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ROLLER COASTER

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PROJECT OFFICERS REPORT—PROJECT 5.2/5.3d

LABORATORY ANALYSES OF ROLLER COASTER SAMPLES

Philip W. Krey, Project Officer

Ralph E. Fried

Isotopes, Incorporated
123 Woodland Avenue
Westwood, New Jersey

143 Pages

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ABSTRACT

Plutonium, uranium, americium, and gamma spectrometric analyses were performed on over two thousand Operation Roller Coaster physical and biological samples. Separate laboratory facilities were maintained for the biological and physical samples to prevent cross-contamination of the activities of the two sample types. In general, samples of low activity were analyzed first, and samples of approximately equal activities were analyzed in groups to further minimize cross-contamination.

A quality control program involving the analyses of standards, splits, and blanks demonstrated the precision of the plutonium analysis to be 4.4 percent at the 95-percent confidence level with no trend in the precision with time and no significant contribution to the determined sample activities from laboratory contamination.

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CHAPTER 1

INTRODUCTION

1.1 OBJECTIVES

The sole objective of Project 5.2/5.3d, Operation Roller Coaster, was to perform the analyses, as requested by the Scientific Director's staff, of biological and physical samples collected by other projects during the field test phase of the operation. These analyses included the determination of plutonium, uranium, and americium.

The biological samples were the organs and excreta of dogs, sheep, and burros exposed during the field program. The physical samples consisted of various types of airborne particulate collections, fallout deposition collections, and soil samples retrieved from contaminated areas after each event.

CHAPTER 2

PROCEDURE

With the exception of samples selected for gamma spectrometric measurements, each sample underwent three phases of treatment, i.e., sample preparation, radiochemical separation, and radiometric assay. These phases are described for the various sample types in succeeding sections.

Storage and analysis of biological and physical samples were performed in separate laboratories to eliminate contamination of the expected low activity biological samples. Manipulation of physical samples prior to digestion with acids was carried out in a glove box to prevent contamination of the laboratory with airborne plutonium.

In general, samples were processed in increasing order of activity and in groups of approximately equal activities to minimize the effects of any sample cross-contamination. For biological samples these estimates were based on expected activities of organs or excreta. For physical samples, judgements of relative activity were made according to the supplied field assay of the samples as to deposition contours developed, for each event, by Projects 2.3 and 2.5. A spike of Pu-236 was added to all samples at the beginning of analysis so that the chemical recovery of each determination could be made. In order to conserve the Pu-236, physical samples whose expected Pu-239 activities were in excess of 10^3 dpm had the spike applied to an appropriate aliquot of the dissolved sample. Aliquot size was determined by evaporating one drop of the final sample solution onto a stainless-steel disc for total alpha assay.

2.1 BIOLOGICAL SAMPLES

The biological samples were sealed in polyethylene bags and stored in the original styrofoam shipping containers packed with dry ice. The weight of each sample was determined to three significant figures. Each sample was then thawed and spiked with a known amount of Pu-236. Bags for those samples whose gross weight was greater than 400 grams were included in the reported weight and incorporated into the analysis; otherwise, the bag was thoroughly rinsed with dilute HCl and the bag then discarded. The sample, depending on its size, was placed in a porcelain evaporating dish, silica crucible, or stainless steel pot, dehydrated on a hot plate from four to eight hours, and ashed at 600°C for twelve hours in a gas-fired incinerator. The incinerator, shown **in Figure 2.1,** was equipped with an after burner to eliminate the venting of noxious fumes. **Figure 2.2** shows the main ashing chamber containing tissues in silica crucibles. The resultant ash was leached with hot 6N HCl, and the leach solution was then reserved. Any remaining residue was fused in a platinum crucible with five times its weight of sodium carbonate. Sand was often found in the sheep urine samples, apparently introduced during collection. When the amounts of sand were small enough, they were dissolved by repeated additions of HF and evaporation. The resulting solution was combined with the sample. When the amounts of sand were large, they were thoroughly leached with 6N HCl and the residue then discarded. Fecal samples were also found to contain large amounts of material that resisted further treatment after ignition. This material was also discarded after HCl leachings.

The cooled melt from the fusion was dissolved in HCl and combined with the leach solution reserved earlier. Residues remaining after this treatment were discarded. Previous analyses of standard soil samples proved that residues remaining after a sodium carbonate fusion contained less than 0.1% of the total sample activity.

Approximately 10 mg of iron carrier was added and the solution made basic with ammonia and the precipitate then centrifuged and washed. The precipitate was dissolved in a minimum of concentrated HNO_3 and diluted to 2N with water. Subsequent steps in the analysis of this prepared solution for plutonium are given in Section 2.3.1. If uranium analysis was to be performed, an aliquot of the prepared solution was treated according to the procedure outlined in Section 2.3.2.

2.2 PHYSICAL SAMPLES

2.2.1 Impactor Stages, Total Air Samples, Film and Aluminum Collectors, Deposition Slides, Individual Particulates, Sticky Wire Swipes. The procedure for dissolving these various materials was essentially the same except for the quantitites of reagents used. The sample, and its immediate cover or envelope, was placed in a beaker and covered with fuming nitric acid. If the activity were low enough, such that the entire sample could be spiked, Pu-236 was added at this point, and the solution evaporated to near-dryness. Alternatively, the spike was withheld until an aliquot of the complete solution was obtained.

Some of the slides receiving special particulate study by Project 2.6b were enclosed in an envelope of vinyl plastic. It was expedient to dissolve the vinyl by evaporation with acetone prior to the treatment with fuming nitric acid. The sample was then covered with a fuming HNO_3 - $HClO_4$ mixture and carefully evaporated to dryness. In the analyses of glass impactor discs and deposition slides, the glass was scrubbed at this point with a rubber policeman and 1N HNO_3, and the glass discarded. If a silicious residue remained, the sample was transferred to a teflon beaker and evaporated to dryness several times with concentrated HF. Fluoride ion was removed by evaporations with HNO_3, and the final residue dissolved in hot 6N HCl.

If uranium analysis was to be performed, the solution was diluted to volume and an appropriate aliquot removed for chemistry as described in Section 2.3.2. Later analyses were performed on the uranium fraction obtained at the ion-exchange separation of plutonium and uranium (Steps 11 and 12 Section 2.3.1).

Ten mg of iron carrier were added to the sample and $Fe(Pu)(OH)_3$ precipitated by the addition of NH_4OH. The precipitate was centrifuged, washed with dilute NH_4OH, and then dissolved in 1N HNO_3. Five ml of a 5% solution of $NH_2OH \cdot HCl$ were added and the solution heated on a hot plate for 10 minutes. The analysis proceeded with Step 11 of Section 2.3.1.

2.2.2 Sticky Wire Samples. The sticky wire collectors and the mailing tubes in which they were shipped were initially processed by Project 2.6b. In some cases, single particles were separated for optical-autoradiographic studies and were analyzed individually. Other fragments, such as particle combinations on microscope slides and in zinc sulfide packages, were eventually combined with the wire and cardboard mailing tube as a single sample solution. The tube and wire were folded and ashed in a silica crucible at 600°C for eight to twelve hours. The residue and wire were quantitatively transferred to a beaker, dissolved as in Section 2.2.1, and combined with solutions of the other sample parts.

2.2.3 Gelman Sequential Air Sampler. The Gelman Sequential Air Sampler tapes were to be analyzed to describe the passage of the radioactive cloud. Consequently, delineation of the active area of the tape and detailed analysis of this section were required. This delineation was accomplished by zinc sulfide phosphor autoradiography. The tapes were cut into sections one foot long and placed on 15-by-16 inch ZnS coated rectangles of sticky cellulose acetate. The tapes were then sealed with additional sheets of

sticky acetate and autoradiographed for six days with a 14-by-16 inch sheet of Kodak Panatomic X. By registering the film with the acetate package, the precise location and relative activities of the sampling areas on the tape were determined. Single sampling areas were cut from the acetate package and analyzed radiochemically for plutonium, as in Section 2.2.1. A plot of the data for one of the two samples analyzed is shown in Figure 2.3.

2.2.4 Solubility Partition Samples. The samples reserved for solubility partition studies consisted of one-liter glass-stoppered bottles containing distilled water and particulate debris. In practically all cases, observable leakage occurred during sample shipment. The objectives of the study were to ascertain the solubility of the plutonium (entrained in the debris) in distilled water, in a buffer of pH 6.0, and in 0.1N HCl. The bottle was placed in an ultrasonic cleaner bath for one-half hour and then manually shaken for a few minutes before proceeding. The volume and pH (by meter) of the sample were measured, and the suspension centrifuged and filtered through Millipore type GS paper (0.22 μ pore). Particles with diameters smaller than 0.2 μ would enter into colloidal dispersion and, as such, could be expected to exhibit behavior similar to that of true solutions. Filters were changed to facilitate filtration when blocking occurred. The residue in the centrifuge tubes was washed with distilled water, centrifuged, and the washings filtered and combined with the original filtrate.

The filter papers and the residue in the centrifuge tubes were transferred to a 600-ml beaker with 250 ml of disodium phosphate-citric acid buffer (pH 6.0) and stirred for twenty-four hours. Centrifugation and filtration were performed in a manner similar to that for the distilled water fraction. A final leaching with 0.1N HCl was carried out as with the buffer fraction.

To determine the amount of water-soluble plutonium which plated out on the walls of the storage bottle, the bottle was thoroughly washed with 300 ml of hot, concentrated HNO_3. Preparation of the water, buffer, HCl, residue, and bottle washing fractions for chemistry was conducted according to the wet ashing techniques described in Section 2.2.1.

2.2.5 Soil Samples. All soil samples designated for analysis were initially classified into size fractions by Project 2.6d. The fractions were weighed to three significant figures; fractions weighing less than 20 grams were treated according to the procedure given in Section 2.2.1. Fractions greater than 20 and less than 100 grams were weighed, spiked with Pu-236, and fused with a sodium hydroxide-sodium carbonate mixture in a nickel crucible. The carbonate component served to complex plutonium and uranium and make the two elements available for transport into the subsequent hot water leach of the cooled flux mixture.

After reserving an aliquot of the volumetrically diluted water fraction for uranium, bismuth carrier was added. The pH was initially adjusted with concentrated HCl and finally with hypophosphorus acid to pH 10.4. The resultant phosphate precipitate was treated as in Section 2.3.1, beginning at Step 5.

2.2.6 Homogenization and Dry Aliquoting Experiment. Several experiments were conducted which were designed to furnish a method whereby large (>100) soil samples could be rendered suitable for dry aliquoting and subsequent chemical analysis. A 1.1 Kg, Project 2.3 soil sample, taken at Double Tracks Station H-050, was ground to 50 to 100 mesh through an Iler Disc Grinder and blended for eight hours in a Patterson-Kelly Twin-Shell blender. Four 15-g aliquots were withdrawn and analyzed.

The results were:

$9.03 \times 10^3 \pm 7.7\%$ dpm Pu^{239}/Total Sample

$4.55 \times 10^4 \pm 5.6\%$

$5.42 \times 10^4 \pm 6.1\%$

$3.71 \times 10^5 \pm 3.8\%$

Spread = 41

To determine whether increased aliquot size would provide reliable ($\leq$ 10% precision) results, two 100-g aliquots of the same blended sample were analyzed. The results were:

$1.22 \times 10^5 \pm 2.7\%$ dpm Pu^{239}/Total sample

$2.51 \times 10^5 \pm 2.4\%$

Spread = 2.1

To determine what effect greater comminution of the sample might have, a device known as the shatterbox was made available on loan from the manufacturer, Spex Industries, Inc., Metuchen, N. J. The machine proved capable of reducing a 100-g sample charge to 325 mesh (44 μ). A 1.1-Kg sample from Double Tracks Station C-048 was ground through the device and blended as previously. Four 5-g and four 10-g aliquots were withdrawn and analyzed. The results were:

5 g Aliquots	10 g Aliquots
$4.75 \times 10^4 \pm 3.4\%$ dpm Pu^{239}/Total sample	$6.25 \times 10^4 \pm 2.3\%$ dpm Pu^{239}/Total sample
$5.89 \times 10^4 \pm 3.2\%$	$6.80 \times 10^4 \pm 2.5\%$
$6.38 \times 10^4 \pm 3.1\%$	$6.84 \times 10^4 \pm 2.1\%$
$1.85 \times 10^6 \pm 1.9\%$	$1.89 \times 10^5 \pm 2.0\%$
Spread = 39	Spread = 3.0

Finally, four 100-g aliquots of the blended sample were withdrawn and gamma counted for americium-241. The results were:

$9.16 \times 10^2 \pm 11\%$ dpm Am^{241}/Total sample

$1.01 \times 10^3 \pm 12\%$

$1.22 \times 10^3 \pm 8.8\%$

$$1.96 \times 10^3 \pm 7.2\%$$

$$\text{Spread} = 2.1$$

Since no combination of degree of comminution and aliquot size yielded reliable results, further attempts to obtain satisfactory homogeneity were discontinued.

2.3 CHEMICAL ANALYSES

2.3.1 Plutonium Analysis. The reagent quantities given in Steps 1 through 3 below were for a 200 volume of prepared solution; quantities were proportionately adjusted for larger or smaller volumes.

(1) To the 2N HNO_3 solution add 10 ml of 5% $NH_2OH \cdot HCl$ and heat for 10 minutes.

(2) Add 100 mg Bi^{+++} (as $Bi(NO_3)_3$ solution) and add concentrated NH_4OH until a precipitate forms; add 5 ml of concentrated HNO_3 to obtain a clear solution.

(3) To the hot solution slowly add, with vigorous stirring, 30 ml of 10% $(NH_4)_2HPO_4$.

(4) Digest the precipitate at room temperature for 1/2 hour; aspirate the supernate to 50 ml above the precipitate and discard.

(5) Centrifuge the precipitate in a Lusteroid tube and discard supernate. Wash down the sides of the beaker containing the precipitate with 10 ml of 20% HCl and boil the solution.

