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RADIOLOGICAL MONITORING PROGRAM
PERIOD COVERING MAY 1, 1974 THROUGH JULY 29, 1974
FOR
CER GEONUCLEAR CORPORATION
PROJECT RIO BLANCO

SUBMITTED BY
EVERLINE INSTRUMENT CORPORATION
Santa Fe Laboratories

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SUMMARY

Results for May 1, 1974 through July 29, 1974

Beta radioactivity in air particulate samples continued to increase into May 1974 as noted during the previous period, peaking during the first two weeks of May, 1974. This increase is attributable to injection of year old fission products from the upper atmosphere due to spring mixing of the upper and lower atmosphere (see the report for period ending April 30, 1974 for a more complete explanation). The radioactivity is not attributable to Project Rio Blanco. After the second week in May, the air concentration shows a decreasing trend from a peak concentration of 0.54 pCi/m^3 in May to less than 0.1 pCi/m^3 at the end of July.

TLD data for this period indicated an average background dose rate of 2.2 mrem/week. There is no evidence of any increase due to Rio Blanco.

Water samples collected during July 1974 did not indicate the presence of any unexpected radioactivity. Gross beta concentration were below 10 pCi/l . Tritium was measured in four samples by electrolytic enrichment followed by liquid scintillation counting. Concentrations of tritium ranged from 0.14 ± 0.08 to $0.49 \pm 0.08 \text{ pCi/ml}$. This tritium is attributable to natural production in the atmosphere and worldwide fallout from weapons testing. This concentration is a small fraction of the peak in 1963 caused by weapons testing in the atmosphere. Gamma emitters were not detected by gamma spectrometry in any of the samples.

Gamma emitters other than natural K-40 were not detected in three milk samples collected in July 1974.

QUALITY CONTROL

Procedures used by Eberline Instrument Corporation (EIC) are the same as or equivalent to those recommended by the Environmental Protection Agency. Standards supplied by the National Bureau of Standards, Health and Safety Laboratory of the U.S. Atomic Energy Commission, Environmental Protection Agency, and the International Atomic Energy Agency are used for calibration of equipment and procedures. EIC also participates in interlaboratory comparison programs. The quality control program includes the use of internal tracers wherever possible, the analysis of blank samples, and the analysis of samples to which known amounts of radioactive material have been added. Samples of interlaboratory cross-checks are listed in the table below.

Interlaboratory Comparisons

<u>Sample Type</u>	<u>Isotope</u>	<u>EIC Value</u>	<u>Ref. Laboratory Standard Value</u>	<u>Ref. Lab.**</u>
Charcoal	^{131}I	4.11×10^5 dpm	4.34×10^5 dpm	LASL
Filter Paper	^{137}Cs	1.22×10^5 dpm	1.18×10^5 dpm	LASL
Filter Paper	^{60}Co	2.28×10^5 dpm	2.36×10^5 dpm	LASL
Filter Paper	^{90}Sr	2.41×10^4 dpm	2.58×10^4 dpm	LASL
Soil	^{90}Sr	2.3 pCi	2.0 pCi	HASL
Soil	^{90}Sr	4.4 pCi	4.2 pCi	HASL
Soil	^{90}Sr	54 pCi	58 pCi	HASL
Soil	^{90}Sr	68 pCi	70 pCi	HASL
Water	^3H	4.75×10^{-2} uCi	4.45×10^{-2} uCi	NERC-EPA
Water	^3H	4.75×10^{-2} uCi	4.49×10^{-2} uCi	LLL
Water	^3H	49.2 pCi/ml	51.8 pCi/ml	AQCS-EPA
Water	^3H	55.4 pCi/ml	52.9 pCi/ml	AQCS-EPA
Urine	^{239}Pu	0.50 pCi	0.63 pCi	IAEA
Urine	U	29.0 ug	33.6 ug	IAEA
Milk	^{90}Sr	1.69 nCi	1.63 nCi	IAEA
Milk	^{131}I	9.4 nCi	10.0 nCi	IAEA
Milk	^{131}I	96 nCi	100 nCi	IAEA
Milk	^{137}Cs	8.9 nCi	10.0 nCi	IAEA
Milk	^{137}Cs	91 nCi	100 nCi	IAEA
Milk	^{140}Ba	1.9 nCi	2.0 nCi	IAEA
Milk	^{140}Ba	22.4 nCi	20.0 nCi	IAEA

Quality Control (Cont'd)

*References

HASL Procedures Manual, edited by John H. Harley, Health and Safety Laboratory, U.S. Atomic Energy Commission, 1972 Edition, revised annually.

Radiochemical Procedures for the Analysis of Nuclear Reactor Aqueous Solutions, edited by H. L. Krieger and S. Gold, Environmental Protection Agency, Division of Research, August 1971.

Radionuclide Analysis of Environmental Samples, A Laboratory Manual of Methodology, edited by Herman L. Krieger, Richard J. Velten, and Frantz J. Burmann, U.S. Department of Health, Education, and Welfare, Division of Radiological Health, revised February 1966.

**Laboratory Codes

LASL - Los Alamos Scientific Laboratory, University of California

HASL - Health & Safety Laboratory, U.S. Atomic Energy Commission

LLL - Lawrence Livermore Laboratory, University of California

NERC - National Environmental Research Center, Las Vegas - EPA

AQCS - Analytical Quality Control Services - EPA

IAEA - International Atomic Energy Agency, Vienna, Austria

GAMMA SENSITIVITIES

EIC NaI (Tl) SYSTEM

4" x 4" NaI (Tl) DETECTOR

<u>Nuclide</u>	<u>Energy Used To Quantify (KeV)</u>	<u>MDA* pCi/Sample</u>	<u>MDA** pCi/Sample</u>	<u>MDA*** pCi/Sample</u>
Co-57	122	10	18	25
Ce-Pr-144	134	15	27	39
Ce-Pr-141	145	15	27	39
Hg-203	279	12	21	31
Cr-51	320	102	181	254
I-131	364	11	20	28
Ru-103 & Ru Rh-106	497-512	11	19	26
Na-22	511	6	10	16
Ba-140	537	34	62	86
Cs-134	605	14	24	30
Cs-137	662	16	28	39
Zr-Nb-95	724, 756, 765	7	13	17
Co-58	810	15	27	36
Mn-54	835	15	28	38
Zn-65	1115	40	73	88
Co-60	1173	20	37	43
K-40	1460	269	483	630

* Minimum detectable activity for a 100 mm diameter x 20 mm deep Petri dish geometry and 100-minutes counting time.

** Minimum detectable activity for a 100 mm diameter x 75 mm deep container geometry and 100-minutes counting time.

***Minimum detectable activity for a 2.5 liter Marinelli beaker geometry and 100-minutes counting time.

RIO BLANCO SITE
AIR PARTICULATE SAMPLES
(Gross Beta Analyses)

<u>Collection Date</u>	<u>Volume m³</u>	<u>Beta pCi/m³</u>
05-14-74	323.7	0.54 ± 0.01
06-01-74	370.9	0.36 ± 0.01
06-14-74	267.2	0.28 ± 0.01
06-29-74	303.7	0.20 ± 0.01
07-14-74	302.0	0.28 ± 0.01
07-28-74	287.2	0.08 ± 0.01

RIFLE
AIR PARTICULATE SAMPLES
(Gross Beta Analyses)

<u>Collection Date</u>	<u>Volume m³</u>	<u>Beta pCi/m³</u>
05-13-74	324.5	0.45 ± 0.01
05-30-74	310.5	0.39 ± 0.01
06-13-74	282.9	0.33 ± 0.01
06-30-74	342.0	0.23 ± 0.01
07-13-74	266.8	0.28 ± 0.01
07-28-74	305.0	0.09 ± 0.01

MEEKER
AIR PARTICULATE SAMPLES
(Gross Beta Analyses)

<u>Collection Date</u>	<u>Volume m³</u>	<u>Beta pCi/m³</u>
05-14-74	328.8	0.47 ± 0.01
06-01-74	*	*
06-14-74	271.9	0.27 ± 0.01
06-29-74	296.5	0.23 ± 0.01
07-14-74	309.4	0.28 ± 0.01
07-28-74	287.2	0.09 ± 0.01

*Equipment failed. (103 ± 3 pCi/Sample)

GRAND JUNCTION
AIR PARTICULATE SAMPLES
(Gross Beta Analyses)

<u>Collection Date</u>	<u>Volume m³</u>	<u>Beta pCi/m³</u>
05-13-74	323.7	0.36 ± 0.01
05-30-74	350.9	0.21 ± 0.01
06-13-74	282.9	0.21 ± 0.01
06-30-74	342.0	0.11 ± 0.01
07-13-74	267.6	0.22 ± 0.01
07-29-74	330.5	0.06 ± 0.01

GRAND VALLEY
AIR PARTICULATE SAMPLES
(Gross Beta Analyses)

<u>Collection Date</u>	<u>Volume m³</u>	<u>Beta pCi/m³</u>
05-13-74	325.4	0.28 ± 0.01
05-30-74	350.9	0.28 ± 0.01
06-13-74	282.9	0.30 ± 0.01
06-30-74	342.0	0.10 ± 0.01
07-13-74	266.8	0.22 ± 0.01
07-29-74	327.5	0.09 ± 0.01

RANGELY
AIR PARTICULATE SAMPLES
(Gross Beta Analyses)

<u>Collection Date</u>	<u>Volume m³</u>	<u>Beta pCi/m³</u>
05-14-74	326.7	0.41 ± 0.01
06-01-74	368.3	0.33 ± 0.01
06-14-74	269.7	0.26 ± 0.01
06-29-74	299.5	0.20 ± 0.01
07-14-74	306.3	0.26 ± 0.01
07-28-74	287.2	0.08 ± 0.01

NORREL RANCH
AIR PARTICULATE SAMPLES
(Gross Beta Analyses)

<u>Collection Date</u>	<u>Volume m³</u>	<u>Beta pCi/m³</u>
05-14-74	323.7	0.41 ± 0.07
06-01-74	*	*
06-14-74	267.2	0.22 ± 0.01
06-29-74	303.3	0.22 ± 0.01
07-14-74	302.5	0.28 ± 0.01
07-28-74	286.7	0.09 ± 0.01

*Equipment failed. (30.3 ± 1.5 pCi/Sample)

AIR PARTICULATE SAMPLES

(Gamma Scan)

Collection Station	Collection Date	pCi/m ³		
		Ce-141, 144	Ru-103, 106	Zr-Nb-95
Grand Junction	3rd Qtr. Composite	0.030 ± 0.013	<0.008	0.010 ± 0.008
Grand Valley	3rd Qtr. Composite	0.026 ± 0.013	<0.008	< 0.005
Meeker	3rd Qtr. Composite	0.043 ± 0.014	<0.008	< 0.005
Norrel Ranch	3rd Qtr. Composite	0.015 ± 0.014	<0.008	< 0.005
Rangely	3rd Qtr. Composite	0.032 ± 0.014	<0.008	< 0.005
Rifle	3rd Qtr. Composite	0.047 ± 0.014	0.024 ± 0.011	0.011 ± 0.008
Rio Blanco Site	3rd Qtr. Composite	0.029 ± 0.014	0.022 ± 0.011	0.026 ± 0.008

AREA MONITORS-TLD
(Dose for Period-mrem*)

<u>Station</u>	<u>mrem $\pm$ 2σ</u>
Wellhead	29 $\pm$ 6
One Mile Up Valley	28 $\pm$ 7
Two Miles Up Valley	26 $\pm$ 3
One Mile Down Valley	30 $\pm$ 9
Two Miles Down Valley	27 $\pm$ 7
Flare Stack Up Valley	29 $\pm$ 5
Flare Stack Down Valley	24 $\pm$ 7
Norrel Ranch	26 $\pm$ 6
Equity Oil Camp	27 $\pm$ 7
Brennan Ranch	23 $\pm$ 9
Berthelson Ranch	25 $\pm$ 4
Meeker	20 $\pm$ 7
Rangely	21 $\pm$ 3
Grand Valley	20 $\pm$ 12
Rifle	42 $\pm$ 6
Grand Junction	22 $\pm$ 5

*TLD's annealed 05-13-74 and read out 08-06-74.

TLD's were in field from 06-01-74 to 07-29-74.

WATER

(Gross Alpha, Beta, Tritium, and Gamma Scan)

<u>Station</u>	<u>Collection Date</u>	<u>Alpha pCi/l</u>	<u>Beta pCi/l</u>	<u>Tritium pCi/ml*</u>	<u>Gamma Scan</u>
Fawn Creek Downstream	07-06-74	0.0 ± 2.5	0.0 ± 2.0		ND
Fawn Creek Upstream	07-06-74	0.0 ± 2.5	0.0 ± 2.0		ND
Berthelson Ranch	07-06-74	0.0 ± 2.5	0.0 ± 2.0	0.14 ± 0.08	ND
Equity Oil Camp	07-06-74	0.0 ± 2.5	0.0 ± 2.0	0.36 ± 0.08	ND
Brennan Ranch	07-06-74	0.0 ± 2.5	0.0 ± 2.0	0.49 ± 0.08	ND
Norrel Ranch	07-06-74	0.0 ± 2.5	7.7 ± 4.8	0.26 ± 0.08	ND
Rifle	07-06-74	0.0 ± 2.5	0.0 ± 2.0		ND
Grand Valley	07-06-74	5.2 ± 2.7	9.7 ± 4.8		ND
Grand Junction	07-06-74	0.0 ± 2.5	5.5 ± 4.7		ND
Rangely	07-06-74	0.0 ± 2.5	0.0 ± 2.0		ND
Meeker	07-06-74	0.0 ± 2.5	4.9 ± 4.6		ND
Colorado River	07-07-74		0.0 ± 2.0		ND
East Rifle Creek	07-10-74		8.7 ± 4.8		ND
Main Elk Creek	07-10-74		0.0 ± 2.0		ND
Piceance Creek	07-06-74		4.9 ± 4.6		ND
White River (West of Piceance)	07-06-74		0.0 ± 2.0		ND
White River (Meeker)	07-06-74		0.0 ± 2.0		ND
Rio Blanco Lake	07-06-74		0.0 ± 2.0		ND

*Analyzed by electrolytic enrichment.

ND = No detectable activity above background and system sensitivity.

MILK SAMPLES

(Gamma Scan)

<u>Station</u>	<u>Collection Date</u>	<u>Gamma Scan</u>
Meeker	07-06-74	ND
Brennan Ranch	07-06-74	ND
Norrel Ranch	07-06-74	ND
Berthelson Ranch	*	*

ND = No detectable activity above background and system sensitivity other than natural potassium.

*No milk available.