ANALYTICAL SUMMARY REPORT

November 11, 2011

Crow Butte Resources
86 Crow Butte Rd
Crawford, NE 69339

Workorder No.: C11091177 Quote ID: C1125 - Crow Butte Uranium

Project Name: Marsland Baseline Private Well Samples

Energy Laboratories, Inc. Casper WY received the following 1 sample for Crow Butte Resources on 9/30/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C11091177-001	Well #725	09/29/11 00:00	09/30/11	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity QA Calculations Conductivity Sample Filtering Fluoride E300.0 Anions Uranium, Suspended Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite pH Digestion, Total Metals Lead 210, Dissolved Lead 210, Suspended Polonium 210, Dissolved Polonium 210, Suspended Radium 226, Dissolved Radium 226, Suspended Thorium, Isotopic Thorium, Suspended Isotopic Solids, Total Dissolved

The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Radiochemistry analyses were performed at Energy Laboratories, Inc., 2325 Kerzell Lane, Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing. All samples are reported on an as received basis unless otherwise indicated.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Sample Delivery Group: C11091177

Report Date: 11/11/11

CASE NARRATIVE

BRANCH LABORATORY SUBCONTRACT ANALYSIS
Tests associated with analyst identified as ELI-CS were subcontracted to Energy Laboratories, 415 Graham Rd., College Station, TX, EPA Number TX01520.

RADIOCHEMISTRY ANALYSIS
Per client request, results less than MDC (or precision if no MDC), are reported as <MDC (or <precision). Actual instrument results are available by request.

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non potable waters should be viewed as inconsistent.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTFICATIONS:
USEPA: WY00002; FL-DOH NELAC: E87641; California: 02118CA
Oregon: WY200001; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, INC. - CASPER,WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI's certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11091177-001
Client Sample ID: Well #725

Report Date: 11/11/11
Collection Date: 09/29/11
DateReceived: 09/30/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	156	mg/L		1		A2320 B	10/01/11 04:39 / jba
Carbonate as CO3	4	mg/L		1		A2320 B	10/01/11 04:39 / jba
Bicarbonate as HCO3	182	mg/L		1		A2320 B	10/01/11 04:39 / jba
Calcium	30	mg/L		1		E200.8	11/04/11 03:03 / sml
Chloride	3	mg/L		1		E300.0	10/09/11 06:26 / ljl
Fluoride	0.7	mg/L		0.1		A4500-F C	10/03/11 10:53 / jba
Magnesium	7	mg/L		1		E200.8	11/04/11 03:03 / sml
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	10/14/11 17:07 / dc
Nitrogen, Nitrate+Nitrite as N	0.8	mg/L		0.1		E353.2	10/21/11 23:25 / ljl
Potassium	4	mg/L		1		E200.8	11/04/11 03:03 / sml
Silica	72.0	mg/L		0.2		E200.7	10/26/11 17:59 / cp
Sodium	25	mg/L		1		E200.8	11/04/11 03:03 / sml
Sulfate	13	mg/L		1		E300.0	10/09/11 06:26 / ljl
PHYSICAL PROPERTIES							
Conductivity @ 25 C	309	umhos/cm		1		A2510 B	10/03/11 09:21 / lmc
pH	8.00	s.u.		0.01		A4500-H B	10/03/11 09:21 / lmc
Solids, Total Dissolved TDS @ 180 C	248	mg/L		10		A2540 C	10/03/11 16:35 / lmc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.7	10/26/11 17:59 / cp
Arsenic	0.005	mg/L		0.001		E200.8	11/04/11 03:03 / sml
Barium	ND	mg/L		0.1		E200.7	10/26/11 17:59 / cp
Boron	ND	mg/L		0.1		E200.7	10/26/11 17:59 / cp
Cadmium	ND	mg/L		0.005		E200.7	10/26/11 17:59 / cp
Chromium	ND	mg/L		0.05		E200.7	10/26/11 17:59 / cp
Copper	ND	mg/L		0.01		E200.8	11/04/11 03:03 / sml
Iron	0.04	mg/L		0.03		E200.7	10/26/11 17:59 / cp
Lead	ND	mg/L		0.001		E200.8	11/04/11 03:03 / sml
Manganese	ND	mg/L		0.01		E200.8	11/04/11 03:03 / sml
Mercury	ND	mg/L		0.001		E200.8	11/04/11 03:03 / sml
Molybdenum	ND	mg/L		0.1		E200.7	10/26/11 17:59 / cp
Nickel	ND	mg/L		0.05		E200.8	11/04/11 03:03 / sml
Selenium	ND	mg/L		0.001		E200.8	11/04/11 03:03 / sml
Uranium	0.0061	mg/L		0.0003		E200.8	11/04/11 03:03 / sml
Uranium, Activity	4.1E-09	uCi/mL		2.0E-10		E200.8	11/04/11 03:03 / sml
Vanadium	ND	mg/L		0.1		E200.8	11/04/11 03:03 / sml
Zinc	0.18	mg/L		0.01		E200.7	10/26/11 17:59 / cp
METALS - SUSPENDED							
Uranium	ND	mg/L		0.0003		E200.8	10/08/11 01:41 / sml
Uranium, Activity	ND	uCi/mL		2.0E-10		E200.8	10/08/11 01:41 / sml

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11091177-001
Client Sample ID: Well #725

Report Date: 11/11/11
Collection Date: 09/29/11
DateReceived: 09/30/11
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Lead 210	<0.8	pCi/L	U	0.8		E909.0	10/20/11 00:40 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	10/20/11 00:40 / eli-cs
Lead 210 MDC	0.8	pCi/L				E909.0	10/20/11 00:40 / eli-cs
Polonium 210	1	pCi/L		0.5		E912.0	10/14/11 11:17 / ep
Polonium 210 precision (±)	0.6	pCi/L				E912.0	10/14/11 11:17 / ep
Polonium 210 MDC	0.5	pCi/L				E912.0	10/14/11 11:17 / ep
Radium 226	0.3	pCi/L		0.1		E903.0	10/17/11 17:31 / js
Radium 226 precision (±)	0.1	pCi/L				E903.0	10/17/11 17:31 / js
Radium 226 MDC	0.1	pCi/L				E903.0	10/17/11 17:31 / js
Thorium 230	<0.2	pCi/L	U	0.2		E908.0	11/04/11 08:40 / dmf
Thorium 230 precision (±)	0.09	pCi/L				E908.0	11/04/11 08:40 / dmf
Thorium 230 MDC	0.2	pCi/L				E908.0	11/04/11 08:40 / dmf
RADIONUCLIDES - SUSPENDED							
Lead 210	<0.6	pCi/L	U	0.6		E909.0	10/29/11 01:07 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	10/29/11 01:07 / eli-cs
Lead 210 MDC	0.6	pCi/L				E909.0	10/29/11 01:07 / eli-cs
Polonium 210	<0.2	pCi/L	U	0.2		E912.0	10/28/11 16:56 / ep
Polonium 210 precision (±)	0.09	pCi/L				E912.0	10/28/11 16:56 / ep
Polonium 210 MDC	0.2	pCi/L				E912.0	10/28/11 16:56 / ep
Radium 226	<0.1	pCi/L	U	0.1		E903.0	10/18/11 00:00 / js
Radium 226 precision (±)	0.03	pCi/L				E903.0	10/18/11 00:00 / js
Radium 226 MDC	0.1	pCi/L				E903.0	10/18/11 00:00 / js
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	11/04/11 13:16 / dmf
Thorium 230 precision (±)	0.04	pCi/L				E908.0	11/04/11 13:16 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	11/04/11 13:16 / dmf
DATA QUALITY							
A/C Balance (± 5)	-5.17	%				Calculation	11/09/11 09:00 / kbh
Anions	3.56	meq/L				Calculation	11/09/11 09:00 / kbh
Cations	3.21	meq/L				Calculation	11/09/11 09:00 / kbh
Solids, Total Dissolved Calculated	270	mg/L				Calculation	11/09/11 09:00 / kbh
TDS Balance (0.80 - 1.20)	0.920					Calculation	11/09/11 09:00 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Report Date: 11/11/11
Project: Marsland Baseline Private Well Samples
Work Order: C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R151375
Sample ID: MBLK	3	Method Blank				Run: MANTECH_110930B				09/30/11 14:09
Alkalinity, Total as CaCO3		3	mg/L	2						
Carbonate as CO3		ND	mg/L	1						
Bicarbonate as HCO3		3	mg/L	1						
Sample ID: LCS		Laboratory Control Sample				Run: MANTECH_110930B				09/30/11 14:25
Alkalinity, Total as CaCO3		196	mg/L	5.0	97	90	110			
Sample ID: C11091168-019AMS		Sample Matrix Spike				Run: MANTECH_110930B				10/01/11 01:48
Alkalinity, Total as CaCO3		729	mg/L	5.0	110	80	120			
Sample ID: C11091168-026ADUP		Sample Duplicate				Run: MANTECH_110930B				10/01/11 02:58
Alkalinity, Total as CaCO3		249	mg/L	5.0				2.8	10	

Qualifiers:

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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B								Analytical Run: ORION555A_111003A		
Sample ID: ICV2_111003_1		Initial Calibration Verification Standard							10/03/11 07:51	
Conductivity @ 25 C		1400	umhos/cm	1.0	99	90	110			
Method: A2510 B								Batch: 111003_1_PH-W_555A-1		
Sample ID: MBLK1_111003_1		Method Blank				Run: ORION555A_111003A			10/03/11 07:48	
Conductivity @ 25 C		0.7	umhos/cm	0.2						
Sample ID: C11091181-004ADUP		Sample Duplicate				Run: ORION555A_111003A			10/03/11 09:35	
Conductivity @ 25 C		4490	umhos/cm	1.0				0.0	10	

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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Report Date: 11/11/11
Project: Marsland Baseline Private Well Samples
Work Order: C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: 111003_2_SLDS-TDS-W	
Sample ID: MBLK1_111003		Method Blank				Run: BAL-1_111003C			10/03/11 16:20	
Solids, Total Dissolved TDS @ 180 C		8	mg/L	4						
Sample ID: LCS1_111003		Laboratory Control Sample				Run: BAL-1_111003C			10/03/11 16:20	
Solids, Total Dissolved TDS @ 180 C		1020	mg/L	10	101	90	110			
Sample ID: C11091168-032AMS		Sample Matrix Spike				Run: BAL-1_111003C			10/03/11 16:33	
Solids, Total Dissolved TDS @ 180 C		2520	mg/L	10	95	90	110			
Sample ID: C11091177-001ADUP		Sample Duplicate				Run: BAL-1_111003C			10/03/11 16:35	
Solids, Total Dissolved TDS @ 180 C		244	mg/L	10				1.6	5	

Qualifiers:

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ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C										Batch: R151458
Sample ID: MBLK		Method Blank				Run: MANTECH_111003A				10/03/11 10:29
Fluoride		0.01	mg/L	0.008						
Sample ID: LCS		Laboratory Control Sample				Run: MANTECH_111003A				10/03/11 10:36
Fluoride		1.82	mg/L	0.10	91	90	110			
Sample ID: C11091177-001BMS		Sample Matrix Spike				Run: MANTECH_111003A				10/03/11 10:55
Fluoride		2.38	mg/L	0.10	85	80	120			
Sample ID: C11091177-001BMSD		Sample Matrix Spike Duplicate				Run: MANTECH_111003A				10/03/11 10:59
Fluoride		2.43	mg/L	0.10	88	80	120	2.1	10	

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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: ORION555A_111003A		
Sample ID: ICV1_111003_1		Initial Calibration Verification Standard							10/03/11 07:50	
pH		6.89	s.u.	0.010	100	98	102			
Method: A4500-H B								Batch: 111003_1_PH-W_555A-1		
Sample ID: C11091181-004ADUP		Sample Duplicate				Run: ORION555A_111003A			10/03/11 09:35	
pH		8.69	s.u.	0.010				0.0	3	

Qualifiers:

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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-NH3 G										Batch: R151991
Sample ID: MBLK-1		Method Blank				Run: TECHNICON_111014B				10/14/11 15:51
Nitrogen, Ammonia as N		ND	mg/L	0.02						
Sample ID: LCS-2		Laboratory Control Sample				Run: TECHNICON_111014B				10/14/11 15:53
Nitrogen, Ammonia as N		2.00	mg/L	0.050	100	90	110			
Sample ID: LFB-3		Laboratory Fortified Blank				Run: TECHNICON_111014B				10/14/11 15:55
Nitrogen, Ammonia as N		1.96	mg/L	0.050	100	80	120			
Sample ID: C11091139-001EMS		Sample Matrix Spike				Run: TECHNICON_111014B				10/14/11 16:57
Nitrogen, Ammonia as N		2.01	mg/L	0.050	98	90	110			
Sample ID: C11091139-001EMSD		Sample Matrix Spike Duplicate				Run: TECHNICON_111014B				10/14/11 16:59
Nitrogen, Ammonia as N		1.99	mg/L	0.050	97	90	110	1.0	10	

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QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-C_111026A	
Sample ID: ICV	9	Initial Calibration Verification Standard							10/26/11 14:37	
Aluminum		2.42	mg/L	0.10	97	95	105			
Barium		2.50	mg/L	0.10	100	95	105			
Boron		2.40	mg/L	0.10	96	95	105			
Cadmium		2.49	mg/L	0.010	100	95	105			
Chromium		2.49	mg/L	0.050	100	95	105			
Iron		2.54	mg/L	0.030	101	95	105			
Molybdenum		2.48	mg/L	0.10	99	95	105			
Silicon		5.09	mg/L	0.10	102	95	105			
Zinc		2.49	mg/L	0.010	99	95	105			
Sample ID: ICSA	9	Interference Check Sample A							10/26/11 15:03	
Aluminum		506	mg/L	0.10	101	80	120			
Barium		0.00200	mg/L	0.10		0	0			
Boron		0.00500	mg/L	0.10		0	0			
Cadmium		0.0164	mg/L	0.010		0	0			
Chromium		0.00570	mg/L	0.050		0	0			
Iron		194	mg/L	0.030	97	80	120			
Molybdenum		-0.0152	mg/L	0.10		0	0			
Silicon		-0.0863	mg/L	0.10		0	0			
Zinc		0.0138	mg/L	0.010		0	0			
Sample ID: ICSAB	9	Interference Check Sample AB							10/26/11 15:07	
Aluminum		520	mg/L	0.10	104	80	120			
Barium		0.538	mg/L	0.10	108	80	120			
Boron		0.358	mg/L	0.10		0	0			
Cadmium		1.03	mg/L	0.010	103	80	120			
Chromium		0.508	mg/L	0.050	102	80	120			
Iron		196	mg/L	0.030	98	80	120			
Molybdenum		-0.0174	mg/L	0.10		0	0			
Silicon		-0.0835	mg/L	0.10		0	0			
Zinc		1.07	mg/L	0.010	107	80	120			
Method: E200.7									Batch: R152562	
Sample ID: MB-111026A	9	Method Blank				Run: ICP2-C_111026A			10/26/11 15:40	
Aluminum		0.01	mg/L	0.01						
Barium		ND	mg/L	0.0006						
Boron		ND	mg/L	0.01						
Cadmium		ND	mg/L	0.0005						
Chromium		ND	mg/L	0.002						
Iron		0.002	mg/L	0.001						
Molybdenum		ND	mg/L	0.001						
Silicon		ND	mg/L	0.007						
Zinc		ND	mg/L	0.001						

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7										Batch: R152562
Sample ID: LFB-111026A	9	Laboratory Fortified Blank				Run: ICP2-C_111026A				10/26/11 15:44
Aluminum		0.912	mg/L	0.10	90	85	115			
Barium		0.943	mg/L	0.10	94	85	115			
Boron		0.899	mg/L	0.10	90	85	115			
Cadmium		0.946	mg/L	0.010	95	85	115			
Chromium		0.928	mg/L	0.050	93	85	115			
Iron		0.949	mg/L	0.030	95	85	115			
Molybdenum		0.938	mg/L	0.10	94	85	115			
Silicon		0.431	mg/L	0.10	96	85	115			
Zinc		0.946	mg/L	0.010	95	85	115			
Sample ID: C11100595-001BMS2	9	Sample Matrix Spike				Run: ICP2-C_111026A				10/26/11 18:15
Aluminum		1.80	mg/L	0.10	78	70	130			
Barium		1.80	mg/L	0.10	88	70	130			
Boron		1.76	mg/L	0.10	86	70	130			
Cadmium		1.81	mg/L	0.010	89	70	130			
Chromium		1.80	mg/L	0.050	88	70	130			
Iron		1.86	mg/L	0.030	91	70	130			
Molybdenum		1.79	mg/L	0.10	88	70	130			
Silicon		0.679	mg/L	0.10	83	70	130			
Zinc		1.84	mg/L	0.010	88	70	130			
Sample ID: C11100595-001BMSD	9	Sample Matrix Spike Duplicate				Run: ICP2-C_111026A				10/26/11 18:19
Aluminum		1.87	mg/L	0.10	82	70	130	3.8	20	
Barium		1.88	mg/L	0.10	92	70	130	4.6	20	
Boron		1.84	mg/L	0.10	90	70	130	4.7	20	
Cadmium		1.87	mg/L	0.010	92	70	130	3.4	20	
Chromium		1.87	mg/L	0.050	92	70	130	4.1	20	
Iron		1.94	mg/L	0.030	95	70	130	4.0	20	
Molybdenum		1.88	mg/L	0.10	92	70	130	4.8	20	
Silicon		0.694	mg/L	0.10	85	70	130	2.1	20	
Zinc		1.90	mg/L	0.010	92	70	130	3.4	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS4-C_111007A		
Sample ID: ICV		Initial Calibration Verification Standard							10/07/11 13:50	
Uranium		0.0496	mg/L	0.00030	99	90	110			
Method: E200.8									Batch: 31450A	
Sample ID: MB-31450		Method Blank				Run: ICPMS4-C_111007A			10/08/11 01:07	
Uranium		0.0005	pCi/Filter							
Sample ID: LCS2-31450		Laboratory Control Sample				Run: ICPMS4-C_111007A			10/08/11 01:10	
Uranium		0.123	pCi/Filter	0.00030	123	85	115			S
- Response is above standard QA limit. This could indicate a high bias for the sample results. Since there were no detectable analyte responses, and the remainder of the ru QA is within acceptance range, this batch is approved. Due to the samples being filters, a re-preparation/reanalysis is not possible.										
Sample ID: C11100147-003AMS		Sample Matrix Spike				Run: ICPMS4-C_111007A			10/08/11 02:28	
Uranium		0.0628	pCi/Filter	0.00030	116	70	130			
Sample ID: C11100147-003AMSD		Sample Matrix Spike Duplicate				Run: ICPMS4-C_111007A			10/08/11 02:31	
Uranium		0.0618	pCi/Filter	0.00030	114	70	130	1.6	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS4-C_111103A	
Sample ID: ICV	13	Initial Calibration Verification Standard							11/03/11 21:26	
Arsenic		0.0490	mg/L	0.0010	98	90	110			
Calcium		9.94	mg/L	0.0066	99	90	110			
Copper		0.0503	mg/L	0.0010	101	90	110			
Lead		0.0488	mg/L	0.0010	98	90	110			
Magnesium		9.85	mg/L	0.0027	98	90	110			
Manganese		0.0500	mg/L	0.0010	100	90	110			
Mercury		0.00506	mg/L	0.0010	101	90	110			
Nickel		0.0499	mg/L	0.0010	100	90	110			
Potassium		9.90	mg/L	0.0041	99	90	110			
Selenium		0.0499	mg/L	0.0010	100	90	110			
Sodium		9.64	mg/L	0.0043	96	90	110			
Uranium		0.0504	mg/L	0.00030	101	90	110			
Vanadium		0.0467	mg/L	0.0010	93	90	110			
Method: E200.8									Batch: R152827A	
Sample ID: LRB	13	Method Blank				Run: ICPMS4-C_111103A			11/03/11 12:54	
Arsenic		ND	mg/L	5E-05						
Calcium		ND	mg/L	0.007						
Copper		ND	mg/L	3E-05						
Lead		ND	mg/L	2E-05						
Magnesium		ND	mg/L	0.003						
Manganese		ND	mg/L	3E-05						
Mercury		ND	mg/L	5E-05						
Nickel		ND	mg/L	9E-05						
Potassium		ND	mg/L	0.004						
Selenium		ND	mg/L	7E-05						
Sodium		ND	mg/L	0.004						
Uranium		ND	mg/L	9E-06						
Vanadium		ND	mg/L	4E-05						
Sample ID: LFB	13	Laboratory Fortified Blank				Run: ICPMS4-C_111103A			11/03/11 13:00	
Arsenic		0.0523	mg/L	0.0010	105	85	115			
Calcium		12.9	mg/L	0.0066	103	85	115			
Copper		0.0530	mg/L	0.0010	106	85	115			
Lead		0.0514	mg/L	0.0010	103	85	115			
Magnesium		12.6	mg/L	0.0027	101	85	115			
Manganese		0.0531	mg/L	0.0010	106	85	115			
Mercury		0.00541	mg/L	0.0010	108	85	115			
Nickel		0.0530	mg/L	0.0010	106	85	115			
Potassium		12.8	mg/L	0.0041	102	85	115			
Selenium		0.0511	mg/L	0.0010	102	85	115			
Sodium		12.6	mg/L	0.0043	101	85	115			
Uranium		0.0523	mg/L	0.00030	105	85	115			
Vanadium		0.0522	mg/L	0.0010	104	85	115			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: R152827A	
Sample ID: C11100040-023BMS4	13	Sample Matrix Spike				Run: ICPMS4-C_111103A			11/04/11 05:28	
Arsenic		0.0545	mg/L	0.0010	106	70	130			
Calcium		523	mg/L	1.0		70	130			A
Copper		0.0511	mg/L	0.010	91	70	130			
Lead		0.0508	mg/L	0.050	95	70	130			
Magnesium		83.4	mg/L	1.0		70	130			A
Manganese		9.28	mg/L	0.010		70	130			A
Mercury		0.00504	mg/L	0.0010	101	70	130			
Nickel		0.101	mg/L	0.050	91	70	130			
Potassium		21.1	mg/L	1.0	99	70	130			
Selenium		0.0673	mg/L	0.0010	101	70	130			
Sodium		51.2	mg/L	1.0	93	70	130			
Uranium		2.49	mg/L	0.00030		70	130			A
Vanadium		0.0455	mg/L	0.0010	90	70	130			
Sample ID: C11100040-023BMSD	13	Sample Matrix Spike Duplicate				Run: ICPMS4-C_111103A			11/04/11 05:33	
Arsenic		0.0605	mg/L	0.0010	118	70	130	11	20	
Calcium		540	mg/L	1.0		70	130	3.1	20	A
Copper		0.0567	mg/L	0.010	102	70	130	10	20	
Lead		0.0503	mg/L	0.050	94	70	130	0.8	20	
Magnesium		84.3	mg/L	1.0		70	130	1.0	20	A
Manganese		7.88	mg/L	0.010		70	130	16	20	A
Mercury		0.00562	mg/L	0.0010	112	70	130	11	20	
Nickel		0.108	mg/L	0.050	105	70	130	6.8	20	
Potassium		22.9	mg/L	1.0	113	70	130	8.2	20	
Selenium		0.0677	mg/L	0.0010	102	70	130	0.6	20	
Sodium		52.4	mg/L	1.0	102	70	130	2.1	20	
Uranium		2.11	mg/L	0.00030		70	130	17	20	A
Vanadium		0.0511	mg/L	0.0010	102	70	130	12	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC2-C_111007A	
Sample ID: ICV100711-10	2	Initial Calibration Verification Standard							10/07/11 18:38	
Chloride		10.0	mg/L	1.0	100	90	110			
Sulfate		40.8	mg/L	1.0	102	90	110			
Sample ID: ICB2100711-12	2	Initial Calibration Blank, Instrument Blank							10/07/11 19:05	
Chloride		-0.0170	mg/L	1.0		0	0			
Sulfate		0.268	mg/L	1.0		0	0			
Method: E300.0									Batch: R151722	
Sample ID: ICB100711-11	2	Method Blank				Run: IC2-C_111007A			10/07/11 18:52	
Chloride		ND	mg/L	0.10						
Sulfate		0.3	mg/L	0.08						
Sample ID: LFB100711-13	2	Laboratory Fortified Blank				Run: IC2-C_111007A			10/07/11 19:18	
Chloride		9.99	mg/L	1.0	100	90	110			
Sulfate		40.7	mg/L	1.0	101	90	110			
Sample ID: LFBD100711-14	2	Laboratory Fortified Blank Duplicate				Run: IC2-C_111007A			10/07/11 19:32	
Chloride		10.0	mg/L	1.0	100	90	110	0.3	10	
Sulfate		40.8	mg/L	1.0	101	90	110	0.3	10	
Sample ID: C11091170-001AMS	2	Sample Matrix Spike				Run: IC2-C_111007A			10/09/11 05:05	
Chloride		56.2	mg/L	1.0	99	90	110			
Sulfate		626	mg/L	4.0	89	90	110			S
- Matrix spike recoveries outside the acceptance range are considered matrix-related.										
Sample ID: C11091170-001AMSD	2	Sample Matrix Spike Duplicate				Run: IC2-C_111007A			10/09/11 05:18	
Chloride		56.2	mg/L	1.0	99	90	110	0.1	10	
Sulfate		624	mg/L	4.0	88	90	110	0.4	10	S
- Matrix spike recoveries outside the acceptance range are considered matrix-related.										

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2										Batch: R152322
Sample ID: MBLK-1		Method Blank				Run: TECHNICON_111021C				10/21/11 21:03
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.06						
Sample ID: LCS-2		Laboratory Control Sample				Run: TECHNICON_111021C				10/21/11 21:05
Nitrogen, Nitrate+Nitrite as N		2.47	mg/L	0.10	99	90	110			
Sample ID: LFB-3		Laboratory Fortified Blank				Run: TECHNICON_111021C				10/21/11 21:08
Nitrogen, Nitrate+Nitrite as N		2.01	mg/L	0.10	103	90	110			
Sample ID: C11091093-011DMS		Sample Matrix Spike				Run: TECHNICON_111021C				10/21/11 23:00
Nitrogen, Nitrate+Nitrite as N		2.01	mg/L	0.10	103	90	110			
Sample ID: C11091093-011DMSD		Sample Matrix Spike Duplicate				Run: TECHNICON_111021C				10/21/11 23:03
Nitrogen, Nitrate+Nitrite as N		2.07	mg/L	0.10	106	90	110	2.9	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: RA226-5655	
Sample ID: C11091177-001DMS		Sample Matrix Spike				Run: BERTHOLD 770-2_111007A			10/17/11 17:31	
Radium 226		11	pCi/L		85	70	130			
Sample ID: C11091177-001DMSD		Sample Matrix Spike Duplicate				Run: BERTHOLD 770-2_111007A			10/17/11 17:31	
Radium 226		12	pCi/L		95	70	130	11	25.7	
Sample ID: MB-RA226-5655	3	Method Blank				Run: BERTHOLD 770-2_111007A			10/17/11 22:00	
Radium 226		0.04	pCi/L							U
Radium 226 precision (±)		0.08	pCi/L							
Radium 226 MDC		0.1	pCi/L							
Sample ID: LCS-RA226-5655		Laboratory Control Sample				Run: BERTHOLD 770-2_111007A			10/17/11 22:00	
Radium 226		5.2	pCi/L		82	80	120			
Method: E903.0									Batch: 31450	
Sample ID: C11100135-002AMS		Sample Matrix Spike				Run: BERTHOLD 770-2_111010A			10/18/11 00:00	
Radium 226		38.0	pCi/Filter		97	70	130			
Sample ID: C11100135-002AMSD		Sample Matrix Spike Duplicate				Run: BERTHOLD 770-2_111010A			10/18/11 00:00	
Radium 226		42.0	pCi/Filter		106	70	130	10	26.5	
Sample ID: LCS-31450		Laboratory Control Sample				Run: BERTHOLD 770-2_111010A			10/18/11 01:38	
Radium 226		11.7	pCi/Filter		100	70	130			
Sample ID: MB-31450	3	Method Blank				Run: BERTHOLD 770-2_111010A			10/18/11 01:38	
Radium 226		-0.1	pCi/Filter							U
Radium 226 precision (±)		0.1	pCi/Filter							
Radium 226 MDC		0.3	pCi/Filter							

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0									Batch: RA-TH-ISO-1504	
Sample ID: LCS-RA-TH-ISO-1504		Laboratory Control Sample				Run: ALPHANALYST_111031A			11/04/11 08:39	
Thorium 230		6.5	pCi/L		114	70	130			
Sample ID: C11091177-001DMS		Sample Matrix Spike				Run: ALPHANALYST_111031A			11/04/11 08:40	
Thorium 230		12	pCi/L		103	70	130			
Sample ID: C11091177-001DMSD		Sample Matrix Spike Duplicate				Run: ALPHANALYST_111031A			11/04/11 08:40	
Thorium 230		10	pCi/L		89	70	130	13	38.7	
Sample ID: MB-RA-TH-ISO-1504	3	Method Blank				Run: ALPHANALYST_111031A			11/04/11 08:40	
Thorium 230		0.03	pCi/L							U
Thorium 230 precision (±)		0.07	pCi/L							
Thorium 230 MDC		0.2	pCi/L							
Method: E908.0									Batch: R153032	
Sample ID: LCS-31450		Laboratory Control Sample				Run: ALPHANALYST_111101A			11/04/11 13:16	
Thorium 230		10.3	pCi/Filter		104	70	130			
Sample ID: MB-31450	3	Method Blank				Run: ALPHANALYST_111101A			11/04/11 13:16	
Thorium 230		0.2	pCi/Filter							
Thorium 230 precision (±)		0.1	pCi/Filter							
Thorium 230 MDC		0.1	pCi/Filter							
Sample ID: C11100045-001AMS		Sample Matrix Spike				Run: ALPHANALYST_111101A			11/04/11 13:16	
Thorium 230		46.8	pCi/Filter		94	70	130			
Sample ID: C11100045-001AMSD		Sample Matrix Spike Duplicate				Run: ALPHANALYST_111101A			11/04/11 13:16	
Thorium 230		49.9	pCi/Filter		101	70	130	6.5	31.9	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E909.0									Batch: T_PB-210-0162	
Sample ID: T11090087-002BDUP	3	Sample Duplicate				Run: SUB-T42612			10/18/11 18:40	
Lead 210		-0.29	pCi/L					18	291	U
Lead 210 precision (±)		0.47	pCi/L							
Lead 210 MDC		0.79	pCi/L							
Sample ID: MB-PB-210-0162	3	Method Blank				Run: SUB-T42612			10/17/11 19:20	
Lead 210		0.2	pCi/L							U
Lead 210 precision (±)		0.4	pCi/L							
Lead 210 MDC		0.7	pCi/L							
Sample ID: LCS-PB-210-0162		Laboratory Control Sample				Run: SUB-T42612			10/17/11 22:40	
Lead 210		46	pCi/L		87	70	130			
Sample ID: T11100011-008AMS		Sample Matrix Spike				Run: SUB-T42612			10/18/11 05:20	
Lead 210		9.37	pCi/g-dry		93	70	130			
Sample ID: T11100011-008AMSD		Sample Matrix Spike Duplicate				Run: SUB-T42612			10/18/11 08:40	
Lead 210		9.25	pCi/g-dry		93	70	130	1.2	13.2	
Method: E909.0									Batch: T_15019	
Sample ID: T11100041-003AMSD		Sample Matrix Spike Duplicate				Run: SUB-T42695			10/29/11 12:21	
Lead 210		1190	pCi/Filter		89	70	130	7.1	13.4	
Sample ID: T11100041-003AMS		Sample Matrix Spike				Run: SUB-T42695			10/29/11 10:06	
Lead 210		1270	pCi/Filter		96	70	130			
Sample ID: LCS-15019		Laboratory Control Sample				Run: SUB-T42695			10/28/11 22:53	
Lead 210		516	pCi/Filter		92	70	130			
Sample ID: MB-15019	3	Method Blank				Run: SUB-T42695			10/28/11 20:38	
Lead 210		0.09	pCi/Filter							U
Lead 210 precision (±)		4	pCi/Filter							
Lead 210 MDC		7	pCi/Filter							

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 11/11/11

Project: Marsland Baseline Private Well Samples **Work Order:** C11091177

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E912.0									Batch: PO210-0401	
Sample ID: C11090862-008DMS		Sample Matrix Spike				Run: EGG-ORTEC_111005B			10/14/11 13:27	
Polonium 210		9.9	pCi/L		79	70	130			
Sample ID: C11090862-008DMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_111005B			10/14/11 13:27	
Polonium 210		13	pCi/L		103	70	130	27	72.7	
Sample ID: MB-PO210-0401	3	Method Blank				Run: EGG-ORTEC_111005B			10/17/11 10:59	
Polonium 210		0.03	pCi/L							U
Polonium 210 precision (±)		0.2	pCi/L							
Polonium 210 MDC		0.4	pCi/L							
Sample ID: LCS-PO210-0401		Laboratory Control Sample				Run: EGG-ORTEC_111005B			10/17/11 10:59	
Polonium 210		6.4	pCi/L		101	70	130			
Method: E912.0									Batch: R152619	
Sample ID: C11091005-002DMS		Sample Matrix Spike				Run: EGG-ORTEC_111019B			10/28/11 16:56	
Polonium 210		5.5	pCi/L		99	70	130			
Sample ID: C11091005-002DMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_111019B			10/28/11 16:56	
Polonium 210		4.5	pCi/L		78	70	130	22	63.3	
Sample ID: LCS-31331		Laboratory Control Sample				Run: EGG-ORTEC_111019B			10/28/11 16:56	
Polonium 210		27	pCi/L		90	70	130			
Sample ID: MB-31331	3	Method Blank				Run: EGG-ORTEC_111019B			10/28/11 16:56	
Polonium 210		ND	pCi/L							U
Polonium 210 precision (±)		0.7	pCi/L							
Polonium 210 MDC		2	pCi/L							

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

Workorder Receipt Checklist

Crow Butte Resources

C11091177

Login completed by: Edith McPike
Date Received: 9/30/2011
Reviewed by: BL2000\cwagner
Received by: kg
Reviewed Date: 10/5/2011
Carrier name: NDA

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Container/Temp Blank temperature:	10.8°C Melted Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Contact and Corrective Action Comments:

Samples filtered and preserved as necessary per requested analysis.

Chain of Custody and Analytical Request Record

PLEASE PRINT- Provide as much information as possible.

Company Name: Crow Butte Resources, Inc.	Project Name: Marsland Baseline Private Well Samples	Sample Origin: State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 169, Crawford, NE 69339	Contact Name: Larry Teahon; Phone/Fax: 308-665-2341	Email: daxmynus@msn.com	Sampler: (Please Print) Brooke Bass, Rhonda Pelton
Invoice Address: P.O. Box 169, Crawford, NE 69339	Invoice Contact & Phone: Larry Teahon, 308-665-2215 ext 114	Purchase Order: 1125	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

- ☐ DW
- ☐ GSA
- ☐ POTW/WWTP
- ☐ State: _____
- ☐ Other: _____
- ☐ A2LA
- ☐ EDD/EDT (Electronic Data) Format: _____
- ☐ LEVEL IV
- ☐ NELAC

Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other

ANALYSIS REQUESTED

SEE ATTACHED

RUSH

Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments: NDEQ parameters for baseline sampling. Report on separate sheets. Analyze as per WDEQ Guideline 8 and NRC Reg. Guide 4.14 requirements. Record U as mg/L and µCi/ml and radiometrics as pCi/L.

Shipped by: UPS-NDA

Cooler ID(s): Client

Receipt Temp: 10.8 °C

On Ice: Yes (melted) No

Custody Seal: Y (N)

Intact: Y N

Signature Match: Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	HNO3-F, Metals	RAW-F, Common Ions	RAW-UF, Alkalinity	H2SO4-F, NO2, NO3, NH4	Raw-UF, Ra226, Po210 dis, sus	Raw-UF, Pb210 dis and sus	Rau-UF, Th230, U-nat dis and sus			Normal Turnaround (TAT)		Please Report 11/05/11
1	Well #725	9/29/11		Water	.5	1	1	.5	1 G	1 G	1 G					
2																
3																
4																
5																
6																
7																
8																
9																
10																

LABORATORY USE ONLY

11/09/11 77

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Brooke Bass	9/29/11	Brooke Bass			
Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Sample Disposal: Return to Client: No		Lab Disposal: YES	Received by Laboratory:	Date/Time: 9/30/11 9:30	Signature: Kris Gisse

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

CROW BUTTE RESOURCES, INC.
CROW BUTTE PROJECT

NO3

DATE: 9-29-11

ANALYST: bt

STANDARD CURVE DATA

	BL		0.01	.05	.10		
Abs	0		.033	.164	.320		
Abs							

SAMPLE #	VOLUME	Df	Abs	NO3 mg/L
1 725	10ml	1	.002	<0.01
2 725 Dup	10ml	1	.001	<0.01
3				
4				
5				
Dup				
6				
7				
8				
9				
10				
Dup				
11				
12				
13				
14				
15				
Dup				
16				
17				
18				
19				
20				
Dup				
21				
22				
23				
24				
25				
Dup				

ANALYTICAL SUMMARY REPORT

February 28, 2012

Crow Butte Resources
86 Crow Butte Rd
Crawford, NE 69339

Workorder No.: C11120623 Quote ID: C1125 - Crow Butte Uranium

Project Name: Marsland Baseline Private Well Samples

Energy Laboratories, Inc. Casper WY received the following 6 samples for Crow Butte Resources on 12/20/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C11120623-001	Well #727	12/15/11 0:00	12/20/11	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity QA Calculations Conductivity Fluoride E300.0 Anions Uranium, Suspended Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite pH Digestion, Total Metals Lead 210, Dissolved Lead 210, Suspended Polonium 210, Dissolved Polonium 210, Suspended Radium 226, Dissolved Radium 226, Suspended Thorium, Isotopic Thorium, Suspended Isotopic Solids, Total Dissolved
C11120623-002	Well #759	12/15/11 0:00	12/20/11	Aqueous	Same As Above
C11120623-003	Well #703	12/15/11 0:00	12/20/11	Aqueous	Same As Above
C11120623-004	Well #741	12/15/11 0:00	12/20/11	Aqueous	Same As Above
C11120623-005	Well #745	12/15/11 0:00	12/20/11	Aqueous	Same As Above
C11120623-006	Well #725	12/16/11 0:00	12/20/11	Aqueous	Same As Above

The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Radiochemistry analyses were performed at Energy Laboratories, Inc., 2325 Kerzell Lane, Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing. Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. Data corrected for moisture content are typically noted as - dry on the report. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Sample Delivery Group: C11120623

Report Date: 02/28/12

CASE NARRATIVE

pH COMMENTS
Per NELAC rule, pH is considered a field parameter with a holding time of 15 minutes. Due to this rule, all pH analyses will be flagged with an H.

BRANCH LABORATORY SUBCONTRACT ANALYSIS
Tests associated with analyst identified as ELI-CS were subcontracted to Energy Laboratories, 415 Graham Rd., College Station, TX, EPA Number TX01520.

RADIOCHEMISTRY ANALYSIS
Per client request, results less than MDC (or precision if no MDC), are reported as <MDC (or <precision). Actual instrument results are available by request.

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non potable waters should be viewed as inconsistent.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTFICATIONS:
USEPA: WY00002; FL-DOH NELAC: E87641; California: 02118CA
Oregon: WY200001; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, INC. - CASPER,WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI's certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-001
Client Sample ID: Well #727

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	146	mg/L		1		A2320 B	12/20/11 18:46 / jba
Carbonate as CO3	ND	mg/L		1		A2320 B	12/20/11 18:46 / jba
Bicarbonate as HCO3	178	mg/L		1		A2320 B	12/20/11 18:46 / jba
Calcium	34	mg/L		1		E200.8	12/30/11 18:34 / sml
Chloride	5	mg/L		1		E300.0	12/28/11 04:02 / ljl
Fluoride	0.5	mg/L		0.1		A4500-F C	12/22/11 11:45 / jba
Magnesium	13	mg/L		1		E200.8	12/30/11 18:34 / sml
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	12/22/11 12:14 / dc
Nitrogen, Nitrate+Nitrite as N	1.6	mg/L		0.1		E353.2	12/21/11 13:10 / dc
Potassium	4	mg/L		1		E200.8	12/30/11 18:34 / sml
Silica	83	mg/L	D	1		E200.7	01/12/12 18:06 / cp
Sodium	19	mg/L		1		E200.8	12/30/11 18:34 / sml
Sulfate	8	mg/L		1		E300.0	12/28/11 04:02 / ljl
PHYSICAL PROPERTIES							
Conductivity @ 25 C	344	umhos/cm		1		A2510 B	12/20/11 16:57 / wc
pH	7.73	s.u.	H	0.01		A4500-H B	12/21/11 10:27 / wc
Solids, Total Dissolved TDS @ 180 C	229	mg/L		10		A2540 C	12/20/11 16:54 / wc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.8	12/30/11 18:34 / sml
Arsenic	0.002	mg/L		0.001		E200.8	12/30/11 18:34 / sml
Barium	ND	mg/L		0.1		E200.8	12/30/11 18:34 / sml
Boron	ND	mg/L		0.1		E200.8	12/30/11 18:34 / sml
Cadmium	ND	mg/L		0.005		E200.8	12/30/11 18:34 / sml
Chromium	ND	mg/L		0.05		E200.8	12/30/11 18:34 / sml
Copper	ND	mg/L		0.01		E200.8	12/30/11 18:34 / sml
Iron	0.03	mg/L		0.03		E200.8	12/30/11 18:34 / sml
Lead	ND	mg/L		0.001		E200.8	12/30/11 18:34 / sml
Manganese	ND	mg/L		0.01		E200.8	12/30/11 18:34 / sml
Mercury	ND	mg/L		0.001		E200.8	12/30/11 18:34 / sml
Molybdenum	ND	mg/L		0.1		E200.7	01/13/12 00:22 / cp
Nickel	ND	mg/L		0.05		E200.8	12/30/11 18:34 / sml
Selenium	0.002	mg/L		0.001		E200.8	12/30/11 18:34 / sml
Uranium	0.0080	mg/L		0.0003		E200.8	12/30/11 18:34 / sml
Uranium, Activity	5.4E-09	uCi/mL		2.0E-10		E200.8	12/30/11 18:34 / sml
Vanadium	ND	mg/L		0.1		E200.8	12/30/11 18:34 / sml
Zinc	0.49	mg/L		0.01		E200.8	12/30/11 18:34 / sml
METALS - SUSPENDED							
Uranium	ND	mg/L		0.0003		E200.8	12/27/11 19:10 / sml
Uranium, Activity	ND	uCi/mL		2.0E-10		E200.8	12/27/11 19:10 / sml

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-001
Client Sample ID: Well #727

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Lead 210	<0.7	pCi/L	U	0.7		E909.0	01/01/12 01:11 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	01/01/12 01:11 / eli-cs
Lead 210 MDC	0.7	pCi/L				E909.0	01/01/12 01:11 / eli-cs
Polonium 210	<0.7	pCi/L	U	0.7		E912.0	01/27/12 08:27 / plj
Polonium 210 precision (±)	0.4	pCi/L				E912.0	01/27/12 08:27 / plj
Polonium 210 MDC	0.7	pCi/L				E912.0	01/27/12 08:27 / plj
Radium 226	1.8	pCi/L		0.1		E903.0	01/03/12 11:35 / js
Radium 226 precision (±)	0.2	pCi/L				E903.0	01/03/12 11:35 / js
Radium 226 MDC	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/03/12 13:19 / dmf
Thorium 230 precision (±)	0.07	pCi/L				E908.0	01/03/12 13:19 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/03/12 13:19 / dmf
RADIONUCLIDES - SUSPENDED							
Lead 210	<0.8	pCi/L	U	0.8		E909.0	01/07/12 10:00 / eli-cs
Lead 210 precision (±)	0.5	pCi/L				E909.0	01/07/12 10:00 / eli-cs
Lead 210 MDC	0.8	pCi/L				E909.0	01/07/12 10:00 / eli-cs
Polonium 210	<0.6	pCi/L	U	0.6		E912.0	02/23/12 13:35 / ep
Polonium 210 precision (±)	0.3	pCi/L				E912.0	02/23/12 13:35 / ep
Polonium 210 MDC	0.6	pCi/L				E912.0	02/23/12 13:35 / ep
Radium 226	<0.1	pCi/L	U	0.1		E903.0	01/09/12 12:58 / trs
Radium 226 precision (±)	0.05	pCi/L				E903.0	01/09/12 12:58 / trs
Radium 226 MDC	0.1	pCi/L				E903.0	01/09/12 12:58 / trs
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/06/12 08:42 / dmf
Thorium 230 precision (±)	0.06	pCi/L				E908.0	01/06/12 08:42 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/06/12 08:42 / dmf
DATA QUALITY							
A/C Balance (± 5)	5.25	%				Calculation	01/04/12 14:55 / kbh
Anions	3.37	meq/L				Calculation	01/04/12 14:55 / kbh
Cations	3.74	meq/L				Calculation	01/04/12 14:55 / kbh
Solids, Total Dissolved Calculated	179	mg/L				Calculation	01/04/12 14:55 / kbh
TDS Balance (0.80 - 1.20)	1.28					Calculation	01/04/12 14:55 / kbh

- The ion balance is not appropriate for samples having a conductivity less than 300 umhos/cm.

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-002
Client Sample ID: Well #759

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	140	mg/L		1		A2320 B	12/20/11 18:54 / jba
Carbonate as CO3	ND	mg/L		1		A2320 B	12/20/11 18:54 / jba
Bicarbonate as HCO3	170	mg/L		1		A2320 B	12/20/11 18:54 / jba
Calcium	32	mg/L		1		E200.8	12/21/11 22:53 / sml
Chloride	2	mg/L		1		E300.0	12/28/11 04:15 / ljl
Fluoride	0.6	mg/L		0.1		A4500-F C	12/22/11 11:56 / jba
Magnesium	6	mg/L		1		E200.8	12/30/11 18:41 / sml
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	12/22/11 12:16 / dc
Nitrogen, Nitrate+Nitrite as N	0.8	mg/L		0.1		E353.2	12/21/11 13:13 / dc
Potassium	5	mg/L		1		E200.8	12/21/11 22:53 / sml
Silica	71.9	mg/L		0.2		E200.7	01/12/12 18:18 / cp
Sodium	25	mg/L		1		E200.8	12/30/11 18:41 / sml
Sulfate	7	mg/L		1		E300.0	12/28/11 04:15 / ljl
PHYSICAL PROPERTIES							
Conductivity @ 25 C	307	umhos/cm		1		A2510 B	12/20/11 17:00 / wc
pH	7.76	s.u.	H	0.01		A4500-H B	12/21/11 10:30 / wc
Solids, Total Dissolved TDS @ 180 C	203	mg/L		10		A2540 C	12/20/11 16:54 / wc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.8	12/30/11 18:41 / sml
Arsenic	0.003	mg/L		0.001		E200.8	12/21/11 22:53 / sml
Barium	0.1	mg/L		0.1		E200.8	12/30/11 18:41 / sml
Boron	ND	mg/L		0.1		E200.8	12/30/11 18:41 / sml
Cadmium	ND	mg/L		0.005		E200.8	12/30/11 18:41 / sml
Chromium	ND	mg/L		0.05		E200.8	12/21/11 22:53 / sml
Copper	ND	mg/L		0.01		E200.8	12/21/11 22:53 / sml
Iron	ND	mg/L		0.03		E200.8	12/30/11 18:41 / sml
Lead	ND	mg/L		0.001		E200.8	12/21/11 22:53 / sml
Manganese	ND	mg/L		0.01		E200.8	12/30/11 18:41 / sml
Mercury	ND	mg/L		0.001		E200.8	12/30/11 18:41 / sml
Molybdenum	ND	mg/L		0.1		E200.7	01/12/12 18:18 / cp
Nickel	ND	mg/L		0.05		E200.8	12/21/11 22:53 / sml
Selenium	ND	mg/L		0.001		E200.8	12/30/11 18:41 / sml
Uranium	0.0049	mg/L		0.0003		E200.8	12/30/11 18:41 / sml
Uranium, Activity	3.3E-09	uCi/mL		2.0E-10		E200.8	12/30/11 18:41 / sml
Vanadium	ND	mg/L		0.1		E200.8	12/21/11 22:53 / sml
Zinc	0.10	mg/L		0.01		E200.8	12/21/11 22:53 / sml
METALS - SUSPENDED							
Uranium	ND	mg/L		0.0003		E200.8	12/27/11 19:12 / sml
Uranium, Activity	ND	uCi/mL		2.0E-10		E200.8	12/27/11 19:12 / sml

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-002
Client Sample ID: Well #759

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Lead 210	<0.7	pCi/L	U	0.7		E909.0	01/01/12 06:42 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	01/01/12 06:42 / eli-cs
Lead 210 MDC	0.7	pCi/L				E909.0	01/01/12 06:42 / eli-cs
Polonium 210	<0.6	pCi/L	U	0.6		E912.0	01/27/12 08:27 / plj
Polonium 210 precision (±)	0.2	pCi/L				E912.0	01/27/12 08:27 / plj
Polonium 210 MDC	0.6	pCi/L				E912.0	01/27/12 08:27 / plj
Radium 226	1.0	pCi/L		0.1		E903.0	01/03/12 11:35 / js
Radium 226 precision (±)	0.2	pCi/L				E903.0	01/03/12 11:35 / js
Radium 226 MDC	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Thorium 230	<0.2	pCi/L	U	0.2		E908.0	01/03/12 13:19 / dmf
Thorium 230 precision (±)	0.07	pCi/L				E908.0	01/03/12 13:19 / dmf
Thorium 230 MDC	0.2	pCi/L				E908.0	01/03/12 13:19 / dmf
RADIONUCLIDES - SUSPENDED							
Lead 210	<0.8	pCi/L	U	0.8		E909.0	01/07/12 12:05 / eli-cs
Lead 210 precision (±)	0.5	pCi/L				E909.0	01/07/12 12:05 / eli-cs
Lead 210 MDC	0.8	pCi/L				E909.0	01/07/12 12:05 / eli-cs
Polonium 210	<0.5	pCi/L	U	0.5		E912.0	02/23/12 13:35 / ep
Polonium 210 precision (±)	0.2	pCi/L				E912.0	02/23/12 13:35 / ep
Polonium 210 MDC	0.5	pCi/L				E912.0	02/23/12 13:35 / ep
Radium 226	<0.1	pCi/L	U	0.1		E903.0	01/09/12 12:58 / trs
Radium 226 precision (±)	0.04	pCi/L				E903.0	01/09/12 12:58 / trs
Radium 226 MDC	0.1	pCi/L				E903.0	01/09/12 12:58 / trs
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/06/12 08:42 / dmf
Thorium 230 precision (±)	0.06	pCi/L				E908.0	01/06/12 08:42 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/06/12 08:42 / dmf
DATA QUALITY							
A/C Balance (± 5)	4.27	%				Calculation	01/04/12 08:42 / kbh
Anions	3.08	meq/L				Calculation	01/04/12 08:42 / kbh
Cations	3.35	meq/L				Calculation	01/04/12 08:42 / kbh
Solids, Total Dissolved Calculated	166	mg/L				Calculation	01/04/12 08:42 / kbh
TDS Balance (0.80 - 1.20)	1.22					Calculation	01/04/12 08:42 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-003
Client Sample ID: Well #703

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	144	mg/L		1		A2320 B	12/20/11 19:02 / jba
Carbonate as CO3	ND	mg/L		1		A2320 B	12/20/11 19:02 / jba
Bicarbonate as HCO3	176	mg/L		1		A2320 B	12/20/11 19:02 / jba
Calcium	42	mg/L		1		E200.8	12/30/11 18:48 / sml
Chloride	3	mg/L		1		E300.0	12/28/11 09:35 / ljl
Fluoride	0.5	mg/L		0.1		A4500-F C	12/22/11 11:59 / jba
Magnesium	8	mg/L		1		E200.8	12/30/11 18:48 / sml
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	12/22/11 12:18 / dc
Nitrogen, Nitrate+Nitrite as N	1.7	mg/L		0.1		E353.2	12/21/11 13:15 / dc
Potassium	3	mg/L		1		E200.8	12/30/11 18:48 / sml
Silica	65.7	mg/L		0.2		E200.7	01/12/12 18:26 / cp
Sodium	16	mg/L		1		E200.8	12/30/11 18:48 / sml
Sulfate	7	mg/L		1		E300.0	12/28/11 09:35 / ljl
PHYSICAL PROPERTIES							
Conductivity @ 25 C	325	umhos/cm		1		A2510 B	12/20/11 17:02 / wc
pH	7.79	s.u.	H	0.01		A4500-H B	12/21/11 10:34 / wc
Solids, Total Dissolved TDS @ 180 C	208	mg/L		10		A2540 C	12/20/11 16:54 / wc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.8	12/30/11 18:48 / sml
Arsenic	0.004	mg/L		0.001		E200.8	12/30/11 18:48 / sml
Barium	0.1	mg/L		0.1		E200.8	12/30/11 18:48 / sml
Boron	ND	mg/L		0.1		E200.8	12/30/11 18:48 / sml
Cadmium	ND	mg/L		0.005		E200.8	12/30/11 18:48 / sml
Chromium	ND	mg/L		0.05		E200.8	12/30/11 18:48 / sml
Copper	ND	mg/L		0.01		E200.8	12/30/11 18:48 / sml
Iron	ND	mg/L		0.03		E200.8	12/30/11 18:48 / sml
Lead	ND	mg/L		0.001		E200.8	12/21/11 23:20 / sml
Manganese	ND	mg/L		0.01		E200.8	12/30/11 18:48 / sml
Mercury	ND	mg/L		0.001		E200.8	12/30/11 18:48 / sml
Molybdenum	ND	mg/L		0.1		E200.7	01/12/12 18:26 / cp
Nickel	ND	mg/L		0.05		E200.8	12/30/11 18:48 / sml
Selenium	0.001	mg/L		0.001		E200.8	12/30/11 18:48 / sml
Uranium	0.0040	mg/L		0.0003		E200.8	12/30/11 18:48 / sml
Uranium, Activity	2.7E-09	uCi/mL		2.0E-10		E200.8	12/30/11 18:48 / sml
Vanadium	ND	mg/L		0.1		E200.8	12/30/11 18:48 / sml
Zinc	0.11	mg/L		0.01		E200.8	12/30/11 18:48 / sml
METALS - SUSPENDED							
Uranium	ND	mg/L		0.0003		E200.8	12/27/11 19:21 / sml
Uranium, Activity	ND	uCi/mL		2.0E-10		E200.8	12/27/11 19:21 / sml

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-003
Client Sample ID: Well #703

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Lead 210	<0.7	pCi/L	U	0.7		E909.0	01/01/12 12:13 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	01/01/12 12:13 / eli-cs
Lead 210 MDC	0.7	pCi/L				E909.0	01/01/12 12:13 / eli-cs
Polonium 210	<0.5	pCi/L	U	0.5		E912.0	01/27/12 08:27 / plj
Polonium 210 precision (±)	0.4	pCi/L				E912.0	01/27/12 08:27 / plj
Polonium 210 MDC	0.5	pCi/L				E912.0	01/27/12 08:27 / plj
Radium 226	0.5	pCi/L		0.1		E903.0	01/03/12 11:35 / js
Radium 226 precision (±)	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Radium 226 MDC	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/03/12 13:19 / dmf
Thorium 230 precision (±)	0.08	pCi/L				E908.0	01/03/12 13:19 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/03/12 13:19 / dmf
RADIONUCLIDES - SUSPENDED							
Lead 210	<0.8	pCi/L	U	0.8		E909.0	01/07/12 14:10 / eli-cs
Lead 210 precision (±)	0.5	pCi/L				E909.0	01/07/12 14:10 / eli-cs
Lead 210 MDC	0.8	pCi/L				E909.0	01/07/12 14:10 / eli-cs
Polonium 210	<0.5	pCi/L	U	0.5		E912.0	02/23/12 13:35 / ep
Polonium 210 precision (±)	0.2	pCi/L				E912.0	02/23/12 13:35 / ep
Polonium 210 MDC	0.5	pCi/L				E912.0	02/23/12 13:35 / ep
Radium 226	<0.1	pCi/L	U	0.1		E903.0	01/09/12 12:58 / trs
Radium 226 precision (±)	0.07	pCi/L				E903.0	01/09/12 12:58 / trs
Radium 226 MDC	0.1	pCi/L				E903.0	01/09/12 12:58 / trs
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/06/12 08:42 / dmf
Thorium 230 precision (±)	0.06	pCi/L				E908.0	01/06/12 08:42 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/06/12 08:42 / dmf
DATA QUALITY							
A/C Balance (± 5)	3.88	%				Calculation	01/04/12 08:42 / kbh
Anions	3.25	meq/L				Calculation	01/04/12 08:42 / kbh
Cations	3.51	meq/L				Calculation	01/04/12 08:42 / kbh
Solids, Total Dissolved Calculated	173	mg/L				Calculation	01/04/12 08:42 / kbh
TDS Balance (0.80 - 1.20)	1.20					Calculation	01/04/12 08:42 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-004
Client Sample ID: Well #741

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	173	mg/L		1		A2320 B	12/20/11 19:09 / jba
Carbonate as CO3	ND	mg/L		1		A2320 B	12/20/11 19:09 / jba
Bicarbonate as HCO3	211	mg/L		1		A2320 B	12/20/11 19:09 / jba
Calcium	49	mg/L		1		E200.8	12/30/11 18:55 / sml
Chloride	5	mg/L		1		E300.0	12/28/11 10:15 / ljl
Fluoride	0.6	mg/L		0.1		A4500-F C	12/22/11 12:06 / jba
Magnesium	9	mg/L		1		E200.8	12/30/11 18:55 / sml
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	12/22/11 12:20 / dc
Nitrogen, Nitrate+Nitrite as N	3.1	mg/L		0.1		E353.2	12/21/11 13:18 / dc
Potassium	5	mg/L		1		E200.8	12/30/11 18:55 / sml
Silica	64.4	mg/L		0.2		E200.7	01/12/12 18:30 / cp
Sodium	26	mg/L		1		E200.8	12/30/11 18:55 / sml
Sulfate	12	mg/L		1		E300.0	12/28/11 10:15 / ljl
PHYSICAL PROPERTIES							
Conductivity @ 25 C	327	umhos/cm		1		A2510 B	12/21/11 10:40 / wc
pH	7.86	s.u.	H	0.01		A4500-H B	12/21/11 10:40 / wc
Solids, Total Dissolved TDS @ 180 C	259	mg/L		10		A2540 C	12/20/11 16:54 / wc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.8	12/30/11 18:55 / sml
Arsenic	0.006	mg/L		0.001		E200.8	12/30/11 18:55 / sml
Barium	0.1	mg/L		0.1		E200.8	12/30/11 18:55 / sml
Boron	ND	mg/L		0.1		E200.8	12/30/11 18:55 / sml
Cadmium	ND	mg/L		0.005		E200.8	12/30/11 18:55 / sml
Chromium	ND	mg/L		0.05		E200.8	12/30/11 18:55 / sml
Copper	ND	mg/L		0.01		E200.8	12/30/11 18:55 / sml
Iron	ND	mg/L		0.03		E200.8	12/30/11 18:55 / sml
Lead	ND	mg/L		0.001		E200.8	12/21/11 23:27 / sml
Manganese	ND	mg/L		0.01		E200.8	12/30/11 18:55 / sml
Mercury	ND	mg/L		0.001		E200.8	12/30/11 18:55 / sml
Molybdenum	ND	mg/L		0.1		E200.7	01/12/12 18:30 / cp
Nickel	ND	mg/L		0.05		E200.8	12/30/11 18:55 / sml
Selenium	0.002	mg/L		0.001		E200.8	12/21/11 23:27 / sml
Uranium	0.0057	mg/L		0.0003		E200.8	12/30/11 18:55 / sml
Uranium, Activity	3.9E-09	uCi/mL		2.0E-10		E200.8	12/30/11 18:55 / sml
Vanadium	ND	mg/L		0.1		E200.8	12/30/11 18:55 / sml
Zinc	0.02	mg/L		0.01		E200.8	12/30/11 18:55 / sml
METALS - SUSPENDED							
Uranium	ND	mg/L		0.0003		E200.8	12/27/11 19:23 / sml
Uranium, Activity	ND	uCi/mL		2.0E-10		E200.8	12/27/11 19:23 / sml

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-004
Client Sample ID: Well #741

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Lead 210	<0.7	pCi/L	U	0.7		E909.0	01/01/12 17:44 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	01/01/12 17:44 / eli-cs
Lead 210 MDC	0.7	pCi/L				E909.0	01/01/12 17:44 / eli-cs
Polonium 210	1.7	pCi/L		1.3		E912.0	02/02/12 08:46 / plj
Polonium 210 precision (±)	1.5	pCi/L				E912.0	02/02/12 08:46 / plj
Polonium 210 MDC	1.3	pCi/L				E912.0	02/02/12 08:46 / plj
Radium 226	0.5	pCi/L		0.1		E903.0	01/03/12 11:35 / js
Radium 226 precision (±)	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Radium 226 MDC	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/03/12 13:19 / dmf
Thorium 230 precision (±)	0.05	pCi/L				E908.0	01/03/12 13:19 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/03/12 13:19 / dmf
RADIONUCLIDES - SUSPENDED							
Lead 210	<0.8	pCi/L	U	0.8		E909.0	01/07/12 16:15 / eli-cs
Lead 210 precision (±)	0.5	pCi/L				E909.0	01/07/12 16:15 / eli-cs
Lead 210 MDC	0.8	pCi/L				E909.0	01/07/12 16:15 / eli-cs
Polonium 210	<0.6	pCi/L	U	0.6		E912.0	02/23/12 13:35 / ep
Polonium 210 precision (±)	0.2	pCi/L				E912.0	02/23/12 13:35 / ep
Polonium 210 MDC	0.6	pCi/L				E912.0	02/23/12 13:35 / ep
Radium 226	<0.1	pCi/L	U	0.1		E903.0	01/09/12 12:58 / trs
Radium 226 precision (±)	0.08	pCi/L				E903.0	01/09/12 12:58 / trs
Radium 226 MDC	0.1	pCi/L				E903.0	01/09/12 12:58 / trs
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/06/12 08:42 / dmf
Thorium 230 precision (±)	0.05	pCi/L				E908.0	01/06/12 08:42 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/06/12 08:42 / dmf
DATA QUALITY							
A/C Balance (± 5)	3.69	%				Calculation	01/04/12 08:42 / kbh
Anions	4.10	meq/L				Calculation	01/04/12 08:42 / kbh
Cations	4.42	meq/L				Calculation	01/04/12 08:42 / kbh
Solids, Total Dissolved Calculated	224	mg/L				Calculation	01/04/12 08:42 / kbh
TDS Balance (0.80 - 1.20)	1.16					Calculation	01/04/12 08:42 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-005
Client Sample ID: Well #745

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	164	mg/L		1		A2320 B	12/20/11 19:17 / jba
Carbonate as CO3	ND	mg/L		1		A2320 B	12/20/11 19:17 / jba
Bicarbonate as HCO3	200	mg/L		1		A2320 B	12/20/11 19:17 / jba
Calcium	61	mg/L		1		E200.8	12/22/11 00:02 / sml
Chloride	4	mg/L		1		E300.0	12/28/11 10:28 / ljl
Fluoride	0.4	mg/L		0.1		A4500-F C	12/22/11 12:13 / jba
Magnesium	11	mg/L		1		E200.8	12/22/11 00:02 / sml
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	12/22/11 12:22 / dc
Nitrogen, Nitrate+Nitrite as N	5.0	mg/L		0.1		E353.2	12/21/11 13:20 / dc
Potassium	2	mg/L		1		E200.8	12/22/11 00:02 / sml
Silica	67.2	mg/L		0.2		E200.7	01/12/12 18:34 / cp
Sodium	8	mg/L		1		E200.8	12/22/11 00:02 / sml
Sulfate	16	mg/L		1		E300.0	12/28/11 10:28 / ljl
PHYSICAL PROPERTIES							
Conductivity @ 25 C	327	umhos/cm		1		A2510 B	12/21/11 10:45 / wc
pH	7.79	s.u.	H	0.01		A4500-H B	12/21/11 10:45 / wc
Solids, Total Dissolved TDS @ 180 C	292	mg/L		10		A2540 C	12/20/11 16:54 / wc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.8	12/30/11 19:30 / sml
Arsenic	0.003	mg/L		0.001		E200.8	12/22/11 00:02 / sml
Barium	ND	mg/L		0.1		E200.8	12/30/11 19:30 / sml
Boron	ND	mg/L		0.1		E200.8	12/30/11 19:30 / sml
Cadmium	ND	mg/L		0.005		E200.8	12/30/11 19:30 / sml
Chromium	ND	mg/L		0.05		E200.8	12/22/11 00:02 / sml
Copper	ND	mg/L		0.01		E200.8	12/22/11 00:02 / sml
Iron	ND	mg/L		0.03		E200.8	12/30/11 19:30 / sml
Lead	0.002	mg/L		0.001		E200.8	12/22/11 00:02 / sml
Manganese	ND	mg/L		0.01		E200.8	12/22/11 00:02 / sml
Mercury	ND	mg/L		0.001		E200.8	12/30/11 19:30 / sml
Molybdenum	ND	mg/L		0.1		E200.7	01/12/12 18:34 / cp
Nickel	ND	mg/L		0.05		E200.8	12/22/11 00:02 / sml
Selenium	0.002	mg/L		0.001		E200.8	12/22/11 00:02 / sml
Uranium	0.0165	mg/L		0.0003		E200.8	12/30/11 19:30 / sml
Uranium, Activity	1.1E-08	uCi/mL		2.0E-10		E200.8	12/30/11 19:30 / sml
Vanadium	ND	mg/L		0.1		E200.8	12/22/11 00:02 / sml
Zinc	0.72	mg/L		0.01		E200.8	12/22/11 00:02 / sml
METALS - SUSPENDED							
Uranium	ND	mg/L		0.0003		E200.8	12/27/11 19:24 / sml
Uranium, Activity	ND	uCi/mL		2.0E-10		E200.8	12/27/11 19:24 / sml

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-005
Client Sample ID: Well #745

Report Date: 02/28/12
Collection Date: 12/15/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Lead 210	<0.7	pCi/L	U	0.7		E909.0	01/01/12 23:15 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	01/01/12 23:15 / eli-cs
Lead 210 MDC	0.7	pCi/L				E909.0	01/01/12 23:15 / eli-cs
Polonium 210	<1.0	pCi/L	U	1.0		E912.0	01/27/12 08:27 / plj
Polonium 210 precision (±)	0.5	pCi/L				E912.0	01/27/12 08:27 / plj
Polonium 210 MDC	1.0	pCi/L				E912.0	01/27/12 08:27 / plj
Radium 226	0.4	pCi/L		0.1		E903.0	01/03/12 11:35 / js
Radium 226 precision (±)	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Radium 226 MDC	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/03/12 13:19 / dmf
Thorium 230 precision (±)	0.05	pCi/L				E908.0	01/03/12 13:19 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/03/12 13:19 / dmf
RADIONUCLIDES - SUSPENDED							
Lead 210	<0.8	pCi/L	U	0.8		E909.0	01/07/12 18:20 / eli-cs
Lead 210 precision (±)	0.5	pCi/L				E909.0	01/07/12 18:20 / eli-cs
Lead 210 MDC	0.8	pCi/L				E909.0	01/07/12 18:20 / eli-cs
Polonium 210	<0.5	pCi/L	U	0.5		E912.0	02/23/12 13:35 / ep
Polonium 210 precision (±)	0.2	pCi/L				E912.0	02/23/12 13:35 / ep
Polonium 210 MDC	0.5	pCi/L				E912.0	02/23/12 13:35 / ep
Radium 226	<0.1	pCi/L	U	0.1		E903.0	01/09/12 12:58 / trs
Radium 226 precision (±)	0.05	pCi/L				E903.0	01/09/12 12:58 / trs
Radium 226 MDC	0.1	pCi/L				E903.0	01/09/12 12:58 / trs
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/06/12 08:42 / dmf
Thorium 230 precision (±)	0.07	pCi/L				E908.0	01/06/12 08:42 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/06/12 08:42 / dmf
DATA QUALITY							
A/C Balance (± 5)	3.13	%				Calculation	01/04/12 08:42 / kbh
Anions	4.10	meq/L				Calculation	01/04/12 08:42 / kbh
Cations	4.36	meq/L				Calculation	01/04/12 08:42 / kbh
Solids, Total Dissolved Calculated	223	mg/L				Calculation	01/04/12 08:42 / kbh
TDS Balance (0.80 - 1.20)	1.31					Calculation	01/04/12 08:42 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-006
Client Sample ID: Well #725

Report Date: 02/28/12
Collection Date: 12/16/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	141	mg/L		1		A2320 B	12/20/11 19:25 / jba
Carbonate as CO3	ND	mg/L		1		A2320 B	12/20/11 19:25 / jba
Bicarbonate as HCO3	172	mg/L		1		A2320 B	12/20/11 19:25 / jba
Calcium	33	mg/L		1		E200.8	12/22/11 00:09 / sml
Chloride	2	mg/L		1		E300.0	12/28/11 10:42 / ljl
Fluoride	0.7	mg/L		0.1		A4500-F C	12/22/11 12:16 / jba
Magnesium	6	mg/L		1		E200.8	12/22/11 00:09 / sml
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	12/22/11 12:24 / dc
Nitrogen, Nitrate+Nitrite as N	0.7	mg/L		0.1		E353.2	12/21/11 13:23 / dc
Potassium	4	mg/L		1		E200.8	12/22/11 00:09 / sml
Silica	68.4	mg/L		0.2		E200.7	01/12/12 18:38 / cp
Sodium	31	mg/L		1		E200.8	12/22/11 00:09 / sml
Sulfate	16	mg/L		1		E300.0	12/28/11 10:42 / ljl
PHYSICAL PROPERTIES							
Conductivity @ 25 C	241	umhos/cm		1		A2510 B	12/21/11 10:48 / wc
pH	7.95	s.u.	H	0.01		A4500-H B	12/21/11 10:48 / wc
Solids, Total Dissolved TDS @ 180 C	234	mg/L		10		A2540 C	12/20/11 16:55 / wc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.8	12/30/11 19:37 / sml
Arsenic	0.004	mg/L		0.001		E200.8	12/22/11 00:09 / sml
Barium	ND	mg/L		0.1		E200.8	12/22/11 00:09 / sml
Boron	ND	mg/L		0.1		E200.8	12/30/11 19:37 / sml
Cadmium	ND	mg/L		0.005		E200.8	12/22/11 00:09 / sml
Chromium	ND	mg/L		0.05		E200.8	12/22/11 00:09 / sml
Copper	ND	mg/L		0.01		E200.8	12/22/11 00:09 / sml
Iron	0.06	mg/L		0.03		E200.8	12/30/11 19:37 / sml
Lead	ND	mg/L		0.001		E200.8	12/22/11 00:09 / sml
Manganese	0.01	mg/L		0.01		E200.8	12/22/11 00:09 / sml
Mercury	ND	mg/L		0.001		E200.8	12/30/11 19:37 / sml
Molybdenum	ND	mg/L		0.1		E200.7	01/12/12 18:38 / cp
Nickel	ND	mg/L		0.05		E200.8	12/22/11 00:09 / sml
Selenium	ND	mg/L		0.001		E200.8	12/22/11 00:09 / sml
Uranium	0.0057	mg/L		0.0003		E200.8	12/30/11 19:37 / sml
Uranium, Activity	3.8E-09	uCi/mL		2.0E-10		E200.8	12/30/11 19:37 / sml
Vanadium	ND	mg/L		0.1		E200.8	12/22/11 00:09 / sml
Zinc	0.24	mg/L		0.01		E200.8	12/22/11 00:09 / sml
METALS - SUSPENDED							
Uranium	ND	mg/L		0.0003		E200.8	12/27/11 19:26 / sml
Uranium, Activity	ND	uCi/mL		2.0E-10		E200.8	12/27/11 19:26 / sml

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120623-006
Client Sample ID: Well #725

Report Date: 02/28/12
Collection Date: 12/16/11
DateReceived: 12/20/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Lead 210	<0.7	pCi/L	U	0.7		E909.0	01/02/12 04:46 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	01/02/12 04:46 / eli-cs
Lead 210 MDC	0.7	pCi/L				E909.0	01/02/12 04:46 / eli-cs
Polonium 210	<0.5	pCi/L	U	0.5		E912.0	01/27/12 08:27 / plj
Polonium 210 precision (±)	0.3	pCi/L				E912.0	01/27/12 08:27 / plj
Polonium 210 MDC	0.5	pCi/L				E912.0	01/27/12 08:27 / plj
Radium 226	<0.1	pCi/L	U	0.1		E903.0	01/03/12 11:35 / js
Radium 226 precision (±)	0.09	pCi/L				E903.0	01/03/12 11:35 / js
Radium 226 MDC	0.1	pCi/L				E903.0	01/03/12 11:35 / js
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/04/12 12:18 / dmf
Thorium 230 precision (±)	0.08	pCi/L				E908.0	01/04/12 12:18 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/04/12 12:18 / dmf
RADIONUCLIDES - SUSPENDED							
Lead 210	<0.9	pCi/L	U	0.9		E909.0	01/07/12 20:25 / eli-cs
Lead 210 precision (±)	0.5	pCi/L				E909.0	01/07/12 20:25 / eli-cs
Lead 210 MDC	0.9	pCi/L				E909.0	01/07/12 20:25 / eli-cs
Polonium 210	<0.6	pCi/L	U	0.6		E912.0	02/23/12 13:35 / ep
Polonium 210 precision (±)	0.2	pCi/L				E912.0	02/23/12 13:35 / ep
Polonium 210 MDC	0.6	pCi/L				E912.0	02/23/12 13:35 / ep
Radium 226	<0.1	pCi/L	U	0.1		E903.0	01/09/12 12:58 / trs
Radium 226 precision (±)	0.05	pCi/L				E903.0	01/09/12 12:58 / trs
Radium 226 MDC	0.1	pCi/L				E903.0	01/09/12 12:58 / trs
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/06/12 08:42 / dmf
Thorium 230 precision (±)	0.06	pCi/L				E908.0	01/06/12 08:42 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/06/12 08:42 / dmf
DATA QUALITY							
A/C Balance (± 5)	4.47	%				Calculation	01/04/12 08:42 / kbh
Anions	3.30	meq/L				Calculation	01/04/12 08:42 / kbh
Cations	3.61	meq/L				Calculation	01/04/12 08:42 / kbh
Solids, Total Dissolved Calculated	181	mg/L				Calculation	01/04/12 08:42 / kbh
TDS Balance (0.80 - 1.20)	1.29					Calculation	01/04/12 08:42 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R154609
Sample ID: MBLK	3	Method Blank				Run: MANTECH_111220A				12/20/11 16:01
Alkalinity, Total as CaCO3		3	mg/L	2						
Carbonate as CO3		ND	mg/L	1						
Bicarbonate as HCO3		4	mg/L	1						
Sample ID: LCS-6465		Laboratory Control Sample				Run: MANTECH_111220A				12/20/11 16:17
Alkalinity, Total as CaCO3		193	mg/L	5.0	95	90	110			
Sample ID: C11120626-001ADUP	3	Sample Duplicate				Run: MANTECH_111220A				12/20/11 20:27
Alkalinity, Total as CaCO3		3640	mg/L	5.0				0.2	10	
Carbonate as CO3		ND	mg/L	5.0					10	
Bicarbonate as HCO3		4440	mg/L	5.0				0.2	10	
Sample ID: C11120636-001AMS		Sample Matrix Spike				Run: MANTECH_111220A				12/20/11 20:44
Alkalinity, Total as CaCO3		584	mg/L	5.0	91	80	120			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B								Analytical Run: ORION555A_111221A		
Sample ID: ICV2_111221_1		Initial Calibration Verification Standard							12/21/11 10:12	
Conductivity @ 25 C		1480	umhos/cm	1.0	105	90	110			
Method: A2510 B								Batch: 111221_1_PH-W_555A-1		
Sample ID: MBLK1_111221_1		Method Blank				Run: ORION555A_111221A			12/21/11 10:04	
Conductivity @ 25 C		0.6	umhos/cm	0.2						
Sample ID: C11120626-001ADUP		Sample Duplicate				Run: ORION555A_111221A			12/21/11 10:52	
Conductivity @ 25 C		10300	umhos/cm	1.0				0.3	10	
Method: A2510 B								Analytical Run: PHSC_101-C_111220B		
Sample ID: ICV2_111220_1		Initial Calibration Verification Standard							12/20/11 16:47	
Conductivity @ 25 C		1420	umhos/cm	1.0	100	90	110			
Method: A2510 B									Batch: R154653	
Sample ID: MBLK1_111220_1		Method Blank				Run: PHSC_101-C_111220B			12/20/11 16:42	
Conductivity @ 25 C		2	umhos/cm	0.2						
Sample ID: C11120670-001ADUP		Sample Duplicate				Run: PHSC_101-C_111220B			12/21/11 14:10	
Conductivity @ 25 C		1580	umhos/cm	1.0				0.0	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: 111220_1_SLDS-TDS-W	
Sample ID: MBLK1_111220		Method Blank				Run: BAL-1_111222A			12/20/11 16:50	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	4						
Sample ID: LCS1_111220		Laboratory Control Sample				Run: BAL-1_111222A			12/20/11 16:50	
Solids, Total Dissolved TDS @ 180 C		1650	mg/L	10	99	90	110			
Sample ID: C11120476-001ADUP		Sample Duplicate				Run: BAL-1_111222A			12/20/11 16:51	
Solids, Total Dissolved TDS @ 180 C		1080	mg/L	10				0.2	5	
Sample ID: C11120623-001AMS		Sample Matrix Spike				Run: BAL-1_111222A			12/20/11 16:54	
Solids, Total Dissolved TDS @ 180 C		780	mg/L	10	28	90	110			S

- Matrix spike recoveries outside the acceptance range are considered matrix-related.

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C										Batch: R154719
Sample ID: MBLK		Method Blank				Run: MANTECH_111222B				12/22/11 11:17
Fluoride		ND	mg/L	0.008						
Sample ID: LCS-6622		Laboratory Control Sample				Run: MANTECH_111222B				12/22/11 11:21
Fluoride		2.00	mg/L	0.10	100	90	110			
Sample ID: C11120623-001BMS		Sample Matrix Spike				Run: MANTECH_111222B				12/22/11 11:47
Fluoride		2.39	mg/L	0.10	96	80	120			
Sample ID: C11120623-001BMSD		Sample Matrix Spike Duplicate				Run: MANTECH_111222B				12/22/11 11:51
Fluoride		2.43	mg/L	0.10	98	80	120	1.7	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: ORION555A_111221A		
Sample ID: ICV1_111221_1		Initial Calibration Verification Standard							12/21/11 10:06	
pH		6.94	s.u.	0.010	101	98	102			
Method: A4500-H B								Batch: 111221_1_PH-W_555A-1		
Sample ID: C11120626-001ADUP		Sample Duplicate				Run: ORION555A_111221A			12/21/11 10:52	
pH		7.87	s.u.	0.010				2.4	3	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-NH3 G										Batch: R154713
Sample ID: MBLK-1		Method Blank				Run: TECHNICON_111222A				12/22/11 11:56
Nitrogen, Ammonia as N		ND	mg/L	0.02						
Sample ID: LCS-2		Laboratory Control Sample				Run: TECHNICON_111222A				12/22/11 11:58
Nitrogen, Ammonia as N		2.06	mg/L	0.050	103	90	110			
Sample ID: LFB-3		Laboratory Fortified Blank				Run: TECHNICON_111222A				12/22/11 12:00
Nitrogen, Ammonia as N		2.01	mg/L	0.050	103	80	120			
Sample ID: C11120636-001DMS		Sample Matrix Spike				Run: TECHNICON_111222A				12/22/11 12:32
Nitrogen, Ammonia as N		2.09	mg/L	0.050	100	90	110			
Sample ID: C11120636-001DMSD		Sample Matrix Spike Duplicate				Run: TECHNICON_111222A				12/22/11 12:34
Nitrogen, Ammonia as N		2.14	mg/L	0.050	103	90	110	2.4	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-C_120112A	
Sample ID: ICV	2	Initial Calibration Verification Standard							01/12/12 16:08	
Molybdenum		0.983	mg/L	0.10	98	95	105			
Silicon		10.4	mg/L	0.10	104	95	105			
Sample ID: ICSA	2	Interference Check Sample A							01/12/12 16:37	
Molybdenum		-0.0158	mg/L	0.10						
Silicon		0.0116	mg/L	0.10						
Sample ID: ICSAB	2	Interference Check Sample AB							01/12/12 16:41	
Molybdenum		-0.0141	mg/L	0.10						
Silicon		0.00850	mg/L	0.10						
Method: E200.7									Batch: R155341	
Sample ID: MB-120111A	2	Method Blank				Run: ICP2-C_120112A			01/12/12 17:01	
Molybdenum		0.001	mg/L	0.001						
Silicon		0.02	mg/L	0.007						
Sample ID: LFB-120111A	2	Laboratory Fortified Blank				Run: ICP2-C_120112A			01/12/12 17:05	
Molybdenum		0.926	mg/L	0.10	92	85	115			
Silicon		0.428	mg/L	0.10	91	85	115			
Sample ID: C11120623-001CMS2	2	Sample Matrix Spike				Run: ICP2-C_120112A			01/12/12 18:10	
Molybdenum		92.4	mg/L	0.12	90	70	130			
Silicon		77.3	mg/L	0.67	94	70	130			
Sample ID: C11120623-001CMSD	2	Sample Matrix Spike Duplicate				Run: ICP2-C_120112A			01/12/12 18:14	
Molybdenum		93.9	mg/L	0.12	92	70	130	1.6	20	
Silicon		78.4	mg/L	0.67	97	70	130	1.4	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS2-C_111227A		
Sample ID: ICV		Initial Calibration Verification Standard							12/27/11 11:15	
Uranium		0.0507	mg/L	0.00030	101	90	110			
Method: E200.8									Batch: 32280	
Sample ID: MB-32280		Method Blank				Run: ICPMS2-C_111227A			12/27/11 19:05	
Uranium		9E-05	mg/L	6E-05						
Sample ID: LCS2-32201		Laboratory Control Sample				Run: ICPMS2-C_111227A			12/27/11 19:06	
Uranium		0.0950	mg/L	0.00030	95	85	115			
Sample ID: C11120623-006HMS		Sample Matrix Spike				Run: ICPMS2-C_111227A			12/27/11 19:28	
Uranium		0.00269	mg/L	0.00030	57	70	130			S
Sample ID: C11120623-006HMSD		Sample Matrix Spike Duplicate				Run: ICPMS2-C_111227A			12/27/11 19:30	
Uranium		0.00715	mg/L	0.00030	158	70	130	91	20	SR

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.

R - RPD exceeds advisory limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS4-C_111221A		
Sample ID: ICV	15	Initial Calibration Verification Standard							12/21/11 11:54	
Arsenic		0.0490	mg/L	0.0010	98	90	110			
Barium		0.0476	mg/L	0.0010	95	90	110			
Cadmium		0.0484	mg/L	0.0010	97	90	110			
Calcium		9.63	mg/L	0.0066	96	90	110			
Chromium		0.0493	mg/L	0.0010	99	90	110			
Copper		0.0503	mg/L	0.0010	101	90	110			
Lead		0.0481	mg/L	0.0010	96	90	110			
Magnesium		9.66	mg/L	0.0027	97	90	110			
Manganese		0.0478	mg/L	0.0010	96	90	110			
Nickel		0.0494	mg/L	0.0010	99	90	110			
Potassium		9.64	mg/L	0.0041	96	90	110			
Selenium		0.0494	mg/L	0.0010	99	90	110			
Sodium		9.32	mg/L	0.0043	93	90	110			
Vanadium		0.0501	mg/L	0.0010	100	90	110			
Zinc		0.0502	mg/L	0.0010	100	90	110			
Method: E200.8									Batch: R154680A	
Sample ID: C11120623-002CMS4	15	Sample Matrix Spike				Run: ICPMS4-C_111221A			12/21/11 23:00	
Arsenic		0.0559	mg/L	0.0010	105	70	130			
Barium		0.195	mg/L	0.10	108	70	130			
Cadmium		0.0517	mg/L	0.010	103	70	130			
Calcium		44.9	mg/L	1.0	100	70	130			
Chromium		0.0547	mg/L	0.050	109	70	130			
Copper		0.0560	mg/L	0.010	111	70	130			
Lead		0.0545	mg/L	0.050	109	70	130			
Magnesium		18.7	mg/L	1.0	99	70	130			
Manganese		0.0561	mg/L	0.010	111	70	130			
Nickel		0.0537	mg/L	0.050	107	70	130			
Potassium		17.8	mg/L	1.0	103	70	130			
Selenium		0.0559	mg/L	0.0010	97	70	130			
Sodium		37.5	mg/L	1.0	99	70	130			
Vanadium		0.0670	mg/L	0.0010	117	70	130			
Zinc		0.150	mg/L	0.010	92	70	130			
Sample ID: C11120623-002CMSD	15	Sample Matrix Spike Duplicate				Run: ICPMS4-C_111221A			12/21/11 23:07	
Arsenic		0.0563	mg/L	0.0010	106	70	130	0.8	20	
Barium		0.197	mg/L	0.10	112	70	130	0.9	20	
Cadmium		0.0527	mg/L	0.010	105	70	130	1.9	20	
Calcium		45.1	mg/L	1.0	102	70	130	0.4	20	
Chromium		0.0544	mg/L	0.050	108	70	130	0.7	20	
Copper		0.0552	mg/L	0.010	109	70	130	1.5	20	
Lead		0.0570	mg/L	0.050	114	70	130	4.5	20	
Magnesium		18.9	mg/L	1.0	101	70	130	1.0	20	
Manganese		0.0565	mg/L	0.010	112	70	130	0.6	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: R154680A	
Sample ID: C11120623-002CMSD	15	Sample Matrix Spike Duplicate				Run: ICPMS4-C_111221A			12/21/11 23:07	
Nickel		0.0540	mg/L	0.050	107	70	130	0.5	20	
Potassium		17.8	mg/L	1.0	103	70	130	0.1	20	
Selenium		0.0561	mg/L	0.0010	97	70	130	0.4	20	
Sodium		37.6	mg/L	1.0	100	70	130	0.2	20	
Vanadium		0.0681	mg/L	0.0010	119	70	130	1.5	20	
Zinc		0.152	mg/L	0.010	96	70	130	1.3	20	
Sample ID: LRB	15	Method Blank				Run: ICPMS4-C_111221A			12/21/11 13:17	
Arsenic		ND	mg/L	5E-05						
Barium		ND	mg/L	7E-05						
Cadmium		ND	mg/L	3E-05						
Calcium		ND	mg/L	0.007						
Chromium		ND	mg/L	4E-05						
Copper		ND	mg/L	3E-05						
Lead		ND	mg/L	2E-05						
Magnesium		ND	mg/L	0.003						
Manganese		ND	mg/L	3E-05						
Nickel		ND	mg/L	9E-05						
Potassium		0.01	mg/L	0.004						
Selenium		ND	mg/L	7E-05						
Sodium		ND	mg/L	0.004						
Vanadium		ND	mg/L	4E-05						
Zinc		ND	mg/L	0.0002						
Sample ID: LFB	15	Laboratory Fortified Blank				Run: ICPMS4-C_111221A			12/21/11 13:37	
Arsenic		0.0533	mg/L	0.0010	107	85	115			
Barium		0.0523	mg/L	0.0010	105	85	115			
Cadmium		0.0526	mg/L	0.0010	105	85	115			
Calcium		12.2	mg/L	0.0066	97	85	115			
Chromium		0.0526	mg/L	0.0010	105	85	115			
Copper		0.0514	mg/L	0.0010	103	85	115			
Lead		0.0475	mg/L	0.0010	95	85	115			
Magnesium		12.5	mg/L	0.0027	100	85	115			
Manganese		0.0524	mg/L	0.0010	105	85	115			
Nickel		0.0538	mg/L	0.0010	108	85	115			
Potassium		12.3	mg/L	0.0041	98	85	115			
Selenium		0.0544	mg/L	0.0010	109	85	115			
Sodium		12.4	mg/L	0.0043	99	85	115			
Vanadium		0.0494	mg/L	0.0010	99	85	115			
Zinc		0.0550	mg/L	0.0010	110	85	115			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS4-C_111230A		
Sample ID: ICV	20	Initial Calibration Verification Standard								12/30/11 10:59
Aluminum		0.0482	mg/L	0.0010	96	90	110			
Arsenic		0.0497	mg/L	0.0010	99	90	110			
Barium		0.0494	mg/L	0.0010	99	90	110			
Boron		0.0502	mg/L	0.0010	100	90	110			
Cadmium		0.0503	mg/L	0.0010	101	90	110			
Calcium		9.70	mg/L	0.0066	97	90	110			
Chromium		0.0497	mg/L	0.0010	99	90	110			
Copper		0.0503	mg/L	0.0010	101	90	110			
Iron		1.07	mg/L	0.0010	107	90	110			
Lead		0.0492	mg/L	0.0010	98	90	110			
Magnesium		9.67	mg/L	0.0027	97	90	110			
Manganese		0.0501	mg/L	0.0010	100	90	110			
Mercury		0.00519	mg/L	0.0010	104	90	110			
Nickel		0.0500	mg/L	0.0010	100	90	110			
Potassium		9.72	mg/L	0.0041	97	90	110			
Selenium		0.0522	mg/L	0.0010	104	90	110			
Sodium		9.69	mg/L	0.0043	97	90	110			
Uranium		0.0494	mg/L	0.00030	99	90	110			
Vanadium		0.0491	mg/L	0.0010	98	90	110			
Zinc		0.0513	mg/L	0.0010	103	90	110			
Method: E200.8										Batch: R154953A
Sample ID: LRB	20	Method Blank				Run: ICPMS4-C_111230A				12/30/11 12:08
Aluminum		ND	mg/L	0.0002						
Arsenic		ND	mg/L	5E-05						
Barium		ND	mg/L	7E-05						
Boron		ND	mg/L	0.0004						
Cadmium		ND	mg/L	3E-05						
Calcium		ND	mg/L	0.007						
Chromium		ND	mg/L	4E-05						
Copper		ND	mg/L	3E-05						
Iron		ND	mg/L	0.0006						
Lead		ND	mg/L	2E-05						
Magnesium		ND	mg/L	0.003						
Manganese		ND	mg/L	3E-05						
Mercury		ND	mg/L	5E-05						
Nickel		ND	mg/L	9E-05						
Potassium		ND	mg/L	0.004						
Selenium		ND	mg/L	7E-05						
Sodium		ND	mg/L	0.004						
Uranium		5E-05	mg/L	9E-06						
Vanadium		ND	mg/L	4E-05						
Zinc		ND	mg/L	0.0002						

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: R154953A	
Sample ID: LFB	20	Laboratory Fortified Blank				Run: ICPMS4-C_111230A			12/30/11 12:15	
Aluminum		0.0522	mg/L	0.0010	104	85	115			
Arsenic		0.0523	mg/L	0.0010	105	85	115			
Barium		0.0503	mg/L	0.0010	101	85	115			
Boron		0.0491	mg/L	0.0010	98	85	115			
Cadmium		0.0511	mg/L	0.0010	102	85	115			
Calcium		12.7	mg/L	0.0066	102	85	115			
Chromium		0.0516	mg/L	0.0010	103	85	115			
Copper		0.0517	mg/L	0.0010	103	85	115			
Iron		1.29	mg/L	0.0010	103	85	115			
Lead		0.0508	mg/L	0.0010	102	85	115			
Magnesium		12.6	mg/L	0.0027	101	85	115			
Manganese		0.0513	mg/L	0.0010	103	85	115			
Mercury		0.00506	mg/L	0.0010	101	85	115			
Nickel		0.0518	mg/L	0.0010	103	85	115			
Potassium		12.7	mg/L	0.0041	101	85	115			
Selenium		0.0510	mg/L	0.0010	102	85	115			
Sodium		12.7	mg/L	0.0043	102	85	115			
Uranium		0.0503	mg/L	0.00030	100	85	115			
Vanadium		0.0515	mg/L	0.0010	103	85	115			
Zinc		0.0539	mg/L	0.0010	108	85	115			
Sample ID: C11120623-006CMS4	20	Sample Matrix Spike				Run: ICPMS4-C_111230A			12/30/11 19:44	
Aluminum		0.0483	mg/L	0.0010	63	70	130			S
Arsenic		0.0565	mg/L	0.0010	105	70	130			
Barium		0.147	mg/L	0.10	106	70	130			
Boron		0.0680	mg/L	0.0010	86	70	130			
Cadmium		0.0508	mg/L	0.010	102	70	130			
Calcium		45.2	mg/L	1.0	111	70	130			
Chromium		0.0513	mg/L	0.050	102	70	130			
Copper		0.0518	mg/L	0.010	98	70	130			
Iron		1.32	mg/L	0.030	101	70	130			
Lead		0.0516	mg/L	0.050	103	70	130			
Magnesium		19.9	mg/L	1.0	108	70	130			
Manganese		0.0605	mg/L	0.010	100	70	130			
Mercury		0.00518	mg/L	0.0010	104	70	130			
Nickel		0.0486	mg/L	0.0010	96	70	130			
Potassium		17.5	mg/L	1.0	106	70	130			
Selenium		0.0560	mg/L	0.0010	111	70	130			
Sodium		44.9	mg/L	1.0	109	70	130			
Uranium		0.0579	mg/L	0.00030	104	70	130			
Vanadium		0.0551	mg/L	0.0010	97	70	130			
Zinc		0.302	mg/L	0.010		70	130			A
Sample ID: C11120623-006CMSD	20	Sample Matrix Spike Duplicate				Run: ICPMS4-C_111230A			12/30/11 19:50	
Aluminum		0.0487	mg/L	0.0010	64	70	130	0.8	20	S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Report Date: 02/28/12
Project: Marsland Baseline Private Well Samples
Work Order: C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Batch: R154953A
Sample ID: C11120623-006CMSD	20	Sample Matrix Spike Duplicate				Run: ICPMS4-C_111230A			12/30/11 19:50	
Arsenic		0.0566	mg/L	0.0010	105	70	130	0.2	20	
Barium		0.145	mg/L	0.10	104	70	130	0.8	20	
Boron		0.0697	mg/L	0.0010	89	70	130	2.5	20	
Cadmium		0.0509	mg/L	0.010	102	70	130	0.1	20	
Calcium		45.1	mg/L	1.0	111	70	130	0.1	20	
Chromium		0.0517	mg/L	0.050	102	70	130	0.7	20	
Copper		0.0521	mg/L	0.010	99	70	130	0.7	20	
Iron		1.33	mg/L	0.030	102	70	130	1.1	20	
Lead		0.0511	mg/L	0.050	102	70	130	1.0	20	
Magnesium		20.0	mg/L	1.0	108	70	130	0.2	20	
Manganese		0.0607	mg/L	0.010	101	70	130	0.5	20	
Mercury		0.00524	mg/L	0.0010	105	70	130	1.2	20	
Nickel		0.0497	mg/L	0.0010	98	70	130	2.4	20	
Potassium		17.8	mg/L	1.0	108	70	130	1.5	20	
Selenium		0.0554	mg/L	0.0010	110	70	130	1.1	20	
Sodium		44.2	mg/L	1.0	104	70	130	1.5	20	
Uranium		0.0578	mg/L	0.00030	104	70	130	0.1	20	
Vanadium		0.0560	mg/L	0.0010	98	70	130	1.7	20	
Zinc		0.303	mg/L	0.010		70	130	0.3	20	A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC2-C_111227A	
Sample ID: ICV-122711-10	2	Initial Calibration Verification Standard							12/27/11 14:36	
Chloride		10.0	mg/L	1.0	100	90	110			
Sulfate		40.2	mg/L	1.0	100	90	110			
Sample ID: ICB2-122711-12	2	Initial Calibration Blank, Instrument Blank							12/27/11 15:03	
Chloride		0.0510	mg/L	1.0		0	0			
Sulfate		0.202	mg/L	1.0		0	0			
Method: E300.0									Batch: R154870	
Sample ID: ICB-122711-11	2	Method Blank				Run: IC2-C_111227A			12/27/11 14:50	
Chloride		ND	mg/L	0.10						
Sulfate		0.2	mg/L	0.08						
Sample ID: LFB-122711-13	2	Laboratory Fortified Blank				Run: IC2-C_111227A			12/27/11 15:17	
Chloride		10.3	mg/L	1.0	103	90	110			
Sulfate		39.9	mg/L	1.0	99	90	110			
Sample ID: LFBD-122711-14	2	Laboratory Fortified Blank Duplicate				Run: IC2-C_111227A			12/27/11 15:30	
Chloride		10.4	mg/L	1.0	103	90	110	0.5	10	
Sulfate		39.9	mg/L	1.0	99	90	110	0.1	10	
Sample ID: LCS-32231	2	Laboratory Control Sample				Run: IC2-C_111227A			12/27/11 16:37	
Chloride		10.4	mg/L	1.0	104	90	110			
Sulfate		43.6	mg/L	1.0	102	90	110			
Sample ID: C11120623-003BMS	2	Sample Matrix Spike				Run: IC2-C_111227A			12/28/11 09:48	
Chloride		12.7	mg/L	1.0	102	90	110			
Sulfate		46.2	mg/L	1.0	102	90	110			
Sample ID: C11120623-003BMSD	2	Sample Matrix Spike Duplicate				Run: IC2-C_111227A			12/28/11 10:01	
Chloride		12.7	mg/L	1.0	103	90	110	0.1	10	
Sulfate		46.6	mg/L	1.0	103	90	110	0.7	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2										Batch: R154654
Sample ID: MBLK-1		Method Blank				Run: TECHNICON_111221A				12/21/11 12:50
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.06						
Sample ID: LCS-2		Laboratory Control Sample				Run: TECHNICON_111221A				12/21/11 12:53
Nitrogen, Nitrate+Nitrite as N		2.52	mg/L	0.10	101	90	110			
Sample ID: LFB-3		Laboratory Fortified Blank				Run: TECHNICON_111221A				12/21/11 12:55
Nitrogen, Nitrate+Nitrite as N		1.97	mg/L	0.10	101	90	110			
Sample ID: C11120631-001AMS		Sample Matrix Spike				Run: TECHNICON_111221A				12/21/11 13:35
Nitrogen, Nitrate+Nitrite as N		2.09	mg/L	0.10	101	90	110			
Sample ID: C11120631-001AMSD		Sample Matrix Spike Duplicate				Run: TECHNICON_111221A				12/21/11 13:38
Nitrogen, Nitrate+Nitrite as N		2.08	mg/L	0.10	100	90	110	0.5	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0										Batch: R155169
Sample ID: C11120623-003HMS		Sample Matrix Spike				Run: BERTHOLD 770-2_111230A				01/09/12 12:58
Radium 226		9.8	pCi/L		97	70	130			
Sample ID: C11120623-003HMSD		Sample Matrix Spike Duplicate				Run: BERTHOLD 770-2_111230A				01/09/12 12:58
Radium 226		9.2	pCi/L		90	70	130	6.5	25.8	
Sample ID: LCS-32280		Laboratory Control Sample				Run: BERTHOLD 770-2_111230A				01/09/12 12:58
Radium 226		11	pCi/L		88	85	115			
Sample ID: MB-32280	3	Method Blank				Run: BERTHOLD 770-2_111230A				01/09/12 14:30
Radium 226		0.03	pCi/L							U
Radium 226 precision (±)		0.1	pCi/L							
Radium 226 MDC		0.3	pCi/L							
Method: E903.0										Batch: RA226-5765
Sample ID: C11101104-002CMS		Sample Matrix Spike				Run: G542M_111227A				01/03/12 11:35
Radium 226		13	pCi/L		97	70	130			
Sample ID: C11101104-002CMSD		Sample Matrix Spike Duplicate				Run: G542M_111227A				01/03/12 11:35
Radium 226		13	pCi/L		98	70	130	0.2	24.2	
Sample ID: MB-RA226-5765	3	Method Blank				Run: G542M_111227A				01/03/12 13:18
Radium 226		0.10	pCi/L							U
Radium 226 precision (±)		0.10	pCi/L							
Radium 226 MDC		0.1	pCi/L							
Sample ID: LCS-RA226-5765		Laboratory Control Sample				Run: G542M_111227A				01/03/12 13:18
Radium 226		6.0	pCi/L		94	80	120			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0									Batch: RA-TH-ISO-1540	
Sample ID: LCS-RA-TH-ISO-1540		Laboratory Control Sample				Run: EGG-ORTEC_111220B			01/03/12 13:19	
Thorium 230		5.3	pCi/L		94	70	130			
Sample ID: C11120623-006EMS		Sample Matrix Spike				Run: EGG-ORTEC_111220B			01/04/12 12:18	
Thorium 230		11	pCi/L		95	70	130			
Sample ID: C11120623-006EMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_111220B			01/04/12 12:18	
Thorium 230		11	pCi/L		91	70	130	4.4	38	
Sample ID: MB-RA-TH-ISO-1540	3	Method Blank				Run: EGG-ORTEC_111220B			01/04/12 12:18	
Thorium 230		-0.01	pCi/L							U
Thorium 230 precision (±)		0.05	pCi/L							
Thorium 230 MDC		0.1	pCi/L							
Method: E908.0									Batch: 32280	
Sample ID: C11120623-006HMS		Sample Matrix Spike				Run: EGG-ORTEC_120103C			01/06/12 08:42	
Thorium 230		8.2	pCi/L		104	70	130			
Sample ID: C11120623-006HMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_120103C			01/06/12 08:42	
Thorium 230		8.6	pCi/L		108	70	130	4.8	38.3	
Sample ID: LCS-32280		Laboratory Control Sample				Run: EGG-ORTEC_120103C			01/06/12 13:00	
Thorium 230		10	pCi/L		103	70	130			
Sample ID: MB-32280	3	Method Blank				Run: EGG-ORTEC_120103C			01/06/12 13:00	
Thorium 230		0.007	pCi/L							U
Thorium 230 precision (±)		0.1	pCi/L							
Thorium 230 MDC		0.3	pCi/L							

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E909.0										Batch: T_PB-210-0198
Sample ID: MB-PB-210-0198	3	Method Blank				Run: SUB-T43504				12/31/11 03:07
Lead 210		0.1	pCi/L							U
Lead 210 precision (±)		0.4	pCi/L							
Lead 210 MDC		0.7	pCi/L							
Sample ID: LCS-PB-210-0198		Laboratory Control Sample				Run: SUB-T43504				12/31/11 08:38
Lead 210		87	pCi/L		103	70	130			
Sample ID: C11120623-006GMS		Sample Matrix Spike				Run: SUB-T43504				01/02/12 10:17
Lead 210		200	pCi/L		104	70	130			
Sample ID: C11120623-006GMSD		Sample Matrix Spike Duplicate				Run: SUB-T43504				01/02/12 15:48
Lead 210		210	pCi/L		108	70	130	3.7	12.2	
Method: E909.0										Batch: T_15485
Sample ID: MB-15485	3	Method Blank				Run: SUB-T43556				01/07/12 05:50
Lead 210		-2	pCi/L							U
Lead 210 precision (±)		5	pCi/L							
Lead 210 MDC		9	pCi/L							
Sample ID: LCS-15485		Laboratory Control Sample				Run: SUB-T43556				01/07/12 07:55
Lead 210		570	pCi/L		101	70	130			
Sample ID: C11120623-006HMS		Sample Matrix Spike				Run: SUB-T43556				01/07/12 22:30
Lead 210		150	pCi/L		101	70	130			
Sample ID: C11120623-006HMSD		Sample Matrix Spike Duplicate				Run: SUB-T43556				01/08/12 00:35
Lead 210		150	pCi/L		102	70	130	3.7	14.1	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120623

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E912.0										Batch: R156705
Sample ID: C11120623-004HMS		Sample Matrix Spike				Run: ALPHANALYST_120213B				02/23/12 13:35
Polonium 210		5.7	pCi/L		88	70	130			
Sample ID: C11120623-004HMSD		Sample Matrix Spike Duplicate				Run: ALPHANALYST_120213B				02/23/12 13:35
Polonium 210		5.1	pCi/L		79	70	130	11	82.3	
Sample ID: LCS-32280		Laboratory Control Sample				Run: ALPHANALYST_120213B				02/23/12 13:35
Polonium 210		35	pCi/L		101	70	130			
Sample ID: MB-32280	3	Method Blank				Run: ALPHANALYST_120213B				02/23/12 13:35
Polonium 210		-0.1	pCi/L							U
Polonium 210 precision (±)		2	pCi/L							
Polonium 210 MDC		7	pCi/L							
Method: E912.0										Batch: PO210-0414
Sample ID: C11120623-002FMS		Sample Matrix Spike				Run: EGG-ORTEC_120125C				01/27/12 08:27
Polonium 210		13	pCi/L		102	70	130			
Sample ID: C11120623-002FMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_120125C				01/27/12 08:27
Polonium 210		12	pCi/L		95	70	130	8.4	108.8	
Sample ID: MB-PO210-0414	3	Method Blank				Run: EGG-ORTEC_120125C				01/27/12 10:10
Polonium 210		0.4	pCi/L							U
Polonium 210 precision (±)		0.6	pCi/L							
Polonium 210 MDC		0.9	pCi/L							
Sample ID: LCS-PO210-0414		Laboratory Control Sample				Run: EGG-ORTEC_120125C				02/02/12 08:46
Polonium 210		5.0	pCi/L		75	70	130			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

Workorder Receipt Checklist

Crow Butte Resources

C11120623

Login completed by: Debra Williams
Date Received: 12/20/2011
Reviewed by: BL2000\cwagner
Received by: kg
Reviewed Date: 12/22/2011
Carrier name: NDA

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Container/Temp Blank temperature:	2.6°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Contact and Corrective Action Comments:

None

Chain of Custody and Analytical Request Record

PLEASE PRINT- Provide as much information as possible.

Company Name: Crow Butte Resources, Inc.	Project Name: Marsland Baseline Private Well Samples	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 169 Crawford, NE 69339	Contact Name: Larry Teahon Phone/Fax: 308-665-2341	Email: daxmynus@msn.com	Sampler: (Please Print) Brooke Bass Rhonda Pelton
Invoice Address: P.O. Box 169 Crawford, NE 69339	Invoice Contact & Phone: Larry Teahon 308-665-2215 ext 114	Purchase Order: 1125	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

- ☐ DW
- ☐ GSA
- ☐ POTW/WWTP
- ☐ State: _____
- ☐ Other: _____
- ☐ A2LA
- ☐ EDD/EDT (Electronic Data) Format: _____
- ☐ LEVEL IV
- ☐ NELAC

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	HNO3-F, Metals	RAW-F, Common Ions	RAW-UF, Alkalinity	H2SO4-F, NO2, NO3, NH4	Raw-UF, Ra226, Po210 dis, sus	Raw-UF, Pb210 dis and sus	Rau-UF, Th230, U-nat dis and sus			SEE ATTACHED	Normal Turnaround (TAT)	RUSH	Comments
1	Well #727	12/15/11		Water	.5	1	1	.5	1 G	1 G	1 G						Please Report 1/30/12
2	Well #759	12/15/11		Water	.5	1	1	.5	1 G	1 G	1 G						Please Report 1/30/12
3	Well #703	12/15/11		Water	.5	1	1	.5	1 G	1 G	1 G						Please Report 1/30/12
4	Well #741	12/15/11		Water	.5	1	1	.5	1 G	1 G	1 G						Please Report 1/30/12
5	Well #745	12/15/11		Water	.5	1	1	.5	1 G	1 G	1 G						Please Report 1/30/12
6	Well #725	12/16/11		Water	.5	1	1	.5	1 G	1 G	1 G						Please Report 1/30/12
7																	
8																	
9																	
10																	

RUSH: Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments: NDEQ parameters for baseline sampling. Report on separate sheets. Analyze as per WDEQ Guideline 8 and NRC Reg. Guide 4.14 requirements. Record U as mg/L and µCi/ml and radiometrics as pCi/L.

LABORATORY USE ONLY

Shipped by: UPS-NDA
Cooler ID(s): 2- Various
Receipt Temp: 2.6 °C
On Ice: (Yes) No
Custody Seal Y (N)
Intact Y N
Signature Match Y N

1112062 3

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Rhonda L Pelton	12-19-11 11:07	Rhonda Pelton	UPS		

Received by Laboratory: Date/Time: 12-20-11 10:00 Signature: Kris Gissel

Sample Disposal: Return to Client: No Lab Disposal: YES

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

CROW BUTTE RESOURCES, INC.
CROW BUTTE PROJECT

NO_2^-

DATE: 12·16·11 ANALYST: MO

STANDARD CURVE DATA

	BL	.01	.05	.10			.9998
Abs	000	.027	.153	.314			
Abs							

SAMPLE #	VOLUME	Df	Abs	NO_2^- mg/L
1 703	10ml	1	-.001	<.01
2 723	10ml	1	.001	<.01
3 727	10ml	1	.004	<.01
4 727 Dup	10ml	1	.006	<.01
5 741	10ml	1	-.004	<.01
745	10ml	1	-.002	<.01
6 759	10ml	1	-.002	<.01
7 759 Dup	10ml	1	-.000	<.01
8				
9				
10				
Dup				
11				
12				
13				
14				
15				
Dup				
16				
17				
18				
19				
20				
Dup				
21				
22				
23				
24				
25				
Dup				

ANALYTICAL SUMMARY REPORT

February 28, 2012

Crow Butte Resources
86 Crow Butte Rd
Crawford, NE 69339

Workorder No.: C11120731 Quote ID: C1125 - Crow Butte Uranium

Project Name: Marsland Baseline Private Well Samples

Energy Laboratories, Inc. Casper WY received the following 1 sample for Crow Butte Resources on 12/23/2011 for analysis.

Sample ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C11120731-001	Well #723	12/20/11 00:00	12/23/11	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity QA Calculations Conductivity Fluoride E300.0 Anions Uranium, Suspended Nitrogen, Ammonia Nitrogen, Nitrate + Nitrite pH Digestion, Total Metals Lead 210, Dissolved Lead 210, Suspended Polonium 210, Dissolved Polonium 210, Suspended Radium 226, Dissolved Radium 226, Suspended Thorium, Isotopic Thorium, Suspended Isotopic Solids, Total Dissolved

The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Radiochemistry analyses were performed at Energy Laboratories, Inc., 2325 Kerzell Lane, Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing. Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. Data corrected for moisture content are typically noted as - dry on the report. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Sample Delivery Group: C11120731

Report Date: 02/28/12

CASE NARRATIVE

pH COMMENTS
Per NELAC rule, pH is considered a field parameter with a holding time of 15 minutes. Due to this rule, all pH analyses will be flagged with an H.

BRANCH LABORATORY SUBCONTRACT ANALYSIS
Tests associated with analyst identified as ELI-CS were subcontracted to Energy Laboratories, 415 Graham Rd., College Station, TX, EPA Number TX01520.

RADIOCHEMISTRY ANALYSIS
Per client request, results less than MDC (or precision if no MDC), are reported as <MDC (or <precision). Actual instrument results are available by request.

ORIGINAL SAMPLE SUBMITTAL(S)
All original sample submittals have been returned with the data package.

SAMPLE TEMPERATURE COMPLIANCE: 4°C (±2°C)
Temperature of samples received may not be considered properly preserved by accepted standards. Samples that are hand delivered immediately after collection shall be considered acceptable if there is evidence that the chilling process has begun.

GROSS ALPHA ANALYSIS
Method 900.0 for gross alpha and gross beta is intended as a drinking water method for low TDS waters. Data provided by this method for non potable waters should be viewed as inconsistent.

SOIL/SOLID SAMPLES
All samples reported on an as received basis unless otherwise indicated.

SUBCONTRACTING ANALYSIS
Subcontracting of sample analyses to an outside laboratory may be required. If so, ENERGY LABORATORIES will utilize its branch laboratories or qualified contract laboratories for this service. Any such laboratories will be indicated within the Laboratory Analytical Report.

BRANCH LABORATORY LOCATIONS
eli-b - Energy Laboratories, Inc. - Billings, MT
eli-g - Energy Laboratories, Inc. - Gillette, WY
eli-h - Energy Laboratories, Inc. - Helena, MT
eli-r - Energy Laboratories, Inc. - Rapid City, SD
eli-t - Energy Laboratories, Inc. - College Station, TX

CERTFICATIONS:
USEPA: WY00002; FL-DOH NELAC: E87641; California: 02118CA
Oregon: WY200001; Utah: 3072350515; Virginia: 00057; Washington: C1903

ISO 17025 DISCLAIMER:
The results of this Analytical Report relate only to the items submitted for analysis.

ENERGY LABORATORIES, INC. - CASPER,WY certifies that certain method selections contained in this report meet requirements as set forth by the above accrediting authorities. Some results requested by the client may not be covered under these certifications. All analysis data to be submitted for regulatory enforcement should be certified in the sample state of origin. Please verify ELI's certification coverage by visiting www.energylab.com

ELI appreciates the opportunity to provide you with this analytical service. For additional information and services visit our web page www.energylab.com.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120731-001
Client Sample ID: Well #723

Report Date: 02/28/12
Collection Date: 12/20/11
DateReceived: 12/23/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	149	mg/L		1		A2320 B	12/28/11 14:33 / jba
Carbonate as CO3	ND	mg/L		1		A2320 B	12/28/11 14:33 / jba
Bicarbonate as HCO3	182	mg/L		1		A2320 B	12/28/11 14:33 / jba
Calcium	34	mg/L		1		E200.8	12/30/11 20:04 / sml
Chloride	2	mg/L		1		E300.0	12/30/11 02:22 / ljl
Fluoride	0.6	mg/L		0.1		A4500-F C	12/29/11 12:17 / jba
Magnesium	9	mg/L		1		E200.8	12/30/11 20:04 / sml
Nitrogen, Ammonia as N	ND	mg/L		0.05		A4500-NH3 G	12/29/11 16:24 / dc
Nitrogen, Nitrate+Nitrite as N	0.7	mg/L		0.1		E353.2	12/23/11 14:15 / dc
Potassium	3	mg/L		1		E200.8	12/30/11 20:04 / sml
Silica	75.6	mg/L		0.2		E200.7	01/14/12 13:02 / cp
Sodium	22	mg/L		1		E200.8	12/30/11 20:04 / sml
Sulfate	9	mg/L		1		E300.0	12/30/11 02:22 / ljl
PHYSICAL PROPERTIES							
Conductivity @ 25 C	306	umhos/cm		1		A2510 B	12/28/11 09:13 / wc
pH	7.72	s.u.	H	0.01		A4500-H B	12/28/11 09:13 / wc
Solids, Total Dissolved TDS @ 180 C	215	mg/L		10		A2540 C	12/23/11 12:32 / wc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.8	12/30/11 20:04 / sml
Arsenic	0.006	mg/L		0.001		E200.8	12/30/11 20:04 / sml
Barium	0.1	mg/L		0.1		E200.8	12/30/11 20:04 / sml
Boron	ND	mg/L		0.1		E200.8	12/30/11 20:04 / sml
Cadmium	ND	mg/L		0.005		E200.8	12/30/11 20:04 / sml
Chromium	ND	mg/L		0.05		E200.8	12/30/11 20:04 / sml
Copper	0.06	mg/L		0.01		E200.8	12/30/11 20:04 / sml
Iron	ND	mg/L		0.03		E200.8	12/30/11 20:04 / sml
Lead	ND	mg/L		0.001		E200.8	12/30/11 20:04 / sml
Manganese	ND	mg/L		0.01		E200.8	12/30/11 20:04 / sml
Mercury	ND	mg/L		0.001		E200.8	12/30/11 20:04 / sml
Molybdenum	ND	mg/L		0.1		E200.7	01/11/12 16:34 / cp
Nickel	ND	mg/L		0.05		E200.8	12/30/11 20:04 / sml
Selenium	0.001	mg/L		0.001		E200.8	12/30/11 20:04 / sml
Uranium	0.0058	mg/L		0.0003		E200.8	12/30/11 20:04 / sml
Uranium, Activity	3.9E-09	uCi/mL		2.0E-10		E200.8	12/30/11 20:04 / sml
Vanadium	ND	mg/L		0.1		E200.8	12/30/11 20:04 / sml
Zinc	0.19	mg/L		0.01		E200.8	12/30/11 20:04 / sml
METALS - SUSPENDED							
Uranium	ND	mg/L		0.0003		E200.8	12/30/11 21:07 / sml
Uranium, Activity	ND	uCi/mL		2.0E-10		E200.8	12/30/11 21:07 / sml

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Project: Marsland Baseline Private Well Samples
Lab ID: C11120731-001
Client Sample ID: Well #723

Report Date: 02/28/12
Collection Date: 12/20/11
DateReceived: 12/23/11
Matrix: Aqueous

Analyses	Result	Units	Qualifier	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Lead 210	<1.0	pCi/L	U	1.0		E909.0	01/07/12 04:43 / eli-cs
Lead 210 precision (±)	0.6	pCi/L				E909.0	01/07/12 04:43 / eli-cs
Lead 210 MDC	1.0	pCi/L				E909.0	01/07/12 04:43 / eli-cs
Polonium 210	<0.9	pCi/L	U	0.9		E912.0	01/27/12 10:10 / plj
Polonium 210 precision (±)	0.7	pCi/L				E912.0	01/27/12 10:10 / plj
Polonium 210 MDC	0.9	pCi/L				E912.0	01/27/12 10:10 / plj
Radium 226	<0.2	pCi/L	U	0.2		E903.0	01/09/12 12:56 / trs
Radium 226 precision (±)	0.1	pCi/L				E903.0	01/09/12 12:56 / trs
Radium 226 MDC	0.2	pCi/L				E903.0	01/09/12 12:56 / trs
Thorium 230	<0.1	pCi/L	U	0.1		E908.0	01/12/12 09:23 / dmf
Thorium 230 precision (±)	0.06	pCi/L				E908.0	01/12/12 09:23 / dmf
Thorium 230 MDC	0.1	pCi/L				E908.0	01/12/12 09:23 / dmf
RADIONUCLIDES - SUSPENDED							
Lead 210	<0.8	pCi/L	U	0.8		E909.0	01/08/12 17:15 / eli-cs
Lead 210 precision (±)	0.4	pCi/L				E909.0	01/08/12 17:15 / eli-cs
Lead 210 MDC	0.8	pCi/L				E909.0	01/08/12 17:15 / eli-cs
Polonium 210	<0.9	pCi/L	U	0.9		E912.0	02/23/12 13:35 / ep
Polonium 210 precision (±)	0.4	pCi/L				E912.0	02/23/12 13:35 / ep
Polonium 210 MDC	0.9	pCi/L				E912.0	02/23/12 13:35 / ep
Radium 226	<0.1	pCi/L	U	0.1		E903.0	01/09/12 14:30 / trs
Radium 226 precision (±)	0.06	pCi/L				E903.0	01/09/12 14:30 / trs
Radium 226 MDC	0.1	pCi/L				E903.0	01/09/12 14:30 / trs
Thorium 230	0.1	pCi/L		0.04		E908.0	01/06/12 19:17 / dmf
Thorium 230 precision (±)	0.04	pCi/L				E908.0	01/06/12 19:17 / dmf
Thorium 230 MDC	0.04	pCi/L				E908.0	01/06/12 19:17 / dmf
DATA QUALITY							
A/C Balance (± 5)	1:91	%				Calculation	01/04/12 08:43 / kbh
Anions	3.31	meq/L				Calculation	01/04/12 08:43 / kbh
Cations	3.44	meq/L				Calculation	01/04/12 08:43 / kbh
Solids, Total Dissolved Calculated	172	mg/L				Calculation	01/04/12 08:43 / kbh
TDS Balance (0.80 - 1.20)	1.24					Calculation	01/04/12 08:43 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B									Batch: R154864	
Sample ID: MBLK	3	Method Blank				Run: MANTECH_111228A			12/28/11 11:13	
Alkalinity, Total as CaCO3		3	mg/L	2						
Carbonate as CO3		ND	mg/L	1						
Bicarbonate as HCO3		3	mg/L	1						
Sample ID: LCS-6465		Laboratory Control Sample				Run: MANTECH_111228A			12/28/11 11:35	
Alkalinity, Total as CaCO3		193	mg/L	5.0	95	90	110			
Sample ID: C11120665-003ADUP	3	Sample Duplicate				Run: MANTECH_111228A			12/28/11 12:34	
Alkalinity, Total as CaCO3		343	mg/L	5.0				1.2	10	
Carbonate as CO3		ND	mg/L	5.0					10	
Bicarbonate as HCO3		419	mg/L	5.0				2.8	10	
Sample ID: C11120665-004AMS		Sample Matrix Spike				Run: MANTECH_111228A			12/28/11 12:50	
Alkalinity, Total as CaCO3		553	mg/L	5.0	96	80	120			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B								Analytical Run: ORION555A_111228A		
Sample ID: ICV2_111228_1		Initial Calibration Verification Standard							12/28/11 08:52	
Conductivity @ 25 C		1410	umhos/cm	1.0	100	90	110			
Method: A2510 B								Batch: 111228_1_PH-W_555A-1		
Sample ID: MBLK1_111228_1		Method Blank				Run: ORION555A_111228A			12/28/11 08:49	
Conductivity @ 25 C		0.8	umhos/cm	0.2						
Sample ID: C11120714-001ADUP		Sample Duplicate				Run: ORION555A_111228A			12/28/11 09:22	
Conductivity @ 25 C		1180	umhos/cm	1.0				0.1	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2540 C									Batch: 111223_1_SLDS-TDS-W	
Sample ID: MBLK1_111223		Method Blank				Run: BAL-1_111223A			12/23/11 09:20	
Solids, Total Dissolved TDS @ 180 C		ND	mg/L	4						
Sample ID: LCS1_111223		Laboratory Control Sample				Run: BAL-1_111223A			12/23/11 09:20	
Solids, Total Dissolved TDS @ 180 C		1670	mg/L	10	100	90	110			
Sample ID: C11120723-003AMS		Sample Matrix Spike				Run: BAL-1_111223A			12/23/11 12:30	
Solids, Total Dissolved TDS @ 180 C		64400	mg/L	120	101	90	110			
Sample ID: C11120739-003ADUP		Sample Duplicate				Run: BAL-1_111223A			12/23/11 12:33	
Solids, Total Dissolved TDS @ 180 C		410	mg/L	10				0.8	5	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Report Date: 02/28/12
Project: Marsland Baseline Private Well Samples
Work Order: C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-F C										Batch: R154884
Sample ID: MBLK		Method Blank				Run: MANTECH_111229A				12/29/11 12:02
Fluoride		0.01	mg/L	0.008						
Sample ID: LCS-6622		Laboratory Control Sample				Run: MANTECH_111229A				12/29/11 12:05
Fluoride		2.00	mg/L	0.10	100	90	110			
Sample ID: C11120731-001BMS		Sample Matrix Spike				Run: MANTECH_111229A				12/29/11 12:23
Fluoride		2.62	mg/L	0.10	99	80	120			
Sample ID: C11120731-001BMSD		Sample Matrix Spike Duplicate				Run: MANTECH_111229A				12/29/11 12:25
Fluoride		2.62	mg/L	0.10	99	80	120	0.0	10	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B								Analytical Run: ORION555A_111228A		
Sample ID: ICV1_111228_1		Initial Calibration Verification Standard							12/28/11 08:51	
pH		6.80	s.u.	0.010	99	98	102			
Method: A4500-H B								Batch: 111228_1_PH-W_555A-1		
Sample ID: C11120714-001ADUP		Sample Duplicate				Run: ORION555A_111228A			12/28/11 09:22	
pH		11.0	s.u.	0.010				0.0	3	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-NH3 G										Batch: R154889
Sample ID: MBLK-1		Method Blank				Run: TECHNICON_111229B				12/29/11 15:16
Nitrogen, Ammonia as N		ND	mg/L	0.02						
Sample ID: LCS-2		Laboratory Control Sample				Run: TECHNICON_111229B				12/29/11 15:18
Nitrogen, Ammonia as N		2.03	mg/L	0.050	100	90	110			
Sample ID: LFB-3		Laboratory Fortified Blank				Run: TECHNICON_111229B				12/29/11 15:20
Nitrogen, Ammonia as N		2.07	mg/L	0.050	105	80	120			
Sample ID: C11120723-001DMS		Sample Matrix Spike				Run: TECHNICON_111229B				12/29/11 16:14
Nitrogen, Ammonia as N		9.68	mg/L	0.25	99	90	110			
Sample ID: C11120723-001DMSD		Sample Matrix Spike Duplicate				Run: TECHNICON_111229B				12/29/11 16:16
Nitrogen, Ammonia as N		9.68	mg/L	0.25	99	90	110	0.0	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP2-C_120111A	
Sample ID: ICV		Initial Calibration Verification Standard							01/11/12 13:05	
Molybdenum		0.989	mg/L	0.10	99	95	105			
Sample ID: ICSA		Interference Check Sample A							01/11/12 13:39	
Molybdenum		-0.0139	mg/L	0.10						
Sample ID: ICSAB		Interference Check Sample AB							01/11/12 13:43	
Molybdenum		-0.0151	mg/L	0.10						
Method: E200.7									Batch: R155281	
Sample ID: MB-120110A		Method Blank				Run: ICP2-C_120111A			01/11/12 14:04	
Molybdenum		0.003	mg/L	0.001						
Sample ID: LFB-120110A		Laboratory Fortified Blank				Run: ICP2-C_120111A			01/11/12 14:08	
Molybdenum		0.922	mg/L	0.10	92	85	115			
Sample ID: C11120719-003BMS2		Sample Matrix Spike				Run: ICP2-C_120111A			01/11/12 16:17	
Molybdenum		1.88	mg/L	0.0023	91	70	130			
Sample ID: C11120719-003BMSD		Sample Matrix Spike Duplicate				Run: ICP2-C_120111A			01/11/12 16:21	
Molybdenum		1.91	mg/L	0.0023	93	70	130	1.6	20	
Method: E200.7									Analytical Run: ICP2-C_120114A	
Sample ID: ICV		Initial Calibration Verification Standard							01/14/12 10:02	
Silicon		10.5	mg/L	0.10	105	95	105			
Sample ID: ICSA		Interference Check Sample A							01/14/12 10:31	
Silicon		0.0145	mg/L	0.10						
Sample ID: ICSAB		Interference Check Sample AB							01/14/12 10:35	
Silicon		0.00940	mg/L	0.10						
Method: E200.7									Batch: R155357	
Sample ID: MB-120114A		Method Blank				Run: ICP2-C_120114A			01/14/12 10:55	
Silicon		0.01	mg/L	0.007						
Sample ID: LFB-120114A		Laboratory Fortified Blank				Run: ICP2-C_120114A			01/14/12 10:59	
Silicon		0.464	mg/L	0.10	101	85	115			
Sample ID: C11120881-001BMS2		Sample Matrix Spike				Run: ICP2-C_120114A			01/14/12 13:14	
Silicon		0.888	mg/L	0.10	106	70	130			
Sample ID: C11120881-001BMSD		Sample Matrix Spike Duplicate				Run: ICP2-C_120114A			01/14/12 13:18	
Silicon		0.896	mg/L	0.10	107	70	130	0.9	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources
Report Date: 02/28/12
Project: Marsland Baseline Private Well Samples
Work Order: C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS2-C_111230A	
Sample ID: ICV		Initial Calibration Verification Standard							12/30/11 10:23	
Uranium		0.0496	mg/L	0.00030	99	90	110			
Method: E200.8									Batch: 32300	
Sample ID: MB-32300		Method Blank				Run: ICPMS2-C_111230A			12/30/11 20:54	
Uranium		0.0001	mg/L	6E-05						
Sample ID: LCS2-32300		Laboratory Control Sample				Run: ICPMS2-C_111230A			12/30/11 21:03	
Uranium		0.0982	mg/L	0.00030	98	85	115			
Sample ID: C11120731-001HMS		Sample Matrix Spike				Run: ICPMS2-C_111230A			12/30/11 21:09	
Uranium		0.00436	mg/L	0.00030	97	70	130			
Sample ID: C11120731-001HMSD		Sample Matrix Spike Duplicate				Run: ICPMS2-C_111230A			12/30/11 21:10	
Uranium		0.00433	mg/L	0.00030	96	70	130	0.6	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS4-C_111230A		
Sample ID: ICV	20	Initial Calibration Verification Standard							12/30/11 10:59	
Aluminum		0.0482	mg/L	0.0010	96	90	110			
Arsenic		0.0497	mg/L	0.0010	99	90	110			
Barium		0.0494	mg/L	0.0010	99	90	110			
Boron		0.0502	mg/L	0.0010	100	90	110			
Cadmium		0.0503	mg/L	0.0010	101	90	110			
Calcium		9.70	mg/L	0.0066	97	90	110			
Chromium		0.0497	mg/L	0.0010	99	90	110			
Copper		0.0503	mg/L	0.0010	101	90	110			
Iron		1.07	mg/L	0.0010	107	90	110			
Lead		0.0492	mg/L	0.0010	98	90	110			
Magnesium		9.67	mg/L	0.0027	97	90	110			
Manganese		0.0501	mg/L	0.0010	100	90	110			
Mercury		0.00519	mg/L	0.0010	104	90	110			
Nickel		0.0500	mg/L	0.0010	100	90	110			
Potassium		9.72	mg/L	0.0041	97	90	110			
Selenium		0.0522	mg/L	0.0010	104	90	110			
Sodium		9.69	mg/L	0.0043	97	90	110			
Uranium		0.0494	mg/L	0.00030	99	90	110			
Vanadium		0.0491	mg/L	0.0010	98	90	110			
Zinc		0.0513	mg/L	0.0010	103	90	110			
Method: E200.8									Batch: R154953A	
Sample ID: LRB	20	Method Blank				Run: ICPMS4-C_111230A			12/30/11 12:08	
Aluminum		ND	mg/L	0.0002						
Arsenic		ND	mg/L	5E-05						
Barium		ND	mg/L	7E-05						
Boron		ND	mg/L	0.0004						
Cadmium		ND	mg/L	3E-05						
Calcium		ND	mg/L	0.007						
Chromium		ND	mg/L	4E-05						
Copper		ND	mg/L	3E-05						
Iron		ND	mg/L	0.0006						
Lead		ND	mg/L	2E-05						
Magnesium		ND	mg/L	0.003						
Manganese		ND	mg/L	3E-05						
Mercury		ND	mg/L	5E-05						
Nickel		ND	mg/L	9E-05						
Potassium		ND	mg/L	0.004						
Selenium		ND	mg/L	7E-05						
Sodium		ND	mg/L	0.004						
Uranium		5E-05	mg/L	9E-06						
Vanadium		ND	mg/L	4E-05						
Zinc		ND	mg/L	0.0002						

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: R154953A	
Sample ID: LFB	20	Laboratory Fortified Blank				Run: ICPMS4-C_111230A			12/30/11 12:15	
Aluminum		0.0522	mg/L	0.0010	104	85	115			
Arsenic		0.0523	mg/L	0.0010	105	85	115			
Barium		0.0503	mg/L	0.0010	101	85	115			
Boron		0.0491	mg/L	0.0010	98	85	115			
Cadmium		0.0511	mg/L	0.0010	102	85	115			
Calcium		12.7	mg/L	0.0066	102	85	115			
Chromium		0.0516	mg/L	0.0010	103	85	115			
Copper		0.0517	mg/L	0.0010	103	85	115			
Iron		1.29	mg/L	0.0010	103	85	115			
Lead		0.0508	mg/L	0.0010	102	85	115			
Magnesium		12.6	mg/L	0.0027	101	85	115			
Manganese		0.0513	mg/L	0.0010	103	85	115			
Mercury		0.00506	mg/L	0.0010	101	85	115			
Nickel		0.0518	mg/L	0.0010	103	85	115			
Potassium		12.7	mg/L	0.0041	101	85	115			
Selenium		0.0510	mg/L	0.0010	102	85	115			
Sodium		12.7	mg/L	0.0043	102	85	115			
Uranium		0.0503	mg/L	0.00030	100	85	115			
Vanadium		0.0515	mg/L	0.0010	103	85	115			
Zinc		0.0539	mg/L	0.0010	108	85	115			
Sample ID: C11120623-006CMS4	20	Sample Matrix Spike				Run: ICPMS4-C_111230A			12/30/11 19:44	
Aluminum		0.0483	mg/L	0.0010	63	70	130			S
Arsenic		0.0565	mg/L	0.0010	105	70	130			
Barium		0.147	mg/L	0.10	106	70	130			
Boron		0.0680	mg/L	0.0010	86	70	130			
Cadmium		0.0508	mg/L	0.010	102	70	130			
Calcium		45.2	mg/L	1.0	111	70	130			
Chromium		0.0513	mg/L	0.050	102	70	130			
Copper		0.0518	mg/L	0.010	98	70	130			
Iron		1.32	mg/L	0.030	101	70	130			
Lead		0.0516	mg/L	0.050	103	70	130			
Magnesium		19.9	mg/L	1.0	108	70	130			
Manganese		0.0605	mg/L	0.010	100	70	130			
Mercury		0.00518	mg/L	0.0010	104	70	130			
Nickel		0.0486	mg/L	0.0010	96	70	130			
Potassium		17.5	mg/L	1.0	106	70	130			
Selenium		0.0560	mg/L	0.0010	111	70	130			
Sodium		44.9	mg/L	1.0	109	70	130			
Uranium		0.0579	mg/L	0.00030	104	70	130			
Vanadium		0.0551	mg/L	0.0010	97	70	130			
Zinc		0.302	mg/L	0.010		70	130			A
Sample ID: C11120623-006CMSD	20	Sample Matrix Spike Duplicate				Run: ICPMS4-C_111230A			12/30/11 19:50	
Aluminum		0.0487	mg/L	0.0010	64	70	130	0.8	20	S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: R154953A	
Sample ID: C11120623-006CMSD	20	Sample Matrix Spike Duplicate				Run: ICPMS4-C_111230A			12/30/11 19:50	
Arsenic		0.0566	mg/L	0.0010	105	70	130	0.2	20	
Barium		0.145	mg/L	0.10	104	70	130	0.8	20	
Boron		0.0697	mg/L	0.0010	89	70	130	2.5	20	
Cadmium		0.0509	mg/L	0.010	102	70	130	0.1	20	
Calcium		45.1	mg/L	1.0	111	70	130	0.1	20	
Chromium		0.0517	mg/L	0.050	102	70	130	0.7	20	
Copper		0.0521	mg/L	0.010	99	70	130	0.7	20	
Iron		1.33	mg/L	0.030	102	70	130	1.1	20	
Lead		0.0511	mg/L	0.050	102	70	130	1.0	20	
Magnesium		20.0	mg/L	1.0	108	70	130	0.2	20	
Manganese		0.0607	mg/L	0.010	101	70	130	0.5	20	
Mercury		0.00524	mg/L	0.0010	105	70	130	1.2	20	
Nickel		0.0497	mg/L	0.0010	98	70	130	2.4	20	
Potassium		17.8	mg/L	1.0	108	70	130	1.5	20	
Selenium		0.0554	mg/L	0.0010	110	70	130	1.1	20	
Sodium		44.2	mg/L	1.0	104	70	130	1.5	20	
Uranium		0.0578	mg/L	0.00030	104	70	130	0.1	20	
Vanadium		0.0560	mg/L	0.0010	98	70	130	1.7	20	
Zinc		0.303	mg/L	0.010		70	130	0.3	20	A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC2-C_111229A	
Sample ID: ICV-122911-10	2	Initial Calibration Verification Standard							12/29/11 14:44	
Chloride		10.0	mg/L	1.0	100	90	110			
Sulfate		40.4	mg/L	1.0	101	90	110			
Method: E300.0									Batch: R154925	
Sample ID: ICB-122911-11	2	Method Blank				Run: IC2-C_111229A			12/29/11 14:57	
Chloride		ND	mg/L	0.10						
Sulfate		0.2	mg/L	0.08						
Sample ID: LFB-122911-12	2	Laboratory Fortified Blank				Run: IC2-C_111229A			12/29/11 15:11	
Chloride		10.3	mg/L	1.0	103	90	110			
Sulfate		40.2	mg/L	1.0	100	90	110			
Sample ID: C11120685-001AMS	2	Sample Matrix Spike				Run: IC2-C_111229A			12/29/11 18:45	
Chloride		26.8	mg/L	1.0	101	90	110			
Sulfate		226	mg/L	1.6	91	90	110			
Sample ID: C11120685-001AMSD	2	Sample Matrix Spike Duplicate				Run: IC2-C_111229A			12/29/11 18:59	
Chloride		26.7	mg/L	1.0	101	90	110	0.2	10	
Sulfate		225	mg/L	1.6	90	90	110	0.4	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E353.2										Batch: R154758
Sample ID: MBLK-1		Method Blank				Run: TECHNICON_111223A				12/23/11 11:50
Nitrogen, Nitrate+Nitrite as N		ND	mg/L	0.06						
Sample ID: LCS-2		Laboratory Control Sample				Run: TECHNICON_111223A				12/23/11 11:53
Nitrogen, Nitrate+Nitrite as N		2.55	mg/L	0.10	102	90	110			
Sample ID: LFB-3		Laboratory Fortified Blank				Run: TECHNICON_111223A				12/23/11 11:55
Nitrogen, Nitrate+Nitrite as N		1.97	mg/L	0.10	101	90	110			
Sample ID: C11120736-001AMS		Sample Matrix Spike				Run: TECHNICON_111223A				12/23/11 13:25
Nitrogen, Nitrate+Nitrite as N		2.08	mg/L	0.10	99	90	110			
Sample ID: C11120736-001AMSD		Sample Matrix Spike Duplicate				Run: TECHNICON_111223A				12/23/11 13:28
Nitrogen, Nitrate+Nitrite as N		2.12	mg/L	0.10	101	90	110	1.9	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: RA226-5771	
Sample ID: MB-RA226-5771	3	Method Blank				Run: BERTHOLD 770-1_120103A			01/09/12 12:56	
Radium 226		-0.03	pCi/L							U
Radium 226 precision (±)		0.09	pCi/L							
Radium 226 MDC		0.2	pCi/L							
Sample ID: LCS-RA226-5771		Laboratory Control Sample				Run: BERTHOLD 770-1_120103A			01/09/12 12:56	
Radium 226		6.5	pCi/L		103	80	120			
Sample ID: C11120751-001EMS		Sample Matrix Spike				Run: BERTHOLD 770-1_120103A			01/09/12 12:56	
Radium 226		15	pCi/L		117	70	130			
Sample ID: C11120751-001EMSD		Sample Matrix Spike Duplicate				Run: BERTHOLD 770-1_120103A			01/09/12 12:56	
Radium 226		16	pCi/L		125	70	130	6.3	26.4	
Method: E903.0									Batch: R155169	
Sample ID: C11120623-003HMS		Sample Matrix Spike				Run: BERTHOLD 770-2_111230A			01/09/12 12:58	
Radium 226		9.8	pCi/L		97	70	130			
Sample ID: C11120623-003HMSD		Sample Matrix Spike Duplicate				Run: BERTHOLD 770-2_111230A			01/09/12 12:58	
Radium 226		9.2	pCi/L		90	70	130	6.5	25.8	
Sample ID: LCS-32280		Laboratory Control Sample				Run: BERTHOLD 770-2_111230A			01/09/12 12:58	
Radium 226		11	pCi/L		88	85	115			
Sample ID: MB-32280	3	Method Blank				Run: BERTHOLD 770-2_111230A			01/09/12 14:30	
Radium 226		0.03	pCi/L							U
Radium 226 precision (±)		0.1	pCi/L							
Radium 226 MDC		0.3	pCi/L							

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E908.0									Batch: RA-TH-ISO-1546	
Sample ID: LCS-RA-TH-ISO-1546		Laboratory Control Sample				Run: ALPHANALYST_120110A			01/12/12 09:23	
Thorium 230		6.12	pCi/L		108	70	130			
Sample ID: C11120731-001DMS		Sample Matrix Spike				Run: ALPHANALYST_120110A			01/12/12 09:23	
Thorium 230		11	pCi/L		100	70	130			
Sample ID: C11120731-001DMSD		Sample Matrix Spike Duplicate				Run: ALPHANALYST_120110A			01/12/12 09:24	
Thorium 230		9.4	pCi/L		85	70	130	17	39.4	
Sample ID: MB-RA-TH-ISO-1546	3	Method Blank				Run: ALPHANALYST_120110A			01/12/12 09:24	
Thorium 230		-0.02	pCi/L							U
Thorium 230 precision (±)		0.07	pCi/L							
Thorium 230 MDC		0.2	pCi/L							
Method: E908.0									Batch: 32300	
Sample ID: C11120731-001HMS		Sample Matrix Spike				Run: EGG-ORTEC_120103B			01/06/12 19:17	
Thorium 230		4.5	pCi/L		104	70	130			
Sample ID: C11120731-001HMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_120103B			01/06/12 19:17	
Thorium 230		5.1	pCi/L		117	70	130	12	34.6	
Sample ID: LCS-32300		Laboratory Control Sample				Run: EGG-ORTEC_120103B			01/06/12 19:17	
Thorium 230		5.76	pCi/Filter		116	70	130			
Sample ID: MB-32300	3	Method Blank				Run: EGG-ORTEC_120103B			01/06/12 19:17	
Thorium 230		0.1	pCi/Filter							
Thorium 230 precision (±)		0.07	pCi/Filter							
Thorium 230 MDC		0.08	pCi/Filter							

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E909.0									Batch: T_PB-210-0200R	
Sample ID: MB-PB-210-0200	3	Method Blank				Run: SUB-T43555			01/06/12 19:44	
Lead 210		-0.4	pCi/L							U
Lead 210 precision (±)		0.6	pCi/L							
Lead 210 MDC		1	pCi/L							
Sample ID: LCS-PB-210-0200		Laboratory Control Sample				Run: SUB-T43555			01/06/12 21:59	
Lead 210		86	pCi/L		102	70	130			
Sample ID: C11120731-001EMS		Sample Matrix Spike				Run: SUB-T43555			01/07/12 06:58	
Lead 210		160	pCi/L		99	70	130			
Sample ID: C11120731-001EMSD		Sample Matrix Spike Duplicate				Run: SUB-T43555			01/07/12 09:13	
Lead 210		170	pCi/L		107	70	130	6.9	13.8	
Method: E909.0									Batch: T_15486	
Sample ID: MB-15486	3	Method Blank				Run: SUB-T43556			01/08/12 02:40	
Lead 210		0.9	pCi/Filter							U
Lead 210 precision (±)		5	pCi/Filter							
Lead 210 MDC		9	pCi/Filter							
Sample ID: LCS-15486		Laboratory Control Sample				Run: SUB-T43556			01/08/12 04:45	
Lead 210		611	pCi/Filter		109	70	130			
Sample ID: C11120710-003AMS		Sample Matrix Spike				Run: SUB-T43556			01/08/12 13:05	
Lead 210		1960	pCi/Filter		115	70	130			
Sample ID: C11120710-003AMSD		Sample Matrix Spike Duplicate				Run: SUB-T43556			01/08/12 15:10	
Lead 210		2040	pCi/Filter		119	70	130	3.6	13.7	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Crow Butte Resources **Report Date:** 02/28/12

Project: Marsland Baseline Private Well Samples **Work Order:** C11120731

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E912.0										Batch: R156705
Sample ID: C11120623-004HMS		Sample Matrix Spike				Run: ALPHANALYST_120213B				02/23/12 13:35
Polonium 210		5.7	pCi/L		88	70	130			
Sample ID: C11120623-004HMSD		Sample Matrix Spike Duplicate				Run: ALPHANALYST_120213B				02/23/12 13:35
Polonium 210		5.1	pCi/L		79	70	130	11	82.3	
Sample ID: LCS-32280		Laboratory Control Sample				Run: ALPHANALYST_120213B				02/23/12 13:35
Polonium 210		35	pCi/L		101	70	130			
Sample ID: MB-32280	3	Method Blank				Run: ALPHANALYST_120213B				02/23/12 13:35
Polonium 210		-0.1	pCi/L							U
Polonium 210 precision (±)		2	pCi/L							
Polonium 210 MDC		7	pCi/L							
Method: E912.0										Batch: PO210-0414
Sample ID: C11120623-002FMS		Sample Matrix Spike				Run: EGG-ORTEC_120125C				01/27/12 08:27
Polonium 210		13	pCi/L		102	70	130			
Sample ID: C11120623-002FMSD		Sample Matrix Spike Duplicate				Run: EGG-ORTEC_120125C				01/27/12 08:27
Polonium 210		12	pCi/L		95	70	130	8.4	108.8	
Sample ID: MB-PO210-0414	3	Method Blank				Run: EGG-ORTEC_120125C				01/27/12 10:10
Polonium 210		0.4	pCi/L							U
Polonium 210 precision (±)		0.6	pCi/L							
Polonium 210 MDC		0.9	pCi/L							
Sample ID: LCS-PO210-0414		Laboratory Control Sample				Run: EGG-ORTEC_120125C				02/02/12 08:46
Polonium 210		5.0	pCi/L		75	70	130			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

U - Not detected at minimum detectable concentration

Workorder Receipt Checklist

Crow Butte Resources

C11120731

Login completed by: Corinne Wagner
Date Received: 12/23/2011
Reviewed by: BL2000\emcpike
Received by: wc
Reviewed Date: 12/27/2011
Carrier name: Next Day Air Saver

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on shipping container/cooler?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Container/Temp Blank temperature:	3.2°C On Ice		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Contact and Corrective Action Comments:

Samples for dissolved/suspended metals and radiochem were subsampled, filtered and preserved with 2 mL HNO3 in lab upon receipt to pH <2.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT- Provide as much information as possible.

Company Name: Crow Butte Resources, Inc.	Project Name: Marsland Baseline Private Well Samples	Sample Origin State:	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: P.O. Box 169, Crawford, NE 69339	Contact Name: Larry Teahon; Phone/Fax: 308-665-2341	Email: daxmynus@msn.com	Sampler: (Please Print) Brooke Bass, Rhonda Pelton
Invoice Address: P.O. Box 169, Crawford, NE 69339	Invoice Contact & Phone: Larry Teahon, 308-665-2215 ext 114	Purchase Order: 1125	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

☐ DW ☐ GSA ☐ POTW/WWTP ☐ State: _____ ☐ Other: _____

☐ A2LA ☐ EDD/EDT (Electronic Data) Format: _____ ☐ LEVEL IV ☐ NELAC

ANALYSIS REQUESTED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	HNO3-F, Metals	RAW-F, Common Ions	RAW-UF, Alkalinity	H2SO4-F, NO2, NO3, NH4	Raw-UF, Ra226, Po210 dis, sus	Raw-UF, Pb210 dis and sus	Rau-UF, Th230, U-nat dis and sus			SEE ATTACHED	Normal Turnaround (TAT)	RUSH	Comments
1 Well #723	12/20/11		Water	.5	1	1	.5	1 G	1 G	1 G						Please Report 1/30/12
2																
3																
4																
5																
6																
7																
8																
9																
10																

Contact ELI prior to **RUSH** sample submittal for charges and scheduling – See Instruction Page

Comments: NDEQ parameters for baseline sampling. Report on separate sheets. Analyze as per WDEQ Guideline 8 and NRC Reg. Guide 4.14 requirements. Record U as mg/L and µCi/ml and radiometrics as pCi/L.

Shipped by:

Cooler ID(s):

Receipt Temp 3.2 °C

On Ice: (Yes) No

Custody Seal Y (N)

Intact (Y) N

Signature Match (Y) N

LABORATORY USE ONLY C1112073

Custody Record MUST be Signed

Relinquished by (print)	Date/Time	Signature	Received by (print)	Date/Time	Signature
Brooke Bass	12/21/11	Brooke Bass			
			Received by Laboratory:	Date/Time: 12/23/11 1040	Signature: Wendy Carstens

Sample Disposal: Return to Client: No Lab Disposal: YES

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links

Appendix K

Hydrologic and Erosion Study Report for Marsland Expansion Area

ARCADIS

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Cameco

Hydrologic and Erosion Study
Marsland Expansion Area

April 12, 2012

ARCADIS

Hydrologic and Erosion Study

Marsland Expansion Area

Prepared for:
CAMECO

Prepared by:
ARCADIS U.S., Inc.
630 Plaza Drive
Suite 200
Highlands Ranch
Colorado 80129
Tel 720 344 3500
Fax 720 344 3535

Our Ref.:
CO001636.0001.00008

Date:
April 12, 2012

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1. Introduction

This report outlines the construction of a hydrologic and erosion model of the Marsland Expansion Area (MEA) and provides an assessment of potential erosion in the project area (**Figure 1**). The MEA Project will consist of a uranium insitu satellite processing facility, individual wellfields (mine units), deep disposal well, and other associated assets. The basic layout of the proposed license boundary, mine units and satellite facility locations is shown in **Figure 1**.

This study addresses guidance in NUREG-1569 for an NRC licensee to assess the potential effects of erosion or surface water flooding on a proposed uranium in situ facility. The ultimate objective is to determine whether the potential for erosion or flooding may require special design features or mitigation measures to be implemented.

The study focuses on catchment and watershed delineation, hydrologic characteristics, and determination of areas most prone to flooding and subsequent erosion due to rainfall runoff. The analysis identifies wells and facilities in areas of moderate to high risk of erosion that may require mitigation measures. Four primary tasks comprise the comprehensive hydrologic and erosion analysis:

1) Data collection and analysis: rainfall, digital elevation data, soil and land use data.
2) Watershed delineation: divided the project area basin into watersheds for detailed hydrologic analysis.
3) Hydrologic and erosion analysis: determining the flood routing characteristics of watersheds and generating the erosion risk map using hydrologic, land use and soil data.
4) Erosion risk assessment: identifying MEA wells and other site facilities in locations of high erosion potential that may require scour mitigation.

2. Data Collection

The consequential data necessary to complete the study are terrain data or a digital elevation model (DEM), land use and land cover data (LULC), National Hydrography Dataset (USGS NHD) published stream network data, soil data, and rainfall data.

The terrain data are downloaded from the USGS National Elevation Dataset (NED). NED data is available at a resolution of 30m. The vertical datum is NAVD88, while the coordinate system was converted to UTM Zone 13N. DEM data were utilized

throughout the model domain to describe the watershed terrain. Using this data, the watershed and streams within the study area were described within the hydrologic model. The project area is in the watershed HUC12 101500020607 (Belmont Cemetery-Niobrara River Basin)). **Figure 2** depicts the DEM in the study area.

Land use data for the study area were the National Land Cover Data (NLCD) 2006, which were downloaded online from the USGS seamless Data Warehouse. **Figure 3** depicts the NLCD land use map.

Supplementary data to prepare and recondition the DEM include the USGS National Hydrography Dataset (NHD) published stream network, NHD Flowline (Simley and Carswell 2009) and the Natural Resources Conservation Service's (NRCS) published 12-digit hydrologic unit (HUC12) watershed delineation (NRCS 2009). **Figure 4** depicts the NHD published stream network. **Table 1** lists the associated Hydrologic Unit Code (HUC) 12-digit identification number for each NHD stream. The extents of the data shown in **Figures 1-5** are defined by the NRCS watershed delineation.

Soil data was downloaded from the NRCS geospatial data gateway, Soil Survey Geographic Database (SSURGO). Regional soil characteristics, most importantly the infiltration rate, were represented by the SCS Curve Number Method. Soil data was downloaded from the Natural Resources Conservation Service's (NRCS) geospatial data gateway. **Figure 5** depicts the SSURGO soil map for the project areas. **Figure 6** through **Figure 8** respectively show the SSURGO soil map information for the northern, central and southern portions of the project area. **Table 2** lists the SSURGO K factor values and associated percentages of sand, silt and clay for each SSURGO soil type.

The meteorological data, including precipitation, evaporation and runoff values, were collected from National Ocean and Atmospheric Administration (NOAA) National Weather Service (NWS) or National Climate Data Center (NCDC).

Details of the available geospatial, stream flow and meteorological data can be found in **Table 3**.

3. Watershed Delineation and Basin Characteristics

Prior to catchment processing and watershed delineation, there are several pre-processing steps required for the DEM. First, the HUC12 data is utilized to clip the DEM boundary, such that only the primary watersheds pertinent to the MEA analysis

are maintained. **Figure 2** demonstrates that two regions along on the western edge of the MEA are clipped out of the DEM domain. These regions are removed from the analysis due to the fact that they lie at high elevations in the neighboring HUC12 watershed. Due to their location in the watershed, these regions have limited flow accumulation and thus a low risk of erosion. Flow accumulation is discussed in more detail a part of the hydrologic and soil erosion analysis.

Once the clipped DEM is constructed, drainage patterns are defined using an Arc Hydro tool. The Arc Hydro tool identifies ridges and valleys in the DEM. Arc Hydro constructs a drainage network by connecting valleys that have been identified. Because of limited DEM resolution of 30 meters, it is possible that the DEM data is not able to fully replicate the hydrologic reality of a catchment when deriving the drainage pattern in Arc Hydro. Thus the drainage network initially mapped by Arc Hydro requires adjustments to fully replicate the hydrologic reality of the system. The elevations within the raw DEM were reconditioned to revise elevations along published NHD Flowline (Simley and Carswell 2009) shown in **Figure 4.** Reconditioning the DEM ascertains proper drainage in the study area. This process is known as the AGREE method. The GIS parameters used for the AGREE method were chosen carefully, as it is imperative that they have minimal effects on further terrain analysis (Callow et al. 2007).

Subsequent to the AGREE method for DEM reconditioning, local, small scale depressions and pits in the DEM were raised using GIS. The software applies an algorithm that searches for localized pits and depressions that could capture flow and inadvertently delineate watersheds incorrectly. Once these depressions are identified, the GIS model raises the elevation of the pits to a smoothed elevation based on neighboring elevations to create an improved, depression-less terrain.

Using the final reconditioned, depression-less terrain data, the Arc Hydro tool identifies a definitive system of ridges and valleys used to calculate flow direction and accumulation. **Figure 9** depicts the result of the watershed delineation into 107 subbasins. **Figure 10** depicts the associated drainage line network.

4. Hydrologic and Soil Erosion Analysis

The soil erosion model was constructed to investigate potential erosion in the project area. The results of the model highlight areas where erosion would be most substantial. Areas of high erosion may require mitigation measures or project

modification to achieve maximum project success and minimize environmental impacts.

The susceptibility of sediment to transport and delivery is largely affected by local terrain. The terrain in the study area is highly varied, as shown in **Figure 2**. Principal vegetative cover in the study area is grassland and forest in the upper reaches of the watershed. Grassland, farmland and wetland are the primary vegetative cover in the lower reaches of the watershed. The hydrologic and soil erosion analysis is broken into two components for this study. The first is a comprehensive watershed analysis utilizing the Revised Universal Soil Loss Equation (RUSLE). The second component is a comparison of MEA facility locations to the drainage network lines displayed in **Figure 10**.

4.1 RUSLE

A GIS-based erosion model was used for this analysis, which provides a fine spatial resolution of model results. The RUSLE model is a relatively simple model and one of the most practical methods to estimate soil erosion potential and the effects of different management practices. It was selected to use due to its wide acceptance, including construction site management at the federal level in National Pollutant Discharge Elimination System Phase II permitting (Wachal and Banks 2007, USEPA 2000).

The RUSLE is the modification version of USLE which has been in used to measure soil loss from agriculture lands with relative uniform slopes. The RUSLE modified certain factors in USLE and these modifications allow RUSLE model to more accurately account for more complex terrain. The output of RUSLE model is an annual rate of erosion and sedimentation in tons per acre per year, instead of specific storm events. The model is able to provide a quantitative measurement of erosion that occur as a result of project-related soil disturbance.

The RUSLE formula computes average annual erosion as follows:

$A = R * K * LS * C * P$

Where:

A = computed average annual soil loss in tons/acre/year
R = rainfall-runoff erosivity factor
K = soil erodibility factor
LS = slope length and slope steepness
C = land cover management factor
P = conservation practice factor

The factors can be divided into two categories: (1) environmental variables (R, L, S, and K), which remain relative constant over time, (2) management variables (C and P) which may change over time.

4.1.1 R-factor

The R-factor represents the rainfall erosivity which is the erosive power of rainfall. It is derived from the product of the total kinetic energy of a storm event and the maximum 30-minute intensity. The R-factor accounts for both amount of rainfall and intensity of rainfall.

The R-factor value is typically obtained from an isoerodent map provided in the USDA Handbook 703. The erosion index values for locations between the lines can be obtained by linear interpolation. The R-factor value for the entire study area used in this analysis is 48 based on the published isoerodent map.

4.1.2 K-factor

The K-factor represents soil erodibility, measures the ability of a particular soil type to resist erosion. The ability of soil to resist the erosion depends on the specific contents in the soil (such as percentage of silt, sand, clay and organic matter), the soil structure and the permeability of the soil. The most widely used and frequently cited relationship is the soil-erodibility nomograph (USDA Handbook 703).

The K-factor values range from 0 for water and, although in practice the maximum K-factor does not generally exceed 0.67. Large K-factor values reflect greater potential soil erodibility. The most common used soil database SSURGO has compiled the K-factors into the database. These values are based on the dominant classified soil components in the surficial layers for each map unit. The K-factor value used in this analysis is the SSURGO K-factor. **Table 2** lists the SSURGO K-factor values and associated percentages of sand, silt and clay. **Figure 11** exhibits MEA K-factor values.

4.1.3 LS-factor

The LS-factor is the critical factor in accurately estimating soil erosion potential. It is a combination of two data sets: slope length (L) and slope steepness (S). Longer slope length equate to a higher amount of accumulative runoff. Similarly, the steeper slopes generate higher runoff velocity. Both factors are notable contributors to erosion.

The slope length affects erosion potential more than slope steepness. Slope length is the distance from the origin of the overland flow to the nearest stream or the concentrated flow.

The original equation to calculate the LS-factor was an empirical equation published in the USDA Hankbook 537. The new published equation used in this analysis is as follows (Moore and Burch1986):

$$LS = (\textit{flow accumulation} * \text{cell size} / 22.13)^{0.4} * (\sin(\textit{slope}) * 0.01745) / 0.0896)^{1.4} * 1.4$$

The flow accumulation and slope values are determined using ArcHydro tools in a similar fashion as the DEM reconditioning procedures. **Figure 12** and **Figure 13** respectively demonstrate flow accumulation and topographic slope values.

4.1.4 C-factor

The C-factor represents land cover and management aspects, accounting for the effects of plants and soil cover on soil loss. The C-factor is useful for analysis of various project alternatives with soil disturbing activity. This factor is the main mechanism in which project alternative differences are modeled.

The C-factor values in this analysis are derived from the current conditions described in the National Land Cover Dataset (NLCD 2006). The C-factor for various land use types is shown in the **Table 4**. **Figure 14** illustrates the C-factor for MEA.

4.1.5 P-factor

The P-factor is the support or land management factor, accounting for such practices as farming, terracing and cropping. The P-factor value ranges from 0 to 1, which P=1 equating to zero disturbing activity. The P=1 is used in this analysis assuming no disturbance of this type.

4.2 Concentrated Flow Analysis

Erosion via sheet flow is the focus of the RUSLE component of the study. However, drainage networks on the MEA site, particularly the sections in the lower part of watershed, are at the added risk of concentrated flows. Detailed analysis of the drainage networks during flood events was not completed as part of this study. Rather, the location of MEA well fields and other facilities were compared drainage network locations as well as published Federal Emergency Management Agency

(FEMA) Digital Flood Insurance Rate Map (DFIRM) 100 year floodplain extents (FEMA 2011). Well fields and facilities adjacent to drainage paths, particularly those in the DFIRM floodplain, should be located carefully on the MEA site to ensure a safe distance from the drainage route and floodplain and protect from concentrated flows.

5. Erosion Risk Assessment

The RUSLE map displaying the average annual erosion potential is shown in **Figure 15**. **Figure 16** through **Figure 21** respectively display the erosion potential for the mining units and the satellite facility on the site. The final map should be interpreted as the erosion risk potential.

Well fields and other MEA facility locations are compared to the RUSLE map to evaluate erosion risk potential for each location. Proposed well fields, the satellite building, and the areas adjacent to the satellite building for potential placement of the access road and deep disposal well were all evaluated. **Table 5** lists the risk of erosion for each well field. Mining Unit (MU)-A and MU-1 were found to have low or very low erosion risk throughout the unit, while MU-C, MU-D, MU-E and MU-F have very low erosion risk throughout the unit. However, MU-2, MU-3, MU-4, and MU-B are found to have locations of moderate and high erosion risk. MU-5 has multiple locations of moderate erosion risk. Though MU-2, MU-3, MU-4 and MU-B are found to have high erosion risk in areas, 2-7% of the area within the units is at a moderate to high risk. Placement of well locations around areas of moderate and high potential erosion is a possibility in these units, particularly MU-3 were only 2% of the land is at an increased risk of erosion. MU-5 on the other hand is exposed to a moderate risk of erosion in 11% of the total area. Though the overall risk of MU-5 is lower than other units, it may be more difficult to place wells without additional mitigation measures due to the widespread erosion risk in the unit. If wells cannot be placed outside of areas within the wellfields deemed to have moderate to high risks, mitigation measures (e.g., berms) can be implemented to minimize the potential for flooding and erosion. The mitigation measures can be defined during final engineering and prior to any construction.

Figure 18 displays the erosion potential for the satellite facility, access road and deep disposal well. The gray line in the image represents the proposed area for placement of the satellite facility, and access roads to both locations. The star denotes the proposed deep disposal location. The erosion risk was found to be low or very low throughout the area. Constructing the facilities and access roads in the noted area would minimize the potential for erosion issues.

As part of the concentrated flow analysis, drainage lines and DFIRM floodplain extents are compared to mining unit locations. **Figure 12** demonstrates the high flow accumulation along drainage lines. Drainage lines are the primary contributor to increased erosion risk as part of the RUSLE analysis. However, the RUSLE analysis is unable to accurately define erosion risk in these areas of concentrated flow in flood events. Thus published FEMA DFIRM 100 year floodplain extents were compared to mining units in the area. Mining unit locations within the 100 year floodplain should be considered at risk to flooding, as well as erosion caused by flood events. Further analysis, mitigation measures or modification of well locations should be considered for those wells near concentrated flow routes or in the 100 year floodplain during the final engineering phase and prior to well installation and construction activities.

Figure 22 through **Figure 27** display the drainage lines and floodplain extents relative to the mining unit locations. Mining units MU-2, MU-3, MU-4 and MU-5 all are positioned such that drainage line 21 and the associated DFIRM floodplain crosses the units. Drainage line 21 is NRCS HUC number 149152245 and shown in **Figure 10**. Drainage line 21 runs generally north to south. The well locations in these drainage units should be positioned outside of the floodplain or included flood protection measures in the final engineering plans. Additionally, the proposed access road to the satellite facility crosses drainage line 24, as seen in **Figure 18**. Drainage line 24 is NRCS HUC number 149157281. Note however, as seen in **Figure 24**, the proposed access road and satellite facility are not in the 100 year floodplain. The access road should however be positioned carefully, understanding that a potential drainage route crosses the area.

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Tables

Table 1 National Resources Conservation Services (NRCS) Hydrological Unit (HU) Codes

Figure 4 Stream ID Numbers	NRCS Hydrologic Unit Code Identification
1	149157320
2	149157396
3	149157293
4	149157295
5	149152206
6	149152210
7	149152218
8	149157455
9	149157287
10	149152223
11	149157220
12	149152242
13	149153567
14	149152234
15	149152227
16	149157382
17	149151532
18	149157040
19	149157486
20	149157312
21	149157491
22	149157234
23	149157136
24	149157281
25	149151539
26	149152239
27	149152236
28	149157210
29	149157498
30	149157269
31	149152231
32	149151529
33	149157212
34	149151545
35	149157449
36	149153573
37	149157254
38	149152212
39	149152228
40	149157463
41	149157497
42	149152209
43	149151537
44	149157489
45	149152245
46	149152221
47	149152224
48	149153566
49	149151535
50	149152226
51	149157425
52	149157267

Table 1 National Resources Conservation Services (NRCS) Hydrological Unit (HU) Codes

Figure 4 Stream ID Numbers	NRCS Hydrologic Unit Code Identification
53	149152220
54	149152216
55	149157418
56	149157118
57	149152244
58	149152230
59	149152213
60	149152233
61	149152240
62	149157005
63	149157141
64	149157415
65	149157384
66	149157478
67	149157394
68	149153572
69	149157081
70	149157213
71	149157061
72	149157192
73	149152248
74	149157054
75	149157341
76	149153571
77	149157225
78	149157301
79	149151531
80	149157002
81	149152215
82	149157492
83	149157413
84	149152237
85	149157313
86	149152207
87	149151543
88	149157539
89	149157541
90	149157544
91	149151602
92	149157538
93	149157975
94	149157546
95	149157542

Note: NRC HUC Codes are for each National Hydrography Dataset (NHD).

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
1001 Bankard, channeled, frequently flooded	100	A	0.10	5	95.4	0.6	4.0
1004 Bankard	100	A	0.15	4	87.3	6.7	6.0
1006 Bankard, channeled, frequently flooded	100	A	0.10	5	87.3	4.7	8.0
1008 Bankard variant	99	A	0.15	4	87.3	6.7	6.0
1012 Bankard	100	A	0.37	5	61.2	20.8	18.0
1013 Bankard, frequently flooded	100	A	0.10	4	83.2	10.8	6.0
1014 Bankard	100	A	0.15	4	87.3	6.7	6.0
1030 Glenberg	100	B	0.20	5	66.1	21.9	12.0
1031 Glenberg, channeled	100	B	0.20	5	66.1	21.9	12.0
1036 Glenberg	100	B	0.37	5	80	10	10.0
1037 Glenberg	100	B	0.37	5	80	10	10.0
1114 Bankard	100	A	0.10	5	87.3	4.7	8.0
1187 Las Animas	99	C	0.28	4	42.1	37.9	20.0
1350 Bridget	100	B	0.43	5	42.2	42.8	15.0
1355 Bridget	100	B	0.43	5	14	71	15.0
1356 Bridget	99	B	0.43	5	14	71	15.0
1357 Bridget	99	B	0.43	5	14	71	15.0
1358 Bridget	100	B	0.43	5	14	71	15.0
1361 Bridget	99	B	0.37	5	60.7	27.8	11.5
1362 Bridget	99	B	0.37	5	60.7	27.8	11.5
1363 Bridget	100	B	0.37	5	60.7	27.3	12.0
1364 Bridget	100	B	0.37	5	60.7	27.3	12.0
1535 Sulco	55	B	0.49	5	44.3	44.7	11.0
Halvorson	45	B	0.24	5	37.9	35.6	26.5

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
1616 Keith	50	B	0.43	5	13.7	69.3	18.0
Ulysses	49	B	0.4	5	13.6	68.9	17.5
1618 Keith	100	C	0.43	5	41.2	41.8	18.0
1620 Keith	99	B	0.43	5	13.7	69.3	18.0
1621 Keith	99	C	0.43	5	41.2	38.8	18.0
1631 Keith	99	B	0.43	5	13.7	69.3	18.0
1690 Manvel	100	B	0.37	3	6.8	61.7	31.5
1697 Minnequa	100	C	0.37	3	6.8	61.7	31.5
1698 Minnequa	100	C	0.37	3	6.8	61.7	31.5
1726 Rosebud	99	C	0.28	3	44.8	41.2	14.0
1730 Rosebud	99	C	0.37	3	30.1	54.9	15.0
1736 Rosebud	60	C	0.24	3	43.2	38.8	18.0
Canyon	39	D	0.43	2	64.4	25.6	10.0
1742 Rosebud	74	C	0.28	3	44.8	41.2	14.0
Canyon	25	D	0.32	2	44.3	40.7	15.0
1762 Richfield	99	B	0.37	5	29.3	53.7	17.0
1812 Satanta	99	B	0.28	5	63.5	26.5	10.0
1813 Satanta	100	B	0.28	5	63.5	26.5	10.0
1822 Satanta	65	B	0.28	5	63.5	26.5	10.0
Canyon	35	D	0.32	2	44.3	40.7	15.0
1823 Satanta	60	B	0.28	5	63.5	26.5	10.0
Canyon	40	D	0.32	2	44.3	40.7	15.0
1862 Ulysses	100	B	0.43	5	13.6	68.9	17.5
1881 Dwyer	50	A	0.20	5	78.2	16.3	5.5
Valent	50	A	0.15	5	86.8	6.7	6.5

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
1882 Valent	50	A	0.15	5	86.8	6.7	6.5
1882 Dwyer	49	A	0.20	5	78.2	16.3	5.5
1884 Valent	65	A	0.10	5	95.4	0.6	4.0
Valent	35	A	0.10	5	95.4	0.6	4.0
1885 Valent	100	A	0.10	5	95.4	0.6	4.0
1886 Valent	99	A	0.10	5	95.4	0.6	4.0
1891 Valent	99	A	0.10	5	86.8	4.2	9.0
1892 Valent	99	A	0.10	5	84.5	6.5	9.0
1894 Valent	100	A	0.15	5	86.8	6.7	6.5
2360 Munjor	100	B	0.20	4	66.5	20.0	13.5
2361 Munjor, channeled, frequently flooded	100	B	0.20	4	66.5	20.0	13.5
4223 Bolent	98	A	0.15	5	86.8	6.7	6.5
4524 Els	98	A	0.10	5	94.9	0.6	4.5
4636 Hoffland	100	D	0.10	3	63.1	19.4	17.5
4649 Ipage	100	A	0.20	5	78.6	16.4	5.0
4713 Orpha	100	A	0.10	5	86.4	6.6	7.0
4716 Orpha	65	A	0.10	5	86.4	6.6	7.0
4716 Niobrara	35	D	0.20	2	79.9	16.6	3.5
5003 Lohmiller, frequently flooded	100	C	0.32	5	17.3	47.7	35.0
5056 Bufton	99	C	0.24	5	33.3	36.7	30.0
5058 Bufton	100	C	0.32	5	17.3	47.7	35.0
5060 Bufton	100	C	0.32	5	17.3	47.7	35.0
5061 Bufton	69	C	0.32	5	17.3	47.7	35.0
Hisle	30	D	0.43	2	24.8	52.7	22.5

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
5070 Vetal	50	B	0.17	5	66.1	19.9	14.0
Bayard	49	B	0.24	5	62.5	26.0	11.5
5101 Alliance	100	B	0.37	4	41.0	41.0	18.0
5102 Alliance	99	B	0.37	4	41.0	41.0	18.0
5105 Alliance	99	B	0.37	4	13.6	68.9	17.5
5106 Alliance	99	B	0.37	4	13.6	68.9	17.5
5107 Alliance	99	B	0.37	4	13.6	68.9	17.5
5112 Bufton	99	C	0.24	5	33.3	36.7	30.0
5114 Bufton	100	C	0.32	5	17.3	47.7	35.0
5115 Bufton	100	C	0.32	5	17.3	47.7	35.0
5118 Busher	60	A	0.32	4	80.0	10.0	10.0
Tassel	40	D	0.43	2	81.8	12.2	6.0
5123 Busher	99	A	0.32	4	80.0	10.0	10.0
5124 Busher	99	A	0.32	4	80.0	10.0	10.0
5125 Busher	100	A	0.37	4	80.0	10.0	9.0
5126 Busher	100	A	0.32	4	80.0	10.0	10.0
5128 Busher	99	A	0.32	4	80.0	10.0	10.0
5129 Busher	100	A	0.32	4	80.0	10.0	10.0
5133 Busher	59	A	0.32	4	80.0	10.0	10.0
Jayem	40	B	0.32	5	80.0	10.0	10.0
5134 Busher	59	A	0.32	4	80.0	10.0	10.0
Jayem	40	B	0.32	5	80.0	10.0	10.0
5135 Busher	60	A	0.32	4	80.0	10.0	10.0
Jayem	40	B	0.32	5	80.0	10.0	10.0

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
5139 Busher	59	A	0.37	4	80.0	11.0	9.0
Tassel	40	D	0.37	2	81.8	10.2	8.0
5143 Busher	59	A	0.32	4	80.0	10.0	10.0
Tassel	40	D	0.43	2	81.8	12.2	6.0
5152 Canyon	100	D	0.32	2	44.3	40.7	15.0
5153 Canyon	100	D	0.32	2	44.3	40.7	15.0
5162 Canyon	50	D	0.32	2	44.3	40.7	15.0
Rock outcrop	50	D	—	—	—	—	0.0
5184 Keota	70	B	0.49	3	14.3	73.2	12.5
Epping	29	D	0.49	2	30.1	54.9	15.0
5188 Keya	99	B	0.24	5	39.5	37.5	23.0
5191 Norrest	100	C	0.20	3	33.2	34.8	32.0
5192 Norrest	100	C	0.20	3	33.2	34.8	32.0
5195 Norrest	100	C	0.32	3	17.3	52.2	30.5
5196 Norrest	100	C	0.32	3	17.3	52.2	30.5
5197 Norrest	100	C	0.32	3	17.3	52.2	30.5
5200 Oglala	100	B	0.43	4	42.7	43.3	14.0
5206 Oglala	65	B	0.37	4	60.3	27.7	12.0
Canyon	35	D	0.43	2	64.4	25.6	10.0
5207 Oglala	59	B	0.43	4	42.7	43.3	14.0
Canyon	40	D	0.32	2	44.3	40.7	15.0
5210 Oglala	64	B	0.37	4	60.3	27.7	12.0
Canyon	35	D	0.43	2	64.4	25.6	10.0
5211 Oglala	70	B	0.43	4	42.7	43.3	14.0
Canyon	30	D	0.32	2	44.3	40.7	15.0

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
5215 Oglala	55	B	0.32	4	59.0	23.0	18.0
Canyon	45	D	0.37	2	61.2	20.8	18.0
5225 Pierre	99	D	0.20	3	17.1	27.9	55.0
5226 Pierre	100	D	0.20	3	17.1	27.9	55.0
5227 Pierre	70	D	0.24	3	2.5	42.5	55.0
Hisle	30	D	0.43	2	24.8	52.7	22.5
5230 Ponderosa	100	B	0.37	5	79.5	12.0	8.5
5231 Ponderosa	100	B	0.37	5	79.5	11.5	9.0
5234 Ponderosa	60	B	0.37	5	79.5	11.5	9.0
Tassel	20	D	0.37	2	81.8	10.2	8.0
Vetal	20	B	0.32	5	62.0	24.0	14.0
5240 Samsil	65	D	0.24	2	2.6	44.9	52.5
Pierre	35	D	0.20	3	17.1	27.9	55.0
5241 Samsil	65	D	0.24	2	18.2	31.8	50.0
Pierre	35	D	0.20	3	17.1	27.9	55.0
5243 Samsil	70	D	0.24	2	2.6	44.9	52.5
Rock outcrop	30	D	—	—	—	—	0.0
5254 Schamber	100	A	0.24	2	58.6	19.9	21.5
5255 Skilak	99	C	0.37	5	6.9	62.1	31.0
5257 Thirtynine	99	B	0.37	5	13.7	69.3	17.0
5258 Thirtynine	99	B	0.37	5	13.7	69.3	17.0
5259 Thirtynine	99	B	0.37	5	13.7	69.3	17.0
5260 Thirtynine	100	B	0.37	5	41.2	41.8	17.0
5261 Thirtynine	100	B	0.37	5	41.2	41.8	17.0
5262 Thirtynine	100	B	0.37	5	41.2	41.8	17.0

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
5281 Vetal	100	B	0.20	5	66.1	21.9	12.0
5282 Vetal	100	B	0.17	5	66.1	19.9	14.0
5288 Vetal	100	B	0.10	5	85.9	6.6	7.5
5291 Vetal	99	B	0.37	5	62.0	26.0	12.0
5292 Vetal	99	B	0.37	5	62.0	26.0	12.0
5350 Enning	50	D	0.37	2	19.3	52.2	28.5
Minnequa	50	C	0.37	3	6.8	61.7	31.5
5351 Enning	60	D	0.37	2	19.3	52.2	28.5
Minnequa	40	C	0.37	3	6.8	61.7	31.5
5352 Enning	70	D	0.37	2	19.3	52.2	28.5
Rock outcrop	30	D	—	—	—	—	0.0
5353 Enning	65	D	0.37	2	19.3	52.2	28.5
Shale outcrop	35	D	—	—	—	—	0.0
5355 Hisle	70	D	0.32	2	39.8	38.2	22.0
Slickspots	30	D	0.20	3	17.1	27.9	55.0
5358 Kyle	100	D	0.20	5	2.3	40.2	57.5
5359 Kyle	99	D	0.20	5	2.3	40.2	57.5
5360 Kyle	70	D	0.20	5	2.3	40.2	57.5
Hisle	30	D	0.43	2	24.8	52.7	22.5
5600 Bigwinder	100	D	0.17	5	66.1	19.9	14.0
5612 Craft, channeled, frequently flooded	100	B	0.43	5	42.7	41.3	16.0
5637 Haverson	100	B	0.32	5	23.5	50.0	26.5
5638 Haverson	100	B	0.32	5	23.5	50.0	26.5
5639 Haverson	100	B	0.37	5	20.0	53.5	26.5
5640 Haverson	98	B	0.24	5	37.9	35.6	26.5

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
5657 Lisco, occasionally flooded	100	C	0.43	5	63.6	25.4	11.0
5810 Buffington	100	B	0.28	5	7.7	49.8	42.5
5834 Mitchell	100	B	0.43	5	11.3	67.7	21.0
5836 Mitchell	100	B	0.43	5	11.3	67.7	21.0
5838 Mitchell	100	B	0.43	5	11.3	67.7	21.0
5839 Mitchell	100	B	0.43	5	11.3	67.7	21.0
5849 Epping	50	D	0.49	2	30.1	54.9	15.0
Mitchell	50	B	0.43	5	11.3	67.7	21.0
5870 Tripp	99	B	0.37	5	14.2	71.8	14.0
5871 Tripp	99	B	0.37	5	14.2	71.8	14.0
5872 Tripp	100	B	0.43	5	14.2	71.8	14.0
5943 Duroc	99	B	0.43	5	41.0	41.5	17.5
5947 Duroc	99	B	0.32	5	59.3	23.2	17.5
5964 Jayem	50	B	0.32	5	80.0	10.0	10.0
Vetal	50	B	0.37	5	79.5	12	8.5
5965 Jayem	99	B	0.24	5	63.5	26.5	10.0
5966 Jayem	99	B	0.24	5	63.5	26.5	10.0
5978 Jayem	99	B	0.32	5	80.0	10.0	10.0
5979 Jayem	100	B	0.32	5	80.0	10.0	10.0
5980 Jayem	100	B	0.32	5	80.0	10.0	10.0
5983 Rock outcrop	65	D	—	—	—	—	0.0
Tassel	35	D	0.15	2	78.6	13.4	8.0
5987 Orella	100	D	0.24	2	26.1	28.9	45.0
5988 Orella	100	D	0.43	2	18.7	47.8	33.5

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
6026 Tassel	100	D	0.43	2	81.8	12.2	6.0
6028 Tassel	100	D	0.43	2	81.8	12.2	6.0
6031 Tassel	55	D	0.37	2	81.8	10.2	8.0
Ashollow	25	B	0.37	5	81.8	9.2	9.0
Rock outcrop	20	D	—	—	—	—	0.0
6036 Tassel	55	D	0.37	2	81.8	10.2	8.0
Busher	30	A	0.32	4	80	10	10.0
Rock outcrop	15	D	—	—	—	—	0.0
6043 Tassel	45	D	0.43	2	81.8	12.2	6.0
Ponderosa	35	B	0.37	5	79.5	12.0	8.5
6043 Rock outcrop	20	D	—	—	—	—	0.0
6045 Tassel	75	D	0.37	2	65.5	26.0	8.5
Rock outcrop	25	D	—	—	—	—	0.0
6048 Orella	55	D	0.43	2	18.7	47.8	33.5
Badland	45	D	—	—	—	—	0.0
6090 Sarben	70	A	0.37	5	81.5	7.0	11.5
Vetal	30	B	0.37	5	79.5	12.0	8.5
6091 Sarben	100	A	0.20	5	66.1	19.9	14.0
6092 Sarben	99	A	0.20	5	66.1	19.9	14.0
6093 Sarben	100	A	0.20	5	66.1	19.9	14.0
6109 Sarben	100	A	0.37	5	81.5	9.5	9.0
6201 Epping	100	D	0.49	2	30.1	54.9	15.0
6203 Epping	60	D	0.49	2	30.1	54.9	15.0
Badland	40	D	—	—	—	—	0.0
6240 Keota	99	B	0.49	3	14.3	73.2	12.5

Table 2 Revised Universal Soil Loss Equation, Version 2 Related Attributes, Dawes County, Nebraska

Map Symbol and Soil Name	Pct of Map	Hydrologic Group	Kf	T factor	Representative Value		
					% Sand	% Silt	% Clay
9971 Arents, earthen dam	100	—	—	—	—	—	—
9973 Badland	100	D	—	1	—	—	—
9983 Pits	100	A	—	2	—	—	—
9986 Water, sewage lagoons	100	—	—	—	—	—	—
9999 Water	100	—	—	—	—	—	—

[This report shows only the major soils in each map unit]

Table 3 Details of Available Geospatial, Stream Flow and Meteorological Data

Datat Type	Resource Agency	Resource Information	Notes
Terrain DEM	USGS NED	http://seamless.usgs.gov/ned13.php	30 meter resolution
Land Use	USGS NLCD	http://seamless.usgs.gov/nlcd.php	2006 version
Flowline Data	USGS NHD	http://nhd.usgs.gov/	
Soil data	NRCS	http://datagateway.nrcs.usda.gov/	SSURGO
Meteorological	NOAA NWS and NCDC	NWS and NCDC websites	Precipitation, evaporation and runoff values

Table 4 C-factor Values for Various Land Use Types

Land Use Category	C Value
Open Water	0.000
Deciduous Forest	0.002
Evergreen Forest	0.001
Mixed Forest	0.001
Scrub/Shrub	0.003
Grassland/Herbaceous	0.010
Pasture/Hay	0.470
Cultivated Crops	0.470
Woody Wetlands	0.001
Emergent Herbaceous Wetland	0.001

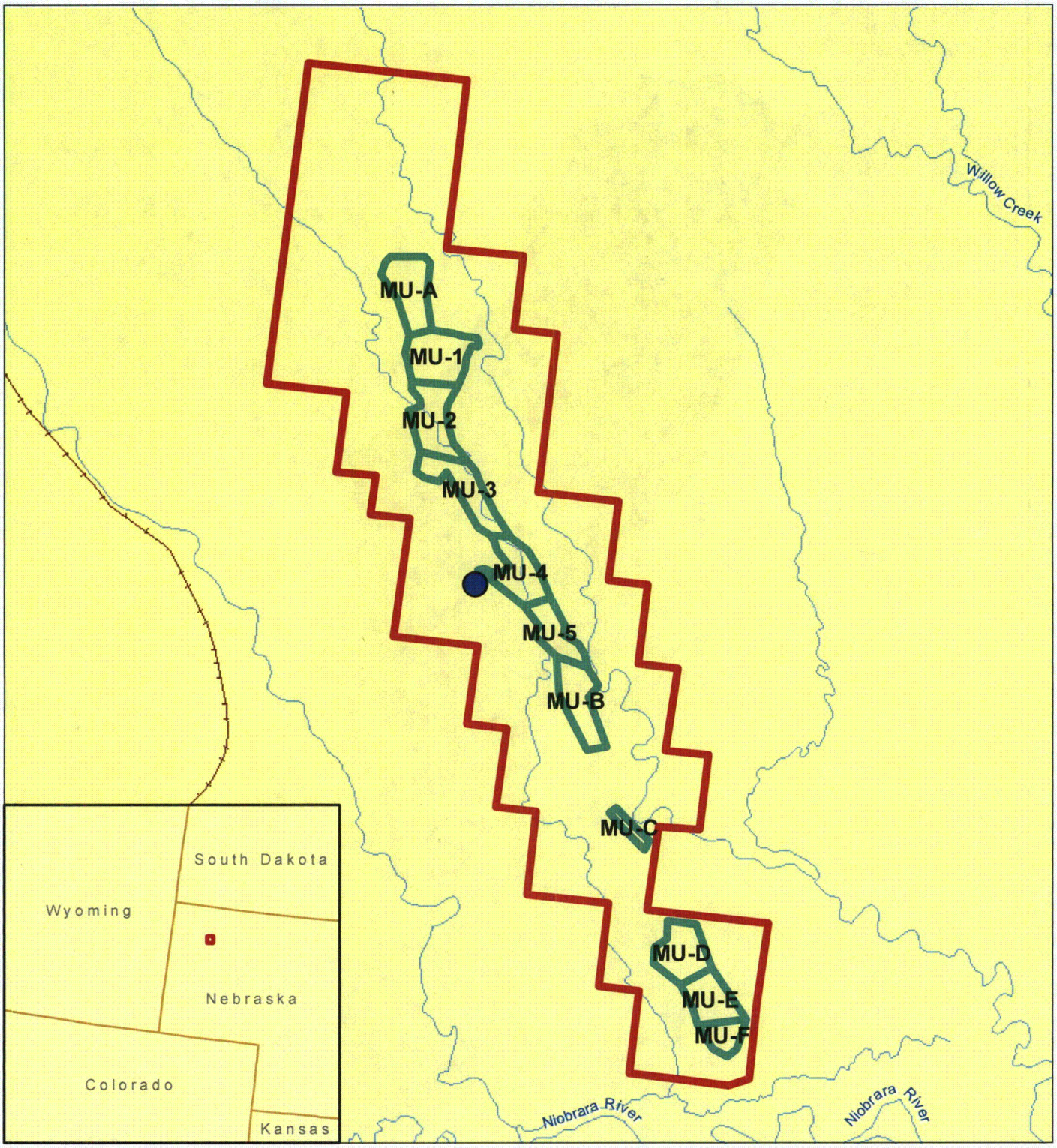
Note: C-factor values derived from current conditions described in the National Cover Dataset (NLCD 2006).

Table 5 MEA Mine Units Determined to be at a High or Moderate Risk of Erosion

Mining Unit	MU Maximum Soil Loss (ton/acre/year)	MU Maximum Erosion Risk	Percent MU Area of Moderate to High Erosion Risk	Drainage Lines Crossing MU
MU-A	3.3	Low	N/A	N/A
MU-1	3.4	Low	N/A	N/A
MU-2	18.7	High	5	21
MU-3	22.2	High	2	21
MU-4	24.5	High	7	21
MU-5	13.5	Moderate	11	21
MU-B	20.0	High	6	N/A
MU-C	2.7	Very Low	N/A	N/A
MU-D	0.9	Very Low	N/A	30
MU-E	1.1	Very Low	N/A	N/A
MU-F	0.7	Very Low	N/A	N/A

ARCADIS

Figures



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Mine Unit Boundaries
- Satellite Facility Location

N

0 0.3 0.6 0.9 Miles

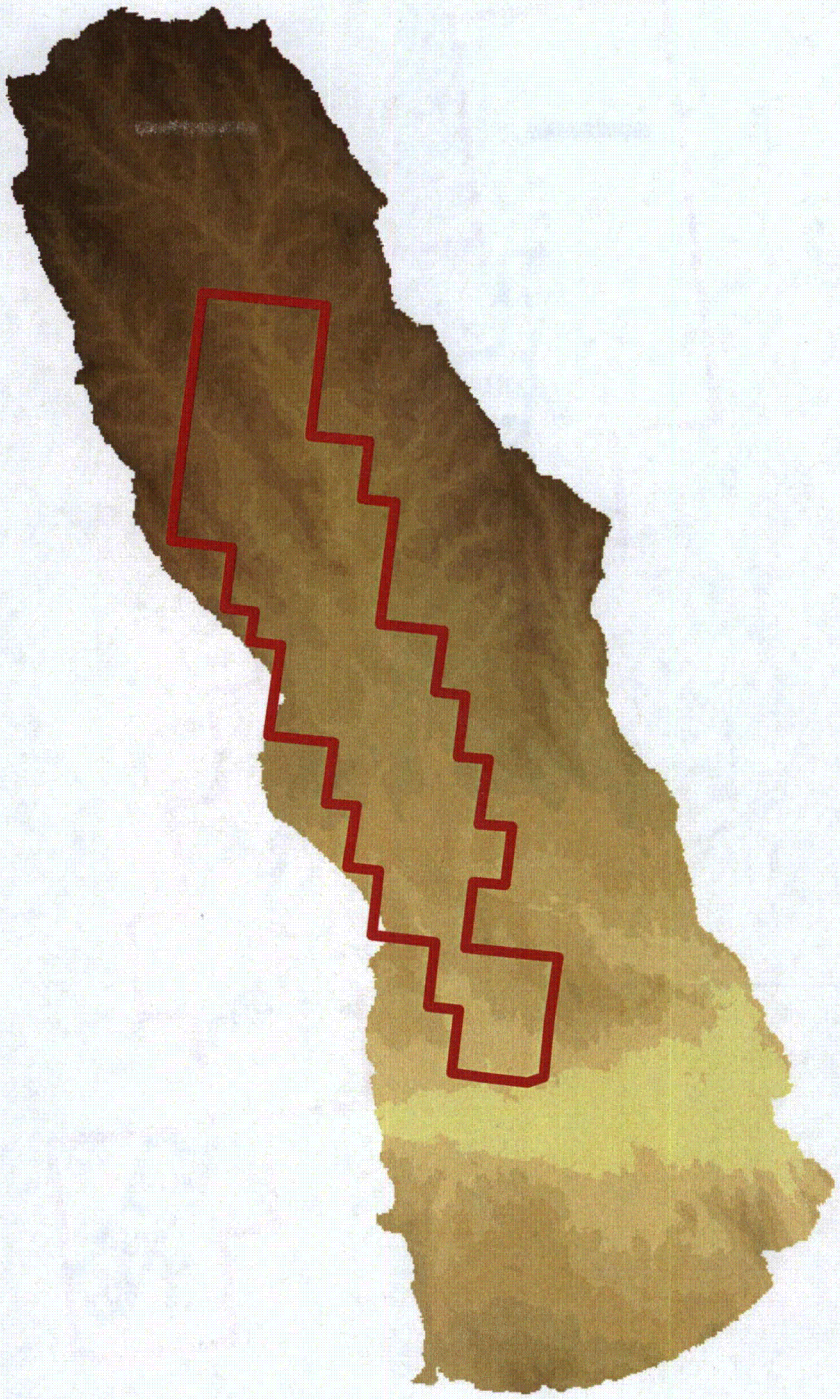
0 0.55 1.1 1.65 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 1
PROPOSED CAMECO/MARSLAND EXPANSION AREA

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

Meters NAVD88

- 1,226 - 1,241
- 1,242 - 1,253
- 1,254 - 1,264
- 1,265 - 1,275
- 1,276 - 1,288
- 1,289 - 1,301
- 1,302 - 1,314
- 1,315 - 1,327
- 1,328 - 1,341
- 1,342 - 1,355
- 1,356 - 1,367
- 1,368 - 1,379
- 1,380 - 1,390
- 1,391 - 1,402
- 1,403 - 1,419

N

0 0.5 1 1.5 Miles

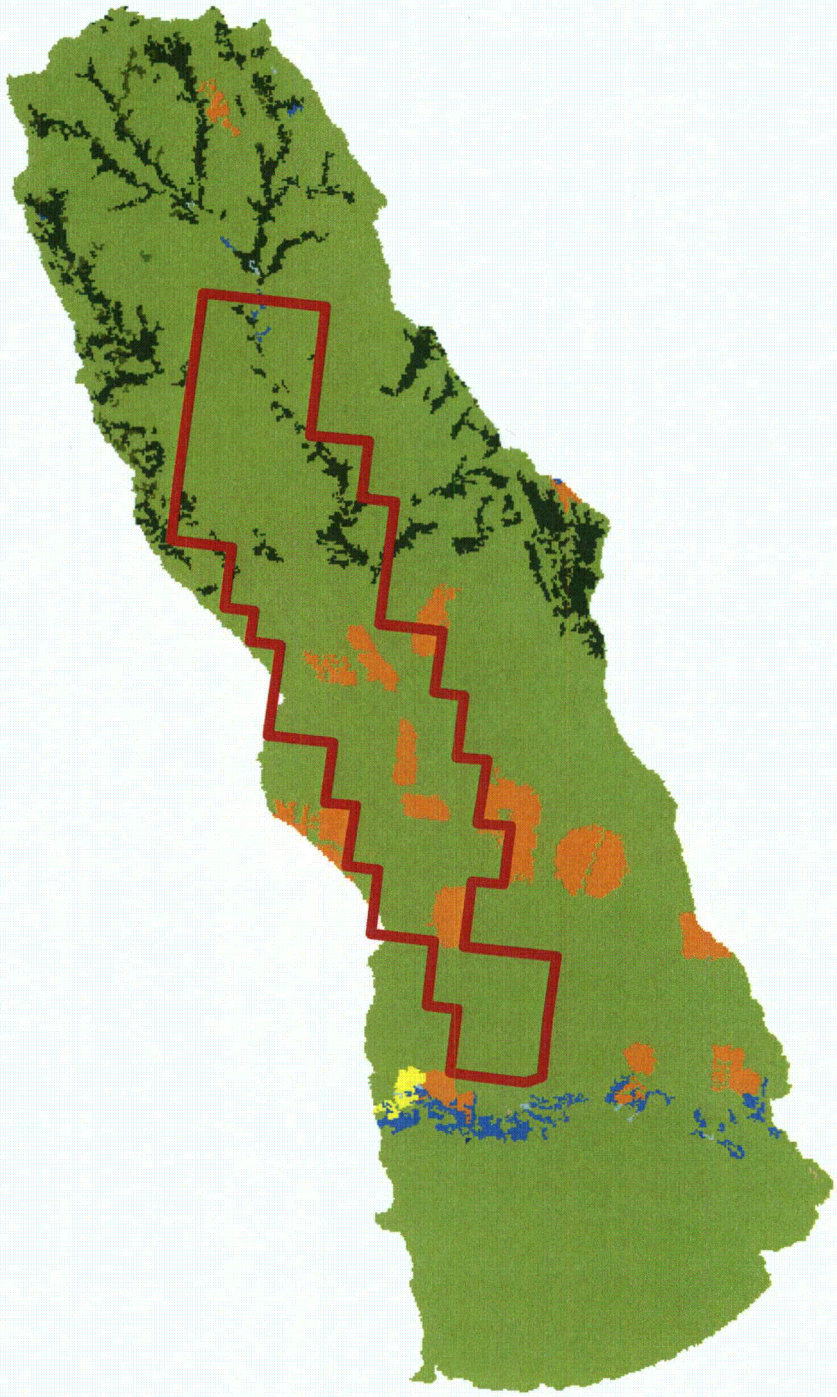
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 2
DIGITAL ELEVATION MODEL (DEM)

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

- Open Water
- Low Intensity Residential
- High Intensity Residential
- Commercial/Industrial/Transportation
- Developed High Intensity
- Bare Rock/Sand/Clay
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Scrub/Shrub
- Grassland/Herbaceous
- Pasture/Hay
- Row Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

N

0 0.5 1 1.5 Miles

0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 3
LAND CLASSIFICATIONS
NLCD 2006

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com

LEGEND

Proposed Cameco/Marsland Expansion Area

NHD Stream Network

Stream Network ID

N

0 0.5 1 1.5 Miles

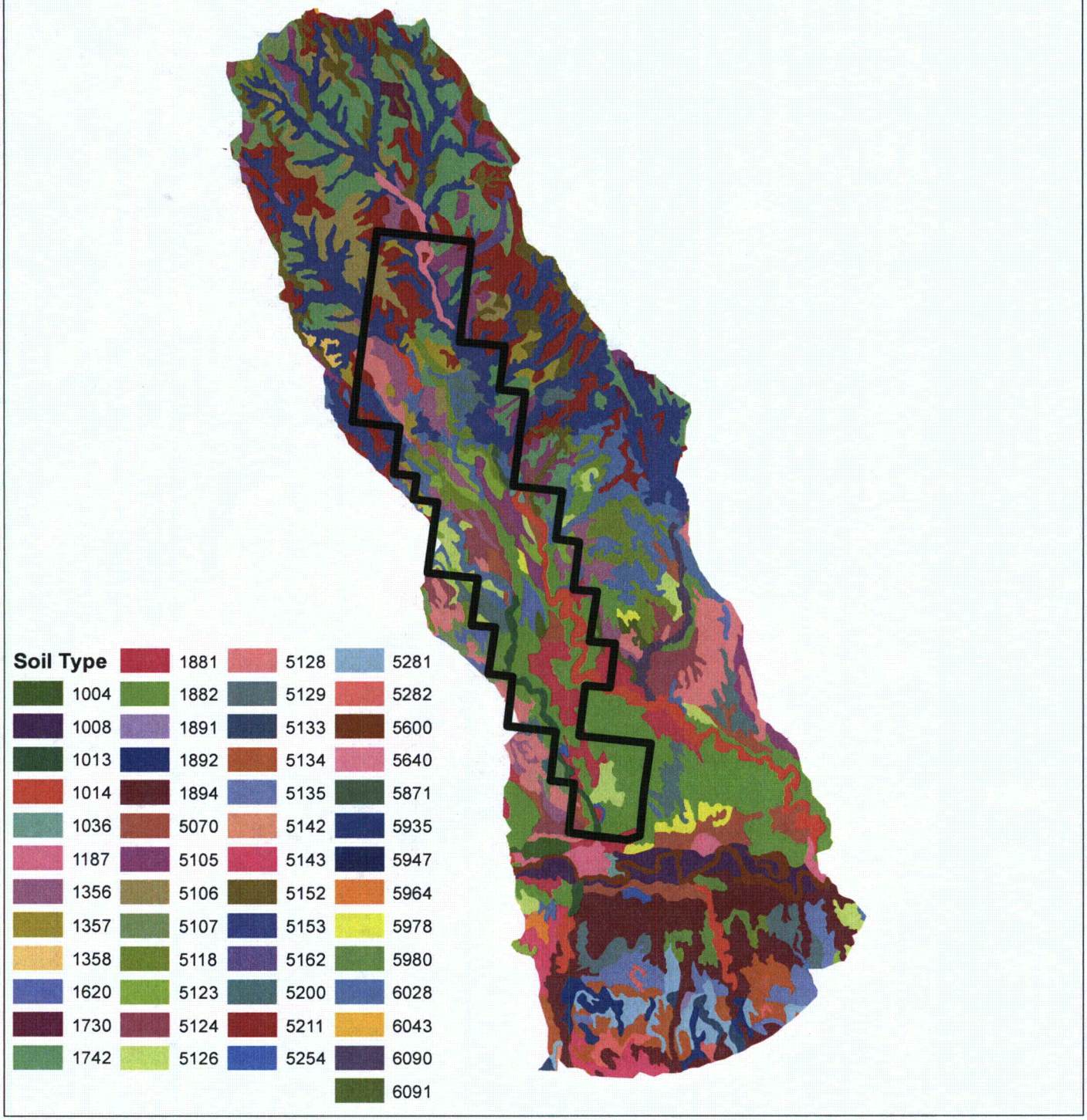
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 4
NHD PUBLISHED STREAM NETWORK

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

N

0 0.5 1 1.5 Miles

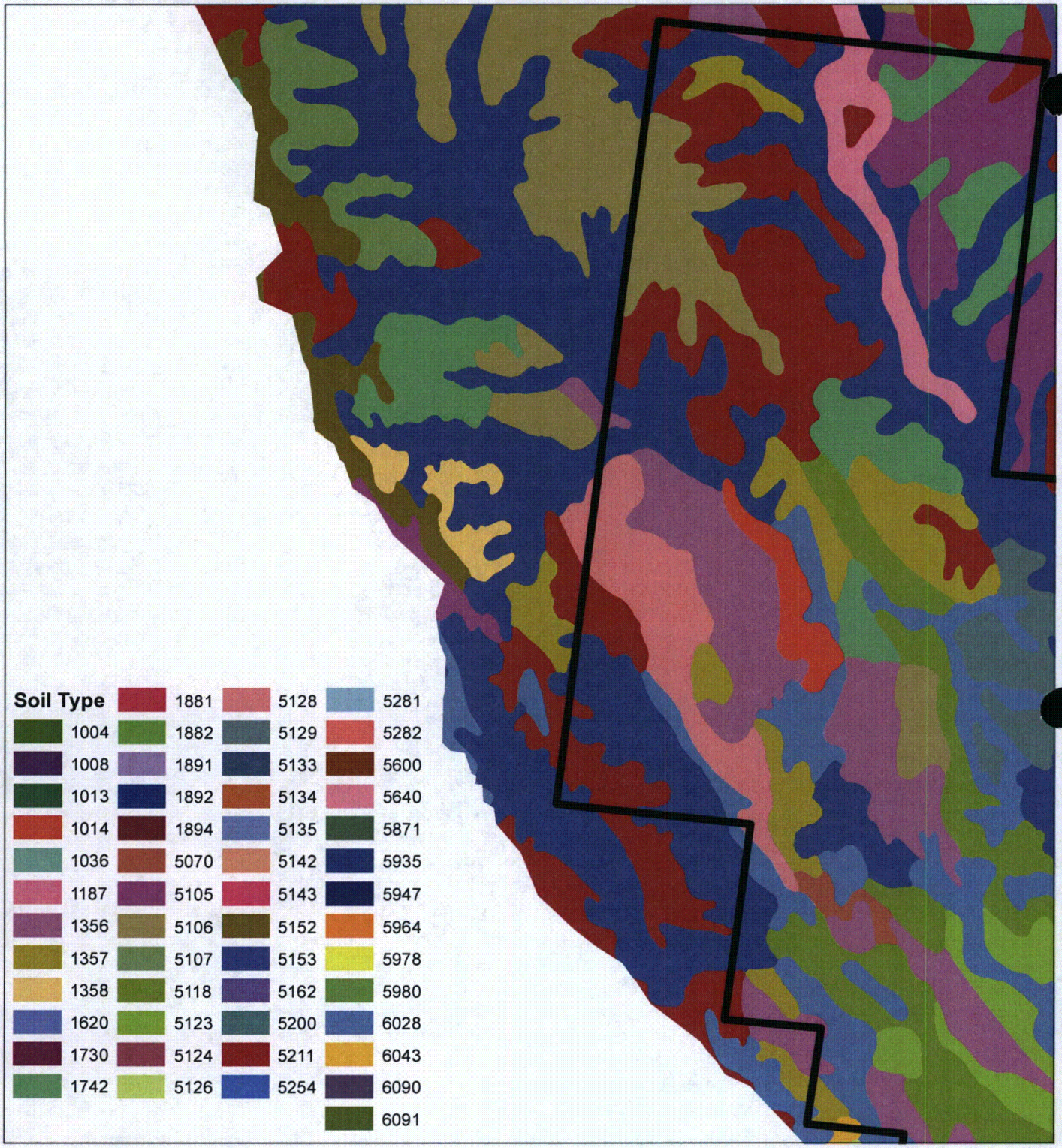
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 5
NRCS SSURGO SOIL TYPES

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

N

0 0.1 0.2 0.3 Miles

0 0.2 0.4 0.6 Kilometers

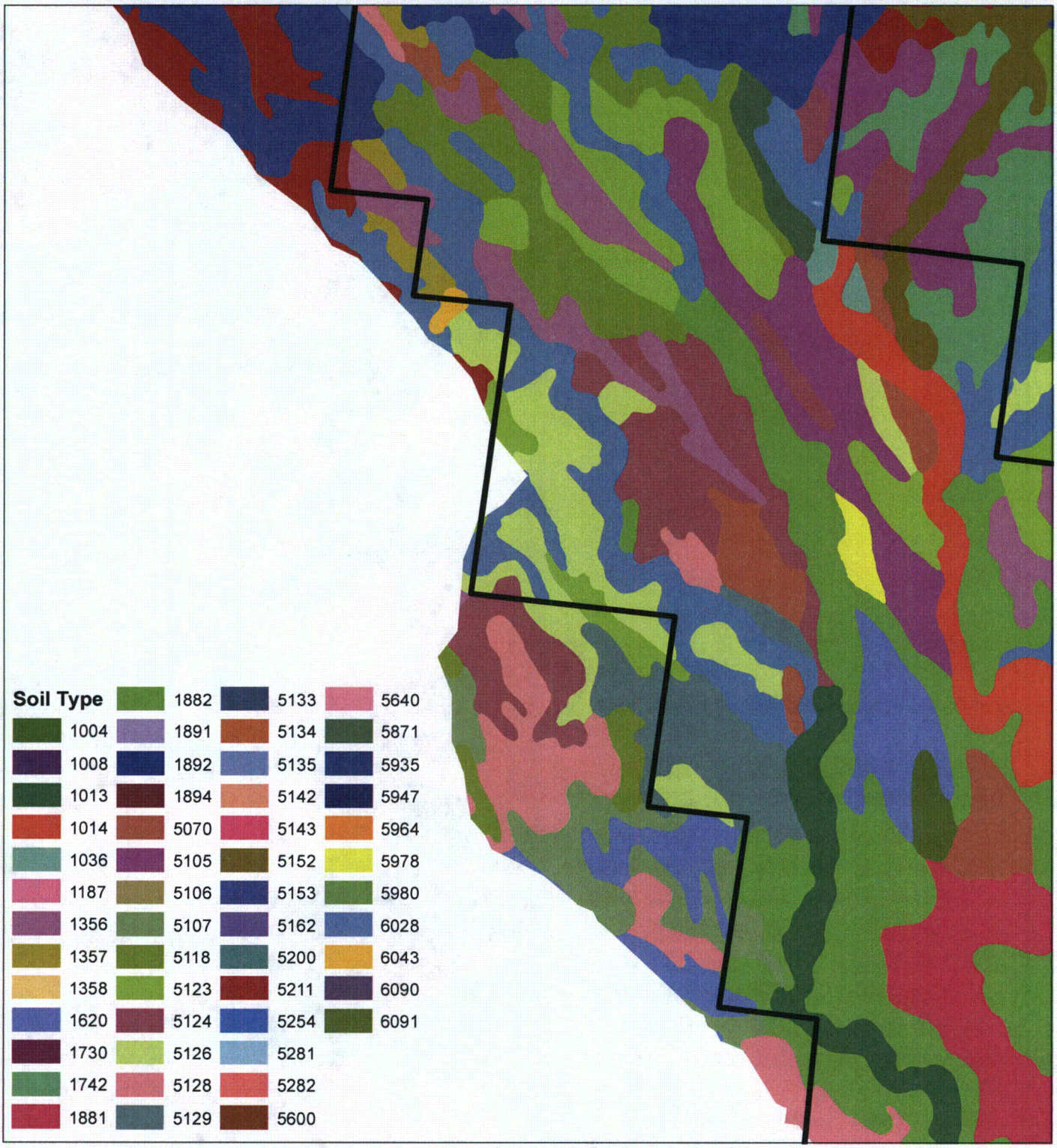
CROW BUTTE RESOURCES, INC.

FIGURE 6
NRCS SSURGO SOIL TYPES

PROJECT: CO001636

ARCADIS

630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

N

0 0.1 0.2 0.3 Miles

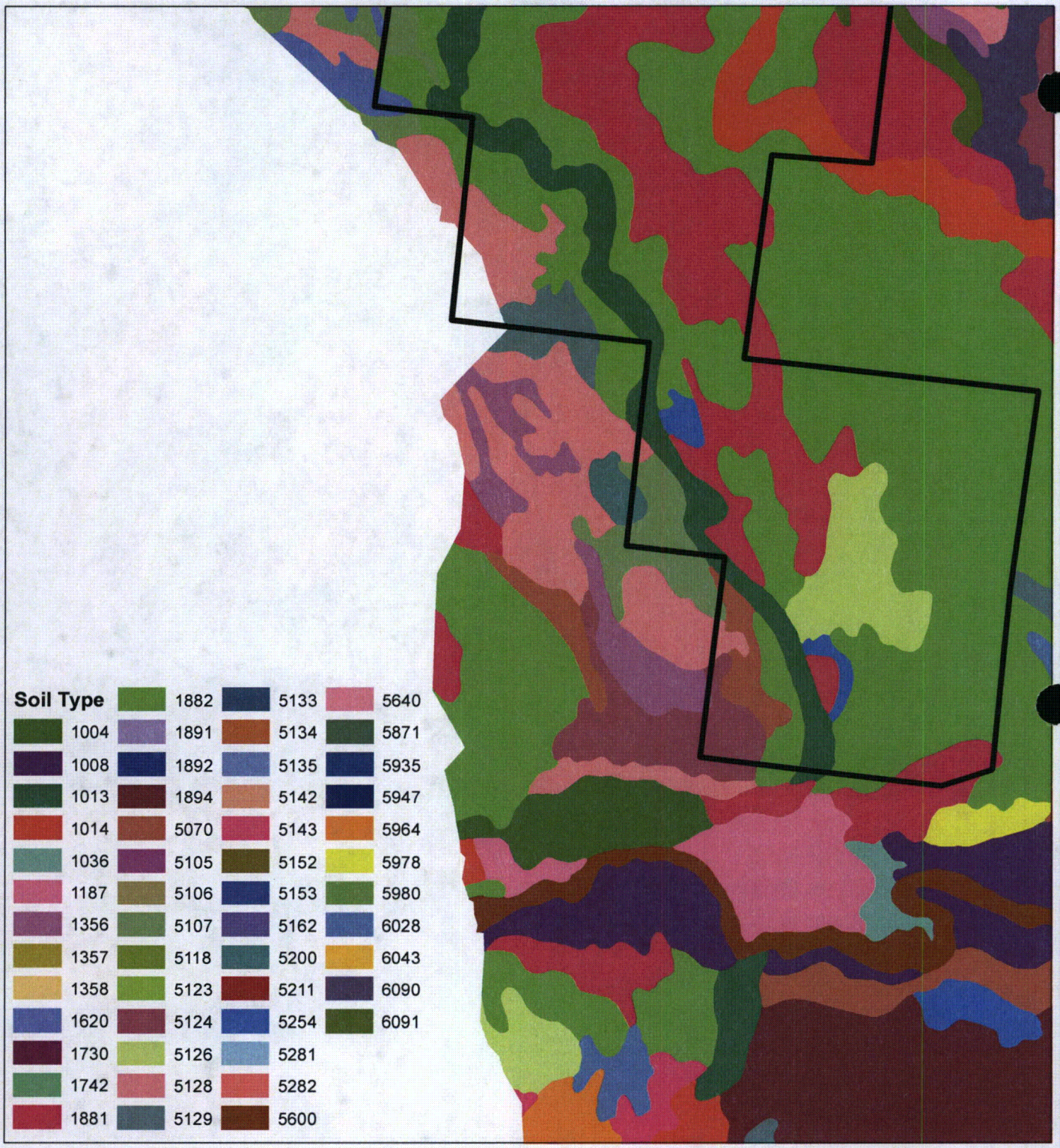
0 0.2 0.4 0.6 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 7
NRCS SSURGO SOIL TYPES

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

N

0 0.1 0.2 0.3 Miles

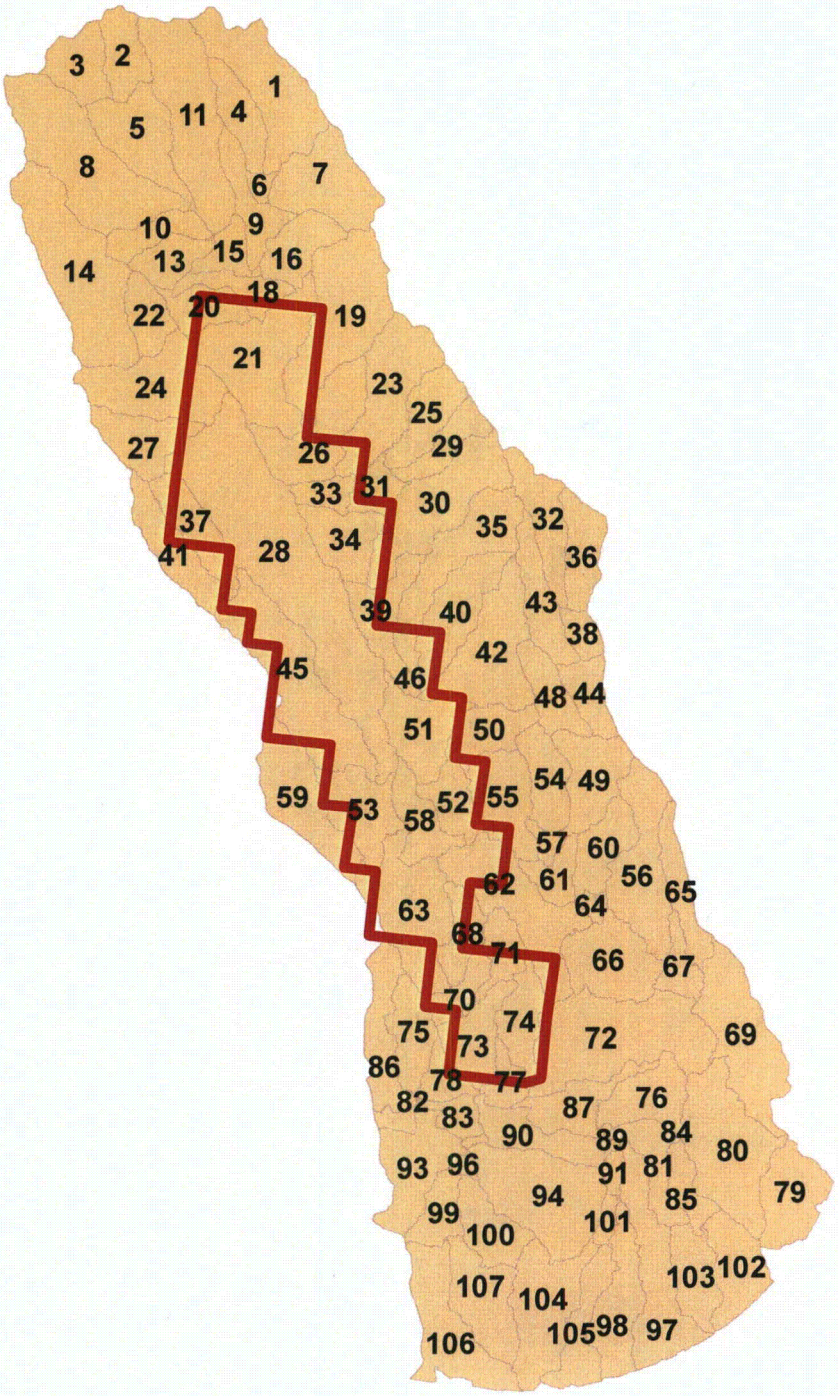
0 0.2 0.4 0.6 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 8
NRCS SSURGO SOIL TYPES

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

Watersed Delineation

Watershed ID

N

0 0.5 1 1.5 Miles

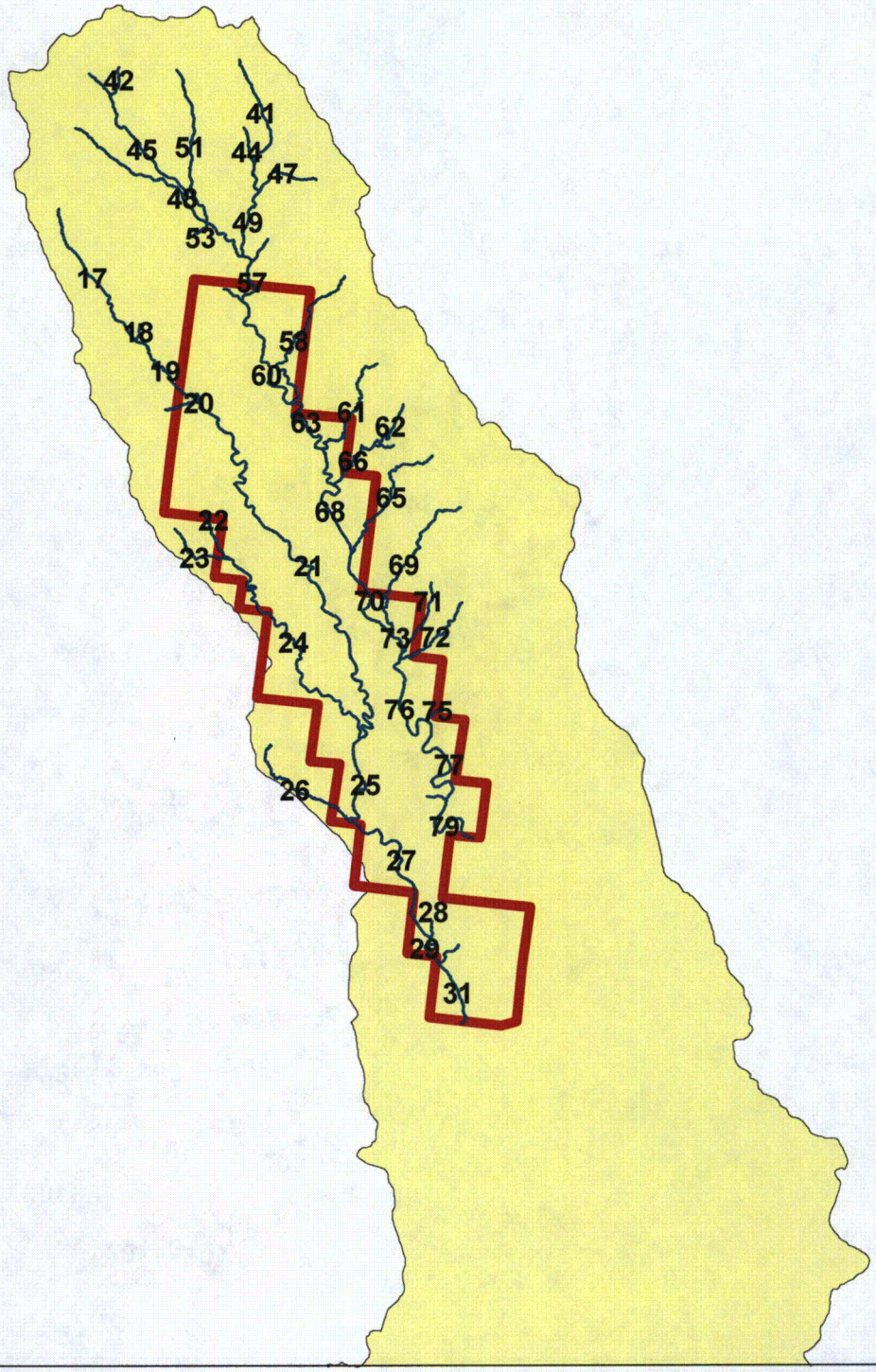
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 9
WATERSHED DELINEATION FOR THE CAMECO/MARSLAND EXPANSION WITH RECONDITIONED DEM

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

Drainage Lines

Drainage Line ID

N

0 0.5 1 1.5 Miles

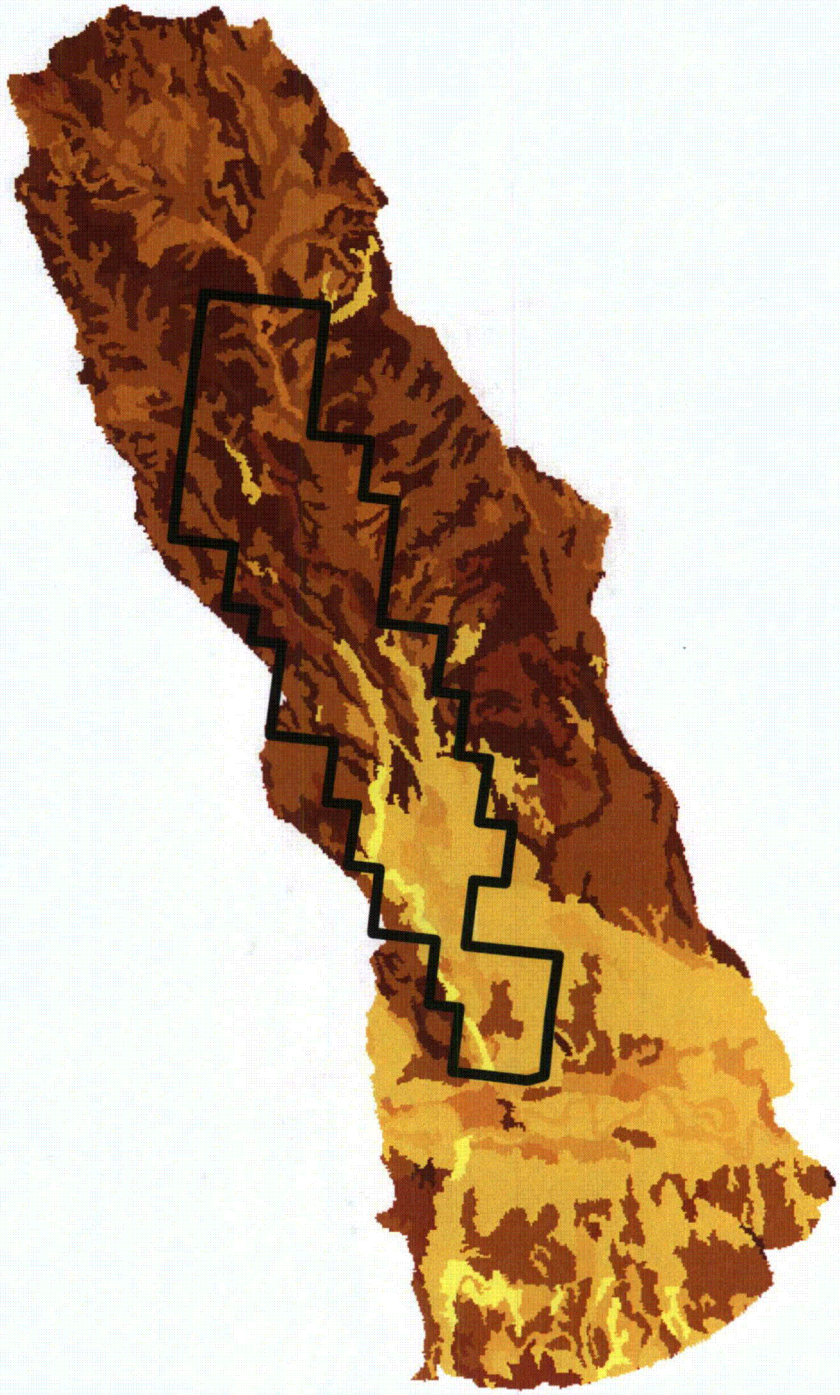
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 10
DRAINAGE LINES

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

0.1	0.21 - 0.24	0.33 - 0.32
0.11 - 0.17	0.25 - 0.29	0.33 - 0.37
0.18 - 0.2	0.3 - 0.32	0.38 - 0.4
		0.41 - 0.43

N

0 0.5 1 1.5 Miles

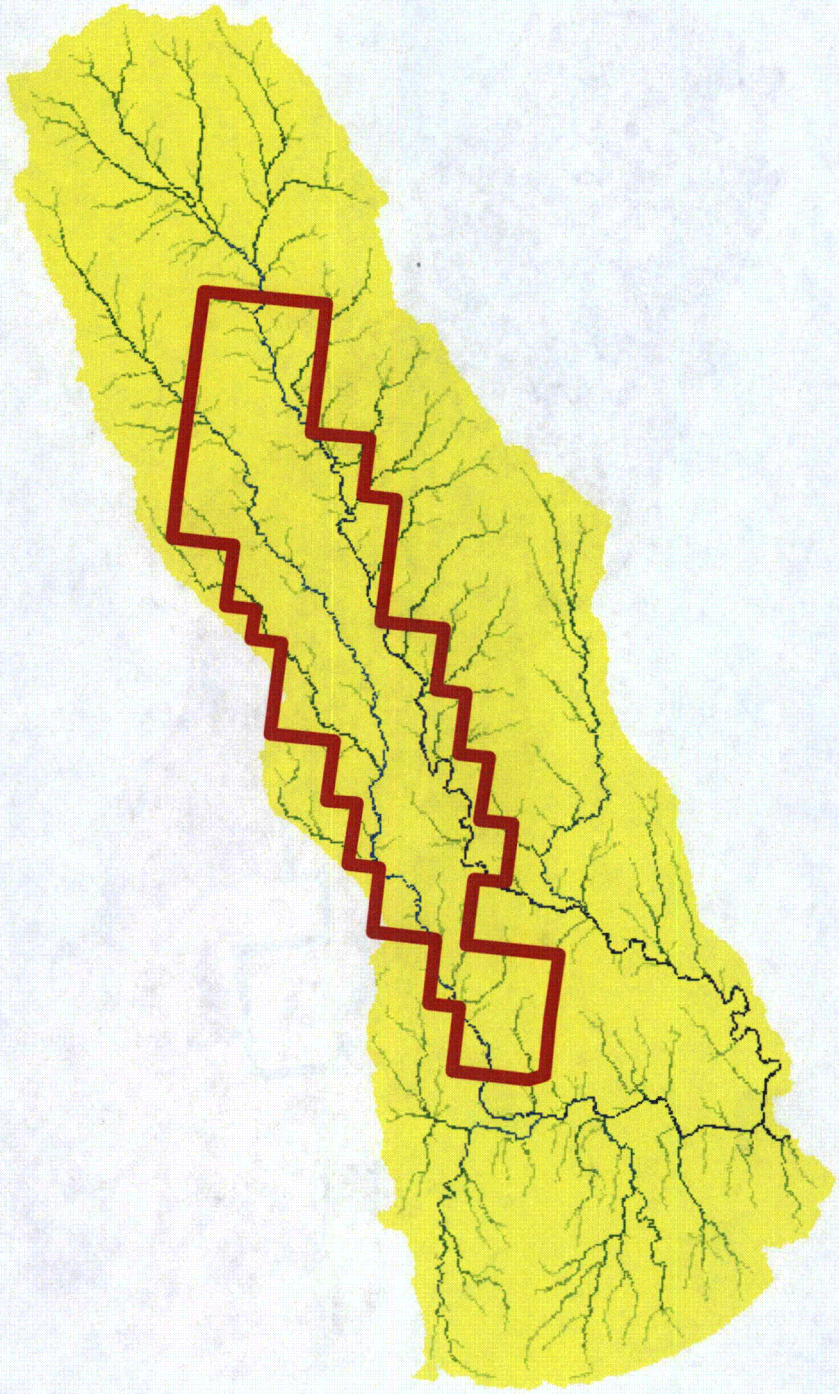
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 11
RUSLE SOIL ERODIBILITY
K FACTOR

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

0 - 68	1,473 - 2,297	9,882 - 17,521
69 - 242	2,298 - 3,615	17,522 - 23,683
243 - 515	3,616 - 5,528	23,684 - 31,219
516 - 915	5,529 - 7,796	31,220 - 39,673
916 - 1,472	7,797 - 9,881	39,674 - 92,908

NOTE: Value represents the number of 900 m^2 cells that drain through a given 900 m^2 cell

N

0 0.5 1 1.5 Miles

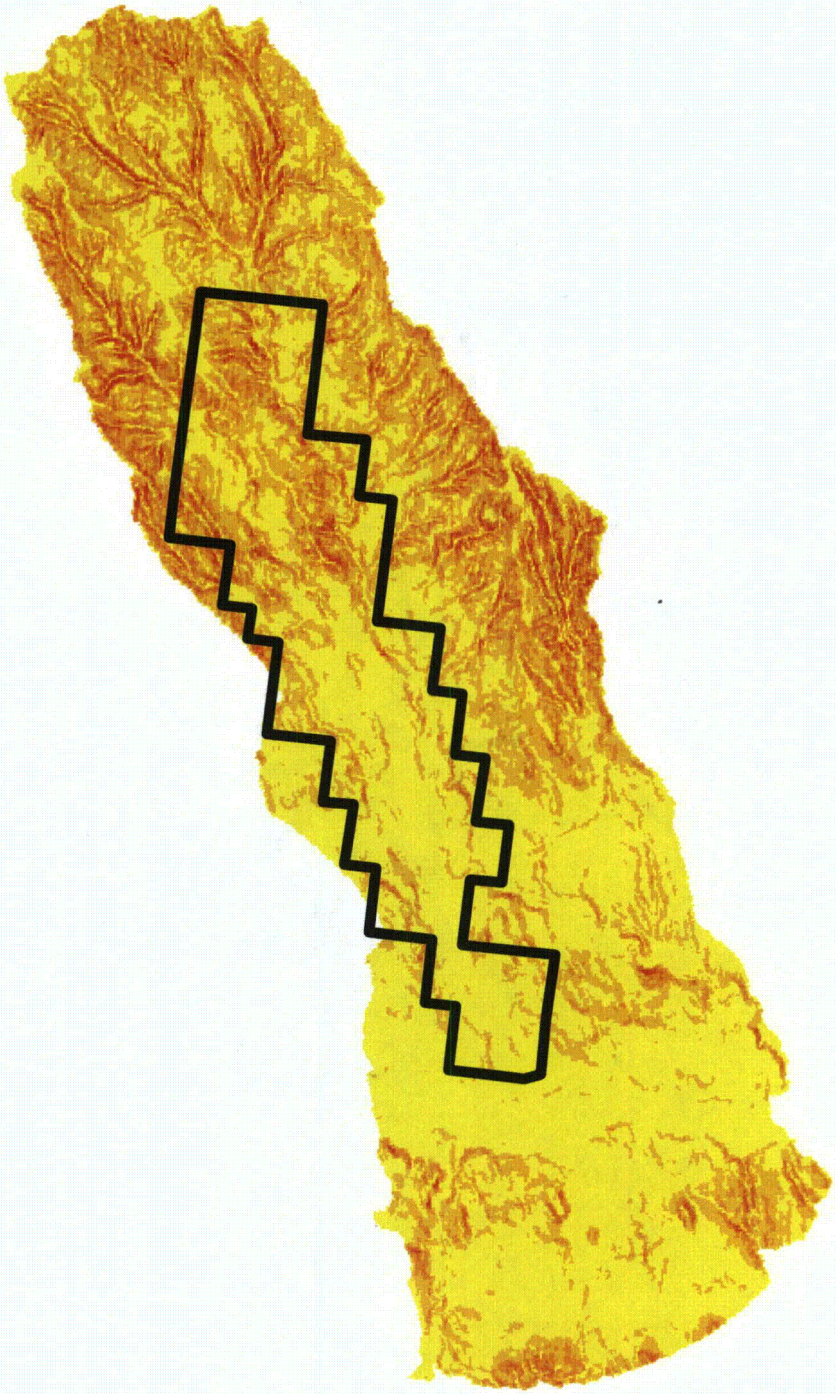
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 12
FLOW ACCUMULATION VALUES USED TO CALCULATE RUSLE LS-FACTOR

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

0% - 5%
6% - 10%
11% - 15%
16% - 20%
21% - 25%
26% - 30%
31% - 35%
36% - 40%

N

0 0.5 1 1.5 Miles

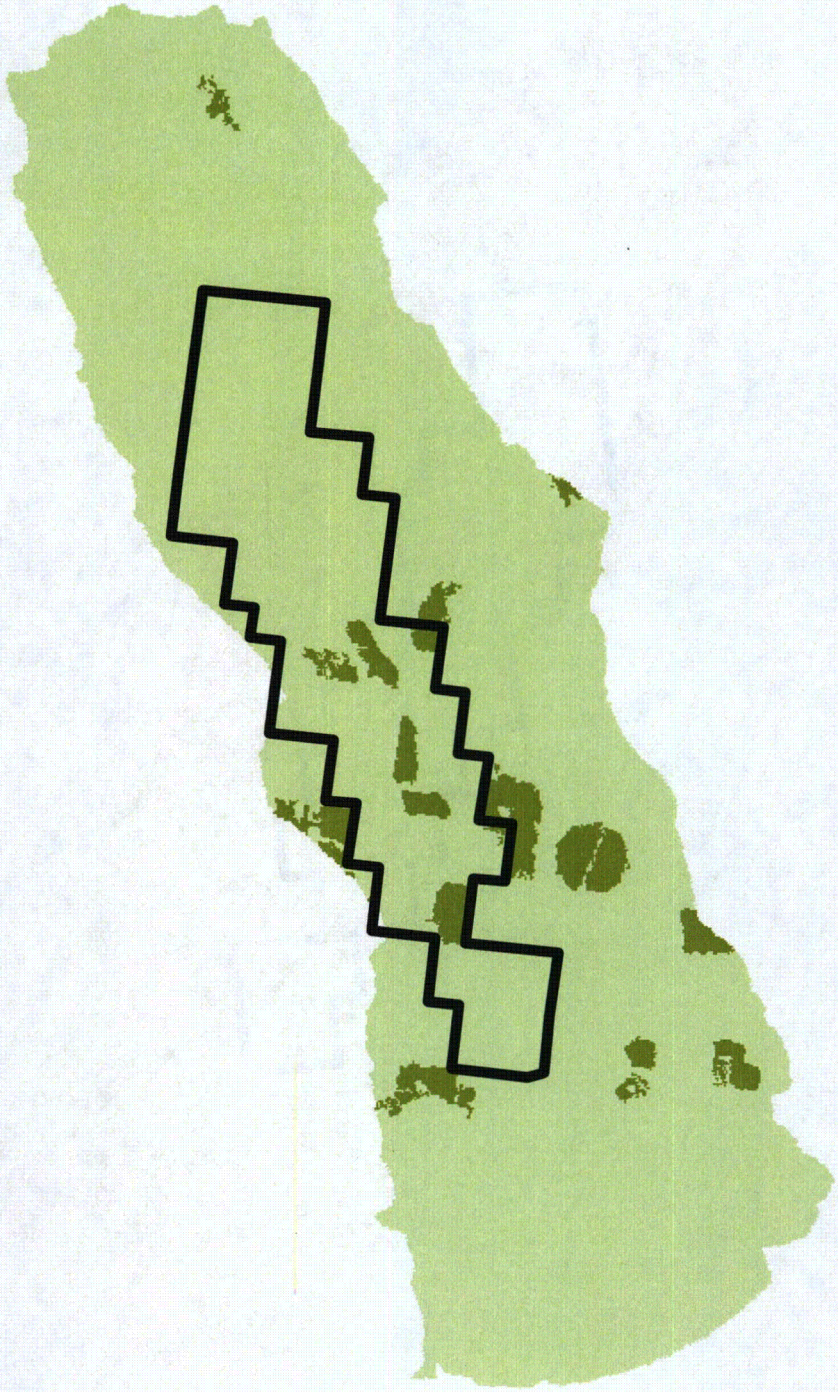
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 13
PERCENT TOPOGRAPHIC SLOPE

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

Proposed Cameco/Marsland Expansion Area

0 - 0.05	0.15 - 0.19	0.29 - 0.33
0.06 - 0.09	0.2 - 0.23	0.34 - 0.37
0.1 - 0.14	0.24 - 0.28	0.38 - 0.42
		0.43 - 0.47

N

0 0.5 1 1.5 Miles

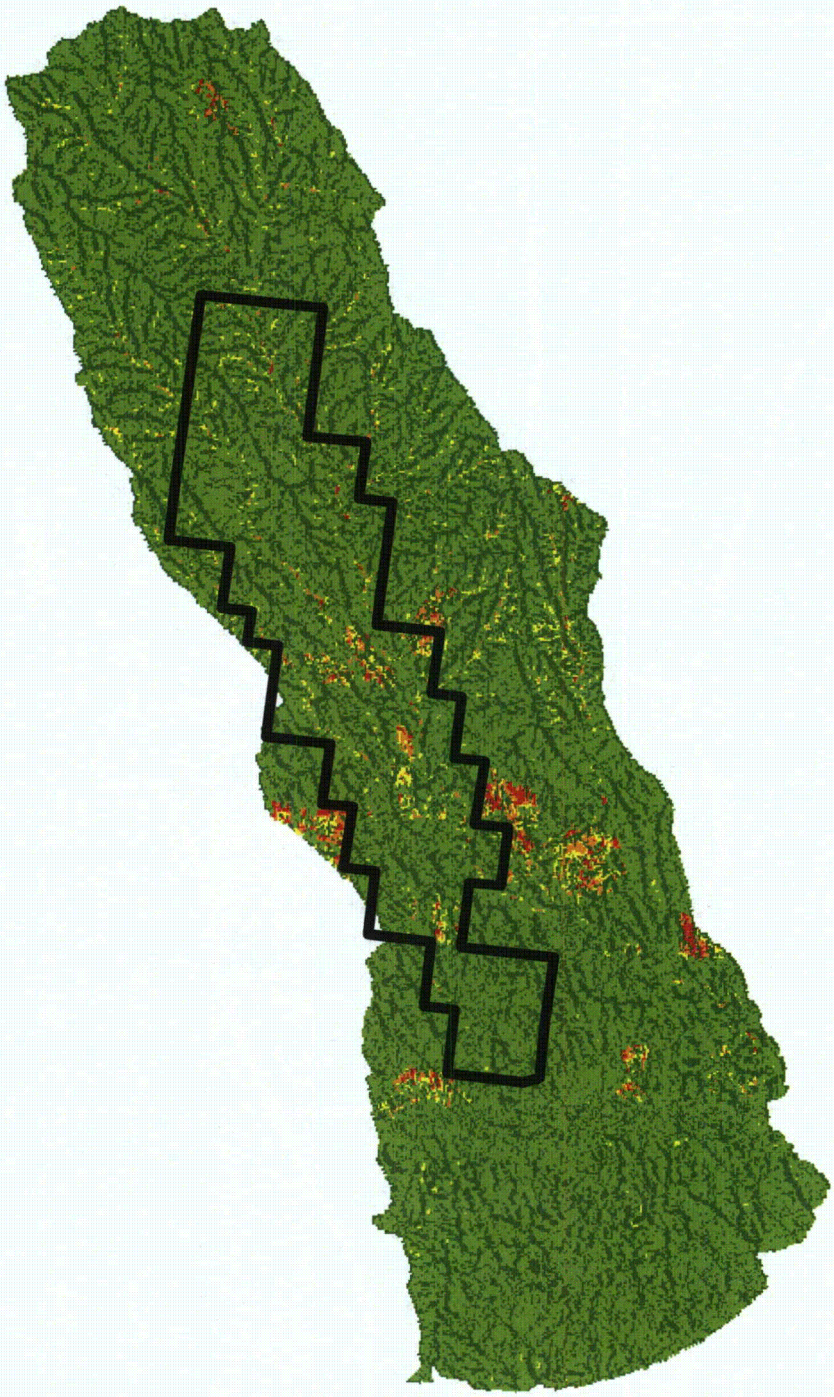
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 14
RUSLE LAND COVER MANAGEMENT
C FACTOR

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- No Erosion (A = 0)
- Very Low Erosion (A = 0 - 3)
- Low Erosion (A = 3 - 6)
- Moderate Erosion (A = 6 - 15)
- High Erosion (A = 15 - 100)
- Very High Erosion (A > 100)

N

0 0.5 1 1.5 Miles

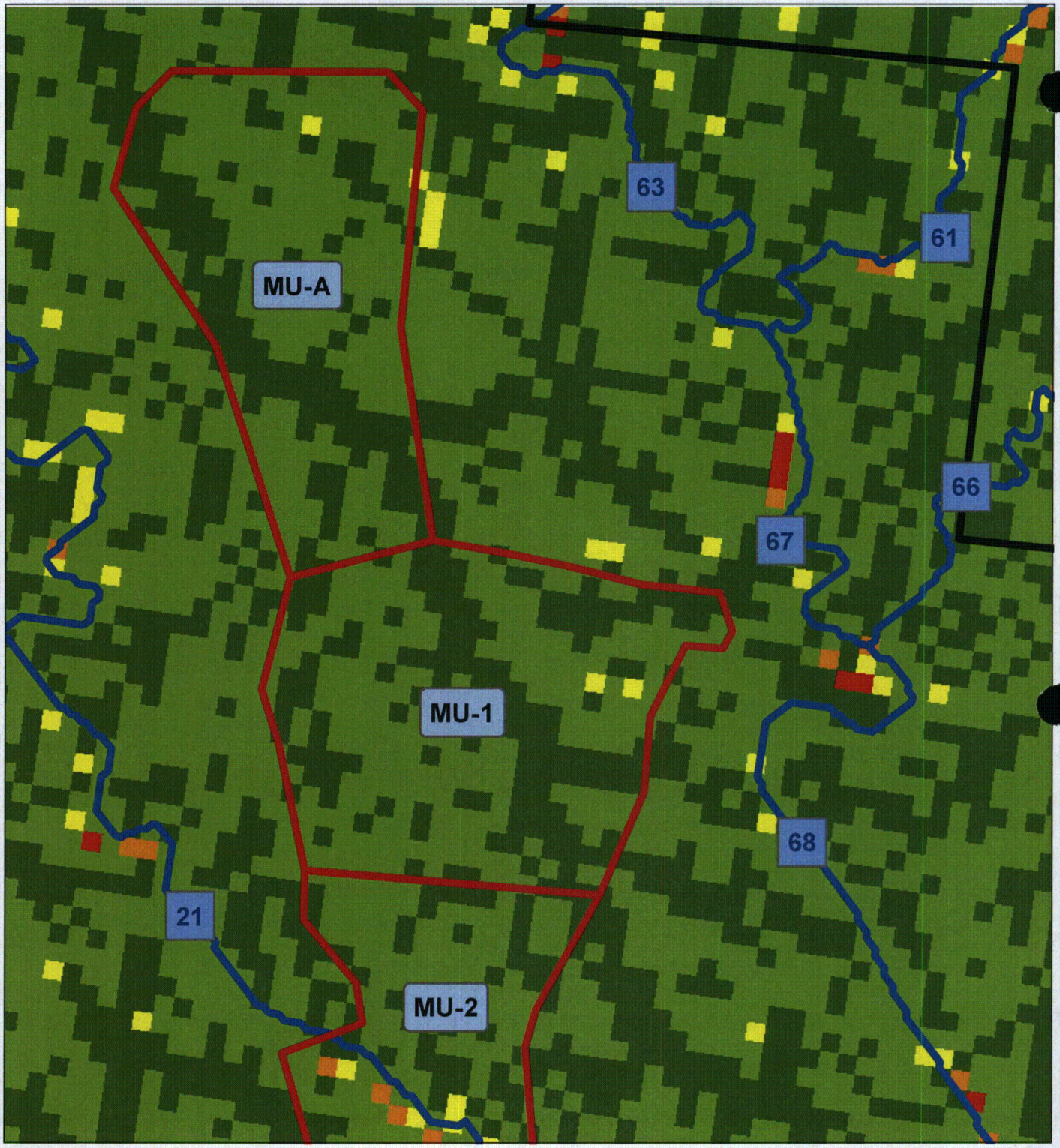
0 1 2 3 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 15
AVERAGE ANNUAL SOIL LOSS
RUSLE A FACTOR (TONS/ACRE/YEAR)

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- No Erosion (A = 0)
- Very Low Erosion (A = 0 - 3)
- Low Erosion (A = 3 - 6)
- Moderate Erosion (A = 6 - 15)
- High Erosion (A = 15 - 100)
- Very High Erosion (A > 100)

N

0 0.045 0.09 0.135 Miles

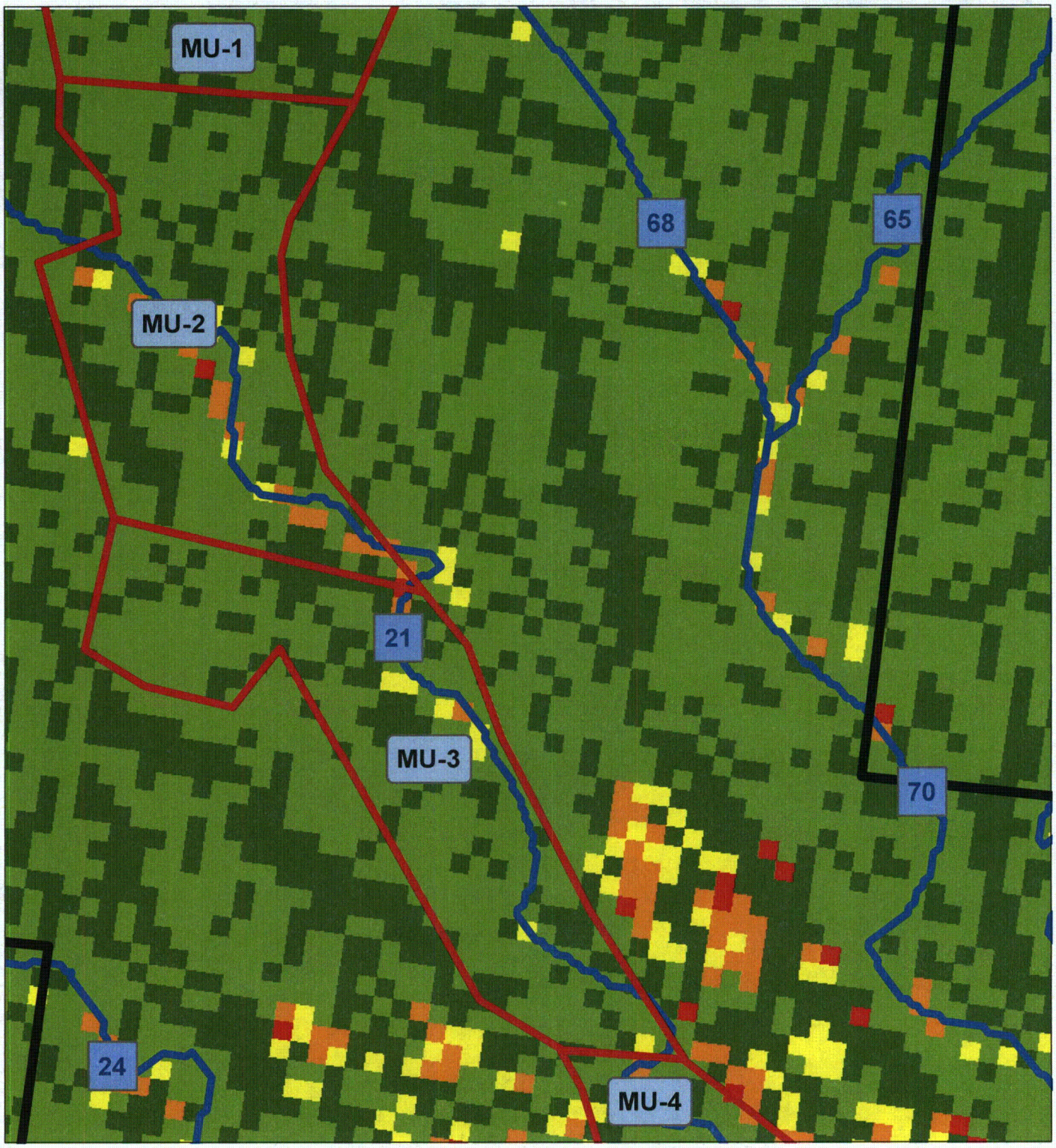
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 16
MINE UNIT BOUNDARIES, DRAINAGE LINES AND SOIL LOSS FOR MU-A and MU-1

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- No Erosion (A = 0)
- Very Low Erosion (A = 0 - 3)
- Low Erosion (A = 3 - 6)
- Moderate Erosion (A = 6 - 15)
- High Erosion (A = 15 - 100)
- Very High Erosion (A > 100)

N

0 0.05 0.1 0.15 Miles

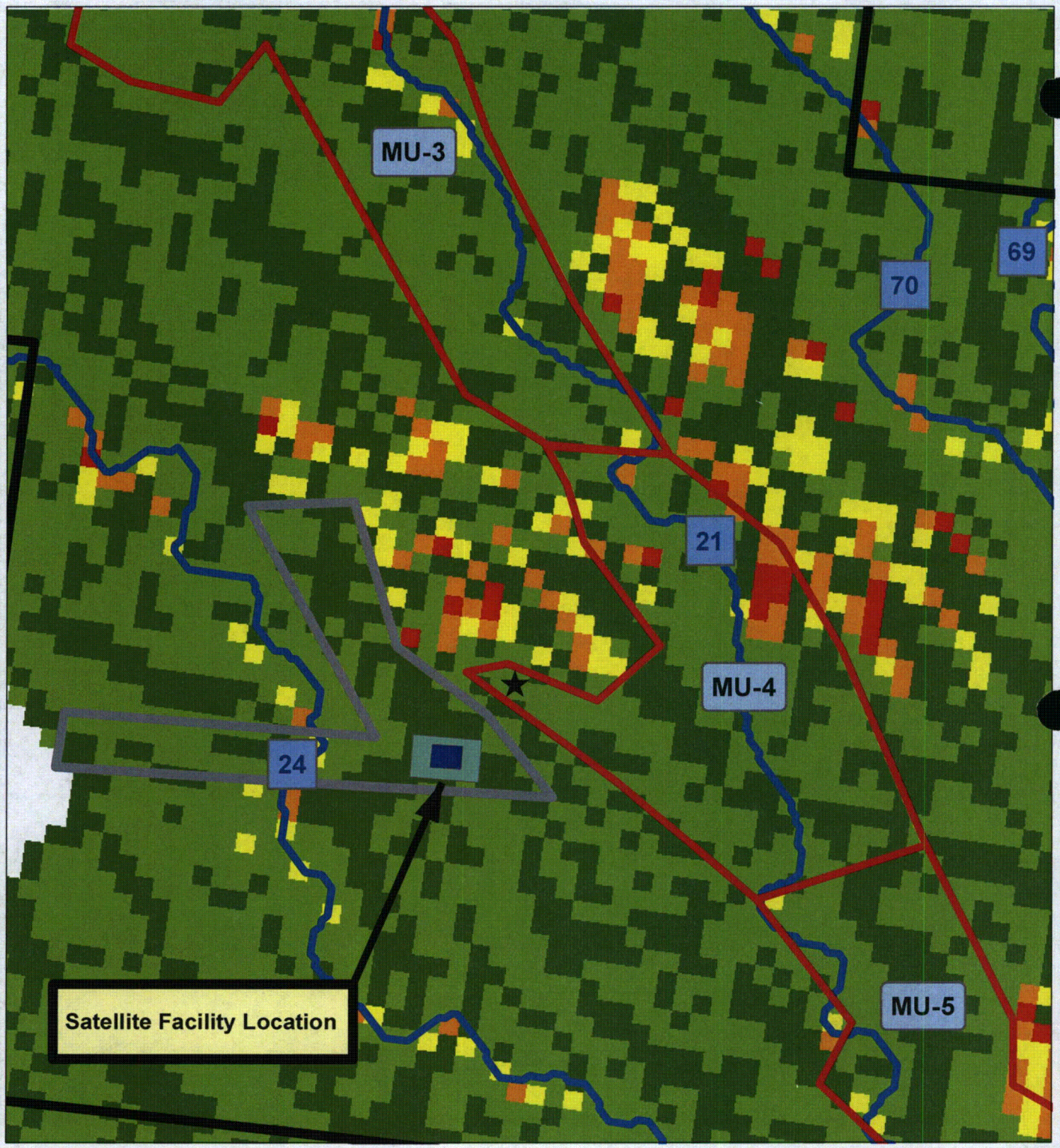
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 17
MINE UNIT BOUNDARIES, DRAINAGE LINES AND SOIL LOSS FOR MU-2 and MU-3

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- Satellite facility, deep disposal well and access road boundary
- ★ Proposed Deep Disposal Well

- No Erosion (A = 0)
- Very Low Erosion (A = 0 - 3)
- Low Erosion (A = 3 - 6)
- Moderate Erosion (A = 6 - 15)
- High Erosion (A = 15 - 100)
- Very High Erosion (A > 100)

N

0 0.045 0.09 0.135 Miles

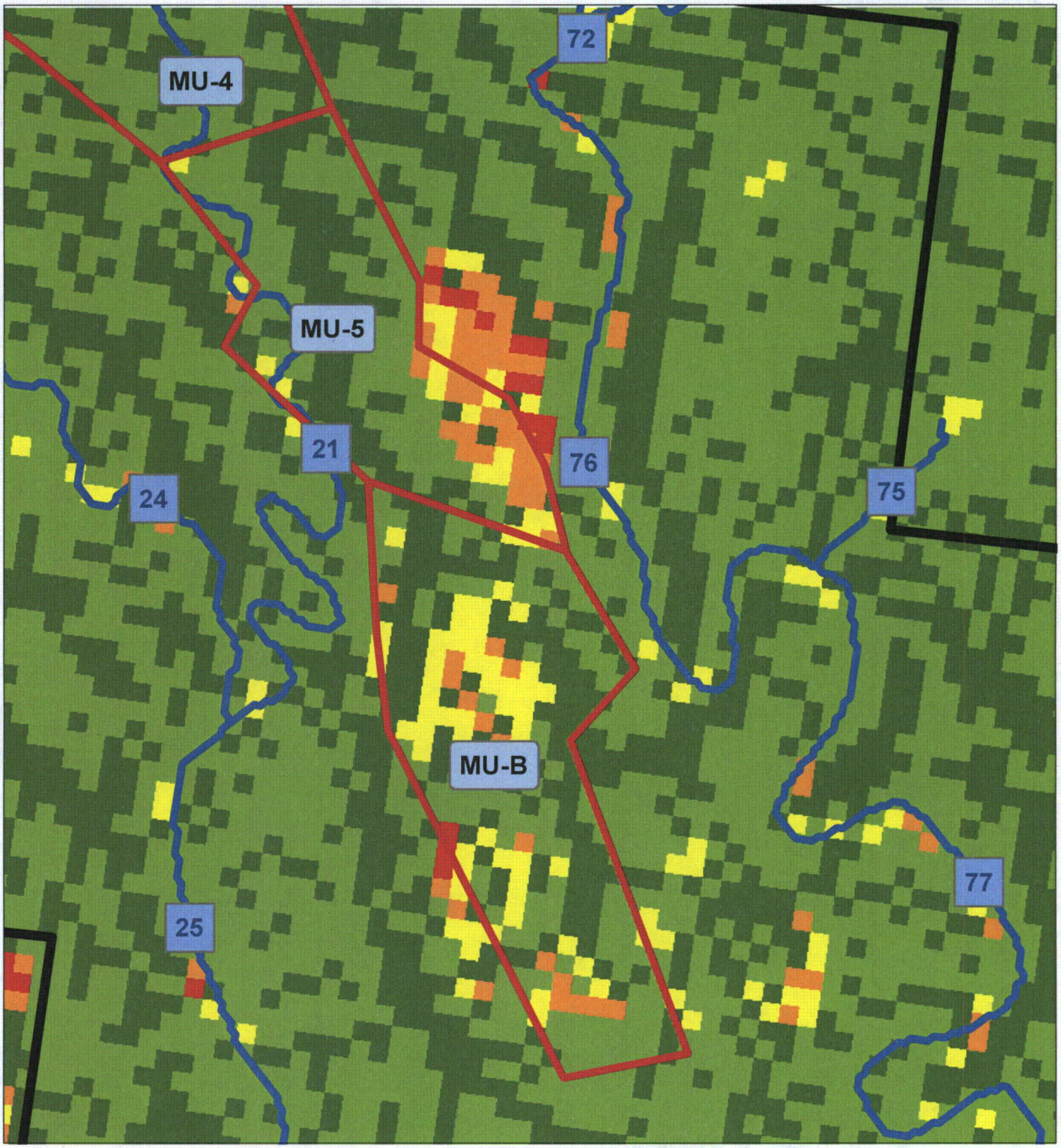
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 18
MINE UNIT BOUNDARIES, DRAINAGE LINES AND SOIL LOSS FOR MU-3 and MU-4

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- No Erosion (A = 0)
- Very Low Erosion (A = 0 - 3)
- Low Erosion (A = 3 - 6)
- Moderate Erosion (A = 6 - 15)
- High Erosion (A = 15 - 100)
- Very High Erosion (A > 100)

N

0 0.05 0.1 0.15 Miles

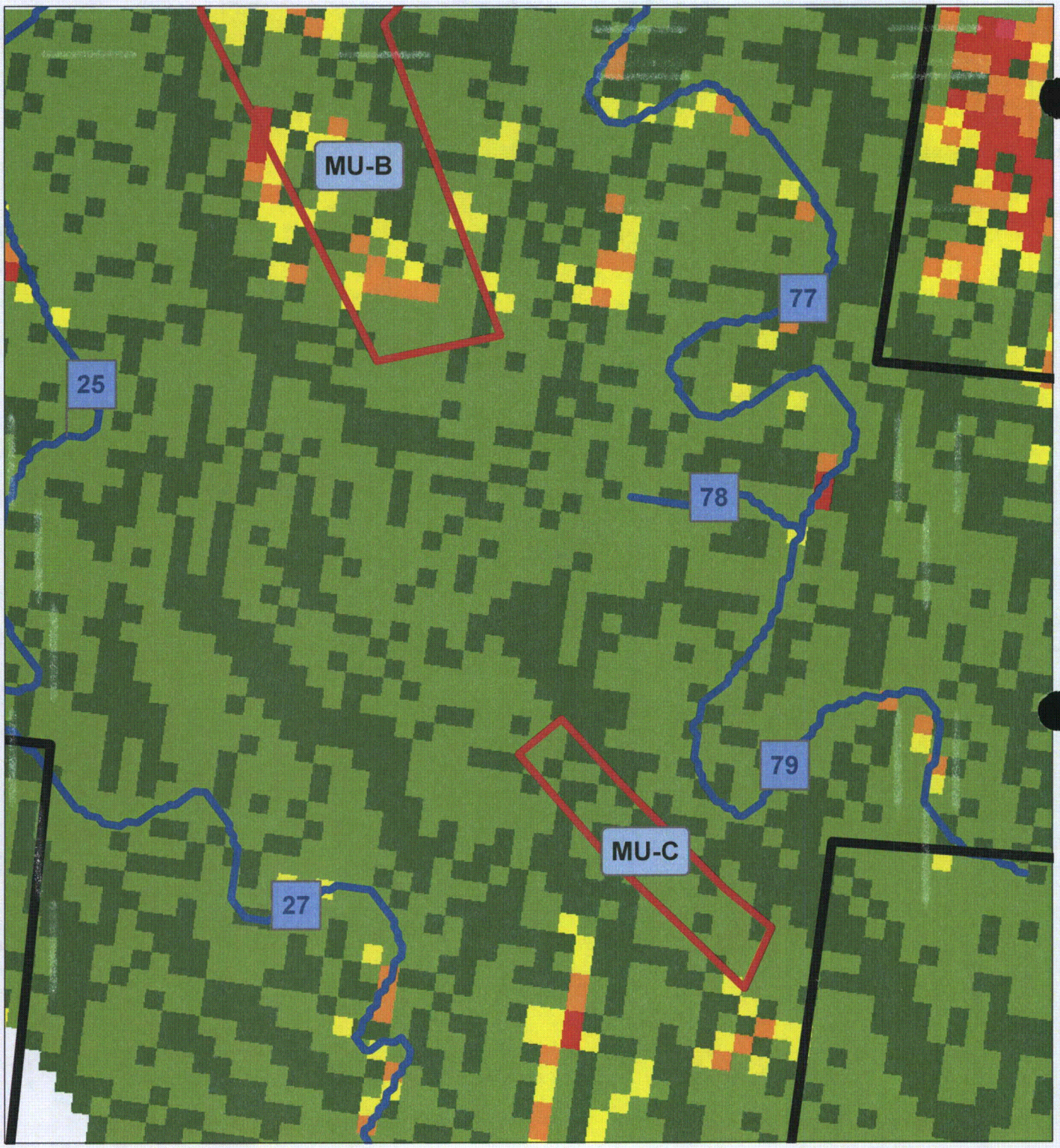
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 19
MINE UNIT BOUNDARIES, DRAINAGE LINES AND SOIL LOSS FOR MU-5 and MU-B

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- No Erosion (A = 0)
- Very Low Erosion (A = 0 - 3)
- Low Erosion (A = 3 - 6)
- Moderate Erosion (A = 6 - 15)
- High Erosion (A = 15 - 100)
- Very High Erosion (A > 100)

N

0 0.05 0.1 0.15 Miles

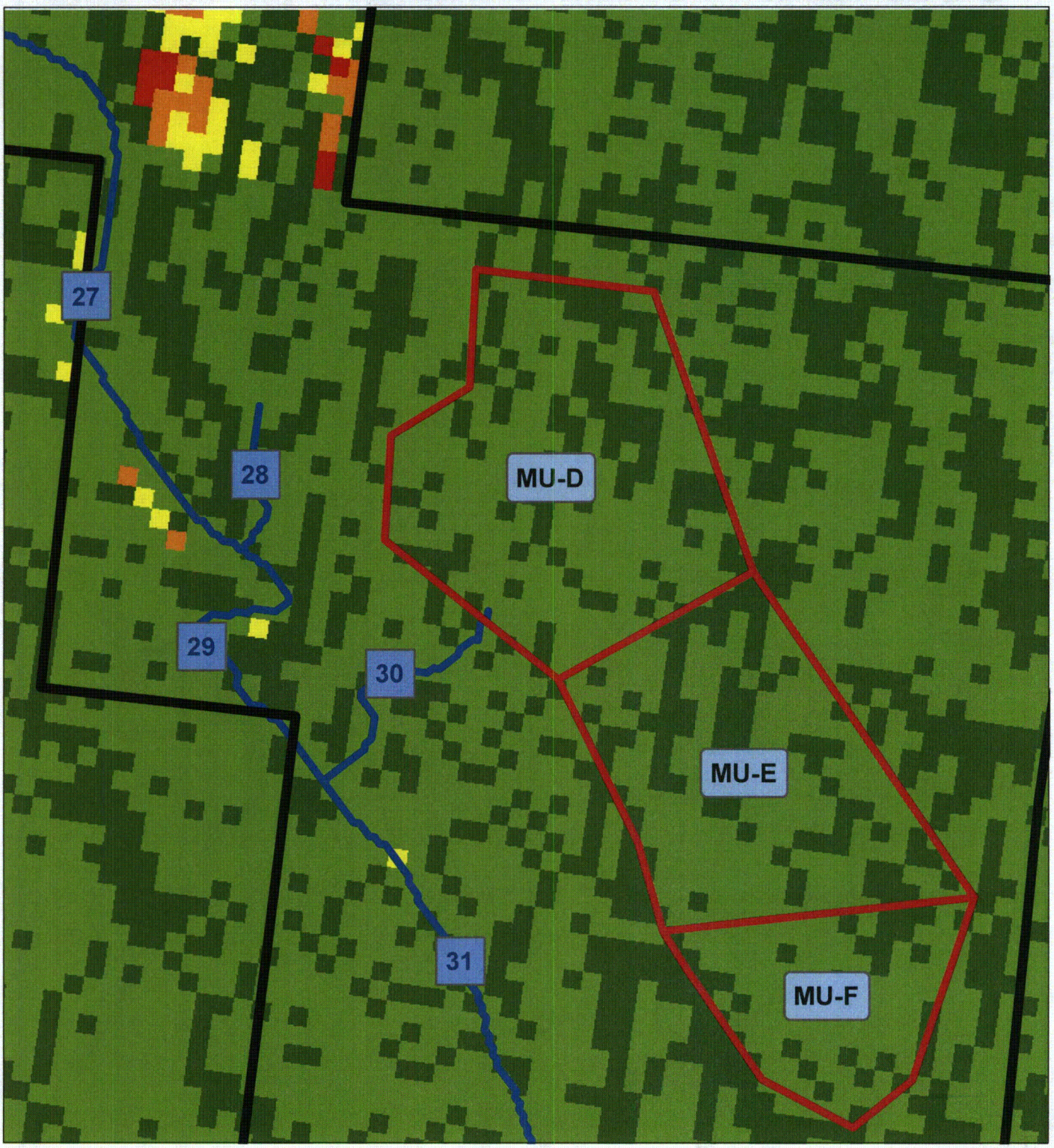
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 20
MINE UNIT BOUNDARIES, DRAINAGE LINES AND SOIL LOSS FOR MU-B and MU-C

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- No Erosion (A = 0)
- Very Low Erosion (A = 0 - 3)
- Low Erosion (A = 3 - 6)
- Moderate Erosion (A = 6 - 15)
- High Erosion (A = 15 - 100)
- Very High Erosion (A > 100)

N

0 0.05 0.1 0.15 Miles

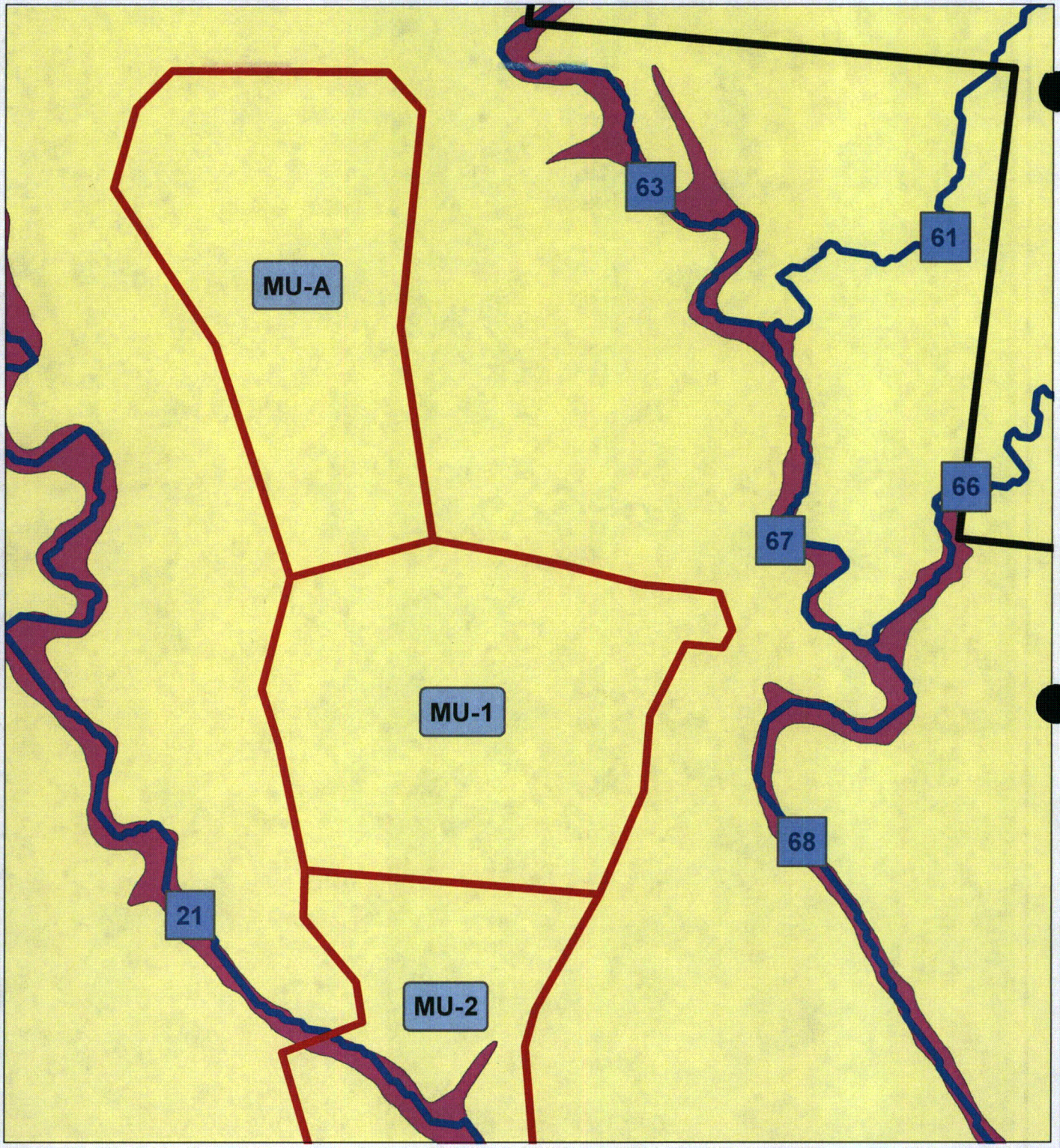
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 21
MINE UNIT BOUNDARIES, DRAINAGE LINES AND SOIL LOSS FOR MU-D. MU-E and MU-F

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- FEMA DFIRM 100 year Flood Plain

N

0 0.045 0.09 0.135 Miles

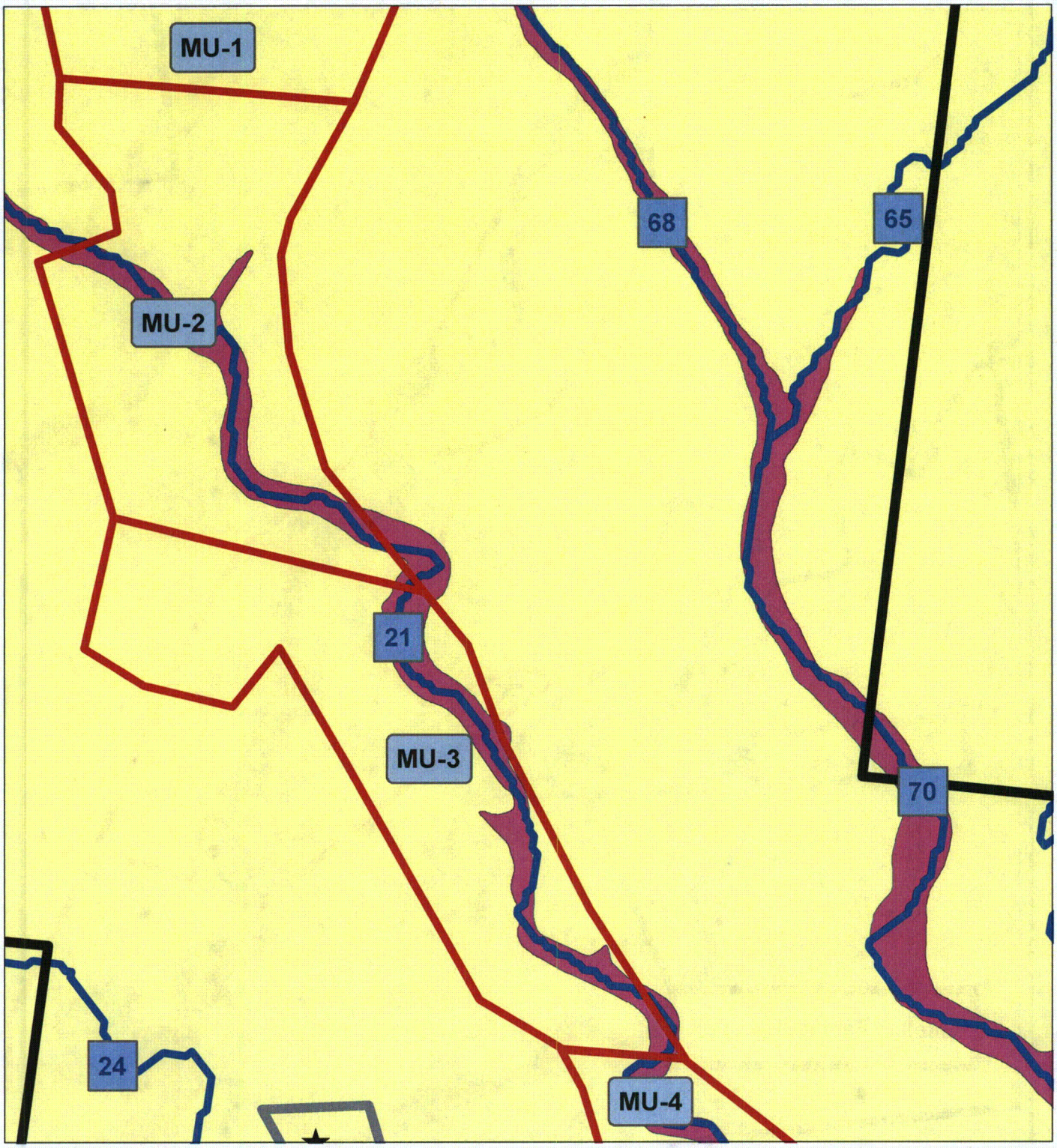
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 22
MINE UNIT BOUNDARIES, DRAINAGE LINES AND POTENTIAL FLOOD PLAIN

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- FEMA DFIRM 100 year Flood Plain

N

0 0.05 0.1 0.15 Miles

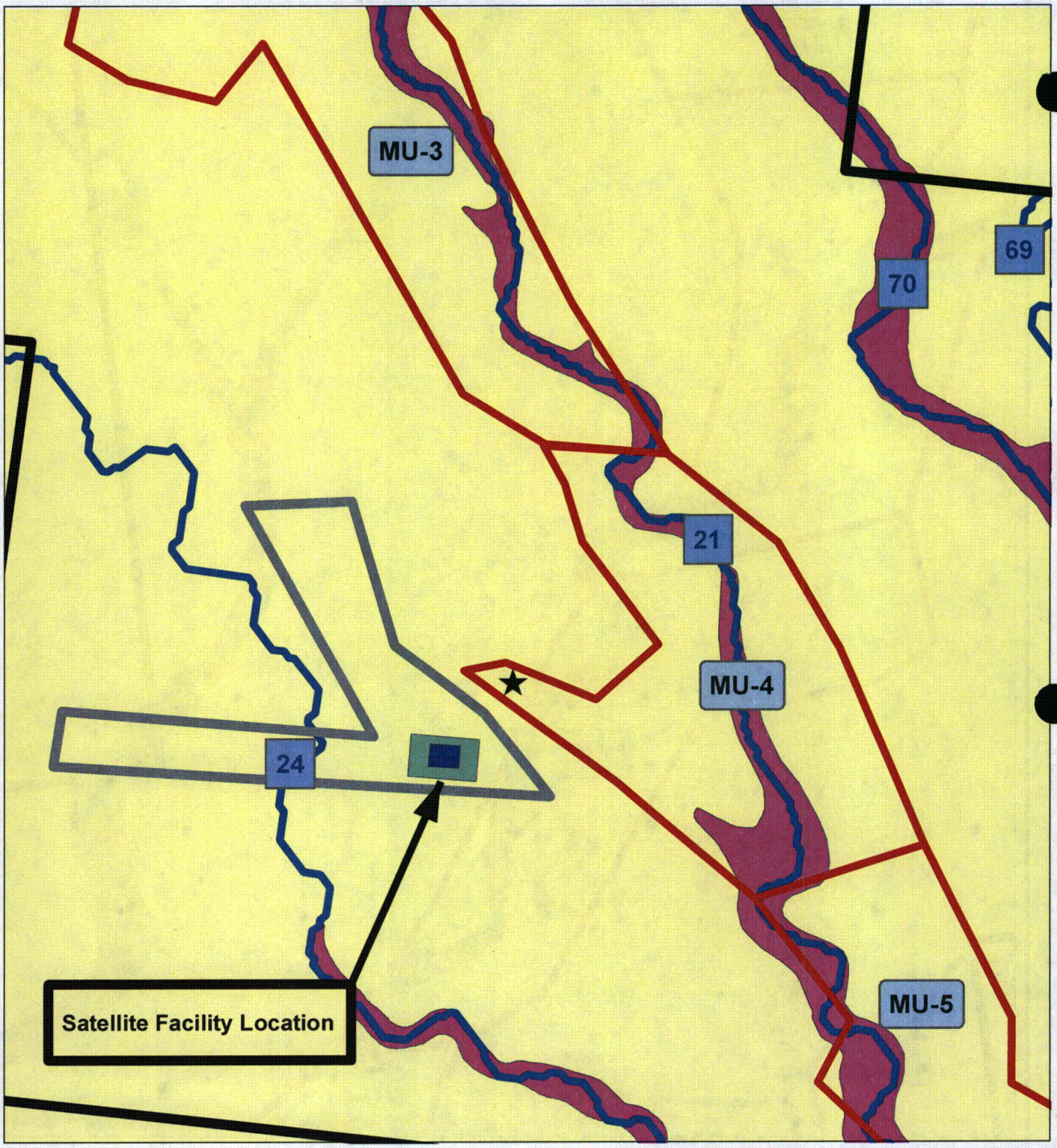
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 23
MINE UNIT BOUNDARIES, DRAINAGE LINES AND POTENTIAL FLOOD PLAIN

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- FEMA DFIRM 100 year Flood Plain
- Satellite facility, deep disposal well and access road boundary
- ★ Proposed Deep Disposal Well

N

0 0.045 0.09 0.135 Miles

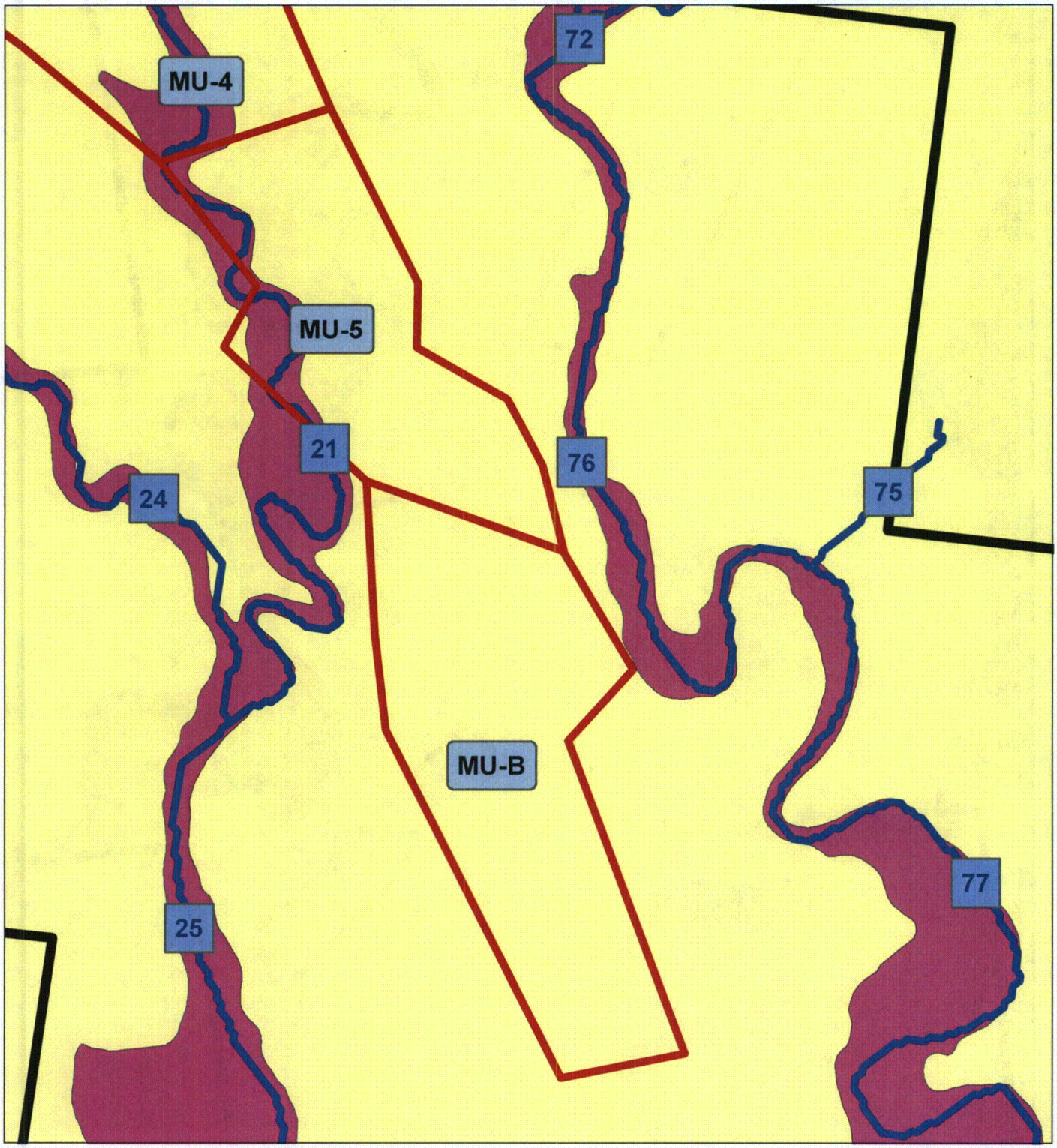
0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 24
MINE UNIT BOUNDARIES, DRAINAGE LINES AND POTENTIAL FLOOD PLAIN

PROJECT: CO001636

ARCADIS
630 Plaza Drive, Ste. 100
Highlands Ranch, CO 80129
P: 720-344-3500 F: 720-344-3535
www.arcadis-us.com



LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- FEMA DFIRM 100 year Flood Plain

N

0 0.05 0.1 0.15 Miles

0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 25
MINE UNIT BOUNDARIES, DRAINAGE LINES AND POTENTIAL FLOOD PLAIN

PROJECT: CO001636

ARCADIS
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Highlands Ranch, CO 80129
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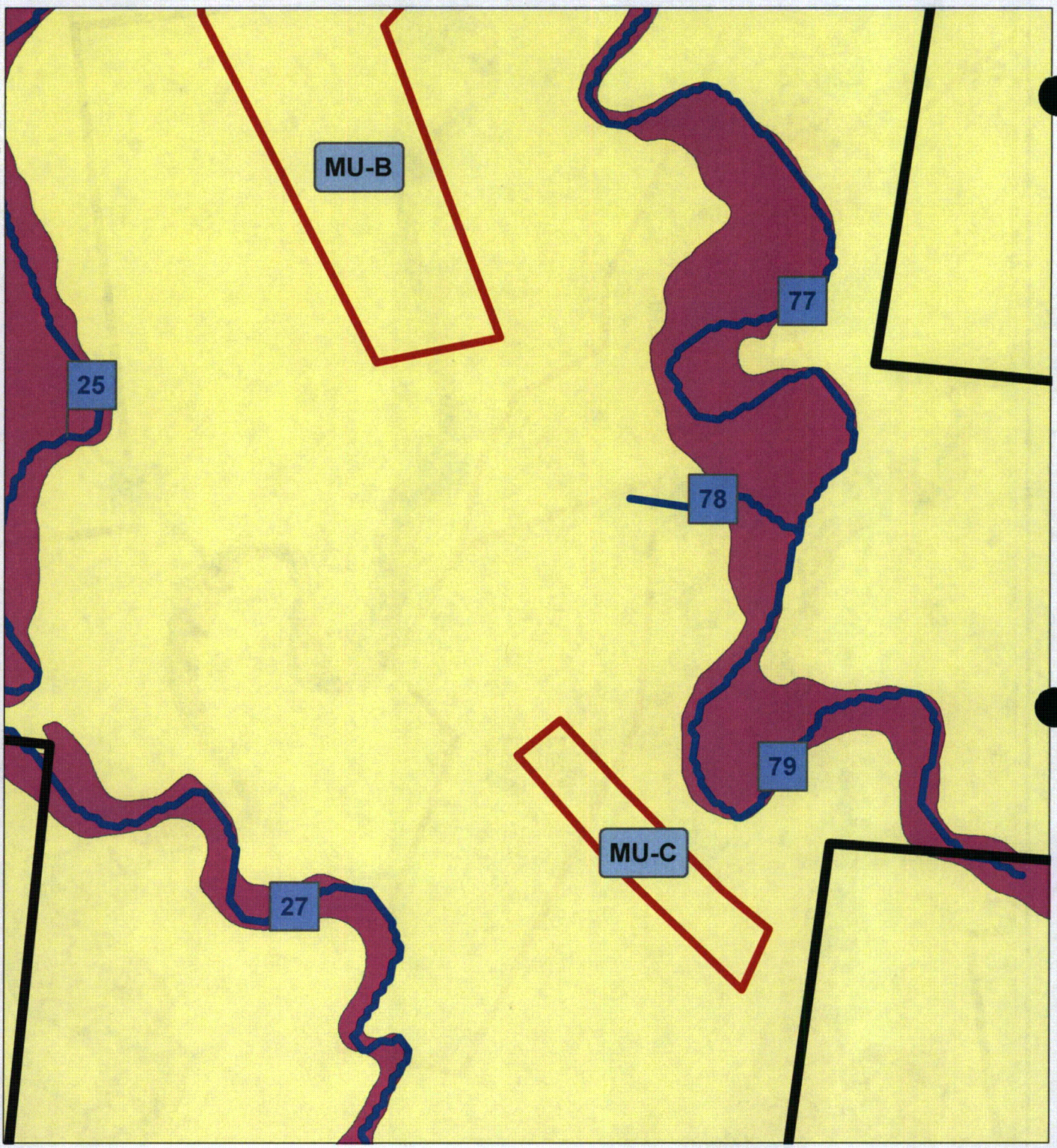

LEGEND

- Proposed Cameco/Marsland Expansion Area
- Drainage Lines
- Mine Unit Boundaries
- FEMA DFIRM 100 year Flood Plain

N

0 0.05 0.1 0.15 Miles

0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 26
MINE UNIT BOUNDARIES, DRAINAGE LINES AND POTENTIAL FLOOD PLAIN

PROJECT: CO001636

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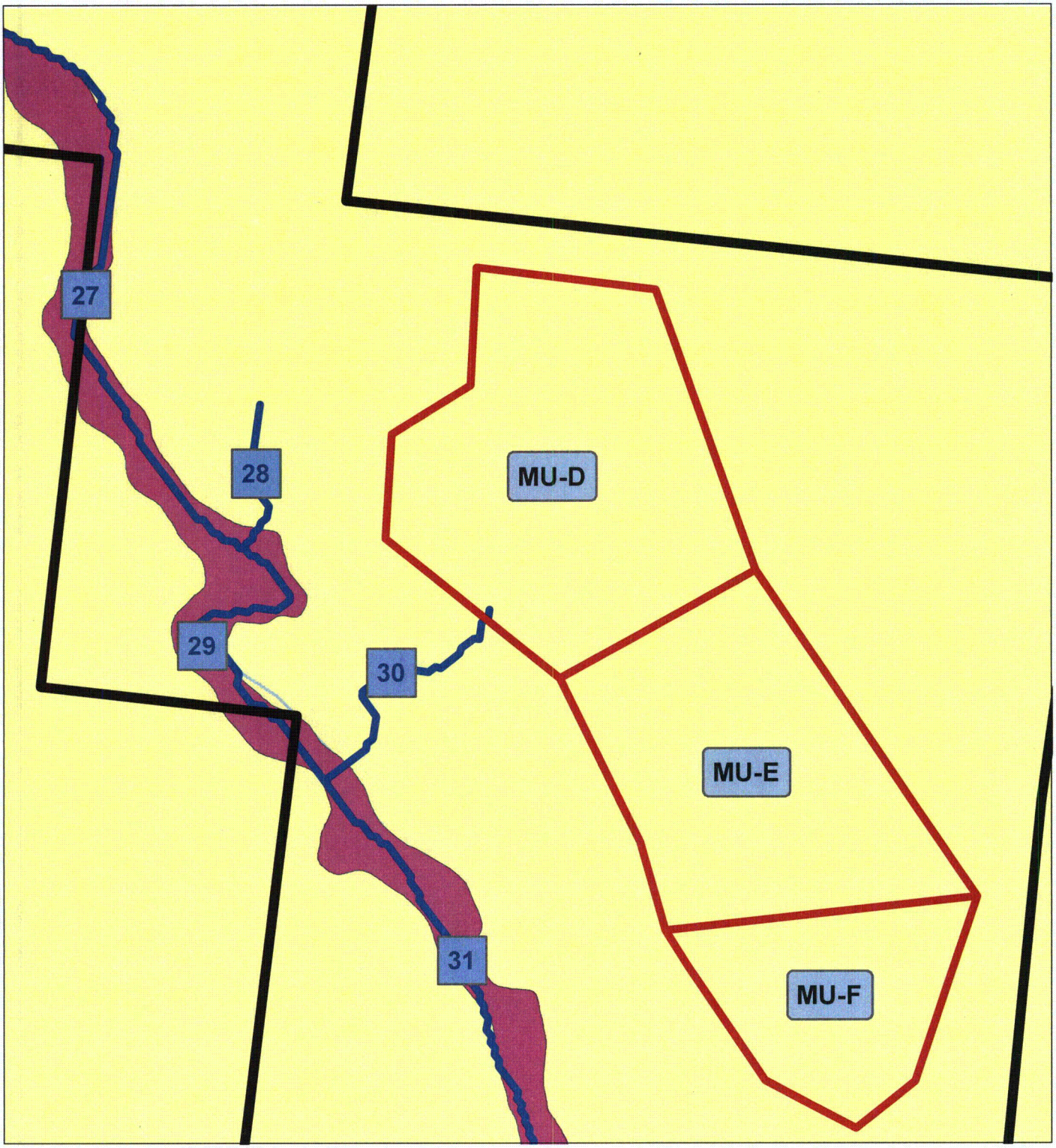

LEGEND

- Proposed Cameco/Marsland Expansion Area
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N

0 0.05 0.1 0.15 Miles

0 0.09 0.18 0.27 Kilometers

CROW BUTTE RESOURCES, INC.

FIGURE 27
MINE UNIT BOUNDARIES, DRAINAGE LINES AND POTENTIAL FLOOD PLAIN

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Appendix L

Crow Butte Solubility
Characteristics of Crow Butte
Yellowcake

Appendix L
Crow Butte Solubility Characteristics of Crow Butte Yellowcake Kinetics of Uranium Dissolution in Simulated Lung Fluids

1.0 SUMMARY

Based on discussions with the NRC and internal discussions within Cameco, an analysis of the solubility characteristics of Crow Butte yellowcake was performed and the material was classified according to the days, weeks, and years (D/W/Y) classification scheme of 10CFR20. This report provides a summary and dosimetry interpretation of the experiment performed by the Cameco Technology and Innovation Research Centre (CTI-RC)[1] to determine these solubility characteristics. This submission supersedes any previous reports submitted on this topic as it incorporates the most recent comments from the NRC and internal discussions.

The experimental results were interpreted in the context of the ICRP 30[2] solubility classifications of days, weeks, and years (D/W/Y) used by 10 CFR20. In addition, the annual limit on intake (ALI) and derived air concentrations (DAC) were calculated for each sample. The individual results were then averaged to establish the typical solubility characteristics, ALI and DAC for Crow Butte material. In terms of the D/W/Y classification, the majority of the samples were classified as type D with a small component of type W material. The resulting ALI and DAC values are the same as the default type D material at 1 μCi and 5E-10 μCi/ml, respectively.

2.0 EXPERIMENT

The experimental circuit used in this experiment was designed specifically to study the kinetics of uranium dissolution in simulated lung fluids. Details of the experimental design and set up are found in the report Solubility of Radionuclides in Simulated Lung Fluid [1]. In brief, each site submitted several samples of their uranium concentrate for analysis. The samples were passed through a 20 μm filter and the filtered uranium powder placed between two glass fiber filters in 47-mm polypropylene filter holders that were used as extraction cells. A 20 μm filter was used to ensure that only particles of a size range, which may reach lungs and react with lung fluid, were included in the analysis; a more detailed analysis of the particulate size analysis conducted as part of this experiment is presented a CTI-RC Memo[3]. The simulated lung fluid was then passed over the sample at a predetermined flow rate. After passing over the product samples, the simulated lung fluid was collected and analyzed in a lab for uranium content. This uranium dissolution experiment was continued for 100 days. At the end of the experiment the residual uranium on a filter was analyzed using an X-Ray fluorescence method.

3.0 SOLUBILITY CLASSIFICATION

Current United States regulations in relation to internal dosimetry and solubility classifications are based on ICRP 30. ICRP 30 divides the respiratory tract into three regions and within each region are a number of compartments, each associated with a clearance pathway (absorption or particle transport). To describe the clearance of radioactive materials from the lungs, the materials are classified as D (day), W (week), and Y (year), referring to retention time (corresponding to dissolution half-time of the material) in the pulmonary region. The retention times for the classifications are as follows:

	Retention Time (Corresponds to Dissolution Half-Time)
Type D	up to 10
Type W	10 – 100
Type Y	greater than 100

4.0 RESULTS

The simulated lung fluid study conducted on the Crow Butte uranium product by the Cameco Technology and Innovation Research Centre followed published methods in performing this experiment [Ansoborlo et al. 1999][4]. The study was run for 100 days and was followed up with an X-ray fluorescence (XRF) measurement of the residual material left on the glass fiber filter.

Table 1 shows the fraction of uranium remaining on the filter (retention fraction) at each sampling time based on ICP Mass Spectrometry analysis. Standard errors on these results vary from 5% to 10%, with the higher errors occurring later in the testing, near the 100 day mark. Table 2 shows the summary of the XRF results taken at the end of the experiment. It is important to note that though the ICP-MS indicated that between approximately 1% and 8% (± 10%) of the uranium remained undissolved at 100 days (Table 1), it was later shown through the XRF analysis that the majority of that material was dissolved uranium that had been reabsorbed by the filter. To determine if there had been reabsorption of uranium on the filter, first the filter was inspected visually. There were no visual traces of undissolved uranium remaining on the filter. It is relatively easy to see undissolved material (if any is present) on the filter. Following the visual inspection, the filter was dissolved and analyzed. The amount of uranium found was lower than or close to the detection limit of the method. This means that within experimental error there is essentially no material remaining undissolved at 100 days.

Table 1: Crow Butte Material Dissolution Kinetics

Sample No	CROW 2533-A	CROW 2533-B	CROW 2533-C	CROW 2537-A	CROW 2537-B	C ROW 2537-C	CROW 2538-A	CROW 2538-B	CROW 2538-C	CROW 2539-A	CROW 2539-B	CROW 2539-C	CROW 2540-A	CROW 2540-B	CROW 2540-C
U Total in 50 mg Sample (%)	74.12	74.04	74.24	73.51	73.44	73.26	76.7	76.78	76.81	74.44	74.45	74.42	73.12	73.18	73.1
U Total (mg)	37.06	37.02	37.12	36.76	36.72	36.63	38.35	38.39	38.41	37.22	37.23	37.21	36.56	36.59	36.55
Elapsed Time (d)	Retention (%)														
0	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
0.02	94.40	94.90	99.00	97.90	92.40	97.50	95.60	98.80	95.10	92.00	96.00	93.50	94.80	95.80	93.60
0.13	72.90	73.30	97.00	88.20	86.40	90.70	78.40	92.80	73.80	63.80	79.30	70.10	87.80	78.40	71.70
0.31	66.30	51.00	94.40	76.70	77.10	81.50	59.10	82.90	50.60	45.60	69.10	50.80	77.10	59.80	54.00
1	45.50	34.90	72.30	64.40	54.30	60.20	29.20	54.60	18.30	30.70	52.50	34.20	59.90	43.80	35.10
1.31	40.80	32.30	65.60	62.70	51.00	57.60	25.90	49.40	16.40	27.90	48.60	31.10	54.30	41.40	31.30
2	36.10	26.30	45.30	57.90	42.50	44.00	20.10	32.30	12.30	21.40	38.10	25.40	44.10	36.10	24.10
2.31	34.50	24.20	37.40	56.10	40.60	41.50	19.00	26.60	11.10	19.20	34.70	23.20	41.80	34.10	22.10
3	30.90	20.10	27.60	52.40	38.60	37.80	17.30	20.70	8.00	14.60	27.90	19.20	36.90	29.30	18.70
4	26.20	15.90	21.80	50.00	36.90	34.10	15.50	18.60	5.70	10.10	21.20	16.00	33.20	24.30	16.10
7	18.70	7.60	16.40	44.50	28.60	26.50	11.70	14.50	2.10	4.60	10.40	9.70	25.30	11.50	11.90
9	13.90	5.70	13.70	41.20	20.20	22.30	9.90	10.60	1.10	4.40	8.80	7.70	21.40	7.60	10.40
11	10.50	5.10	11.90	37.10	14.30	18.10	8.40	8.30	1.10	4.40	8.70	7.50	18.40	5.90	9.50
14	7.80	4.50	9.90	30.70	11.00	14.30	7.00	6.80	1.10	4.40	8.70	7.50	14.90	5.70	8.60
21	7.60	4.50	7.40	16.10	6.70	9.70	6.50	6.50	1.00	4.40	8.70	7.50	9.30	5.70	7.80
28	7.60	4.50	5.90	11.00	6.30	9.40	6.50	6.40	1.00	4.40	8.70	7.50	7.50	5.70	7.60
36	7.60	4.50	5.80	6.70	6.30	9.40	6.40	6.40	1.00	4.40	8.70	7.50	7.40	5.70	7.50
42	7.50	4.50	5.70	5.00	6.30	9.30	6.40	6.40	1.00	4.40	8.70	7.50	7.40	5.70	7.50
49	7.50	4.50	5.70	3.90	6.30	9.30	6.40	6.40	1.00	4.40	8.70	7.50	7.40	5.60	7.50
56	7.50	4.40	5.70	3.40	6.30	9.20	6.40	6.30	1.00	4.40	8.60	7.50	7.30	5.60	7.50
63	7.50	4.40	5.70	3.20	6.30	9.20	6.40	6.30	1.00	4.30	8.60	7.50	7.30	5.60	7.40
71	7.50	4.40	5.60	3.20	6.30	9.20	6.40	6.30	1.00	4.30	8.60	7.40	7.30	5.60	7.40
84	7.50	4.40	5.60	3.10	6.20	9.10	6.40	6.30	1.00	4.30	8.60	7.40	7.30	5.60	7.40
100	7.50	4.40	5.60	3.10	6.20	9.10	6.30	6.30	0.90	4.30	8.60	7.40	7.30	5.60	7.40

Table 2: X-Ray Fluorescence Results

Sample No	CROW 2533-A	CROW 2533-B	CROW 2533-C	CROW 2537-A	CROW 2537-B	CROW 2537-C	CROW 2538-A	CROW 2538-B	CROW 2538-C	CROW 2539-A	CROW 2539-B	CROW 2539-C	CROW 2540-A	CROW 2540-B	CROW 2540-C
U Total in 50 mg Sample, (%)	74.12	74.04	74.24	73.51	73.44	73.26	76.7	76.78	76.81	74.44	74.45	74.42	73.12	73.18	73.1
U in a Sample Initial (mg)	37.06	37.02	37.12	36.76	36.72	36.63	38.35	38.39	38.41	37.22	37.23	37.21	36.56	36.59	36.55
U in a Sample Calculated from Extracted U (mg)	34.3	35.4	35.04	35.62	34.43	33.3	35.9	36	38	35.6	34	34.5	33.9	34.5	33.8
U Residual on a Filter After the Completion Calculated (mg)	2.76	1.62	2.08	1.14	2.29	3.33	2.45	2.39	0.41	1.62	3.23	2.71	2.66	2.09	2.75
U Residual on a Filter XRF Analyses After the Completion (mg)	0.6	0.7	0.7	0.8	0.8	0.8	0.4	0.4	1.8	0.5	0.6	0.3	0.3	0.5	0.4
Difference	2.16	0.92	1.38	0.34	1.49	2.53	2.05	1.99	-1.39	1.12	2.63	2.41	2.36	1.59	2.35
Standard Error (%)	6	2	4	1	4	7	5	5	-4	3	7	6	6	4	6

4.1 Absorption parameters and Dosimetric Quantities

This equation and the methods used to determine the parameters are described in detail in the CTI-RC report [1].

The method that was used to determine the DWY classification is to fit a curve to the dissolution data in Table 1 and use the fit parameters from that curve to classify the material into DWY. To estimate the dissolution times and the fraction of material assigned to each category, an exponential model was used. The number of terms used in the model was based on statistical tests; the decision as to how many terms to use was based on the amount of error associated with each fit. For this experiment, the equation with the lowest error was chosen for each sample. In all but one case, for Crow Butte samples, the equation with the lowest error was three-term equation; in the one exception a two-term equation had the lower error. The three term equation used was:

$$\frac{M}{M_0} = f_1 \exp(-0.693\frac{t}{T_1}) + f_2 \exp(-0.693\frac{t}{T_2}) + f_3 \exp(-0.693\frac{t}{T_3}) \quad (1)$$

Where:

M - mass of undissolved uranium at time t

M_0 – initial mass of uranium

t – elapsed time

f_1 - fraction of total U with corresponding dissolution half-time T_1

f_2 - fraction of total U with corresponding dissolution half-time T_2

f_3 - fraction of total U with corresponding dissolution half-time T_3

$f_1 + f_2 + f_3 = 100\%$

Note: the two term equation was of the same format, with the term involving f_3 and T_3 removed.

The results of the X-Ray diffraction analysis indicated that the Crow Butte concentrate samples were composed mainly of two well-defined crystal phases, namely, metaschoepite, $UO_3 \bullet 2H_2O$, and metastudtite, $UO_4 \bullet 2H_2O$ [3]. Very small quantities of unidentified amorphous material might also be present in almost all samples.

A program was developed at Cameco research centre for calculation of dissolution parameters using non-linear regression analysis. The standard deviations of parameters were calculated from the inverse Hessian matrix using the MSE (Mean Square Error) calculated as the square root of F/(N-v), where **N** is the number of data points and **v** is the number of parameters used in the model (**N - v** is the number of degrees of freedom).

The program automatically tests several kinetics models applied to the same set of experimental data. For each model, the minimization is repeated 200 to 500 times (this number is specified by the user). Then, the program selects the model that has the smallest MSE, which is considered to be the best approximation to the experimental data. Some models with a large number of adjustable parameters that show lower F are not the best description for the experiment because they have higher MSE (lower denominator).

Absolute values of standard errors for parameters are given in parenthesis. In some cases, when calculated values of uncertainties are high, an additional sampling during first day and (or) after last day of extraction is required in order to obtain lower uncertainties.

The value of the Mean Square Deviation (MSD) characterizes an average error for the curve fitting, i.e., the difference between the experimental values of uranium extraction, $(1 - M/M_0)*100\%$, and the theoretical value.

4.2 Dosimetric Quantities

The current ALI and DAC used at Crow Butte are based on the type D Uranium Natural parameters in 10CFR20. The purpose of this experiment was to determine the site specific solubility for material at Crow Butte. Part of this assessment was to determine the breakdown of Crow Butte uranium product into the DWY solubility types defined by ICRP 30 and 10CFR20. In addition, we needed to consider whether any mixture of isotopes existed. Isotopic analysis of the uranium product showed that only isotopes of uranium were present in fresh yellowcake. To assess the main plant, outside of drying an packaging areas, smears from surfaces throughout the main plant were collected and analyzed for the presence of alpha (natural uranium) and beta/gamma (Th^{234} and $Pa^{234}m$) emitters. A dual channel alpha and beta/gamma counter was used to measure the emissions from the smears. These smears characterize the material that has the potential to be made airborne throughout the plant and inhaled by workers. The smears indicated that natural uranium and the short-lived decay products are in approximate equilibrium. To account for the presence of these short-lived decay products at the time of inhalation, a mixed ALI and DAC was calculated and presented Table 3; the calculation used was $(C_{Unat}/ALI_{Unat}+C_{Th234}/ALI_{Th234}+C_{Pa234}/ALI_{Pa234})^{-1}$ and similarly for the DAC, where C represents the concentration ratio of each material assuming equilibrium. As shown, the ALI and DAC for each solubility class are unchanged from the Uranium Natural values. Note, as per standard protocol, all final results are shown to one significant digit as this is the number of significant digits shown in 10CFR20 and therefore the maximum that can be used in the final output of the equations.

Table 3: Mixed ALI and DAC Values

Isotope	Solubility	ALI (µCi)	DAC (µCi/ml)
Uranium Natural	D	1	5E-10
	W	0.8	3E-10
	Y	0.05	2E-11
^{234}Th	W*	200	8E-8
	Y	200	6E-8
^{234}Pa	W*	8000	3E-6
	Y	7000	3E-6
Final Default Mixture	D	1	5E-10
	W	0.8	3E-10
	Y	0.05	2E-11

* The solubility class for ^{234}Th and ^{234}Pa was assumed to be W, because the isotopes are not expected to be in oxide or hydroxide forms.

As part of the proposed sampling plan to the NRC, additional sampling for isotopes such as Ra226 is ongoing. Should any subsequent analysis indicate the detectable presence of additional radionuclides, the mixed ALI and DAC will be adjusted accordingly.

Table 4 shows the solubility parameter fit results following the method outlined in the report Solubility of Radionuclides in Simulated Lung Fluid [1]. The F values represent the fraction of material with the given dissolution half-time (the T value). It is again important to note that this fit was performed based on the results of Table 1 and the fraction assigned to retention times (T values) greater than 100 days should be reassigned to the time from of 10-100 days as subsequent analysis showed no measureable material remaining after 100 days, within error. This is a conservative assignment because some of that material absorbed onto the filter could have been dissolved before day 10, however we are assuming all of the absorbed material was dissolved after day 10.

Along with the solubility parameters, Table 4 also shows the subsequent DWY classification. Each sample is assigned to DWY based on the dissolution half time values, T values, and the fraction assigned to each classification is based on the F values. For example, using sample CROW 2533-C, T_1 is less than 10 days, so 90.0% (the F_1 value) is assigned to class D and 10.0% (F_2) is assigned to class W because T_2 is between 10 and 100. In cases where both T_1 and T_2 are below 10 days, the fraction considered Class D is the sum of F_1 and F_2. As stated, where a T_3 exists, its associated F value is included in the Type W fraction based on XRF results.

For all samples, except CROW 2537-A, the fraction of material classed as Type D is greater than 90%. For that one sample, the kinetics data in Table 1 shows that in reality nearly 60% of the material had been dissolved by day 9 and within experimental error, the T_2 value of 11.16 days could actually be less than 10 days. This means that within experimental error, this sample could also have a Type D fraction of greater than 90%.

Finally, Table 4 includes the ALI and DAC for each sample and an overall plant average. The final ALI and DAC values were calculated by taking a weighted sum of the percent contribution of each solubility class within a sample multiplied by the appropriate mixed ALI and DAC for that solubility class, from Table 3. One additional note is that the default ALI and DAC from 10CFR20 are based on a particle size of 1 μm. The particulate size analysis for Crow Butte product shows that particle sizes are significantly larger than the default assumption. This means that use of default values based on a 1 μm assumption are conservative for our product; a larger particle size would be associated with a lower dose. However, the more conservative defaults have been used in determining the site specific ALI and DAC for Crow Butte. Again, the final result is to one significant digit as this is the number of digits available in 10CFR20, with two significant digits have been carried through the intermediate calculations as per standard protocol.

Table 3: Crow Butte Solubility Parameters and Dosimetric Quantities

Sample No. [a]	F_1 (%)	T_1 (d)	F_2 (%)	T_2 (d)	F_3 (%)	T_3 (d)	MSD (%)	Type D (%)	Type W (%)	ALI (µCi)	DAC (µCi/ml)
CROW 2533-A	45.4	0.14	47.2	2.98	7.4	3.93E+08	1.7	92.6	7.4	0.99	4.9E-10
CROW 2533-B	53.5	0.13	42.2	2.1	4.3	7.02E+09	0.7	95.7	4.3	0.99	4.9E-10
CROW 2533-C	90.0	1.5	10.0	76			2.9	90.0	10.0	0.98	4.8E-10
CROW 2537-A	34.1	0.22	64.4	11.16	1.6	2.42E+08	1.8	34.1	65.9[a]	0.87	3.7E-10
CROW 2537-B	43.6	0.3	50.6	4.89	5.9	6.89E+08	2	94.1	5.9	0.99	4.9E-10
CROW 2537-C	48.0	0.55	43.1	4.98	9.0	1.56E+09	1.2	91.0	9.0	0.98	4.8E-10
CROW 2538-A	72.5	0.27	21.1	3.29	6.4	1.15E+08	0.4	93.6	6.4	0.99	4.9E-10
CROW 2538-B	81.4	0.9	12.4	5.36	6.2	8.22E+08	1.4	93.8	6.2	0.99	4.9E-10
CROW 2538-C	76.8	0.23	22.3	1.86	0.9	19317409	0.5	99.1	0.9	1.00	5.0E-10
CROW 2539-A	52.6	0.09	43.2	1.46	4.2	7.84E+09	0.4	95.8	4.2	0.99	4.9E-10
CROW 2539-B	23.4	0.07	68.2	1.65	8.4	2.84E+10	0.6	91.6	8.4	0.98	4.8E-10
CROW 2539-C	52.9	0.12	39.8	1.74	7.4	2.23E+10	0.3	92.6	7.4	0.99	4.9E-10
CROW 2540-A	45.7	0.42	47.1	5.03	7.2	94634910	1.6	92.8	7.2	0.99	4.9E-10
CROW 2540-B	42.8	0.13	52.0	2.54	5.3	1.69E+09	1.1	94.7	5.3	0.99	4.9E-10
CROW 2540-C	50.0	0.13	40.8	1.46	9.2	213.001	0.7	90.8	9.2	0.98	4.8E-10
									Average	**1**	**5E-10**

Note: [a] Within experimental errors this fraction could be assigned to class D or W.

5.0 CONCLUSION

Cameco has completed a solubility study to analyze the solubility characteristics of the Crow Butte yellowcake product. This study showed that the yellowcake produced at Crow Butte was primarily of solubility type D with a relatively low type W component. The resulting ALI and DAC values are the same as the default type D material at 1 μCi and 5E-10 μCi/ml. As stated in the introduction, this analysis of the data incorporates the most recent comments from the NRC and Cameco and supersedes all previous submissions in this area.

6.0 REFERENCE LIST

Cameco Innovation and Technology Development Research Centre, Solubility of Radionuclides in Simulated Lung Fluid, Report Number 200183, Report Number RC-09-05, 2009

ICRP, Limits for Intakes of Radionuclides by Workers, ICRP Publication 30 Part 1, Ann ICRP 2(3-4), 1979.

Tairova, G. "Analysis of Crow Butte and Smith Ranch-Highland Concentrate Samples", Cameco Technology and Innovation Research Centre Memo, September, 2011.

Ansoborlo, E.; Hengé-Napoli, M.H.; Chazel, V.; Gibert, R.; Guilmette, L.A. *Review and Critical Analysis of Available In Vitro Dissolution Tests*, Health Physics, **77**(6): 638-645; 1999.

Appendix M

MILDOS Analysis

Appendix M-1

MILDOS-AREA Modeling Results for Marsland Expansion Area

APPENDIX B - MEA RADIATION DOSE RATES FROM MILDOS

Appendix B contains the print out from the computer program MILDOS in the following order:

Appendix	Title	Radon Source	Weather Data	Purge Rate
B1	MARMU15P	MU 1-5	MEA	44

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ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR
POPULATION DOSE SUMMARY 6
INDIVIDUAL RECEPTOR ALC CHECK AND/OR ANNUAL DOSE COMMITMENTS 7

REGION: Marsland All Well Field CODE: MILDOS-AREA (02/97) PAGE 2

METSET: DATA: MarMU15P.MIL 10/06/11

JOINT FREQUENCY IN PERCENT, DIRECTION INDICATES WHERE WIND IS FROM FREQWS=0.14427,0.29579,0.30967,0.17441,0.05798,0.01793

MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTALS
STABILITY CLASS 1																	
1.5	0.1410	0.0240	0.0710	0.0820	0.0940	0.1300	0.1060	0.2120	0.1770	0.3540	0.1410	0.0940	0.1180	0.0820	0.0590	0.0590	1.9440
5.5	0.2360	0.1530	0.1890	0.1770	0.1770	0.2590	0.2000	0.2120	0.2120	0.2590	0.2240	0.4010	0.1180	0.1180	0.2000	0.2120	3.3470
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.3770	0.1770	0.2600	0.2590	0.2710	0.3890	0.3060	0.4240	0.3890	0.6130	0.3650	0.4950	0.2360	0.2000	0.2590	0.2710	5.2910
STABILITY CLASS 2																	
1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0470	0.0470	0.0940	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.2710
5.5	0.2000	0.2240	0.2470	0.1770	0.1770	0.2470	0.3420	0.2470	0.2360	0.3180	0.3060	0.2590	0.1300	0.1650	0.2360	0.2120	3.7230
10.0	0.0240	0.0000	0.0120	0.0000	0.0120	0.0350	0.0350	0.0240	0.0710	0.0590	0.0000	0.0470	0.0240	0.0120	0.0710	0.0470	0.4730
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.2240	0.2240	0.2590	0.1770	0.1890	0.3170	0.3890	0.3180	0.3540	0.4710	0.3180	0.3060	0.1660	0.1890	0.3070	0.2590	4.4670
STABILITY CLASS 3																	
1.5	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0350	0.0240	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.1300
5.5	0.0590	0.0590	0.0590	0.0820	0.1180	0.1770	0.1890	0.1530	0.1530	0.1410	0.1890	0.0820	0.0710	0.0470	0.0590	0.0940	1.7320
10.0	1.0300	0.4710	0.2950	0.3420	0.3300	0.5540	0.4120	0.4360	0.4950	0.4360	0.5660	0.6600	0.4360	0.4710	0.8130	0.7780	8.5250
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.1010	0.5300	0.3540	0.4240	0.4480	0.7310	0.6360	0.6010	0.6830	0.6010	0.7670	0.7420	0.5070	0.5180	0.8720	0.8720	10.3870
STABILITY CLASS 4																	
1.5	0.0240	0.0240	0.0000	0.0000	0.0120	0.0470	0.0240	0.0120	0.0120	0.0120	0.0240	0.0120	0.0000	0.0120	0.0120	0.0710	0.2980
5.5	0.7310	0.4710	0.1890	0.3060	0.5770	0.8840	1.0490	0.7540	0.5190	0.3890	0.4830	0.5070	0.4120	0.3770	0.6840	1.3550	9.6870
10.0	1.9100	1.0720	0.9190	0.7310	1.0370	0.9190	1.2140	1.6500	1.3080	0.8960	0.7900	1.4610	1.2730	1.4850	1.9090	2.3690	20.9430
15.5	1.7800	0.8600	0.3060	0.2000	0.3180	0.3060	0.3890	0.9550	1.3790	0.6720	0.3650	0.8720	1.2610	1.9560	3.0050	2.8170	17.4410
21.5	0.4120	0.2240	0.0120	0.0000	0.0120	0.0240	0.0350	0.3420	0.2830	0.1180	0.1410	0.2470	0.2950	0.7190	1.6970	1.2370	5.7980
28.0	0.1410	0.0120	0.0000	0.0120	0.0000	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.0240	0.2360	0.2950	0.5890	0.4480	1.7930
ALL	4.9980	2.6630	1.4260	1.2490	1.9560	2.1920	2.7110	3.7250	3.5130	2.0870	1.8030	3.1230	3.4770	4.8440	7.8960	8.2970	55.9600
STABILITY CLASS 5																	
1.5	0.1530	0.0710	0.0000	0.0000	0.0590	0.0350	0.0820	0.0710	0.0350	0.0000	0.0350	0.0350	0.0120	0.0710	0.0590	0.0940	0.8120
5.5	0.2360	0.1300	0.1650	0.2000	0.1530	0.3060	0.2000	0.2470	0.2710	0.2000	0.2950	0.2830	0.2000	0.1300	0.3540	0.9660	4.3360
10.0	0.0470	0.0350	0.0240	0.0470	0.0590	0.0240	0.0240	0.0470	0.0240	0.0240	0.0590	0.1060	0.0940	0.0820	0.1410	0.1890	1.0260
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.4360	0.2360	0.1890	0.2470	0.2710	0.3650	0.3060	0.3650	0.3300	0.2240	0.3890	0.4240	0.3060	0.2830	0.5540	1.2490	6.1740
STABILITY CLASS 6																	
1.5	0.9780	0.6950	0.6360	0.5420	0.4480	0.5190	0.6720	0.6130	0.7540	0.6600	0.5770	0.7310	0.5660	0.5770	0.6720	1.3320	10.9720
5.5	0.7070	0.2830	0.1180	0.2590	0.3540	0.3180	0.3420	0.4830	0.3420	0.4950	0.4360	0.4710	0.2950	0.5540	0.4600	0.8370	6.7540
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.6850	0.9780	0.7540	0.8010	0.8020	0.8370	1.0140	1.0960	1.0960	1.1550	1.0130	1.2020	0.8610	1.1310	1.1320	2.1690	17.7260
ALL	8.8210	4.8080	3.2420	3.1570	3.9370	4.8310	5.3620	6.5290	6.3650	5.1510	4.6550	6.2920	5.5530	7.1650	11.0200	13.1170	100.0050

INDIVIDUAL RECEPTOR LOCATION DATA, 30 LOCATIONS INPUT THIS RUN

I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE	I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE
1	Alliance	30.00	-45.40	-50.00	54.42	1	16	Residence 1	-0.80	-0.40	6.00	0.89	1
2	Berea	21.50	-32.60	-50.00	39.05	1	17	Residence 2	1.00	0.30	-4.00	1.04	1
3	Chardon	22.30	35.80	-50.00	42.18	1	18	Residence 3	-0.80	-1.90	-16.00	2.06	1
4	Clinton	75.40	26.50	-50.00	79.92	1	19	Residence 4	-0.40	-3.40	-31.00	3.42	1
5	Crawford	-12.10	20.80	-50.00	24.06	1	20	Residence 5	1.90	-4.30	-36.00	4.70	1
6	Harrison	-50.50	22.50	633.00	55.29	1	21	Residence 6	-4.70	1.86	22.00	5.05	1
7	Hay Springs	47.10	18.80	-50.00	50.71	1	22	Residence 7	2.40	3.60	76.00	4.33	1
8	Hemmingford	14.30	-20.40	36.00	24.91	1	23	Residence 8	4.70	-4.40	-50.00	6.44	1
9	Marsland	-3.80	-6.10	-50.00	7.19	1	24	Unoccupied 1	-0.90	2.00	21.00	2.19	1
10	Mitchell	-48.50	-60.00	-50.00	77.15	1	25	Unoccupied 2	2.00	2.80	69.00	3.44	1
11	Oelrichs	4.90	75.30	-50.00	75.46	1	26	North Boundary	0.00	2.60	29.00	2.60	1
12	Rushville	66.00	22.00	-50.00	69.57	1	27	East Boundary	1.40	0.30	-20.00	1.43	1
13	Scottsbluff	-36.30	-68.90	-50.00	77.88	1	28	South Boundary	0.00	-0.50	13.00	0.50	1
14	Van Tassell	-67.50	21.00	49.00	70.69	1	29	West Boundary	-0.70	0.00	49.00	0.70	1
15	Whitney	1.20	31.40	-50.00	31.42	1	30	Minatare	-22.40	-75.60	-41.40	78.85	1

MISCELLANEOUS INPUTABLE PARAMETER VALUES

DMM	DMA	TSTART	FFORI	FHAYI	FFORP	FHAYP	FPR(1)	FPR(2)	FPR(3)	ACTRAT
100.0	100.0	1.00	0.50	0.50	0.50	0.50	0.00	0.00	0.00	2.50

IPACT EQUALS 0, 0, 0, 0, 0,

JC EQUALS 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

TIME STEP DATA....	STEP NAMES	LENGTH, YRS	IFTODO
1		5.00	1

XRHO EQUALS 1.5, 2.5, 3.5, 4.5, 7.5, 15.0, 25.0, 35.0, 45.0, 55.0, 65.0, 75.0,

HDP EQUALS 50.0

POPULATION DISTRIBUTION

KILOMETERS	N 0.0	NNE 22.5	NE 45.0	ENE 67.5	E 90.0	ESE 112.5	SE 135.0	SSE 157.5	S 180.0	SSW 202.5	SW 225.0	WSW 247.5	W 270.0	WNW 292.5	NW 315.0	NNW 337.5
1.0- 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.0- 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.0- 4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0- 5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.0-10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.0-20.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20.0-30.0	0	0	0	0	0	0	993	0	0	0	0	0	0	0	0	1107
30.0-40.0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.0-50.0	0	5634	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50.0-60.0	0	0	0	652	0	0	0	9859	0	0	0	0	0	279	0	0
60.0-70.0	0	0	0	999	0	0	0	0	0	0	0	0	0	0	0	0
70.0-80.0	145	0	14	30	0	0	0	0	0	15542	1831	0	0	19	0	0
1.0-80.0	232	5634	14	1681	0	0	993	9859	0	15542	1831	0	0	298	0	1107

TOTAL 1-80 KM POPULATION IS 37191 PERSONS

NUMBER OF SOURCES= 5

NO.	KM X	KM Y	M Z	KM2 AREA	CI/YEAR U-238	Th-230	Ra-226	Pb-210	Rn-222	ID	PSIZE SET	M/SEC EXIT VEL	SOURCE NAME
1	-0.56	2.23	27.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+03	1001	1	0.00E+00	MU-1
2	-0.55	1.65	16.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E+03	1002	1	0.00E+00	MU-2
3	-0.15	0.95	13.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E+03	1003	1	0.00E+00	MU-3
4	0.44	0.13	-4.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+03	1004	1	0.00E+00	MU-4
5	0.84	-0.45	-15.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E+03	1005	1	0.00E+00	MU-5

INPUT TAILS ACTIVITIES, PCI/G

SET	URANIUM	THORIUM	RADIUM	LEAD
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AMAD AND FRACTIONAL DISTRIBUTION

SET	1.5	3.0	7.7	54.0
1	0.000	1.000	0.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.300	0.700

PARTICULATE SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
4	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
5	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

RADON SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
4	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
5	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

MARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 1--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.552E-01	2.877E+00	4.644E-02	2.157E+00	1.037E+00	1.369E+02
GROUND	1.936E-02	1.936E-02	1.936E-02	1.936E-02	1.936E-02	1.936E-02
CLOUD	1.172E+00	1.172E+00	1.172E+00	1.172E+00	1.172E+00	1.172E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.547E+00	4.068E+00	1.238E+00	3.349E+00	2.229E+00	1.381E+02

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GROUND	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CLOUD	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.552E-01	2.877E+00	4.644E-02	2.157E+00	1.037E+00	1.369E+02
GROUND	1.936E-02	1.936E-02	1.936E-02	1.936E-02	1.936E-02	1.936E-02
CLOUD	1.172E+00	1.172E+00	1.172E+00	1.172E+00	1.172E+00	1.172E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.547E+00	4.068E+00	1.238E+00	3.349E+00	2.229E+00	1.381E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 1 NAME=Alliance X= 30.0KM, Y= -45.4KM, Z= -50.0M, DIST= 54.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.44E-01	1.12E-01	4.80E-02	4.09E-01	1.84E-01	4.71E+00
CHILD	TOTALS	3.38E-01	1.59E-01	6.33E-02	2.24E-01	1.24E-01	4.71E+00
TEENAGE	TOTALS	3.42E-01	2.80E-01	7.38E-02	1.42E-01	1.00E-01	4.71E+00
ADULT	TOTALS	3.44E-01	2.71E-01	8.72E-02	1.44E-01	1.06E-01	4.71E+00

NUMBER 2 NAME=Berea X= 21.5KM, Y= -32.6KM, Z= -50.0M, DIST= 39.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.87E-01	1.29E-01	6.41E-02	4.32E-01	2.03E-01	6.84E+00
CHILD	TOTALS	4.81E-01	1.77E-01	7.97E-02	2.43E-01	1.41E-01	6.84E+00
TEENAGE	TOTALS	4.85E-01	3.00E-01	9.04E-02	1.60E-01	1.17E-01	6.84E+00
ADULT	TOTALS	4.87E-01	2.91E-01	1.04E-01	1.62E-01	1.23E-01	6.84E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 3 NAME=Chardon X= 22.3KM, Y= 35.8KM, Z= -50.0M, DIST= 42.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.78E-01	8.88E-02	3.89E-02	3.22E-01	1.45E-01	3.82E+00
CHILD	TOTALS	2.74E-01	1.26E-01	5.09E-02	1.76E-01	9.83E-02	3.82E+00
TEENAGE	TOTALS	2.77E-01	2.20E-01	5.92E-02	1.13E-01	7.98E-02	3.82E+00
ADULT	TOTALS	2.78E-01	2.14E-01	6.97E-02	1.14E-01	8.41E-02	3.82E+00

NUMBER 4 NAME=Clinton X= 75.4KM, Y= 26.5KM, Z= -50.0M, DIST= 79.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.39E-01	6.20E-02	2.12E-02	2.55E-01	1.09E-01	1.81E+00
CHILD	TOTALS	1.35E-01	9.28E-02	3.09E-02	1.35E-01	6.99E-02	1.81E+00
TEENAGE	TOTALS	1.37E-01	1.71E-01	3.76E-02	8.20E-02	5.47E-02	1.81E+00
ADULT	TOTALS	1.39E-01	1.65E-01	4.63E-02	8.33E-02	5.82E-02	1.81E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 5 NAME=Crawford X= -12.1KM, Y= 20.8KM, Z= -50.0M, DIST= 24.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	5.61E-01	1.17E-01	6.94E-02	3.36E-01	1.70E-01	8.06E+00
CHILD	TOTALS	5.57E-01	1.52E-01	8.09E-02	1.99E-01	1.26E-01	8.06E+00
TEENAGE	TOTALS	5.60E-01	2.41E-01	8.87E-02	1.40E-01	1.08E-01	8.06E+00
ADULT	TOTALS	5.61E-01	2.35E-01	9.86E-02	1.41E-01	1.12E-01	8.06E+00

NUMBER 6 NAME=Harrison X= -50.5KM, Y= 22.5KM, Z= 633.0M, DIST= 55.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.11E-01	7.91E-02	3.07E-02	3.06E-01	1.34E-01	2.83E+00
CHILD	TOTALS	2.06E-01	1.15E-01	4.23E-02	1.64E-01	8.83E-02	2.83E+00
TEENAGE	TOTALS	2.09E-01	2.07E-01	5.03E-02	1.03E-01	7.04E-02	2.83E+00
ADULT	TOTALS	2.11E-01	2.01E-01	6.05E-02	1.04E-01	7.45E-02	2.83E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 7 NAME=Hay Springs X= 47.1KM, Y= 18.8KM, Z= -50.0M, DIST= 50.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.30E-01	7.64E-02	3.25E-02	2.82E-01	1.26E-01	3.14E+00
CHILD	TOTALS	2.26E-01	1.09E-01	4.30E-02	1.54E-01	8.48E-02	3.14E+00
TEENAGE	TOTALS	2.28E-01	1.93E-01	5.03E-02	9.77E-02	6.85E-02	3.14E+00
ADULT	TOTALS	2.30E-01	1.87E-01	5.95E-02	9.91E-02	7.23E-02	3.14E+00

NUMBER 8 NAME=Hemmingford X= 14.3KM, Y= -20.4KM, Z= 36.0M, DIST= 24.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	9.20E-01	2.00E-01	1.13E-01	6.08E-01	3.00E-01	1.32E+01
CHILD	TOTALS	9.11E-01	2.65E-01	1.34E-01	3.54E-01	2.17E-01	1.32E+01
TEENAGE	TOTALS	9.16E-01	4.31E-01	1.48E-01	2.43E-01	1.85E-01	1.32E+01
ADULT	TOTALS	9.19E-01	4.19E-01	1.67E-01	2.45E-01	1.92E-01	1.32E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 9 NAME=Marsland X= -3.8KM, Y= -6.1KM, Z= -50.0M, DIST= 7.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.11E+00	1.26E-01	1.01E-01	2.42E-01	1.54E-01	1.68E+01
CHILD	TOTALS	1.11E+00	1.44E-01	1.07E-01	1.70E-01	1.31E-01	1.68E+01
TEENAGE	TOTALS	1.11E+00	1.92E-01	1.11E-01	1.38E-01	1.21E-01	1.68E+01
ADULT	TOTALS	1.11E+00	1.88E-01	1.16E-01	1.39E-01	1.23E-01	1.68E+01

NUMBER 10 NAME=Mitchell X= -48.5KM, Y= -60.0KM, Z= -50.0M, DIST= 77.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.02E-01	4.95E-02	1.59E-02	2.08E-01	8.83E-02	1.31E+00
CHILD	TOTALS	9.86E-02	7.49E-02	2.39E-02	1.09E-01	5.61E-02	1.31E+00
TEENAGE	TOTALS	1.01E-01	1.39E-01	2.94E-02	6.61E-02	4.35E-02	1.31E+00
ADULT	TOTALS	1.02E-01	1.35E-01	3.65E-02	6.71E-02	4.64E-02	1.31E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 11 NAME=Oelrichs X= 4.9KM, Y= 75.3KM, Z= -50.0M, DIST= 75.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.64E-01	7.57E-02	2.52E-02	3.14E-01	1.34E-01	2.13E+00
CHILD	TOTALS	1.60E-01	1.14E-01	3.72E-02	1.65E-01	8.55E-02	2.13E+00
TEENAGE	TOTALS	1.62E-01	2.10E-01	4.55E-02	1.01E-01	6.66E-02	2.13E+00
ADULT	TOTALS	1.64E-01	2.04E-01	5.63E-02	1.02E-01	7.10E-02	2.13E+00

NUMBER 12 NAME=Rushville X= 66.0KM, Y= 22.0KM, Z= -50.0M, DIST= 69.6KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.61E-01	6.53E-02	2.39E-02	2.60E-01	1.13E-01	2.13E+00
CHILD	TOTALS	1.57E-01	9.64E-02	3.38E-02	1.39E-01	7.33E-02	2.13E+00
TEENAGE	TOTALS	1.59E-01	1.76E-01	4.06E-02	8.56E-02	5.79E-02	2.13E+00
ADULT	TOTALS	1.61E-01	1.70E-01	4.94E-02	8.69E-02	6.15E-02	2.13E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 13 NAME=Scottsbluff X= -36.3KM, Y= -68.9KM, Z= -50.0M, DIST= 77.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.14E-01	5.39E-02	1.76E-02	2.25E-01	9.56E-02	1.47E+00
CHILD	TOTALS	1.10E-01	8.12E-02	2.62E-02	1.18E-01	6.09E-02	1.47E+00
TEENAGE	TOTALS	1.12E-01	1.51E-01	3.22E-02	7.17E-02	4.73E-02	1.47E+00
ADULT	TOTALS	1.13E-01	1.46E-01	3.99E-02	7.28E-02	5.05E-02	1.47E+00

NUMBER 14 NAME=Van Tassell X= -67.5KM, Y= 21.0KM, Z= 49.0M, DIST= 70.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.53E-01	6.69E-02	2.32E-02	2.72E-01	1.17E-01	2.01E+00
CHILD	TOTALS	1.49E-01	9.97E-02	3.36E-02	1.44E-01	7.53E-02	2.01E+00
TEENAGE	TOTALS	1.52E-01	1.83E-01	4.08E-02	8.82E-02	5.90E-02	2.01E+00
ADULT	TOTALS	1.53E-01	1.77E-01	5.01E-02	8.96E-02	6.28E-02	2.01E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 15 NAME=Whitney X= 1.2KM, Y= 31.4KM, Z= -50.0M, DIST= 31.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.17E-01	1.07E-01	5.45E-02	3.50E-01	1.66E-01	5.88E+00
CHILD	TOTALS	4.12E-01	1.45E-01	6.71E-02	1.98E-01	1.17E-01	5.88E+00
TEENAGE	TOTALS	4.15E-01	2.44E-01	7.57E-02	1.32E-01	9.73E-02	5.88E+00
ADULT	TOTALS	4.17E-01	2.37E-01	8.67E-02	1.33E-01	1.02E-01	5.88E+00

NUMBER 16 NAME=Residence 1 X= -0.8KM, Y= -0.4KM, Z= 6.0M, DIST= 0.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.58E+01	6.22E-01	5.98E-01	7.34E-01	6.49E-01	2.54E+02
CHILD	TOTALS	1.58E+01	6.40E-01	6.04E-01	6.64E-01	6.27E-01	2.54E+02
TEENAGE	TOTALS	1.58E+01	6.85E-01	6.08E-01	6.34E-01	6.18E-01	2.54E+02
ADULT	TOTALS	1.58E+01	6.82E-01	6.13E-01	6.35E-01	6.20E-01	2.54E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 17 NAME=Residence 2 X= 1.0KM, Y= 0.3KM, Z= -4.0M, DIST= 1.0KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.45E+01	5.92E-01	5.79E-01	6.50E-01	6.06E-01	7.33E+02
CHILD	TOTALS	4.45E+01	6.01E-01	5.82E-01	6.14E-01	5.94E-01	7.33E+02
TEENAGE	TOTALS	4.45E+01	6.25E-01	5.84E-01	5.98E-01	5.89E-01	7.33E+02
ADULT	TOTALS	4.45E+01	6.23E-01	5.87E-01	5.98E-01	5.90E-01	7.33E+02

NUMBER 18 NAME=Residence 3 X= -0.8KM, Y= -1.9KM, Z= -16.0M, DIST= 2.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.86E+00	4.30E-01	4.01E-01	5.68E-01	4.64E-01	1.08E+02
CHILD	TOTALS	6.86E+00	4.52E-01	4.08E-01	4.82E-01	4.36E-01	1.08E+02
TEENAGE	TOTALS	6.86E+00	5.08E-01	4.13E-01	4.45E-01	4.25E-01	1.08E+02
ADULT	TOTALS	6.86E+00	5.04E-01	4.19E-01	4.46E-01	4.28E-01	1.08E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 19 NAME=Residence 4 X= -0.4KM, Y= -3.4KM, Z= -31.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.16E+00	3.25E-01	2.91E-01	4.82E-01	3.63E-01	6.46E+01
CHILD	TOTALS	4.16E+00	3.50E-01	3.00E-01	3.84E-01	3.32E-01	6.46E+01
TEENAGE	TOTALS	4.16E+00	4.14E-01	3.05E-01	3.42E-01	3.19E-01	6.46E+01
ADULT	TOTALS	4.16E+00	4.09E-01	3.12E-01	3.43E-01	3.22E-01	6.46E+01

NUMBER 20 NAME=Residence 5 X= 1.9KM, Y= -4.3KM, Z= -36.0M, DIST= 4.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.85E+00	4.06E-01	3.54E-01	6.46E-01	4.64E-01	7.50E+01
CHILD	TOTALS	4.84E+00	4.44E-01	3.67E-01	4.96E-01	4.16E-01	7.50E+01
TEENAGE	TOTALS	4.85E+00	5.42E-01	3.75E-01	4.31E-01	3.97E-01	7.50E+01
ADULT	TOTALS	4.85E+00	5.35E-01	3.86E-01	4.32E-01	4.01E-01	7.50E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 21 NAME=Residence 6 X= -4.7KM, Y= 1.9KM, Z= 22.0M, DIST= 5.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.45E+00	3.19E-01	2.81E-01	4.96E-01	3.62E-01	5.30E+01
CHILD	TOTALS	3.45E+00	3.47E-01	2.90E-01	3.85E-01	3.26E-01	5.30E+01
TEENAGE	TOTALS	3.45E+00	4.19E-01	2.96E-01	3.37E-01	3.12E-01	5.30E+01
ADULT	TOTALS	3.45E+00	4.14E-01	3.04E-01	3.38E-01	3.15E-01	5.30E+01

NUMBER 22 NAME=Residence 7 X= 2.4KM, Y= 3.6KM, Z= 76.0M, DIST= 4.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.17E+00	4.88E-01	4.45E-01	6.90E-01	5.37E-01	9.57E+01
CHILD	TOTALS	6.17E+00	5.20E-01	4.55E-01	5.64E-01	4.96E-01	9.57E+01
TEENAGE	TOTALS	6.17E+00	6.02E-01	4.62E-01	5.09E-01	4.80E-01	9.57E+01
ADULT	TOTALS	6.17E+00	5.96E-01	4.72E-01	5.10E-01	4.84E-01	9.57E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 23 NAME=Residence 8 X= 4.7KM, Y= -4.4KM, Z= -50.0M, DIST= 6.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.13E+00	1.66E-01	1.41E-01	2.85E-01	1.95E-01	3.32E+01
CHILD	TOTALS	2.13E+00	1.85E-01	1.47E-01	2.11E-01	1.71E-01	3.32E+01
TEENAGE	TOTALS	2.13E+00	2.33E-01	1.51E-01	1.79E-01	1.62E-01	3.32E+01
ADULT	TOTALS	2.13E+00	2.30E-01	1.57E-01	1.79E-01	1.64E-01	3.32E+01

NUMBER 24 NAME=Unoccupied 1 X= -0.9KM, Y= 2.0KM, Z= 21.0M, DIST= 2.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	7.50E+01	7.12E-01	6.96E-01	7.86E-01	7.30E-01	1.24E+03
CHILD	TOTALS	7.50E+01	7.24E-01	7.00E-01	7.40E-01	7.15E-01	1.24E+03
TEENAGE	TOTALS	7.50E+01	7.54E-01	7.03E-01	7.20E-01	7.09E-01	1.24E+03
ADULT	TOTALS	7.50E+01	7.52E-01	7.06E-01	7.20E-01	7.11E-01	1.24E+03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 25 NAME=Unoccupied 2 X= 2.0KM, Y= 2.8KM, Z= 69.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	8.61E+00	5.52E-01	5.15E-01	7.20E-01	5.93E-01	1.35E+02
CHILD	TOTALS	8.61E+00	5.79E-01	5.24E-01	6.15E-01	5.59E-01	1.35E+02
TEENAGE	TOTALS	8.61E+00	6.47E-01	5.30E-01	5.69E-01	5.45E-01	1.35E+02
ADULT	TOTALS	8.61E+00	6.42E-01	5.38E-01	5.70E-01	5.48E-01	1.35E+02

NUMBER 26 NAME=North Boundary X= 0.0KM, Y= 2.6KM, Z= 29.0M, DIST= 2.6KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.91E+01	7.26E-01	7.05E-01	8.24E-01	7.50E-01	6.40E+02
CHILD	TOTALS	3.91E+01	7.42E-01	7.10E-01	7.63E-01	7.30E-01	6.40E+02
TEENAGE	TOTALS	3.91E+01	7.82E-01	7.14E-01	7.36E-01	7.22E-01	6.40E+02
ADULT	TOTALS	3.91E+01	7.79E-01	7.18E-01	7.37E-01	7.24E-01	6.40E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 27 NAME=East Boundary X= 1.4KM, Y= 0.3KM, Z= -20.0M, DIST= 1.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.67E+01	3.12E-01	3.04E-01	3.49E-01	3.21E-01	2.73E+02
CHILD	TOTALS	1.67E+01	3.18E-01	3.06E-01	3.26E-01	3.14E-01	2.73E+02
TEENAGE	TOTALS	1.67E+01	3.33E-01	3.07E-01	3.16E-01	3.11E-01	2.73E+02
ADULT	TOTALS	1.67E+01	3.32E-01	3.09E-01	3.16E-01	3.11E-01	2.73E+02

NUMBER 28 NAME=South Boundary X= 0.0KM, Y= -0.5KM, Z= 13.0M, DIST= 0.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.50E+01	9.16E-01	8.83E-01	1.07E+00	9.52E-01	5.70E+02
CHILD	TOTALS	3.50E+01	9.40E-01	8.91E-01	9.72E-01	9.22E-01	5.70E+02
TEENAGE	TOTALS	3.50E+01	1.00E+00	8.96E-01	9.31E-01	9.10E-01	5.70E+02
ADULT	TOTALS	3.50E+01	9.96E-01	9.03E-01	9.32E-01	9.13E-01	5.70E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 29 NAME=West Boundary X= -0.7KM, Y= 0.0KM, Z= 49.0M, DIST= 0.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.41E+01	7.60E-01	7.36E-01	8.70E-01	7.87E-01	3.89E+02
CHILD	TOTALS	2.41E+01	7.78E-01	7.42E-01	8.01E-01	7.65E-01	3.89E+02
TEENAGE	TOTALS	2.41E+01	8.22E-01	7.46E-01	7.72E-01	7.56E-01	3.89E+02
ADULT	TOTALS	2.41E+01	8.19E-01	7.51E-01	7.72E-01	7.58E-01	3.89E+02

NUMBER 30 NAME=Minatare X= -22.4KM, Y= -75.6KM, Z= -41.4M, DIST= 78.8KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.44E-01	6.76E-02	2.23E-02	2.81E-01	1.20E-01	1.86E+00
CHILD	TOTALS	1.40E-01	1.02E-01	3.30E-02	1.48E-01	7.63E-02	1.86E+00
TEENAGE	TOTALS	1.42E-01	1.88E-01	4.05E-02	8.98E-02	5.94E-02	1.86E+00
ADULT	TOTALS	1.44E-01	1.82E-01	5.01E-02	9.12E-02	6.33E-02	1.86E+00

Program execution time = 1.97 seconds

APPENDIX B - MEA RADIATION DOSE RATES FROM MILDOS

Appendix B contains the print out from the computer program MILDOS in the following order:

Appendix	Title	Radon Source	Weather Data	Purge Rate
B2	MARST15P	SATELLITE	MEA	44

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METSET: DATA: MARST15P.MIL 10/06/11

JOINT FREQUENCY IN PERCENT, DIRECTION INDICATES WHERE WIND IS FROM FREQWS=0.14427,0.29579,0.30967,0.17441,0.05798,0.01793

MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTALS
STABILITY CLASS 1																	
1.5	0.1410	0.0240	0.0710	0.0820	0.0940	0.1300	0.1060	0.2120	0.1770	0.3540	0.1410	0.0940	0.1180	0.0820	0.0590	0.0590	1.9440
5.5	0.2360	0.1530	0.1890	0.1770	0.1770	0.2590	0.2000	0.2120	0.2120	0.2590	0.2240	0.4010	0.1180	0.1180	0.2000	0.2120	3.3470
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.3770	0.1770	0.2600	0.2590	0.2710	0.3890	0.3060	0.4240	0.3890	0.6130	0.3650	0.4950	0.2360	0.2000	0.2590	0.2710	5.2910
STABILITY CLASS 2																	
1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0470	0.0470	0.0940	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.2710
5.5	0.2000	0.2240	0.2470	0.1770	0.1770	0.2470	0.3420	0.2470	0.2360	0.3180	0.3060	0.2590	0.1300	0.1650	0.2360	0.2120	3.7230
10.0	0.0240	0.0000	0.0120	0.0000	0.0120	0.0350	0.0350	0.0240	0.0710	0.0590	0.0000	0.0470	0.0240	0.0120	0.0710	0.0470	0.4730
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.2240	0.2240	0.2590	0.1770	0.1890	0.3170	0.3890	0.3180	0.3540	0.4710	0.3180	0.3060	0.1660	0.1890	0.3070	0.2590	4.4670
STABILITY CLASS 3																	
1.5	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0350	0.0240	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.1300
5.5	0.0590	0.0590	0.0590	0.0820	0.1180	0.1770	0.1890	0.1530	0.1530	0.1410	0.1890	0.0820	0.0710	0.0470	0.0590	0.0940	1.7320
10.0	1.0300	0.4710	0.2950	0.3420	0.3300	0.5540	0.4120	0.4360	0.4950	0.4360	0.5660	0.6600	0.4360	0.4710	0.8130	0.7780	8.5250
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.1010	0.5300	0.3540	0.4240	0.4480	0.7310	0.6360	0.6010	0.6830	0.6010	0.7670	0.7420	0.5070	0.5180	0.8720	0.8720	10.3870
STABILITY CLASS 4																	
1.5	0.0240	0.0240	0.0000	0.0000	0.0120	0.0470	0.0240	0.0120	0.0120	0.0120	0.0240	0.0120	0.0000	0.0120	0.0120	0.0710	0.2980
5.5	0.7310	0.4710	0.1890	0.3060	0.5770	0.8840	1.0490	0.7540	0.5190	0.3890	0.4830	0.5070	0.4120	0.3770	0.6840	1.3550	9.6870
10.0	1.9100	1.0720	0.9190	0.7310	1.0370	0.9190	1.2140	1.6500	1.3080	0.8960	0.7900	1.4610	1.2730	1.4850	1.9090	2.3690	20.9430
15.5	1.7800	0.8600	0.3060	0.2000	0.3180	0.3060	0.3890	0.9550	1.3790	0.6720	0.3650	0.8720	1.2610	1.9560	3.0050	2.8170	17.4410
21.5	0.4120	0.2240	0.0120	0.0000	0.0120	0.0240	0.0350	0.3420	0.2830	0.1180	0.1410	0.2470	0.2950	0.7190	1.6970	1.2370	5.7980
28.0	0.1410	0.0120	0.0000	0.0120	0.0000	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.0240	0.2360	0.2950	0.5890	0.4480	1.7930
ALL	4.9980	2.6630	1.4260	1.2490	1.9560	2.1920	2.7110	3.7250	3.5130	2.0870	1.8030	3.1230	3.4770	4.8440	7.8960	8.2970	55.9600
STABILITY CLASS 5																	
1.5	0.1530	0.0710	0.0000	0.0000	0.0590	0.0350	0.0820	0.0710	0.0350	0.0000	0.0350	0.0350	0.0120	0.0710	0.0590	0.0940	0.8120
5.5	0.2360	0.1300	0.1650	0.2000	0.1530	0.3060	0.2000	0.2470	0.2710	0.2000	0.2950	0.2830	0.2000	0.1300	0.3540	0.9660	4.3360
10.0	0.0470	0.0350	0.0240	0.0470	0.0590	0.0240	0.0240	0.0470	0.0240	0.0240	0.0590	0.1060	0.0940	0.0820	0.1410	0.1890	1.0260
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.4360	0.2360	0.1890	0.2470	0.2710	0.3650	0.3060	0.3650	0.3300	0.2240	0.3890	0.4240	0.3060	0.2830	0.5540	1.2490	6.1740
STABILITY CLASS 6																	
1.5	0.9780	0.6950	0.6360	0.5420	0.4480	0.5190	0.6720	0.6130	0.7540	0.6600	0.5770	0.7310	0.5660	0.5770	0.6720	1.3320	10.9720
5.5	0.7070	0.2830	0.1180	0.2590	0.3540	0.3180	0.3420	0.4830	0.3420	0.4950	0.4360	0.4710	0.2950	0.5540	0.4600	0.8370	6.7540
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.6850	0.9780	0.7540	0.8010	0.8020	0.8370	1.0140	1.0960	1.0960	1.1550	1.0130	1.2020	0.8610	1.1310	1.1320	2.1690	17.7260
	8.8210	4.8080	3.2420	3.1570	3.9370	4.8310	5.3620	6.5290	6.3650	5.1510	4.6550	6.2920	5.5530	7.1650	11.0200	13.1170	100.0050

INDIVIDUAL RECEPTOR LOCATION DATA, 30 LOCATIONS INPUT THIS RUN

I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE	I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE
1	Alliance	30.00	-45.40	-50.00	54.42	1	16	Residence 1	-0.80	-0.40	6.00	0.89	1
2	Berea	21.50	-32.60	-50.00	39.05	1	17	Residence 2	1.00	0.30	-4.00	1.04	1
3	Chardon	22.30	35.80	-50.00	42.18	1	18	Residence 3	-0.80	-1.90	-16.00	2.06	1
4	Clinton	75.40	26.50	-50.00	79.92	1	19	Residence 4	-0.40	-3.40	-31.00	3.42	1
5	Crawford	-12.10	20.80	-50.00	24.06	1	20	Residence 5	1.90	-4.30	-36.00	4.70	1
6	Harrison	-50.50	22.50	633.00	55.29	1	21	Residence 6	-4.70	1.86	22.00	5.05	1
7	Hay Springs	47.10	18.80	-50.00	50.71	1	22	Residence 7	2.40	3.60	76.00	4.33	1
8	Hemmingford	14.30	-20.40	36.00	24.91	1	23	Residence 8	4.70	-4.40	-50.00	6.44	1
9	Marsland	-3.80	-6.10	-50.00	7.19	1	24	Unoccupied 1	-0.90	2.00	21.00	2.19	1
10	Mitchell	-48.50	-60.00	-50.00	77.15	1	25	Unoccupied 2	2.00	2.80	69.00	3.44	1
11	Oelrichs	4.90	75.30	-50.00	75.46	1	26	North Boundary	0.00	2.60	29.00	2.60	1
12	Rushville	66.00	22.00	-50.00	69.57	1	27	East Boundary	1.40	0.30	-20.00	1.43	1
13	Scottsbluff	-36.30	-68.90	-50.00	77.88	1	28	South Boundary	0.00	-0.50	13.00	0.50	1
14	Van Tassell	-67.50	21.00	49.00	70.69	1	29	West Boundary	-0.70	0.00	49.00	0.70	1
15	Whitney	1.20	31.40	-50.00	31.42	1	30	Minatare	-22.40	-75.60	-41.40	78.85	1

MISCELLANEOUS INPUTABLE PARAMETER VALUES

DMM	DMA	TSTART	FFORI	FHAYI	FFORP	FHAYP	FPR(1)	FPR(2)	FPR(3)	ACTRAT
100.0	100.0	1.00	0.50	0.50	0.50	0.50	0.00	0.00	0.00	2.50

IPACT EQUALS 0,

JC EQUALS 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

TIME STEP DATA....	STEP NAMES	LENGTH, YRS	IFTODO
1		5.00	1

XRHO EQUALS 1.5, 2.5, 3.5, 4.5, 7.5, 15.0, 25.0, 35.0, 45.0, 55.0, 65.0, 75.0,

HDP EQUALS 50.0

POPULATION DISTRIBUTION

KILOMETERS	N 0.0	NNE 22.5	NE 45.0	ENE 67.5	E 90.0	ESE 112.5	SE 135.0	SSE 157.5	S 180.0	SSW 202.5	SW 225.0	WSW 247.5	W 270.0	WNW 292.5	NW 315.0	NNW 337.5
1.0- 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.0- 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.0- 4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0- 5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.0-10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.0-20.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20.0-30.0	0	0	0	0	0	0	993	0	0	0	0	0	0	0	0	1107
30.0-40.0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.0-50.0	0	5634	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50.0-60.0	0	0	0	652	0	0	0	9859	0	0	0	0	0	279	0	0
60.0-70.0	0	0	0	999	0	0	0	0	0	0	0	0	0	0	0	0
70.0-80.0	145	0	14	30	0	0	0	0	0	15542	1831	0	0	19	0	0
1.0-80.0	232	5634	14	1681	0	0	993	9859	0	15542	1831	0	0	298	0	1107

TOTAL 1-80 KM POPULATION IS 37191 PERSONS

NUMBER OF SOURCES= 1

NO.	KM X	KM Y	M Z	KM2 AREA	U-238	Th-230	CI/YEAR Ra-226	Pb-210	Rn-222	ID	PSIZE SET	M/SEC EXIT VEL	SOURCE NAME
1	0.00	0.00	10.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.72E+03	1001	1	1.00E+01	Satellite

INPUT TAILS ACTIVITIES, PCI/G

SET	URANIUM	THORIUM	RADIUM	LEAD
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AMAD AND FRACTIONAL DISTRIBUTION

SET	1.5	3.0	7.7	54.0
1	0.000	1.000	0.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.300	0.700

PARTICULATE SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

RADON SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

MARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 1--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.498E-01	2.833E+00	4.566E-02	2.125E+00	1.022E+00	1.379E+02
GROUND	1.942E-02	1.942E-02	1.942E-02	1.942E-02	1.942E-02	1.942E-02
CLOUD	1.180E+00	1.180E+00	1.180E+00	1.180E+00	1.180E+00	1.180E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.549E+00	4.032E+00	1.245E+00	3.324E+00	2.221E+00	1.391E+02

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GROUND	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CLOUD	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.498E-01	2.833E+00	4.566E-02	2.125E+00	1.022E+00	1.379E+02
GROUND	1.942E-02	1.942E-02	1.942E-02	1.942E-02	1.942E-02	1.942E-02
CLOUD	1.180E+00	1.180E+00	1.180E+00	1.180E+00	1.180E+00	1.180E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.549E+00	4.032E+00	1.245E+00	3.324E+00	2.221E+00	1.391E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 1 NAME=Alliance X= 30.0KM, Y= -45.4KM, Z= -50.0M, DIST= 54.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.20E-01	9.69E-02	4.41E-02	3.44E-01	1.57E-01	4.42E+00
CHILD	TOTALS	3.15E-01	1.36E-01	5.67E-02	1.90E-01	1.07E-01	4.42E+00
TEENAGE	TOTALS	3.18E-01	2.37E-01	6.55E-02	1.23E-01	8.74E-02	4.42E+00
ADULT	TOTALS	3.20E-01	2.29E-01	7.66E-02	1.24E-01	9.20E-02	4.42E+00

NUMBER 2 NAME=Berea X= 21.5KM, Y= -32.6KM, Z= -50.0M, DIST= 39.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.46E-01	1.09E-01	5.75E-02	3.47E-01	1.67E-01	6.31E+00
CHILD	TOTALS	4.41E-01	1.47E-01	6.98E-02	1.99E-01	1.18E-01	6.31E+00
TEENAGE	TOTALS	4.44E-01	2.44E-01	7.83E-02	1.33E-01	9.95E-02	6.31E+00
ADULT	TOTALS	4.46E-01	2.37E-01	8.90E-02	1.35E-01	1.04E-01	6.31E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 3 NAME=Chardon X= 22.3KM, Y= 35.8KM, Z= -50.0M, DIST= 42.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.50E-01	7.82E-02	3.49E-02	2.81E-01	1.28E-01	3.44E+00
CHILD	TOTALS	2.46E-01	1.11E-01	4.53E-02	1.55E-01	8.65E-02	3.44E+00
TEENAGE	TOTALS	2.49E-01	1.93E-01	5.25E-02	9.93E-02	7.05E-02	3.44E+00
ADULT	TOTALS	2.50E-01	1.87E-01	6.16E-02	1.01E-01	7.42E-02	3.44E+00

NUMBER 4 NAME=Clinton X= 75.4KM, Y= 26.5KM, Z= -50.0M, DIST= 79.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.30E-01	5.55E-02	1.96E-02	2.25E-01	9.69E-02	1.70E+00
CHILD	TOTALS	1.26E-01	8.26E-02	2.81E-02	1.19E-01	6.25E-02	1.70E+00
TEENAGE	TOTALS	1.28E-01	1.51E-01	3.40E-02	7.32E-02	4.90E-02	1.70E+00
ADULT	TOTALS	1.29E-01	1.46E-01	4.17E-02	7.43E-02	5.22E-02	1.70E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 5 NAME=Crawford X= -12.1KM, Y= 20.8KM, Z= -50.0M, DIST= 24.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.78E-01	9.64E-02	5.87E-02	2.71E-01	1.39E-01	6.89E+00
CHILD	TOTALS	4.75E-01	1.24E-01	6.79E-02	1.62E-01	1.03E-01	6.89E+00
TEENAGE	TOTALS	4.77E-01	1.95E-01	7.41E-02	1.15E-01	8.96E-02	6.89E+00
ADULT	TOTALS	4.78E-01	1.90E-01	8.20E-02	1.16E-01	9.29E-02	6.89E+00

NUMBER 6 NAME=Harrison X= -50.5KM, Y= 22.5KM, Z= 633.0M, DIST= 55.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.06E-01	7.77E-02	3.00E-02	3.01E-01	1.32E-01	2.76E+00
CHILD	TOTALS	2.01E-01	1.13E-01	4.14E-02	1.62E-01	8.68E-02	2.76E+00
TEENAGE	TOTALS	2.04E-01	2.04E-01	4.93E-02	1.01E-01	6.91E-02	2.76E+00
ADULT	TOTALS	2.06E-01	1.97E-01	5.94E-02	1.02E-01	7.32E-02	2.76E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 7 NAME=Hay Springs X= 47.1KM, Y= 18.8KM, Z= -50.0M, DIST= 50.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.09E-01	6.64E-02	2.93E-02	2.40E-01	1.09E-01	2.87E+00
CHILD	TOTALS	2.06E-01	9.41E-02	3.82E-02	1.32E-01	7.35E-02	2.87E+00
TEENAGE	TOTALS	2.08E-01	1.64E-01	4.44E-02	8.44E-02	5.97E-02	2.87E+00
ADULT	TOTALS	2.09E-01	1.59E-01	5.22E-02	8.56E-02	6.29E-02	2.87E+00

NUMBER 8 NAME=Hemmingford X= 14.3KM, Y= -20.4KM, Z= 36.0M, DIST= 24.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	9.33E-01	1.98E-01	1.13E-01	5.93E-01	2.94E-01	1.34E+01
CHILD	TOTALS	9.25E-01	2.61E-01	1.33E-01	3.47E-01	2.14E-01	1.34E+01
TEENAGE	TOTALS	9.29E-01	4.21E-01	1.48E-01	2.39E-01	1.83E-01	1.34E+01
ADULT	TOTALS	9.32E-01	4.10E-01	1.65E-01	2.42E-01	1.90E-01	1.34E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 9 NAME=Marsland X= -3.8KM, Y= -6.1KM, Z= -50.0M, DIST= 7.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	8.14E-01	6.53E-02	5.55E-02	1.11E-01	7.63E-02	1.26E+01
CHILD	TOTALS	8.13E-01	7.26E-02	5.79E-02	8.24E-02	6.71E-02	1.26E+01
TEENAGE	TOTALS	8.13E-01	9.10E-02	5.95E-02	7.00E-02	6.36E-02	1.26E+01
ADULT	TOTALS	8.14E-01	8.97E-02	6.16E-02	7.03E-02	6.44E-02	1.26E+01

NUMBER 10 NAME=Mitchell X= -48.5KM, Y= -60.0KM, Z= -50.0M, DIST= 77.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	9.31E-02	4.32E-02	1.43E-02	1.79E-01	7.63E-02	1.21E+00
CHILD	TOTALS	9.04E-02	6.48E-02	2.12E-02	9.43E-02	4.87E-02	1.21E+00
TEENAGE	TOTALS	9.20E-02	1.20E-01	2.59E-02	5.73E-02	3.79E-02	1.21E+00
ADULT	TOTALS	9.30E-02	1.16E-01	3.20E-02	5.82E-02	4.05E-02	1.21E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 11 NAME=Oelrichs X= 4.9KM, Y= 75.3KM, Z= -50.0M, DIST= 75.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.51E-01	6.81E-02	2.31E-02	2.80E-01	1.20E-01	1.98E+00
CHILD	TOTALS	1.47E-01	1.02E-01	3.38E-02	1.48E-01	7.68E-02	1.98E+00
TEENAGE	TOTALS	1.50E-01	1.88E-01	4.12E-02	9.02E-02	6.00E-02	1.98E+00
ADULT	TOTALS	1.51E-01	1.82E-01	5.08E-02	9.15E-02	6.39E-02	1.98E+00

NUMBER 12 NAME=Rushville X= 66.0KM, Y= 22.0KM, Z= -50.0M, DIST= 69.6KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.49E-01	5.80E-02	2.20E-02	2.28E-01	9.94E-02	1.99E+00
CHILD	TOTALS	1.46E-01	8.51E-02	3.06E-02	1.22E-01	6.50E-02	1.99E+00
TEENAGE	TOTALS	1.48E-01	1.54E-01	3.65E-02	7.57E-02	5.15E-02	1.99E+00
ADULT	TOTALS	1.49E-01	1.49E-01	4.42E-02	7.68E-02	5.47E-02	1.99E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 13 NAME=Scottsbluff X= -36.3KM, Y= -68.9KM, Z= -50.0M, DIST= 77.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.05E-01	4.75E-02	1.61E-02	1.95E-01	8.35E-02	1.38E+00
CHILD	TOTALS	1.03E-01	7.11E-02	2.36E-02	1.03E-01	5.35E-02	1.38E+00
TEENAGE	TOTALS	1.04E-01	1.31E-01	2.87E-02	6.28E-02	4.18E-02	1.38E+00
ADULT	TOTALS	1.05E-01	1.27E-01	3.54E-02	6.38E-02	4.45E-02	1.38E+00

NUMBER 14 NAME=Van Tassell X= -67.5KM, Y= 21.0KM, Z= 49.0M, DIST= 70.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.53E-01	6.71E-02	2.32E-02	2.74E-01	1.17E-01	2.00E+00
CHILD	TOTALS	1.49E-01	1.00E-01	3.36E-02	1.45E-01	7.56E-02	2.00E+00
TEENAGE	TOTALS	1.51E-01	1.84E-01	4.09E-02	8.86E-02	5.92E-02	2.00E+00
ADULT	TOTALS	1.53E-01	1.78E-01	5.02E-02	8.99E-02	6.30E-02	2.00E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 15 NAME=Whitney X= 1.2KM, Y= 31.4KM, Z= -50.0M, DIST= 31.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.58E-01	8.87E-02	4.64E-02	2.86E-01	1.37E-01	5.05E+00
CHILD	TOTALS	3.54E-01	1.20E-01	5.67E-02	1.63E-01	9.68E-02	5.05E+00
TEENAGE	TOTALS	3.56E-01	2.00E-01	6.37E-02	1.09E-01	8.12E-02	5.05E+00
ADULT	TOTALS	3.58E-01	1.94E-01	7.25E-02	1.10E-01	8.48E-02	5.05E+00

NUMBER 16 NAME=Residence 1 X= -0.8KM, Y= -0.4KM, Z= 6.0M, DIST= 0.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.32E+01	1.02E-01	1.01E-01	1.06E-01	1.03E-01	2.19E+02
CHILD	TOTALS	1.32E+01	1.02E-01	1.01E-01	1.03E-01	1.02E-01	2.19E+02
TEENAGE	TOTALS	1.32E+01	1.04E-01	1.01E-01	1.02E-01	1.01E-01	2.19E+02
ADULT	TOTALS	1.32E+01	1.04E-01	1.01E-01	1.02E-01	1.02E-01	2.19E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 17 NAME=Residence 2 X= 1.0KM, Y= 0.3KM, Z= -4.0M, DIST= 1.0KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.30E+01	7.91E-02	7.83E-02	8.27E-02	7.99E-02	2.16E+02
CHILD	TOTALS	1.30E+01	7.96E-02	7.85E-02	8.04E-02	7.92E-02	2.16E+02
TEENAGE	TOTALS	1.30E+01	8.11E-02	7.86E-02	7.94E-02	7.89E-02	2.16E+02
ADULT	TOTALS	1.30E+01	8.10E-02	7.88E-02	7.95E-02	7.90E-02	2.16E+02

NUMBER 18 NAME=Residence 3 X= -0.8KM, Y= -1.9KM, Z= -16.0M, DIST= 2.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.07E+00	1.03E-01	9.94E-02	1.20E-01	1.07E-01	6.63E+01
CHILD	TOTALS	4.07E+00	1.06E-01	1.00E-01	1.10E-01	1.04E-01	6.63E+01
TEENAGE	TOTALS	4.07E+00	1.13E-01	1.01E-01	1.05E-01	1.02E-01	6.63E+01
ADULT	TOTALS	4.07E+00	1.12E-01	1.02E-01	1.05E-01	1.03E-01	6.63E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 19 NAME=Residence 4 X= -0.4KM, Y= -3.4KM, Z= -31.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.07E+00	1.31E-01	1.22E-01	1.73E-01	1.41E-01	4.92E+01
CHILD	TOTALS	3.07E+00	1.38E-01	1.24E-01	1.47E-01	1.33E-01	4.92E+01
TEENAGE	TOTALS	3.07E+00	1.55E-01	1.26E-01	1.35E-01	1.29E-01	4.92E+01
ADULT	TOTALS	3.07E+00	1.53E-01	1.28E-01	1.36E-01	1.30E-01	4.92E+01

NUMBER 20 NAME=Residence 5 X= 1.9KM, Y= -4.3KM, Z= -36.0M, DIST= 4.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.51E+00	1.85E-01	1.67E-01	2.66E-01	2.05E-01	5.58E+01
CHILD	TOTALS	3.51E+00	1.98E-01	1.72E-01	2.16E-01	1.88E-01	5.58E+01
TEENAGE	TOTALS	3.51E+00	2.31E-01	1.75E-01	1.93E-01	1.82E-01	5.58E+01
ADULT	TOTALS	3.51E+00	2.29E-01	1.78E-01	1.94E-01	1.83E-01	5.58E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 21 NAME=Residence 6 X= -4.7KM, Y= 1.9KM, Z= 22.0M, DIST= 5.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.33E+00	3.20E-01	2.79E-01	5.11E-01	3.66E-01	5.10E+01
CHILD	TOTALS	3.33E+00	3.51E-01	2.89E-01	3.92E-01	3.28E-01	5.10E+01
TEENAGE	TOTALS	3.33E+00	4.28E-01	2.96E-01	3.40E-01	3.13E-01	5.10E+01
ADULT	TOTALS	3.33E+00	4.22E-01	3.04E-01	3.41E-01	3.16E-01	5.10E+01

NUMBER 22 NAME=Residence 7 X= 2.4KM, Y= 3.6KM, Z= 76.0M, DIST= 4.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.86E+00	4.44E-01	3.96E-01	6.66E-01	4.98E-01	7.46E+01
CHILD	TOTALS	4.85E+00	4.79E-01	4.08E-01	5.27E-01	4.53E-01	7.46E+01
TEENAGE	TOTALS	4.86E+00	5.69E-01	4.16E-01	4.67E-01	4.35E-01	7.46E+01
ADULT	TOTALS	4.86E+00	5.63E-01	4.26E-01	4.68E-01	4.40E-01	7.46E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 23 NAME=Residence 8 X= 4.7KM, Y= -4.4KM, Z= -50.0M, DIST= 6.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.65E+00	8.37E-02	7.43E-02	1.27E-01	9.41E-02	2.63E+01
CHILD	TOTALS	1.65E+00	9.05E-02	7.66E-02	9.99E-02	8.54E-02	2.63E+01
TEENAGE	TOTALS	1.65E+00	1.08E-01	7.82E-02	8.81E-02	8.20E-02	2.63E+01
ADULT	TOTALS	1.65E+00	1.07E-01	8.01E-02	8.84E-02	8.28E-02	2.63E+01

NUMBER 24 NAME=Unoccupied 1 X= -0.9KM, Y= 2.0KM, Z= 21.0M, DIST= 2.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.24E+01	5.55E-01	5.30E-01	6.69E-01	5.83E-01	1.97E+02
CHILD	TOTALS	1.24E+01	5.73E-01	5.36E-01	5.98E-01	5.59E-01	1.97E+02
TEENAGE	TOTALS	1.24E+01	6.20E-01	5.40E-01	5.67E-01	5.50E-01	1.97E+02
ADULT	TOTALS	1.24E+01	6.16E-01	5.45E-01	5.67E-01	5.52E-01	1.97E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 25 NAME=Unoccupied 2 X= 2.0KM, Y= 2.8KM, Z= 69.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.54E+00	4.97E-01	4.57E-01	6.83E-01	5.42E-01	1.02E+02
CHILD	TOTALS	6.54E+00	5.27E-01	4.67E-01	5.67E-01	5.05E-01	1.02E+02
TEENAGE	TOTALS	6.54E+00	6.02E-01	4.74E-01	5.16E-01	4.90E-01	1.02E+02
ADULT	TOTALS	6.54E+00	5.97E-01	4.82E-01	5.18E-01	4.93E-01	1.02E+02

NUMBER 26 NAME=North Boundary X= 0.0KM, Y= 2.6KM, Z= 29.0M, DIST= 2.6KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.11E+01	6.70E-01	6.31E-01	8.49E-01	7.13E-01	1.75E+02
CHILD	TOTALS	1.11E+01	6.98E-01	6.40E-01	7.37E-01	6.77E-01	1.75E+02
TEENAGE	TOTALS	1.11E+01	7.71E-01	6.47E-01	6.88E-01	6.63E-01	1.75E+02
ADULT	TOTALS	1.11E+01	7.66E-01	6.55E-01	6.90E-01	6.66E-01	1.75E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 27 NAME=East Boundary X= 1.4KM, Y= 0.3KM, Z= -20.0M, DIST= 1.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	5.69E+00	4.80E-02	4.72E-02	5.15E-02	4.88E-02	9.40E+01
CHILD	TOTALS	5.69E+00	4.85E-02	4.74E-02	4.93E-02	4.81E-02	9.40E+01
TEENAGE	TOTALS	5.69E+00	4.99E-02	4.75E-02	4.83E-02	4.78E-02	9.40E+01
ADULT	TOTALS	5.69E+00	4.98E-02	4.77E-02	4.83E-02	4.79E-02	9.40E+01

NUMBER 28 NAME=South Boundary X= 0.0KM, Y= -0.5KM, Z= 13.0M, DIST= 0.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	9.43E+01	2.35E-01	2.34E-01	2.38E-01	2.35E-01	1.57E+03
CHILD	TOTALS	9.43E+01	2.35E-01	2.34E-01	2.36E-01	2.35E-01	1.57E+03
TEENAGE	TOTALS	9.43E+01	2.36E-01	2.34E-01	2.35E-01	2.34E-01	1.57E+03
ADULT	TOTALS	9.43E+01	2.36E-01	2.34E-01	2.35E-01	2.35E-01	1.57E+03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 29 NAME=West Boundary X= -0.7KM, Y= 0.0KM, Z= 49.0M, DIST= 0.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.10E+01	6.15E-01	6.10E-01	6.37E-01	6.20E-01	1.01E+03
CHILD	TOTALS	6.10E+01	6.19E-01	6.11E-01	6.23E-01	6.16E-01	1.01E+03
TEENAGE	TOTALS	6.10E+01	6.28E-01	6.12E-01	6.17E-01	6.14E-01	1.01E+03
ADULT	TOTALS	6.10E+01	6.27E-01	6.13E-01	6.17E-01	6.15E-01	1.01E+03

NUMBER 30 NAME=Minatare X= -22.4KM, Y= -75.6KM, Z= -41.4M, DIST= 78.8KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.35E-01	6.06E-02	2.06E-02	2.49E-01	1.06E-01	1.76E+00
CHILD	TOTALS	1.31E-01	9.06E-02	3.01E-02	1.31E-01	6.83E-02	1.76E+00
TEENAGE	TOTALS	1.34E-01	1.67E-01	3.67E-02	8.01E-02	5.33E-02	1.76E+00
ADULT	TOTALS	1.35E-01	1.62E-01	4.52E-02	8.14E-02	5.68E-02	1.76E+00

Program execution time = 0.28 seconds

APPENDIX B - MEA RADIATION DOSE RATES FROM MILDOS

Appendix B contains the print out from the computer program MILDOS in the following order:

Appendix	Title	Radon Source	Weather Data	Purge Rate
B3	MARMU15R	MU1-5 RESTORATION	MEA	44

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POPULATION DOSE SUMMARY 6
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REGION: Marsland All Well Field CODE: MILDOS-AREA (02/97) PAGE 2

METSET: DATA: MarMU15R.MIL 10/07/11

JOINT FREQUENCY IN PERCENT, DIRECTION INDICATES WHERE WIND IS FROM FREQWS=0.14427,0.29579,0.30967,0.17441,0.05798,0.01793

MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTALS
STABILITY CLASS 1																	
1.5	0.1410	0.0240	0.0710	0.0820	0.0940	0.1300	0.1060	0.2120	0.1770	0.3540	0.1410	0.0940	0.1180	0.0820	0.0590	0.0590	1.9440
5.5	0.2360	0.1530	0.1890	0.1770	0.1770	0.2590	0.2000	0.2120	0.2120	0.2590	0.2240	0.4010	0.1180	0.1180	0.2000	0.2120	3.3470
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.3770	0.1770	0.2600	0.2590	0.2710	0.3890	0.3060	0.4240	0.3890	0.6130	0.3650	0.4950	0.2360	0.2000	0.2590	0.2710	5.2910
STABILITY CLASS 2																	
1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0470	0.0470	0.0940	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.2710
5.5	0.2000	0.2240	0.2470	0.1770	0.1770	0.2470	0.3420	0.2470	0.2360	0.3180	0.3060	0.2590	0.1300	0.1650	0.2360	0.2120	3.7230
10.0	0.0240	0.0000	0.0120	0.0000	0.0120	0.0350	0.0350	0.0240	0.0710	0.0590	0.0000	0.0470	0.0240	0.0120	0.0710	0.0470	0.4730
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.2240	0.2240	0.2590	0.1770	0.1890	0.3170	0.3890	0.3180	0.3540	0.4710	0.3180	0.3060	0.1660	0.1890	0.3070	0.2590	4.4670
STABILITY CLASS 3																	
1.5	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0350	0.0240	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.1300
5.5	0.0590	0.0590	0.0590	0.0820	0.1180	0.1770	0.1890	0.1530	0.1530	0.1410	0.1890	0.0820	0.0710	0.0470	0.0590	0.0940	1.7320
10.0	1.0300	0.4710	0.2950	0.3420	0.3300	0.5540	0.4120	0.4360	0.4950	0.4360	0.5660	0.6600	0.4360	0.4710	0.8130	0.7780	8.5250
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.1010	0.5300	0.3540	0.4240	0.4480	0.7310	0.6360	0.6010	0.6830	0.6010	0.7670	0.7420	0.5070	0.5180	0.8720	0.8720	10.3870
STABILITY CLASS 4																	
1.5	0.0240	0.0240	0.0000	0.0000	0.0120	0.0470	0.0240	0.0120	0.0120	0.0120	0.0240	0.0120	0.0000	0.0120	0.0120	0.0710	0.2980
5.5	0.7310	0.4710	0.1890	0.3060	0.5770	0.8840	1.0490	0.7540	0.5190	0.3890	0.4830	0.5070	0.4120	0.3770	0.6840	1.3550	9.6870
10.0	1.9100	1.0720	0.9190	0.7310	1.0370	0.9190	1.2140	1.6500	1.3080	0.8960	0.7900	1.4610	1.2730	1.4850	1.9090	2.3690	20.9430
15.5	1.7800	0.8600	0.3060	0.2000	0.3180	0.3060	0.3890	0.9550	1.3790	0.6720	0.3650	0.8720	1.2610	1.9560	3.0050	2.8170	17.4410
21.5	0.4120	0.2240	0.0120	0.0000	0.0120	0.0240	0.0350	0.3420	0.2830	0.1180	0.1410	0.2470	0.2950	0.7190	1.6970	1.2370	5.7980
28.0	0.1410	0.0120	0.0000	0.0120	0.0000	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.0240	0.2360	0.2950	0.5890	0.4480	1.7930
ALL	4.9980	2.6630	1.4260	1.2490	1.9560	2.1920	2.7110	3.7250	3.5130	2.0870	1.8030	3.1230	3.4770	4.8440	7.8960	8.2970	55.9600
STABILITY CLASS 5																	
1.5	0.1530	0.0710	0.0000	0.0000	0.0590	0.0350	0.0820	0.0710	0.0350	0.0000	0.0350	0.0350	0.0120	0.0710	0.0590	0.0940	0.8120
5.5	0.2360	0.1300	0.1650	0.2000	0.1530	0.3060	0.2000	0.2470	0.2710	0.2000	0.2950	0.2830	0.2000	0.1300	0.3540	0.9660	4.3360
10.0	0.0470	0.0350	0.0240	0.0470	0.0590	0.0240	0.0240	0.0470	0.0240	0.0240	0.0590	0.1060	0.0940	0.0820	0.1410	0.1890	1.0260
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.4360	0.2360	0.1890	0.2470	0.2710	0.3650	0.3060	0.3650	0.3300	0.2240	0.3890	0.4240	0.3060	0.2830	0.5540	1.2490	6.1740
STABILITY CLASS 6																	
1.5	0.9780	0.6950	0.6360	0.5420	0.4480	0.5190	0.6720	0.6130	0.7540	0.6600	0.5770	0.7310	0.5660	0.5770	0.6720	1.3320	10.9720
5.5	0.7070	0.2830	0.1180	0.2590	0.3540	0.3180	0.3420	0.4830	0.3420	0.4950	0.4360	0.4710	0.2950	0.5540	0.4600	0.8370	6.7540
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.6850	0.9780	0.7540	0.8010	0.8020	0.8370	1.0140	1.0960	1.0960	1.1550	1.0130	1.2020	0.8610	1.1310	1.1320	2.1690	17.7260
ALL	8.8210	4.8080	3.2420	3.1570	3.9370	4.8310	5.3620	6.5290	6.3650	5.1510	4.6550	6.2920	5.5530	7.1650	11.0200	13.1170	100.0050

INDIVIDUAL RECEPTOR LOCATION DATA, 30 LOCATIONS INPUT THIS RUN

I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE	I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE
1	Alliance	30.00	-45.40	-50.00	54.42	1	16	Residence 1	-0.80	-0.40	6.00	0.89	1
2	Berea	21.50	-32.60	-50.00	39.05	1	17	Residence 2	1.00	0.30	-4.00	1.04	1
3	Chardon	22.30	35.80	-50.00	42.18	1	18	Residence 3	-0.80	-1.90	-16.00	2.06	1
4	Clinton	75.40	26.50	-50.00	79.92	1	19	Residence 4	-0.40	-3.40	-31.00	3.42	1
5	Crawford	-12.10	20.80	-50.00	24.06	1	20	Residence 5	1.90	-4.30	-36.00	4.70	1
6	Harrison	-50.50	22.50	633.00	55.29	1	21	Residence 6	-4.70	1.86	22.00	5.05	1
7	Hay Springs	47.10	18.80	-50.00	50.71	1	22	Residence 7	2.40	3.60	76.00	4.33	1
8	Hemmingford	14.30	-20.40	36.00	24.91	1	23	Residence 8	4.70	-4.40	-50.00	6.44	1
9	Marsland	-3.80	-6.10	-50.00	7.19	1	24	Unoccupied 1	-0.90	2.00	21.00	2.19	1
10	Mitchell	-48.50	-60.00	-50.00	77.15	1	25	Unoccupied 2	2.00	2.80	69.00	3.44	1
11	Oelrichs	4.90	75.30	-50.00	75.46	1	26	North Boundary	-0.70	0.70	29.00	0.99	1
12	Rushville	66.00	22.00	-50.00	69.57	1	27	East Boundary	1.40	0.30	-20.00	1.43	1
13	Scottsbluff	-36.30	-68.90	-50.00	77.88	1	28	South Boundary	0.00	-0.50	13.00	0.50	1
14	Van Tassell	-67.50	21.00	49.00	70.69	1	29	West Boundary	-0.70	0.00	49.00	0.70	1
15	Whitney	1.20	31.40	-50.00	31.42	1	30	Minatare	-22.40	-75.60	-41.40	78.85	1

MISCELLANEOUS INPUTABLE PARAMETER VALUES

DMM	DMA	TSTART	FFORI	FHAYI	FFORP	FHAYP	FPR(1)	FPR(2)	FPR(3)	ACTRAT
100.0	100.0	1.00	0.50	0.50	0.50	0.50	0.00	0.00	0.00	2.50

IPACT EQUALS 0, 0, 0, 0, 0,

JC EQUALS 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

TIME STEP DATA....	STEP NAMES	LENGTH, YRS	IFTODO
1		5.00	1

XRHO EQUALS 1.5, 2.5, 3.5, 4.5, 7.5, 15.0, 25.0, 35.0, 45.0, 55.0, 65.0, 75.0,

HDP EQUALS 50.0

POPULATION DISTRIBUTION

KILOMETERS	N 0.0	NNE 22.5	NE 45.0	ENE 67.5	E 90.0	ESE 112.5	SE 135.0	SSE 157.5	S 180.0	SSW 202.5	SW 225.0	WSW 247.5	W 270.0	WNW 292.5	NW 315.0	NNW 337.5
1.0- 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.0- 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.0- 4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0- 5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.0-10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.0-20.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20.0-30.0	0	0	0	0	0	0	993	0	0	0	0	0	0	0	0	1107
30.0-40.0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.0-50.0	0	5634	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50.0-60.0	0	0	0	652	0	0	0	9859	0	0	0	0	0	279	0	0
60.0-70.0	0	0	0	999	0	0	0	0	0	0	0	0	0	0	0	0
70.0-80.0	145	0	14	30	0	0	0	0	0	15542	1831	0	0	19	0	0
1.0-80.0	232	5634	14	1681	0	0	993	9859	0	15542	1831	0	0	298	0	1107

TOTAL 1-80 KM POPULATION IS 37191 PERSONS

NUMBER OF SOURCES= 5

NO.	KM X	KM Y	M Z	KM2 AREA	U-238	Th-230	CI/YEAR Ra-226	Pb-210	Rn-222	ID	PSIZE SET	M/SEC EXIT VEL	SOURCE NAME
1	-0.56	2.23	27.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E+03	1001	1	0.00E+00	MU-1
2	-0.55	1.65	16.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E+03	1002	1	0.00E+00	MU-2
3	-0.15	0.95	13.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.12E+03	1003	1	0.00E+00	MU-3
4	0.44	0.13	-4.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.60E+03	1004	1	0.00E+00	MU-4
5	0.84	-0.45	-15.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E+03	1005	1	0.00E+00	MU-5

INPUT TAILS ACTIVITIES, PCI/G

SET	URANIUM	THORIUM	RADIUM	LEAD
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AMAD AND FRACTIONAL DISTRIBUTION

SET	1.5	3.0	7.7	54.0
1	0.000	1.000	0.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.300	0.700

PARTICULATE SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
4	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
5	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

RADON SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
4	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
5	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

MARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 1--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.534E-01	2.861E+00	4.620E-02	2.146E+00	1.032E+00	1.361E+02
GROUND	1.926E-02	1.926E-02	1.926E-02	1.926E-02	1.926E-02	1.926E-02
CLOUD	1.166E+00	1.166E+00	1.166E+00	1.166E+00	1.166E+00	1.166E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.539E+00	4.047E+00	1.232E+00	3.332E+00	2.217E+00	1.373E+02

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GROUND	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CLOUD	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.534E-01	2.861E+00	4.620E-02	2.146E+00	1.032E+00	1.361E+02
GROUND	1.926E-02	1.926E-02	1.926E-02	1.926E-02	1.926E-02	1.926E-02
CLOUD	1.166E+00	1.166E+00	1.166E+00	1.166E+00	1.166E+00	1.166E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.539E+00	4.047E+00	1.232E+00	3.332E+00	2.217E+00	1.373E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 1 NAME=Alliance X= 30.0KM, Y= -45.4KM, Z= -50.0M, DIST= 54.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.42E-01	1.11E-01	4.78E-02	4.07E-01	1.83E-01	4.69E+00
CHILD	TOTALS	3.36E-01	1.58E-01	6.29E-02	2.22E-01	1.23E-01	4.69E+00
TEENAGE	TOTALS	3.40E-01	2.78E-01	7.34E-02	1.42E-01	9.96E-02	4.69E+00
ADULT	TOTALS	3.42E-01	2.70E-01	8.67E-02	1.44E-01	1.05E-01	4.69E+00

NUMBER 2 NAME=Berea X= 21.5KM, Y= -32.6KM, Z= -50.0M, DIST= 39.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.85E-01	1.28E-01	6.37E-02	4.29E-01	2.02E-01	6.81E+00
CHILD	TOTALS	4.79E-01	1.76E-01	7.93E-02	2.42E-01	1.41E-01	6.81E+00
TEENAGE	TOTALS	4.82E-01	2.98E-01	9.00E-02	1.60E-01	1.17E-01	6.81E+00
ADULT	TOTALS	4.85E-01	2.90E-01	1.04E-01	1.62E-01	1.22E-01	6.81E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 3 NAME=Chardon X= 22.3KM, Y= 35.8KM, Z= -50.0M, DIST= 42.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.77E-01	8.83E-02	3.87E-02	3.20E-01	1.45E-01	3.80E+00
CHILD	TOTALS	2.72E-01	1.25E-01	5.06E-02	1.76E-01	9.78E-02	3.80E+00
TEENAGE	TOTALS	2.75E-01	2.19E-01	5.89E-02	1.12E-01	7.94E-02	3.80E+00
ADULT	TOTALS	2.77E-01	2.13E-01	6.93E-02	1.14E-01	8.37E-02	3.80E+00

NUMBER 4 NAME=Clinton X= 75.4KM, Y= 26.5KM, Z= -50.0M, DIST= 79.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.38E-01	6.17E-02	2.11E-02	2.53E-01	1.08E-01	1.81E+00
CHILD	TOTALS	1.34E-01	9.23E-02	3.07E-02	1.34E-01	6.96E-02	1.81E+00
TEENAGE	TOTALS	1.37E-01	1.70E-01	3.74E-02	8.16E-02	5.44E-02	1.81E+00
ADULT	TOTALS	1.38E-01	1.64E-01	4.60E-02	8.29E-02	5.79E-02	1.81E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 5 NAME=Crawford X= -12.1KM, Y= 20.8KM, Z= -50.0M, DIST= 24.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	5.58E-01	1.16E-01	6.90E-02	3.35E-01	1.69E-01	8.02E+00
CHILD	TOTALS	5.54E-01	1.51E-01	8.04E-02	1.98E-01	1.25E-01	8.02E+00
TEENAGE	TOTALS	5.57E-01	2.40E-01	8.82E-02	1.39E-01	1.08E-01	8.02E+00
ADULT	TOTALS	5.58E-01	2.33E-01	9.81E-02	1.40E-01	1.12E-01	8.02E+00

NUMBER 6 NAME=Harrison X= -50.5KM, Y= 22.5KM, Z= 633.0M, DIST= 55.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.10E-01	7.86E-02	3.06E-02	3.04E-01	1.34E-01	2.81E+00
CHILD	TOTALS	2.05E-01	1.15E-01	4.21E-02	1.63E-01	8.79E-02	2.81E+00
TEENAGE	TOTALS	2.08E-01	2.06E-01	5.00E-02	1.02E-01	7.00E-02	2.81E+00
ADULT	TOTALS	2.09E-01	1.99E-01	6.02E-02	1.04E-01	7.42E-02	2.81E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 7 NAME=Hay Springs X= 47.1KM, Y= 18.8KM, Z= -50.0M, DIST= 50.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.29E-01	7.60E-02	3.23E-02	2.80E-01	1.26E-01	3.12E+00
CHILD	TOTALS	2.25E-01	1.09E-01	4.28E-02	1.53E-01	8.43E-02	3.12E+00
TEENAGE	TOTALS	2.27E-01	1.92E-01	5.00E-02	9.72E-02	6.81E-02	3.12E+00
ADULT	TOTALS	2.28E-01	1.86E-01	5.92E-02	9.86E-02	7.19E-02	3.12E+00

NUMBER 8 NAME=Hemmingford X= 14.3KM, Y= -20.4KM, Z= 36.0M, DIST= 24.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	9.15E-01	1.99E-01	1.12E-01	6.05E-01	2.98E-01	1.31E+01
CHILD	TOTALS	9.07E-01	2.64E-01	1.33E-01	3.52E-01	2.16E-01	1.31E+01
TEENAGE	TOTALS	9.12E-01	4.29E-01	1.48E-01	2.41E-01	1.84E-01	1.31E+01
ADULT	TOTALS	9.14E-01	4.17E-01	1.66E-01	2.44E-01	1.91E-01	1.31E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 9 NAME=Marsland X= -3.8KM, Y= -6.1KM, Z= -50.0M, DIST= 7.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.11E+00	1.25E-01	1.00E-01	2.41E-01	1.53E-01	1.68E+01
CHILD	TOTALS	1.10E+00	1.44E-01	1.06E-01	1.69E-01	1.30E-01	1.68E+01
TEENAGE	TOTALS	1.11E+00	1.91E-01	1.10E-01	1.37E-01	1.21E-01	1.68E+01
ADULT	TOTALS	1.11E+00	1.87E-01	1.16E-01	1.38E-01	1.23E-01	1.68E+01

NUMBER 10 NAME=Mitchell X= -48.5KM, Y= -60.0KM, Z= -50.0M, DIST= 77.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.01E-01	4.93E-02	1.58E-02	2.07E-01	8.78E-02	1.30E+00
CHILD	TOTALS	9.81E-02	7.45E-02	2.37E-02	1.09E-01	5.58E-02	1.30E+00
TEENAGE	TOTALS	1.00E-01	1.39E-01	2.92E-02	6.57E-02	4.32E-02	1.30E+00
ADULT	TOTALS	1.01E-01	1.34E-01	3.64E-02	6.67E-02	4.61E-02	1.30E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 11 NAME=Oelrichs X= 4.9KM, Y= 75.3KM, Z= -50.0M, DIST= 75.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.63E-01	7.53E-02	2.51E-02	3.12E-01	1.33E-01	2.12E+00
CHILD	TOTALS	1.59E-01	1.13E-01	3.70E-02	1.65E-01	8.51E-02	2.12E+00
TEENAGE	TOTALS	1.62E-01	2.09E-01	4.53E-02	1.00E-01	6.63E-02	2.12E+00
ADULT	TOTALS	1.63E-01	2.02E-01	5.60E-02	1.02E-01	7.06E-02	2.12E+00

NUMBER 12 NAME=Rushville X= 66.0KM, Y= 22.0KM, Z= -50.0M, DIST= 69.6KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.60E-01	6.50E-02	2.38E-02	2.59E-01	1.12E-01	2.12E+00
CHILD	TOTALS	1.56E-01	9.59E-02	3.36E-02	1.38E-01	7.29E-02	2.12E+00
TEENAGE	TOTALS	1.59E-01	1.75E-01	4.04E-02	8.51E-02	5.76E-02	2.12E+00
ADULT	TOTALS	1.60E-01	1.69E-01	4.91E-02	8.64E-02	6.11E-02	2.12E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 13 NAME=Scottsbluff X= -36.3KM, Y= -68.9KM, Z= -50.0M, DIST= 77.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.13E-01	5.36E-02	1.75E-02	2.24E-01	9.51E-02	1.46E+00
CHILD	TOTALS	1.10E-01	8.08E-02	2.61E-02	1.18E-01	6.06E-02	1.46E+00
TEENAGE	TOTALS	1.12E-01	1.50E-01	3.20E-02	7.13E-02	4.71E-02	1.46E+00
ADULT	TOTALS	1.13E-01	1.45E-01	3.97E-02	7.24E-02	5.02E-02	1.46E+00

NUMBER 14 NAME=Van Tassell X= -67.5KM, Y= 21.0KM, Z= 49.0M, DIST= 70.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.52E-01	6.65E-02	2.31E-02	2.71E-01	1.16E-01	2.00E+00
CHILD	TOTALS	1.48E-01	9.92E-02	3.34E-02	1.44E-01	7.49E-02	2.00E+00
TEENAGE	TOTALS	1.51E-01	1.82E-01	4.06E-02	8.78E-02	5.87E-02	2.00E+00
ADULT	TOTALS	1.52E-01	1.76E-01	4.98E-02	8.91E-02	6.25E-02	2.00E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 15 NAME=Whitney X= 1.2KM, Y= 31.4KM, Z= -50.0M, DIST= 31.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.15E-01	1.06E-01	5.42E-02	3.48E-01	1.65E-01	5.84E+00
CHILD	TOTALS	4.10E-01	1.45E-01	6.67E-02	1.97E-01	1.16E-01	5.84E+00
TEENAGE	TOTALS	4.13E-01	2.43E-01	7.53E-02	1.31E-01	9.68E-02	5.84E+00
ADULT	TOTALS	4.15E-01	2.36E-01	8.62E-02	1.33E-01	1.01E-01	5.84E+00

NUMBER 16 NAME=Residence 1 X= -0.8KM, Y= -0.4KM, Z= 6.0M, DIST= 0.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.57E+01	6.19E-01	5.95E-01	7.30E-01	6.46E-01	2.53E+02
CHILD	TOTALS	1.57E+01	6.37E-01	6.01E-01	6.61E-01	6.24E-01	2.53E+02
TEENAGE	TOTALS	1.57E+01	6.82E-01	6.05E-01	6.31E-01	6.15E-01	2.53E+02
ADULT	TOTALS	1.57E+01	6.78E-01	6.10E-01	6.31E-01	6.17E-01	2.53E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 17 NAME=Residence 2 X= 1.0KM, Y= 0.3KM, Z= -4.0M, DIST= 1.0KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.43E+01	5.89E-01	5.76E-01	6.47E-01	6.03E-01	7.29E+02
CHILD	TOTALS	4.43E+01	5.98E-01	5.79E-01	6.10E-01	5.91E-01	7.29E+02
TEENAGE	TOTALS	4.43E+01	6.21E-01	5.81E-01	5.95E-01	5.86E-01	7.29E+02
ADULT	TOTALS	4.43E+01	6.20E-01	5.84E-01	5.95E-01	5.87E-01	7.29E+02

NUMBER 18 NAME=Residence 3 X= -0.8KM, Y= -1.9KM, Z= -16.0M, DIST= 2.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.82E+00	4.28E-01	3.99E-01	5.65E-01	4.61E-01	1.07E+02
CHILD	TOTALS	6.82E+00	4.50E-01	4.06E-01	4.80E-01	4.34E-01	1.07E+02
TEENAGE	TOTALS	6.82E+00	5.06E-01	4.11E-01	4.42E-01	4.23E-01	1.07E+02
ADULT	TOTALS	6.82E+00	5.02E-01	4.17E-01	4.43E-01	4.25E-01	1.07E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 19 NAME=Residence 4 X= -0.4KM, Y= -3.4KM, Z= -31.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.14E+00	3.24E-01	2.90E-01	4.80E-01	3.62E-01	6.43E+01
CHILD	TOTALS	4.13E+00	3.49E-01	2.98E-01	3.82E-01	3.30E-01	6.43E+01
TEENAGE	TOTALS	4.14E+00	4.12E-01	3.04E-01	3.40E-01	3.18E-01	6.43E+01
ADULT	TOTALS	4.14E+00	4.07E-01	3.11E-01	3.41E-01	3.21E-01	6.43E+01

NUMBER 20 NAME=Residence 5 X= 1.9KM, Y= -4.3KM, Z= -36.0M, DIST= 4.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.82E+00	4.04E-01	3.52E-01	6.43E-01	4.62E-01	7.46E+01
CHILD	TOTALS	4.82E+00	4.42E-01	3.65E-01	4.94E-01	4.13E-01	7.46E+01
TEENAGE	TOTALS	4.82E+00	5.39E-01	3.73E-01	4.29E-01	3.94E-01	7.46E+01
ADULT	TOTALS	4.82E+00	5.32E-01	3.84E-01	4.30E-01	3.99E-01	7.46E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 21 NAME=Residence 6 X= -4.7KM, Y= 1.9KM, Z= 22.0M, DIST= 5.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.44E+00	3.17E-01	2.79E-01	4.93E-01	3.60E-01	5.27E+01
CHILD	TOTALS	3.43E+00	3.45E-01	2.88E-01	3.83E-01	3.24E-01	5.27E+01
TEENAGE	TOTALS	3.43E+00	4.17E-01	2.95E-01	3.35E-01	3.10E-01	5.27E+01
ADULT	TOTALS	3.44E+00	4.12E-01	3.03E-01	3.37E-01	3.14E-01	5.27E+01

NUMBER 22 NAME=Residence 7 X= 2.4KM, Y= 3.6KM, Z= 76.0M, DIST= 4.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.14E+00	4.86E-01	4.42E-01	6.86E-01	5.34E-01	9.52E+01
CHILD	TOTALS	6.13E+00	5.18E-01	4.53E-01	5.61E-01	4.94E-01	9.52E+01
TEENAGE	TOTALS	6.14E+00	5.99E-01	4.60E-01	5.06E-01	4.78E-01	9.52E+01
ADULT	TOTALS	6.14E+00	5.93E-01	4.69E-01	5.08E-01	4.82E-01	9.52E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 23 NAME=Residence 8 X= 4.7KM, Y= -4.4KM, Z= -50.0M, DIST= 6.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.12E+00	1.65E-01	1.40E-01	2.83E-01	1.94E-01	3.31E+01
CHILD	TOTALS	2.12E+00	1.84E-01	1.46E-01	2.10E-01	1.70E-01	3.31E+01
TEENAGE	TOTALS	2.12E+00	2.32E-01	1.50E-01	1.78E-01	1.61E-01	3.31E+01
ADULT	TOTALS	2.12E+00	2.29E-01	1.56E-01	1.78E-01	1.63E-01	3.31E+01

NUMBER 24 NAME=Unoccupied 1 X= -0.9KM, Y= 2.0KM, Z= 21.0M, DIST= 2.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	7.46E+01	7.08E-01	6.92E-01	7.82E-01	7.26E-01	1.23E+03
CHILD	TOTALS	7.46E+01	7.20E-01	6.96E-01	7.36E-01	7.11E-01	1.23E+03
TEENAGE	TOTALS	7.46E+01	7.50E-01	6.99E-01	7.16E-01	7.05E-01	1.23E+03
ADULT	TOTALS	7.46E+01	7.48E-01	7.02E-01	7.16E-01	7.07E-01	1.23E+03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 25 NAME=Unoccupied 2 X= 2.0KM, Y= 2.8KM, Z= 69.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	8.57E+00	5.49E-01	5.13E-01	7.16E-01	5.90E-01	1.35E+02
CHILD	TOTALS	8.56E+00	5.76E-01	5.22E-01	6.12E-01	5.56E-01	1.35E+02
TEENAGE	TOTALS	8.57E+00	6.44E-01	5.28E-01	5.66E-01	5.42E-01	1.35E+02
ADULT	TOTALS	8.57E+00	6.39E-01	5.35E-01	5.67E-01	5.46E-01	1.35E+02

NUMBER 26 NAME=North Boundary X= -0.7KM, Y= 0.7KM, Z= 29.0M, DIST= 1.0KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.13E+01	8.24E-01	8.07E-01	9.02E-01	8.43E-01	6.76E+02
CHILD	TOTALS	4.13E+01	8.36E-01	8.11E-01	8.53E-01	8.27E-01	6.76E+02
TEENAGE	TOTALS	4.13E+01	8.68E-01	8.14E-01	8.32E-01	8.21E-01	6.76E+02
ADULT	TOTALS	4.13E+01	8.66E-01	8.17E-01	8.32E-01	8.22E-01	6.76E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 27 NAME=East Boundary X= 1.4KM, Y= 0.3KM, Z= -20.0M, DIST= 1.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.66E+01	3.10E-01	3.02E-01	3.47E-01	3.19E-01	2.72E+02
CHILD	TOTALS	1.66E+01	3.16E-01	3.04E-01	3.24E-01	3.12E-01	2.72E+02
TEENAGE	TOTALS	1.66E+01	3.31E-01	3.06E-01	3.14E-01	3.09E-01	2.72E+02
ADULT	TOTALS	1.66E+01	3.30E-01	3.07E-01	3.14E-01	3.10E-01	2.72E+02

NUMBER 28 NAME=South Boundary X= 0.0KM, Y= -0.5KM, Z= 13.0M, DIST= 0.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.48E+01	9.11E-01	8.79E-01	1.06E+00	9.47E-01	5.67E+02
CHILD	TOTALS	3.48E+01	9.35E-01	8.86E-01	9.67E-01	9.17E-01	5.67E+02
TEENAGE	TOTALS	3.48E+01	9.95E-01	8.92E-01	9.26E-01	9.05E-01	5.67E+02
ADULT	TOTALS	3.48E+01	9.91E-01	8.99E-01	9.27E-01	9.08E-01	5.67E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 29 NAME=West Boundary X= -0.7KM, Y= 0.0KM, Z= 49.0M, DIST= 0.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.39E+01	7.56E-01	7.33E-01	8.65E-01	7.83E-01	3.87E+02
CHILD	TOTALS	2.39E+01	7.74E-01	7.38E-01	7.97E-01	7.61E-01	3.87E+02
TEENAGE	TOTALS	2.39E+01	8.18E-01	7.42E-01	7.68E-01	7.52E-01	3.87E+02
ADULT	TOTALS	2.39E+01	8.15E-01	7.47E-01	7.68E-01	7.54E-01	3.87E+02

NUMBER 30 NAME=Minatare X= -22.4KM, Y= -75.6KM, Z= -41.4M, DIST= 78.8KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.43E-01	6.72E-02	2.21E-02	2.80E-01	1.19E-01	1.85E+00
CHILD	TOTALS	1.39E-01	1.01E-01	3.28E-02	1.47E-01	7.59E-02	1.85E+00
TEENAGE	TOTALS	1.42E-01	1.87E-01	4.02E-02	8.93E-02	5.91E-02	1.85E+00
ADULT	TOTALS	1.43E-01	1.81E-01	4.98E-02	9.07E-02	6.30E-02	1.85E+00

Program execution time = 1.98 seconds

APPENDIX B - MEA RADIATION DOSE RATES FROM MILDOS

Appendix B contains the print out from the computer program MILDOS in the following order:

Appendix	Title	Radon Source	Weather Data	Purge Rate
B4	MARMU15N	MU1-5 NEW WELL	MEA	44

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METSET: DATA: MarMU15N.MIL 10/07/11

JOINT FREQUENCY IN PERCENT, DIRECTION INDICATES WHERE WIND IS FROM FREQWS=0.14427,0.29579,0.30967,0.17441,0.05798,0.01793

MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTALS
STABILITY CLASS 1																	
1.5	0.1410	0.0240	0.0710	0.0820	0.0940	0.1300	0.1060	0.2120	0.1770	0.3540	0.1410	0.0940	0.1180	0.0820	0.0590	0.0590	1.9440
5.5	0.2360	0.1530	0.1890	0.1770	0.1770	0.2590	0.2000	0.2120	0.2120	0.2590	0.2240	0.4010	0.1180	0.1180	0.2000	0.2120	3.3470
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.3770	0.1770	0.2600	0.2590	0.2710	0.3890	0.3060	0.4240	0.3890	0.6130	0.3650	0.4950	0.2360	0.2000	0.2590	0.2710	5.2910
STABILITY CLASS 2																	
1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0470	0.0470	0.0940	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.2710
5.5	0.2000	0.2240	0.2470	0.1770	0.1770	0.2470	0.3420	0.2470	0.2360	0.3180	0.3060	0.2590	0.1300	0.1650	0.2360	0.2120	3.7230
10.0	0.0240	0.0000	0.0120	0.0000	0.0120	0.0350	0.0350	0.0240	0.0710	0.0590	0.0000	0.0470	0.0240	0.0120	0.0710	0.0470	0.4730
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.2240	0.2240	0.2590	0.1770	0.1890	0.3170	0.3890	0.3180	0.3540	0.4710	0.3180	0.3060	0.1660	0.1890	0.3070	0.2590	4.4670
STABILITY CLASS 3																	
1.5	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0350	0.0240	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.1300
5.5	0.0590	0.0590	0.0590	0.0820	0.1180	0.1770	0.1890	0.1530	0.1530	0.1410	0.1890	0.0820	0.0710	0.0470	0.0590	0.0940	1.7320
10.0	1.0300	0.4710	0.2950	0.3420	0.3300	0.5540	0.4120	0.4360	0.4950	0.4360	0.5660	0.6600	0.4360	0.4710	0.8130	0.7780	8.5250
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.1010	0.5300	0.3540	0.4240	0.4480	0.7310	0.6360	0.6010	0.6830	0.6010	0.7670	0.7420	0.5070	0.5180	0.8720	0.8720	10.3870
STABILITY CLASS 4																	
1.5	0.0240	0.0240	0.0000	0.0000	0.0120	0.0470	0.0240	0.0120	0.0120	0.0120	0.0240	0.0120	0.0000	0.0120	0.0120	0.0710	0.2980
5.5	0.7310	0.4710	0.1890	0.3060	0.5770	0.8840	1.0490	0.7540	0.5190	0.3890	0.4830	0.5070	0.4120	0.3770	0.6840	1.3550	9.6870
10.0	1.9100	1.0720	0.9190	0.7310	1.0370	0.9190	1.2140	1.6500	1.3080	0.8960	0.7900	1.4610	1.2730	1.4850	1.9090	2.3690	20.9430
15.5	1.7800	0.8600	0.3060	0.2000	0.3180	0.3060	0.3890	0.9550	1.3790	0.6720	0.3650	0.8720	1.2610	1.9560	3.0050	2.8170	17.4410
21.5	0.4120	0.2240	0.0120	0.0000	0.0120	0.0240	0.0350	0.3420	0.2830	0.1180	0.1410	0.2470	0.2950	0.7190	1.6970	1.2370	5.7980
28.0	0.1410	0.0120	0.0000	0.0120	0.0000	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.0240	0.2360	0.2950	0.5890	0.4480	1.7930
ALL	4.9980	2.6630	1.4260	1.2490	1.9560	2.1920	2.7110	3.7250	3.5130	2.0870	1.8030	3.1230	3.4770	4.8440	7.8960	8.2970	55.9600
STABILITY CLASS 5																	
1.5	0.1530	0.0710	0.0000	0.0000	0.0590	0.0350	0.0820	0.0710	0.0350	0.0000	0.0350	0.0350	0.0120	0.0710	0.0590	0.0940	0.8120
5.5	0.2360	0.1300	0.1650	0.2000	0.1530	0.3060	0.2000	0.2470	0.2710	0.2000	0.2950	0.2830	0.2000	0.1300	0.3540	0.9660	4.3360
10.0	0.0470	0.0350	0.0240	0.0470	0.0590	0.0240	0.0240	0.0470	0.0240	0.0240	0.0590	0.1060	0.0940	0.0820	0.1410	0.1890	1.0260
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.4360	0.2360	0.1890	0.2470	0.2710	0.3650	0.3060	0.3650	0.3300	0.2240	0.3890	0.4240	0.3060	0.2830	0.5540	1.2490	6.1740
STABILITY CLASS 6																	
1.5	0.9780	0.6950	0.6360	0.5420	0.4480	0.5190	0.6720	0.6130	0.7540	0.6600	0.5770	0.7310	0.5660	0.5770	0.6720	1.3320	10.9720
5.5	0.7070	0.2830	0.1180	0.2590	0.3540	0.3180	0.3420	0.4830	0.3420	0.4950	0.4360	0.4710	0.2950	0.5540	0.4600	0.8370	6.7540
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.6850	0.9780	0.7540	0.8010	0.8020	0.8370	1.0140	1.0960	1.0960	1.1550	1.0130	1.2020	0.8610	1.1310	1.1320	2.1690	17.7260
ALL	8.8210	4.8080	3.2420	3.1570	3.9370	4.8310	5.3620	6.5290	6.3650	5.1510	4.6550	6.2920	5.5530	7.1650	11.0200	13.1170	100.0050

INDIVIDUAL RECEPTOR LOCATION DATA, 30 LOCATIONS INPUT THIS RUN

I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE	I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE
1	Alliance	30.00	-45.40	-50.00	54.42	1	16	Residence 1	-0.80	-0.40	6.00	0.89	1
2	Berea	21.50	-32.60	-50.00	39.05	1	17	Residence 2	1.00	0.30	-4.00	1.04	1
3	Chardon	22.30	35.80	-50.00	42.18	1	18	Residence 3	-0.80	-1.90	-16.00	2.06	1
4	Clinton	75.40	26.50	-50.00	79.92	1	19	Residence 4	-0.40	-3.40	-31.00	3.42	1
5	Crawford	-12.10	20.80	-50.00	24.06	1	20	Residence 5	1.90	-4.30	-36.00	4.70	1
6	Harrison	-50.50	22.50	633.00	55.29	1	21	Residence 6	-4.70	1.86	22.00	5.05	1
7	Hay Springs	47.10	18.80	-50.00	50.71	1	22	Residence 7	2.40	3.60	76.00	4.33	1
8	Hemmingford	14.30	-20.40	36.00	24.91	1	23	Residence 8	4.70	-4.40	-50.00	6.44	1
9	Marsland	-3.80	-6.10	-50.00	7.19	1	24	Unoccupied 1	-0.90	2.00	21.00	2.19	1
10	Mitchell	-48.50	-60.00	-50.00	77.15	1	25	Unoccupied 2	2.00	2.80	69.00	3.44	1
11	Oelrichs	4.90	75.30	-50.00	75.46	1	26	North Boundary	-0.70	0.70	29.00	0.99	1
12	Rushville	66.00	22.00	-50.00	69.57	1	27	East Boundary	1.40	0.30	-20.00	1.43	1
13	Scottsbluff	-36.30	-68.90	-50.00	77.88	1	28	South Boundary	0.00	-0.50	13.00	0.50	1
14	Van Tassell	-67.50	21.00	49.00	70.69	1	29	West Boundary	-0.70	0.00	49.00	0.70	1
15	Whitney	1.20	31.40	-50.00	31.42	1	30	Minatare	-22.40	-75.60	-41.40	78.85	1

MISCELLANEOUS INPUTABLE PARAMETER VALUES

DMM	DMA	TSTART	FFORI	FHAYI	FFORP	FHAYP	FPR(1)	FPR(2)	FPR(3)	ACTRAT
100.0	100.0	1.00	0.50	0.50	0.50	0.50	0.00	0.00	0.00	2.50

IPACT EQUALS 0, 0, 0, 0, 0,

JC EQUALS 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

TIME STEP DATA....	STEP NAMES	LENGTH, YRS	IFTODO
1		5.00	1

XRHO EQUALS 1.5, 2.5, 3.5, 4.5, 7.5, 15.0, 25.0, 35.0, 45.0, 55.0, 65.0, 75.0,

HDP EQUALS 50.0

POPULATION DISTRIBUTION

KILOMETERS	N 0.0	NNE 22.5	NE 45.0	ENE 67.5	E 90.0	ESE 112.5	SE 135.0	SSE 157.5	S 180.0	SSW 202.5	SW 225.0	WSW 247.5	W 270.0	WNW 292.5	NW 315.0	NNW 337.5
1.0- 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.0- 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.0- 4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0- 5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.0-10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.0-20.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20.0-30.0	0	0	0	0	0	0	993	0	0	0	0	0	0	0	0	1107
30.0-40.0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.0-50.0	0	5634	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50.0-60.0	0	0	0	652	0	0	0	9859	0	0	0	0	0	279	0	0
60.0-70.0	0	0	0	999	0	0	0	0	0	0	0	0	0	0	0	0
70.0-80.0	145	0	14	30	0	0	0	0	0	15542	1831	0	0	19	0	0
1.0-80.0	232	5634	14	1681	0	0	993	9859	0	15542	1831	0	0	298	0	1107

TOTAL 1-80 KM POPULATION IS 37191 PERSONS

NUMBER OF SOURCES= 5

NO.	KM X	KM Y	M Z	KM2 AREA	CI/YEAR U-238	Th-230	Ra-226	Pb-210	Rn-222	ID	PSIZE SET	M/SEC EXIT VEL	SOURCE NAME
1	-0.56	2.23	27.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-02	1001	1	0.00E+00	MU-1
2	-0.55	1.65	16.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-02	1002	1	0.00E+00	MU-2
3	-0.15	0.95	13.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-02	1003	1	0.00E+00	MU-3
4	0.44	0.13	-4.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-02	1004	1	0.00E+00	MU-4
5	0.84	-0.45	-15.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-02	1005	1	0.00E+00	MU-5

INPUT TAILS ACTIVITIES, PCI/G

SET	URANIUM	THORIUM	RADIUM	LEAD
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AMAD AND FRACTIONAL DISTRIBUTION

SET	1.5	3.0	7.7	54.0
1	0.000	1.000	0.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.300	0.700

PARTICULATE SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
4	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
5	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

RADON SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
4	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
5	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

MARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 1--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.263E-06	2.643E-05	4.266E-07	1.982E-05	9.530E-06	1.257E-03
GROUND	1.778E-07	1.778E-07	1.778E-07	1.778E-07	1.778E-07	1.778E-07
CLOUD	1.077E-05	1.077E-05	1.077E-05	1.077E-05	1.077E-05	1.077E-05
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.421E-05	3.737E-05	1.137E-05	3.076E-05	2.047E-05	1.268E-03

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GROUND	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CLOUD	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.263E-06	2.643E-05	4.266E-07	1.982E-05	9.530E-06	1.257E-03
GROUND	1.778E-07	1.778E-07	1.778E-07	1.778E-07	1.778E-07	1.778E-07
CLOUD	1.077E-05	1.077E-05	1.077E-05	1.077E-05	1.077E-05	1.077E-05
VEG. ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MEAT ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
MILK ING	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.421E-05	3.737E-05	1.137E-05	3.076E-05	2.047E-05	1.268E-03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 1 NAME=Alliance X= 30.0KM, Y= -45.4KM, Z= -50.0M, DIST= 54.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.18E-06	1.03E-06	4.45E-07	3.79E-06	1.71E-06	4.36E-05
CHILD	TOTALS	3.13E-06	1.47E-06	5.86E-07	2.07E-06	1.15E-06	4.36E-05
TEENAGE	TOTALS	3.16E-06	2.59E-06	6.83E-07	1.32E-06	9.28E-07	4.36E-05
ADULT	TOTALS	3.18E-06	2.51E-06	8.07E-07	1.34E-06	9.79E-07	4.36E-05

NUMBER 2 NAME=Berea X= 21.5KM, Y= -32.6KM, Z= -50.0M, DIST= 39.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.52E-06	1.20E-06	5.94E-07	4.01E-06	1.88E-06	6.35E-05
CHILD	TOTALS	4.47E-06	1.65E-06	7.40E-07	2.26E-06	1.31E-06	6.35E-05
TEENAGE	TOTALS	4.50E-06	2.79E-06	8.40E-07	1.49E-06	1.09E-06	6.35E-05
ADULT	TOTALS	4.52E-06	2.71E-06	9.67E-07	1.51E-06	1.14E-06	6.35E-05

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 3 NAME=Chardon X= 22.3KM, Y= 35.8KM, Z= -50.0M, DIST= 42.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.57E-06	8.23E-07	3.60E-07	2.99E-06	1.35E-06	3.52E-05
CHILD	TOTALS	2.53E-06	1.17E-06	4.71E-07	1.64E-06	9.12E-07	3.52E-05
TEENAGE	TOTALS	2.55E-06	2.05E-06	5.48E-07	1.05E-06	7.40E-07	3.52E-05
ADULT	TOTALS	2.57E-06	1.98E-06	6.45E-07	1.06E-06	7.80E-07	3.52E-05

NUMBER 4 NAME=Clinton X= 75.4KM, Y= 26.5KM, Z= -50.0M, DIST= 79.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.28E-06	5.74E-07	1.96E-07	2.36E-06	1.01E-06	1.67E-05
CHILD	TOTALS	1.25E-06	8.58E-07	2.85E-07	1.25E-06	6.47E-07	1.67E-05
TEENAGE	TOTALS	1.27E-06	1.58E-06	3.48E-07	7.59E-07	5.05E-07	1.67E-05
ADULT	TOTALS	1.28E-06	1.53E-06	4.28E-07	7.71E-07	5.38E-07	1.67E-05

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 5 NAME=Crawford X= -12.1KM, Y= 20.8KM, Z= -50.0M, DIST= 24.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	5.16E-06	1.08E-06	6.40E-07	3.14E-06	1.58E-06	7.41E-05
CHILD	TOTALS	5.12E-06	1.41E-06	7.47E-07	1.86E-06	1.17E-06	7.41E-05
TEENAGE	TOTALS	5.15E-06	2.24E-06	8.21E-07	1.30E-06	1.00E-06	7.41E-05
ADULT	TOTALS	5.16E-06	2.18E-06	9.13E-07	1.31E-06	1.04E-06	7.41E-05

NUMBER 6 NAME=Harrison X= -50.5KM, Y= 22.5KM, Z= 633.0M, DIST= 55.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.92E-06	7.22E-07	2.80E-07	2.79E-06	1.23E-06	2.58E-05
CHILD	TOTALS	1.88E-06	1.05E-06	3.86E-07	1.50E-06	8.07E-07	2.58E-05
TEENAGE	TOTALS	1.91E-06	1.89E-06	4.59E-07	9.37E-07	6.43E-07	2.58E-05
ADULT	TOTALS	1.92E-06	1.83E-06	5.52E-07	9.51E-07	6.81E-07	2.58E-05

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 7 NAME=Hay Springs X= 47.1KM, Y= 18.8KM, Z= -50.0M, DIST= 50.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.13E-06	7.10E-07	3.01E-07	2.62E-06	1.18E-06	2.90E-05
CHILD	TOTALS	2.09E-06	1.01E-06	3.99E-07	1.43E-06	7.88E-07	2.90E-05
TEENAGE	TOTALS	2.11E-06	1.79E-06	4.67E-07	9.08E-07	6.36E-07	2.90E-05
ADULT	TOTALS	2.13E-06	1.74E-06	5.53E-07	9.21E-07	6.72E-07	2.90E-05

NUMBER 8 NAME=Hemmingford X= 14.3KM, Y= -20.4KM, Z= 36.0M, DIST= 24.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	8.48E-06	1.84E-06	1.04E-06	5.57E-06	2.75E-06	1.22E-04
CHILD	TOTALS	8.40E-06	2.44E-06	1.23E-06	3.25E-06	1.99E-06	1.22E-04
TEENAGE	TOTALS	8.45E-06	3.95E-06	1.36E-06	2.23E-06	1.70E-06	1.22E-04
ADULT	TOTALS	8.47E-06	3.84E-06	1.53E-06	2.25E-06	1.76E-06	1.22E-04

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 9 NAME=Marsland X= -3.8KM, Y= -6.1KM, Z= -50.0M, DIST= 7.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.05E-05	1.20E-06	9.58E-07	2.30E-06	1.46E-06	1.59E-04
CHILD	TOTALS	1.05E-05	1.37E-06	1.02E-06	1.61E-06	1.24E-06	1.59E-04
TEENAGE	TOTALS	1.05E-05	1.82E-06	1.06E-06	1.31E-06	1.15E-06	1.59E-04
ADULT	TOTALS	1.05E-05	1.79E-06	1.11E-06	1.32E-06	1.17E-06	1.59E-04

NUMBER 10 NAME=Mitchell X= -48.5KM, Y= -60.0KM, Z= -50.0M, DIST= 77.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	9.38E-07	4.58E-07	1.46E-07	1.93E-06	8.17E-07	1.21E-05
CHILD	TOTALS	9.09E-07	6.93E-07	2.20E-07	1.01E-06	5.18E-07	1.21E-05
TEENAGE	TOTALS	9.27E-07	1.29E-06	2.72E-07	6.11E-07	4.02E-07	1.21E-05
ADULT	TOTALS	9.37E-07	1.25E-06	3.38E-07	6.20E-07	4.29E-07	1.21E-05

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 11 NAME=Oelrichs X= 4.9KM, Y= 75.3KM, Z= -50.0M, DIST= 75.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.51E-06	6.99E-07	2.32E-07	2.90E-06	1.23E-06	1.96E-05
CHILD	TOTALS	1.47E-06	1.05E-06	3.43E-07	1.53E-06	7.89E-07	1.96E-05
TEENAGE	TOTALS	1.49E-06	1.94E-06	4.20E-07	9.27E-07	6.14E-07	1.96E-05
ADULT	TOTALS	1.51E-06	1.88E-06	5.19E-07	9.42E-07	6.55E-07	1.96E-05

NUMBER 12 NAME=Rushville X= 66.0KM, Y= 22.0KM, Z= -50.0M, DIST= 69.6KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.48E-06	6.05E-07	2.21E-07	2.41E-06	1.05E-06	1.97E-05
CHILD	TOTALS	1.45E-06	8.93E-07	3.12E-07	1.28E-06	6.79E-07	1.97E-05
TEENAGE	TOTALS	1.47E-06	1.63E-06	3.76E-07	7.93E-07	5.36E-07	1.97E-05
ADULT	TOTALS	1.48E-06	1.57E-06	4.57E-07	8.04E-07	5.69E-07	1.97E-05

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 13 NAME=Scottsbluff X= -36.3KM, Y= -68.9KM, Z= -50.0M, DIST= 77.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.05E-06	4.99E-07	1.63E-07	2.08E-06	8.85E-07	1.35E-05
CHILD	TOTALS	1.02E-06	7.52E-07	2.42E-07	1.10E-06	5.64E-07	1.35E-05
TEENAGE	TOTALS	1.04E-06	1.40E-06	2.98E-07	6.63E-07	4.38E-07	1.35E-05
ADULT	TOTALS	1.05E-06	1.35E-06	3.69E-07	6.74E-07	4.67E-07	1.35E-05

NUMBER 14 NAME=Van Tassell X= -67.5KM, Y= 21.0KM, Z= 49.0M, DIST= 70.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.40E-06	6.13E-07	2.12E-07	2.50E-06	1.07E-06	1.84E-05
CHILD	TOTALS	1.36E-06	9.13E-07	3.08E-07	1.32E-06	6.90E-07	1.84E-05
TEENAGE	TOTALS	1.39E-06	1.68E-06	3.74E-07	8.08E-07	5.40E-07	1.84E-05
ADULT	TOTALS	1.40E-06	1.62E-06	4.58E-07	8.21E-07	5.75E-07	1.84E-05

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 15 NAME=Whitney X= 1.2KM, Y= 31.4KM, Z= -50.0M, DIST= 31.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.84E-06	9.88E-07	5.02E-07	3.25E-06	1.54E-06	5.41E-05
CHILD	TOTALS	3.80E-06	1.35E-06	6.20E-07	1.84E-06	1.08E-06	5.41E-05
TEENAGE	TOTALS	3.82E-06	2.27E-06	7.00E-07	1.22E-06	9.01E-07	5.41E-05
ADULT	TOTALS	3.84E-06	2.20E-06	8.02E-07	1.24E-06	9.43E-07	5.41E-05

NUMBER 16 NAME=Residence 1 X= -0.8KM, Y= -0.4KM, Z= 6.0M, DIST= 0.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.48E-04	5.62E-06	5.41E-06	6.57E-06	5.85E-06	2.38E-03
CHILD	TOTALS	1.48E-04	5.77E-06	5.46E-06	5.97E-06	5.66E-06	2.38E-03
TEENAGE	TOTALS	1.48E-04	6.15E-06	5.50E-06	5.72E-06	5.58E-06	2.38E-03
ADULT	TOTALS	1.48E-04	6.13E-06	5.54E-06	5.72E-06	5.60E-06	2.38E-03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 17 NAME=Residence 2 X= 1.0KM, Y= 0.3KM, Z= -4.0M, DIST= 1.0KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.31E-04	5.60E-06	5.49E-06	6.10E-06	5.72E-06	7.10E-03
CHILD	TOTALS	4.31E-04	5.68E-06	5.52E-06	5.79E-06	5.62E-06	7.10E-03
TEENAGE	TOTALS	4.31E-04	5.88E-06	5.53E-06	5.65E-06	5.58E-06	7.10E-03
ADULT	TOTALS	4.31E-04	5.86E-06	5.56E-06	5.65E-06	5.59E-06	7.10E-03

NUMBER 18 NAME=Residence 3 X= -0.8KM, Y= -1.9KM, Z= -16.0M, DIST= 2.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.53E-05	4.03E-06	3.76E-06	5.26E-06	4.33E-06	1.03E-03
CHILD	TOTALS	6.53E-05	4.22E-06	3.83E-06	4.49E-06	4.08E-06	1.03E-03
TEENAGE	TOTALS	6.53E-05	4.72E-06	3.87E-06	4.15E-06	3.98E-06	1.03E-03
ADULT	TOTALS	6.53E-05	4.69E-06	3.93E-06	4.16E-06	4.00E-06	1.03E-03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 19 NAME=Residence 4 X= -0.4KM, Y= -3.4KM, Z= -31.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.98E-05	3.09E-06	2.78E-06	4.53E-06	3.44E-06	6.18E-04
CHILD	TOTALS	3.97E-05	3.32E-06	2.85E-06	3.63E-06	3.15E-06	6.18E-04
TEENAGE	TOTALS	3.97E-05	3.90E-06	2.90E-06	3.24E-06	3.03E-06	6.18E-04
ADULT	TOTALS	3.97E-05	3.86E-06	2.97E-06	3.25E-06	3.06E-06	6.18E-04

NUMBER 20 NAME=Residence 5 X= 1.9KM, Y= -4.3KM, Z= -36.0M, DIST= 4.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.70E-05	3.91E-06	3.42E-06	6.16E-06	4.46E-06	7.28E-04
CHILD	TOTALS	4.70E-05	4.27E-06	3.54E-06	4.76E-06	4.00E-06	7.28E-04
TEENAGE	TOTALS	4.70E-05	5.18E-06	3.62E-06	4.14E-06	3.82E-06	7.28E-04
ADULT	TOTALS	4.70E-05	5.12E-06	3.72E-06	4.16E-06	3.86E-06	7.28E-04

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 21 NAME=Residence 6 X= -4.7KM, Y= 1.9KM, Z= 22.0M, DIST= 5.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.13E-05	2.92E-06	2.56E-06	4.58E-06	3.32E-06	4.80E-04
CHILD	TOTALS	3.13E-05	3.19E-06	2.65E-06	3.54E-06	2.99E-06	4.80E-04
TEENAGE	TOTALS	3.13E-05	3.86E-06	2.71E-06	3.09E-06	2.86E-06	4.80E-04
ADULT	TOTALS	3.13E-05	3.81E-06	2.78E-06	3.10E-06	2.89E-06	4.80E-04

NUMBER 22 NAME=Residence 7 X= 2.4KM, Y= 3.6KM, Z= 76.0M, DIST= 4.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	5.47E-05	4.40E-06	4.00E-06	6.26E-06	4.85E-06	8.48E-04
CHILD	TOTALS	5.47E-05	4.70E-06	4.10E-06	5.10E-06	4.48E-06	8.48E-04
TEENAGE	TOTALS	5.47E-05	5.45E-06	4.16E-06	4.59E-06	4.33E-06	8.48E-04
ADULT	TOTALS	5.47E-05	5.40E-06	4.25E-06	4.61E-06	4.36E-06	8.48E-04

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 23 NAME=Residence 8 X= 4.7KM, Y= -4.4KM, Z= -50.0M, DIST= 6.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.03E-05	1.58E-06	1.34E-06	2.69E-06	1.85E-06	3.16E-04
CHILD	TOTALS	2.02E-05	1.75E-06	1.39E-06	1.99E-06	1.62E-06	3.16E-04
TEENAGE	TOTALS	2.03E-05	2.20E-06	1.43E-06	1.69E-06	1.53E-06	3.16E-04
ADULT	TOTALS	2.03E-05	2.17E-06	1.48E-06	1.70E-06	1.55E-06	3.16E-04

NUMBER 24 NAME=Unoccupied 1 X= -0.9KM, Y= 2.0KM, Z= 21.0M, DIST= 2.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	5.98E-04	6.48E-06	6.32E-06	7.25E-06	6.67E-06	9.86E-03
CHILD	TOTALS	5.97E-04	6.61E-06	6.36E-06	6.77E-06	6.51E-06	9.86E-03
TEENAGE	TOTALS	5.97E-04	6.91E-06	6.39E-06	6.56E-06	6.45E-06	9.86E-03
ADULT	TOTALS	5.98E-04	6.89E-06	6.42E-06	6.57E-06	6.47E-06	9.86E-03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 25 NAME=Unoccupied 2 X= 2.0KM, Y= 2.8KM, Z= 69.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	7.71E-05	5.02E-06	4.68E-06	6.57E-06	5.39E-06	1.21E-03
CHILD	TOTALS	7.71E-05	5.26E-06	4.76E-06	5.60E-06	5.08E-06	1.21E-03
TEENAGE	TOTALS	7.71E-05	5.90E-06	4.82E-06	5.18E-06	4.96E-06	1.21E-03
ADULT	TOTALS	7.71E-05	5.85E-06	4.89E-06	5.19E-06	4.98E-06	1.21E-03

NUMBER 26 NAME=North Boundary X= -0.7KM, Y= 0.7KM, Z= 29.0M, DIST= 1.0KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.87E-04	7.29E-06	7.14E-06	7.98E-06	7.46E-06	6.34E-03
CHILD	TOTALS	3.87E-04	7.40E-06	7.18E-06	7.55E-06	7.32E-06	6.34E-03
TEENAGE	TOTALS	3.87E-04	7.68E-06	7.21E-06	7.37E-06	7.27E-06	6.34E-03
ADULT	TOTALS	3.87E-04	7.66E-06	7.24E-06	7.37E-06	7.28E-06	6.34E-03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 27 NAME=East Boundary X= 1.4KM, Y= 0.3KM, Z= -20.0M, DIST= 1.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.68E-04	3.06E-06	2.99E-06	3.39E-06	3.14E-06	2.76E-03
CHILD	TOTALS	1.68E-04	3.11E-06	3.00E-06	3.18E-06	3.07E-06	2.76E-03
TEENAGE	TOTALS	1.68E-04	3.24E-06	3.02E-06	3.09E-06	3.04E-06	2.76E-03
ADULT	TOTALS	1.68E-04	3.23E-06	3.03E-06	3.09E-06	3.05E-06	2.76E-03

NUMBER 28 NAME=South Boundary X= 0.0KM, Y= -0.5KM, Z= 13.0M, DIST= 0.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.39E-04	8.34E-06	8.07E-06	9.58E-06	8.64E-06	5.52E-03
CHILD	TOTALS	3.39E-04	8.53E-06	8.13E-06	8.81E-06	8.39E-06	5.52E-03
TEENAGE	TOTALS	3.39E-04	9.04E-06	8.18E-06	8.47E-06	8.29E-06	5.52E-03
ADULT	TOTALS	3.39E-04	9.00E-06	8.23E-06	8.47E-06	8.31E-06	5.52E-03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 29 NAME=West Boundary X= -0.7KM, Y= 0.0KM, Z= 49.0M, DIST= 0.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.25E-04	6.76E-06	6.56E-06	7.68E-06	6.98E-06	3.65E-03
CHILD	TOTALS	2.25E-04	6.91E-06	6.61E-06	7.11E-06	6.80E-06	3.65E-03
TEENAGE	TOTALS	2.25E-04	7.28E-06	6.64E-06	6.86E-06	6.73E-06	3.65E-03
ADULT	TOTALS	2.25E-04	7.25E-06	6.68E-06	6.86E-06	6.74E-06	3.65E-03

NUMBER 30 NAME=Minatare X= -22.4KM, Y= -75.6KM, Z= -41.4M, DIST= 78.8KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.33E-06	6.23E-07	2.05E-07	2.60E-06	1.10E-06	1.72E-05
CHILD	TOTALS	1.29E-06	9.37E-07	3.04E-07	1.37E-06	7.04E-07	1.72E-05
TEENAGE	TOTALS	1.31E-06	1.74E-06	3.73E-07	8.28E-07	5.47E-07	1.72E-05
ADULT	TOTALS	1.32E-06	1.68E-06	4.61E-07	8.41E-07	5.84E-07	1.72E-05

Program execution time = 2.03 seconds

RADIATION DOSES FROM CAMECO RESOURCES MARSLAND EXPANSION AREA IN-SITU URANIUM RECOVERY OPERATION

By
Noel Savignac, Ph.D.

October 12, 2011

8500 Menaul Blvd., NE, Suite B-335, Albuquerque, NM 87112
Bus: (505) 881-4150 Res: (505) 256-9603 Fax: (505) 296-3289
Email: noelsav@swcp.com

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Appendix A MEA Weather Data in STAR Format

Appendix B Radiation Does Rates from MILDOS

EXECUTIVE SUMMARY

Radiation dose rates were determined using the Nuclear Regulatory Commission (NRC) computer code MILDOS for the Crow Butte Resources Marsland Expansion Area (MEA) in-situ uranium recovery facility near Marsland Nebraska. The operation is expected to have 11 Mine Units (MUs), with up to a 30-year total life required to complete restoration.

The MILDOS evaluation of radiation doses showed that for typical operating conditions:

- Dose rates to the public at the property boundaries, the cities and towns within an 80 km radius from the MEA, and at the nearest residence were below the 100 mrem/yr limit specified in 10 CFR 20 (total effective dose equivalent).
- The highest MEA boundary dose rate was 93 mrem/yr at the south property boundary.
- The highest residential dose rate was 13 mrem/yr at Residence 1.
- The highest dose rate at cities and towns within an 80 km radius from the MEA was 0.9 mrem/yr at the town of Hemingford.
- The 10 CFR 190 dose rate was 0 mrem/yr which was below the 10 mrem/yr dose limit for emissions that exclude radon and its progeny.
- The population effective dose rate within 80 km radius from the MEA Project was 1.3 person-rem/yr and 0 person-rem/yr beyond 80 km.
- Assuming an unrealistic upper bound purge rate, the maximum dose to the public onsite 10 hours/month is 3 mrem/yr.
- Assuming an unrealistic upper bound purge rate, the maximum occupational dose rate to employees and contractors onsite 1500 hours/yr is 35 mrem/yr

For comparison naturally occurring background radiation, from cosmic and terrestrial sources, is approximately 365 mrem/yr.

A sensitivity analysis demonstrated that:

- When assuming an unrealistic upper bound purge rate of 222 gallons per minute the dose rates never exceeded 100 mrem/yr.
- Radiation doses calculated using a 25% / 75% distribution of radon released from the mine unit header houses and from the satellite plant did not appear significantly different from the doses calculated using a 10% / 90% distribution.

OBJECTIVE

Determine the radiation doses to members of the public within an 80 km radius of the MEA using the NRC computer code MILDOS. Determine the potential annual dose rate to workers on the site. Determine the sensitivity of the MILDOS estimates of radiation dose.

PROJECT DESCRIPTION

The MEA is located in northwestern Nebraska in Dawes County near Crawford Nebraska. See Figure 1.

Figure 2 is the site layout map of the MEA which shows MUs 1 through 5 and A through F..

The wells in each mine unit will pump oxygenated water through the underground ore zone to extract uranium. The pregnant lixiviant is then pumped to an ion exchange column for removal of the uranium, and then back underground to extract additional uranium. The resin from the MEA will be trucked to the Crow Butte Central Processing facility near Crawford, Nebraska for removal of the uranium from the resin, after which the resin is returned to the MEA.

RADIOACTIVE EFFLUENTS

Radon-222 gas and its decay products are the only radioactive effluents from the MEA under normal operating conditions. Radon is released into the atmosphere at the following locations:

- New Well Fields - When wells are drilled into the ore body, ore cuttings are transported to the ground surface in the drilling mud. The cuttings are temporarily stored in mud pits where radon-222 is released from the radium-226 in the cuttings. The quantity of radon-222 released from new well fields is much less than 1% of the radon-222 released during well field production as shown in the following section "MILDOS Output – Radiation Dose Rates."
- Production Well Fields - Radon-222 is released from 2 locations during production and restoration. The largest source of radon is from the satellite building. There radon is released from the purge water storage tanks prior to being injected back into the ore body and from the removal of resins from the ion exchange columns. The second largest source of radon outside of the satellite building is from the well heads and valves in each mining unit.
- Restoration Well Fields – Radon is released during restoration of the well fields.
- Land Application – The MEA site does not use land application or evaporation ponds.

Figure 1. Significant Population Centers within 80 km (50 mile) Radius of the Marsland Site

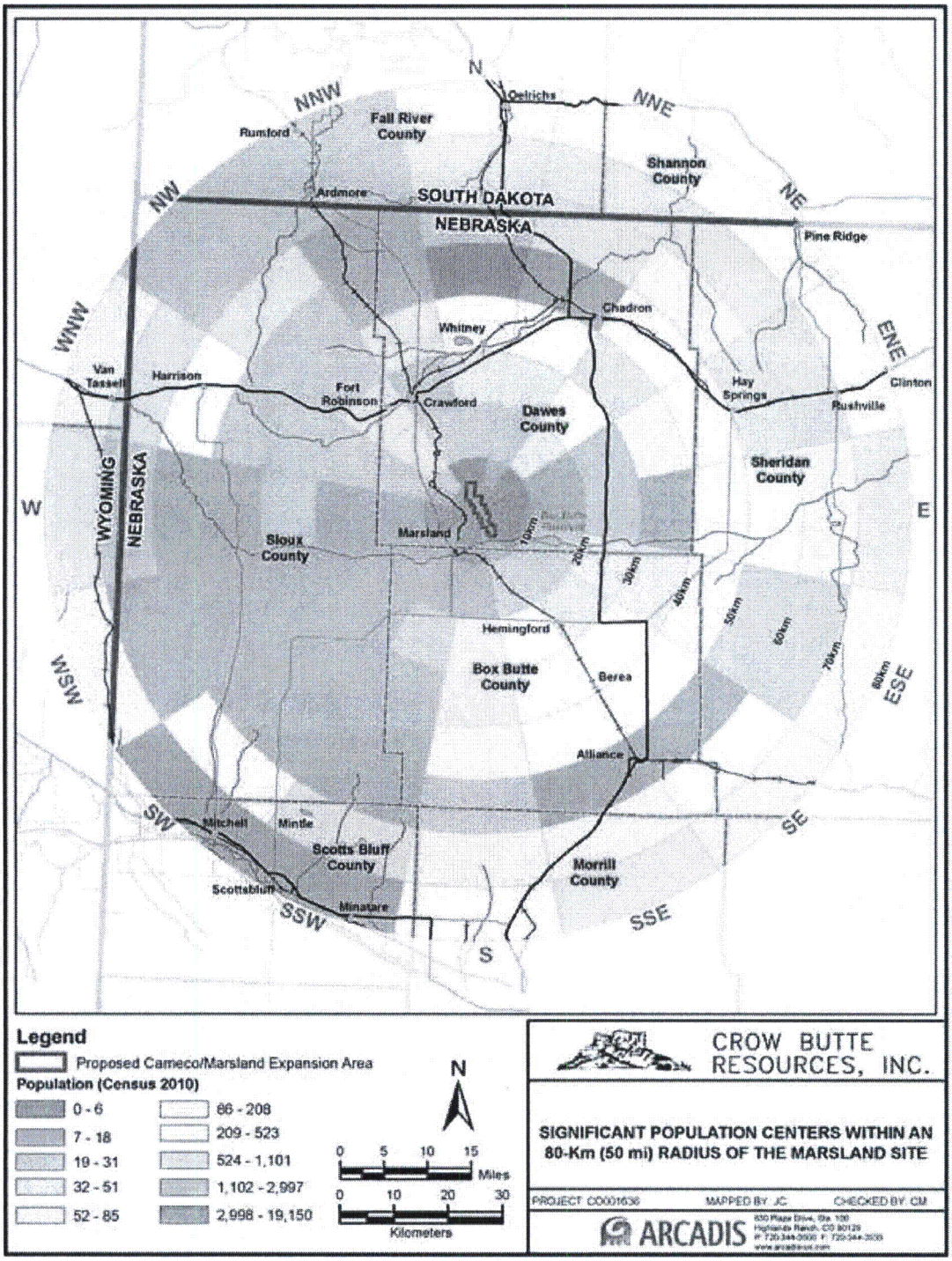


Figure 2. Marsland Expansion Area Map

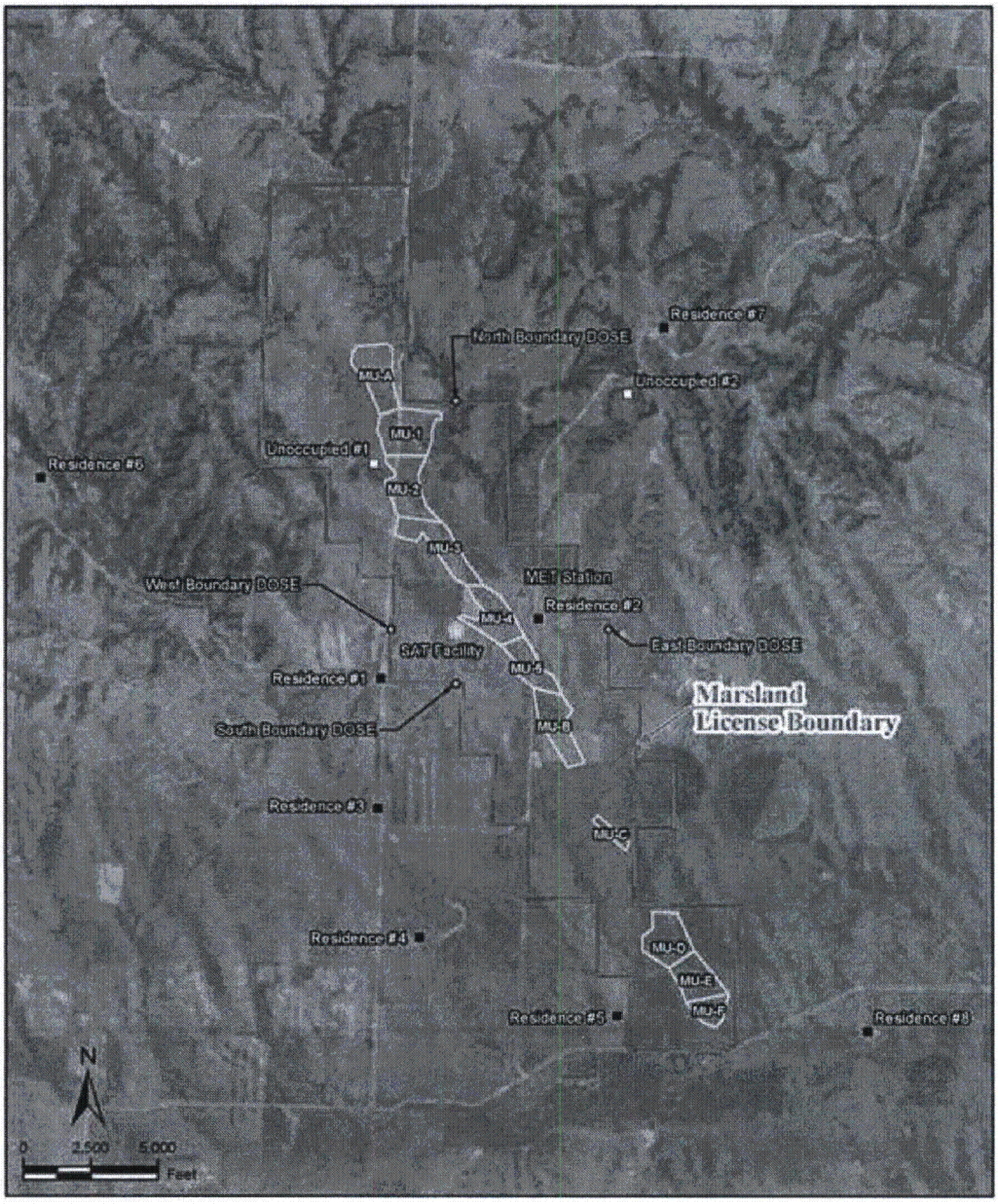
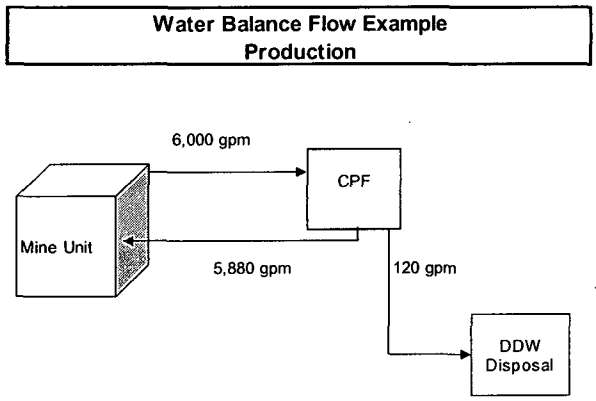


Figure 3. Marsland Expansion Area Water Balance



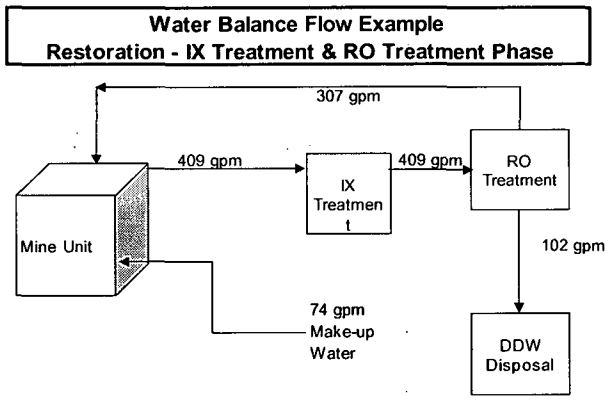
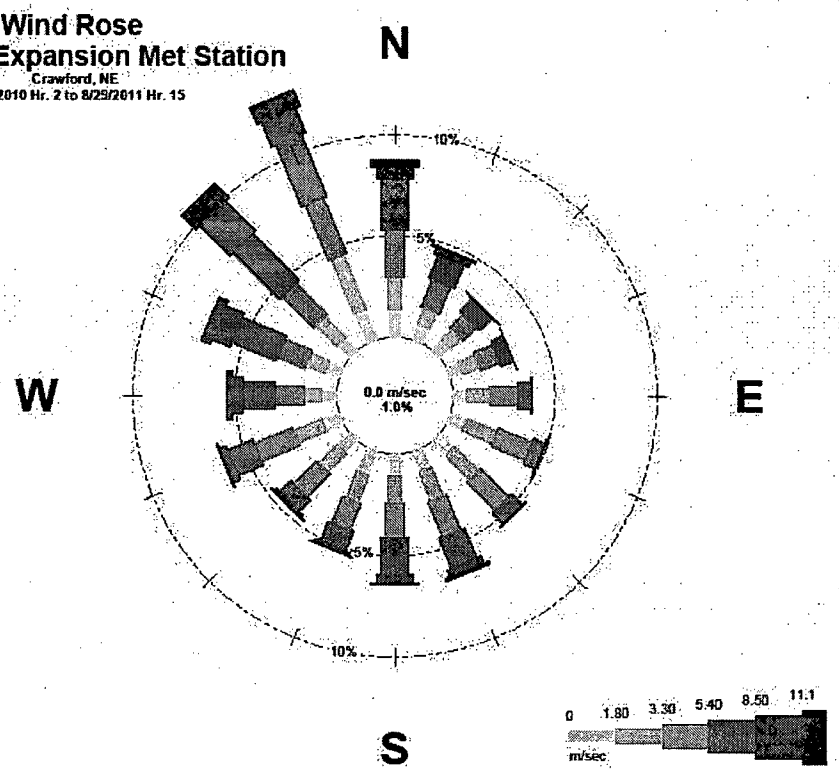


Figure 4. Wind Rose
Expansion Met Station
Crawford, NE
8/24/2010 Hr. 2 to 8/25/2011 Hr. 15



Under accident conditions where process water escapes from the process piping and/or tanks, uranium and radium-226 are released on the ground and radon into the air. Those releases are anticipated to be within the process area, are cleaned up locally, and release small amounts of radon similar in magnitude to the radon released by drill cuttings from new well installations.

MARSLAND EXPANSION AREA OPERATIONS

Eleven mining units are planned for the MEA. MUs 1 through 5 and then A through F will be brought into production sequentially every 2 years, operated 5 years and then restored for an estimated 5 years. Based upon the State of Nebraska Class III UIC requirements, no more than five MUs may in operation or restoration at any one time. The result is an estimated 30 year operational life..

Table 1 shows the sequence of production and restoration for MU 1 through 5. Subsequently, MUs A through F will be added during years 11 through 21. By year 30, it is expected that MU-F will have completed restoration.

The maximum doses associated with at the MEA occur when the greatest number of mine units is in production or in restoration, and when the combination of mine units releases the greatest amount of radon. Radon production was calculated for each mine unit by MILDOS. The maximum impact at the MEA occurs in years 9 and 10 when MUs 1 through 5 are in production or restoration and MUs 1 through 5 release more radon than is released from any other combination of MUs throughout the 30 year lifespan of the MEA project.

Table 1 Production and Restoration Schedule for MUs 1 through 5)

Yr 1	**Yr 1**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**	**Yr 7**	**Yr 8**	**Yr 9**
MU-1P	MU-1P	MU-1P	MU-1P	MU-1P	MU-1R	MU-1R	MU-1R	MU-1R
		MU-2P	MU-2P	MU-2P	MU-2P	MU-2P	MU-2R	MU-2R
				MU-3P	MU-3P	MU-3P	MU-3P	MU-3P
						MU-4P	MU-4P	MU-4P
								MU-5P
Yr 10	**Yr 11**	**Yr 12**	**Yr13**	**Yr 14**	**Yr 15**	**Yr 16**	**Yr-17**	**Yr-18**
MU-1R								
MU-2R	MU-2R	MU-2R						
MU-3R	MU-3R	MU-3R	MU-3R	Mu-3R				
MU-4P	MU-4P	MU-4R	MU-4R	MU-4R	MU-4R	MU-4R		
MU-5P	MU-5P	MU-5P	MU-5P	MU-5R	MU-5R	MU-5R	MU-5R	MU-5R

(P = Production R = Restoration)

MILDOS

The computer code MILDOS was used to determine the impact of radon-222 release on the surrounding populations. The code was originally designed to address the impacts of uranium mill operations but was subsequently updated in 1998 to include the impacts of uranium in-situ leaching operations using a MS Windows format. The code was developed by Argonne National Laboratory for the NRC to assess the radiological impacts and regulatory compliance of a release. The code is a Gaussian-plumb, air-dispersion model which utilizes user-provided wind frequency data. Mechanisms such as radioactive decay and ingrowth of daughter radionuclides are included in the code. The code calculates the radiation doses at any location within an 80 km radius in 16 compass directions for a large number of radiological sources.

MILDOS INPUT – WEATHER DATA

The MEA is located in northwestern Nebraska in Dawes County near Crawford Nebraska. Weather data was collected onsite from 8/24/2010 to 8/29/2011.

"The High Plains are a subregion of the Great Plains mostly in the Western United States, but also partly in the Midwest states of Nebraska, Kansas, and South Dakota, generally encompassing the western part of the Great Plains before the region reaches the Rocky Mountains. From east to west, the High Plains rise in elevation from around 1,160 feet (350 m)

to over 7,800 feet (2,400 m). The High Plains are semi-arid, receiving between 10–20 inches (250–510 mm) of precipitation annually. Shortgrass prairie, prickly pear cacti and scrub vegetation cover the region, with occasional buttes or other rocky outcrops. Agriculture in the forms of cattle ranching and the growing of wheat, cotton and sunflowers is the primary economic activity in the region. The High Plains has one of the lowest population densities of any region in the continental United States. Due to low moisture and high elevation, the High Plains commonly experiences wide ranges and extremes in temperature. The temperature range from day to night commonly exceeds 59 °F (15 °C), and 24-hour temperature shifts of 68 to 77 °F (20 to 25 °C) are not unknown. The region is known for the steady, and sometimes intense, winds that prevail from the west. [At the MEA the prevailing wind direction is from the NNW.] The winds add a considerable wind chill factor in the winter. The development of wind farms in the High Plains is one of the newest areas of economic development." (Wikipedia)

The MEA weather data were collected using an on-site meteorological station consistent with NRC Regulatory Guide 3.63 and converted to the STAR (STBability ABay) format using the NRC speed classes for seasonal-wind-frequency distributions. Radiation doses were calculated by MILDOS using that MEA weather data. (See Appendix A).

MILDOS INPUT – OPERATIONAL DATA

The MEA operational data for are presented in Table 2. The mine unit locations are expressed on a grid system with the MEA satellite facility as the center, km east as positive values, km west as negative values, km north as positive values, km south as negative values, meters elevation as positive values, and meters depression as negative values. The circulation volume is the volume of the entire extraction circuit from the injection well to the IX column and return.

Consistent with prior Crow Butte MILDOS Modeling, the radon from the MEA is released to the environment in the following proportions:

25% of the radon from the mine well field header houses, and
75% of the radon from the satellite plant vent.

Radon released from the open tanks and the IX column in the satellite plant will be vented from the plant through a stack with an estimated exit velocity of 10 m/sec.

In addition, the radon releases at MEA account for the use of deep disposal wells for management of purge water. The usual MILDOS model assumes that 100% of the radon is released to the atmosphere by disposing of the purge water using spay irrigation or evaporation ponds. In contrast, at the MEA the MILDOS evaluation assumes that 20% of the radon in the purge water will be released, because purge water at the MEA will be disposed in a deep disposal well. In all likelihood the 20% is an overestimate since the purge water delivery system is a closed pressurized system, with the exception of vents on the equalization tanks. The release of 20% of the radon from the purge water is entered into the MILDOS model as 20% of the maximum purge rate of 222 gallon per minute show in Figure 3 for production and restoration occurring simultaneously. Twenty percent of 222 gallons per minute is 44 gallons per minute which is the purge rate used to calculate radiation doses at MEA for typical operating conditions.

MILDOS INPUT - NEW WELL DATA

The following data was used to determine the doses from the new wells:

Storage time in the pits	12 days
Ore material in the pits	3.5E6 g/yr
Number of pits	12

MILDOS INPUT - RADIATION DOSE LOCATIONS DATA

Radiation doses were calculated using MILDOS at:

- Cities and towns within 80 km radius of MEA.
- The north, south, east and west boundaries of MEA using the grid system with the center point at the MEA satellite facility.
- Eight residences on the MEA. Residence 2 was the nearest downwind residence.
- Two unoccupied structures on the MEA

The X and Y coordinates in kilometers and the Z coordinate in meters for each of those locations are shown in Table 3.

Table 2 Operational Data for Mine Units 1 through 5 and A through F

Location	X km	Y km	Z m	Ra pCi/g	Em FR	Thick m	Den g/cm*3	Area m*2	Fr Rn	Col Vol L	Rn vent /d	Col Util	Por	Op days	Cir Vol L	Purg L/d
MU-1	-0.56	2.23	27	620	0.25	7.6	1.89	3.02E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-2	-0.55	1.65	16	620	0.25	7.6	1.89	2.70E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-3	-0.15	0.95	13	620	0.25	7.6	1.89	1.71E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-4	0.43	0.13	-4	620	0.25	7.6	1.89	2.43E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-5	0.84	-0.45	-14	620	0.25	7.6	1.89	1.82E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-A	-0.86	2.88	45	620	0.25	7.6	1.89	2.66E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-B	1.12	-1.02	-15	620	0.25	7.6	1.89	2.48E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-C	1.74	-2.33	-25	620	0.25	7.6	1.89	4.58E+04	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-D	2.42	-3.56	-36	620	0.25	7.6	1.89	2.45E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-E	2.74	-3.98	-42	620	0.25	7.6	1.89	2.08E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-F	2.90	-4.30	-47	620	0.25	7.6	1.89	1.06E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05

Locations = Well unit
X = Km from Marsland satellite (+) = East, (-) = West
Y = Km from Marsland satellite (+) = North, (-) = South
Z = m elevation (+) = above the satellite, (-) = below the satellite
Ra = Radium concentration
EM. FR = Radon emanation fraction
THICK = Thickness of ore in m
DEN = Density of ore in g/cm^3
AREA = Area of well unit
FR Rn = Fraction of Radon in process water
COL VOL = Ion-Exchange column volume in L
Rn VENT = Rate of Radon venting from process water
Col Util = Ion-Exchange column unloading rate
POR = Porosity of ion exchange resin
Op Days = Days of operation in days
CIR VOL = Volume of process water in circulation in L
PURGE = Treated water purge rate in L/d

Table 3 Locations Relative to Satellite Plant Where Radiation Doses Were Calculated by MILDOS

Location	X (km)	Y (km)	Z (m)*
Alliance	30.0	-45.4	-50
Berea	21.5	-32.6	-50
Chadron	22.3	35.8	-50
Clinton	75.4	26.5	-50
Crawford	-12.1	20.8	-50
Harrison	-50.5	22.9	633
Hay Springs	47.1	18.8	-50
Hemmingford	14.3	-20.4	36
Marsland	-3.8	-6.1	-50
Minatare	-23.4	-75.6	-41.4
Mitchell	-48.5	-60.0	-50
Oelrichs	4.9	75.3	-50
Rushville	66.0	22.0	-50
Scottsbluff	-36.3	-68.9	-50
Van Tassell	-67.5	21.0	515
Whitney	1.2	31.4	-50
Residence 1	-0.8	-0.4	6
Residence 2	1.0	0.3	-4
Residence 3	-0.8	-1.9	-16
Residence 4	0.4	-3.4	-31
Residence 5	1.9	-4.2	-36
Residence 6	-4.7	1.9	22
Residence 7	2.4	3.6	76
Residence 8	4.7	-4.4	-50
Unoccupied 1	-0.9	2.0	21
Unoccupied 2	2.0	2.8	69
North Boundary	0.0	2.6	29
East Boundary	1.4	0.3	-20
South Boundary	0.0	-0.5	13
West boundary	-0.7	0.0	49

*Minimum value for MILDOS is -50 m.

MILDOS INPUT - POPULATION DATA

Table 4 presents the population within an 80 km radius of the MEA. The largest values in Table 4 show where the cities are located. For example Scottsbluff is approximately 80 km SSW of the MEA.

MILDOS INPUT - OCCUPATIONAL DOSE RATE

Occupational dose rates to Cameco employees, contractors, and visitors to the MEA were evaluated using the following criteria:

- Radon is the main source of radiation.
- Radon is released at the header house for each mine unit and from the satellite vent stack.
- The header houses are continuously vented using fans.
- Locations 0.1 km east of the header houses and 0.1 km east of the satellite plant are locations on site where radon from the header houses and satellite plant vent stack mix. These locations are considered representative of the radon concentration present on the MEA.

MILDOS OUTPUT – RADIATION DOSE RATES

Table 5 presents the dose rates calculated for the major cities and towns within 80 km radius of the MEA, 8 residences, 2 unoccupied structures, and for the north, south, east, and west property boundaries. The dose rates were calculated using the MEA weather data and using a purge rate of 44 gallon per minute for the closed-pressurized uranium extraction circuit used at the MEA site.

Since radon is released from both the mine fields header houses and from the satellite plant, the doses were proportioned 25% from the mine fields and 75% from the satellite. Table 5 presents the **TOTAL DOSE FROM THE MEA** MUs 1 through 5 and A through F under typical operating conditions from both sources of radon. Conclusions from those dose rates are as follows:

- All dose rates to the public at the property boundaries, the cities and towns within an 80 km radius from the MEA, and at the nearest residence were below the 100 mrem/yr limit specified in 10 CFR 20 (total effective dose equivalent).
- The highest MEA boundary dose rate was 93 mrem/yr at the south property boundary.
- The highest residential dose rate was 13 mrem/yr at residence 1.
- The highest dose rate at cities and towns within an 80 km radius from the MEA was 0.9 mrem/yr at the town of Hemingford.
- The 10 CFR 190 dose rate was 0 mrem/yr which was below the 10 mrem/yr dose limit for emissions that exclude radon and its progeny.
- The population effective dose rate within 80 km radius from the MEA Project was 1.3 person-rem/yr and 0 person-rem/yr beyond 80 km.

For comparison naturally occurring background radiation, from cosmic and terrestrial sources, is approximately 365 mrem/yr.

The radiation doses from the production wells and from the wells in restoration are identical. The doses from the new wells are all zero. See appendices B1 for production well doses, B3 for restoration well doses, and B4 for new well doses. The doses presented in these appendices have not been proportioned between the mine field emissions and the satellite stack emissions.

Table 4 Population Distribution Within 80 km Radius of the Site

Compass Directions	N 0	NNE 22.5	NE 45	ENE 67.5	E 90	ESE 112.5	SE 135	SSE 157.5	S 180	SSW 202.5	SW 225	WSW 247.5	W 270	WNW 292.5	NW 315	NNW 337.5
Kilometers																
1.0 - 2.0																
2.0 - 3.0																
3.0 - 4.0																
4.0 - 5.0																
5.0 - 10.0																
10.0 - 20.0																
20.0 - 30.0							993									1107
30.0 - 40.0	87															
40.0 - 50.0		5634														
50.0 - 60.0				652				8959						279		
60.0 - 70.0				999												
70.0 - 80.0	145		14	30						15542	1831			19		
0-80.0	**232**	**5634**	**14**	**1681**	**0**	**0**	**993**	**8959**	**0**	**15542**	**1831**	**0**	**0**	**298**	**0**	**1107**

Table 5 Radiation Dose Rates Within 80 km radius of the Site

Radon Sources	**MU1 through 5**
Weather Data	**MEA**
Location of Dose	**mrem/yr**
Alliance	**0.3**
Berea	**0.5**
Chadron	**0.3**
Clinton	**0.1**
Crawford	**0.5**
Harrison	**0.2**
Hay Springs	**0.2**
Hemingford	**0.9**
Marsland	**0.8**
Minatare	**0.1**
Mitchell	**0.1**
Oelrichs	**0.2**
Rushville	**0.2**
Scottsbluff	**0.1**
Van Tassell	**0.2**
Whitney	**0.4**
Residence 1	**13.0**
Residence 2	**12.7**
Residence 3	**4.0**
Residence 4	**3.0**
Residence 5	**3.4**
Residence 6	**3.2**
Residence 7	**4.8**
Residence 8	**1.6**
Unoccupied 1	**12.0**
Unoccupied 2	**6.3**
North Boundary	**18.6**
East Boundary	**5.5**
South Boundary	**93.1**
West boundary	**59.7**

MILDOS OUTPUT – PUBLIC AND OCCUPATIONAL RADIATION DOSE RATES

Dose rates for the public apply to delivery personnel, regulatory inspectors, visitors, or other personnel that may spend 10 hours per month onsite. Occupational dose rates apply to personnel that may spend an estimated 1500 hours per year working onsite such as company employees or contractors. For example a water sampling technician who works an estimated 5 days per week, 6 hours per day, 50 weeks per year near the fine fields or satellite plant would spend 1500 hours onsite each year.

The evaluation of the public and occupational dose rates was based on:

- The unrealistic, worst-case purge rate of 222 gallons per minute.
- Twenty five percent of the radon is vented by continuously operating fans from the header house for each mine unit. Seventy five percent of the radon released at the site is released at the satellite plant vent stack.
- Doses from these two sources were calculated at locations 0.1 km east of the header houses, 0.1 km east of the site boundaries, and 0.1 km east of the satellite vent stack as being representative of the radon/radon progeny doses onsite.
- The occupational factor for being present onsite one hour is equal (1hr / 8760 hours in a year) or 1.14E-4.

Table 6 shows the MEA public and occupational dose rates. For typical operating conditions the maximum dose rate to the public was 3 mrem/yr with an average of 2 mrem/yr and the maximum occupational dose rate to employees and contractors was 35 mrem/yr with an average of 19 mrem/yr.

Table 6 Public and Occupational Doses

Radon Source Location of Dose	Public Dose mrem/yr from 10 hrs/month onsite	Occupational mrem/yr from 1500 hrs/yr onsite
North Boundary	0.3	3.2
East Boundary	0.1	1.7
South Boundary	1.1	13.5
West Boundary	0.8	10.3
MU-1	1.7	21.6
MU-2	2.8	35.3
MU-3	1.9	23.7
MU-4	2.3	29.2
MU-5	1.7	21.4
Satellite	2.5	31.0
Average	1.5	19.1

SENSITIVITY ANALYSIS

The MILDOS sensitivity analysis identifies how input parameters affect the calculated radiation dose.

PURGE RATE

The input parameters from Table 2 for the MILDOS computer model used to calculate radiation doses to people in and around the Marsland site and the variability of each parameter are:

Parameter	Description	Variability
1.	Location in the X, Y, Z coordinate system	Constant
2.	The Radium 226 concentration in the ore	Constant
3.	The Radon emanation rate from the ore	Constant
4.	The ore thickness	Constant
5.	The ore density	Constant
6.	The area of the ore deposit	Constant
7.	The fraction of radon in process water	Constant
8.	The ion exchange column volume	Constant
9.	The ion exchange column unloading rate	Constant; set by operator
10.	The porosity of the ion exchange resin	Constant for each resin
11.	The days of operation each year	Constant, set by operator
12.	The volume of process water in circulation	Constant with some small variations
13.	Purge rate	Variable, depending on operating conditions.

All the parameters except parameter 13 are constant except for the purge rate which can vary depending on the operating conditions at the site. An increase in the purge rate increases the amount of radon released and the resulting dose. Table 5 presents dose rates calculated using 44 gallons per minute urge rate which is typical for operations. The maximum purge rate at MEA is 222 gallons per minute as shown in Figure 3 as the combined discharge to the deep disposal well from production and restoration. The dose rates from a purge rate of 222 gallons per minute is shown in Table 7 That purge rate is not considered realistic for the operating conditions at the MEA but is considered as the upper limit of the range of purge rates. Even at the upper bound purge rates the dose rates in Table 7 do not exceed the 100 mrem/yr regulatory limit.

Table 7 Dose Rates Assuming an Upper Bound Purge Rate

Radon Sources	MU 1 through 5
Weather Data	**MEA**
Location of Dose	**mrem/yr**
Alliance	0.4
Berea	0.6
Chadron	0.3
Clinton	0.2
Crawford	0.6
Harrison	0.3
Hay Springs	0.3
Hemingford	1.2
Marsland	1.1
Minatare	0.2
Mitchell	0.1
Oelrichs	0.2
Rushville	0.2
Scottsbluff	0.1
Van Tassell	0.2
Whitney	0.5
Residence 1	17.3
Residence 2	26.0
Residence 3	6.0
Residence 4	4.2
Residence 5	4.8
Residence 6	4.2
Residence 7	6.5
Residence 8	2.3
Unoccupied 1	34.8
Unoccupied 2	8.8
North Boundary	56.8
East Boundary	10.5
South Boundary	99.4
West boundary	64.5

(Assumes unrealistic upper bound 222 gallons per minute purge rate)

RADON RELEASE POINTS

The radiation dose rates from typical operations are presented in Table 5 using:

25% radon released from the mine field header houses.
75% radon released from the satellite plant vent stack.

That distribution has been used historically in MILDOS assessments. For comparison dose rates were calculated using:

10% radon released from the mine field header houses.
90% radon released from the satellite plant vent stack.

The dose rates from both distributions are presented in Table 8. A comparison of the 25% / 75% distribution of radon in column 2 with the 10% / 90% distribution of radon release in column 3 shows that the averages and standard distributions are nearly identical. That similarity suggests that within the range of values selected for the radon distribution between releases at the mine fields and releases at the satellite plant, the distribution is not important in assessing the doses to people around the MEA site.

Table 8 Radiation Doses Calculated from Different Percentage Releases from the Mine Units and the Satellite Plant

Radon Sources	MU1 through 5	MU1 through 5
Distribution	0.25 / 0.75	0.10 / 0.90
Location of Dose	mrem/yr	mrem/yr
Alliance	0.3	0.3
Berea	0.5	0.5
Chadron	0.3	0.3
Clinton	0.1	0.1
Crawford	0.5	0.5
Harrison	0.2	0.2
Hay Springs	0.2	0.2
Hemingford	0.9	0.9
Marsland	0.8	0.8
Minatare	0.1	0.1
Mitchell	0.1	0.1
Oelrichs	0.2	0.2
Rushville	0.2	0.2
Scottsbluff	0.1	0.1
Van Tassell	0.2	0.2
Whitney	0.4	0.4
Residence 1	13.0	13.1
Residence 2	12.7	12.9
Residence 3	4.0	4.1
Residence 4	3.0	3.1
Residence 5	3.4	3.5
Residence 6	3.2	3.3
Residence 7	4.8	4.8
Residence 8	1.6	1.7
Unoccupied 1	12.0	12.2
Unoccupied 2	6.3	6.4
North Boundary	18.6	14.1
East Boundary	5.5	5.6
South Boundary	93.1	93.8
West boundary	59.7	60.5
Average	8.2	8.1
Std. Dev.	19.6	19.8

APPENDIX A - MEA WEATHER DATA IN STAR FORMAT

Column	1	Blank
	2-4	Wind Direction
	5	Blank
	6	Stability Category
	7	Blank
	8	Start of the Wind Speed Categories (knots)
	8-14	Wind Speed 1-3 (knots)
	15-21	Wind Speed 4-6 (knots)
	22-28	Wind Speed 7-10 (knots)
	29-35	Wind Speed 11-16 (knots)
	36-42	Wind Speed 17-21 (knots)
	43-49	Wind Speed >21 (knots)

The MEA weather data used for dose evaluation (8-24-2010/8-29-2011) is printed below:

```
  N A 0.001410.002360.000000.000000.000000.00000
NNE A 0.000240.001530.000000.000000.000000.00000
 NE A 0.000710.001890.000000.000000.000000.00000
ENE A 0.000820.001770.000000.000000.000000.00000
  E A 0.000940.001770.000000.000000.000000.00000
ESE A 0.001300.002590.000000.000000.000000.00000
 SE A 0.001060.002000.000000.000000.000000.00000
SSE A 0.002120.002120.000000.000000.000000.00000
  S A 0.001770.002120.000000.000000.000000.00000
SSW A 0.003540.002590.000000.000000.000000.00000
 SW A 0.001410.002240.000000.000000.000000.00000
WSW A 0.000940.004010.000000.000000.000000.00000
  W A 0.001180.001180.000000.000000.000000.00000
WNW A 0.000820.001180.000000.000000.000000.00000
 NW A 0.000590.002000.000000.000000.000000.00000
NNW A 0.000590.002120.000000.000000.000000.00000
  N B 0.000000.002000.000240.000000.000000.00000
NNE B 0.000000.002240.000000.000000.000000.00000
 NE B 0.000000.002470.000120.000000.000000.00000
ENE B 0.000000.001770.000000.000000.000000.00000
  E B 0.000000.001770.000120.000000.000000.00000
ESE B 0.000350.002470.000350.000000.000000.00000
 SE B 0.000120.003420.000350.000000.000000.00000
SSE B 0.000470.002470.000240.000000.000000.00000
  S B 0.000470.002360.000710.000000.000000.00000
SSW B 0.000940.003180.000590.000000.000000.00000
 SW B 0.000120.003060.000000.000000.000000.00000
WSW B 0.000000.002590.000470.000000.000000.00000
  W B 0.000120.001300.000240.000000.000000.00000
WNW B 0.000120.001650.000120.000000.000000.00000
 NW B 0.000000.002360.000710.000000.000000.00000
NNW B 0.000000.002120.000470.000000.000000.00000
  N C 0.000120.000590.010250.000000.000000.00000
```

```
NNE C 0.000000.000590.004710.000000.000000.00000
 NE C 0.000000.000590.002950.000000.000000.00000
ENE C 0.000000.000820.003420.000000.000000.00000
  E C 0.000000.001180.003300.000000.000000.00000
ESE C 0.000000.001770.005540.000000.000000.00000
 SE C 0.000350.001890.004120.000000.000000.00000
SSE C 0.000120.001530.004360.000000.000000.00000
  S C 0.000350.001530.004950.000000.000000.00000
SSW C 0.000240.001410.004360.000000.000000.00000
 SW C 0.000120.001890.005660.000000.000000.00000
WSW C 0.000000.000820.006600.000000.000000.00000
  W C 0.000000.000710.004360.000000.000000.00000
WNW C 0.000000.000470.004710.000000.000000.00000
 NW C 0.000000.000590.008130.000000.000000.00000
NNW C 0.000000.000940.007780.000000.000000.00000
  N D 0.000240.007310.019090.017800.004120.00141
NNE D 0.000240.004710.010720.008600.002240.00012
 NE D 0.000000.001890.009190.003060.000120.00000
ENE D 0.000000.003060.007310.002000.000000.00012
  E D 0.000120.005770.010370.003180.000120.00000
ESE D 0.000470.008840.009190.003060.000240.00012
 SE D 0.000240.010490.012140.003890.000350.00000
SSE D 0.000120.007540.016500.009550.003420.00012
  S D 0.000120.005190.013080.013790.002830.00012
SSW D 0.000120.003890.008960.006720.001180.00000
 SW D 0.000240.004830.007900.003650.001410.00000
WSW D 0.000120.005070.014610.008720.002470.00024
  W D 0.000000.004120.012730.012610.002950.00236
WNW D 0.000120.003770.014850.019560.007190.00295
 NW D 0.000120.006840.019090.030050.016970.00589
NNW D 0.000710.013550.023690.028170.012370.00448
  N E 0.001530.002360.000470.000000.000000.00000
NNE E 0.000710.001300.000350.000000.000000.00000
 NE E 0.000000.001650.000240.000000.000000.00000
ENE E 0.000000.002000.000470.000000.000000.00000
  E E 0.000590.001530.000590.000000.000000.00000
ESE E 0.000350.003060.000240.000000.000000.00000
 SE E 0.000820.002000.000240.000000.000000.00000
SSE E 0.000710.002470.000470.000000.000000.00000
  S E 0.000350.002710.000240.000000.000000.00000
SSW E 0.000000.002000.000240.000000.000000.00000
 SW E 0.000350.002950.000590.000000.000000.00000
WSW E 0.000350.002830.001060.000000.000000.00000
  W E 0.000120.002000.000940.000000.000000.00000
WNW E 0.000710.001300.000820.000000.000000.00000
 NW E 0.000590.003540.001410.000000.000000.00000
NNW E 0.000940.009660.001890.000000.000000.00000
  N F 0.009780.007070.000000.000000.000000.00000
NNE F 0.006950.002830.000000.000000.000000.00000
 NE F 0.006360.001180.000000.000000.000000.00000
ENE F 0.005420.002590.000000.000000.000000.00000
  E F 0.004480.003540.000000.000000.000000.00000
ESE F 0.005190.003180.000000.000000.000000.00000
 SE F 0.006720.003420.000000.000000.000000.00000
```

```
SSE F 0.006130.004830.000000.000000.000000.00000
  S F 0.007540.003420.000000.000000.000000.00000
SSW F 0.006600.004950.000000.000000.000000.00000
 SW F 0.005770.004360.000000.000000.000000.00000
WSW F 0.007310.004710.000000.000000.000000.00000
  W F 0.005660.002950.000000.000000.000000.00000
WNW F 0.005770.005540.000000.000000.000000.00000
 NW F 0.006720.004600.000000.000000.000000.00000
NNW F 0.013320.008370.000000.000000.000000.00000
```

APPENDIX B - MEA RADIATION DOSE RATES FROM MILDOS

Appendix B contains the print out from the computer program MILDOS in the following order:

Appendix	Title	Radon Source	Weather Data	Purge Rate
B1	MARMU15P	MU 1-5	MEA	44
B2	MARST15P	SATELLITE	MEA	44
B3	MARMU15R	MU1-5 RESTORATION	MEA	44
B4	MARMU15N	MU1-5 NEW WELL	MEA	44
B5	MAROC2	MU 1-5 OCCUPATIONAL	MEA	222
B6	MAROC3	SATELLITE OCCUPATIONAL	MEA	222
B7	MARMU15	MU 1-5	MEA	222
B8	MARST15	SATELLITE	MEA	222

Appendix M-2

Vegetation Sampling at Cameco Resources In-Situ Recovery Operations

MILDOS printout of radiation doses from the vegetation pathway (consumption of vegetables, meat and milk) at the Cameco Resources Marsland Expansion Area In- Situ Uranium Recovery Operation

By

Noel Savignac, Ph.D.

October 19, 2011

8500 Menaul Blvd., NE, Suite B-335, Albuquerque, NM 87112
Bus: (505) 881-4150 Res: (505) 256-9603 Fax: (505) 296-3289
Email: noelsav@swcp.com

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REGION: Marsland All Well Field CODE: MILDOS-AREA (02/97) PAGE 2

METSET: DATA: MarMU15P.MIL 10/19/11

JOINT FREQUENCY IN PERCENT, DIRECTION INDICATES WHERE WIND IS FROM FREQWS=0.14427,0.29579,0.30967,0.17441,0.05798,0.01793

MPH	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTALS
STABILITY CLASS 1																	
1.5	0.1410	0.0240	0.0710	0.0820	0.0940	0.1300	0.1060	0.2120	0.1770	0.3540	0.1410	0.0940	0.1180	0.0820	0.0590	0.0590	1.9440
5.5	0.2360	0.1530	0.1890	0.1770	0.1770	0.2590	0.2000	0.2120	0.2120	0.2590	0.2240	0.4010	0.1180	0.1180	0.2000	0.2120	3.3470
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.3770	0.1770	0.2600	0.2590	0.2710	0.3890	0.3060	0.4240	0.3890	0.6130	0.3650	0.4950	0.2360	0.2000	0.2590	0.2710	5.2910
STABILITY CLASS 2																	
1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0470	0.0470	0.0940	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.2710
5.5	0.2000	0.2240	0.2470	0.1770	0.1770	0.2470	0.3420	0.2470	0.2360	0.3180	0.3060	0.2590	0.1300	0.1650	0.2360	0.2120	3.7230
10.0	0.0240	0.0000	0.0120	0.0000	0.0120	0.0350	0.0350	0.0240	0.0710	0.0590	0.0000	0.0470	0.0240	0.0120	0.0710	0.0470	0.4730
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.2240	0.2240	0.2590	0.1770	0.1890	0.3170	0.3890	0.3180	0.3540	0.4710	0.3180	0.3060	0.1660	0.1890	0.3070	0.2590	4.4670
STABILITY CLASS 3																	
1.5	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0350	0.0120	0.0350	0.0240	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.1300
5.5	0.0590	0.0590	0.0590	0.0820	0.1180	0.1770	0.1890	0.1530	0.1530	0.1410	0.1890	0.0820	0.0710	0.0470	0.0590	0.0940	1.7320
10.0	1.0300	0.4710	0.2950	0.3420	0.3300	0.5540	0.4120	0.4360	0.4950	0.4360	0.5660	0.6600	0.4360	0.4710	0.8130	0.7780	8.5250
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.1010	0.5300	0.3540	0.4240	0.4480	0.7310	0.6360	0.6010	0.6830	0.6010	0.7670	0.7420	0.5070	0.5180	0.8720	0.8720	10.3870
STABILITY CLASS 4																	
1.5	0.0240	0.0240	0.0000	0.0000	0.0120	0.0470	0.0240	0.0120	0.0120	0.0120	0.0240	0.0120	0.0000	0.0120	0.0120	0.0710	0.2980
5.5	0.7310	0.4710	0.1890	0.3060	0.5770	0.8840	1.0490	0.7540	0.5190	0.3890	0.4830	0.5070	0.4120	0.3770	0.6840	1.3550	9.6870
10.0	1.9100	1.0720	0.9190	0.7310	1.0370	0.9190	1.2140	1.6500	1.3080	0.8960	0.7900	1.4610	1.2730	1.4850	1.9090	2.3690	20.9430
15.5	1.7800	0.8600	0.3060	0.2000	0.3180	0.3060	0.3890	0.9550	1.3790	0.6720	0.3650	0.8720	1.2610	1.9560	3.0050	2.8170	17.4410
21.5	0.4120	0.2240	0.0120	0.0000	0.0120	0.0240	0.0350	0.3420	0.2830	0.1180	0.1410	0.2470	0.2950	0.7190	1.6970	1.2370	5.7980
28.0	0.1410	0.0120	0.0000	0.0120	0.0000	0.0120	0.0000	0.0120	0.0120	0.0000	0.0000	0.0240	0.2360	0.2950	0.5890	0.4480	1.7930
ALL	4.9980	2.6630	1.4260	1.2490	1.9560	2.1920	2.7110	3.7250	3.5130	2.0870	1.8030	3.1230	3.4770	4.8440	7.8960	8.2970	55.9600
STABILITY CLASS 5																	
1.5	0.1530	0.0710	0.0000	0.0000	0.0590	0.0350	0.0820	0.0710	0.0350	0.0000	0.0350	0.0350	0.0120	0.0710	0.0590	0.0940	0.8120
5.5	0.2360	0.1300	0.1650	0.2000	0.1530	0.3060	0.2000	0.2470	0.2710	0.2000	0.2950	0.2830	0.2000	0.1300	0.3540	0.9660	4.3360
10.0	0.0470	0.0350	0.0240	0.0470	0.0590	0.0240	0.0240	0.0470	0.0240	0.0240	0.0590	0.1060	0.0940	0.0820	0.1410	0.1890	1.0260
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	0.4360	0.2360	0.1890	0.2470	0.2710	0.3650	0.3060	0.3650	0.3300	0.2240	0.3890	0.4240	0.3060	0.2830	0.5540	1.2490	6.1740
STABILITY CLASS 6																	
1.5	0.9780	0.6950	0.6360	0.5420	0.4480	0.5190	0.6720	0.6130	0.7540	0.6600	0.5770	0.7310	0.5660	0.5770	0.6720	1.3320	10.9720
5.5	0.7070	0.2830	0.1180	0.2590	0.3540	0.3180	0.3420	0.4830	0.3420	0.4950	0.4360	0.4710	0.2950	0.5540	0.4600	0.8370	6.7540
10.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ALL	1.6850	0.9780	0.7540	0.8010	0.8020	0.8370	1.0140	1.0960	1.0960	1.1550	1.0130	1.2020	0.8610	1.1310	1.1320	2.1690	17.7260
ALL	8.8210	4.8080	3.2420	3.1570	3.9370	4.8310	5.3620	6.5290	6.3650	5.1510	4.6550	6.2920	5.5530	7.1650	11.0200	13.1170	100.0050

INDIVIDUAL RECEPTOR LOCATION DATA, 30 LOCATIONS INPUT THIS RUN

I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE	I	LOCATION NAMES	X(KM)	Y(KM)	Z(M)	DIST(KM)	TYPE
1	Alliance	30.00	-45.40	-50.00	54.42	1	16	Residence 1	-0.80	-0.40	6.00	0.89	1
2	Berea	21.50	-32.60	-50.00	39.05	1	17	Residence 2	1.00	0.30	-4.00	1.04	1
3	Chardon	22.30	35.80	-50.00	42.18	1	18	Residence 3	-0.80	-1.90	-16.00	2.06	1
4	Clinton	75.40	26.50	-50.00	79.92	1	19	Residence 4	-0.40	-3.40	-31.00	3.42	1
5	Crawford	-12.10	20.80	-50.00	24.06	1	20	Residence 5	1.90	-4.30	-36.00	4.70	1
6	Harrison	-50.50	22.50	633.00	55.29	1	21	Residence 6	-4.70	1.86	22.00	5.05	1
7	Hay Springs	47.10	18.80	-50.00	50.71	1	22	Residence 7	2.40	3.60	76.00	4.33	1
8	Hemmingford	14.30	-20.40	36.00	24.91	1	23	Residence 8	4.70	-4.40	-50.00	6.44	1
9	Marsland	-3.80	-6.10	-50.00	7.19	1	24	Unoccupied 1	-0.90	2.00	21.00	2.19	1
10	Mitchell	-48.50	-60.00	-50.00	77.15	1	25	Unoccupied 2	2.00	2.80	69.00	3.44	1
11	Oelrichs	4.90	75.30	-50.00	75.46	1	26	North Boundary	0.00	2.60	29.00	2.60	1
12	Rushville	66.00	22.00	-50.00	69.57	1	27	East Boundary	1.40	0.30	-20.00	1.43	1
13	Scottsbluff	-36.30	-68.90	-50.00	77.88	1	28	South Boundary	0.00	-0.50	13.00	0.50	1
14	Van Tassell	-67.50	21.00	49.00	70.69	1	29	West Boundary	-0.70	0.00	49.00	0.70	1
15	Whitney	1.20	31.40	-50.00	31.42	1	30	Minatare	-22.40	-75.60	-41.40	78.85	1

MISCELLANEOUS INPUTABLE PARAMETER VALUES

DMM	DMA	TSTART	FFORI	FHAYI	FFORP	FHAYP	FPR(1)	FPR(2)	FPR(3)	ACTRAT
100.0	100.0	1.00	0.50	0.50	0.50	0.50	2800.00	3200.00	1400.00	2.50

IPACT EQUALS 0, 0, 0, 0, 0,

JC EQUALS 0, 0, 0, 0, 0, 0, 1, 0, 0, 0

TIME STEP DATA....	STEP NAMES	LENGTH, YRS	IFTODO
1		5.00	1

XRHO EQUALS 1.5, 2.5, 3.5, 4.5, 7.5, 15.0, 25.0, 35.0, 45.0, 55.0, 65.0, 75.0,

HDP EQUALS 50.0

POPULATION DISTRIBUTION

KILOMETERS	N 0.0	NNE 22.5	NE 45.0	ENE 67.5	E 90.0	ESE 112.5	SE 135.0	SSE 157.5	S 180.0	SSW 202.5	SW 225.0	WSW 247.5	W 270.0	WNW 292.5	NW 315.0	NNW 337.5
1.0- 2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.0- 3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.0- 4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0- 5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.0-10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.0-20.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20.0-30.0	0	0	0	0	0	0	993	0	0	0	0	0	0	0	0	1107
30.0-40.0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40.0-50.0	0	5634	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50.0-60.0	0	0	0	652	0	0	0	9859	0	0	0	0	0	279	0	0
60.0-70.0	0	0	0	999	0	0	0	0	0	0	0	0	0	0	0	0
70.0-80.0	145	0	14	30	0	0	0	0	0	15542	1831	0	0	19	0	0
1.0-80.0	232	5634	14	1681	0	0	993	9859	0	15542	1831	0	0	298	0	1107

TOTAL 1-80 KM POPULATION IS 37191 PERSONS

NUMBER OF SOURCES= 5

NO.	KM X	KM Y	M Z	KM2 AREA	CI/YEAR U-238	Th-230	Ra-226	Pb-210	Rn-222	ID	PSIZE SET	M/SEC EXIT VEL	SOURCE NAME
1	-0.56	2.23	27.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E+03	1001	1	0.00E+00	MU-1
2	-0.55	1.65	16.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.78E+03	1002	1	0.00E+00	MU-2
3	-0.15	0.95	13.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.13E+03	1003	1	0.00E+00	MU-3
4	0.44	0.13	-4.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+03	1004	1	0.00E+00	MU-4
5	0.84	-0.45	-15.00	0.0000	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E+03	1005	1	0.00E+00	MU-5

INPUT TAILS ACTIVITIES, PCI/G

SET	URANIUM	THORIUM	RADIUM	LEAD
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AMAD AND FRACTIONAL DISTRIBUTION

SET	1.5	3.0	7.7	54.0
1	0.000	1.000	0.000	0.000
2	1.000	0.000	0.000	0.000
3	0.000	0.000	0.300	0.700

PARTICULATE SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
4	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
5	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

RADON SOURCE STRENGTH MULTIPLIERS BY TIME STEP, 1 TIME STEP(S) USED FOR THIS RUN

SOURCE NUMBER	TSTEP 1 5.00YRS	TSTEP 2 5.00YRS	TSTEP 3 5.00YRS	TSTEP 4 5.00YRS	TSTEP 5 5.00YRS	TSTEP 6 5.00YRS	TSTEP 7 5.00YRS	TSTEP 8 5.00YRS	TSTEP 9 5.00YRS	TSTEP10 5.00YRS
1	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
2	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
3	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
4	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
5	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

MMARY PRINT OF POPULATION DOSES COMPUTED FOR TSTEP 1--DOSES SHOWN ARE ANNUAL POPULATION DOSE COMMITMENTS, PERSON-REM PER YEAR

DOSES RECEIVED BY PEOPLE WITHIN 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.552E-01	2.877E+00	4.644E-02	2.157E+00	1.037E+00	1.369E+02
GROUND	1.936E-02	1.936E-02	1.936E-02	1.936E-02	1.936E-02	1.936E-02
CLOUD	1.172E+00	1.172E+00	1.172E+00	1.172E+00	1.172E+00	1.172E+00
VEG. ING	1.668E+00	1.927E+01	1.668E+00	5.728E+00	4.665E+00	1.668E+00
MEAT ING	9.137E-02	1.056E+00	9.137E-02	3.138E-01	2.556E-01	9.137E-02
MILK ING	3.140E-02	3.628E-01	3.140E-02	1.078E-01	8.783E-02	3.140E-02
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	3.337E+00	2.476E+01	3.029E+00	9.498E+00	7.238E+00	1.398E+02

DOSES RECEIVED BY PEOPLE BEYOND 80 KILOMETERS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
GROUND	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
CLOUD	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
VEG. ING	7.454E+00	8.614E+01	7.454E+00	2.560E+01	2.085E+01	7.454E+00
MEAT ING	1.446E+00	1.671E+01	1.446E+00	4.966E+00	4.045E+00	1.446E+00
MILK ING	8.229E-02	9.508E-01	8.229E-02	2.826E-01	2.302E-01	8.229E-02
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	8.983E+00	1.038E+02	8.983E+00	3.085E+01	2.513E+01	8.983E+00

TOTAL DOSES COMPUTED OVER ALL POPULATIONS

PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INHAL.	3.552E-01	2.877E+00	4.644E-02	2.157E+00	1.037E+00	1.369E+02
GROUND	1.936E-02	1.936E-02	1.936E-02	1.936E-02	1.936E-02	1.936E-02
CLOUD	1.172E+00	1.172E+00	1.172E+00	1.172E+00	1.172E+00	1.172E+00
VEG. ING	9.122E+00	1.054E+02	9.122E+00	3.133E+01	2.552E+01	9.122E+00
MEAT ING	1.537E+00	1.777E+01	1.537E+00	5.280E+00	4.301E+00	1.537E+00
MILK ING	1.137E-01	1.314E+00	1.137E-01	3.904E-01	3.180E-01	1.137E-01
RNPLUS50	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
TOTALS	1.232E+01	1.286E+02	1.201E+01	4.035E+01	3.237E+01	1.488E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 1 NAME=Alliance X= 30.0KM, Y= -45.4KM, Z= -50.0M, DIST= 54.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.44E-01	1.12E-01	4.80E-02	4.09E-01	1.84E-01	4.71E+00
CHILD	TOTALS	3.38E-01	1.59E-01	6.33E-02	2.24E-01	1.24E-01	4.71E+00
TEENAGE	TOTALS	3.42E-01	2.80E-01	7.38E-02	1.42E-01	1.00E-01	4.71E+00
ADULT	TOTALS	3.44E-01	2.71E-01	8.72E-02	1.44E-01	1.06E-01	4.71E+00

NUMBER 2 NAME=Berea X= 21.5KM, Y= -32.6KM, Z= -50.0M, DIST= 39.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.87E-01	1.29E-01	6.41E-02	4.32E-01	2.03E-01	6.84E+00
CHILD	TOTALS	4.81E-01	1.77E-01	7.97E-02	2.43E-01	1.41E-01	6.84E+00
TEENAGE	TOTALS	4.85E-01	3.00E-01	9.04E-02	1.60E-01	1.17E-01	6.84E+00
ADULT	TOTALS	4.87E-01	2.91E-01	1.04E-01	1.62E-01	1.23E-01	6.84E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 3 NAME=Chardon X= 22.3KM, Y= 35.8KM, Z= -50.0M, DIST= 42.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.78E-01	8.88E-02	3.89E-02	3.22E-01	1.45E-01	3.82E+00
CHILD	TOTALS	2.74E-01	1.26E-01	5.09E-02	1.76E-01	9.83E-02	3.82E+00
TEENAGE	TOTALS	2.77E-01	2.20E-01	5.92E-02	1.13E-01	7.98E-02	3.82E+00
ADULT	TOTALS	2.78E-01	2.14E-01	6.97E-02	1.14E-01	8.41E-02	3.82E+00

NUMBER 4 NAME=Clinton X= 75.4KM, Y= 26.5KM, Z= -50.0M, DIST= 79.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.39E-01	6.20E-02	2.12E-02	2.55E-01	1.09E-01	1.81E+00
CHILD	TOTALS	1.35E-01	9.28E-02	3.09E-02	1.35E-01	6.99E-02	1.81E+00
TEENAGE	TOTALS	1.37E-01	1.71E-01	3.76E-02	8.20E-02	5.47E-02	1.81E+00
ADULT	TOTALS	1.39E-01	1.65E-01	4.63E-02	8.33E-02	5.82E-02	1.81E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 5 NAME=Crawford X= -12.1KM, Y= 20.8KM, Z= -50.0M, DIST= 24.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	5.61E-01	1.17E-01	6.94E-02	3.36E-01	1.70E-01	8.06E+00
CHILD	TOTALS	5.57E-01	1.52E-01	8.09E-02	1.99E-01	1.26E-01	8.06E+00
TEENAGE	TOTALS	5.60E-01	2.41E-01	8.87E-02	1.40E-01	1.08E-01	8.06E+00
ADULT	TOTALS	5.61E-01	2.35E-01	9.86E-02	1.41E-01	1.12E-01	8.06E+00

NUMBER 6 NAME=Harrison X= -50.5KM, Y= 22.5KM, Z= 633.0M, DIST= 55.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.11E-01	7.91E-02	3.07E-02	3.06E-01	1.34E-01	2.83E+00
CHILD	TOTALS	2.06E-01	1.15E-01	4.23E-02	1.64E-01	8.83E-02	2.83E+00
TEENAGE	TOTALS	2.09E-01	2.07E-01	5.03E-02	1.03E-01	7.04E-02	2.83E+00
ADULT	TOTALS	2.11E-01	2.01E-01	6.05E-02	1.04E-01	7.45E-02	2.83E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 7 NAME=Hay Springs X= 47.1KM, Y= 18.8KM, Z= -50.0M, DIST= 50.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.30E-01	7.64E-02	3.25E-02	2.82E-01	1.26E-01	3.14E+00
CHILD	TOTALS	2.26E-01	1.09E-01	4.30E-02	1.54E-01	8.48E-02	3.14E+00
TEENAGE	TOTALS	2.28E-01	1.93E-01	5.03E-02	9.77E-02	6.85E-02	3.14E+00
ADULT	TOTALS	2.30E-01	1.87E-01	5.95E-02	9.91E-02	7.23E-02	3.14E+00

NUMBER 8 NAME=Hemmingford X= 14.3KM, Y= -20.4KM, Z= 36.0M, DIST= 24.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	9.20E-01	2.00E-01	1.13E-01	6.08E-01	3.00E-01	1.32E+01
CHILD	TOTALS	9.11E-01	2.65E-01	1.34E-01	3.54E-01	2.17E-01	1.32E+01
TEENAGE	TOTALS	9.16E-01	4.31E-01	1.48E-01	2.43E-01	1.85E-01	1.32E+01
ADULT	TOTALS	9.19E-01	4.19E-01	1.67E-01	2.45E-01	1.92E-01	1.32E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 9 NAME=Marsland X= -3.8KM, Y= -6.1KM, Z= -50.0M, DIST= 7.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.11E+00	1.26E-01	1.01E-01	2.42E-01	1.54E-01	1.68E+01
CHILD	TOTALS	1.11E+00	1.44E-01	1.07E-01	1.70E-01	1.31E-01	1.68E+01
TEENAGE	TOTALS	1.11E+00	1.92E-01	1.11E-01	1.38E-01	1.21E-01	1.68E+01
ADULT	TOTALS	1.11E+00	1.88E-01	1.16E-01	1.39E-01	1.23E-01	1.68E+01

NUMBER 10 NAME=Mitchell X= -48.5KM, Y= -60.0KM, Z= -50.0M, DIST= 77.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.02E-01	4.95E-02	1.59E-02	2.08E-01	8.83E-02	1.31E+00
CHILD	TOTALS	9.86E-02	7.49E-02	2.39E-02	1.09E-01	5.61E-02	1.31E+00
TEENAGE	TOTALS	1.01E-01	1.39E-01	2.94E-02	6.61E-02	4.35E-02	1.31E+00
ADULT	TOTALS	1.02E-01	1.35E-01	3.65E-02	6.71E-02	4.64E-02	1.31E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 11 NAME=Oelrichs X= 4.9KM, Y= 75.3KM, Z= -50.0M, DIST= 75.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.64E-01	7.57E-02	2.52E-02	3.14E-01	1.34E-01	2.13E+00
CHILD	TOTALS	1.60E-01	1.14E-01	3.72E-02	1.65E-01	8.55E-02	2.13E+00
TEENAGE	TOTALS	1.62E-01	2.10E-01	4.55E-02	1.01E-01	6.66E-02	2.13E+00
ADULT	TOTALS	1.64E-01	2.04E-01	5.63E-02	1.02E-01	7.10E-02	2.13E+00

NUMBER 12 NAME=Rushville X= 66.0KM, Y= 22.0KM, Z= -50.0M, DIST= 69.6KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.61E-01	6.53E-02	2.39E-02	2.60E-01	1.13E-01	2.13E+00
CHILD	TOTALS	1.57E-01	9.64E-02	3.38E-02	1.39E-01	7.33E-02	2.13E+00
TEENAGE	TOTALS	1.59E-01	1.76E-01	4.06E-02	8.56E-02	5.79E-02	2.13E+00
ADULT	TOTALS	1.61E-01	1.70E-01	4.94E-02	8.69E-02	6.15E-02	2.13E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 13 NAME=Scottsbluff X= -36.3KM, Y= -68.9KM, Z= -50.0M, DIST= 77.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.14E-01	5.39E-02	1.76E-02	2.25E-01	9.56E-02	1.47E+00
CHILD	TOTALS	1.10E-01	8.12E-02	2.62E-02	1.18E-01	6.09E-02	1.47E+00
TEENAGE	TOTALS	1.12E-01	1.51E-01	3.22E-02	7.17E-02	4.73E-02	1.47E+00
ADULT	TOTALS	1.13E-01	1.46E-01	3.99E-02	7.28E-02	5.05E-02	1.47E+00

NUMBER 14 NAME=Van Tassell X= -67.5KM, Y= 21.0KM, Z= 49.0M, DIST= 70.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.53E-01	6.69E-02	2.32E-02	2.72E-01	1.17E-01	2.01E+00
CHILD	TOTALS	1.49E-01	9.97E-02	3.36E-02	1.44E-01	7.53E-02	2.01E+00
TEENAGE	TOTALS	1.52E-01	1.83E-01	4.08E-02	8.82E-02	5.90E-02	2.01E+00
ADULT	TOTALS	1.53E-01	1.77E-01	5.01E-02	8.96E-02	6.28E-02	2.01E+00

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 15 NAME=Whitney X= 1.2KM, Y= 31.4KM, Z= -50.0M, DIST= 31.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.17E-01	1.07E-01	5.45E-02	3.50E-01	1.66E-01	5.88E+00
CHILD	TOTALS	4.12E-01	1.45E-01	6.71E-02	1.98E-01	1.17E-01	5.88E+00
TEENAGE	TOTALS	4.15E-01	2.44E-01	7.57E-02	1.32E-01	9.73E-02	5.88E+00
ADULT	TOTALS	4.17E-01	2.37E-01	8.67E-02	1.33E-01	1.02E-01	5.88E+00

NUMBER 16 NAME=Residence 1 X= -0.8KM, Y= -0.4KM, Z= 6.0M, DIST= 0.9KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.58E+01	6.22E-01	5.98E-01	7.34E-01	6.49E-01	2.54E+02
CHILD	TOTALS	1.58E+01	6.40E-01	6.04E-01	6.64E-01	6.27E-01	2.54E+02
TEENAGE	TOTALS	1.58E+01	6.85E-01	6.08E-01	6.34E-01	6.18E-01	2.54E+02
ADULT	TOTALS	1.58E+01	6.82E-01	6.13E-01	6.35E-01	6.20E-01	2.54E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 17 NAME=Residence 2 X= 1.0KM, Y= 0.3KM, Z= -4.0M, DIST= 1.0KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.45E+01	5.92E-01	5.79E-01	6.50E-01	6.06E-01	7.33E+02
CHILD	TOTALS	4.45E+01	6.01E-01	5.82E-01	6.14E-01	5.94E-01	7.33E+02
TEENAGE	TOTALS	4.45E+01	6.25E-01	5.84E-01	5.98E-01	5.89E-01	7.33E+02
ADULT	TOTALS	4.45E+01	6.23E-01	5.87E-01	5.98E-01	5.90E-01	7.33E+02

NUMBER 18 NAME=Residence 3 X= -0.8KM, Y= -1.9KM, Z= -16.0M, DIST= 2.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.86E+00	4.30E-01	4.01E-01	5.68E-01	4.64E-01	1.08E+02
CHILD	TOTALS	6.86E+00	4.52E-01	4.08E-01	4.82E-01	4.36E-01	1.08E+02
TEENAGE	TOTALS	6.86E+00	5.08E-01	4.13E-01	4.45E-01	4.25E-01	1.08E+02
ADULT	TOTALS	6.86E+00	5.04E-01	4.19E-01	4.46E-01	4.28E-01	1.08E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 19 NAME=Residence 4 X= -0.4KM, Y= -3.4KM, Z= -31.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.16E+00	3.25E-01	2.91E-01	4.82E-01	3.63E-01	6.46E+01
CHILD	TOTALS	4.16E+00	3.50E-01	3.00E-01	3.84E-01	3.32E-01	6.46E+01
TEENAGE	TOTALS	4.16E+00	4.14E-01	3.05E-01	3.42E-01	3.19E-01	6.46E+01
ADULT	TOTALS	4.16E+00	4.09E-01	3.12E-01	3.43E-01	3.22E-01	6.46E+01

NUMBER 20 NAME=Residence 5 X= 1.9KM, Y= -4.3KM, Z= -36.0M, DIST= 4.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	4.85E+00	4.06E-01	3.54E-01	6.46E-01	4.64E-01	7.50E+01
CHILD	TOTALS	4.84E+00	4.44E-01	3.67E-01	4.96E-01	4.16E-01	7.50E+01
TEENAGE	TOTALS	4.85E+00	5.42E-01	3.75E-01	4.31E-01	3.97E-01	7.50E+01
ADULT	TOTALS	4.85E+00	5.35E-01	3.86E-01	4.32E-01	4.01E-01	7.50E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 21 NAME=Residence 6 X= -4.7KM, Y= 1.9KM, Z= 22.0M, DIST= 5.1KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.45E+00	3.19E-01	2.81E-01	4.96E-01	3.62E-01	5.30E+01
CHILD	TOTALS	3.45E+00	3.47E-01	2.90E-01	3.85E-01	3.26E-01	5.30E+01
TEENAGE	TOTALS	3.45E+00	4.19E-01	2.96E-01	3.37E-01	3.12E-01	5.30E+01
ADULT	TOTALS	3.45E+00	4.14E-01	3.04E-01	3.38E-01	3.15E-01	5.30E+01

NUMBER 22 NAME=Residence 7 X= 2.4KM, Y= 3.6KM, Z= 76.0M, DIST= 4.3KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	6.17E+00	4.88E-01	4.45E-01	6.90E-01	5.37E-01	9.57E+01
CHILD	TOTALS	6.17E+00	5.20E-01	4.55E-01	5.64E-01	4.96E-01	9.57E+01
TEENAGE	TOTALS	6.17E+00	6.02E-01	4.62E-01	5.09E-01	4.80E-01	9.57E+01
ADULT	TOTALS	6.17E+00	5.96E-01	4.72E-01	5.10E-01	4.84E-01	9.57E+01

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 23 NAME=Residence 8 X= 4.7KM, Y= -4.4KM, Z= -50.0M, DIST= 6.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.13E+00	1.66E-01	1.41E-01	2.85E-01	1.95E-01	3.32E+01
CHILD	TOTALS	2.13E+00	1.85E-01	1.47E-01	2.11E-01	1.71E-01	3.32E+01
TEENAGE	TOTALS	2.13E+00	2.33E-01	1.51E-01	1.79E-01	1.62E-01	3.32E+01
ADULT	TOTALS	2.13E+00	2.30E-01	1.57E-01	1.79E-01	1.64E-01	3.32E+01

NUMBER 24 NAME=Unoccupied 1 X= -0.9KM, Y= 2.0KM, Z= 21.0M, DIST= 2.2KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	7.50E+01	7.12E-01	6.96E-01	7.86E-01	7.30E-01	1.24E+03
CHILD	TOTALS	7.50E+01	7.24E-01	7.00E-01	7.40E-01	7.15E-01	1.24E+03
TEENAGE	TOTALS	7.50E+01	7.54E-01	7.03E-01	7.20E-01	7.09E-01	1.24E+03
ADULT	TOTALS	7.50E+01	7.52E-01	7.06E-01	7.20E-01	7.11E-01	1.24E+03

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 25 NAME=Unoccupied 2 X= 2.0KM, Y= 2.8KM, Z= 69.0M, DIST= 3.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	8.61E+00	5.52E-01	5.15E-01	7.20E-01	5.93E-01	1.35E+02
CHILD	TOTALS	8.61E+00	5.79E-01	5.24E-01	6.15E-01	5.59E-01	1.35E+02
TEENAGE	TOTALS	8.61E+00	6.47E-01	5.30E-01	5.69E-01	5.45E-01	1.35E+02
ADULT	TOTALS	8.61E+00	6.42E-01	5.38E-01	5.70E-01	5.48E-01	1.35E+02

NUMBER 26 NAME=North Boundary X= 0.0KM, Y= 2.6KM, Z= 29.0M, DIST= 2.6KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.91E+01	7.26E-01	7.05E-01	8.24E-01	7.50E-01	6.40E+02
CHILD	TOTALS	3.91E+01	7.42E-01	7.10E-01	7.63E-01	7.30E-01	6.40E+02
TEENAGE	TOTALS	3.91E+01	7.82E-01	7.14E-01	7.36E-01	7.22E-01	6.40E+02
ADULT	TOTALS	3.91E+01	7.79E-01	7.18E-01	7.37E-01	7.24E-01	6.40E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 27 NAME=East Boundary X= 1.4KM, Y= 0.3KM, Z= -20.0M, DIST= 1.4KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.67E+01	3.12E-01	3.04E-01	3.49E-01	3.21E-01	2.73E+02
CHILD	TOTALS	1.67E+01	3.18E-01	3.06E-01	3.26E-01	3.14E-01	2.73E+02
TEENAGE	TOTALS	1.67E+01	3.33E-01	3.07E-01	3.16E-01	3.11E-01	2.73E+02
ADULT	TOTALS	1.67E+01	3.32E-01	3.09E-01	3.16E-01	3.11E-01	2.73E+02

NUMBER 28 NAME=South Boundary X= 0.0KM, Y= -0.5KM, Z= 13.0M, DIST= 0.5KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	3.50E+01	9.16E-01	8.83E-01	1.07E+00	9.52E-01	5.70E+02
CHILD	TOTALS	3.50E+01	9.40E-01	8.91E-01	9.72E-01	9.22E-01	5.70E+02
TEENAGE	TOTALS	3.50E+01	1.00E+00	8.96E-01	9.31E-01	9.10E-01	5.70E+02
ADULT	TOTALS	3.50E+01	9.96E-01	9.03E-01	9.32E-01	9.13E-01	5.70E+02

TIME STEP NUMBER 1, DURATION IN YRS IS... 5.0

NUMBER 29 NAME=West Boundary X= -0.7KM, Y= 0.0KM, Z= 49.0M, DIST= 0.7KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	2.41E+01	7.60E-01	7.36E-01	8.70E-01	7.87E-01	3.89E+02
CHILD	TOTALS	2.41E+01	7.78E-01	7.42E-01	8.01E-01	7.65E-01	3.89E+02
TEENAGE	TOTALS	2.41E+01	8.22E-01	7.46E-01	7.72E-01	7.56E-01	3.89E+02
ADULT	TOTALS	2.41E+01	8.19E-01	7.51E-01	7.72E-01	7.58E-01	3.89E+02

NUMBER 30 NAME=Minatare X= -22.4KM, Y= -75.6KM, Z= -41.4M, DIST= 78.8KM, IRTYPE= 1

40CFR190 ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CHILD	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TEENAGE	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ADULT	TOTALS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TOTAL ANNUAL DOSE COMMITMENTS COMPUTED FOR THIS LOCATION, MREM/YR

AGE	PATHWAY	EFFECTIV	BONE	AVG.LUNG	LIVER	KIDNEY	BRONCHI
INFANT	TOTALS	1.44E-01	6.76E-02	2.23E-02	2.81E-01	1.20E-01	1.86E+00
CHILD	TOTALS	1.40E-01	1.02E-01	3.30E-02	1.48E-01	7.63E-02	1.86E+00
TEENAGE	TOTALS	1.42E-01	1.88E-01	4.05E-02	8.98E-02	5.94E-02	1.86E+00
ADULT	TOTALS	1.44E-01	1.82E-01	5.01E-02	9.12E-02	6.33E-02	1.86E+00

Program execution time = 1.98 seconds

VEGETATION SAMPLING AT CAMECO RESOURCES IN-SITU URANIUM RECOVERY OPERATIONS

By
Noel Savignac, Ph.D.

October 27, 2011

8500 Menaul Blvd., NE, Suite B-335, Albuquerque, NM 87112
Bus: (505) 881-4150 Res: (505) 256-9603 Fax: (505) 296-3289
Email: noelsav@swcp.com

Question Should vegetation or forage sampling be required at in-situ uranium extraction operations?

Reference U.S. Regulatory Commissions Regulatory Guide 4.14, "Radiological Effluent and Environmental Monitoring at Uranium Mills" Table 2 footnote (o) specifies "Vegetation or forage sampling need be carried out only if dose calculations indicate that the ingestion pathway from grazing animals is a potentially significant exposure pathway (an exposure pathway should be considered important if the predicted dose to an individual would exceed 5% of the applicable radiation protection standard.

The applicable radiation protection standard in 10 CFR 20 is 100 mrem/yr. Five percent of 100 mrem/yr is 5 mrem/yr.

Reg. Guide 4.14 Table 2 specifies 3 or more samples from animal grazing areas near the mill site in the direction of the highest predicted airborne radionuclide concentrations, 3 times during the growing season, analyzed for Ra-226 and Pb-210.

Application Reg. Guide 4.14 Table 2 applies to operating uranium mills that emit U, Ra-226, Th-230 and Rn-222. The vegetation or foliage sampling program will measure the Ra-226 and Th-230 that are incident on the foliage or as uptake by the foliage. In-situ uranium extraction operations only emit Rn-222 and not Ra-226 and Th-230.

Dose Calculations – The computer program MILDOS calculates radiation doses from in-situ uranium operations. The program contains a food pathway for calculation of radiation doses from vegetables, meat, and milk. MILDOS was used to calculate the doses from the food pathway from the Crow Butte Marsland Expansion Area In-Situ Uranium Recovery Facility near Marsland, Nebraska.

MILDOS Input parameters – MILDOS file CAMMU15P was used to calculate the dose from the food pathway. The file is for typical operations from production wells with the operational parameters specified in Table 1.

Table 1.Operational Data for a Typical In-Situ Uranium Recovery Facility

Location	X km	Y km	Z m	Ra pCi/g	Em FR	Thick m	Den g/cm*3	Area m*2	Fr Rn	Col Vol L	Rn vent /d	Col Util	Por	Op days	Cir Vol L	Purg L/d
MU-1	-0.56	2.23	27	620	0.25	7.6	1.89	3.02E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-2	-0.55	1.65	16	620	0.25	7.6	1.89	2.70E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-3	-0.15	0.95	13	620	0.25	7.6	1.89	1.71E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-4	0.43	0.13	-4	620	0.25	7.6	1.89	2.43E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-5	0.84	-0.45	-14	620	0.25	7.6	1.89	1.82E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-A	-0.86	2.88	45	620	0.25	7.6	1.89	2.66E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-B	1.12	-1.02	-15	620	0.25	7.6	1.89	2.48E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-C	1.74	-2.33	-25	620	0.25	7.6	1.89	4.58E+04	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-D	2.42	-3.56	-36	620	0.25	7.6	1.89	2.45E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-E	2.74	-3.98	-42	620	0.25	7.6	1.89	2.08E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05
MU-F	2.90	-4.30	-47	620	0.25	7.6	1.89	1.06E+05	0.8	1.41E+05	0.01	5.00E-01	0.29	365	3.40E+08	2.42E+05

Locations = Well unit
X = Km from Marsland satellite (+) = East, (-) = West
Y = Km from Marsland satellite (+) = North, (-) = South
Z = m elevation (+) = above the satellite, (-) = below the satellite
Ra = Radium concentration
EM. FR = Radon emanation fraction
THICK = Thickness of ore in m
DEN = Density of ore in g/cm^3
AREA = Area of well unit
FR Rn = Fraction of Radon in process water
COL VOL = Ion-Exchange column volume in L
Rn VENT = Rate of Radon venting from process water
Col Util = Ion-Exchange column unloading rate
POR = Porosity of ion exchange resin
Op Days = Days of operation in days
CIR VOL = Volume of process water in circulation in L
PURGE = Treated water purge rate in L/d

The total annual livestock fed requirements entered into the program were:

	Pasture grass	Hay
Individual	0.5	0.5
Population	0.5	0.5

The areal food-production rates were obtained from U.S. Regulatory Guide 3.51, Table 7, page 35. Since Nebraska was not listed as one of the state for which the food production rates were listed, the production rates for Colorado were used in the program as follows:

Vegetables	2,800 kg/yr per km^2
Meat	3,200 kg/yr per km^2
Milk	1,400 kg/yr per km^2

MILDOS Dose Calculations

MILDOS calculated the radiation dose to individuals within 80 km of the site from vegetables, meat and milk as population doses in units of person-rem/yr. Dividing those doses by the population within 80 km and converting the doses to mrem/yr gives the doses in Table 2. The total dose in Table 2 is the average dose to humans living within 80 km of the uranium recovery operation that results the consumption of vegetables, meat, and/or milk that may have been impacted by the release of radon and its decay products on vegetation or forage from uranium in-situ extraction operations.

Table 2 Radiation Doses from Vegetation-Pathway to man within 80 km of the Uranium In-Situ uranium recovery Operation.

Pathway	Radiation Dose in mrem/yr
Vegetables	0.045
Meat	0.002
Milk	0.0008
Total	0.05

The maximum radiation dose to residents living near the uranium recovery operation is determined by ratio of population exposures from the vegetation, meat and milk pathways to the total population exposures times the maximum resident dose at the Marsland operation. (See See Radiation Doses from Cameco Resources Marsland Expansion Area In-Situ Uranium Recovery Operation, Table 5, by Noel Savignac October 19, 2011). The maximum dose to nearby residents from the vegetation pathway (consumption of vegetables, meat and milk) at Cameco Resources Marsland operation was 1.5 mrem/yr at residence # 2.

Answer

Vegetation or forage sampling at in-situ uranium recovery operations should not be required because the radiation dose calculated for those operations is not considered important. The average radiation dose to people living within 80 km of the Marsland operation from the vegetation pathway was 0.05 mrem/yr. The maximum radiation dose to the nearby residents from the vegetation pathway was 1.5 mrem/yr. Regulatory Guide 4.14 considers doses less than 5% of the applicable radiation standard (5% of 100 mrem/yr = 5 mrem/yr) as not important as a vegetation pathway.