UNITED STATES ENVIRONMENTAL PROTECTION AGENCY- Region III
OFFICE OF ANALTYICAL SERVICES AND QUALITY ASSURANCE
Environmental Sciences Center
701 Mapes Road
Fort Meade, Maryland 20755-5350

DATE: April 05, 2012

SUBJECT: Region III Data QA Review

FROM: Fred Foreman, Chief
OASQA, Technical Services Branch (3EA22)

for F Foreman
Daniel S Lizys

TO: Richard M. Fetzer
Region III On-Scene Coordinator

Attached is the gas isotope data from the Dimock Residential Groundwater Site for a sample collected on March 5th and submitted to Isotech Laboratories Inc. for analysis. Due to the proprietary nature of the analytical method utilized by isotech, we are unable to perform a validation of this data.

The sample submitted and analyzed is HW60.

Please contact me if you have any questions. I may be reached at 410-305-2629 or by email at foreman.fred@epa.gov.

DIM0193523

ISOTECH
ISOTECH LABORATORIES INC

ANALYSIS REPORT

Lab #:	239878	Job #:	17692
Sample Name/Number:	HW60		
Company:	TechLaw, Inc.		
Date Sampled:	3/05/2012		
Container:	Dissolved Gas Bottle		
Field/Site Name:	Case# R33917		
Location:			
Formation/Depth:			
Sampling Point:			
Date Received:	3/13/2012	Date Reported:	4/03/2012

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{18}O$ ‰
Carbon Monoxide	nd			
Hydrogen Sulfide	na			
Helium	0.0233			
Hydrogen	nd			
Argon	0.516			
Oxygen	0.066			
Nitrogen	29.47			
Carbon Dioxide	0.053			
Methane	69.86	-35.20	-193.0	
Ethane	0.0119			
Ethylene	nd			
Propane	nd			
Propylene	0.0001			
Iso-butane	nd			
N-butane	nd			
Iso-pentane	nd			
N-pentane	nd			
Hexanes +	nd			
Water			-66.1	-9.88

Total BTU/cu.ft. dry @ 60deg F & 14.7psia, calculated: 708 Specific gravity, calculated: 0.681

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Calculations for BTU and specific gravity per ASTM D3588. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

ISOTECH
ISOTECH LABORATORIES INC
www.isotechlabs.com

Isotech Gas Data

Job 17692

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_2H_4 %	C_3 %	C_3H_6 %	iC_4 %	nC_4 %	iC_5 %	nC_5 %	C_6+ %	MS Date	$\delta^{13}C_1$ ‰	δDC_1 ‰	$\delta D\ H_2O$ ‰	$\delta^{18}O\ H_2O$ ‰	Specific Gravity	BTU
239878	HW60	3/5/2012	12:25	Case# R33917	3/22/2012	0.0233	nd	0.516	0.066	0.053	29.47	nd	69.86	0.0119	nd	nd	0.0001	nd	nd	nd	nd	nd	3/30/2012	-35.20	-193.0	-66.1	-9.88	0.681	708

Analysis is of gas extracted from water by headspace equilibration.
These labs did not have helium added to them: 239878
nd = not detected, na = not analyzed

USEPA CLP Generic COC (LAB COPY)

DateShipped: 3/8/2012
CarrierName: FedEx
AirbillNo: 7981 4861 1157

CHAIN OF CUSTODY RECORD

Case #: R33917

No: 3-030812-164148-0259

Lab: Isotech Laboratories
Lab Contact: [redacted]
Lab Phone: 217.398.3490

Sample #	Matrix/Sampler	Coll. Method	Analysis/Turnaround	Tag/Preservative/Bottles	Station Location	Collected	For Lab Use Only
HW60	Drinking Water/ [redacted]	Grab	Isotech(180)	19090 (Biocide / 1L Plastic) (1)	HW60	03/05/2012 12:25	

Special Instructions:

Shipment for Case Complete? N

Samples Transferred From Chain of Custody #

Analysis Key: Isotech=17-Isotech

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
1	[redacted]	3/8/12	[redacted]	3-9-12	9:00						

Job 17692

Compositional QA/QC

GPA

Date	Expected ' Componei	0.5030 He	not listed oxygen	0.9950 CO2	5.0100 N2	70.3020 C1	9.0700 C2	6.0600 C3	3.0200 IC4	3.0200 NC4	1.0100 IC5	1.0100 NC5	Not listed C6+
3/22/2012	gpa	0.4538	0.1058	0.9879	5.3534	69.9495	8.9933	6.1077	3.0180	3.0264	0.9891	1.0013	0.0078
3/22/2012	gpa	0.4542	0.1004	0.9909	5.3232	70.0259	9.0083	6.0586	3.0113	2.9720	0.9652	0.9655	0.0085
3/22/2012	gpa	0.4559	0.0890	0.9936	5.3312	70.1914	9.0307	6.0788	2.9781	2.9557	0.9451	0.9448	0.0000

Date	Repeated Samples Lab/Std	He	% RPD He %	Ar	% RPD Ar %	H2	% RPD H2 %	O2	% RPD O2 %	CO2	% RPD CO2 %	N2	% RPD N2 %

No duplicate analysis performed in this job

C1	% RPD C1 %	C2	% RPD C2 %	C3	% RPD C3 %	C3H6	% RPD C3H6 %	IC4	% RPD IC4 %	NC4	% RPD NC4 %	IC5	% RPD IC5 %

NC5	% RPD NC5 %

Job 17407

Isotope QA/QC

Isotope results for internal check/reference standards

Orca

Date prepared	Date Analyzed	$\delta^{13}C_1$	δDC1
03/26/12	03/26/12	-41.34	-174.8
03/26/12	03/26/12	-41.25	-176.8
Expected:		**-41.38**	**-174.5**

GPA

Date prepared	Date Analyzed	$\delta^{13}C_1$	δDC1
03/25/12	03/25/12	-43.28	-189.7
Expected:		**-43.32**	**-189.8**

Duplicate $\delta 13C_1$ Analyses

Sample Name	Sample ID	Reported Value	Duplicate Analysis Value	Difference (per mil)
239878	HW60	-35.20	-35.19	0.01

