

Alan R. Langenfeld
1308 Parkland Ct.
Champaign, IL 61821
10/04/2018

Brent Pooler
Senior Hydrogeologist
PO Box 60295
Lafayette, LA 70596-0295

Dear Brent Pooler :

On behalf of everyone at Isotech Laboratories, thank you for choosing us for your analytical needs. Attached with this document are the reports you requested. These documents relate to project Indigo / 8060.00 (Job 39507). We will hold your sample material until 11/05/2018. If you would like us to hold it longer please let us know.

Note that we were unable to obtain some requested isotopic values due to insufficient concentration.

We are committed to providing you with the highest level of customer satisfaction possible. If for any reason you have questions or comments, we are delighted to hear from you.

Again, thank you for your patronage. We look forward to serving you again in the future.

Best Regards,



Alan R. Langenfeld
Lab Manager

Isotech Gas Data

Job 39507

CoreTrac IS-78329

Isotech Lab No.	Sample Name	Sample Date	Sample Time	Field Name	GC Date	He %	H ₂ %	Ar %	O ₂ %	CO ₂ %	N ₂ %	CO %	C ₁ %	C ₂ %	C ₂ H ₄ %	C ₃ %	C ₃ H ₈ %	iC ₄ %	nC ₄ %	iC ₅ %	nC ₅ %	C ₆ + %	MS Date	δ ¹³ C ₁ ‰	δDC ₁ ‰	δ ¹³ C ₂ ‰	δDC ₂ ‰	Specific Gravity	BTU	Comments
683517	Samson 33-1	9/11/2018	10:35	Indigo / 8060.00	9/25/2018	0.0415	nd	0.0079	nd	0.95	2.61	nd	95.81	0.397	nd	0.0305	nd	0.0126	0.0136	0.0063	0.0111	0.107	9/26/2018	-31.68	-114.6	-23.40	-86.8	0.579	986	Insufficient propane concentration for isotopic analysis.

All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19
 nd = not detected, na = not analyzed

Lowest Quantifiable limits		
C1	2 ppm	0.00%
C2-C6+	1 ppm	0.00%
Ar	50 ppm	0.01%
O2	100 ppm	0.01%
N2	100 ppm	0.01%
He	50 ppm	0.01%
H2	100 ppm	0.01%
CO2	50 ppm	0.01%
CO	100 ppm	0.01%

Lab #: 683517 Job #: 39507 IS-78329 Co. Job#: _____
 Sample Name: Samson 33-1 Co. Lab#: _____
 Company: Hydro-Environmental Technology, Inc. Cylinder: 3165
 API/Well: _____
 Container: Cylinder
 Field/Site Name: Indigo / 8060.00
 Location: _____
 Formation: _____
 Sampling Point: _____
 Date Sampled: 9/11/2018 10:35 Date Received: 9/17/2018 Date Reported: 10/04/2018

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	0.0415			
Hydrogen -----	nd			
Argon -----	0.0079			
Oxygen -----	nd			
Nitrogen -----	2.61			
Carbon Dioxide -----	0.95			
Methane -----	95.81	-31.68	-114.6	
Ethane -----	0.397	-23.40	-86.8	
Ethylene -----	nd			
Propane -----	0.0305			
Propylene -----	nd			
Iso-butane -----	0.0126			
N-butane -----	0.0136			
Iso-pentane -----	0.0063			
N-pentane -----	0.0111			
Hexanes + -----	0.107			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 986
 Specific gravity, calculated: 0.579

Remarks: Insufficient propane concentration for isotopic analysis.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Standards																																											
Date	Lab/Std	QA/QC?	Comment	He	He %	Ar	Ar %	H2	H2 %	O2	O2 %	O2+Ar	O2+Ar %	CO2	CO2 %	N2	N2 %	CO	CO %	C1	C1 %	C2	C2 %	C2H4	C2H4 %	C3	C3 %	C3H6	C3H6 %	IC4	IC4 %	NC4	NC4 %	IC5	IC5 %	NC5	NC5 %	C6+	C6+ %	Raw Total			
9/25/2018	HighChkStd	N	First of day	0	0.00068	0	0	0.0055	0	0.0055	0	0	0	0	0	10.0792	100.82	0	0	89.91462	99.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98.6204	
9/25/2018	HighChkStd	Y		0	0.00084	0	0	0.00394	0	0.00394	0	0	0	0	0	10.08086	100.84	0	0	89.91436	99.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	98.3297
9/25/2018	midchkstd	Y	H2, He near RL/ O2 diff <30 ppm	0.00962	93.85	0.02428	99.08	0.00925	94.78	0.02141	110.3	0	0	1.51212	100.28	51.59634	100.41	0.0667	106.08	39.115	99.27	3.0884	102.38	0.50536	99.18	1.78959	100.08	0.13334	100.11	0.75823	99.5	0.75704	99.6	0.25492	100.2	0.25561	100.49	0.10278	105.17	97.7191			