(6) Cool the beaker and add the HCl solution to the Lusteroid tube containing the precipitate in order to dissolve the $BiPO_4$.

(7) Wash the beaker with 2 ml of 20% HCl and transfer the solution to the Lusteroid tube (Note 1). Add 1 ml of La solution. Add 2 to 4 drops of 5% NH_2OH-HCl and wait 10 minutes.

(8) Add concentrated HF to make the final solution 2.5 molar in HF (Note 2). Digest the precipitate for 5 minutes and then centrifuge; discard the supernate.

(9) Wash the LaF precipitate with 2.5M HF-HNO_3 solution. Centrifuge and discard the supernate.

(10) Slurry 1 ml of boric acid solution with the LaF precipitate and transfer to 50-ml beaker with 7N HNO_3.

(11) Heat the solution and adjust the acidity to 7N HNO_3; transfer the solution to the column and adjust flow rate of 0.2 ml/min (Note 3).

(12) Wash the resin with 200 ml of 7N HNO_3 at full flow and discard effluent.

(13) Strip the Pu from the column with 20 ml of 1N HNO_3 followed by 45 ml of 5% $NH_2OH \cdot HCl$. Collect the strip solution in a 100-ml beaker.

(14) Recycle the column with 20 ml of 1N HNO_3, 45 ml of $NH_2OH \cdot HCl$, 20 ml of 1N HNO_3. Back flush the resin with H_2O and then add 100 ml of 7N HNO_3. Discard recycling solution.

(15) Reduce the volume of the strip solution until the effervescence from the oxidation of $NH_2OH \cdot HCl$ is completed. Caution should be observed in volume reduction due to the frequent violent oxidation by HNO_3, causing splattering and loss of sample.

(16) Transfer the solution to a 30-ml beaker with 1N HNO_3 and take down the volume to about one drop.

(17) Wash the sides of the beaker with 5 ml of 1N HNO_3; take the solution to about 1 drop and add 1 ml of 1N HNO_3.

(18) Cool the solution and add 1 ml of 2% $NH_2OH \cdot HCl$. Wait for 1 hour.

(19) Add 8 ml of H_2O and transfer the solution to an electrodeposition cup using 1 ml 0.1N HNO_3 to wash the beaker.

(20) Electroplate at 0.5 amp for 1 hour (Note 4).

(21) Neutralize the solution with concentrated NH_4OH (Note 5) and flame the stainless steel disc.

(22) Count the sample on an alpha spectrometer.

NOTES

Note 1. If the sample contains a high content of Ca as in the case of bone, a second $BiPO_4$ precipitation has to be performed. $Ca(F)_2$ precipitates during the La scavenge, and the Ca interferes with the efficiency of the ion-exchange column.

Note 2. If some Fe has been carried through with the $BiPO_4$ precipitation, sufficient HF must be added to complex this element. When complexing of the Fe is complete, the solution should be decolorized.

Note 3. The 100 to 200 mesh moist (Dowex 1-x2) is washed with 4 portions of H_2O and 3 portions of concentrated HCl, alternating each. After each wash the resin is allowed to settle for 2 to 3 minutes and the fine particles in suspensions are decanted. The resin is added to height of 6 to 7 centimeters to a 1-centimeter-diameter column and the resin is cycled with the following solutions allowing the resin to run dry before the addition of each solution:

(a) 100 ml of 7N HNO_3

(b) 20 ml of 1N HNO_3

(c) 30 ml of NH_2OH HCl

(d) 20 ml of 1N HNO_3

(e) 100 ml of 7N HNO_3

(f) Follow cycle again ending with 100 ml of 7N HNO_3

Note 4. The electrodeposition equipment is shown in Figures 2.4 and 2.5. The anode is a platinum wire with its upper end attached to the shaft of a 1-rps clock motor and its lower end wound in a horizontal spiral. During the deposition the anode also serves as a stirrer for the solution. The cathode onto which the plutonium is deposited is a 1-inch diameter stainless steel disc made from 26 gauge (0.0185 inch) sheet stock with a number 4 finish. The cathode disc is held against an O-ring which forms a seal between the plastic plating cell and the cathode. Thus, the active area of the cathode is circular, with a diameter of 13/16 inches.

Note 5. The addition of concentrated NH_4OH is made before the current is turned off in order to prevent the Pu from going into solution.

2.3.2 Uranium Analysis. The separated fractions of the aliquots removed for uranium determination were processed according to the following procedure:

(1) Add 5 ml of iron carrier and raise the pH to 8 to 9 with ammonium hydroxide. Centrifuge and discard the supernate.

(2) Dissolve the precipitate with a few drops of concentrated nitric acid and add 5 ml of saturated ammonium carbonate. Centrifuge and transfer the supernate to a 100-ml beaker. Discard the precipitate.

(3) Evaporate the uranium carbonate solution to dryness.

(4) Add 15 ml saturated aluminum nitrate and transfer quantitatively to a 125-ml separatory funnel.

(5) Quantitatively add 10 ml of ethyl acetate and shake for 3 minutes and allow 1 minute for separation of the two layers.

(6) Place fourteen washed platinum dishes on a 4-1/2-inch-diameter nichrome wire gauge and dry under a heating lamp. Place a 0.4 gram NaF-LiF flux pellet in each dish.

(7) From the ethyl acetate layer (top layer) of each extracted sample, pipette a 0.1-ml aliquot onto a pellet.

(8) Transfer the gauze holding the platinum dishes and pellets to the iron tripod of a Fletcher burner.

(9) Fuse at about 900°C for 2 minutes. Then decrease the temperature to 850°C and continue the fusion for another minute.

(10) Turn off the flame and allow to cool for 15 minutes.

(11) Measure the fluorescence intensity of each sample in a Jarrell-Ash Fluorometer and compare to the fluorescence intensity of a standard sample analyzed under identical conditions. Calculate the uranium content of the sample from this comparison.

2.3.3 Americium Analysis. In order to monitor the yield of americium-241

analysis, americium-243 tracer was added to the sample coincidentally with plutonium-236. The analysis was initiated on the combined column effluent and wash from Steps 11 and 12 of Section 2.3.1:

(1) Evaporate the combined 7N HNO_3 column effluent and wash, to dryness.

(2) Take up the residue in concentrated HCl, evaporate to dryness, and dissolve in 10N HCl.

(3) Add the solution to a 10-cm-by-6-mm pre-conditioned Dowex 1-x2 anion exchanger, and evaporate the effluent to dryness.

(4) Take up the residue in 1N HCl, evaporate to dryness, and dissolve in 0.5 ml of 0.05N HCl.

(5) Add the solution to the top of a 5 cm-by-6 mm, pre-conditioned, Dowex 50-x8 cation exchanger. Wash the beaker with 0.5ml of 0.05N HCl and add the wash to the column.

(6) Allow the sample and wash to flow into the resin and wait 30 minutes.

(7) Wash the column with 5ml of 1N HCl and discard the effluent.

(8) Elute americium with 25 ml of concentrated HCl at a flow rate of 0.1 ml/minute.

(9) Evaporate the solution to dryness, add concentrated HNO_3, and again evaporate to dryness.

(10) Add 1 ml of 1N HNO_3, 1 ml of 5% $NH_2OH \cdot HCl$ solution and wait one hour.

(11) Add 8 ml of H_2O and transfer the solution to an electrodeposition cup using 1 ml of 0.1N HNO_3 to wash the beaker.

(12) Electroplate at 0.5 amp for 2 hours.

(13) Neutralize the solution with concentrated NH_4OH and flame the stainless steel disc.

(14) Count the sample in an alpha spectrometer.

2.4 RADIOASSAY MEASUREMENTS

2.4.1 Alpha Spectrometry. The electroplated plutonium discs were radioassayed by means of alpha particle spectrometers. Each of the two spectrometers

used during the course of the program consisted of a surface barrier diode coupled with a low-noise amplifier system and multichannel pulse-height analyzer. The chemical recovery of each sample was determined from the 5.76 Mev photopeak of Pu-236. The Pu-239 was determined from the 5.15 Mev photopeak, with a minor correction for Pu-236 tailing. Although there were relatively small quantities of Pu-240 present in all samples, its 5.12 and 5.16 Mev alpha energies could not be distinguished from that of Pu-239. Consequently, all Pu-239 data appearing in the tables of data actually represent the sum of Pu-239 plus any Pu-240 which may be present. **Figure 2.6 depicts** a typical spectrum of a separated plutonium mount and illustrates the relative positions of the Pu-236 and Pu-239 photopeaks.

Three surface-barrier diodes were used during the analytical program, each available from the Oak Ridge Technical Enterprises Corporation (ORTEC). These were a 2.4-cm diameter, 450 mm^2 diode, a 1.95-cm diameter, 300 mm^2 diode, and a 1.6-cm diameter, 200 mm^2 diode. The maximum acceptable noise widths of these diodes was 40 Kev. The spectrum of the electroplated plutonium was somewhat distorted by effects from the mount itself and as backscatter and foreign material being incorporated into the source. If the distortion was severe enough, such that the resolution of the Pu-236 photopeak was **poorer** than 75 Kev, the mount was repurified. Each diode was housed in a vacuum chamber **(Figure 2.7) and** operated at a pressure of about 50 microns of Hg. The amplifier systems consisted of an ORTEC Model 101-201 system and an Instrument Development Products Co. Model SS-200C system. The multichannel pulse-height analyzers were a Radiation Instruments Development Laboratory (RIDL) Model 34-12B 400 channel analyzer and a Technical Measurements Corporation (TMC) Model 404 400 channel analyzer.

These systems were calibrated against a plutonium standard obtained from the Radiochemical Centre, Amersham, United Kingdom. As an example, the counting efficiency of the 300 mm^2 diode for Pu-239 was 17.3% with a background of

0.004 cpm, though the calibration factors were somewhat different for each diode. Considering the factors of Pu-236 tailing, efficiency, yield of analysis, and background variations (dependent upon length of counting), the limit of sensitivity was generally on the order of 0.3 dpm. The required limit for any sample type was not lower than 0.5 dpm. Samples were counted long enough to achieve the desired sensitivity and, in general, $\leq$ 3% counting statistics for the Pu-239 photopeak.

2.4.2 Gamma Spectrometry. The non-destructive gamma spectrometric analysis of the 59.6 Kev gamma ray of americium-241 was accomplished with either a 3-by-3 or 8-by-4-inch NaI(Tl) crystal, depending upon the size of the sample to be assayed. Each detector (crystal-photomultiplier-amplifier) was coupled to a RIDL 400 channel pulse-height analyzer.

The samples measured by this system included the balloon discs and soil samples. The ⅛-by-7-inch-diameter discs were unpacked from their shipping containers in a glove box and sealed in small cardboard boxes. The enclosed discs, active side up, were then centered on the 8-by-4-inch crystal and assayed The calibration of this system was performed with a point source of americium-241 obtained from ORTEC and through use of a secondary standard of W-181 (67.6 Kev). The absolute disintegration rate of a W-181 spike solution was determined by comparing a carefully prepared point source of the solution with the activity generated by the ORTEC Am-241 standard.

The efficiency was assumed to be equal to that determined by evaporating small droplets of the calibrated W-181 solution in a uniform distribution on the surface of a mock disc. This prepared disc was then counted under the same conditions as the samples. The counting efficiency by this method was found to be 2.27%.

The majority of soil samples were assayed in 600-ml beakers on the 3-by-3-inch crystal; some of the larger throw-out samples were assayed on the 8-by-4-inch crystal. The calibration of these sample geometries was performed by use of the standardized W-181 solution on preshot Tonopah Test Range soil.

Figure 2.1 Gas-fired incinerator with afterburner. (Isotopes photo)

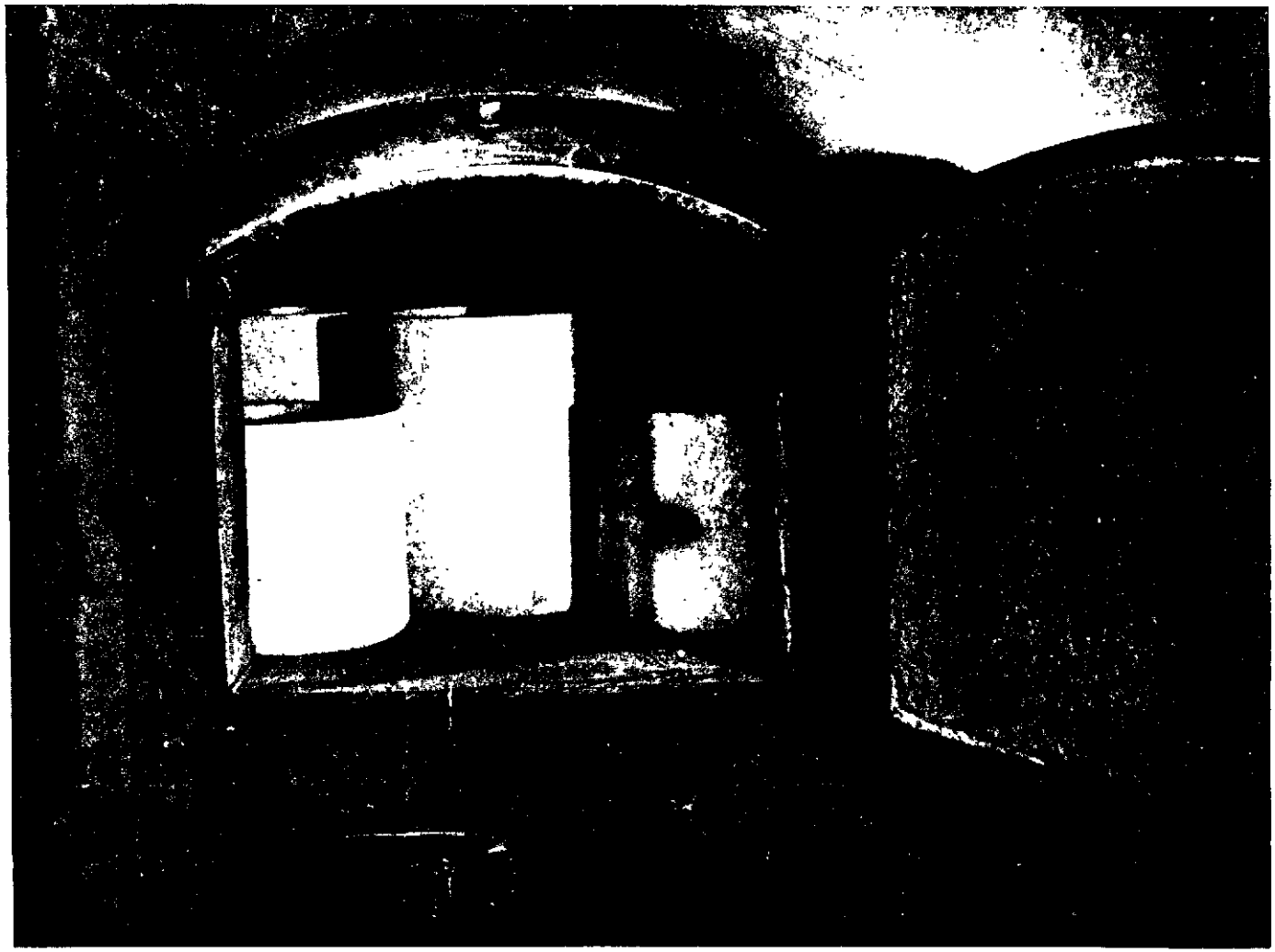

Figure 2.2 Main ashing chamber containing tissues in silica crucibles. (Isotopes photo)

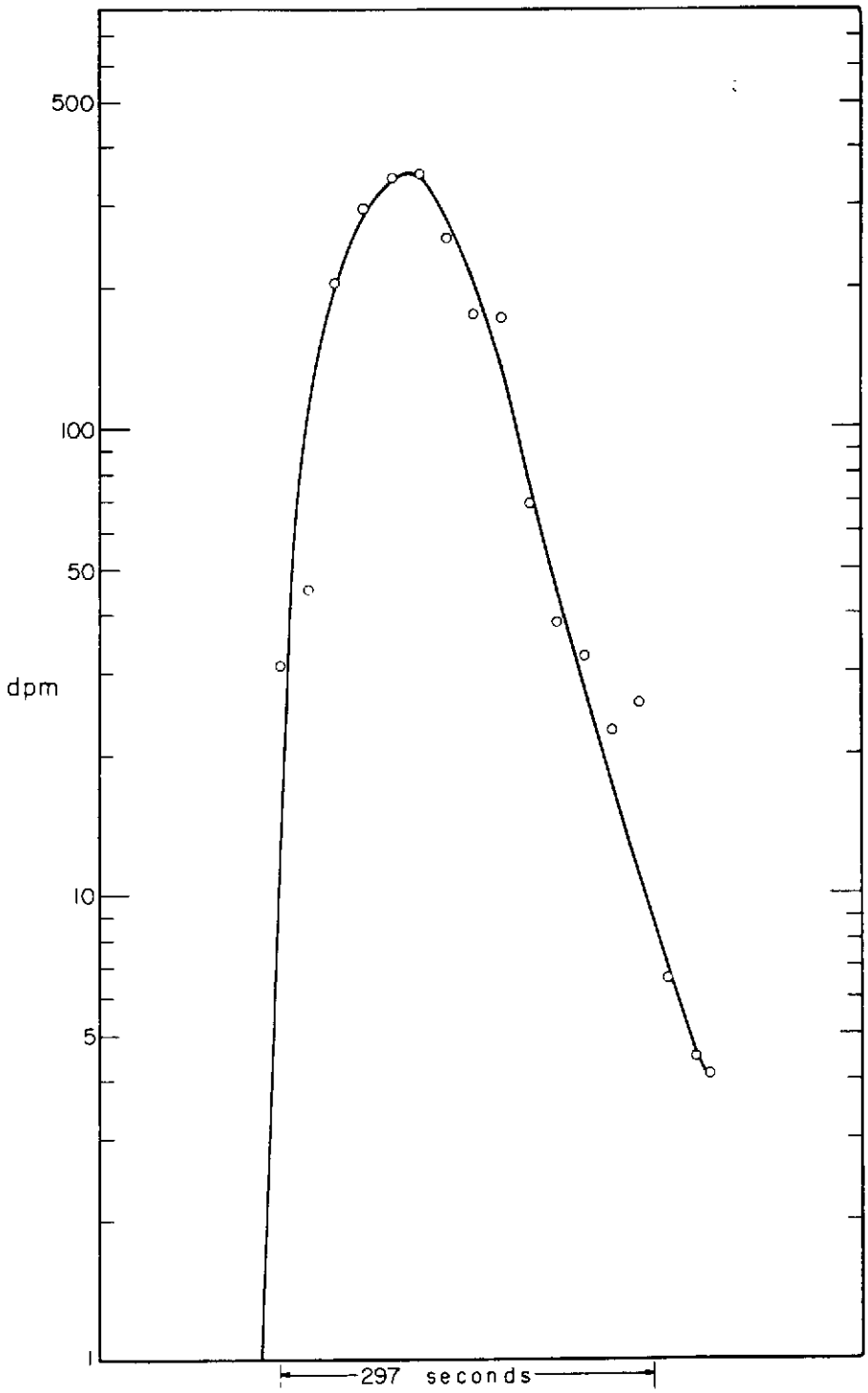

Figure 2.3 Data spectrum of Double Tracks Gelman sequential air sample.

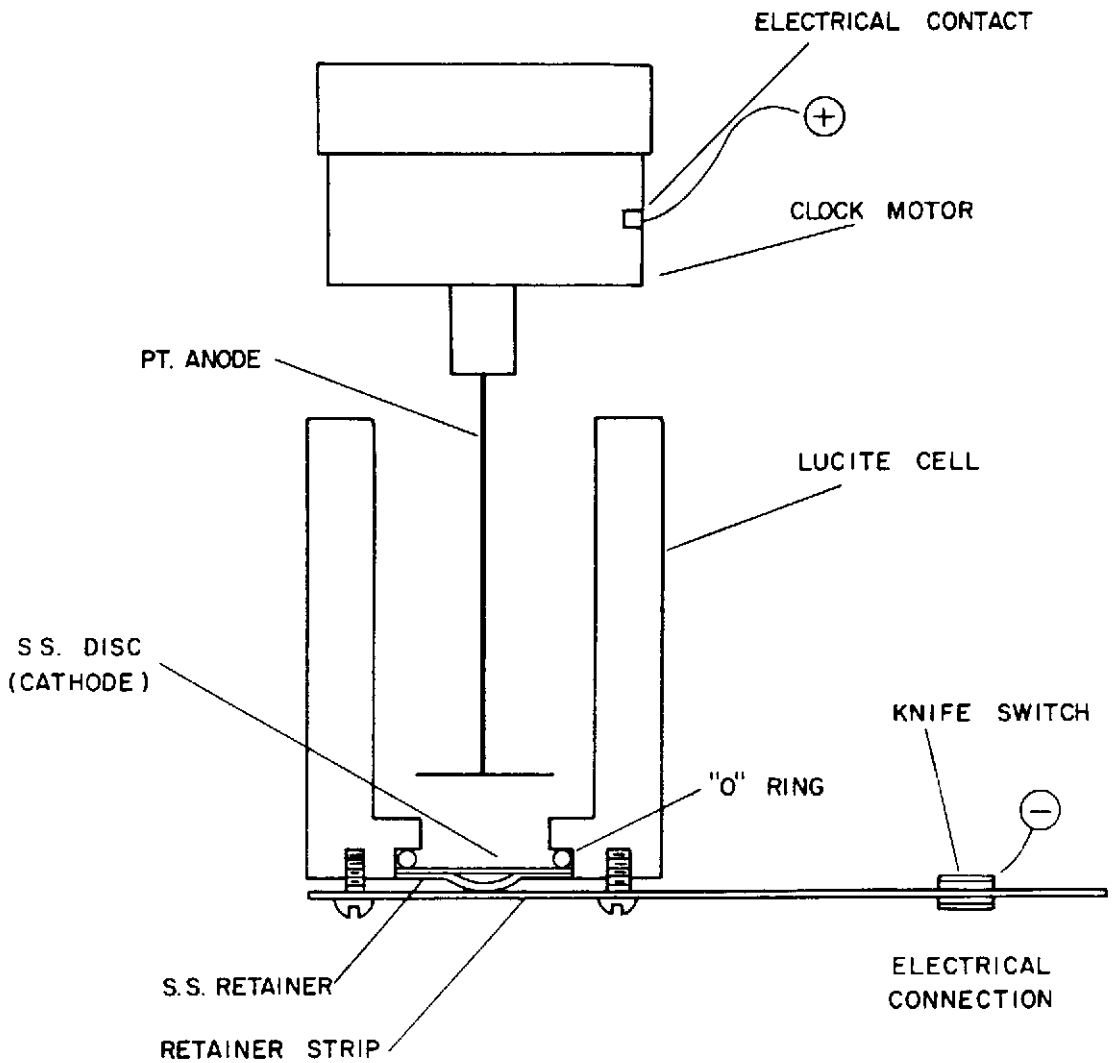

Figure 2.4 Schematic of plutonium of electrodeposition cell.

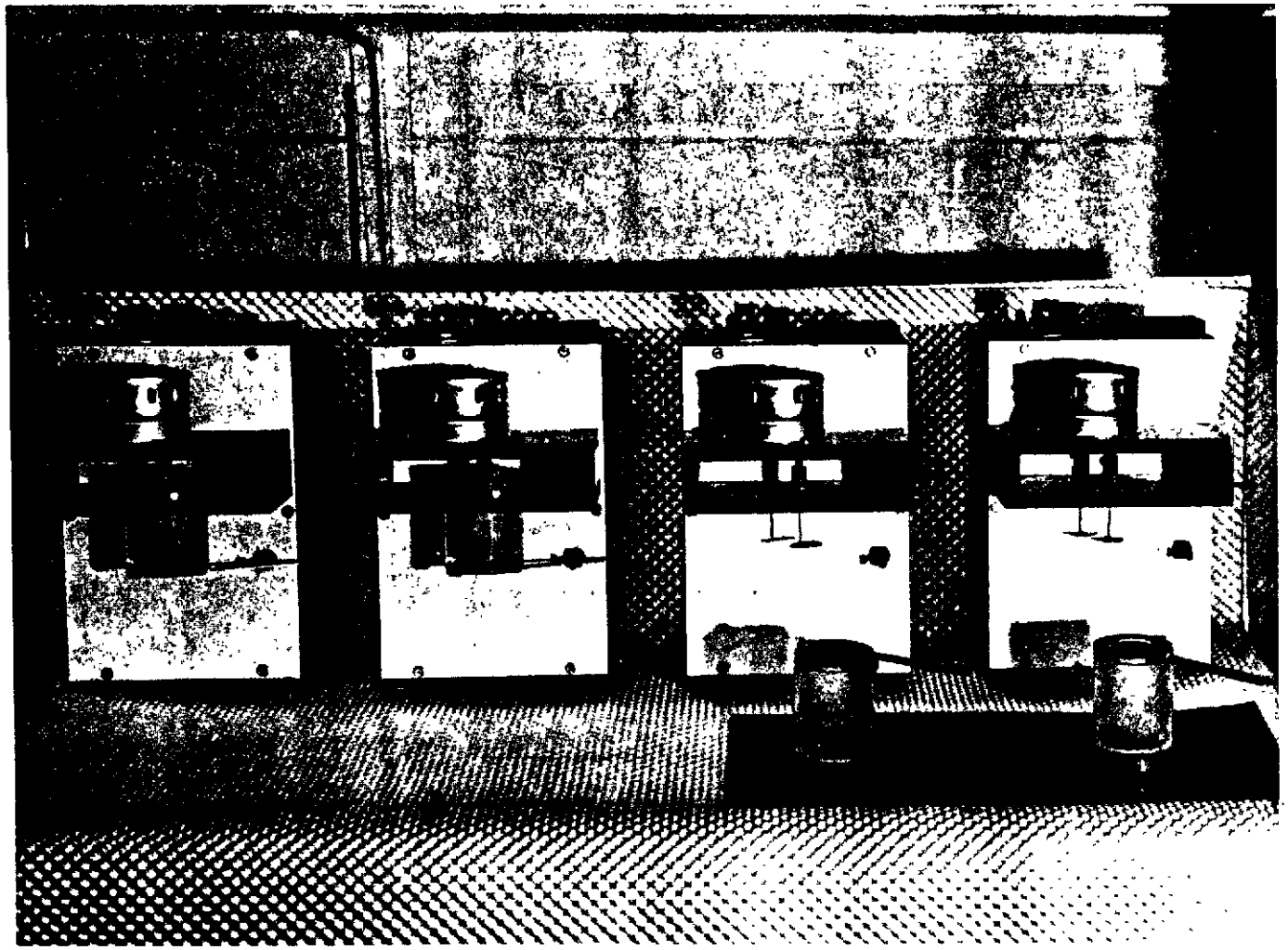

Figure 2.5 Bank of electrodeposition cells. (Isotopes photo)

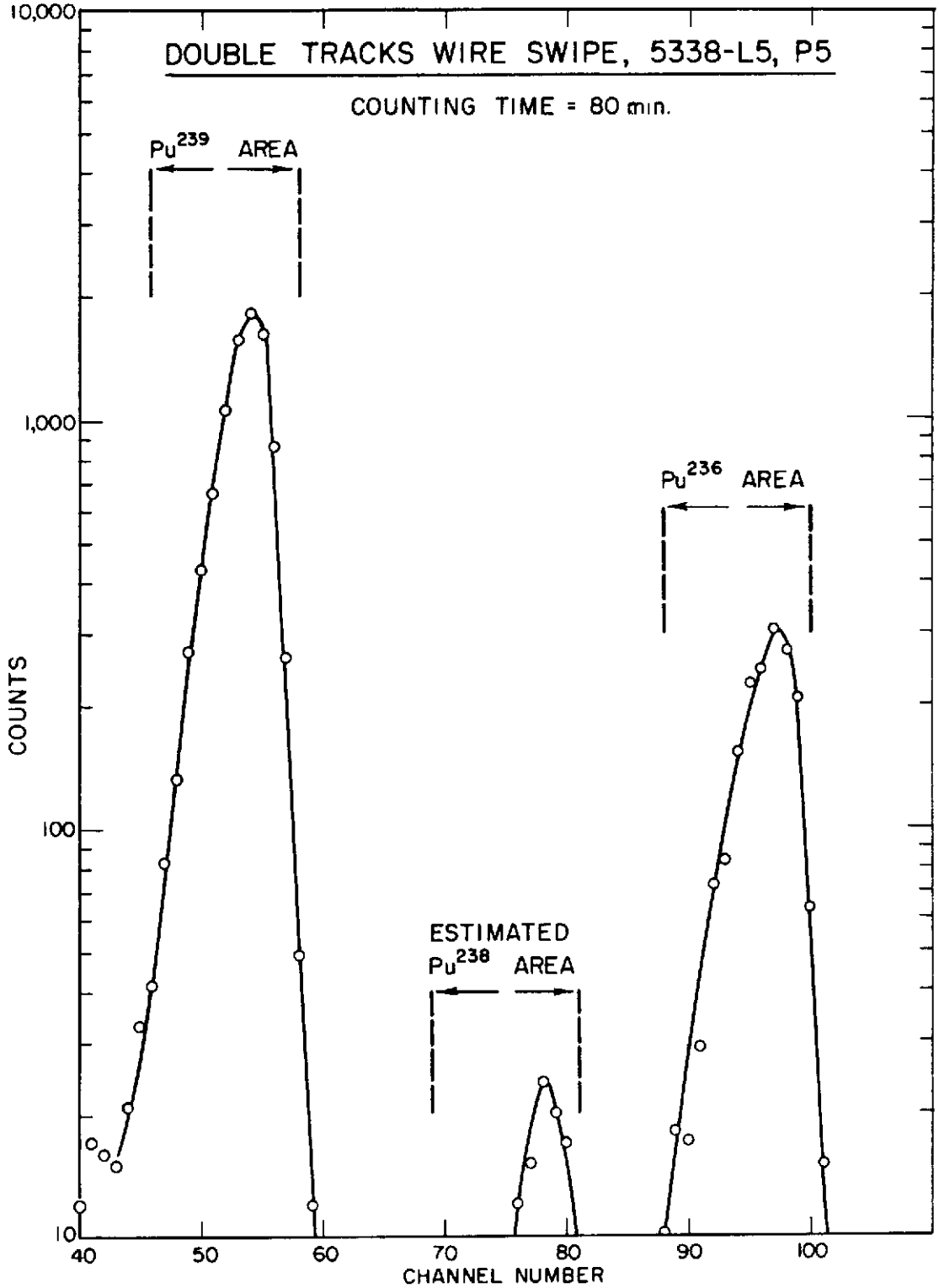

Figure 2.6 Alpha spectrum of Double Tracks wire swipe sample.

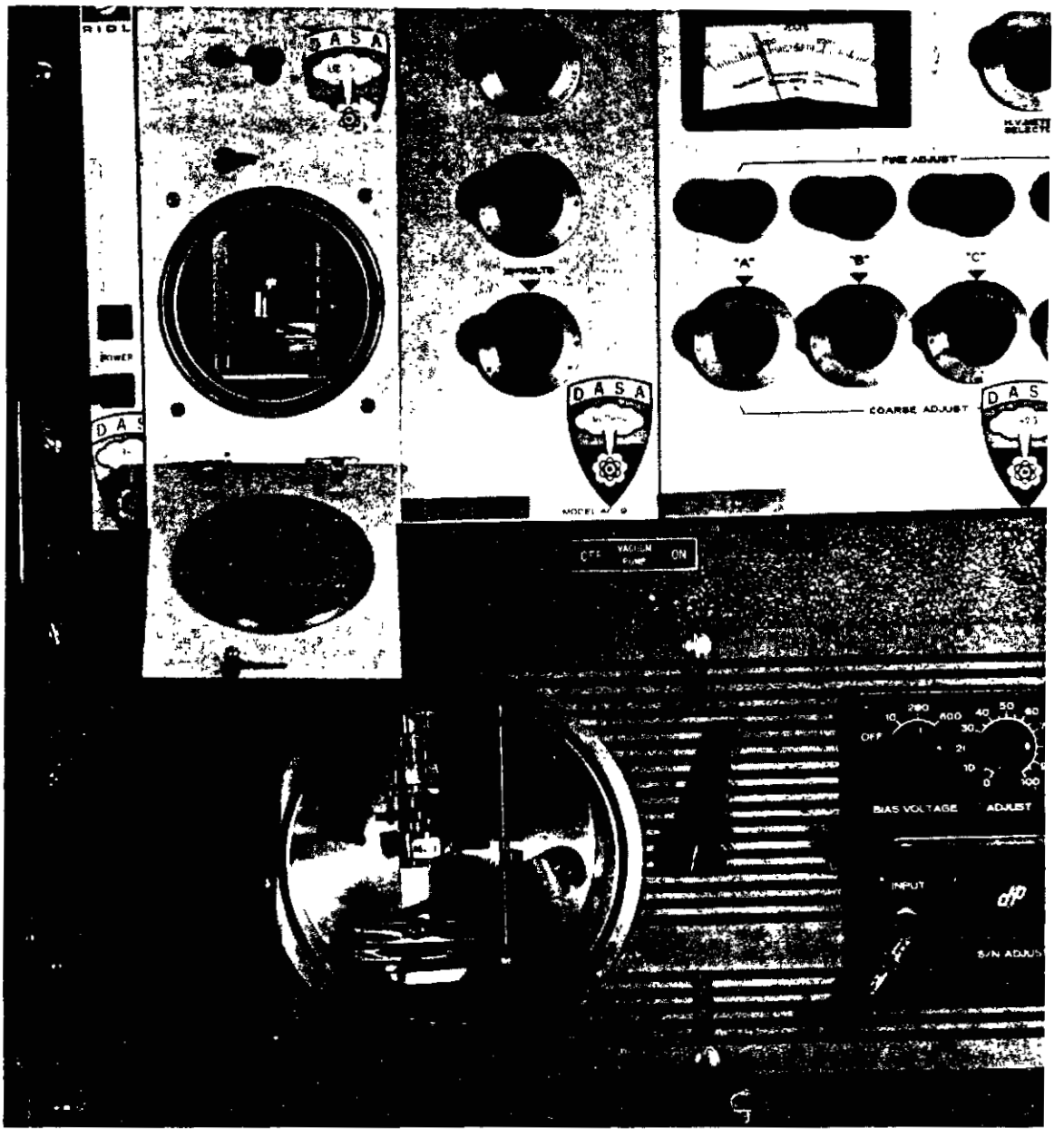

Figure 2.7 Close-up of vacuum chambers and surface-barrier diodes. (Isotopes photo)

CHAPTER 3

RESULTS

3.1 TEST SAMPLES

The results of analyses of the test samples are presented in Tables 3.1 through 3.20. The data are grouped according to sample type and in numerical order by the Tracerlab Sample Record Number within each group. The analyses of the short-term biological samples are given in Tables 3.1 through 3.5. Table 3.6 contains the data of the D+1 year biological samples. A mixture of blood and tissue fluids was found in the bottom of some of the styrofoam boxes in which the samples were refrigerated, indicating that at some time the samples must have been thawed, resulting in the fluids leaking out of the polyethylene bags in which the samples were stored. A two-liter aliquot of four liters of fluid collected from the bottom of a box containing burro organs was analyzed; no (0 ± 0.32 dpm) plutonium activity was detected.

The results of analyses of the various physical sample types are presented in Tables 3.7 through 3.20.

3.2 QUALITY CONTROL

The quality control program consisted of the analyses of laboratory blanks, internal and external laboratory standards, and split samples. Since the project required the operation of separate facilities for the biological and physical samples, a control program for each was necessary. Table 3.21 gives the results of plutonium analyses of blank samples for both the biological and physical laboratories. The analyses of internal laboratory standards for both facilities are presented in Table 3.22. Since the plutonium content of most biological samples was very low, they could not readily be split for duplicate analyses. Consequently, only physical samples were split; the results of the

split analyses of the Casella impactor and fallout collector film samples are presented in Table 3.23. The plutonium analyses of the University of Rochester biological standard samples are presented in Table 3.24, and the analysis results of the Los Alamos plutonium and uranium standard solutions are given in Tables 3.25 and 3.26, respectively.

Table 3.1 Plutonium Analyses of Dog Tissues

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}
1004-1 Control	Left femur	31.0	59.6	0 ± 0.54
1004-2	Kidneys	47.2	68.8	0 ± 0.32
1004-3	Liver	220	60.2	0 ± 0.42
1004-4	Lungs	81.8	29.4[a]	0 ± 0.38
1004-5	Hylar lymph nodes	1.17	78.4	0 ± 0.34
1005-1 Control	Left femur	37.7	48.7	0 ± 0.17
1005-2	Kidneys	72.2	60.9	0 ± 0.27
1005-3	Liver	312	39.5[a]	0.88 ± 0.09
1005-4	Lungs	163	74.0	0.70 ± 0.07
1005-5	Hylar lymph nodes	1.95	68.4	0 ± 0.52
1007-1	Left femur	38.0	93.4	0 ± 0.41
1007-2	Kidneys	78.7	61.5	0 ± 0.28
1007-3	Liver	417	45.5	0 ± 0.43
1007-4	Lungs	121	59.8	65.9 ± 1.3
1007-5	Hylar lymph nodes	1.06	85.1	0 ± 0.42
1008-1	Left femur	24.1	88.6	0 ± 0.33
1008-2	Kidneys	34.0	85.2	0 ± 0.31
1008-3	Liver	243	61.5	0 ± 0.22
1008-4	Lungs	80.0	83.3	18.4 ± 0.6
1008-5	Hylar lymph nodes	0.668	76.5	0 ± 0.47
1009-1	Left femur	21.2	90.4	0 ± 0.15
1009-2	Kidneys	32.6	81.7	0 ± 0.26
1009-3	Liver	281	47.8	0 ± 0.35
1009-4	Lungs	87.5	85.5	46.3 ± 0.9
1009-5	Hylar lymph nodes	1.31	86.7	0 ± 0.43
1012-1	Left femur	36.5	86.4	0 ± 0.31
1012-2	Kidneys	51.7	82.7	0 ± 0.28
1012-3	Liver	291	58.6	1.0 ± 0.1
1012-4	Lungs	94.4	75.5	15.5 ± 0.5
1012-5	Hylar lymph nodes	0.492	63.9	0 ± 0.42
1014-1	Left femur	26.8	83.3	0 ± 0.16
1014-2	Kidneys	48.9	70.0	0 ± 0.41
1014-3	Liver	235	49.1[a]	0.67 ± 0.13
1014-4	Lungs	75.5	84.6	69.1 ± 1.5
1014-5	Hylar lymph nodes	0.744	74.4	0 ± 0.51

a: Reanalysis yield

Table 3.1 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}
1015-1	Left femur	43.0	50.7	0 ± 0.39
1015-2	Kidneys	57.2	87.2	0 ± 0.27
1015-3	Liver	341	41.8	0 ± 0.37
1015-4	Lungs	93.1	45.2[a]	47.6 ± 1.5
1015-5	Hylar lymph nodes	0.725	68.7	0 ± 0.52
1021-1	Left femur	38.5	76.7	0 ± 0.31
1021-2	Kidneys	58.9	89.7	0 ± 0.33
1021-3	Liver	281	54.3	0 ± 0.27
1021-4	Lungs	115	65.0	3.67 ± 0.25
1021-5	Hylar lymph nodes	0.854	74.0	0 ± 0.36
1027-1	Left femur	45.5	93.5	0 ± 0.22
1027-2	Kidneys	51.0	68.1	0 ± 0.32
1027-3	Liver	399	65.1	0 ± 0.33
1027-4	Lungs	-	83.9	4.62 ± 0.9
1027-5	Hylar lymph nodes	2.17	77.3	0 ± 0.38
1028-1	Left femur	33.5	82.8	0 ± 0.16
1028-2	Kidneys	73.9	80.7	0 ± 0.35
1028-3	Liver	376	61.1[a]	1.2 ± 0.1
1028-4	Lungs	88.9	78.1	55.4 ± 1.1
1028-5	Hylar lymph nodes	0.784	85.5	0 ± 0.44
1031-1 Control	Left femur	33.5	47.8	0 ± 0.38
1031-2	Kidneys	58.6	81.3	0 ± 0.28
1031-3	Liver	424	68.5	0 ± 0.27
1031-4	Lungs	119	62.2	0 ± 0.35
1031-5	Hylar lymph nodes	1.81	84.6	0 ± 0.51
1032-1	Left femur	29.5	92.2	0 ± 0.26
1032-2	Kidneys	64.8	89.0	0 ± 0.37
1032-3	Liver	343	47.4	0 ± 0.38
1032-4	Lungs	-	85.2	37.1 ± 0.8
1032-5	Hylar lymph nodes	1.07	73.3	0 ± 0.41
1033-1 Control	Left femur	34.1	86.9	0 ± 0.37
1033-2	Kidneys	58.5	74.1	0 ± 0.36
1033-3	Liver	337	53.7	0 ± 0.39
1033-4	Lungs	102	71.4	0 ± 0.41
1033-5	Hylar lymph nodes	0.750	71.8	0 ± 0.39

a: Reanalysis yield

Table 3.1 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}
1034-1	Left femur	35.3	88.8	0 ± 0.36
1034-2	Kidneys	60.9	86.4	0 ± 0.38
1034-3	Liver	456	84.4	0 ± 0.21
1034-4	Lungs	95.4	76.0	2.6 ± 0.2
1034-5[b]	Hylar lymph nodes	1.36	89.7	0 ± 0.33
1036-1	Left femur	36.7	79.8	0 ± 0.15
1036-2	Kidneys	63.1	63.3	0 ± 0.29
1036-3	Liver	505	45.2	0 ± 0.41
1036-4	Lungs	106	78.1	10.6 ± 0.4
1036-5	Hylar lymph nodes	1.00	82.6	0 ± 0.44
1038-1	Left femur	32.4	74.8	0 ± 0.39
1038-2	Kidneys	52.6	85.7	0 ± 0.34
1038-3	Liver	463	53.0	0 ± 0.19
1038-4	Lungs	97.4	71.6	3.36 ± 0.24
1038-5	Hylar lymph nodes	1.25	88.8	0 ± 0.48
1043-1	Left femur	36.1	67.6	0 ± 0.43
1043-2	Kidneys	78.4	74.3	0 ± 0.30
1043-3	Liver	673	51.2[a]	1.0 ± 0.1
1043-4	Lungs	114	84.2	2.9 ± 0.2
1043-5	Hylar lymph nodes	1.18	64.1	0 ± 0.49
1044-1 Control	Left femur	23.0	59.2	0 ± 0.36
1044-2	Kidneys	57.4	80.8	0 ± 0.22
1044-3	Liver	286	61.1	0 ± 0.39
1044-4	Lungs	89.0	81.4	0 ± 0.35
1044-5	Hylar lymph nodes	1.28	79.8	0 ± 0.40
1049-1	Left femur	39.6	67.7	0 ± 0.18
1049-2	Kidneys	41.1	80.3	0 ± 0.26
1049-3	Liver	341	44.7	0 ± 0.44
1049-4	Lungs	110	50.9	59.9 ± 2.2
1049-5	Hylar lymph nodes	1.36	83.5	0 ± 0.37
1051-1	Left femur	20.4	56.6	0 ± 0.32
1051-2	Kidneys	32.6	68.3	0 ± 0.31
1051-3	Liver	195	49.7	0 ± 0.41
1051-4	Lungs	77.0	63.3	1.0 ± 0.1
1051-5	Hylar lymph nodes	1.04	69.8	0 ± 0.52

a: Reanalysis yield
b: Sample listed as 1034-5 or 1092-5

Table 3.1 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}
1053-1	Left femur	34.6	84.0	0 ± 0.35
1053-2	Kidneys	60.7	61.7	0 ± 0.37
1053-3	Liver	312	71.2	0 ± 0.38
1053-4	Lungs	92.7	81.7	0 ± 0.34
1053-5	Hylar lymph nodes	0.817	75.3	0 ± 0.36
1061-1	Left femur	26.5	87.6	0 ± 0.45
1061-2	Kidneys	47.2	78.7	0 ± 0.25
1061-3	Liver	379	72.4	0 ± 0.32
1061-4	Lungs	71.6	79.2	14.1 ± 0.4
1061-5	Hylar lymph nodes	0.956	79.5	0 ± 0.51
1063-1	Left femur	36.5	53.7	0 ± 0.46
1063-2	Kidneys	39.8	65.9	0 ± 0.29
1063-3	Liver	413	54.4	0 ± 0.46
1063-4	Lungs	102	89.1	0.79 ± 0.08
1063-5	Hylar lymph nodes	1.45	67.6	0 ± 0.44
1064-1	Left femur	29.5	79.8	0 ± 0.41
1064-2	Kidneys	57.7	76.5	0 ± 0.31
1064-3	Liver	422	51.2[a]	1.2 ± 0.1
1064-4	Lungs	90.2	69.4	3.64 ± 0.25
1064-5	Hylar lymph nodes	1.39	68.7	0 ± 0.42
1065-1	Left femur	29.5	51.8	0 ± 0.38
1065-2	Kidneys	50.9	68.2	0 ± 0.42
1065-3	Liver	266	82.7	0 ± 0.39
1065-4	Lungs	86.7	77.5	12.5 ± 0.4
1065-5	Hylar lymph nodes	1.20	83.2	0 ± 0.48
1077-1	Left femur	27.1	77.3	0 ± 0.18
1077-2	Kidneys	37.8	75.4	0 ± 0.30
1077-3	Liver	290	77.9	0 ± 0.44
1077-4	Lungs	131	58.6	6.29 ± 0.33
1077-5	Hylar lymph nodes	0.657	65.6	0 ± 0.50
1080-1	Left femur	32.1	81.6	0 ± 0.17
1080-2	Kidneys	47.2	68.1	0 ± 0.39
1080-3	Liver	337	41.3	0 ± 0.25
1080-4	Lungs	91.5	66.7	12.5 ± 0.4
1080-5	Hylar lymph nodes	0.686	63.9	0 ± 0.51

a: Reanalysis yield

Table 3.1 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}
1082-1	Left femur	22.6	74.2	0 ± 0.15
1082-2	Kidneys	40.4	50.9	2.58 ± 0.17
1082-3	Liver	258	79.2	0 ± 0.34
1082-4	Lungs	65.8	79.5	2.80 ± 0.15
1082-5	Hylar lymph nodes	0.437	76.8	0 ± 0.52
1086-1	Left femur	23.5	72.0	0 ± 0.32
1086-2	Kidneys	42.7	77.5	0 ± 0.27
1086-3	Liver	269	79.1	0 ± 0.34
1086-4	Lungs	84.9	77.6	0 ± 0.38
1086-5	Hylar lymph nodes	1.05	79.1	0 ± 0.50
1092-1	Left femur	43.0	57.3	0 ± 0.40
1092-2	Kidneys	82.1	41.3	0 ± 0.41
1092-3	Liver	403	61.2	0.70 ± 0.07
1092-4	Lungs	123	85.8	70.0 ± 0.9
1092-5[b]	Hylar lymph nodes			
1100-1	Left femur	33.5	42.4	0 ± 0.47
1100-2	Kidneys	54.0	45.9	0 ± 0.21
1100-3	Liver	271	67.7	0.77 ± 0.08
1100-4	Lungs	104	88.4	4.37 ± 0.17
1100-5	Hylar lymph nodes	0.871	85.1	0 ± 0.32
1103-1	Left femur	32.3	86.8	0 ± 0.38
1103-2	Kidneys	93.5	73.9	0 ± 0.38
1103-3	Liver	319	70.1	1.9 ± 0.1
1103-4	Lungs	105	69.6	56.4 ± 1.4
1103-5	Hylar lymph nodes	2.26	80.2	0 ± 0.52
1105-1	Left femur	26.3	55.2	0 ± 0.14
1105-2	Kidneys	37.6	65.5	0 ± 0.42
1105-3	Liver	229	75.6[a]	0.57 ± 0.06
1105-4	Lungs	89.2	68.6	0 ± 0.41
1105-5	Hylar lymph nodes	1.06	63.4	0 ± 0.53
1109-1	Left femur	26.5	72.2	0.76 ± 0.25
1109-2	Kidneys	47.7	47.4[a]	0 ± 0.45
1109-3	Liver	215	77.8	0 ± 0.18
1109-4	Lungs	89.7	85.1	3.27 ± 0.26
1109-5	Hylar lymph nodes	0.643	71.5	0 ± 0.48

a: Reanalysis yield
b: Sample listed as 1034-5 or 1092-5

Table 3.1 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}
1110-1 Control	Left femur	35.7	65.5	0 ± 0.36
1110-2	Kidneys	55.2	93.3	0 ± 0.29
1110-3	Liver	301	65.6	0 ± 0.33
1110-4	Lungs	111	68.3	0.60 ± 0.06
1110-5	Hylar lymph nodes	0.866	59.5	0 ± 0.28
1113-1	Left femur	30.3	68.2	0 ± 0.39
1113-2	Kidneys	49.1	82.9[a]	1.4 ± 0.1
1113-3	Liver	305	51.3	0 ± 0.42
1113-4	Lungs	111	85.2	0.75 ± 0.07
1113-5	Hylar lymph nodes	0.509	69.5	0 ± 0.51
1118-1	Left femur	32.2	54.9	0 ± 0.13
1118-2	Kidneys	46.3	75.4	0 ± 0.40
1118-3	Liver	237	54.3	0 ± 0.39
1118-4	Lungs	88.0	60.1	1.9 ± 0.2
1118-5	Hylar lymph nodes	0.941	74.7	0 ± 0.50
1123-1	Left femur	31.1	89.9	0 ± 0.48
1123-2	Kidneys	63.3	67.0	0 ± 0.24
1123-3	Liver	627	65.7	0 ± 0.28
1123-4	Lungs	118	63.7	5.35 ± 0.28
1123-5	Hylar lymph nodes	0.876	81.1	0 ± 0.31
1126-1	Left femur	39.2	76.8	0 ± 0.41
1126-2	Kidneys	73.1	84.2	0 ± 0.29
1126-3	Liver	422	56.8	0.77 ± 0.10
1126-4	Lungs	126	82.5	11.1 ± 0.4
1126-5	Hylar lymph nodes	1.47	63.4	0 ± 0.14

a: Reanalysis yield

Table 3.2 Plutonium and Uranium Analyses of Sheep Tissues

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	µg U	Mean µg U	µg U/µg Pu
2003-1	Left femur	189	49.5	0 ± 0.38			
2003-2	Kidneys	65.2	55.3	0 ± 0.34			
2003-3	Liver	489	44.2	0 ± 0.38			
2003-4-A	Lungs	632	66.3	115 ± 3	2.44	2.74±0.30	3.46×10^3
2003-4-B					3.03		
2003-5	Hylar lymph nodes	3.83	84.3	0 ± 0.38			
2003-7	Trachea	116	72.3	8.12 ± 0.37			
2003-8	Stomach-esophagus	2.34×10^3	29.8[a]	$2.41 \pm 0.06 \times 10^3$			
2003-9	Pharyngeal mucosa	4.51	43.6	0 ± 0.22			
2003-10	Nasal mucosa	84.6	87.7	0 ± 0.37			
2009-1	Left femur	198	55.4	0 ± 0.45			
2009-2	Kidneys	96.4	56.7	0 ± 0.42			
2009-3	Liver	571	41.6	1.6 ± 0.2			
2009-4	Lungs	417	73.8	0.70 ± 0.07			
2009-5	Hylar lymph nodes	2.66	63.4	0 ± 0.28			
2034-1	Left femur	175	61.1	0 ± 0.37			
2034-2	Kidneys	65.4	75.2[a]	1.2 ± 0.1			
2034-3	Liver	536	52.3	0 ± 0.47			
2034-4	Lungs	649	58.0	76.5 ± 2.1	2.49		4.72×10^3
2034-5	Hylar lymph nodes	3.28	77.5	0 ± 0.38			
2034-7	Trachea	145	80.3	8.54 ± 0.32			
2034-8	Stomach-esophagus	4.20×10^3	37.7[a]	217 ± 5			
2034-9	Pharyngeal mucosa	2.42	42.1[a]	4.62 ± 0.37			
2034-10	Nasal mucosa	70.2	89.4	53.8 ± 0.8			
2053-1	Left femur	186	90.4	0 ± 0.40			
2053-2	Kidneys	93.1	43.9[a]	0 ± 0.41			
2053-3	Liver	528	58.1	1.6 ± 0.2			
2053-4	Lungs	455	66.1	31.0 ± 0.8			
2053-5	Hylar lymph nodes	3.72	70.5	0 ± 0.30			

a: Reanalysis yield

Table 3.2 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	μg U	Mean μg U	μg U/μg Pu
2056-1	Left femur	188	70.2	0 ± 0.51			
2056-2	Kidneys	87.3	75.4	0 ± 0.28			
2056-3	Liver	45.2	66.8	0 ± 0.28			
2056-4	Lungs	379	78.7	8.16 ± 0.49			
2056-5	Hylar lymph nodes	1.00	60.6	0 ± 0.39			
2059-1	Left femur	219	60.7	0 ± 0.42			
2059-2	Kidneys	90.0	63.9	3.1 ± 0.2			
2059-3	Liver	511	75.4	0 ± 0.38			
2059-4	Lungs	466	75.4	1.3 ± 0.1			
2059-5	Hylar lymph nodes	0.883	72.8	0 ± 0.37			
2061-1	Left femur	181	82.0	0 ± 0.34			
2061-2	Kidneys	85.2	29.9[a]	0.56 ± 0.06			
2061-3	Liver	491	32.4[a]	0 ± 0.34			
2061-4-A	Lungs	493	64.2	41.7 ± 1.5	2.53	2.38±0.15	8.29×10^3
2061-4-B					2.23		
2061-5	Hylar lymph nodes	2.76	75.5	0 ± 0.38			
2061-7	Trachea	122	82.6	0 ± 0.39			
2061-8	Stomach-esophagus	4.05×10^3	22.6[a]	$2.49 \pm 0.06 \times 10^3$			
2061-9	Pharyngeal mucosa	12.3	70.3	0.63 ± 0.08			
2061-10	Nasal mucosa	82.2	81.1	2.2 ± 0.2			
2063-1	Left femur	150	48.7	1.2 ± 0.1			
2063-2	Kidneys	98.2	63.3	0 ± 0.40			
2063-3	Liver	581	58.1	0.78 ± 0.11			
2063-4	Lungs	422	72.7	0.99 ± 0.09			
2063-5	Hylar lymph nodes	4.11	92.7	0 ± 0.34			

a: Reanalysis yield

Table 3.2 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	µg U	Mean µg U	µg U/µg Pu
2069-1	Left femur	174	58.5	0 ± 0.44			
2069-2	Kidneys	79.0	72.5	0 ± 0.26			
2069-3	Liver	475	83.1	0 ± 0.38			
2069-4-A	Lungs	349	72.7	50.3 ± 1.5	0.968	1.10±0.14	3.18×10^3
2069-4-B					1.24		
2069-5	Hylar lymph nodes	1.03	58.5	0 ± 0.40			
2069-7	Trachea	96.6	51.3	18.0 ± 0.6			
2069-8	Stomach-esophagus	3.10×10^3	38.7	$2.39 \pm 0.05 \times 10^3$			
2069-10	Nasal mucosa	67.2	93.4	0 ± 0.38			
2091-1	Left femur	220	86.2	0 ± 0.36			
2091-2	Kidneys	91.1	55.1	0 ± 0.34			
2091-3	Liver	531	58.1	0 ± 0.37			
2091-4	Lungs	417	80.9	1.0 ± 0.1			
2091-5	Hylar lymph nodes	2.59	52.3	0 ± 0.27			
2106-1	Left femur	201	79.8	0 ± 0.36			
2106-2	Kidneys	65.9	67.9	0 ± 0.31			
2106-3	Liver	528	58.1	0.76 ± 0.11			
2106-4	Lungs	438	72.1	9.56 ± 0.38			
2106-5	Hylar lymph nodes	1.73	71.2	0 ± 0.32			
2115-Control-1	Left femur	178	59.6	0 ± 0.44			
2115-Control-2	Kidneys	128	72.5	0 ± 0.36			
2115-Control-3	Liver	786	53.2	0 ± 0.48			
2115-Control-4	Lungs	568	81.4	0 ± 0.44			
2115-Control-5	Hylar lymph nodes	3.28	89.1	0 ± 0.41			
2116-1	Left femur	209	84.4	0 ± 0.40			
2116-2	Kidneys	91.4	68.4	0 ± 0.22			
2116-3	Liver	550	74.7	0 ± 0.33			
2116-4	Lungs	441	67.4	371 ± 7	3.09		1.21×10^3
2116-5	Hylar lymph nodes	2.03	85.9	0 ± 0.35			
2116-7	Trachea	108	51.6	42.8 ± 1.1			
2116-8	Stomach-esophagus	4.37×10^3	39.4	$1.46 \pm 0.03 \times 10^3$			
2116-10	Nasal mucosa	58.0	75.2	215 ± 6			

Table 3.2 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2121-1	Left femur	212	71.9	0 ± 0.41		
2121-2	Kidneys	93.1	63.9	0 ± 0.29		
2121-3	Liver	523	77.3	0 ± 0.45		
2121-4	Lungs	372	74.9	112 ± 3		
2121-5	Hylar lymph nodes	2.19	47.7	0 ± 0.39		
2123-1	Left femur	236	65.9	0 ± 0.39		
2123-2	Kidneys	120	73.6	0 ± 0.27		
2123-3	Liver	768	81.4	0 ± 0.42		
2123-4	Lungs	497	83.3	7.39 ± 0.42		
2123-5	Hylar lymph nodes	2.13	83.1	0 ± 0.41		
2126-1	Left femur	201	76.3	0 ± 0.35		
2126-2	Kidneys	99.7	48.6	0 ± 0.38		
2126-3	Liver	633	76.8	0 ± 0.37		
2126-4	Lungs	470	82.0	9.02 ± 0.24	2.83	4.56×10^4
2126-6	Hylar lymph nodes	3.86	76.3	0 ± 0.45		
2126-7	Trachea	116	75.5	0.54 ± 0.05		
2126-8	Stomach-esophagus	5.22×10^3	37.3	$1.55 \pm 0.04 \times 10^3$		
2126-9	Pharyngeal mucosa	4.61	80.9	0 ± 0.34		
2126-10	Nasal mucosa	84.5	93.5	0 ± 0.28		
2130-1	Left femur	215	52.7	0 ± 0.48		
2130-2	Kidneys	91.5	75.4	0 ± 0.32		
2130-3	Liver	521	63.7	0 ± 0.28		
2130-4	Lungs	411	72.4	125 ± 4		
2130-5	Hylar lymph nodes	16.6	86.4	0 ± 0.28		
2131-1	Left femur	196	74.9	0 ± 0.41		
2131-2	Kidneys	109	76.0	0 ± 0.24		
2131-3	Liver	678	76.1	0 ± 0.30		
2131-4	Lungs	384	78.1	65.0 ± 2		
2131-5	Hylar lymph nodes	1.00	63.3	0 ± 0.38		

Table 3.2 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2158-1	Left femur	162	65.5	0 ± 0.36		
2158-2	Kidneys	87.1	71.0	0 ± 0.29		
2158-3	Liver	606	44.7	1.1 ± 0.2		
2158-4	Lungs	338	66.7	1.3 ± 0.1		
2158-5	Hylar lymph nodes	2.21	69.2	0 ± 0.39		
2165-Control-1	Left femur	205	87.2	0 ± 0.37		
2165-Control-2	Kidneys	76.7	78.0	0 ± 0.26		
2165-Control-3	Liver	443	28.7[a]	0 ± 0.31		
2165-Control-4	Lungs	352	60.9	0 ± 0.32		
2165-Control-5	Hylar lymph nodes	2.11	86.1	0.31 ± 0.16		
2175-1	Left femur	189	38.3[a]	0 ± 0.47		
2175-2	Kidneys	90.4	72.2	0 ± 0.35		
2175-3	Liver	613	58.8	0 ± 0.34		
2175-4	Lungs	438	71.6	64.3 ± 2.7		
2175-5	Hylar lymph nodes	1.13	51.5	0 ± 0.47		
2183-1	Left femur	173	72.7	0 ± 0.40		
2183-2	Kidneys	92.4	51.4	0 ± 0.34		
2183-3	Liver	618	45.8	0 ± 0.38		
2183-4	Lungs	501	53.2	2.3 ± 0.2	1.47	9.30×10^4
2183-5	Hylar lymph nodes	1.94	44.3	0 ± 0.41		
2183-7	Trachea	102	54.7	0 ± 0.42		
2183-8	Stomach-esophagus	3.57×10^3	45.9	918 ± 22		
2183-9	Pharyngeal mucosa	9.40	84.5	0 ± 0.26		
2183-10	Nasal mucosa	61.1	94.0	0 ± 0.31		
2190-1	Left femur	209	45.9	0 ± 0.46		
2190-2	Kidneys	104	42.6	0 ± 0.33		
2190-3	Liver	492	50.6	0 ± 0.39		
2190-4	Lungs	411	86.9	1.9 ± 0.2		
2190-5	Hylar lymph nodes	0.654	84.6	0 ± 0.42		

a: Reanalysis yield

Table 3.2 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2193-1	Left femur	192	45.3	0 ± 0.38		
2193-2	Kidneys	108	65.6	0 ± 0.22		
2193-3	Liver	751	34.7[a]	0 ± 0.38		
2193-4	Lungs	405	91.7	1.7 ± 0.2		
2193-5	Hylar lymph nodes	1.85	83.1	0 ± 0.40		
2194-1	Left femur	226	43.5[a]	1.8 ± 0.1		
2194-2	Kidneys	88.1	82.7	0 ± 0.31		
2194-3	Liver	626	56.1	0 ± 0.21		
2194-4	Lungs	453	69.6	289 ± 7		
2194-5	Hylar lymph nodes	2.75	95.5	0 ± 0.46		
Control C-2-1	Left femur	181	78.9	0 ± 0.34		
Control C-2-2	Kidneys	63.5	63.5	0 ± 0.26		
Control C-2-3	Liver	446	75.5	0 ± 0.44		
Control C-2-4	Lungs	362	65.2	0 ± 0.29	5.93	-
Control C-2-5	Hylar lymph nodes	4.14	43.4	0 ± 0.42		
Control C-2-7	Trachea	97.4	88.4	0.54 ± 0.07		
Control C-2-8	Stomach-esophagus	2.19×10^3	54.3[a]	23.9 ± 1.1		
Control C-2-10	Nasal mucosa	63.5	91.1	0 ± 0.28		
Control C-7-1	Left femur	193	64.7	0 ± 0.29		
Control C-7-2	Kidneys	87.2	61.0	0 ± 0.24		
Control C-7-3	Liver	558	80.2	0 ± 0.27		
Control C-7-4	Lungs	327	77.3	0 ± 0.34	3.70	-
Control C-7-5	Hylar lymph nodes	3.97	58.1	0 ± 0.49		
Control C-7-7	Trachea	118	85.2	0 ± 0.29		
Control C-7-8	Stomach-esophagus	4.14×10^3	27.4[a]	23.5 ± 1.7		
Control C-7-9	Pharyngeal mucosa	4.51	49.6	0 ± 0.37		
Control C-7-10	Nasal mucosa	55.6	90.5	0 ± 0.29		

a: Reanalysis yield

Table 3.3 Plutonium Analyses of Sheep Urine

Sample No.	Date	G Sample	Yield, %	dpm Pu^{239}
2031	19 & 20 May	1.31×10^3	61.5	$2.51 \pm 0.04 \times 10^3$
2031	23 May	758	48.7	455 ± 10
2031	23 Aug	1.08×10^3	53.2	14.3 ± 0.6
2031	24 Aug	1.05×10^3	61.9	$1.39 \pm 0.03 \times 10^3$
2033	19 & 20 May	2.57×10^3	47.3	$4.26 \pm 0.09 \times 10^3$
2036	16 May	821	54.0	$2.35 \pm 0.02 \times 10^4$
2036	17 May	1.02×10^3	45.6	$4.83 \pm 0.05 \times 10^3$
2036	19 & 20 May	2.21×10^3	52.7	$1.54 \pm 0.02 \times 10^4$
2036	23 Aug	1.52×10^3	51.2	776 ± 20
2036	24 Aug	1.04×10^3	80.7	2.6 ± 0.2
2036	No Date	1.40×10^3	41.9	677 ± 15
2057	17 May	760	48.0	12.4 ± 0.4
2057	19 & 20 May	1.74×10^3	64.4	$1.00 \pm 0.01 \times 10^4$
2057	21 May	1.64×10^3	79.0	136 ± 3
2081	16 June	2.04×10^3	53.7	559 ± 11
2087	17 May	705	37.7	917 ± 24
2087	19 & 20 May	1.30×10^3	75.9	862 ± 18
2087	19 June	2.08×10^3	38.3	210 ± 5
2087	20 June	809	73.9	$1.44 \pm 0.02 \times 10^4$
2087	23 Aug	2.12×10^3	66.3	9.24 ± 0.41
2087	24 Aug	1.43×10^3	47.2[a]	14.1 ± 0.6
2087	No Date	1.27×10^3	79.5	15.4 ± 0.4

a: Reanalysis yield

Table 3.3 (Continued)

Sample No.	Date	G Sample	Yield, %	dpm Pu^{239}
2092	19 & 20 May	1.82×10^3	43.5	$1.14 \pm 0.03 \times 10^3$
2092	20 June	1.35×10^3	75.9	29.3 ± 0.9
2092	23 Aug	1.35×10^3	48.8	0 ± 0.37
2097	19 & 20 May	1.92×10^3	72.2	73.2 ± 1.9
2111	19 & 20 May	1.55×10^3	79.1	$6.32 \pm 0.14 \times 10^3$
2111	23 May	1.03×10^3	81.2	253 ± 6
2111	20 June	2.26×10^3	29.4[a]	64.6 ± 3.1
2111	23 Aug	1.12×10^3	83.3[a]	111 ± 3
2111	24 Aug	821	50.4[a]	388 ± 12
2131	18 June	1.84×10^3	57.3	659 ± 14
2133	17 May	880	62.7	$2.39 \pm 0.04 \times 10^3$
2133	23 May	1.06×10^3	61.7	$1.07 \pm 0.02 \times 10^3$
2133	16 June	1.66×10^3	52.4	162 ± 5
2133	23 Aug	1.47×10^3	52.8	51.3 ± 1.4
2133	24 Aug	1.18×10^3	42.5	245 ± 6
2134	17 May	544	29.7	$6.89 \pm 0.14 \times 10^3$
2134	19 & 20 May	2.01×10^3	55.8	$1.25 \pm 0.02 \times 10^4$
2134	18 June	1.60×10^3	57.8	138 ± 4
2134	23 Aug	1.38×10^3	64.9	0 ± 0.35
2137	19 & 20 May	2.47×10^3	59.4	$7.68 \pm 0.15 \times 10^3$
2157	17 May	1.83×10^3	59.0	$1.92 \pm 0.03 \times 10^3$
2157	21 May	1.73×10^3	78.3	$4.10 \pm 0.10 \times 10^3$
2157	23 May	1.04×10^3	56.1	$1.67 \pm 0.03 \times 10^3$
2157	23 Aug	1.42×10^3	37.6[a]	20.7 ± 0.7

a: Reanalysis yield

Table 3.3 (Continued)

Sample No.	Date	G Sample	Yield, %	dpm Pu^{239}
2172	16 May	858	59.5	$1.07 \pm 0.02 \times 10^4$
2172	19 & 20 May	1.25×10^3	58.5	$2.23 \pm 0.04 \times 10^3$
2172	23 May	723	77.1	671 ± 13
2172	19 June	1.58×10^3	41.7[a]	458 ± 11
2172	20 June	2.08×10^3	63.9	199 ± 2
2172	23 Aug	1.09×10^3	49.1[a]	21.7 ± 0.6
2172	24 Aug	1.01×10^3	55.1	672 ± 14
3078-B	18 June	1.59×10^3	53.7	0 ± 0.36
3078-B	20 June	998	37.8[a]	14.4 ± 0.4
3078-B	23 Aug	1.14×10^3	80.5	0 ± 0.41
"B"	19 & 20 May	2.08×10^3	80.7	$4.22 \pm 0.09 \times 10^3$
"B"	23 May	1.01×10^3	88.3	853 ± 17

a: Reanalysis yield

Table 3.4 Plutonium Analyses of Sheep Feces

Sample No.	Date	G Sample	Yield, %	dpm Pu^{239}
2031	19 & 20 May	1.74×10^3	52.0	$4.08 \pm 0.06 \times 10^3$
2031	D+90	2.01×10^3	42.5	181 ± 5
2036	17 May	305	38.6	42.6 ± 1.5
2036	19 & 20 May	1.20×10^3	61.0	$1.71 \pm 0.03 \times 10^3$
2036	D+90	2.55×10^3	47.4	47.5 ± 1.1
2057	17 May	287	51.3	11.8 ± 0.4
2057	19 & 20 May	2.14×10^3	57.9	72.5 ± 1.8
2087	17 May	268	59.3	1.48 ± 0.03
2087	19 & 20 May	1.30×10^3	55.2	$3.92 \pm 0.05 \times 10^3$
2087	D+90	1.78×10^3	33.5[a]	117 ± 4
2092	19 & 20 May	1.08×10^3	37.4[a]	$1.13 \pm 0.02 \times 10^3$
2092	21 May	670	29.5[a]	69.1 ± 1.9
2092	D+90	2.03×10^3	28.5[a]	29.4 ± 2.2
2097	17 May	154	86.7	3.17 ± 0.22
2097	19 & 20 May	1.91×10^3	54.6	12.7 ± 0.4
2097	21 May	678	63.1[a]	4.30 ± 0.25
2111	19 & 20 May	886	53.6	304 ± 7
2111	21 May	365	75.1	20.4 ± 0.7
2111	D+90	2.48×10^3	34.2[a]	14.2 ± 1.1
2133	17 May	240	87.2	70.7 ± 2.0
2133	19 & 20 May	1.74×10^3	34.7[a]	284 ± 9
2133	D+90	2.39×10^3	39.4	88.4 ± 3.9

a: Reanalysis yield

Table 3.4 (Continued)

Sample No.	Date	G Sample	Yield, %	dpm Pu^{239}
2134	17 May	445	65.6	11.4±0.4
2134	19 & 20 May	2.11×10^3	26.4[a]	$2.42 \pm 0.07 \times 10^3$
2134	D+90	2.22×10^3	22.7[a]	$1.78 \pm 0.04 \times 10^3$
2157	19 & 20 May	2.11×10^3	48.3	644±14
2157	D+90	2.28×10^3	57.5	39.4±1.6
2167	17 May	481	77.3	628±16
2172	19 & 20 May	1.59×10^3	38.3[a]	499±13
2172	D+90	1.92×10^3	47.1	52.8±1.4
"B"	19 & 20 May	1.71×10^3	50.2	$1.57 \pm 0.03 \times 10^3$
3078-AKA "B"[b]	D+90	3.00×10^3	70.8	24.2±0.7

b AKA = Also known as "B"

a: Reanalysis yield

Table 3.5 Plutonium and Uranium Analyses of Burro Tissues

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
3001-1	Left femur	1.06×10^3	32.7	0 ± 0.45		
3001-2	Kidneys	789	57.4	0 ± 0.41		
3001-3	Liver	1.93×10^3	26.4[a]	1.8 ± 0.2		
3001-4	Lungs	1.24×10^3	91.5	57.2 ± 1.1		
3001-5	Hylar lymph nodes	3.52	59.5	0 ± 0.38		
3005-4	Lungs	1.05×10^3	55.5	$1.59 \pm 0.04 \times 10^3$	4.11	3.77×10^2
3005-5	Hylar lymph nodes	2.72	57.8	0 ± 0.42		
3005-7	Trachea	449	58.2	288 ± 8		
3005-8	Stomach-esophagus	1.25×10^3	67.2	$1.03 \pm 0.03 \times 10^3$		
3005-9	Pharyngeal mucosa	28.4	81.7	1.2 ± 0.1		
3005-10	Nasal mucosa	117	91.7	3.85 ± 0.21		
3007-1[b]	Left femur	996	88.9	0 ± 0.42		
3007-2[b]	Kidneys	763	56.4	0 ± 0.39		
3007-3[b]	Liver	1.36×10^3	76.8	20.8 ± 0.6		
3007-4[b]	Lungs	1.27×10^3	86.6	33.8 ± 1.0	7.37	3.16×10^4
3007-5[b]	Hylar lymph nodes	6.84	62.7	0 ± 0.34		
3007-6	Right femur	997	52.2	0 ± 0.47		
3007-7	Trachea	383	67.1	0.79 ± 0.10		
3007-8	Stomach-esophagus	1.81×10^3	88.4	50.7 ± 1.2		
3007-9	Pharyngeal mucosa	69.8	72.5	3.81 ± 0.28		
3007-10	Nasal mucosa	84.1	78.7	0 ± 0.32		
3007-1[c]	Left femur	1.04×10^3	51.8	1.1 ± 0.1		
3007-2[c]	Kidneys	976	49.5	0 ± 0.34		
3007-3[c,d]	Liver	2.78×10^3	80.0	39.8 ± 0.9		
3007-4[c]	Lungs	1.38×10^3	89.8	188 ± 4		
3007-5[c]	Hylar lymph nodes	3.93	86.8	0 ± 0.39		
3008-6	Right femur	1.20×10^3	45.1	0.69 ± 0.09		
3008-10	Nasal mucosa	173	86.8	7.59 ± 0.30		

a: Reanalysis yield
b: Box # 31
c: Box # 26
d: Two samples labeled "3007-3 and 3118-3"

Table 3.5 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	μg U	Mean μg/μ	μg U/μg Pu
3012 Control -1	Left femur	1.38×10^3	25.6	1.2 ± 0.1			
3012 Control -2	Kidneys	605	74.2	0 ± 0.42			
3012 Control -3	Liver	2.34×10^3	75.4	2.1 ± 0.2			
3012 Control -4	Lungs	1.46×10^3	81.5	0.56 ± 0.06			
3012 Control -5	Hylar lymph nodes	6.65	83.5	0 ± 0.43			
3019-10	Nasal mucosa	131	94.1	148 ± 5			
3020-1	Left femur	1.05×10^3	44.7	1.0 ± 0.1			
3020-2	Kidneys	570	38.1[a]	0 ± 0.46			
3020-3	Liver	1.14×10^3	64.5	6.57 ± 0.40			
3020-4-A	Lungs	1.19×10^3	92.0	$1.85 \pm 0.03 \times 10^3$	43.6	40.5±3.1	3.18×10^3
3020-4-B					37.4		
3020-5	Hylar lymph nodes	6.01	78.5[a]	0 ± 0.29			
3020-6	Right femur	1.20×10^3	56.1	0 ± 0.44			
3020-7	Trachea	768	51.5	311 ± 8			
3020-8	Stomach-esophagus	1.69×10^3	82.9	$1.18 \pm 0.03 \times 10^3$			
3020-9	Pharyngeal mucosa	46.4	63.9	61.8 ± 1.2			
3020-10	Nasal mucosa	149	65.6	52.0 ± 1.0			
3025-1	Left femur	1.45×10^3	48.6	1.4 ± 0.1			
3025-2	Kidneys	749	64.1	0 ± 0.32			
3025-3	Liver	2.09×10^3	84.0	33.3 ± 1.1			
3025-4	Lungs	1.44×10^3	87.3	948 ± 19			
3025-5	Hylar lymph nodes	2.72	89.4	0 ± 0.35			
3032-10	Nasal mucosa	145	64.8	$3.38 \pm 0.03 \times 10^3$			
3033-1	Left femur	1.04×10^3	26.2[a]	0.94 ± 0.11			
3033-2	Kidneys	637	53.3	0 ± 0.29			
3033-3	Liver	2.33×10^3	45.5[a]	14.3 ± 0.3			
3033-4	Lungs	1.23×10^3	87.1	23.1 ± 0.7			
3033-5	Hylar lymph nodes	10.2	69.7	0 ± 0.44			
3039-10	Nasal mucosa	150	79.4	174 ± 5			

a: Reanalysis yield

Table 3.5 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}
3042-1	Left femur	1.17×10^3	51.1	1.4 ± 0.1
3042-2	Kidneys	624	61.9	0 ± 0.28
3042-3	Liver	2.05×10^3	53.2	13.6 ± 0.4
3042-4	Lungs	1.34×10^3	87.9	60.3 ± 1.9
3042-5	Hylar lymph nodes	9.84	74.1	0 ± 0.39
3045-1	Left femur	1.08×10^3	52.6	0 ± 0.37
3045-2	Kidneys	628	67.1	0 ± 0.34
3045-3	Liver	1.81×10^3	43.1	32.5 ± 1.1
3045-4	Lungs	1.17×10^3	84.5	$1.05 \pm 0.02 \times 10^3$
3045-5	Hylar lymph nodes	7.63	89.0	0 ± 0.39
3053-2	Kidneys	1.02×10^3	50.3	0 ± 0.41
3053-3	Liver	2.96×10^3	32.5	32.4 ± 1.3
3053-4	Lungs	1.62×10^3	87.7	85.7 ± 2.3
3053-5	Hylar lymph nodes	11.7	77.6	0 ± 0.41
3076-1	Left femur	1.21×10^3	61.0	0 ± 0.32
3076-2	Kidneys	771	87.4	0 ± 0.21
3076-3	Liver	2.72×10^3	65.2	18.3 ± 0.5
3076-4	Lungs	1.34×10^3	54.5	$2.39 \pm 0.03 \times 10^3$
3076-5	Hylar lymph nodes	8.19	69.5	0 ± 0.37
3109-1	Left femur	1.19×10^3	55.4	0 ± 0.44
3109-2	Kidneys	845	44.4	0 ± 0.35
3109-3	Liver	2.97×10^3	65.4	14.3 ± 0.4
3109-4	Lungs	1.43×10^3	92.5	52.1 ± 1.4
3109-5	Hylar lymph nodes	10.1	51.2	0 ± 0.39
3111-1	Left femur	1.09×10^3	51.0	0 ± 0.42
3111-2	Kidneys	648	35.2[a]	10.2 ± 0.4
3111-3	Liver	2.01×10^3	38.2[a]	47.0 ± 1.3
3111-4	Lungs	1.43×10^3	87.9	60.0 ± 1.7
3111-5	Hylar lymph nodes	2.02	65.1	0 ± 0.34

a: Reanalysis yield

Table 3.5 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	μg U	Mean μg/μ	μg U/μg Pu
3123 Control -1	Left femur	1.22×10^3	57.6	0 ± 0.31			
3123 Control -2	Kidneys	623	62.3	0 ± 0.38			
3123 Control -3	Liver	2.09×10^3	57.4	2.1 ± 0.2			
3123 Control -4	Lungs	1.45×10^3	67.2	0 ± 0.41			
3123 Control -5	Hylar lymph nodes	2.81	51.4[a]	0 ± 0.35			
3127-4	Lungs	1.43×10^3	76.6	14.3 ± 0.4	4.13		4.19×10^4
3127-10	Nasal mucosa	178	74.6	336 ± 7			
3131-1	Left femur	1.01×10^3	42.4	0 ± 0.37			
3131-2	Kidneys	654	67.4	0 ± 0.29			
3131-3	Liver	1.81×10^3	69.5[a]	77.7 ± 2.0			
3131-4-A	Lungs	1.11×10^3	95.5	$1.50 \pm 0.03 \times 10^3$	7.98	9.00±0.11	8.75×10^2
3131-4-B					10.1		
3131-5	Hylar lymph nodes	0.435	79.6	0 ± 0.41			
3131-6	Right femur	1.19×10^3	46.2	2.49 ± 0.14			
3131-7	Trachea	409	44.2	172 ± 4			
3131-8	Stomach-esophagus	980	59.0	$7.59 \pm 0.13 \times 10^3$			
3131-9	Pharyngeal mucosa	30.5	77.4	451 ± 9			
3131-10	Nasal mucosa	131	74.1	2.0 ± 0.2			
3138-1	Left femur	855	45.7[a]	0.97 ± 0.15			
3138-2	Kidneys	518	55.2	0 ± 0.24			
3138-3	Liver	1.96×10^3	62.2[a]	20.2 ± 0.8			
3138-4	Lungs	952	53.1	23.0 ± 0.7	3.88		2.46×10^4
3138-5	Hylar lymph nodes	13.2	69.3	7.26 ± 0.35			
3138-6	Right femur	1.01×10^3	50.7	0.68 ± 0.09			
3138-7	Trachea	324	65.7	72.8 ± 0.5			
3138-8	Stomach-esophagus	925	51.9	5.99 ± 0.27			
3138-9	Pharyngeal mucosa	40.6	54.6	0 ± 0.44			
3138-10	Nasal mucosa	159	87.7	0 ± 0.32			

a: Reanalysis yield

Table 3.5 (Continued)