Duplicate δDC_1 Analyses

Sample Name	Sample ID	Reported Value	Duplicate Analysis Value	Difference (per mil)
239878	HW60	-193.00	-193.70	-0.7

Results of Daily Instrument Check

Delta S: Dual Inlet Carbon Isotope Analysis

Date	zero enrichment	*ck std* expected	*ck std* measured
3/25/2012	-0.002	-10.67	-10.77
3/25/2012		-10.67	-10.78

Delta Plus: Dual Inlet Hydrogen Isotope Analysis

Date	zero enrichment	*ck std* expected	*ck std* measured
03/30/212	0.911	-174.3	-174.9
03/30/212		-174.3	-174.9
03/30/212		-174.3	-174.8
03/30/212		-174.3	-174.8

Job 17692

Water QA/QC

Standards	DI-3		LT		CHK	
Date Ran	^{18}O	δd	^{18}O	δd	^{18}O	δd
3/18/2012	-6.87	-44.0	-18.78	-140.8		
3/19/2012	-6.81	-43.4	-18.86	-140.9		
3/19/2012	-6.82	-44.0	-18.83	-140.4	-11.92	-87.0
3/19/2012	-6.87	-44.1	-18.87	-140.7		
3/20/2012	-6.79	-43.5	-18.77	-140.7		
Average	**-6.83**	**-43.8**	**-18.82**	**-140.7**	**-11.92**	**-87.0**
Lit (MS) Value	**-6.83**	**-43.8**	**-18.82**	**-140.7**	**-12.01**	**-87.8**

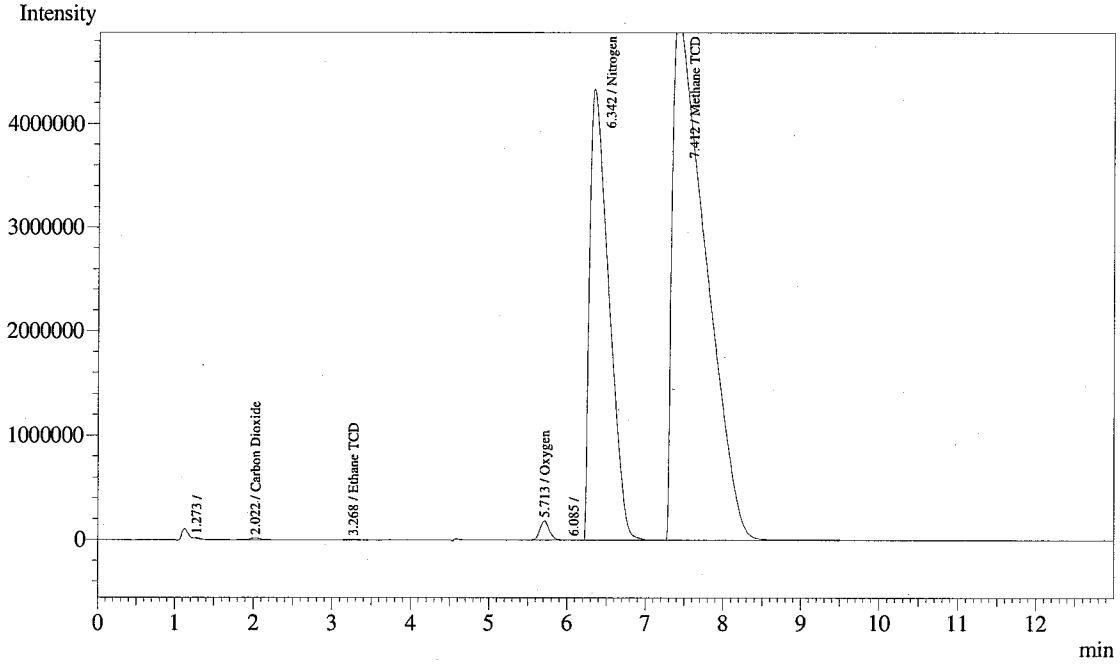
DUPLICATE ANALYSES

I-Number	Sample ID	^{18}O	δd

No duplicate analysis performed for this job

Analysis Date & Time : 3/22/2012 9:28:09 AM
User Name : Admin
Vial# : 1
Sample Name : A_239878
Sample ID : lab
Sample Type : Unknown
Injection Volume :
ISTD Amount :

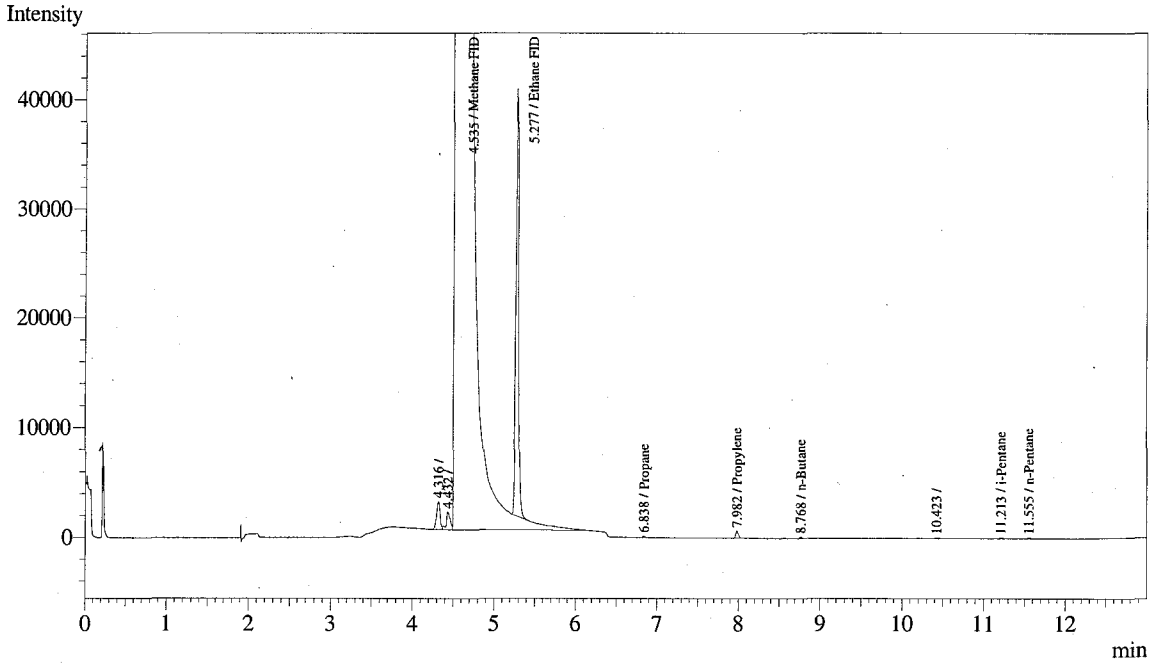
Data Name : C:\GCsolution\Data\239878_lab_03222012_0924 AM#A.gcd
Method Name : C:\GCsolution\Data\Copy of AB 60C.gcm



Peak#	Ret.Time	Area	Height	Conc.	Unit	Mark	ID#	Cmpd Name
1	1.273	25317	6370	0.000				
2	2.022	146646	17156	0.052	percei	V	1	Carbon Dioxide
3	3.268	35120	3319	0.012	percei		4	Ethane TCD
4	5.713	1495107	180549	0.564	percei	S	6	Oxygen
5	6.085	3299	533	0.000		T		
6	6.342	73811913	4333187	29.195	percei		7	Nitrogen
7	7.412	148763525	5057607	69.203	percei		8	Methane TCD
Total		224280927	9598721					

Analysis Date & Time : 3/22/2012 9:28:09 AM
User Name : Admin
Vial# : 1
Sample Name : B_239878
Sample ID : lab
Sample Type : Unknown
Injection Volume :
ISTD Amount :

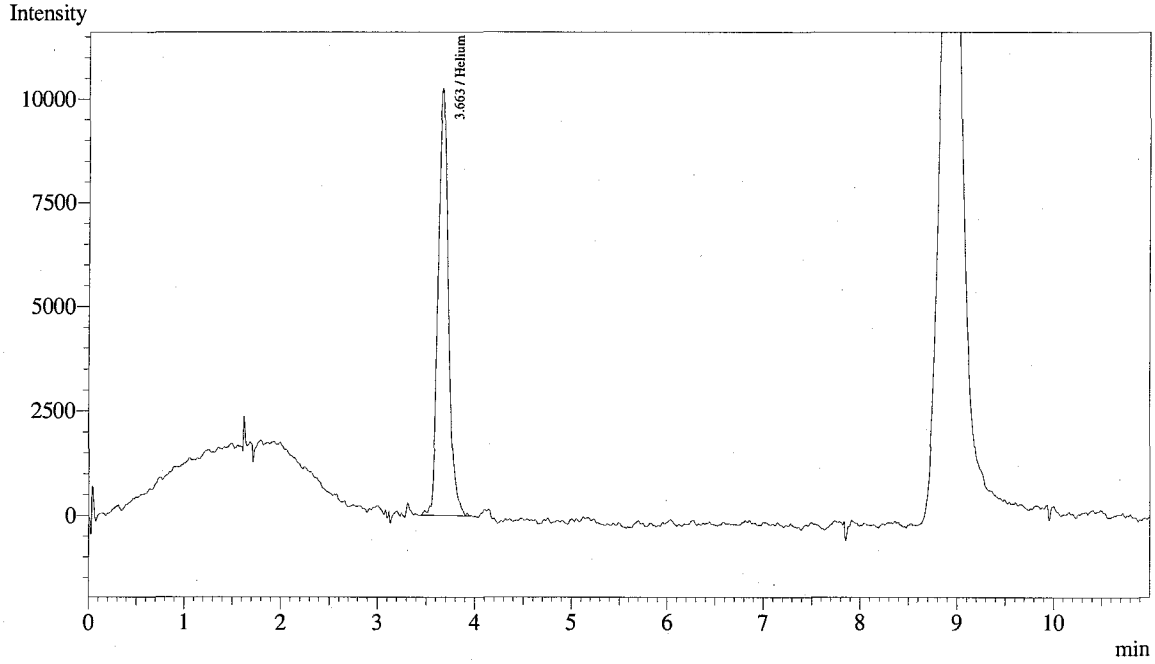
Data Name : C:\GCsolution\Data\239878_lab_03222012_0924 AM#B.gcd
Method Name : C:\GCsolution\Data\Copy of AB 60C.gcm



Peak#	Ret.Time	Area	Height	Conc.	Unit	Mark	ID#	Cmpd Name
1	4.316	7659	2547	0.000				
2	4.432	5599	1612	0.000		V		
3	4.535	270565884	83222584	67.410	percei	SV	2	Methane FID
4	5.277	95855	38702	0.012	percei	T	3	Ethane FID
5	6.838	237	135	0.000	percei		5	Propane
6	7.982	1388	647	0.000	percei		6	Propylene
7	8.768	269	142	0.000	percei		8	n-Butane
8	10.423	154	69	0.000				
9	11.213	193	75	0.000	percei		10	i-Pentane
10	11.555	247	84	0.000	percei		11	n-Pentane
Total		270677485	83266597					

Analysis Date & Time	: 3/22/2012 9:28:11 AM
User Name	: Admin
Vial#	: 1
Sample Name	: C_239878
Sample ID	: lab
Sample Type	: Unknown
Injection Volume	:
ISTD Amount	:

