

APPENDIX 1
M34-496 Background Arsenic Information:
Figure 4 – M34-496 Background Locations
Analytical Table
Analytical Report



143 Diamond Ave
Parachute, CO 81635
PHONE: 970-285-2600

Created By: Jake Janicek (EHS Specialist)
Date: 5/2/2019

LEGEND



Background Soil Sample

Figure 4
M34-496

Background Soil Samples



Site Location:
North Parachute Ranch (NPR)
Garfield County, Colorado
Caerus Oil and Gas LLC

TABLE 1
M34-496
BACKGROUND SOIL ANALYTICAL RESULTS
CAERUS OIL AND GAS
PICEANCE BASIN, COLORADO

PARAMETER	COGCC CONCENTRATION LEVELS	UNITS	M34-SE BACK - 081710	M34-S BACK - 081710	M34-SW BACK - 081710
Sample Date			8/17/2010	8/17/2010	8/17/2010
Sample Type			Background	Background	Background
Arsenic	0.39	mg/kg	4.3	14	5.1
Barium	15,000	mg/kg	NA	NA	NA
Cadmium	70	mg/kg	NA	NA	NA
Chromium (III)	120,000	mg/kg	NA	NA	NA
Chromium (VI)	23	mg/kg	NA	NA	NA
Copper	3,100	mg/kg	NA	NA	NA
Lead	400	mg/kg	NA	NA	NA
Mercury	23	mg/kg	NA	NA	NA
Nickel	1,600	mg/kg	NA	NA	NA
Selenium	390	mg/kg	NA	NA	NA
Silver	390	mg/kg	NA	NA	NA
Zinc	23,000	mg/kg	NA	NA	NA
EC	4 or 2x background	mmhos/cm	NA	NA	NA
pH	6-9	SU	NA	NA	NA
SAR	12	unitless	NA	NA	NA
TPH-DRO			NA	NA	NA
TPH-GRO			NA	NA	NA
TPH	500	mg/kg	NA	NA	NA
Benzene	0.17	mg/kg	NA	NA	NA
Toluene	85	mg/kg	NA	NA	NA
Ethylbenzene	100	mg/kg	NA	NA	NA
Total Xylenes	175	mg/kg	NA	NA	NA
Acenaphthene	1,000	mg/kg	NA	NA	NA
Anthracene	1,000	mg/kg	NA	NA	NA
Benz(a)anthracene	0.22	mg/kg	NA	NA	NA
Benzo(b)fluoranthene	0.22	mg/kg	NA	NA	NA
Benzo(k)fluoranthene	2.2	mg/kg	NA	NA	NA
Benzo(a)pyrene	0.022	mg/kg	NA	NA	NA
Chrysene	22	mg/kg	NA	NA	NA
Dibenzo(a,h)anthracene	0.022	mg/kg	NA	NA	NA
Fluoranthene	1,000	mg/kg	NA	NA	NA
Fluorene	1,000	mg/kg	NA	NA	NA
Indeno(1,2,3,c,d)pyrene	0.22	mg/kg	NA	NA	NA
Naphthalene	23	mg/kg	NA	NA	NA
Pyrene	1,000	mg/kg	NA	NA	NA

Notes:

< - less than the stated reporting limit

Highlight - indicates result exceeds the COGCC concentration level

COGCC - Colorado Oil and Gas Conservation Commission

EC - electrical conductivity

mg/kg - milligrams per kilogram

mmhos/cm - millimhos per centimeter

NA - not analyzed

SAR - sodium adsorption ratio

SU - standard unit

TPH-GRO - total petroleum hydrocarbons-gasoline range organics

TPH-DRO - total petroleum hydrocarbons-diesel range organics

TPH - combination of TPH-GRO and TPH-DRO



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Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

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Est. 1970

Chris Hines or Brad Kieding
EnCana Oil & Gas Inc. - CO
2717 County Road 215, Suite 100
Parachute, CO 81635

Report Summary

Monday August 23, 2010

Report Number: L474577

Samples Received: 08/19/10

Client Project: M34 PIT CLOSURE

Description: M34 Pit Closure

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By:

Jarred Willis , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - I-2327, CT - PH-0197, FL - E87487
GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704, ND - R-140
NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 00109, WV - 233
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REPORT OF ANALYSIS

Chris Hines or Brad Kieding
EnCana Oil & Gas Inc. - CO
2717 County Road 215, Suite 100
Parachute, CO 81635

August 23, 2010

Date Received : August 19, 2010
Description : M34 Pit Closure
Sample ID : M34-SE BACK-081710
Collected By : Blair Rollins
Collection Date : 08/17/10 13:25

ESC Sample # : L474577-01

Site ID :

Project # : M34 PIT CLOSURE

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	4.3	1.0	mg/kg	6010B	08/21/10	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

The reported analytical results relate only to the sample submitted.

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EnCana Oil & Gas Inc. - CO
2717 County Road 215, Suite 100
Parachute, CO 81635

August 23, 2010

Date Received : August 19, 2010
Description : M34 Pit Closure
Sample ID : M34-S BACK-081710
Collected By : Blair Rollins
Collection Date : 08/17/10 13:30

ESC Sample # : L474577-02

Site ID :

Project # : M34 PIT CLOSURE

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	14.	1.0	mg/kg	6010B	08/21/10	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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Parachute, CO 81635

August 23, 2010

Date Received : August 19, 2010
Description : M34 Pit Closure
Sample ID : M34-SW BACK-081710
Collected By : Blair Rollins
Collection Date : 08/17/10 13:35

ESC Sample # : L474577-03

Site ID :

Project # : M34 PIT CLOSURE

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	5.1	1.0	mg/kg	6010B	08/21/10	1

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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Parachute, CO 81635

August 23, 2010

Date Received : August 19, 2010
Description : M34 Pit Closure
Sample ID : M34-S PIT-081710
Collected By : Blair Rollins
Collection Date : 08/17/10 14:10

ESC Sample # : L474577-04

Site ID :

Project # : M34 PIT CLOSURE

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	3.6	1.0	mg/kg	6010B	08/20/10	1
Benzene	BDL	0.0025	mg/kg	8021/8015	08/19/10	5
Toluene	BDL	0.025	mg/kg	8021/8015	08/19/10	5
Ethylbenzene	BDL	0.0025	mg/kg	8021/8015	08/19/10	5
Total Xylene	BDL	0.0075	mg/kg	8021/8015	08/19/10	5
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	GRO	08/19/10	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	103.		% Rec.	8021/8015	08/19/10	5
a,a,a-Trifluorotoluene(PID)	107.		% Rec.	8021/8015	08/19/10	5
TPH (GC/FID) High Fraction	2000	80.	mg/kg	3546/DRO	08/22/10	20
Surrogate recovery(%)						
o-Terphenyl	0.00		% Rec.	3546/DRO	08/22/10	20

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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2717 County Road 215, Suite 100
Parachute, CO 81635

August 23, 2010

Date Received : August 19, 2010
Description : M34 Pit Closure
Sample ID : M34-N PIT-081710
Collected By : Blair Rollins
Collection Date : 08/17/10 14:30

ESC Sample # : L474577-05

Site ID :

Project # : M34 PIT CLOSURE

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	5.9	1.0	mg/kg	6010B	08/20/10	1
TPH (GC/FID) Low Fraction	BDL	0.50	mg/kg	8015D/GRO	08/20/10	5
Surrogate Recovery (70-130) a,a,a-Trifluorotoluene(FID)	118.		% Rec.	602/8015	08/20/10	5
TPH (GC/FID) High Fraction	3000	80.	mg/kg	3546/DRO	08/22/10	20
Surrogate recovery(%) o-Terphenyl	0.00		% Rec.	3546/DRO	08/22/10	20

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

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EnCana Oil & Gas Inc. - CO
2717 County Road 215, Suite 100
Parachute, CO 81635

August 23, 2010

Date Received : August 19, 2010
Description : M34 Pit Closure
Sample ID : M34-SPOILS-081710
Collected By : Blair Rollins
Collection Date : 08/17/10 14:50

ESC Sample # : L474577-06

Site ID :

Project # : M34 PIT CLOSURE

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Arsenic	5.4	1.0	mg/kg	6010B	08/20/10	1
Benzene	BDL	0.0025	mg/kg	8021/8015	08/19/10	5
Toluene	BDL	0.025	mg/kg	8021/8015	08/19/10	5
Ethylbenzene	0.0026	0.0025	mg/kg	8021/8015	08/19/10	5
Total Xylene	BDL	0.0075	mg/kg	8021/8015	08/19/10	5
TPH (GC/FID) Low Fraction	3.1	0.50	mg/kg	GRO	08/19/10	5
Surrogate Recovery-%						
a,a,a-Trifluorotoluene(FID)	103.		% Rec.	8021/8015	08/19/10	5
a,a,a-Trifluorotoluene(PID)	105.		% Rec.	8021/8015	08/19/10	5
TPH (GC/FID) High Fraction	1400	80.	mg/kg	3546/DRO	08/22/10	20
Surrogate recovery(%)						
o-Terphenyl	0.00		% Rec.	3546/DRO	08/22/10	20

BDL - Below Detection Limit

Det. Limit - Practical Quantitation Limit(PQL)

Note:

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Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L474577-04	WG494373	SAMP	o-Terphenyl	R1338829	J7
L474577-05	WG494373	SAMP	o-Terphenyl	R1338829	J7
L474577-06	WG494373	SAMP	o-Terphenyl	R1338829	J7

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
J7	Surrogate recovery limits cannot be evaluated; surrogates were diluted out

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods, it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

- Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.
- Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Difference.
- Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromatography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.
- TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed
08/23/10 at 16:53:22

TSR Signing Reports: 358
R3 - Rush: Two Day

Create p-keys for projects. Enter project name as Project Number and Project Name. Log all samples to separate L#s. See L471333 when COC says see attached list. PAHs = SV8270PAHSIM. BTEX = 8021.

Sample: L474577-01 Account: ENCANACO Received: 08/19/10 09:00 Due Date: 08/23/10 00:00 RPT Date: 08/23/10 16:47

Sample: L474577-02 Account: ENCANACO Received: 08/19/10 09:00 Due Date: 08/23/10 00:00 RPT Date: 08/23/10 16:47

Sample: L474577-03 Account: ENCANACO Received: 08/19/10 09:00 Due Date: 08/23/10 00:00 RPT Date: 08/23/10 16:47

Sample: L474577-04 Account: ENCANACO Received: 08/19/10 09:00 Due Date: 08/23/10 00:00 RPT Date: 08/23/10 16:47

Sample: L474577-05 Account: ENCANACO Received: 08/19/10 09:00 Due Date: 08/23/10 00:00 RPT Date: 08/23/10 16:47

Sample: L474577-06 Account: ENCANACO Received: 08/19/10 09:00 Due Date: 08/23/10 00:00 RPT Date: 08/23/10 16:47



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2717 County Road 215, Suite 100

Parachute, CO 81635

Quality Assurance Report
Level II

L474577

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
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Analyte	Result	Laboratory Blank		Limit	Batch	Date Analyzed
		Units	% Rec			
Benzene	< .0005	mg/kg			WG494211	08/19/10 14:24
Ethylbenzene	< .0005	mg/kg			WG494211	08/19/10 14:24
Toluene	< .005	mg/kg			WG494211	08/19/10 14:24
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG494211	08/19/10 14:24
Total Xylene	< .0015	mg/kg			WG494211	08/19/10 14:24
a,a,a-Trifluorotoluene(FID)		% Rec.	103.3	59-128	WG494211	08/19/10 14:24
a,a,a-Trifluorotoluene(PID)		% Rec.	106.9	54-144	WG494211	08/19/10 14:24
TPH (GC/FID) High Fraction	< 4	ppm			WG494373	08/20/10 08:06
o-Terphenyl		% Rec.	96.56	50-150	WG494373	08/20/10 08:06
Arsenic	< 1	mg/kg			WG494363	08/20/10 11:22
TPH (GC/FID) Low Fraction	< .1	mg/kg			WG494250	08/19/10 15:02
a,a,a-Trifluorotoluene(FID)		% Rec.	117.4	59-128	WG494250	08/19/10 15:02
Arsenic	< 1	mg/kg			WG494361	08/21/10 13:00
Arsenic	< 1	mg/kg			WG494575	08/22/10 09:47

Analyte	Units	Result	Duplicate		Limit	Ref Samp	Batch
			Duplicate	RPD			
Arsenic	mg/kg	4.20	4.31	2.35	20	L474594-04	WG494363
Arsenic	mg/kg	11.0	11.3	3.60	20	L474438-07	WG494361
Arsenic	mg/kg	16.0	14.0	12.1	20	L474577-02	WG494575

Analyte	Units	Laboratory Control Sample		% Rec	Limit	Batch
		Known Val	Result			
Benzene	mg/kg	.05	0.0539	108.	76-113	WG494211
Ethylbenzene	mg/kg	.05	0.0539	108.	78-115	WG494211
Toluene	mg/kg	.05	0.0524	105.	76-114	WG494211
Total Xylene	mg/kg	.15	0.156	104.	81-118	WG494211
a,a,a-Trifluorotoluene(PID)				106.9	54-144	WG494211
TPH (GC/FID) Low Fraction	mg/kg	5.5	5.53	101.	67-135	WG494211
a,a,a-Trifluorotoluene(FID)				108.0	59-128	WG494211
TPH (GC/FID) High Fraction	ppm	60	47.6	79.3	50-150	WG494373
o-Terphenyl				99.69	50-150	WG494373
Arsenic	mg/kg	192	163.	84.9	78.6-120.8	WG494363
TPH (GC/FID) Low Fraction	mg/kg	5.5	4.90	89.1	67-135	WG494250
a,a,a-Trifluorotoluene(FID)				77.10	59-128	WG494250

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



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Analyte	Units	Laboratory Control Known Val	Sample Result	% Rec	Limit	Batch
Arsenic	mg/kg	192	164.	85.4	78.6-120.8	WG494361
Arsenic	mg/kg	192	205.	107.	78.6-120.8	WG494575

Analyte	Units	Laboratory Control Result	Ref	Sample Duplicate %Rec	Limit	RPD	Limit	Batch
Benzene	mg/kg	0.0550	0.0539	110.	76-113	2.06	20	WG494211
Ethylbenzene	mg/kg	0.0536	0.0539	107.	78-115	0.590	20	WG494211
Toluene	mg/kg	0.0528	0.0524	106.	76-114	0.750	20	WG494211
Total Xylene	mg/kg	0.155	0.156	103.	81-118	0.640	20	WG494211
a,a,a-Trifluorotoluene(PID)				107.5	54-144			WG494211
TPH (GC/FID) Low Fraction	mg/kg	6.15	5.53	112.	67-135	10.7	20	WG494211
a,a,a-Trifluorotoluene(FID)				107.6	59-128			WG494211
TPH (GC/FID) High Fraction	ppm	47.2	47.6	79.0	50-150	0.877	25	WG494373
o-Terphenyl				102.4	50-150			WG494373
TPH (GC/FID) Low Fraction	mg/kg	5.00	4.90	91.0	67-135	1.95	20	WG494250
a,a,a-Trifluorotoluene(FID)				76.64	59-128			WG494250

Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Benzene	mg/kg	0.224	0.00110	.05	89.2	32-137	L474297-01	WG494211
Ethylbenzene	mg/kg	0.172	0	.05	68.9	10-150	L474297-01	WG494211
Toluene	mg/kg	0.175	0	.05	69.9	20-142	L474297-01	WG494211
Total Xylene	mg/kg	0.510	0.0200	.15	65.3	16-141	L474297-01	WG494211
a,a,a-Trifluorotoluene(PID)					106.2	54-144		WG494211
TPH (GC/FID) Low Fraction	mg/kg	25.5	5.40	5.5	73.1	55-109	L474297-01	WG494211
a,a,a-Trifluorotoluene(FID)					104.7	59-128		WG494211
Arsenic	mg/kg	47.7	4.31	50	86.8	75-125	L474594-04	WG494363
TPH (GC/FID) Low Fraction	mg/kg	4.48	0.295	5.5	76.0	55-109	L474454-03	WG494250
a,a,a-Trifluorotoluene(FID)					81.92	59-128		WG494250
Arsenic	mg/kg	58.5	11.3	10	94.4	75-125	L474438-07	WG494361
Arsenic	mg/kg	56.2	14.0	50	84.4	75-125	L474577-02	WG494575

Analyte	Units	MSD	Ref	Matrix Spike Duplicate %Rec	Limit	RPD	Limit	Ref Samp	Batch
Benzene	mg/kg	0.233	0.224	92.7	32-137	3.79	39	L474297-01	WG494211
Ethylbenzene	mg/kg	0.182	0.172	73.0	10-150	5.76	44	L474297-01	WG494211
Toluene	mg/kg	0.180	0.175	72.0	20-142	2.88	42	L474297-01	WG494211
Total Xylene	mg/kg	0.528	0.510	67.7	16-141	3.47	46	L474297-01	WG494211
a,a,a-Trifluorotoluene(PID)				107.0	54-144				WG494211
TPH (GC/FID) Low Fraction	mg/kg	24.0	25.5	67.6	55-109	6.14	20	L474297-01	WG494211
a,a,a-Trifluorotoluene(FID)				104.6	59-128				WG494211

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August 23, 2010

Analyte	Units	MSD	Matrix Spike Duplicate		Limit	RPD	Limit	Ref Samp	Batch
			Ref	%Rec					
Arsenic	mg/kg	46.3	47.7	84.0	75-125	2.98	20	L474594-04	WG494363
TPH (GC/FID) Low Fraction	mg/kg	4.66	4.48	79.4	55-109	4.02	20	L474454-03	WG494250
a,a,a-Trifluorotoluene(FID)				82.92	59-128				WG494250
Arsenic	mg/kg	57.0	58.5	91.4	75-125	2.60	20	L474438-07	WG494361
Arsenic	mg/kg	57.6	56.2	87.2	75-125	2.46	20	L474577-02	WG494575

Batch number /Run number / Sample number cross reference

WG494211: R1338388: L474577-04 06
WG494373: R1338829: L474577-04 05 06
WG494363: R1339409: L474577-04 05 06
WG494250: R1339648: L474577-05
WG494361: R1341331: L474577-01 03
WG494575: R1341551: L474577-02

* * Calculations are performed prior to rounding of reported values .
* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'



YOUR LAB OF CHOICE

EnCana Oil & Gas Inc. - CO
Chris Hines or Brad Kieding
2717 County Road 215, Suite 100

Parachute, CO 81635

Quality Assurance Report
Level II

L474577

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

August 23, 2010

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.