General

(8)

UNIVERSITY OF CALIFORNIA

LOS ALAMOS SCIENTIFIC LABORATORY
(CONTRACT W-7405-ENG-36)
P. O. Box 1663
LOS ALAMOS, NEW MEXICO

IN REPLY
REFER TO:

H-8-468

May 13, 1971

William E. Hale, District Chief
U. S. Geological Survey
P. O. Box 4369
Albuquerque, New Mexico 87106

Dear Mr. Hale:

Enclosed are tables of radiochemical and chemical (chromate and zinc) analyses of water completed during the period July through December 1970.

Table I - Radiochemical analyses of surface and ground water from disposal canyons

Table II - Supplemental radiochemical analyses of surface and ground water from disposal canyons

Table III - Radiochemical analyses of surface and ground water from area monitoring

Table IV - Chromate and zinc in surface and ground water in Sandia Canyon

Table V - Detection limits of radiochemical analyses

Very truly yours,

William R. Kennedy
Associate Group Leader H-8

WRK:et

encs (5) "a/s"

cc: ISD-5 (2) (w/o encs)

Received by ER-RPF
DEC 23 1992

TABLE I - RADIOCHEMICAL ANALYSES OF SURFACE AND GROUND WATER FROM DISPOSAL CANYONS (ANALYSES BY LASL, H-8)

Source	Date Collected	Microcuries per Milliliter					Micrograms per Milliliter
		Gross Alpha $\times 10^{-9}$	Gross Beta $\times 10^{-9}$	Plutonium ^{238}Pu $\times 10^{-9}$	Plutonium ^{239}Pu $\times 10^{-9}$	Tritium ^{3}H $\times 10^{-6}$	Uranium Natural $\times 10^{-3}$
Pueblo Canyon							
Acid Weir (SW)	4-16-70	ND	346 ± 8	0.03 ± 0.01	0.07 ± 0.02	3 ± 1	ND
Acid Weir (SW)	11-19-70	2.7 ± 1.6	105 ± 4	ND	0.48 ± 0.05	3 ± 1	0.7 ± 0.4
Pueblo 1 (SW)	4-16-70	ND	16.7 ± 1.9	ND	ND	ND	ND
Pueblo 1 (SW)	11-19-70	ND	24.8 ± 2.2	ND	ND	ND	0.5 ± 0.4
Pueblo 2 (SW)	4-16-70	ND	20.8 ± 2.1	ND	0.04 ± 0.01	ND	1.3 ± 0.4
Pueblo 2 (SW)	11-19-70	ND	18.7 ± 2.0	ND	0.08 ± 0.01	ND	ND
Pueblo 3 (SW)	4-16-70	ND	10.3 ± 1.6	ND	ND	ND	ND
Pueblo 3 (SW)	11-19-70	1.3 ± 1.0	12.2 ± 1.7	ND	0.04 ± 0.01	ND	1.0 ± 0.4
Hamilton Bend Spr.	4-16-70	1.3 ± 1.0	4.4 ± 1.3	ND	ND	ND	ND
Hamilton Bend Spr.	11-19-70	1.8 ± 1.4	7.7 ± 1.5	ND	0.05 ± 0.01	ND	0.5 ± 0.4
Well PO-3B	4-16-70	ND	7.1 ± 1.5	ND	0.04 ± 0.01	15 ± 1	ND
Well PO-3B	11-19-70	ND	8.7 ± 1.5	ND	0.04 ± 0.01	13 ± 1	ND
Well PO-4A	4-16-70	ND	4.8 ± 1.3	ND	ND	ND	1.5 ± 0.4
Well PO-4B	4-16-70	3.3 ± 1.6	9.8 ± 1.6	ND	ND	2 ± 1	0.5 ± 0.4
DP Canyon							
DPS-1 (SW)	6-24-70	4.6 ± 2.1	1240 ±14.	1.17 ± 0.07	2.88 ± 0.14	478 ± 3	--
DPS-1 (SW)	8-14-70	6.6 ± 2.3	738 ±11.	0.72 ± 0.05	1.68 ± 0.09	113 ± 1	--
DPS-1 (SW)	9-24-70	11.5 ± 2.8	508 ± 9.	0.72 ± 0.06	2.31 ± 0.10	62 ± 1	--
DPS-1 (SW)	11-17-70	2.4 ± 1.5	1106 ±13.	0.54 ± 0.04	1.53 ± 0.08	752 ± 1	--
DPS-1 (SW)	12-1-70	10.7 ± 2.8	2406 ±20.	0.87 ± 0.07	2.62 ± 0.14	599 ± 3	--
DPS-2 (SW)	8-14-70	4.0 ± 2.0	593 ±10.	0.23 ± 0.03	0.33 ± 0.04	554 ± 5	--
DPS-3 (SW)	8-14-70	2.8 ± 1.8	748 ±11.	0.20 ± 0.02	0.24 ± 0.03	185 ± 2	--
DPS-4 (SW)	6-24-70	ND	424 ± 8.	0.10 ± 0.02	0.54 ± 0.05	117 ± 1	--
DPS-4 (SW)	8-14-70	ND	440 ± 8.	0.14 ± 0.02	0.69 ± 0.02	99 ± 1	--
DPS-4(SW)	11-17-70	ND	479 ± 9.	0.24 ± 0.09	0.05 ± 0.02	115 ± 1	--
Los Alamos Canyon							
Well LAO-C	11-25-70	ND	3.8 ± 1.2	ND	ND	ND	1.2 ± 0.4
Well LAO-1	6-24-70	ND	35.5 ± 2.6	ND	0.05 ± 0.02	6 ± 1	0.9 ± 0.4
Well LAO-1	8-13-70	ND	70.7 ± 3.6	ND	ND	11 ± 1	ND
Well LAO-1	11-17-70	ND	107 ± 4	0.09 ± 0.02	0.06 ± 0.02	41 ± 1	ND
Well LAO-1.2	8-13-70	ND	3.2 ± 1.4	ND	ND	6 ± 1	ND
Well LAO-2	5-11-70	ND	72.6 ± 3.6	ND	0.20 ± 0.02	--	ND
Well LAO-2	8-13-70	ND	87.3 ± 3.9	0.03 ± 0.01	0.14 ± 0.01	190 ± 3	0.7 ± 0.4
Well LAO-3	6-24-70	ND	65.1 ± 3.4	ND	0.07 ± 0.02	97 ± 1	1.6 ± 0.4
Well LAO-3	8-13-70	2.9 ± 1.8	75.2 ± 3.7	0.03 ± 0.01	0.07 ± 0.01	90 ± 1	1.3 ± 0.4
Well LAO-3	11-17-70	ND	74.1 ± 3.6	0.03 ± 0.01	0.12 ± 0.01	131 ± 1	ND
Well LAO-4	8-13-70	ND	9.8 ± 1.7	ND	0.04 ± 0.01	66 ± 1	ND
Well LAO-4.5	5-11-70	ND	8.3 ± 1.6	ND	ND	--	ND
Well LAO-4.5	6-24-70	ND	6.3 ± 1.5	0.11 ± 0.02	0.03 ± 0.01	44 ± 1	ND
Well LAO-4.5	8-13-70	ND	4.0 ± 1.4	ND	0.04 ± 0.01	54 ± 1	ND
Well LAO-4.5	11-17-70	2.1 ± 1.5	42.3 ± 2.8	0.03 ± 0.01	0.04 ± 0.01	40 ± 1	ND

TABLE 1 - Continued

Source	Date Collected	Microcuries per Milliliter					Micrograms per Milliliter
		Gross Alpha X 10^{-9}	Gross Beta X 10^{-9}	Plutonium ^{238}Pu X 10^{-9}	Plutonium ^{239}Pu X 10^{-9}	Tritium ^{3}H X 10^{-6}	Uranium Natural X 10^{-3}
Sanoga Canyon							
SCS-1 (SW)	6-29-70	ND	16.8 ± 2.0	ND	ND	10 ± 1	ND
SCS-1 (SW)	9-24-70	ND	12.7 ± 1.9	0.03 ± 0.01	ND	8 ± 1	ND
SCS-2 (SW)	9-24-70	ND	8.1 ± 1.7	ND	ND	7 ± 1	ND
Mortandad Canyon							
Well MCO-3	6-22-70	4.7 ± 2.1	975. ± 13.	0.97 ± 0.05	0.51 ± 0.04	64 ± 1	2.3 ± 0.4
Well MCO-3	9-24-70	6.0 ± 2.2	345. ± 8.	1.29 ± 0.07	0.68 ± 0.05	46 ± 1	2.1 ± 0.4
Well MCO-4	5-14-70	ND	114. ± 4.	ND	0.08 ± 0.02	522 ± 1	1.3 ± 0.4
Well MCO-4	6-23-70	ND	125. ± 5.	ND	ND	242 ± 1	0.9 ± 0.4
Well MCO-4	9-23-70	2.1 ± 1.6	174. ± 5.	ND	ND	102 ± 1	1.8 ± 0.4
Well MCO-5	9-23-70	ND	29.6 ± 2.4	0.06 ± 0.01	0.03 ± 0.01	672 ± 5	0.6 ± 0.4
Well MCO-5	5-14-70	ND	26.6 ± 2.3	ND	ND	1124 ± 5	2.0 ± 0.4
Well MCO-6	6-23-70	ND	39.7 ± 2.8	ND	0.03 ± 0.01	624 ± 5	1.3 ± 0.4
Well MCO-6	9-23-70	ND	32.5 ± 2.5	ND	0.05 ± 0.01	343 ± 3	ND
Well MCO-7	6-23-70	ND	14.0 ± 1.9	ND	ND	899 ± 4	ND
Well MCO-7	9-23-70	1.8 ± 1.5	22.7 ± 2.2	ND	ND	633 ± 4	ND
Well MCO-7.5	9-23-70	6.3 ± 2.2	26.4 ± 2.3	0.22 ± 0.03	0.14 ± 0.02	777 ± 4	ND
Well MCO-8	6-23-70	ND	8.1 ± 1.6	ND	0.03 ± 0.01	49 ± 1	1.3 ± 0.4
Well MCO-8	9-23-70	ND	9.2 ± 1.6	0.07 ± 0.01	0.03 ± 0.01	298 ± 2	ND
Gaging Sta. 1 (SW)	6-22-70	2.3 ± 1.7	1517. ± 16.	0.34 ± 0.03	0.19 ± 0.03	35 ± 1	--
Gaging Sta. 1 (SW)	7-21-70	29.2 ± 4.3	904. ± 12.	28.9 ± 1.3	18.48 ± 0.85	24 ± 1	--
Gaging Sta. 1 (SW)	9-24-70	5.2 ± 2.1	924. ± 12.	3.92 ± 0.17	1.78 ± 0.09	44 ± 1	--
Gaging Sta. 1 (SW)	11-17-70	10.5 ± 2.7	1240. ± 14.	13.98 ± 0.71	5.44 ± 0.27	41 ± 1	--
Gaging Sta. 1 (SW)	12-1-70	74.2 ± 6.3	19,280. ±230.	50.7 ± 2.5	11.12 ± 0.54	171 ± 2	--
MCS-3.9 (SW)	9-23-70	ND	353. ± 8.	0.39 ± 0.04	0.29 ± 0.04	63 ± 1	1.7 ± 0.4

ND - Below limits of detection
SW - Surface Water

TABLE II - SUPPLEMENTAL RADIOCHEMICAL ANALYSES OF SURFACE AND GROUND WATER FROM DISPOSAL CANYONS (ANALYSES BY LASL, H-8)

Source	Date Collected	Microcuries per Milliliter X 10^{-9}			
		Uranium (^{234}U)	Americium (^{241}Am)	Strontium (^{90}Sr)	Cesium (^{137}Cs)
DP Canyon					
DPS-1 (SW)	6-24-70	9.24 ± 0.54	1.18 ± 0.08	580. ± 19.	900 ± 280
DPS-1 (SW)	8-14-70	13.48 ± 0.74	0.92 ± 0.05	411. ± 17.	660 ± 230
DPS-1 (SW)	9-24-70	15.1 ± 1.5	1.37 ± 0.05	214. ± 13.	250 ± 220
DPS-1 (SW)	11-17-70	10.12 ± 0.89	0.85 ± 0.05	611. ± 22.	350 ± 240
DPS-1 (SW)	12-1-70	13.66 ± 0.75	1.63 ± 0.11	1200. ± 30.	1310 ± 260
DPS-2*(SW)	2-16-70	42.0 ± 1.9	0.97 ± 0.11	620. ± 20.	740 ± 240
DPS-2 (SW)	8-14-70	10.94 ± 0.67	0.19 ± 0.02	447. ± 18.	ND
DPS-3*(SW)	2-16-70	166.7 ± 8.9	1.08 ± 0.09	528. ± 19.	330 ± 230
DPS-3 (SW)	8-14-70	10.21 ± 0.63	0.16 ± 0.01	396. ± 17.	460 ± 230
DPS-4 (SW)	2-16-70	2.41 ± 0.29	0.19 ± 0.03	--	--
DPS-4 (SW)	6-24-70	1.23 ± 0.29	0.37 ± 0.05	--	ND
DPS-4 (SW)	8-14-70	1.30 ± 0.22	0.12 ± 0.01	196. ± 13.	ND
DPS-4 (SW)	11-17-70	1.16 ± 0.19	0.10 ± 0.02	268. ± 15.	ND
Mortandad Canyon					
Well MCO-3	6-22-70	--	--	191. ± 12.	--
Well MCO-3	9-24-70	--	0.20 ± 0.03	54.4 ± 8.1	--
Well MCO-3.9 (SW)	3-17-70	--	--	72.1 ± 8.3	--
MCS-3.9 (SW)	9-23-70	--	--	101.3 ± 9.7	--
GS-1*(SW)	3-17-70	0.86 ± 0.14	17.60 ± 0.69	794. ± 23.	7740 ± 450
GS-1 (SW)	6-22-70	5.17 ± 0.48	0.09 ± 0.02	375. ± 16.	2760 ± 330
GS-1*(SW)	7-21-70	0.58 ± 0.14	0.89 ± 0.07	32. ± 5.8	3030 ± 330
GS-1 (SW)	9-24-70	0.23 ± 0.13	0.38 ± 0.04	90.6 ± 9.3	1420 ± 250
GS-1 (SW)	11-17-70	0.73 ± 0.10	2.56 ± 0.10	67.4 ± 8.8	2380 ± 280
GS-1 (SW)	12-1-70	4.56 ± 0.27	2.64 ± 0.10	1260. ± 30.	32330 ± 630

* Radium (^{226}Ra) below limits of detection.

TABLE III - RADIOCHEMICAL ANALYSES OF SURFACE AND GROUND WATER FROM AREA MONITORING (ANALYSES BY LASL, H-8).

Source	Date Collected	Microcuries per Milliliter					Micrograms per Milliliter
		Gross Alpha $\times 10^{-9}$	Gross Beta $\times 10^{-9}$	Plutonium ^{238}Pu $\times 10^{-9}$	Plutonium ^{239}Pu $\times 10^{-9}$	Tritium ^{3}H $\times 10^{-6}$	Uranium Natural $\times 10^{-3}$
Supply Wells							
1A-1B	7-20-70	4.0 ± 1.8	2.6 ± 1.3	ND	ND	ND	4.1 ± 0.4
1A-2	7-20-70	ND	5.8 ± 1.5	ND	ND	ND	1.7 ± 0.4
1A-3	7-20-70	1.7 ± 1.4	ND	ND	ND	ND	2.7 ± 0.4
1A-4	7-20-70	ND	ND	ND	ND	ND	1.1 ± 0.4
1A-5	7-20-70	ND	ND	ND	ND	ND	0.7 ± 0.4
1A-6*	7-20-70	20.3 ± 3.6	5.4 ± 1.5	ND	ND	ND	29.4 ± 1.9
G-1	7-21-70	1.7 ± 1.4	3.0 ± 1.3	ND	ND	ND	0.6 ± 0.4
G-1A	7-21-70	ND	2.1 ± 1.3	ND	ND	ND	ND
G-2	7-21-70	1.5 ± 1.3	2.7 ± 1.3	ND	ND	ND	ND
G-3	7-21-70	1.5 ± 1.3	2.3 ± 1.3	ND	ND	ND	ND
G-4	7-21-70	ND	6.6 ± 1.5	ND	ND	ND	0.5 ± 0.4
G-5	7-21-70	ND	ND	ND	ND	ND	1.0 ± 0.4
G-6	7-21-70	ND	ND	ND	ND	ND	ND
PM-1	7-20-70	ND	3.3 ± 1.3	ND	ND	ND	1.3 ± 0.4
PM-2	7-20-70	ND	3.3 ± 1.3	ND	ND	ND	ND
PM-3	7-20-70	ND	2.4 ± 1.3	ND	ND	ND	0.5 ± 0.4
Test Wells							
TW-1	5-1-70	ND	4.7 ± 1.3	ND	ND	ND	ND
TW-2	4-7-70	ND	1.3 ± 1.1	ND	ND	ND	ND
TW-2	9-24-70	ND	ND	ND	ND	ND	1.0 ± 0.4
TW-3	4-7-70	3.6 ± 1.6	3.5 ± 1.2	ND	.04 ± .04	ND	ND
TW-3	9-23-70	ND	ND	ND	ND	ND	2.0 ± 0.4
DT-5a	4-24-70	3.3 ± 1.6	2.2 ± 1.1	ND	ND	ND	ND
DT-9	4-28-70	ND	2.0 ± 1.2	ND	ND	ND	0.9 ± 0.4
DT-10	4-30-70	ND	2.5 ± 1.3	ND	ND	ND	ND
Springs and Streams							
American Springs	7-30-70	ND	10.1 ± 1.7	ND	ND	ND	ND
Basalt Spring	10-20-70	ND	5.1 ± 1.5	ND	.03 ± 0.01	ND	ND
Spring 1	10-20-70	2.0 ± 1.6	ND	ND	ND	ND	1.4 ± 0.4
Spring 2	10-20-70	ND	ND	ND	ND	ND	1.2 ± 0.4
Spring 4	10-21-70	ND	ND	ND	ND	ND	0.7 ± 0.4
Spring 4 a	10-21-70	ND	ND	ND	ND	ND	ND
Water Canyon (S-Site WS)	7-30-70	2.0 ± 1.6	4.6 ± 1.4	ND	ND	ND	ND
Water Canyon nr. Beta Hole	4-15-70	ND	ND	ND	ND	ND	2.1 ± 0.4
Observation Well							
GCO-1	4-15-70	ND	2.4 ± 1.3	ND	0.03 ± 0.01	ND	ND

TABLE III - Continued

Source	Date Collected	Microcuries per Milliliter					Micrograms per Milliliter
		Gross Alpha $\times 10^{-9}$	Gross Beta $\times 10^{-9}$	Plutonium ^{238}Pu $\times 10^{-9}$	Plutonium ^{239}Pu $\times 10^{-9}$	Tritium ^{3}H $\times 10^{-6}$	Uranium Natural $\times 10^{-3}$
Rio Chama							
Chamita	Jan.-Feb. 1970	ND	3.1 ± 1.3	ND	0.04 ± 0.01	ND	3.2 ± 0.4
Chamita	Apr.-June 1970	ND	2.2 ± 1.3	ND	ND	ND	0.8 ± 0.4
Chamita	July -Sept.1970	1.9 ± 1.4	7.3 ± 1.5	0.03 ± 0.01	ND	ND	1.4 ± 0.4
Rio Grande							
Embudo	Feb. 1970	ND	1.8 ± 1.2	ND	ND	ND	1.5 ± 0.4
Embudo	Apr.-June 1970	ND	2.9 ± 1.3	ND	ND	ND	ND
Embudo	Aug.-Sept.1970	ND	5.0 ± 1.4	0.03 ± 0.01	0.05 ± 0.01	ND	1.3 ± 0.4
Otowi	Jan.-March 1970	ND	6.2 ± 1.5	ND	ND	ND	2.8 ± 0.4
Otowi	Apr.-June 1970	ND	ND	ND	ND	ND	0.9 ± 0.4
Otowi	July-Sept. 1970	ND	11.3 ± 1.7	ND	ND	ND	2.3 ± 0.4
Cochiti	Jan.-March 1970	ND	2.3 ± 1.3	ND	ND	ND	1.5 ± 0.4
Cochiti	Apr.-June 1970	ND	2.1 ± 1.3	ND	ND	ND	0.7 ± 0.4
Cochiti	July-Sept. 1970	2.7 ± 1.6	6.5 ± 1.4	ND	0.03 ± 0.01	ND	2.7 ± 0.4

ND - Below limits of detection.
* Radium (^{226}Ra) below limits of detection

TABLE IV - CHROMATE AND ZINC IN SURFACE AND GROUND WATER IN SANDIA CANYON
(ANALYSES BY LASL, H-8)

Source	Date Collected	Milligrams per Liter	
		Chromate (Cr^{+6})	Zinc (Zn)
Effluent Power Plant TA-3 (SW)	12-24-68	14.4 ±± 0.3	3.13 ± 0.15
" " "	1-21-69	9.6 ± 0.3	1.20 ± 0.15
	2-6-69	16.3 ± 0.3	4.15 ± 0.15
SCS-1 (SW)	9-5-69	0.07 ± 0.01	--
"	1-13-70	10.6 ± 0.3	--
"	3-19-70	6.6 ± 0.1	--
"	6-29-70	7.0 ± 0.1	--
"	9-24-70	9.8 ± 0.5	--
SCS-2 (SW)	9-5-69	2.4 ± 0.1	--
SCS-2)SW)	1-12-70	8.3 ± 0.3	--
SCS-2 (SW)	3-19-70	1.9 ± 0.1	--
SCS-2 (SW)	4-17-70	6.9 ± 0.1	--
SCS-2 (SW)	9-24-70	4.3 ± 0.5	--
Well SCO-4	9-5-69	0.18 ± 0.05	--
1.1 Mile West of County Line (SW)	2-6-69	8.8 ± 0.3	0.30 ± 0.15

(SW) Surface Water

TABLE V. - DETECTION LIMITS OF RADIOCHEMICAL ANALYSES

Radioactivity or Radionuclide	Microcuries per milliliter
	Limits of Detection
Gross alpha	6×10^{-10}
Gross beta	1×10^{-9}
Plutonium (^{238}Pu)	1×10^{-11}
Plutonium (^{239}Pu)	1×10^{-11}
Tritium (^{3}H)	5×10^{-6}
Uranium (Natural)	4×10^{-4}*
Americium (^{241}Am)	1×10^{-11}
Cesium (^{137}Cs)	2.3×10^{-7}
Radium (^{226}Ra)	1.5×10^{-10}
Uranium (^{234}U)	1×10^{-11}
Strontium (^{90}Sr)	6×10^{-9}

*Micrograms per milliliter.