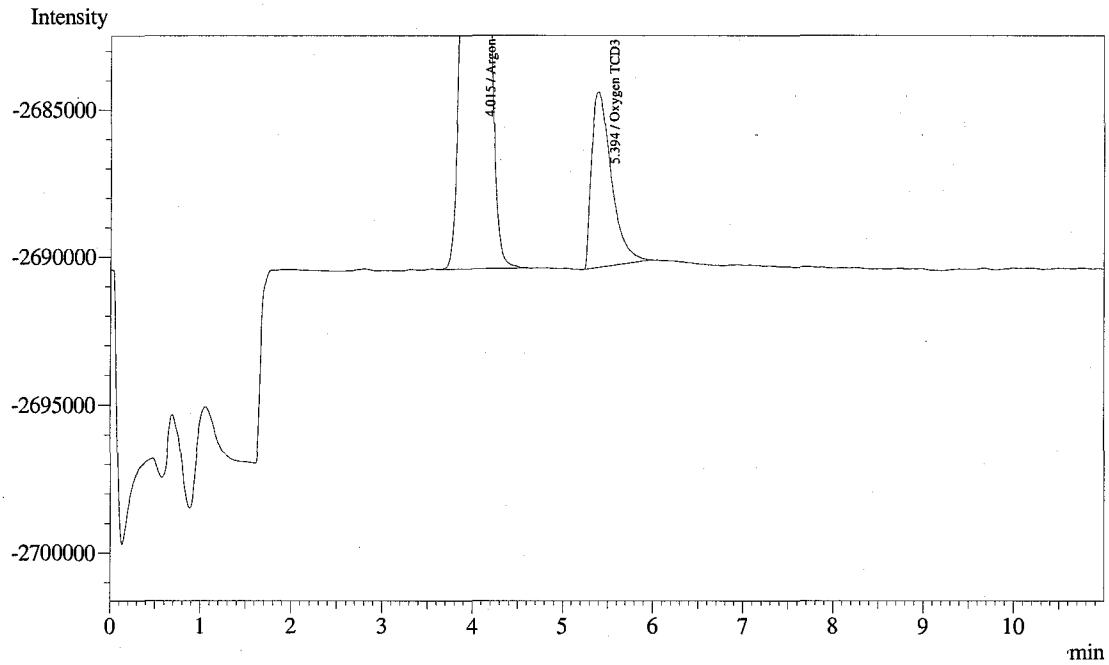
Data Name	: C:\GCsolution\Data\239878_lab_03222012_0924 AM#C.gcd
Method Name	: C:\GCsolution\Data\Copy of CD Normal.gcm



Peak#	Ret.Time	Area	Height	Conc.	Unit	Mark	ID#	Cmpd Name
1	3.663	74694	10155	0.023	percei		1	Helium
Total		74694	10155					

Analysis Date & Time : 3/22/2012 9:28:11 AM
User Name : Admin
Vial# : 1
Sample Name : D_239878
Sample ID : lab
Sample Type : Unknown
Injection Volume :
ISTD Amount :

Data Name : C:\GCsolution\Data\239878_lab_03222012_0924 AM#D.gcd
Method Name : C:\GCsolution\Data\Copy of CD Normal.gcm



Peak#	Ret.Time	Area	Height	Conc.	Unit	Mark	ID#	Cmpd Name
1	4.015	776981	56305	0.511	percei		1	Argon
2	5.394	91995	5958	0.065	percei		2	Oxygen TCD3
Total		868976	62263					

Friday, March 30, 2012 07:42:50

ISOTECH

Delta Plus
Dual Inlet Results
H2

Z:\MS\plus\data\DualInlet\hydrogen\2012\march\120330\P-38808__zero.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
zero	hd-5a	P-38808	HD	03-30-2012	hd_zero.met

Additional Information

Infomation			Gas Configuration	
Peak Center found at [1993]			Gas	H2
Background: -0.03 mV,-1.18 mV			Magnet [Steps]	980
Pressure Adjustment: Left: 6047.9 Right: 6122.0 (Manual A			Cups	1
Ref. Name:	d 2H/1H	vs.	Masses	2.0
H2-zero	0.000	VSMOW	H3 Factor	2.308532
0				

Raw Data

	Int.2 Sample [mV]	Int.3 Sample [mV]	Int.2 Standard [mV]	Int.3 Standard [mV]	rR 3H2/2H2	R 3H2/2H2	rd 3H2/2H2 [per mil] vs. H2-zero	d 3H2/2H2 [per mil] vs.	d 2H/1H [per mil] vs. VSMOW	AT% 2H/1 [%]
Pre			6119.944	1497.757						
1	6042.365	1478.870	6115.743	1497.028	0.230801	0.00031	0.721	0.721	0.721	0.01
2	6037.554	1477.734	6111.795	1495.838	0.230819	0.00031	0.731	0.731	0.731	0.01
3	6033.717	1477.068	6107.879	1494.721	0.230873	0.00031	1.062	1.062	1.062	0.01
4	6028.686	1475.672	6103.081	1493.591	0.230857	0.00031	0.991	0.991	0.991	0.01
5	6024.625	1474.645	6099.080	1492.795	0.230861	0.00031	0.884	0.884	0.884	0.01
6	6019.945	1473.980	6094.977	1491.955	0.230952	0.00031	1.112	1.112	1.112	0.01
7	6016.436	1472.697	6091.185	1490.810	0.230889	0.00031	0.821	0.821	0.821	0.01
8	6011.839	1471.377	6087.346	1489.719	0.230868	0.00031	0.819	0.819	0.819	0.01
9	6007.776	1470.303	6084.197	1488.853	0.230864	0.00031	0.855	0.855	0.855	0.01
10	6003.237	1469.507	6079.587	1487.749	0.230927	0.00031	1.115	1.115	1.115	0.01

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 3H2/2H2 [per mil] vs. VSMC	0.911	0.149	0.047		0
d 2H/1H [per mil] vs. VSMOW	0.911	0.149	0.047	0.015587	0

Friday, March 30, 2012 07:54:42

ISOTECH

Delta Plus
Dual Inlet Results
H2

Z:\MS\plus\data\DualInlet\hydrogen\2012\march\120330\P-38809__hd-7a.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
hd-7a	check std	P-38809	HD	03-30-2012	hd_7v.met

Additional Information

Infomation			Gas Configuration	
Peak Center found at [1993]			Gas	H2
Background: -0.12 mV,-1.31 mV			Magnet [Steps]	980
Pressure Adjustment: Left: 6995.2 Right: 6994.9 (Manual A			Cups	1
Ref. Name:	d 2H/1H	vs.	Masses	2.0
HD-5b	-263.980	VSMOW	H3 Factor	2.308532
0				

