

Alan R. Langenfeld
1308 Parkland Ct.
Champaign, IL 61821
10/22/2019

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 43004). We will hold your sample material until 11/21/2019. 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 43004
 CoreTrac IS-78329

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

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 ₆ %	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 ‰	δ ¹³ C ₃ ‰	Specific Gravity	BTU	Comments
736850	Ardis Martin #27 Relief Well	9/30/2019	10:40	Indigo / 8060.00	10/11/2019	nd	nd	0.0185	nd	0.019	1.04	nd	97.63	1.14	nd	0.108	nd	0.0271	0.0123	0.0047	0.0014	0.0024	10/17/2019	-37.38	-152.2	-23.10	-111.0	-18.02	0.566	1015	Insufficient propane concentration for dD isotopic analysis.

Lowest Quantifiable limits		
C ₁	2 ppm	0.0002%
C ₂ -C ₆ +	1 ppm	0.0001%
Ar	50 ppm	0.0050%
O ₂	100 ppm	0.0100%
N ₂	100 ppm	0.0100%
He	50 ppm	0.0050%
H ₂	100 ppm	0.0100%
CO ₂	50 ppm	0.0050%
CO	100 ppm	0.0100%

Lab #: 736850 Job #: 43004 IS-78329 Co. Job#: _____
 Sample Name: Ardis Martin #27 Relief Well Co. Lab#: _____
 Company: Hydro-Environmental Technology, Inc. Cylinder: 3161
 API/Well: _____
 Container: Cylinder
 Field/Site Name: Indigo / 8060.00
 Location: _____
 Formation: _____
 Sampling Point: _____
 Date Sampled: 9/30/2019 10:40 Date Received: 10/03/2019 Date Reported: 10/22/2019

Component	Chemical mol. %	$\delta^{13}\text{C}$ ‰	δD ‰	$\delta^{15}\text{N}$ ‰
Carbon Monoxide -----	nd			
Helium -----	nd			
Hydrogen -----	nd			
Argon -----	0.0185			
Oxygen -----	nd			
Nitrogen -----	1.04			
Carbon Dioxide -----	0.019			
Methane -----	97.63	-37.38	-152.2	
Ethane -----	1.14	-23.10	-111.0	
Ethylene -----	nd			
Propane -----	0.108	-18.02		
Propylene -----	nd			
Iso-butane -----	0.0271			
N-butane -----	0.0123			
Iso-pentane -----	0.0047			
N-pentane -----	0.0014			
Hexanes + -----	0.0024			

Total BTU/cu.ft. dry @ 60deg F & 14.73psia, calculated: 1015

Specific gravity, calculated: 0.566

Remarks: Insufficient propane concentration for dD 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. %.

Job 43004
Compositional QA/QC

Job	Lab	Sample Name	Analysis Order	Instrument	Run Time	Raw Total	C1	C2	C2H4	C2H2	C3	C3H6	IC4	nC4	IC5	nC5	C6+	Ar	O2	N2	CO2	H2	He	CO
43004	736850	Ardis Martin #27 Hallett Well	1938210	Shimadzu56	10/11/2019 12:24	99.77484	97.6199	1.1422	0	0	0.1084	2E-05	0.0271	0.0123	0.0047	0	0.0024	0.0165	0.00072	1.03985	0.0166	0.0011	0.0028	0

Standards

Job	Lab	Sample Name	Analysis Order	Instrument	Run Time	Raw Total	C1	C2	C2H4	C2H2	C3	C3H6	IC4	nC4	IC5	nC5	C6+	Ar	O2	N2	CO2	H2	He	CO																	
731590		chkmidstd	1943201	Shimadzu56	10/11/2019 6:52	97.02301	38.5892	0.82	3.1565	-0.13	0.492	0.63	0	1.8234	-0.38	0.1254	-0.01	0.7714	-0.63	0.7603	-1.48	-0.256	-2.93	0.25	-4.01	0.0934	-5.61	0.0227	-0.08	0.01184	-2.87	52.1068	-0.51	1.5203	0.2	0.0069	1.42	0.0117	-2.01	0	-1.41
			1943626	Shimadzu56	10/11/2019 11:32	98.36553	38.4454	0.44	3.1457	-0.47	0.4901	0.26	0	1.8222	-0.44	0.1253	-0.08	0.7733	-0.39	0.7653	-0.83	0.2604	-1.25	0.26	-1.66	0.1024	3.19	0.0224	-1.49	0.00628	-48.47	52.2416	-0.25	1.5227	0.36	0.0066	-3.53	0.012	0.58	0	-0.27
			1944306	Shimadzu56	10/11/2019 15:50	98.37088	38.3787	0.27	3.1409	-0.62	0.4894	0.1	0	1.8207	-0.52	0.1253	-0.07	0.7735	-0.37	0.7666	-0.65	0.2614	-0.85	0.26	-0.97	0.1015	2.32	0.0237	3.95	0.02792	129	52.2943	-0.15	1.5173	0	0.0067	-1.76	0.0118	-1.13	0	
							Reference Values	38.2761	3.1606	0.4889	0	1.8303	0.1254	0.7763	0.7717	0.2637	0.26	0.0992	0.0228	0.01219	52.373	1.5173	0.0068	0.0119	0																

Results of Daily Instrument Check

Delta R: Dual Inlet Carbon Isotope Analysis

<i>Date</i>	zero enrichment	ck std expected	ck std measured
10/17/2019	-0.032	-11.31	-11.314
10/17/2019		-11.31	-11.379

Delta Q: Dual Inlet Hydrogen Isotope Analysis

<i>Date</i>	zero enrichment	ck std expected	ck std measured
10/16/2019	0.125	-173.849	-173.036
		-173.849	-173.581

Orca Standard Gamma 3315

Date Ran	C ₁	C ₂	C ₃
10/16/19	-41.554	-31.786	-32.762
Expected Value	-41.60	-31.76	-32.69

Date Ran	2C ₁
10/16/19	-176.006
Expected Value	-175.3

GPA Standard Gamma 2517

Date Ran	C ₁	C ₂	C ₃
10/16/19	-43.519	-29.124	-32.529
Expected Value	-43.57	-28.99	-32.27

Date Ran	2C ₁
10/16/19	-187.374
Expected Value	-189.8



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 _____
Project Location: _____ DeSoto Parish, Louisiana _____	Company: _____ Hydro-Environmental Technology, Inc. _____
	Date: _____ 9/30/2019 _____

Sample I.D.	Type	Date/Time Sampled		Containers	Analysis Requested/Method	Comments
Ardis Martin #27 Relief Well	Gas	9/30/2019	10:40	(1) double-ended gas cylinder	Natural Gases NG-2 Hydrogen (2H/1H), Oxygen-18O/16O	Cyl # 3161

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: <i>Kenn J. Oose</i> Date/Time: <i>10/01/19 0800</i>	Received By: Abby L. Skube / Isotech Laboratories Date/Time: OCT 03 2019 <i>9:10</i>
Relinquished By: Date/Time:	Received By: Date/Time:
Analysis Due: Verbal:	Written: