

## CBRMarslandPEm Resource

---

**From:** John Schmuck [John\_Schmuck@Cameco.com]  
**Sent:** Wednesday, May 28, 2014 5:51 PM  
**To:** Lancaster, Thomas  
**Cc:** Sabrina Fox; Rhonda Grantham; Larry Teahon; Doug Pavlick; Jack Cearley  
**Subject:** Marland TR Appendix U Replacement Pages  
**Attachments:** Appendix U replacement pages 5-28-2014.pdf

Tom - Attached please find 12 replacement pages (the first six pages when double sided) for Appendix U of the Marsland TR. In the comments field of the Sample Analysis Report we have added the time period over which the sample was collected. The other Sample Analysis Reports in Appendix U already include this information.

Thanks. .john

This email and any files transmitted with it are personal and confidential, and are solely for the use of the individual or entity addressed. Therefore, if you are not the intended recipient, please delete this email and any files transmitted with it (without making any copies) and advise the author immediately.

**Hearing Identifier:** CrowButte\_Marsland\_Public  
**Email Number:** 91

**Mail Envelope Properties** (C9CF2A1FD2D6764E9D8E6D15CFBC5AD38453E574)

**Subject:** Marland TR Appendix U Replacement Pages  
**Sent Date:** 5/28/2014 5:51:24 PM  
**Received Date:** 5/28/2014 5:55:26 PM  
**From:** John Schmuck

**Created By:** John\_Schmuck@Cameco.com

**Recipients:**

"Sabrina Fox" <Sabrina\_Fox@cameco.com>  
Tracking Status: None  
"Rhonda Grantham" <Rhonda\_Grantham@cameco.com>  
Tracking Status: None  
"Larry Teahon" <Larry\_Teahon@cameco.com>  
Tracking Status: None  
"Doug Pavlick" <Doug\_Pavlick@cameco.com>  
Tracking Status: None  
"Jack Cearley" <Jack.Cearley@arcadis-us.com>  
Tracking Status: None  
"Lancaster, Thomas" <Thomas.Lancaster@nrc.gov>  
Tracking Status: None

**Post Office:** CA0MX05P.cameco.com

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	668	5/28/2014 5:55:26 PM
Appendix U replacement pages 5-28-2014.pdf		3202720

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**



### Air Filter Summary Report

Client: Cameco Resources, Crow Butte Operation

Client Sample ID: MA-1

Lab ID: S1201090-001		Sample Air Volume: 3850477 Liters						
Sampled 10/1/2011-1/4/2012 (2011 4th Qtr)								
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Lead 210	72.2	6.4	2E-14	2E-15	2E-15	6 E-13	Day	3.33
Radium 226	<0.3		<1E-16		1E-16	9 E-13	Week	0.00
Thorium 230	<0.3		<1E-16		1E-16	3 E-14	Year	0.00
Uranium	<0.3		<1E-16		1E-16	9 E-14	Year	0.00



### Air Filter Summary Report

Client: Cameco Resources, Crow Butte Operation

Client Sample ID: MA-2

Lab ID: S1201090-002		Sampled 10/1/2011-1/4/2012 (2011 4th Qtr)							Sample Air Volume: 3851229 Liters	
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.		
Lead 210	86.9	6.9	2E-14	2E-15	2E-15	6 E-13	Day	3.33		
Radium 226	<0.3		<1E-16		1E-16	9 E-13	Week	0.00		
Thorium 230	<0.3		<1E-16		1E-16	3 E-14	Year	0.00		
Uranium	<0.3		<1E-16		1E-16	9 E-14	Year	0.00		



### Air Filter Summary Report

Client: Cameco Resources, Crow Butte Operation

Client Sample ID: MA-3

Lab ID: S1201090-003		Sample Air Volume: 3852794 Liters						
Sampled 10/1/2011-1/4/2012 (2011 4th Qtr)								
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Lead 210	83.0	6.2	2E-14	2E-15	2E-15	6 E-13	Day	3.33
Radium 226	<0.3		<1E-16		1E-16	9 E-13	Week	0.00
Thorium 230	0.4	0.4	<1E-16		1E-16	3 E-14	Year	0.00
Uranium	0.3		<1E-16		1E-16	9 E-14	Year	0.00



### Air Filter Summary Report

Client: Cameco Resources, Crow Butte Operation

Client Sample ID: MA-4

Lab ID: S1201090-004		Sample Air Volume: 3853046 Liters						
Sampled 10/1/2011-1/4/2012 (2011 4th Qtr)								
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Lead 210	91.2	7.2	2E-14	2E-15	2E-15	6 E-13	Day	3.33
Radium 226	<0.3		<1E-16		1E-16	9 E-13	Week	0.00
Thorium 230	<0.3		<1E-16		1E-16	3 E-14	Year	0.00
Uranium	<0.3		<1E-16		1E-16	9 E-14	Year	0.00

Effluent Limits are from 10 CFR Part 20 Appendix B Table 2

ND - Not Detected at the Reporting Limit



### Air Filter Summary Report

Client: Cameco Resources, Crow Butte Operation

Client Sample ID: MA-5

Lab ID: S1201090-005		Sample Air Volume: 3856136 Liters						
Sampled 10/1/2011-1/4/2012 (2011 4th Qtr)								
Analyte	Result pCi/filter	Precision ± pCi/filter	Result µCi/ml	Precision ± µCi/ml	RL	10 CFR Pt 20 Effluent Limit	Effluent Class	% Effluent Conc.
Lead 210	70.5	6.0	2E-14	2E-15	2E-15	6 E-13	Day	3.33
Radium 226	<0.3		<1E-16		1E-16	9 E-13	Week	0.00
Thorium 230	0.4	0.4	1E-16	1E-16	1E-16	3 E-14	Year	0.33
Uranium	<0.3		<1E-16		1E-16	9 E-14	Year	0.00



Date: 1/20/2012

---

**CLIENT:** Cameco Resources, Crow Butte Operation  
**Project:** Marshland Expansion Area  
**Lab Order:** S1201090

**CASE NARRATIVE**  
**Report ID:** S1201090001

---

Samples MA-1, MA-2, MA-3, MA-4, and MA-5 were received on January 9, 2012.

All samples were received and analyzed within the EPA recommended holding times, except those noted in this case narrative. Samples were analyzed using the methods outlined in the following references:

U.S.E.P.A. 600 "Methods for Chemical Analysis of Water and Wastes", 1993  
"Standard Methods For The Examination of Water and Wastewater", 20th ed., 1998  
Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW846, 3rd Edition  
Methods indicated with the Monday, March 12, 2007 Federal Register, 40 CFR Part 122, 136 et al.

All Quality Control parameters met the acceptance criteria defined by EPA and Inter-Mountain Laboratories except as indicated in this case narrative.

---

Reviewed by:

Wade Nieuwsma, Assistant Laboratory Manager





### Sample Analysis Report

**Company:** Cameco Resources, Crow Butte Operation  
PO Box 169  
Crawford, NE 69339

**Date Reported:** 1/20/2012  
**Report ID:** S1201090001

**ProjectName:** Marshland Expansion Area  
**Lab ID:** S1201090-001  
**ClientSample ID:** MA-1  
**COC:** WEB

**WorkOrder:** S1201090  
**CollectionDate:** 1/4/2012  
**DateReceived:** 1/9/2012  
**FieldSampler:** RG  
**Matrix:** Filter

**Comments** **Sampled 10/1/2011-1/4/2012 (2011 4<sup>th</sup> QTR)**

Analyses	Result	Units	Qual	RL	Method	Date Analyzed/Init
<b>Field</b>						
Actual Volume	3850477	Liters			Field	1/4/2012
<b>Radionuclides - Filter</b>						
Lead 210	72.2	pCi/Filter		2	OTW01	1/19/2012 12:55:00 PM SH
Lead 210 Precision (±)	6.4	pCi/Filter			OTW01	1/19/2012 12:55:00 PM SH
Lead 210	1.9E-14	µCi/mL		2.0E-15	Calculation	2/7/2012 5:07:39 PM WN
Lead 210 Precision (±)	1.7E-15	µCi/mL			Calculation	2/7/2012 5:07:39 PM WN
Radium 226	ND	pCi/Filter		0.3	SM 7500RAB	1/18/2012 11:20:00 AM SH
Radium 226 Precision (±)	NA	pCi/Filter			SM 7500RAB	1/18/2012 11:20:00 AM SH
Radium 226	ND	µCi/mL		1.0E-16	Calculation	2/7/2012 5:07:39 PM WN
Radium 226 Precision (±)	NA	µCi/mL			Calculation	2/7/2012 5:07:39 PM WN
Thorium 230	ND	pCi/Filter		0.3	ACW10	1/31/2012 1:59:00 PM WL
Thorium 230 Precision (±)	NA	pCi/Filter			ACW10	1/31/2012 1:59:00 PM WL
Thorium 230	ND	µCi/mL		1.0E-16	Calculation	2/7/2012 5:07:39 PM WN
Thorium 230 Precision (±)	NA	µCi/mL			Calculation	2/7/2012 5:07:39 PM WN
Uranium	ND	pCi/Filter		0.3	EPA 200.8	2/6/2012 12:15:01 PM MS
Uranium	ND	µCi/mL		1.0E-16	Calculation	2/7/2012 5:07:39 PM WN

These results apply only to the samples tested.

RL - Reporting Limit

- Qualifiers:**
- \* Value exceeds Maximum Contaminant Level
  - C Calculated Value
  - H Holding times for preparation or analysis exceeded
  - L Analyzed by a contract laboratory
  - ND Not Detected at the Reporting Limit
  - S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- M Value exceeds Monthly Ave or MCL
- O Outside the Range of Dilutions

Reviewed by: Wade Nieuwsma  
Wade Nieuwsma, Assistant Laboratory Manager



Sample Analysis Report

Company: Cameco Resources, Crow Butte Operation
PO Box 169
Crawford, NE 69339

Date Reported: 1/20/2012
Report ID: S1201090001

ProjectName: Marshland Expansion Area
Lab ID: S1201090-002
ClientSample ID: MA-2
COC: WEB

WorkOrder: S1201090
CollectionDate: 1/4/2012
DateReceived: 1/9/2012
FieldSampler: RG
Matrix: Filter

Sampled 10/1/2011-1/4/2012 (2011 4th QTR)

Comments

Table with 7 columns: Analyses, Result, Units, Qual, RL, Method, Date Analyzed/Init. Rows include Field, Actual Volume, Radionuclides - Filter, and various radionuclide measurements like Lead 210, Radium 226, Thorium 230, and Uranium.

These results apply only to the samples tested.

RL - Reporting Limit

- Qualifiers: \* Value exceeds Maximum Contaminant Level, C Calculated Value, H Holding times for preparation or analysis exceeded, L Analyzed by a contract laboratory, ND Not Detected at the Reporting Limit, S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank, E Value above quantitation range, J Analyte detected below quantitation limits, M Value exceeds Monthly Ave or MCL, O Outside the Range of Dilutions

Reviewed by: [Signature]
Wade Nieuwsma, Assistant Laboratory Manager



Sample Analysis Report

Company: Cameco Resources, Crow Butte Operation
PO Box 169
Crawford, NE 69339

Date Reported 1/20/2012
Report ID: S1201090001

ProjectName: Marshland Expansion Area
Lab ID: S1201090-003
ClientSample ID: MA-3
COC: WEB

WorkOrder: S1201090
CollectionDate: 1/4/2012
DateReceived: 1/9/2012
FieldSampler: RG
Matrix: Filter

Sampled 10/1/2011-1/4/2012 (2011 4th QTR)

Comments

Table with 7 columns: Analyses, Result, Units, Qual, RL, Method, Date Analyzed/Init. Rows include Field Actual Volume, Radionuclides - Filter (Lead 210, Radium 226, Thorium 230, Uranium) and their respective results and methods.

These results apply only to the samples tested.

RL - Reporting Limit

- Qualifiers: \* Value exceeds Maximum Contaminant Level
C Calculated Value
H Holding times for preparation or analysis exceeded
L Analyzed by a contract laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL
O Outside the Range of Dilutions

Reviewed by: Wade Nieuwsma, Assistant Laboratory Manager



Sample Analysis Report

Company: Cameco Resources, Crow Butte Operation
PO Box 169
Crawford, NE 69339

Date Reported: 1/20/2012
Report ID: S1201090001

ProjectName: Marshland Expansion Area
Lab ID: S1201090-004
ClientSample ID: MA-4
COC: WEB

WorkOrder: S1201090
CollectionDate: 1/4/2012
DateReceived: 1/9/2012
FieldSampler: RG
Matrix: Filter

Sampled 10/1/2011-1/4/2012 (2011 4th QTR)

Comments

Table with columns: Analyses, Result, Units, Qual, RL, Method, Date Analyzed/Init. Rows include Field Actual Volume, Radionuclides - Filter (Lead 210, Radium 226, Thorium 230, Uranium) and their respective results and methods.

These results apply only to the samples tested.

RL - Reporting Limit

- Qualifiers: \* Value exceeds Maximum Contaminant Level
C Calculated Value
H Holding times for preparation or analysis exceeded
L Analyzed by a contract laboratory
ND Not Detected at the Reporting Limit
S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
M Value exceeds Monthly Ave or MCL
O Outside the Range of Dilutions

Reviewed by: [Signature]
Wade Nieuwsma, Assistant Laboratory Manager



Sample Analysis Report

Company: Cameco Resources, Crow Butte Operation
PO Box 169
Crawford, NE 69339

Date Reported: 1/20/2012
Report ID: S1201090001

ProjectName: Marshland Expansion Area
Lab ID: S1201090-005
ClientSample ID: MA-5
COC: WEB

WorkOrder: S1201090
CollectionDate: 1/4/2012
DateReceived: 1/9/2012
FieldSampler: RG
Matrix: Filter

Sampled 10/1/2011-1/4/2012 (2011 4th QTR)

Comments

Table with 7 columns: Analyses, Result, Units, Qual, RL, Method, Date Analyzed/Init. Rows include Field, Actual Volume, Radionuclides - Filter, and various isotopes like Lead 210, Radium 226, Thorium 230, and Uranium.

These results apply only to the samples tested.

RL - Reporting Limit

- Qualifiers: \* Value exceeds Maximum Contaminant Level, C Calculated Value, H Holding times for preparation or analysis exceeded, L Analyzed by a contract laboratory, ND Not Detected at the Reporting Limit, S Spike Recovery outside accepted recovery limits

- B Analyte detected in the associated Method Blank, E Value above quantitation range, J Analyte detected below quantitation limits, M Value exceeds Monthly Ave or MCL, O Outside the Range of Dilutions

Reviewed by: [Signature]
Wade Nieuwsma, Assistant Laboratory Manager



### ANALYTICAL QC SUMMARY REPORT

CLIENT: Cameco Resources, Crow Butte Operation  
Work Order: S1201090  
Project: Marshland Expansion Area

Date: 1/20/2012  
Report ID: S1201090001

#### Uranium, Air Filter Analysis

Sample Type MBLK Units: pCi/Filter

Sample ID	RunNo: 78768	Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
BLK	01/11/12 12:17	Uranium	ND	0.3					

Sample Type LCS Units: pCi/Filter

Sample ID	RunNo: 78768	Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
LCS	01/11/12 10:05	Uranium	65.8	0.3	67.7		97.1	85 - 115	

Sample Type MS Units: pCi/Filter

Sample ID	RunNo: 78768	Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
S1201090-001AS	01/11/12 10:19	Uranium	726	0.3	745	16.6	95.3	70 - 130	

Sample Type MSD Units: pCi/Filter

Sample ID	RunNo: 78768	Analyte	Result	RL	Conc	%RPD	%REC	% RPD Limits	Qual
S1201090-001AMSD	01/11/12 10:21	Uranium	745	0.3	726	2.68		20	

Sample Type DUP Units: pCi/Filter

Sample ID	RunNo: 78768	Analyte	Result	RL	Ref Samp	%RPD	%REC	% RPD Limits	Qual
S1201090-001AD	01/11/12 10:16	Uranium	ND	0.3	16.6			20	

#### Lead 210 in Filters

Sample Type MBLK Units: pCi/Filter

Sample ID	RunNo: 79071	Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
AMB12-011	01/19/12 10:44	Lead 210	ND	2					

Sample Type LCS Units: pCi/Filter

Sample ID	RunNo: 79071	Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
LCS	01/19/12 0:00	Lead 210	14	2	12.8		112	70 - 130	

#### Radium 226 Air Filter Analysis

Sample Type MBLK Units: pCi/Filter

Sample ID	RunNo: 79035	Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
MB12-011	01/18/12 11:20	Radium 226	ND	0.3					

Sample Type LCS Units: pCi/Filter

Sample ID	RunNo: 79035	Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
LCS12-011	01/18/12 11:20	Radium 226	5.0	0.3	5.06		99.5	70 - 130	

Sample Type MS Units: pCi/Filter

Sample ID	RunNo: 79035	Analyte	Result	RL	Spike	Ref Samp	%REC	% Rec Limits	Qual
TAP WATER MS	01/18/12 13:44	Radium 226	4.8	0.3	5.06	ND	94.1	70 - 130	

- Qualifiers:**
- B Analyte detected in the associated Method Blank
  - H Holding times for preparation or analysis exceeded
  - L Analyzed by a contract laboratory
  - O Outside the Range of Dilutions
  - S Spike Recovery outside accepted recovery limits
  - E Value above quantitation range
  - J Analyte detected below quantitation limits
  - ND Not Detected at the Reporting Limit
  - R RPD outside accepted recovery limits