Raw Data

	Int.2 Sample [mV]	Int.3 Sample [mV]	Int.2 Standard [mV]	Int.3 Standard [mV]	rR 3H2/2H2	R 3H2/2H2	rd 3H2/2H2 [per mil] vs. HD-5b	d 3H2/2H2 [per mil] vs.	d 2H/1H [per mil] vs. VSMOW	AT% 2H/1H [%]
Pre			6991.696	1726.726						
1	6960.683	1913.181	6985.520	1724.749	0.258786	0.000257	121.247	-174.740	-174.740	0.012852
2	6947.556	1908.907	6980.002	1723.428	0.258720	0.000257	121.039	-174.893	-174.893	0.012849
3	6934.636	1905.622	6974.921	1722.616	0.258788	0.000257	121.107	-174.843	-174.843	0.012850
4	6921.864	1902.096	6969.156	1721.155	0.258816	0.000257	121.023	-174.905	-174.905	0.012849
5	6909.719	1898.434	6964.328	1719.719	0.258797	0.000257	120.979	-174.937	-174.937	0.012849
6	6896.624	1894.508	6957.983	1718.247	0.258779	0.000257	120.893	-175.000	-175.000	0.012848

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 3H2/2H2 [per mil] vs. VSMC	-174.886	0.089	0.036		0
d 2H/1H [per mil] vs. VSMOW	-174.886	0.089	0.036	0.012849	0

Friday, March 30, 2012 11:44:36

ISOTECH

Delta Plus
Dual Inlet Results
H2

Z:\MS\plus\data\DualInlet\hydrogen\2012\march\120330\P-38819__HD-7a.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
HD-7a	Check Std	P-38819	HD	03/30/2012	hd_7v.met

Additional Information

Infomation			Gas Configuration	
Peak Center found at [1999]			Gas	H2
Background: 1.19 mV,-1.01 mV			Magnet [Steps]	980
Pressure Adjustment: Left: 6990.5 Right: 6996.7 (Manual A			Cups	1
Ref. Name:	d 2H/1H	vs.	Masses	2.0
HD-5b	-263.980	VSMOW	H3 Factor	2.308532
0				

Raw Data

	Int.2 Sample [mV]	Int.3 Sample [mV]	Int.2 Standard [mV]	Int.3 Standard [mV]	rR 3H2/2H2	R 3H2/2H2	rd 3H2/2H2 [per mil] vs. HD-5b	d 3H2/2H2 [per mil] vs.	d 2H/1H [per mil] vs. VSMOW	AT% 2H/1H [%]
Pre			6995.364	1727.914						
1	6951.565	1910.716	6988.909	1726.137	0.258813	0.000257	121.113	-174.838	-174.838	0.012850
2	6938.594	1906.915	6980.954	1724.252	0.258809	0.000257	121.051	-174.884	-174.884	0.012850
3	6925.935	1903.473	6974.605	1722.672	0.258843	0.000257	121.097	-174.850	-174.850	0.012850
4	6913.903	1899.527	6968.104	1720.717	0.258779	0.000257	120.870	-175.017	-175.017	0.012847
5	6901.155	1895.804	6961.055	1718.739	0.258776	0.000257	120.988	-174.931	-174.931	0.012849
6	6887.773	1891.883	6953.805	1716.970	0.258772	0.000257	120.963	-174.949	-174.949	0.012849

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 3H2/2H2 [per mil] vs. VSMC	-174.911	0.067	0.028		0
d 2H/1H [per mil] vs. VSMOW	-174.911	0.067	0.028	0.012849	0

Friday, March 30, 2012 13:17:44

ISOTECH

Delta Plus
Dual Inlet Results
H2

Z:\MS\plus\data\DualInlet\hydrogen\2012\march\120330\P-38827__239878.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
239878	HW60 g(2210)	P-38827	2C1	03/25/2012	hd_9v.met

Additional Information

Infomation			Gas Configuration	
Peak Center found at [1993]			Gas	H2
Background: 1.39 mV,-1.59 mV			Magnet [Steps]	980
Pressure Adjustment: Left: 9004.8 Right: 9001.5 (Manual A			Cups	1
Ref. Name:	d 2H/1H	vs.	Masses	2.0
HD-5b	-263.980	VSMOW	H3 Factor	2.308532
0				

Raw Data

	Int.2 Sample [mV]	Int.3 Sample [mV]	Int.2 Standard [mV]	Int.3 Standard [mV]	rR 3H2/2H2	R 3H2/2H2	rd 3H2/2H2 [per mil] vs. HD-5b	d 3H2/2H2 [per mil] vs.	d 2H/1H [per mil] vs. VSMOW	AT% 2H/1H [%]
Pre			8995.729	2262.204						
1	8984.330	2467.990	8987.522	2260.393	0.253958	0.000252	100.666	-189.888	-189.888	0.012616
2	8982.406	2468.494	8974.630	2256.879	0.254078	0.000252	101.072	-189.589	-189.589	0.012621
3	8974.265	2466.504	8960.634	2253.162	0.254124	0.000252	101.250	-189.458	-189.458	0.012623
4	8966.292	2464.057	8949.272	2250.024	0.254114	0.000252	101.194	-189.499	-189.499	0.012622
5	8959.257	2461.879	8937.240	2246.985	0.254103	0.000252	101.096	-189.572	-189.572	0.012621
6	8952.449	2460.009	8924.343	2243.341	0.254119	0.000252	101.138	-189.541	-189.541	0.012621

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 3H2/2H2 [per mil] vs. VSMC	-189.591	0.153	0.063		0
d 2H/1H [per mil] vs. VSMOW	-189.591	0.153	0.063	0.012621	0

Friday, March 30, 2012 13:28:13

ISOTECH

Delta Plus
Dual Inlet Results
H2

Z:\MS\plus\data\DualInlet\hydrogen\2012\march\120330\P-38828__239878a.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
239878a	DUPLICATE g(2211)	P-38828	2C1	03/25/2012	hd_9v.met

Additional Information

Infomation			Gas Configuration	
Peak Center found at [1993]			Gas	H2
Background: 1.66 mV,-1.42 mV			Magnet [Steps]	980
Pressure Adjustment: Left: 9009.1 Right: 8994.8 (Manual A			Cups	1
Ref. Name:	d 2H/1H	vs.	Masses	2.0
HD-5b	-263.980	VSMOW	H3 Factor	2.308532
0				

