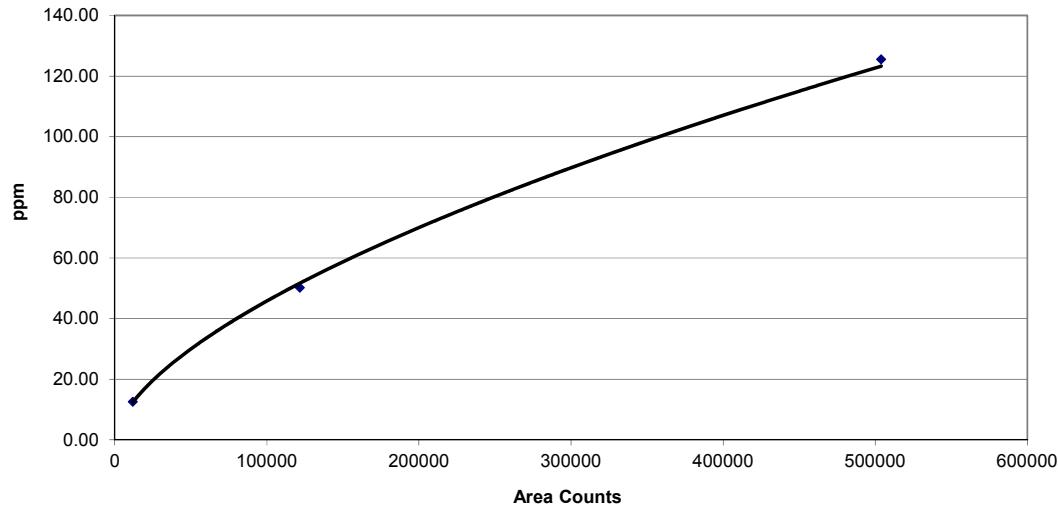
8/21/2015

EPA Method 18: Determination of Gaseous Organic Compounds using Gas Chromatography

Power Regression Calculations  
conc= A\*area<sup>B</sup>

Hydrogen Sulfide			
Certified ppm	Average AC	Power Regression Statistics	ppm from curve
12.55	11852	R <sup>2</sup>	12.41
50.20	121716	A	51.66
125.50	503874	B	123.28
		0.9995 0.039804 0.612201	

### Hydrogen Sulfide





DENVER, SALT LAKE CITY

Hellman & Associates

Wheat Ridge, CO

8/21/2015

EPA Method 18: Determination of Gaseous Organic Compounds using Gas Chromatography

Sample Analysis										
RZ081815-01										
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average			
	RT	AC	RT	AC	RT	AC	RT	AC	OK?	ppm
Hydrogen Sulfide	1.922	46336.3	1.92	42494.3	1.92	43041.1	1.921	43957	Y	27.69
CH081815-02										
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average			
	RT	AC	RT	AC	RT	AC	RT	AC	OK?	ppm
Hydrogen Sulfide	1.919	33697.5	1.921	36956.4	1.923	36041	1.921	35565	Y	24.33
RZ081915-01										
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average			
	RT	AC	RT	AC	RT	AC	RT	AC	OK?	ppm
Hydrogen Sulfide	1.919	42471.9	1.922	40880.8	1.919	40101.9	1.920	41152	Y	26.60
RZ081915-02										
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average			
	RT	AC	RT	AC	RT	AC	RT	AC	OK?	ppm
Hydrogen Sulfide	1.920	49752.5	1.922	45913	1.919	46379.7	1.920	47348	Y	28.98
RZ081915-03										
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average			
	RT	AC	RT	AC	RT	AC	RT	AC	OK?	ppm
Hydrogen Sulfide	1.918	26046.7	1.918	26814.4	1.919	25426.3	1.918	26096	Y	20.13
RZ081915-04										
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average			
	RT	AC	RT	AC	RT	AC	RT	AC	OK?	ppm
Hydrogen Sulfide	1.920	41371	1.921	41512.4	1.919	38972.3	1.920	40619	Y	26.39
RZ081915-05										
Cpd ID	Inj. 1		Inj. 2		Inj. 3		Average			
	RT	AC	RT	AC	RT	AC	RT	AC	OK?	ppm
Hydrogen Sulfide	1.918	25194.8	1.917	24390.7	1.92	23930.9	1.918	24505	Y	19.37



DENVER, SALT LAKE CITY

Hellman & Associates

Wheat Ridge, CO

8/21/2015

EPA Method 18: Determination of Gaseous Organic Compounds using Gas Chromatography

Quality Assurance													
Recovery / Spike (mid-level calibration gas to the sample probe)													
Cpd ID	Conc. (ppm)	RT	Inj. 1 AC	RT	Inj. 2 AC	RT	Inj. 3 AC	RT	Average AC	ppm	TriPLICATE OK?	RECOVERY OK?	AUDIT OK?
Hydrogen Sulfide	50.20	1.919	116106.9	1.922	120649.1	1.919	127446.8	1.920	121401	51.58	Y	Y	Y

## CHAIN OF CUSTODY RECORD - Shipping Receipt

Record all of the unit temperatures, unit pressures, collection dates and ambient conditions.										Temperature on Receipt: _____	
PROJECT CODE	CLIENT NAME			Project Manager			CHAIN OF CUSTODY #				
LWTO-5101	HELMAN & ASSOCIATES			TELEPHONE # / FAX# 303-384-9828							
ADDRESS	11913 W. 170 FRONTAGE RD. N.			DATE	8/21/15		Page	1	of		
CITY	WHEAT RIDGE	STATE	CO	ZIP CODE	80033	SITE CONTACT	LAB CONTACT	Mike Pearson	LAB NUMBER	303-420-5649 X 22	
CONTRACT/PURCHASE/QUOTE #											
SITE NAME	WELL ID & SAMPLE			Cylinder #	Unit Temperature (°F)	Unit Pressure (psi)	Ambient T (°F)	Ambient P (psi)	Date Collected	Sampler's Initials	Analysis Method
WHITING	PZ081915-01								8/18/15	AB	ASTM D5504
WHITING	CH081815-02								8/18/15	AB	ASTM D5504
WHITING	PZ081915-01								8/19/15	AB	ASTM D5504
WHITING	PZ081915-02								8/19/15	AB	ASTM D5504
WHITING	PZ081915-03								8/19/15	AB	ASTM D5504
WHITING	PZ081915-04								8/19/15	AB	ASTM D5504
WHITING	PZ081915-05								8/19/15	AB	ASTM D5504
Notes:											
1. Received By: <u>ALEX BRAY</u>	Date	8/21/15	Time								Date
2. Relinquished By	Date		Time								Date
3. Relinquished By	Date		Time								Date
Comments:											

1. Received By: <u>Kurt Zimmerman</u>	Date	8/21/15	Time								Date
2. Received By	Date		Time								Date
3. Received By	Date		Time								Date
Comments:											