IUC INTERNATIONAL URANIUM (USA) CORPORATION

6425 S. Hwy. 191 • P.O. Box 809 • Blanding, UT 84511 • 801 678 2221 (phone) • 801 678 2224 (fax)

December 3, 1997

Mr. Joseph Holonich, Branch Chief
High Level Waste and Uranium Recovery Projects Branch
Division of Waste Management
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
2 White Flint North, Mail Stop T-7J9
11545 Rockville Pike
Rockville, MD 20852

Re: Amendment Request to revise License Condition 11.4
Source Material License SUA-1358
Docket No. 40-8681.

Dear Mr. Holonich:

International Uranium (USA) Corporation ("IUSA") hereby submits a license amendment request which will eliminate reference to the provisions and requirements of air sampling monitoring as delineated in Section 2 of the licensee's Radiation Protection Procedures Manual, and replace them with a more effective alternative. This manual is contained in the White Mesa Mill's License Application, Appendix D, dated August 23, 1991.

Specifically, Section 2.1.2 of the Licensee's Radiation Protection Procedures Manual requires, in part, "Annually a set of samples, covering eight hours of sampling, each at 40 slpm, to be taken at all sites on Table "Airborne Radiation Sampling Locations", and analyzed for: U-nat, Th-230, Ra-226, Pb-210, and Po-210." License Condition 11.4 of the Mill's operating license indicates a relaxation of the annual eight hour air sampling requirement during extended periods of mill standby, if routine airborne sampling show levels below 10% of 10CFR Part 20 limits.

Contrary to the above, the licensee did not take the set of air samples specified in the application for radioisotopic analysis during 1996. This deficiency was identified during the NRC inspection on July 15-17, 1997, and resulted in a Severity Level IV Violation 40-8681-9701-01. This violation was stated as follows: "Failure to take the annual set of air samples for radioisotopic analyses during 1996".

As stated in our letter of November 3, 1997 and as discussed with NRC enforcement inspectors on October 1, 1997, the corrective action to this violation is the submittal of this License Amendment Request.

NLO5

In the October 1, 1997, discussion with the NRC, IUSA expressed their belief that the data collected under the requirements for the annual eight hour sampling at each location specified in the table (twenty eight locations) and the radioisotopic analyses of each sample for U-nat, Th-230, Ra-226, Pb-210, and Po-210 are of no value with regard to radiation protection procedures and employee radiation exposure assessment.

Therfore, IUSA reseptfully requests that License Condition 11.4 of Source Material License SUA-1358, be revised, in part, as follows:

> **Annually, during mill operational periods a set of air samples covering eight hours of sampling, at a high collection flow rate, (≥ 40 lpm) at routinely occupied or frequented areas will be taken and analyzed for gross alpha. An isotopic analysis of operational mill feed or production product will be analyzed for isotopes U-nat, Th-230, Ra-226, and Pb-210 and will be used to assess fundamental constituent composition of air sample particulates.**

The rationale for IUSA's request is provided in the following discussion. Please review the information provided herein and attempt to respond to this amendment request by December 20, 1997. We request this prompt response because beyond that date additional sampling of mill areas may be necessary according to the existing license condition.

Discussion:

In the White Mesa Mill's License Application License No. SUA-1358, Docket No. 40-8681, Appendix D, the White Mesa Mill Radiation Protection Procedures Manual lists procedures to support the Mill's Radiation Protection Program. Specifically, Section 2.1.2 of the manual indicates that "Annually a set of eight samples, covering eight hours of sampling each at 40 std. liter per minute will be taken at all sites on Table-Airborne Radiation Sampling Locations and analyzed for U-nat, Th-230, Ra-226, Pb-210 and Po-210."

Attached are results of three years (1987, 1990, 1991) of sampling as prescribed. Samples were collected at each location on the above-cited Table for the prescribed time and flow rate; however samples were collected during differing conditions of Mill operational status. Samples for the years 1987 and 1990 were collected at a time when the mill was processing ore through all phases of recovery operations. Both uranium and vanadium were being produced during those time periods. The ore feed rate averaged approximately seventy tons per hour and drying operations were at full capacity. In 1991, when the sampling was performed, the mill was inoperative and no drying activities were being performed. This would indicate that there should be some relevant and remarkable differences in data results for the fully operational years versus suspended periods of operation.

It is also reasonable to expect the data would provide some relative constancy in isotopic ratios of individual decay product isotopes to uranium, regardless of production activities.

Numerous questions can be proposed regarding the purpose of the eight hour sampling for each isotope in every location; however, a statistical analysis was performed on the data to answer the following questions:

1. Is there any significant difference in uranium concentrations in sampling locations during full capacity production periods versus non-production periods?
2. Is there any significant difference in any daughter isotope in sampling locations during full capacity production periods versus non-production periods?
3. Is there any significant difference in uranium concentrations in sampling locations in any given year?
4. Is there any significant difference in any daughter isotope in sampling locations during any given year?
5. Is there constancy of significance in uranium concentration to any daughter isotope ratio in any sampling locations at any time?
6. Does analyzing for any daughter isotope other than uranium have any significance in either any location or in any year?

The following statistical analysis was applied to each of the above suppositions as applicable: unpaired t test, paired t test, One-way analysis of variance, Bartlett's test for homogeneity of variance, Tukey-Kramer multiple comparisons test.

Statistical analysis was done in a manner to reduce the standard deviations as much as possible, and every effort was made to discover any significant differences in data. Statistical analysis of the data is retained on file at the mill and is not provided herein because of the copious volume.

The only conclusion that may be indicated by applied statistical analysis of this data is:

1. There is no significant difference in any suppositional premise proposed above except uranium airborne concentrations are different in the dryer and packaging area during production periods.

This is not a remarkable conclusion. This is a fundamental aspect for radiation protection monitoring and subsequent employee exposure assessment. One identifies the absence or presence of elevated airborne particulate concentrations in all areas of the mill each month by gross alpha counting.

It is IUSA's contention that annual isotopic analysis of U_3O_8 product and /or mill ore feed provides at least as meaningful scientific information regarding fundamental isotopic

composition of airborne particulate sampling as the annual eight hour sampling. The justification for this license amendment request is based not only on the above discussion but also on the excessive financial burden of this sampling requirement. The annual cost for individual isotopic analysis of each area sample location; many of which are within a fifty-foot proximity, amounts to approximately $20,000. If the information provided by the current annual eight-hour sampling requirement was beneficial in any regard or significantly meaningful, IUSA would not object to performing this sampling.

IUSA requests that License Condition 11.4 in part, of the White Mesa Mill's Source Material License No. SUA-1358, be amended to reflect annual use of isotopic composition of U_3O_8 product material to airborne sampling requirements in each provision, instead of individual isotopic analysis of each sample. It is suggested that License Condition 11.4 be revised as follows:

> **Annually, during mill operational periods a set of air samples covering eight hours of sampling, at a high collection flow rate, (≥ 40 lpm) at routinely occupied or frequented areas will be taken and analyzed for gross alpha. An isotopic analysis of operational mill feed or production product will be analyzed for isotopes U-nat, Th-230, Ra-226, and Pb-210 and will be used to assess fundamental constituent composition of air sample particulates.**

Upon approval of this license amendment request, the appropriate sections of all related documents cited herein will be revised to meet the amended License Condition.

Please review this request and respond by December 20, 1997, and should you require any additional information, please do no hesitate to contact Mr. Ron E. Berg or myself at the Mill.

Sincerely,

William N. Deal

William N. Deal
Mill Manager

WND/sp

Attachments

cc: Jim Park U.S. NR
M. Linda McLean U. S. NRC
Harold R. Roberts IUSA
Ron E. Berg IUSA
David Frydenlund IUSA
Michelle R. Rehmann IUSA
Central File

CERTIFIED U.S. MAIL NO. P 077 021 201

BARRINGER LABORATORIES INC

15000 W. 6TH AVE., SUITE 300
GOLDEN, COLORADO 80401
PHONE: (303) 277-1687

1455 DEMING WAY, SUITE 15
SPARKS, NEVADA 89431
PHONE: (702) 358-1158

Umetco Minerals
White Mesa Mill-P. O. Box 669
Blanding, UT 84511

ATTN: S.L. Schierman

Client No. Blending Log No. 6497 Client PO No.

Sample Type: filters

Date Collected: 1/26/87 Date Received: 1/29/87 Date Reported: 3/24/87

AMENDED REPORT

Sample Identification	Pb 210 10^{-6} µCi/filter Composite ±Precision*	Ra 226 10^{-6} µCi/filter Composite ±Precision*	Th 230 10^{-6} µCi/filter Composite ±Precision*	U 10^{-6} µCi/filter Composite
3744	14 ± 3	1.1 ± 1.2	1.4 ± 1.4	5.9
3745	7.7 ± 3.5	13 ± 3	5.4 ± 2.3	17.8
3746	4.4 ± 3.9	4.6 ± 1.9	5.6 ± 2.3	5.5
3747	1.5 ± 3.3	3.3 ± 1.7	0.6 ± 1.2	2.3
3748	7.[illegible] ± 3.0	1.2 ± 1.3	0.2 ± 1.0	1.5
3749	3.[illegible] ± 3.0	0.6 ± 1.2	3.2 ± 1.8	2.1
3750	20 ± 3	13 ± 3	19 ± 4	103
3751	15 ± 3	13 ± 4	16 ± 4	87.1
3752	2.2 ± 2.7	2.2 ± 1.7	2.8 ± 1.8	4.8
3753	0.5 ± 2.7	0.1 ± 1.0	0.4 ± 1.1	40.1
3754	1.8 ± 2.9	0.5 ± 1.1	0.8 ± 1.3	9.5
3755	5.4 ± 4.4	3.9 ± 1.9	3.8 ± 2.2	591
3756	83 ± 5	1.5 ± 1.4	51 ± 6	31700
3757	3.5 ± 2.9	1.8 ± 1.5	1.2 ± 1.5	358
3758	11 ± 3	2.8 ± 1.6	7.8 ± 3.0	4220
3759	2.8 ± 3.0	2.2 ± 1.6	2.5 ± 2.0	1650
3760	20 ± 40	11 ± 3	10 ± 3	69.0
3761	6.2 ± 2.4	3.4 ± 1.8	4.8 ± 2.2	26.1
3762	13 ± 3	5.1 ± 2.0	3.6 ± 1.9	69.0
3763	0.0 ± 2.3	3.1 ± 1.7	0.0 ± 0.9	2.0
3764	9.7 ± 4.2	7.5 ± 2.5	7.2 ± 2.5	29.3
3765	3.5 ± 2.8	4.5 ± 2.0	3.6 ± 1.9	13.4
3766	1.6 ± 2.6	1.5 ± 1.4	0.6 ± 1.2	1.6
3767	2.6 ± 1.9	3.3 ± 1.8	2.8 ± 1.8	30.4
3768	1.5 ± 2.5	1.1 ± 1.5	0.0 ± 0.9	62.3
3769	1.8 ± 2.0	2.6 ± 2.0	3.0 ± 1.8	319
3770	0.0 ± 2.4	1.7 ± 1.7	0.0 ± 0.9	1.1
3771	0.7 ± 1.6	2.6 ± 2.0	1.0 ± 1.3	174

* Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 2σ

Approved by

BARRINGER LABORATORIES INC.

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Umetco Minerals
White Mesa Mill-P. O. Box 669
Blanding, UT 84511

ATTN: S.L. Schierman

Client No. Blanding Log No. 6491 Client PO No.

Sample Type: filters

Date Collected: 1/26/87 Date Received: 1/29/87 Date Reported: 3/5/87

Sample Identification	Pb 210 10^{-6} µCi/filter Composite ±Precision*	Ra 226 10^{-6} µCi/filter Composite ±Precision*	Th 230 10^{-6} µCi/filter Composite ±Precision*	U 10^{-6} µCi/filter Composite
3744	14 ± 3	1.1 ± 1.2	1.4 ± 1.4	5.9
3745	7.7 ± 3.5	13 ± 3	5.4 ± 2.3	17.8
3746	4.4 ± 3.9	4.6 ± 1.9	5.6 ± 2.3	5.5
3747	1.5 ± 3.3	3.3 ± 1.7	0.6 ± 1.2	2.3
3748	7.5 ± 3.0	1.2 ± 1.3	0.2 ± 1.0	1.5
3749	3.4 ± 3.0	0.6 ± 1.2	3.2 ± 1.8	2.1
3750	20 ± 3	13 ± 3	23 ± 4	103
3751	15 ± 3	13 ± 4	16 ± 4	87.1
3752	2.2 ± 2.7	2.2 ± 1.7	2.8 ± 1.8	4.8
3753	0.5 ± 2.7	0.1 ± 1.0	5.8 ± 2.3	40.1
3754	1.8 ± 2.9	0.5 ± 1.1	12 ± 3	9.5
3755	5.4 ± 4.4	3.9 ± 1.9	210 ± 10	591
3756	83 ± 5	1.5 ± 1.4	51 ± 6	31700
3757	3.5 ± 2.9	1.8 ± 1.5	43 ± 6	358
3758	11 ± 3	2.8 ± 1.6	23 ± 4	4220
3759	2.8 ± 3.0	2.2 ± 1.6	29 ± 5	1650
3760	20 ± 40	11 ± 3	28 ± 5	69.0
3761	6.2 ± 2.4	3.4 ± 1.8	9.6 ± 2.9	26.1
3762	13 ± 3	5.1 ± 2.0	13 ± 3	69.0
3763	0.0 ± 2.3	3.1 ± 1.7	25 ± 4	2.0
3764	9.7 ± 4.2	7.5 ± 2.5	14 ± 3	29.3
3765	3.5 ± 2.8	4.5 ± 2.0	8.4 ± 2.7	13.4
3766	1.6 ± 2.6	1.5 ± 1.4	0.6 ± 1.2	1.6
3767	2.6 ± 1.9	3.3 ± 1.8	2.8 ± 1.8	30.4
3768	1.5 ± 2.5	1.1 ± 1.5	0.0 ± 0.9	62.3
3769	1.8 ± 2.0	2.6 ± 2.0	3.0 ± 1.8	319
3770	0.0 ± 2.4	1.7 ± 1.7	0.0 ± 0.9	1.1
3771	0.7 ± 1.6	2.6 ± 2.0	1.0 ± 1.3	174

* Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 2σ

Approved by _____

ON 3/18/87 EOA Called have some problems with QA on Th-230 will rerun and submit new Report SLS 3/20/87

BARRINGER LABORATORIES INC.

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Umerco Minerals
P. O. Box 669 White Mesa Mill
Blanding, UT 84511

ATTN: S.L. Schierman

LGN: 6491

QUALITY CONTROL DATA SHEET

Time Received: Date: 1/29/87 By: Gina Reichert Via: UPS

Sample Container Type: petri
Sample Type: filters

Preservative When Received: None

Additional Lab Preparation: Mixed Acid Digestion

Parameter	Reference	LLD	Preservative	Analyst	Date(s) of Analysis
Lead 210	5	***	none	J. Garcia	2/13-3/6/87
Radium 226	4,7	***	none	M. Howard	2/24-3/2/87
Thorium 230	3	***	none	D. McGuire	2/18/87
Uranium	9,10	***	none	B. Tonning	2/19-3/3/87

DUPLICATES

Sample Identification	Parameter	Result	Result	Relative Deviation From Mean
3758	Uranium	4190	4250	0.7%

QUALITY CONTROL STANDARDS

Parameter	Result	Certified Result	Acceptable Target Range	Relative Deviation From Known
Lead 210		102	97-107	
Radium 226	96	101	96-106	5.0%
Thorium 230		99	94-104	
Uranium	35	34	32-36	2.9%

Approved by _____

BARRINGER LABORATORIES INC.

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19-Oct-90

J. Hamrick/S.L. Schierman
UMETCO MINERALS (Blanding)
P.O. Box 669
Blanding, UT 84511

Attn: Scott Schierman
Project: Blanding

Received: 20-Sep-90 10:43
PO #: 253-10000 (20257)

Job: 903209E

Status: Final

Sample Type: Filter

Sample	Ph-210 Total 10(-6)µCi/pad	Error 2σ*	Ra-226 Total 10(-6)µCi/pad	Error 2σ*	Th-230 Total 10(-6)µCi/pad	Error 2σ*
9001	7.3	±2.8	2.8	±1.4	3.4	±2.0
9002	9.3	±2.5	6.0	±2.0	5.4	±2.4
9003	4.7	±2.5	0.0	±0.4	1.1	±1.4
9004	6.0	±2.7	1.8	±1.2	2.1	±1.7
9005	4.7	±2.5	1.1	±1.0	0.5	±1.2
9006	6.0	±2.5	2.2	±1.3	3.2	±2.0
9007	8.1	±2.8	6.3	±2.1	8.2	±3.4
9008	14	±3	5.6	±1.9	8.7	±2.9
9009	5.1	±3.4	1.3	±1.1	13	±4
9010	4.8	±2.5	0.9	±0.9	6.0	±2.5
9011	4.2	±2.3	1.2	±1.0	4.4	±2.2
9012	6.0	±2.5	0.4	±0.8	7.4	±2.7
9013	6.2	±2.6	2.3	±1.3	8.8	±2.9
9014	5.1	±2.4	3.1	±1.4	3.8	±2.5
9015	2.6	±2.2	2.2	±1.5	2.9	±1.9
9016	4.1	±2.5	1.0	±0.9	3.2	±2.0
9017	6.8	±2.6	2.6	±1.3	2.7	±1.8
9018	5.3	±2.5	2.5	±1.3	3.2	±2.0
9019	9.0	±3.9	2.9	±1.4	2.2	±1.7
9020	4.9	±2.3	0.3	±0.7	1.6	±1.6
9021	6.2	±2.3	5.1	±1.8	5.4	±2.9
9022	11	±2	5.7	±1.9	6.1	±2.5
9023	3.8	±2.2	0.9	±0.9	1.1	±1.4
9024	4.8	±2.2	1.3	±1.1	5.7	±2.4
9025	3.6	±2.2	1.4	±1.4	2.9	±1.9
9026	10	±3	2.6	±1.4	5.6	±2.4
9027	2.8	±2.3	0.0	±0.1	0.0	±1.1
9028	5.0	±2.9	0.0	±0.1	0.2	±1.5

BARRINGER LABORATORIES INC.

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PHONE (702) 358-1158

19-Oct-90

J. Hamrick/S.L. Schierman
UMETCO MINERALS (Blanding)
P.O. Box 669
Blanding, UT 84511

Attn: Scott Schierman
Project: Blanding

Received: 20-Sep-90 10:43
PO #: 253-10000 (20257)

Job: 903209E

Status: Final

Sample Type: Filter

Sample	U Total µg/pad	
9001	7.1	4.75×10^{-6} uCi $\cdot \frac{10^6 \text{ pCi}}{\text{uCi}} = 4.75$ pCi
9002	23.1	15.5
9003	2.5	1.7
9004	3.8	2.5
9005	2.9	1.9
9006	4.4	2.9
9007	25.4	17.0
9008	35.3	23.7
9009	12.0	8.0
9010	15.6	10.5
9011	7.1	4.4
9012	189	126.4
9013	2860	1,916.2
9014	109	73.0
9015	113	75.7
9016	142	95.1
9017	6.7	4.5
9018	23.9	16.0
9019	34.2	22.9
9020	3.2	2.1
9021	18.3	12.3
9022	445	298.2
9023	3.7	2.5
9024	79.5	53.3
9025	44.5	29.8
9026	39.0	26.1
9027	1.6	1.1
9028	146 *	97.8

* Verified by reanalysis

BARRINGER LABORATORIES INC.

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19-Oct-90

J. Ha[illegible]ck/S.L. Schierman
[illegible]NERALS (Blanding)
P.O. Box 669
Blanding, UT 84511

Attn: Scott Schierman
Project: Blanding

Received: 20-Sep-90 10:43
PO #: 25[illegible]-10000 (20257)

Job: 903209E

Status: Final

Abbreviations:

Parameters:

Pb-210	: Lead-210
Ra-226	: Radium-226
Th-230	: Thorium-230
U	: Uranium

Units:

10(-6)µCi/pad	: 10(-6) microCuries per pad
2σ*	: * Counting error at the 95% confidence level, 2σ
µg/pad	: micrograms per pad

Signed: Ellen La Riviere

Ellen La Riviere
Radiochemistry Laboratory Manager

BARRINGER LABORATORIES INC.

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19-Oct-90

J. Hamrick/S.L. Schierman
UMETCO MINERALS (Blanding)
P.O. Box 669
Blanding, UT 84511

Attn: Scott Schierman
Project: Blanding

Received: 20-Sep-90 10:43
PO #: 253-10000 (20257)

Job: 903209E

Status: Final

QUALITY CONTROL DATA SHEET

Time Received: 10:43 Date: 9/20/90 By: Receiving Via: UPS

Sample Container Type: small plastic rd petri dish
Sample Type: filter
Preservative When Received: none
Additional Lab Preparation: mixed acid digestion

Parameter	Ref	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Pb-210	5	---	2x10-6 pCi/l	none	Kidwell	10/1-10/15
Ra-226	4,7,14	SM-705	1x10-7 pCi/l	none	Howard	9/27-10/1
Th-230	11	---	1x10-7 pCi/l	none	Ortiz	9/27-10/2
U	4,9,10,14	ASTMD2907	1x10-7 pCi/l	none	Meyer	9/28-10/1

DUPLICATES

Sample Identification	Parameter	Result	Result	Relative Deviation % From Mean
9009	Pb-210	7.0 ± 3.4	3.2 ± 3.3	37
9019	Pb-210	11 ± 4	7.0 ± 3.7	22
9028	Pb-210	6.5 ± 2.9	3.4 ± 2.9	31
9015	Ra-226	1.8 ± 1.4	2.6 ± 1.6	18
9025	Ra-226	1.3 ± 1.4	1.5 ± 1.3	7.1
9007	Th-230	9.4 ± 3.6	7.0 ± 3.2	15
9014	Th-230	2.4 ± 2.2	5.1 ± 2.8	36
9021	Th-230	5.6 ± 2.9	5.1 ± 2.8	4.7
9028	Th-230	0.0 ± 1.4	0.3 ± 1.5	100
9010	U	15.7	15.5	0.6
9020	U	3.3	3.0	4.8

BARRINGER LABORATORIES INC.

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19-Oct-90

J. Hamrick/S.L. Schierman
UMETCO MINERALS (Blanding)
P.O. Box 669
Blanding, UT 84511

Attn: Scott Schierman
Project: Blanding

Received: 20-Sep-90 10:43
PO #: 253-10000 (20257)

Job: 903209E

Status: Final

QUALITY CONTROL STANDARDS

Parameter	Result	Cert. Result	Target Range	Relative Deviation % From Known
Pb-210	114 ± 2	103	93 - 113	11
Ra-226	106 ± 3	101	91 - 111	5.0
Th-230	104 ± 3	98	88 - 108	6.1
U	33	34	31 - 37	2.9

RADIOCHEMISTRY SPIKES

Sample Identification	Parameter	Spike Recovery %
9019	U	100

Approved by: Ellen LaRuine

WHITE MESA MILL • PO. BOX 639 • BLANDING, UTAH 84511
☎ (801) 678-2221

September 17, 1990

Barringer Laboratories, Inc.
15000 West 6th Ave. Suite 300
Golden, Colorado 80401

Gentlemen:

Enclosed are twenty-eight airborne particulate samples. These are yearly eight-hour samples and must be analyzed for U-Nat, Pb-210, Ra-226 and Th-230. Please report results with matching sample numbers in µg (micrograms)/pad for each parameter.

If you have any questions, please contact me at (801) 678-2221.

Sincerely,

G. A. Jones

G. A. Jones
Radiation Technician

GAJ/gp

For Lab Use Only
Cert. No.
Date Rec'd

UMETCO MINERALS CORP.
ANALYTICAL LABORATORY
P.O. Box 669
Blanding, Utah 84511

REPORT OF ANALYSIS
FOR GRAB/RUSH SAMPLES

REPORT TO: SCOTT SCHIERMAN
6425 South Highway 191
Box 669
BLANDING, UTAH 84511

Submitted by: L.O. Gomez
Date: 9/17/80
Plant/Exp. Office:
Project:
Charge to:

Analytical Code No.	Sample Description		Mg/Pad U. Nat	Mg/Pad Ra-226	Mg/Pad Th-230	Mg/Pad Pb-210				---% or ppm ---element
	1	9001								
	2	9002								
	3	9003								
	4	9004								
	5	9005								
	6	9006								
	7	9007								
	8	9008								
	9	9009								
	10	9010								
	11	9011								
	12	9012								
	13	9013								
	14	9014								
	15	9015								
	16	9016								
	17	9017								
	18	9018								
	19	9019								
	20	9020								
		Assay Total								
		Analyst								

REJECT SAMPLE RETENTION
- ☐ Discard
- ☐ 3 months
- ☐ 12 Months
- ☐ Other (Specify) _____

Special Instructions:

Reported by: _____ Date: _____

For Lab Use Only
Cert. No.
Date Rec'd

UMETCO MINERALS CORP.
ANALYTICAL LABORATORY
P.O. Box 669
Blanding, Utah 84511

REPORT OF ANALYSIS
FOR GRAB/RUSH SAMPLES

REPORT TO: SCOTT SCHIERMAN

Submitted by: D Jones
Date:
Plant/Exp. Office:
Project:
Charge to:

Analytical Code No.	Sample Description	MG/PAD U-NAT	MG/PAD RA-226	MG/PAD TH-230	MG/PAD PB-210				← % or ppm ← element
	1 9021								
	2 9022								
	3 9023								
	4 9024								
	5 9025								
	6 9026								
	7 9027								
	8 9028								
	9								
	10								
	11								
	12								
	13								
	14								
	15								
	16								
	17								
	18								
	19								
	20								
	Assay Total								
	Analyst								

REJECT SAMPLE RETENTION
- ☐ Discard
- ☐ 3 months
- ☐ 12 Months
- ☐ Other (Specify) _____

Special Instructions:

Reported by: _____ Date: _____

BARRINGER LABORATORIES INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

26-Dec-91

J. Hamrick/S.L. Schierman
UMETCO MINERALS (Blanding)
P.O. Box 669
Blanding, UT 84511

Page: 1
Copy: 1 of 2
Set : 1

Attn: S.L. Schierman
Project: Yearly eight-hour

Received: 26-Nov-91 15:35
PO #: 253-10000

Job: 912309E

Status: Final

Sample Type: Filter

Sample	Pb-210 Total pCi/f.comp.	Error 2σ	Ra-226 Total pCi/f.comp.	Error 2σ	Th-230 Total pCi/f.comp.	Error 2σ
199101	1.2	±3.7	0.7	±1.0	0.0	±1.3
199102	0.5	±3.4	1.0	±1.1	0.0	±1.0
199103	1.1	±3.8	2.8	±1.5	0.0	±1.2
199104	0.6	±4.3	1.7	±1.3	0.1	±1.3
199105	0.3	±4.2	1.9	±1.3	0.0	±1.2
199106	0.0	±4.0	0.8	±1.0	0.0	±1.2
199107	0.0	±4.0	0.7	±1.0	0.0	±1.1
199108	0.4	±3.8	0.0	±0.5	0.5	±1.7
199109	1.3	±5.3	0.6	±0.9	0.1	±1.3
199110	4.3	±3.6	1.0	±1.0	0.0	±1.0
199111	3.0	±3.7	0.6	±1.1	0.0	±0.2
199112	1.3	±3.9	1.6	±1.2	0.5	±1.4
199112A	0.3	±4.1	0.2	±0.7	1.3	±1.6
199113	0.3	±4.0	1.0	±1.0	0.0	±1.1
199113A	2.2	±3.7	0.1	±0.8	0.0	±1.3
199114	85	±7	1.1	±1.2	0.7	±1.5
199115	0.3	±3.5	1.2	±1.1	0.9	±2.1
199116	0.9	±4.9	0.0	±0.6	0.0	±1.0
199117	2.9	±3.8	0.2	±0.7	0.0	±1.2
199118	5.9	±4.5	0.0	±0.7	1.3	±1.6
199119	13	±4	14	±3	13	±4
199120	1.6	±3.9	1.7	±1.3	0.0	±1.0
199121	0.0	±3.9	0.3	±0.8	0.0	±1.3
199122	6.7	±4.5	0.0	±0.6	0.5	±1.4
199122A	6.7	±4.2	0.4	±1.0	0.2	±1.7
199123	8.2	±3.6	0.8	±0.9	0.1	±1.3
199124 B	4.3	±5.3	0.0	±0.8	0.0	±1.0
199125 S	4.3	±3.7	0.0	±0.6	0.0	±1.5

BARRINGER LABORATORIES INC.
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26-Dec-91

J. Hamrick/S.L. Schierman
UMETCO MINERALS (Blanding)
P.O. Box 669
Blanding, UT 84511

Attn: S.L. Schierman
Project: Yearly eight-hour

Received: 26-Nov-91 15:35
PO #: 253-10000

Job: 912309E

Status: Final

Sample Type: Filter

Vol: 1.92×10^{2} cc

Sample	U Total mg/f.comp.	U Total pCi/f.comp.(1)	
199101	0.0028	1.9	1.9×10^{-6} uci / 1.92×10^{2} cc = 1.0×10^{-13} uci/cc
199102	0.0013	0.9	9.9E-14 "
199103	0.0026	1.8	4.7E-14 "
199104	0.0016	1.1	5.7E-14 "
199105	0.0014	0.9	4.7 "
199106	0.0015	1.0	5.2×10^{-14} uci/cc
199107	0.0014	0.9	4.7 " "
199108	0.0008	0.5	2.6 " "
199109	0.0010	0.7	3.7 " "
199110	0.0023	1.6	7.3 " "
199111	0.0008	0.5	2.6×10^{-14} uci/cc
199112	0.0015	1.0	5.2 "
199112A	0.118	79.7	4.15×10^{-12} uci/cc
199113	0.0032	2.2	1.15×10^{-13} "
199113A	0.0158	10.7	5.6×10^{-13} "
199114	0.0030	2.0	1.0 " "
199115	0.0013	0.9	4.7×10^{-14} "
199116	0.0011	0.7	3.7 " "
199117	0.0013	0.9	4.7 " "
199118	0.0008	0.5	2.6 " "
199119	0.0254	17.2	9.0×10^{-13} uci/cc
199120	0.0006	0.4	2.1×10^{-14} "
199121	<0.0003	0.2	1.0 " "
199122	0.0015	1.0	5.2 " "
199122A	0.0006	0.4	2.1 " "
199123	0.0012	0.8	4.2 " "
199124	0.0004	0.3	1.6 " "
199125	0.0792	53.5	2.8×10^{-12} uci/cc

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26-Dec-91

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Page: 3
Copy: 1 of 2
Set : 2

Attn: S.L. Schierman
Project: Yearly eight-hour

Received: 26-Nov-91 15:35
PO #: 253-10000

Job: 912309E

Status: Final

Abbreviations:

Parameters:

Pb-210	: Lead-210
Ra-226	: Radium-226
Th-230	: Thorium-230
U	: Uranium

Units:

pCi/f.comp.	: picoCuries per filter composite
2σ	: Counting error at the 95% confidence level, 2σ
mg/f.comp.	: milligrams per filter composite
pCi/f.comp.(1)	: picoCuries per filter composite based on equilibrium

Job approved by:

Signed: Ellen La Riviere

Ellen La Riviere
Radiochemistry Laboratory Manager

BARRINGER LABORATORIES INC.
15000 W. 6TH AVE., SUITE 300 GOLDEN, CO 80401 (303) 277-1687 FAX (303) 277-1689

26-Dec-91

J. Hamrick/S.L. Schierman
UMETCO MINERALS (Blanding)
P.O. Box 669
Blanding, UT 84511

Attn: S.L. Schierman
Project: Yearly eight-hour

Received: 26-Nov-91 15:35
PO #: 253-10000

Job: 912309E

Status: Final

QUALITY CONTROL REPORT

Sample Type: Filter

Sample Id	Pb-210 Total pCi/f.comp.	Error 2σ	Ra-226 Total pCi/f.comp.	Error 2σ
Duplicate	1.2	±5.5	15	±2
Duplicate	1.4	±5.1	17	±2
Duplicate % diff.	7.7	---	6.0	---
Std (found value)	102	±2	100	±4
Std (true value)	97	---	101	---
Std % diff.	5.2	---	1	---
Std % rec.	---	---	99	---
Blank	0.2	±0.5	0.0	±0.1
Spike % rec.	---	---	101	---

Sample Id	Th-230 Total pCi/f.comp.	Error 2σ	U Total mg/f.comp.	U Total pCi/f.comp.(1)
Duplicate	0.0	±1.6	0.0006	---
Duplicate	0.0	±1.4	0.0006	---
Duplicate % diff.	0.0	---	0.0	---
Std (found value)	101	±3	503	---
Std (true value)	98	---	500	---
Std % diff.	3.1	---	0.3	---
Std % rec.	---	---	101	---
Blank	0.0	±0.2	<0.0003	---
Spike % rec.	---	---	95	---

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26-Dec-91

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Status: Final

QUALITY CONTROL REPORT

Abbreviations:

Parameters:

Pb-210	: Lead-210
Ra-226	: Radium-226
Th-230	: Thorium-230
U	: Uranium

Units:

pCi/f.comp.	: picoCuries per filter composite
2σ	: Counting error at the 95% confidence level, 2σ
mg/f.comp.	: milligrams per filter composite
pCi/f.comp.(1)	: picoCuries per filter composite based on equilibrium

Job approved by:

Signed:
.....
Approved
Quality Assurance Department

BARRINGER LABORATORIES INC.
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26-Dec-91

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Job: 912309E

Status: Final

QUALITY CONTROL REPORT

QUALITY CONTROL DATA SHEET

Received by: sc Via: UPS

Sample Container Type: Pl Petri dish
Sample Type: Filter
Preservative When Received: None
Additional Lab Preparation: Mixed Acid Digestion

Parameter	Method	LLD	Preservative	Analyst	Date(s) of Analysis
Pb-210	USGS	1 pCi/f.comp.	none	Kidwell	12/14-12/26
Ra-226	SM-705	0.2 pCi/f.comp.	none	Seidel	12/18-12/23
Th-230	USAEC	0.2 pCi/f.comp.	none	Ortiz	12/ 6-12/16
U	ASTMD2907	0.0003 mg/f.com	none	Meyer	12/16

Signed: .....

Mark Burkhardt, Ph.D.
Laboratory Director

RADIATION MONITORING - AREAS

AIRBORNE RADIATION SAMPLE LOCATIONS

CODE	Location/Description
1	Ore Scalehouse
2	Ore Storage
6	Sample Plant
7	Sag Mill Area
7A	Sag Mill Control Room
8	Leach Tank Area
9	CCD Circuit Thickners
10	SX Building North Area
11	SX Building South Area
12	YC Precipitation & Wet Storage Area
12A	North YC Dryer Enclosure
12B	South YC Dryer Enclosure
13	YC Drying & Packaging Area
13A	YC Packaging Enclosure
14	Packaged YC Storage Room
15	Metallurgical Lab Sample Prep Room
16	Lunch Room Area (New Training Room)
17	Change Room
18	Administration Building
19	Warehouse
20	Maintenance Shop
21	Boiler
22	Vanadium Panel
24	Tails
25	Control Room
26	Shifters Office
27	Operators Lunch Room