Raw Data

	Int.2 Sample [mV]	Int.3 Sample [mV]	Int.2 Standard [mV]	Int.3 Standard [mV]	rR 3H2/2H2	R 3H2/2H2	rd 3H2/2H2 [per mil] vs. HD-5b	d 3H2/2H2 [per mil] vs.	d 2H/1H [per mil] vs. VSMOW	AT% 2H/1H [%]
Pre			8991.190	2261.157						
1	9017.113	2480.178	8993.408	2264.846	0.254236	0.000252	101.061	-189.597	-189.597	0.012620
2	9004.294	2475.484	8975.863	2259.279	0.254135	0.000252	100.019	-190.364	-190.364	0.012608
3	8991.593	2470.226	8957.451	2253.326	0.253968	0.000252	99.753	-190.560	-190.560	0.012605
4	8978.470	2465.823	8939.526	2247.659	0.253910	0.000252	99.959	-190.408	-190.408	0.012608
5	8966.442	2461.306	8922.225	2241.626	0.253802	0.000252	100.057	-190.336	-190.336	0.012609
6	8960.095	2459.638	8913.451	2240.387	0.253825	0.000252	100.204	-190.228	-190.228	0.012611

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 3H2/2H2 [per mil] vs. VSMO	-190.249	0.337	0.138		0
d 2H/1H [per mil] vs. VSMOW	-190.249	0.337	0.138	0.012610	0

Friday, March 30, 2012 13:40:17

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Delta Plus
Dual Inlet Results
H2

Z:\MS\plus\data\DualInlet\hydrogen\2012\march\120330\P-38829__HD-7a.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
HD-7a	Check Std	P-38829	HD	03/28/2012	hd_7v.met

Additional Information

Infomation			Gas Configuration	
Peak Center found at [1993]			Gas	H2
Background: 1.52 mV,-1.49 mV			Magnet [Steps]	980
Pressure Adjustment: Left: 6990.4 Right: 6995.4 (Manual A			Cups	1
Ref. Name:	d 2H/1H	vs.	Masses	2.0
HD-5b	-263.980	VSMOW	H3 Factor	2.308532
0				

Raw Data

	Int.2 Sample [mV]	Int.3 Sample [mV]	Int.2 Standard [mV]	Int.3 Standard [mV]	rR 3H2/2H2	R 3H2/2H2	rd 3H2/2H2 [per mil] vs. HD-5b	d 3H2/2H2 [per mil] vs.	d 2H/1H [per mil] vs. VSMOW	AT% 2H/1H [%]
Pre			6987.891	1725.279						
1	6951.631	1910.192	6980.729	1723.377	0.258735	0.000257	121.219	-174.760	-174.760	0.012851
2	6938.531	1906.417	6972.401	1721.029	0.258740	0.000257	121.302	-174.699	-174.699	0.012852
3	6926.310	1902.822	6964.007	1718.739	0.258734	0.000257	121.360	-174.657	-174.657	0.012853
4	6912.846	1898.575	6956.124	1716.878	0.258685	0.000257	121.106	-174.843	-174.843	0.012850
5	6899.187	1894.819	6947.489	1714.564	0.258716	0.000257	121.181	-174.788	-174.788	0.012851
6	6886.626	1890.919	6940.670	1712.698	0.258680	0.000257	121.066	-174.873	-174.873	0.012850

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 3H2/2H2 [per mil] vs. VSMO	-174.770	0.083	0.034		0
d 2H/1H [per mil] vs. VSMOW	-174.770	0.083	0.034	0.012851	0

Friday, March 30, 2012 15:37:38

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Delta Plus
Dual Inlet Results
H2

Z:\MS\plus\data\DualInlet\hydrogen\2012\march\120330\P-38839__HD-7a.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
HD-7a	Check Std	P-38839	HD	03/28/2012	hd_7v.met

Additional Information

Infomation			Gas Configuration	
Peak Center found at [1993]			Gas	H2
Background: 1.90 mV,-1.44 mV			Magnet [Steps]	980
Pressure Adjustment: Left: 6999.3 Right: 6990.3 (Manual A			Cups	1
Ref. Name:	d 2H/1H	vs.	Masses	2.0
HD-5b	-263.980	VSMOW	H3 Factor	2.308532
0				

Raw Data

	Int.2 Sample [mV]	Int.3 Sample [mV]	Int.2 Standard [mV]	Int.3 Standard [mV]	rR 3H2/2H2	R 3H2/2H2	rd 3H2/2H2 [per mil] vs. HD-5b	d 3H2/2H2 [per mil] vs.	d 2H/1H [per mil] vs. VSMOW	AT% 2H/1H [%]
Pre			6980.886	1722.914						
1	6961.930	1912.749	6971.171	1720.799	0.258672	0.000257	121.151	-174.811	-174.811	0.012851
2	6949.519	1909.318	6961.236	1718.198	0.258697	0.000257	121.104	-174.845	-174.845	0.012850
3	6936.283	1905.277	6951.068	1715.277	0.258670	0.000257	121.067	-174.872	-174.872	0.012850
4	6923.015	1901.485	6941.129	1712.683	0.258679	0.000257	121.188	-174.783	-174.783	0.012851
5	6909.888	1897.813	6930.967	1710.175	0.258700	0.000257	121.214	-174.764	-174.764	0.012851
6	6896.775	1893.394	6938.817	1715.243	0.258611	0.000256	119.724	-175.861	-175.861	0.012834

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 3H2/2H2 [per mil] vs. VSMC	-174.815	0.044	0.020		1
d 2H/1H [per mil] vs. VSMOW	-174.815	0.044	0.020	0.012851	1

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Sunday, March 25, 2012 08:02:43

Delta S
Dual Inlet
Carbon Results

Z:\MS\S\data\dual inlet\13C\2012\March\120325\S-72893__wks-2-3.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
wks-2-3	zero	S-72893	CO2	03-25-2012	zero_co2.met

Additional Information

Infomation
Peak Center found at [1974]
Background: -0.10 mV,0.22 mV,0.26 mV
Pressure Adjustment: Left: 2998.3 Right: 2996.4 (Manual A