Repeated Samples																																								
Date	Lab/Std	QA/QC?	Comment	He	He %	Ar	Ar %	H2	H2 %	O2	O2 %	O2+Ar	O2+Ar %	CO2	CO2 %	N2	N2 %	CO	CO %	C1	C1 %	C2	C2 %	C2H4	C2H4 %	C3	C3 %	C3H6	C3H6 %	IC4	IC4 %	NC4	NC4 %	IC5	IC5 %	NC5	NC5 %	C6+	C6+ %	RAW TOTAL
9/25/2018	683517	lab		0.04143	0.98	0.00792	3.68	0.00105	1.84	0.00528	37.26	0	0	0.94751	4.33	2.61397	0.16	0	95.80544	0.01	0.3967	0.1	0	0	0.03052	0.23	0	0	0.01256	0.02	0.01358	0.18	0.00628	0.1	0.01106	1.2	0.10997	3	0.10673	98.5891
9/25/2018	683517	rep		0.04103	0.98	0.00764	3.68	0.00104	1.84	0.00362	37.26	0	0	0.94458	4.33	2.60971	0.16	0	95.81189	0.01	0.39632	0.1	0	0	0.03059	0.23	0	0	0.01256	0.02	0.01358	0.18	0.00628	0.1	0.01119	1.2	0.10997	3	0.10673	98.4893
9/25/2018	679339	lab		0	0.9277	0	0	0	0	21.36544	0.14	0	0	0.0537	4.33	77.64947	0.04	0	0.00109	38.21	0.00003	0.05	0	0	0	0	0	0	0	0	0	0	0.00002	0.00002	0.00002	40.04	0.00253	4.83	0.00241	99.6443
9/25/2018	679339	rep		0	0.92867	0.1	0	0	0	21.39439	0.14	0	0	0.05607	4.33	77.61765	0.04	0	0.00074	38.21	0.00003	0.05	0	0	0	0	0	0	0	0	0	0	0.00001	0.00003	0.00003	40.04	0.00241	4.83	0.00241	99.5988

Results of Daily Instrument Check

Delta Q: Dual Inlet Hydrogen Isotope Analysis

<i>Date</i>	<i>zero enrichment</i>	<i>ck std expected</i>	<i>ck std measured</i>
9/26/2018	0.314	-173.7	-173.7

Delta R: Dual Inlet Carbon Isotope Analysis

<i>Date</i>	<i>zero enrichment</i>	<i>ck std expected</i>	<i>ck std measured</i>
9/26/2018	-0.047	-11.31	-11.29

Orca Standards

<i>Date Ran</i>	<i>C₁</i>	<i>C₂</i>
09/26/18	-41.58	-31.71

Expected Value -41.60 -31.76

<i>Date Ran</i>	<i>2C₁</i>	<i>2C₂</i>
09/26/18	-176.3	-188.1

Expected Value -175.3 -188.7

GPA Standards

<i>Date Ran</i>	<i>C₁</i>	<i>C₂</i>
09/26/18	-43.40	-28.91

Expected Value -43.57 -28.99

<i>Date Ran</i>	<i>2C₁</i>	<i>2C₂</i>
09/26/18	-188.5	-172.7

Expected Value -189.8 -172.7



HYDRO-ENVIRONMENTAL TECHNOLOGY, INC.
 Environmental Consultants
 P.O. Box 60295
 Lafayette, LA 70596-0295
 Phone (337) 261-1963 FAX (337) 261-1953

SAMPLE CHAIN-OF-CUSTODY RECORD

Project Name: Indigo **Laboratory:** Isotech
Project Number: 8060.00 **Collected By:** KC / WP
Project Location: DeSoto Parish, Louisiana **Company:** Hydro-Environmental Technology, Inc.
Date: 9/11/2018

Sample I.D.	Type	Date/Time Sampled		Containers	Analysis Requested/Method	Comments
Samson 33-1	AQ	9/11/2018	10:35	(1) double-ended gas cylinder	Natural Gases NG-2 Hydrogen (2H/1H), Oxygen-18O/16O	

Note: Report concentrations of all fixed gases & where possible both mol ratios & concentrations of all gases.
 For the NG2 analyses, please include dD for C2 and C3 gases.

Relinquished By: <u>Wade A. Pappas</u>	Received By: <u>Abby L. Skube / Isotech Laboratories</u>
Date/Time: <u>9-13-2018 / 9:00</u>	Date/Time: <u>SEP 17 2018 9:00</u>
Relinquished By:	Received By:
Date/Time:	Date/Time:
Analysis Due: Verbal:	Written: