determination of the needs for the INEL program, a draft report has been prepared that is now under review. The final report should be completed in FY 84.

PLUTONIUM CONCENTRATIONS REFLECTING WORLDWIDE FALLOUT

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Special analyses for plutonium were performed on 1-kg soil samples from six regional stations (Fig. 24). This is 100 times the usual mass used for analyses. These larger samples increase the sensitivity of the plutonium analyses, which is necessary to evaluate background plutonium concentrations in fallout from atmospheric nuclear weapons tests. The samples at each station were collected by taking 5 plugs, 75-mm diam and 50 mm deep, at the center and corners of a square area 10 m on a side. The five plugs were combinced into one sample for radiochemical analyses. (One set of samples from Santa Cruz Lake consisted of 1-kg plugs at the four corners and center and were taken to determine variability in radionuclide concentrations within a sampling

TABLE XXV. Radiochemical Analyses of Special Regional Soils

Analysis	Units	No. of Samples	1981 ($\bar{x}\pm 2s$)	1983 ($\bar{x}\pm 2s$)
^{137}Cs	(pCi/g)	6	0.68 ± 0.80	0.55 ± 0.68
^{238}Pu	(pCi/g)	6	0.00040 ± 0.00049	0.00054 ± 0.00090
$^{239,240}Pu$	(pCi/g)	6	0.0091 ± 0.0098	0.00819 ± 0.01105
^{90}Sr	(pCi/g)	6	0.49 ± 0.50	0.32 ± 0.22
Total uranium	(μg/g)	6	—	2.4 ± 1.2
Gross gamma	(counts/min/g)	6	—	3.0 ± 2.8
$^{239,240}Pu/^{238}Pu$	—	6	23	15

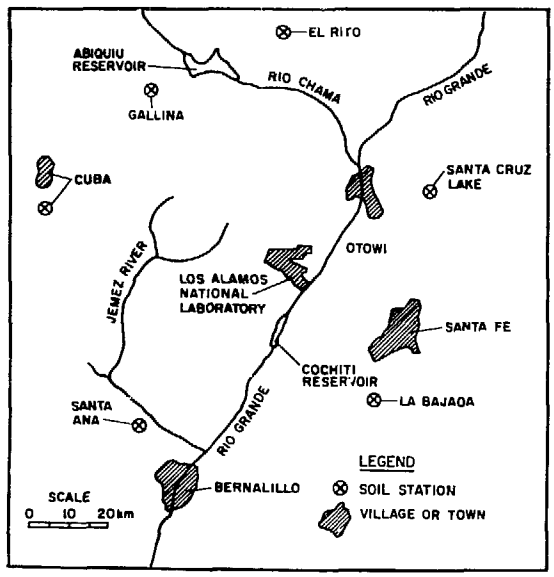

FIGURE 24.
Special regional soil sampling locations.

grid.) The 1-kg samples were analyzed for ^{238}Pu and $^{239,240}Pu$. Analyses for ^{137}Cs, ^{90}Sr, total uranium, and gross gamma were done on standard-size samples.

In Table XXV the analytical results in 1983 from the six stations are compared with similar data from 1981. There is no significant difference in the concentrations of ^{137}Cs, ^{238}Pu, or ^{90}Sr. The average $^{239,240}Pu/^{238}Pu$ ratios for both sets of samples are similar at 23 (1981) and 15 (1983).

TRANSPORT OF RADIONUCLIDES IN SNOWMELT RUNOFF, 1983

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The major transport of radionuclides from canyons that have received or are now receiving treated low-level radioactive effluents is by surface runoff (solution and sediments). Radionuclides in the effluents become adsorbed or attached to sediment particles in the stream channels.

Surface runoff, the major transport mechanism, occurs in two modes. Spring snowmelt runoff occurs over a long period of time (days) at a low discharge rate and sediment load. Summer runoff from thunderstorms occurs over a short period of time (hours) at a high discharge rate and sediment load.

Samples of the runoff were collected and analyzed for radionuclides in solution and suspended sediments (Table XXVI). Radioactivity in solution is defined as the filtrate passing through a 0.45-μm-pore-size filter; radioactivity in suspended sediments is defined as the residue on the filter. The solution was analyzed for ^{137}Cs, ^{238}Pu, $^{239,240}Pu$, ^{3}H, total uranium, and gross gamma, whereas suspended sediments were analyzed for ^{238}Pu and $^{239,240}Pu$.

During 1983, snowmelt runoff was monitored at Los Alamos Canyon at State Road 4 (SR-4) and at Otowi near the Rio Grande (Fig. 25). Los Alamos Canyon and tributary Pueblo Canyon have

TABLE XXVI. Average Radiochemical and Chemical Concentrations in Snowmelt Runoff

Measured Element	Units	Los Alamos Canyon		Pajarito Canyon
		SR-4	Otowi	
Radiochemical (solution)				
^{137}Cs	10^{-9} μCi/mL	20 ± 65	16 ± 44	4 ± 60
^{238}Pu	10^{-9} μCi/mL	0.003 ± 0.018	−0.001 ± 0.008	−0.005 ± 0.019
$^{239,240}Pu$	10^{-9} μCi/mL	0.014 ± 0.021	0.008 ± 0.008	0.007 ± 0.005
^{3}H	10^{-6} μCi/mL	2.4 ± 1.1	2.4 ± 1.0	3.1 ± 1.4
Total uranium	μg/L	0.1 ± 0.7	0.6 ± 1.1	0.3 ± 0.8
Gross gamma	counts/min/L	49 ± 67	33 ± 47	41 ± 56
Radiochemical (suspended sediments)				
^{238}Pu	pCi/g	0.27 ± 0.40	0.15 ± 0.24	0.20 ± 0.59
$^{239,240}Pu$	pCi/g	4.7 ± 6.4	2.3 ± 3.0	0.18 ± 0.53
Chemical				
Cl	mg/L	11	13	31
F	mg/L	0.1	0.2	0.1
NO_3	mg/L	1.5	1.0	0.9
TDS	mg/L	118	131	192
pH	—	7.5	7.8	7.7