Gas Configuration	
Gas	CO2
Magnet [Steps]	10446
Cups	3,4,5
Masses	44.0,45.0,46.0

Ref. Name:	d 13C/12C	vs.	d 18O/16O	vs.
CO2_zero	0.000	VPDB	0.000	VPDB
0				

Raw Data

	Int.44 Sample [mV]	Int.44 Standar [mV]	rR 45CO2/44C	rR 46CO2/44C	rd 45CO2/44 [per mil] vs. CO2_zero	rd 46CO2/44 [per mil] vs. CO2_zero	d 45CO2/44CO [per mil] vs. VPDB	d 46CO2/44C [per mil] vs. VPDB	d 13C/12 [per mil] vs. VPDB	d 18O/16C [per mil] vs. VPDB
Pre		2995.87								
1	2989.26	2992.67	1.1451240	1.3770174	-0.025	0.000	-0.025	0.000	-0.027	0.000
2	2987.14	2989.32	1.1450565	1.3768130	0.004	-0.002	0.004	-0.002	0.004	-0.002
3	2984.23	2985.64	1.1449874	1.3767108	0.006	0.057	0.006	0.057	0.004	0.057
4	2981.17	2981.44	1.1449381	1.3764843	0.004	-0.008	0.004	-0.008	0.005	-0.008
5	2977.59	2977.46	1.1448704	1.3764109	0.001	0.008	0.001	0.008	0.001	0.008
6	2973.95	2974.06	1.1448073	1.3762399	-0.001	-0.063	-0.001	-0.063	0.001	-0.063

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 45CO2/44CO2 [per mil] vs. VPDB	-0.002	0.011	0.005		0
d 46CO2/44CO2 [per mil] vs. VPDB	-0.001	0.038	0.016		0
d 13C/12C [per mil] vs. VPDB	-0.002	0.012	0.005		0
d 18O/16O [per mil] vs. VPDB	-0.001	0.038	0.016	1.105656	0
d 17O/16O vs.	-0.001	0.020	0.008	0.206293	0

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Sunday, March 25, 2012 08:12:58

Delta S
Dual Inlet
Carbon Results

Z:\MS\S\data\dual inlet\13C\2012\March\120325\S-72894__KORN-11.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
KORN-11	ck std	S-72894	CO2	03-25-2012	3v_co2.met

Additional Information

Infomation
Peak Center found at [1981]
Background: 0.49 mV,0.89 mV,1.18 mV
Pressure Adjustment: Left: 2997.7 Right: 3004.0 (Manual A

Gas Configuration	
Gas	CO2
Magnet [Steps]	10446
Cups	3,4,5
Masses	44.0,45.0,46.0

Ref. Name:	d 13C/12C	vs.	d 18O/16O	vs.
WKS-2-3	-43.760	VPDB	-21.530	VPDB
0				

Raw Data

	Int.44 Sample [mV]	Int.44 Standar [mV]	rR 45CO2/44C	rR 46CO2/44C	rd 45CO2/44 [per mil] vs. WKS-2-3	rd 46CO2/44 [per mil] vs. WKS-2-3	d 45CO2/44CO [per mil] vs. VPDB	d 46CO2/44C [per mil] vs. VPDB	d 13C/12 [per mil] vs. VPDB	d 18O/16C [per mil] vs. VPDB
Pre		3013.12								
1	2978.35	3008.74	1.1819959	1.4048007	32.864	21.510	-10.041	-0.557	-10.755	-0.534
2	2973.29	3005.51	1.1819916	1.4047327	32.864	21.488	-10.040	-0.579	-10.754	-0.555
3	2968.96	3001.90	1.1819892	1.4046999	32.877	21.485	-10.029	-0.582	-10.741	-0.559
4	2964.80	2999.75	1.1819072	1.4046394	32.837	21.473	-10.067	-0.594	-10.781	-0.570
5	2961.41	2996.44	1.1818795	1.4045638	32.839	21.474	-10.064	-0.592	-10.779	-0.569
6	2956.73	2993.74	1.1818582	1.4045424	32.848	21.510	-10.056	-0.558	-10.771	-0.534

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 45CO2/44CO2 [per mil] vs. VPDB	-10.050	0.012	0.006		2
d 46CO2/44CO2 [per mil] vs. VPDB	-0.584	0.007	0.004		3
d 13C/12C [per mil] vs. VPDB	-10.765	0.012	0.006		2
d 18O/16O [per mil] vs. VPDB	-0.561	0.007	0.004	1.093887	3
d 17O/16O vs.	11.001	0.004	0.002	0.206178	3

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Sunday, March 25, 2012 16:14:00

Delta S
Dual Inlet
Carbon Results

Z:\MS\S\data\dual inlet\13C\2012\March\120325\S-72916__239878.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
239878	HW60 g(2210)	S-72916	C1	03/25/2012	3v_co2.met

Additional Information

Infomation
Peak Center found at [1981]
Background: 1.09 mV,1.56 mV,2.02 mV
Pressure Adjustment: Left: 3004.0 Right: 3004.4 (Manual A

Gas Configuration	
Gas	CO2
Magnet [Steps]	10446
Cups	3,4,5
Masses	44.0,45.0,46.0

Ref. Name:	d 13C/12C	vs.	d 18O/16O	vs.
WKS-2-3	-43.760	VPDB	-21.530	VPDB
0				

Raw Data

	Int.44 Sample [mV]	Int.44 Standar [mV]	rR 45CO2/44C	rR 46CO2/44C	rd 45CO2/44 [per mil] vs. WKS-2-3	rd 46CO2/44 [per mil] vs. WKS-2-3	d 45CO2/44CO [per mil] vs. VPDB	d 46CO2/44C [per mil] vs. VPDB	d 13C/12 [per mil] vs. VPDB	d 18O/16C [per mil] vs. VPDB
Pre		2999.88								
1	2998.30	2996.21	1.1538305	1.4017635	9.008	20.139	-32.906	-1.898	-35.243	-1.823
2	2997.11	2992.89	1.1538758	1.4017490	9.048	20.148	-32.867	-1.890	-35.202	-1.814
3	2996.30	2989.53	1.1538802	1.4018446	9.042	20.174	-32.873	-1.864	-35.209	-1.789
4	2996.04	2986.82	1.1539162	1.4018138	9.067	20.150	-32.849	-1.888	-35.183	-1.813
5	2994.97	2983.54	1.1538983	1.4018513	9.052	20.194	-32.864	-1.845	-35.200	-1.769
6	2993.49	2979.87	1.1539159	1.4018639	9.076	20.206	-32.840	-1.833	-35.175	-1.757

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 45CO2/44CO2 [per mil] vs. VPDB	-32.863	0.010	0.005		2
d 46CO2/44CO2 [per mil] vs. VPDB	-1.872	0.021	0.011		2
d 13C/12C [per mil] vs. VPDB	-35.198	0.011	0.006		2
d 18O/16O [per mil] vs. VPDB	-1.796	0.021	0.011	1.067157	2
d 17O/16O vs.	10.356	0.011	0.006	0.205924	2

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Sunday, March 25, 2012 16:30:37

Delta S
Dual Inlet
Carbon Results

Z:\MS\S\data\dual inlet\13C\2012\March\120325\S-72918__239878a.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
239878a	DUPLICATE g(2211	S-72918	C1	03/25/2012	3v_co2.met

Additional Information

Infomation
Peak Center found at [1981]
Background: 1.31 mV,1.82 mV,2.35 mV
Pressure Adjustment: Left: 2996.1 Right: 2997.6 (Manual A

Gas Configuration	
Gas	CO2
Magnet [Steps]	10446
Cups	3,4,5
Masses	44.0,45.0,46.0

Ref. Name:	d 13C/12C	vs.	d 18O/16O	vs.
WKS-2-3	-43.760	VPDB	-21.530	VPDB
0				

Raw Data

	Int.44 Sample [mV]	Int.44 Standar [mV]	rR 45CO2/44C	rR 46CO2/44C	rd 45CO2/44 [per mil] vs. WKS-2-3	rd 46CO2/44 [per mil] vs. WKS-2-3	d 45CO2/44CO [per mil] vs. VPDB	d 46CO2/44C [per mil] vs. VPDB	d 13C/12 [per mil] vs. VPDB	d 18O/16C [per mil] vs. VPDB
Pre		2981.15								
1	2983.46	2978.11	1.1539435	1.4018693	9.069	20.142	-32.848	-1.896	-35.180	-1.820
2	2982.46	2975.31	1.1539088	1.4018990	9.035	20.186	-32.880	-1.853	-35.217	-1.777
3	2981.76	2971.69	1.1539493	1.4018966	9.083	20.188	-32.834	-1.851	-35.167	-1.776
4	2980.84	2968.73	1.1539337	1.4018675	9.062	20.137	-32.854	-1.901	-35.187	-1.825
5	2979.64	2965.00	1.1539169	1.4018958	9.046	20.171	-32.870	-1.868	-35.205	-1.792
6	2978.31	2962.48	1.1539467	1.4019277	9.081	20.239	-32.836	-1.801	-35.171	-1.726

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 45CO2/44CO2 [per mil] vs. VPDB	-32.852	0.014	0.007		2
d 46CO2/44CO2 [per mil] vs. VPDB	-1.867	0.021	0.010		2
d 13C/12C [per mil] vs. VPDB	-35.186	0.014	0.007		2
d 18O/16O [per mil] vs. VPDB	-1.791	0.021	0.010	1.067170	2
d 17O/16O vs.	10.359	0.011	0.005	0.205925	2

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Sunday, March 25, 2012 17:11:04

Delta S
Dual Inlet
Carbon Results

Z:\MS\S\data\dual inlet\13C\2012\March\120325\S-72922__KORN-11.caf

Identifier 1	Identifier 2	Analysis	Comment	Preparation	Method
KORN-11	ck std	S-72922	CO2	03-25-2012	3v_co2.met

Additional Information

Infomation
Peak Center found at [1981]
Background: 0.96 mV,1.39 mV,1.82 mV
Pressure Adjustment: Left: 3003.6 Right: 2985.1 (Manual A

Gas Configuration	
Gas	CO2
Magnet [Steps]	10446
Cups	3,4,5
Masses	44.0,45.0,46.0

Ref. Name:	d 13C/12C	vs.	d 18O/16O	vs.
WKS-2-3	-43.760	VPDB	-21.530	VPDB
0				

Raw Data

	Int.44 Sample [mV]	Int.44 Standar [mV]	rR 45CO2/44C	rR 46CO2/44C	rd 45CO2/44 [per mil] vs. WKS-2-3	rd 46CO2/44 [per mil] vs. WKS-2-3	d 45CO2/44CO [per mil] vs. VPDB	d 46CO2/44C [per mil] vs. VPDB	d 13C/12 [per mil] vs. VPDB	d 18O/16C [per mil] vs. VPDB
Pre		2980.92								
1	2992.17	2977.54	1.1811344	1.4034497	32.841	21.427	-10.062	-0.638	-10.775	-0.615
2	2988.58	2973.04	1.1811880	1.4035209	32.872	21.481	-10.033	-0.586	-10.745	-0.563
3	2985.17	2970.54	1.1811634	1.4034271	32.857	21.417	-10.047	-0.648	-10.758	-0.625
4	2981.58	2966.65	1.1811263	1.4034253	32.833	21.414	-10.071	-0.651	-10.783	-0.628
5	2978.38	2962.82	1.1811114	1.4033928	32.830	21.412	-10.073	-0.653	-10.786	-0.630
6	2973.72	2958.35	1.1811001	1.4033438	32.826	21.432	-10.077	-0.633	-10.791	-0.610

Evaluated Data

	Mean	Std.Dev.	ST. Error	Atom%	Outlier
d 45CO2/44CO2 [per mil] vs. VPDB	-10.066	0.012	0.005		1
d 46CO2/44CO2 [per mil] vs. VPDB	-0.645	0.008	0.004		1
d 13C/12C [per mil] vs. VPDB	-10.779	0.013	0.006		1
d 18O/16O [per mil] vs. VPDB	-0.622	0.008	0.004	1.093872	1
d 17O/16O vs.	10.970	0.004	0.002	0.206166	1