Sample No.	Type	G. Tissue	Yield, %	dpm Pu^{239}	µg U	Mean µg/µ	µg U/µg Pu
3146-1	Left femur	1.17×10^3	45.4	5.38 ± 0.29			
3146-2	Kidneys	962	53.2	1.5 ± 0.2			
3146-3	Liver	3.11×10^3	72.0[a]	262 ± 5			
3146-4-A	Lungs	1.37×10^3	72.4	96.9 ± 2.9	16.9	15.9±1.1	2.38×10^4
3146-4-B					14.8		
1346-5	Hylar lymph nodes	2.97	65.6	0 ± 0.47			
3146-6	Right femur	1.18×10^3	57.6	1.3 ± 0.1			
3146-7	Trachea	409	53.7	9.04 ± 0.34			
3146-8	Stomach-esophagus	1.15×10^3	77.6	6.82 ± 0.39			
3146-10	Nasal mucosa	98.2	79.2	8.85 ± 0.35			
3147-10	Nasal mucosa	192	74.2	3.40 ± 0.31			
3148-10	Nasal mucosa	167	62.5	1.3 ± 0.1			
3176-1	Left femur	915	58.8	1.1 ± 0.1			
3176-2	Kidneys	449	38.5[a]	1.4 ± 0.1			
3176-3	Liver	1.34×10^3	74.7	5.90 ± 0.33			
3176-4-A	Lungs	1.16×10^3	94.6	89.8 ± 2.8	8.45	8.20±0.25	1.33×10^4
3176-4-B					7.94		
3176-5	Hylar lymph nodes	5.44	70.1	0 ± 0.31			
3176-6	Right femur	996	37.0	3.42 ± 0.18			
3176-7	Trachea	499	85.2	2.1 ± 0.1			
3176-8	Stomach-esophagus	1.16×10^3	60.1	25.1 ± 0.9			
3176-9	Pharyngeal mucosa	45.3	83.4	13.5 ± 0.4			
3176-10	Nasal mucosa	98.1	78.1	2.8 ± 0.2			
3180 Control -1	Left femur	978	42.1[a]	1.2 ± 0.1			
3180 Control -2	Kidneys	704	51.6	0.66 ± 0.10			
3180 Control -3	Liver	2.10×10^3	56.4	0 ± 0.47			
3180 Control -4	Lungs	1.26×10^3	75.6	53.6 ± 1.3			
3180 Control -5	Hylar lymph nodes	6.39	70.5	0 ± 0.36			

a: Reanalysis yield

Table 3.6 Plutonium Analyses of D+1 Year Biological Samples

A. Dog Tissues

Sample No.	Type	G Tissue	Yield, %	dpm Pu^{239}
1039-1	Femur	72.6	58.3	0 ± 0.31
1039-2	Kidneys	54.2	85.6	0 ± 0.22
1039-3	Liver	370	78.9	0 ± 0.24
1039-4	Lungs	114	70.8	4.37 ± 0.26
1039-5	Hylar lymph nodes	4.55	68.9	1.1 ± 0.1
1048-1	Femur	25.2	54.2	0 ± 0.19
1048-2	Kidneys	51.0	63.5	0 ± 0.26
1048-3	Liver	274	65.2	1.2 ± 0.2
1048-4	Lungs	85.0	78.8	5.87 ± 0.27
1048-5	Hylar lymph nodes	0.48	78.3	2.3 ± 0.1
1072-1	Femur	69.3	77.5	0.77 ± 0.19
1072-2	Kidneys	77.5	68.9	0 ± 0.31
1072-3	Liver	294	64.0	0.49 ± 0.11
1072-4	Lungs	121	59.3	8.17 ± 0.44
1072-5	Hylar lymph nodes	2.92	88.2	0 ± 0.19
1078-1	Femur	35.2	71.5	0 ± 0.24
1078-2	Kidneys	76.9	76.9	0 ± 0.25
1078-3	Liver	211	40.6	0 ± 0.39
1078-4	Lungs	91.2	82.4	0 ± 0.32
1078-5	Hylar lymph nodes	1.20	77.9	0 ± 0.22
1090-1	Femur	60.0	64.8	0 ± 0.25
1090-2	Kidneys	75.0	89.5	0 ± 0.15
1090-3	Liver	363	64.6	0 ± 0.33
1090-4	Lungs	138	22.4[a]	3.4 ± 0.2
1090-5	Hylar lymph nodes	1.00	66.2	0 ± 0.17
1111C-1	Femur	53.3	52.5	0 ± 0.28
1111C-2	Kidneys	58.5	68.0	0 ± 0.24
1111C-3	Liver	351	78.5	0 ± 0.33
1111C-4	Lungs	107	82.2	0 ± 0.35
1111C-5	Hylar lymph nodes	1.31	44.7	0 ± 0.26
1120-1	Femur	57.6	53.6	22.6 ± 1.7
1120-2	Kidneys	84.1	70.8	0 ± 0.34
1120-3	Liver	406	56.5	26.2 ± 1.3
1120-4	Lungs	119	83.5	0 ± 0.19
1120-5	Hylar lymph nodes	2.62	47.4	0 ± 0.25

a - Reanalysis yield

Table 3.6 (Continued)

B. Sheep Tissues

Sample No.	Type	G Tissue	Yield, %	dpm Pu^{239}
2004-1	Femur	234	42.5	0 ± 0.27
2004-2	Kidneys	113	35.7	0 ± 0.29
2004-3	Liver	501	44.1	138 ± 5
2004-4	Lungs	404	73.1	1.1 ± 0.2
2004-5	Hylar lymph nodes	4.8	86.1	0 ± 0.29
2017-1	Femur	330	60.7	0 ± 0.22
2017-2	Kidneys	116	86.4	0 ± 0.15
2017-3	Liver	565	84.6	0 ± 0.28
2017-4	Lungs	445	46.0	27.1 ± 0.8
2017-5	Hylar lymph nodes	26.6	71.1	0 ± 0.24
2038-1	Femur	233	41.8	0 ± 0.25
2038-2	Kidneys	99.0	91.3	0 ± 0.18
2038-3	Liver	508	59.9	0 ± 0.32
2038-4	Lungs	479	42.3	0 ± 0.21
2038-5	Hylar lymph nodes	21.7	65.5	0 ± 0.26
2054-1	Femur	312	47.5	0 ± 0.33
2054-2	Kidneys	123	79.7	0 ± 0.24
2054-3	Liver	524	34.9	30.4 ± 1.5
2054-4	Lungs	451	76.5	0 ± 0.22
2054-5	Hylar lymph nodes	5.36	87.5	0 ± 0.14
2072-1	Left femur	199	33.7	0 ± 0.40
2072-2	Kidneys	103	50.2	0 ± 0.27
2072-3	Liver	530	86.4	0 ± 0.38
2072-4	Lungs	368	49.3	1.5 ± 0.2
2072-5	Hylar lymph nodes	5.47	77.4	0 ± 0.31
2113-1	Femur	211	56.6	0 ± 0.29
2113-2	Kidneys	67.2	88.4	0 ± 0.18
2113-3	Liver	364	52.5	26.2 ± 0.9
2113-4	Lungs	187	69.2	5.84 ± 0.61
2113-5	Hylar lymph nodes	13.6	38.7	0 ± 0.33
2114-1	Femur	221	83.4	0 ± 0.32
2114-2	Kidneys	109	83.7	0 ± 0.16
2114-3	Liver	458	77.2	0 ± 0.29
2114-4	Lungs	384	89.9	0 ± 0.23
2114-5	Hylar lymph nodes	6.22	55.6	99.6 ± 3.3
2147-1	Femur	247	33.7	2.9 ± 0.3
2147-2	Kidneys	107	86.2	0 ± 0.18
2147-3	Liver	496	57.6	0 ± 0.20
2147-4	Lungs	363	35.5	6.51 ± 0.97
2147-5	Hylar lymph nodes	9.99	80.1	0 ± 0.27

Table 3.6B (Continued)

Sample No.	Type	G Tissue	Yield, %	dpm Pu^{239}
2159-C-1	Femur	289	58.6	0 ± 0.26
2159-C-2	Kidneys	125	53.3	0 ± 0.23
2159-C-3	Liver	550	44.9	0 ± 0.33
2159-C-4	Lungs	473	67.4	0 ± 0.26
2159-C-5	Hylar lymph nodes	11.3	17.5[a]	0 ± 0.47
2185-1	Femur	228	38.9	16.7 ± 0.7
2185-2	Kidneys	80.0	87.1	0 ± 0.27
2185-3	Liver	403	18.6[a]	0 ± 0.42
2185-4	Lungs	393	47.3	11.2 ± 0.5
2185-5	Hylar lymph nodes	7.37	74.4	0 ± 0.32
XXX-1	Femur	289	38.3	4.1 ± 0.3
XXX-2	Kidneys	127	76.6	0 ± 0.31
XXX-3	Liver	710	79.2	0 ± 0.21
XXX-4	Lungs	503	77.8	0 ± 0.18
XXX-5	Hylar lymph nodes	7.30	62.8	0 ± 0.39
Y-1	Femur	198	49.3	0 ± 0.26
Y-2	Kidneys	97.4	58.5	0 ± 0.35
Y-3	Liver	495	67.7	0 ± 0.22
Y-4	Lungs	386	46.8	0 ± 0.37
Y-5	Hylar lymph nodes	6.40	63.1	0 ± 0.27

Table 3.6 (Continued)

C. Sheep Urine

Sample No.	Date	G Sample	Yield, %	dpm Pu^{239}
2031	Aug. 8	515	44.6	0.78 ± 0.16
2031	Aug. 9	1.80×10^3	46.5	7.17 ± 0.65
2031	Aug. 10	1.44×10^3	81.7	0 ± 0.24
2031	Aug. 11	1.21×10^3	48.3	1.2 ± 0.2
2031	Aug. 12	893	39.4	0 ± 0.32
2036	Aug. 3	776	71.8	1.6 ± 0.2
2036	Aug. 4	1.61×10^3	48.8	0 ± 0.19
2036	Aug. 5	1.54×10^3	85.4	2.6 ± 0.3
2036	Aug. 6	1.71×10^3	68.6	0.90 ± 0.17
2036	Aug. 7	1.62×10^3	58.6	0 ± 0.24
2087	Aug. 3	583	69.2	0 ± 0.26
2087	Aug. 4	1.74×10^3	54.4	0 ± 0.20
2087	Aug. 5	1.08×10^3	80.4	0.89 ± 0.18
2087	Aug. 6	1.61×10^3	48.7	0 ± 0.16
2087	Aug. 7	1.45×10^3	85.5	0 ± 0.19
2092	Aug. 8	802	59.8	0.42 ± 0.17
2092	Aug. 9	2.33×10^3	73.3	9.54 ± 0.57
2092	Aug. 10	1.75×10^3	84.5	0 ± 0.25
2092	Aug. 11	489	83.2	0 ± 0.22
2092	Aug. 12	822	45.6	9.52 ± 0.55
2097	Aug. 3	868	74.2	0 ± 0.26
2097	Aug. 4	794	70.8	0 ± 0.25
2097	Aug. 5	1.20×10^3	74.3	1.9 ± 0.2
2097	Aug. 6	1.57×10^3	60.5	1.2 ± 0.2
2097	Aug. 7	722	81.1	0.92 ± 0.15
2111	Aug. 3	776	47.3	0.47 ± 0.14
2111	Aug. 4	1.73×10^3	50.9	2.2 ± 0.4
2111	Aug. 5	1.60×10^3	81.7	0 ± 0.22
2111	Aug. 6	1.10×10^3	56.9	1.1 ± 0.2
2111	Aug. 7	1.61×10^3	64.4	3.2 ± 0.2
2133	Aug. 8	2.31×10^3	89.1	0 ± 0.18
2133	Aug. 9	1.87×10^3	57.8	11.0 ± 0.5
2133	Aug. 10	1.60×10^3	81.8	0 ± 0.23
2133	Aug. 11	1.95×10^3	80.4	0 ± 0.19
2133	Aug. 12	1.59×10^3	----	---- b

b - lost in analysis

Table 3.6C (Continued)

Sample No.	Date	G Sample	Yield, %	dpm Pu^{239}
2134	Aug. 8	1.72×10^3	71.6	0 ± 0.25
2134	Aug. 9	2.53×10^3	85.4	0.52 ± 0.18
2134	Aug. 10	1.37×10^3	88.4	0.73 ± 0.25
2134	Aug. 11	1.04×10^3	44.9	1.3 ± 0.2
2134	Aug. 12	995	88.1	0 ± 0.13
2157	Aug. 3	800	55.8	0 ± 0.25
2157	Aug. 4	1.43×10^3	81.7	0.90 ± 0.21
2157	Aug. 5	1.27×10^3	79.9	0.63 ± 0.19
2157	Aug. 6	1.45×10^3	61.6	0 ± 0.18
2157	Aug. 7	1.10×10^3	52.5	2.1 ± 0.2
2172	Aug. 8	1.64×10^3	74.8	0 ± 0.28
2172	Aug. 9	2.85×10^3	79.9	0 ± 0.22
2172	Aug. 10	1.75×10^3	78.6	0 ± 0.18
2172	Aug. 11	1.75×10^3	76.9	0 ± 0.24
2172	Aug. 12	2.02×10^3	61.0	0.39 ± 0.19
3078B	Aug. 3	1.15×10^3	77.7	1.2 ± 0.2
3078B	Aug. 4	1.95×10^3	68.5	1.7 ± 0.2
3078B	Aug. 5	1.44×10^3	71.1	1.1 ± 0.2
3078B	Aug. 6	1.30×10^3	75.4	3.4 ± 0.3
3078B	Aug. 7	1.58×10^3	63.2	10.9 ± 0.7
3079	Aug. 8	3.30×10^3	70.8	0 ± 0.21
3079	Aug. 9	3.34×10^3	68.6	0.40 ± 0.18
3079	Aug. 10	1.30×10^3	84.3	0 ± 0.23
3079	Aug. 11	1.26×10^3	62.8	0 ± 0.34
3079	Aug. 12	1.11×10^3	73.7	0 ± 0.25

Table 3.6 (Continued)

D. Sheep Feces

Sample No.	Date	G Sample	Yield, %	dpm Pu^{239}
2031-F	Aug. 12	1.69×10^3	42.4	25.5 ± 1.6
2036-F	Aug. 7	2.80×10^3	37.5	40.2 ± 2.3
2087-F	Aug. 7	1.65×10^3	39.6	33.8 ± 1.9
2092-F	Aug. 12	2.99×10^3	35.5	21.7 ± 1.6
2097-F	Aug. 7	1.46×10^3	34.7	49.9 ± 2.1
2111-F	Aug. 7	2.04×10^3	50.6	13.4 ± 0.8
2133-F	Aug. 12	986	38.2	25.4 ± 1.8
2134-F	Aug. 12	2.29×10^3	37.9	40.4 ± 2.5
2157-F	Aug. 7	1.63×10^3	55.7	37.4 ± 2.0
2172-F	Aug. 12	1.31×10^3	26.4	45.3 ± 2.6
3078B-F	Aug. 7	1.01×10^3	28.8	33.7 ± 2.3
3079-F	Aug. 12	1.47×10^3	34.9	28.5 ± 1.9

Table 3.6 (Continued)

E. Burro Tissues

Sample No.	Type	G Tissue	Yield, %	dpm Pu^{239}
3000-C-1	Femur	1.08×10^3	68.7	6.8 ± 0.7
3000-C-2	Kidneys	902	71.3	0 ± 0.38
3000-C-3	Liver	3.52×10^3	48.5	11.7 ± 0.8
3000-C-4	Lungs	1.46×10^3	83.7	$1.27 \pm 0.03 \times 10^3$
3000-C-5	Hylar lymph nodes	26.3	76.2	0 ± 0.14
3017-1	Femur	1.25×10^3	43.4	0 ± 0.31
3017-2	Kidneys	715	55.2	0 ± 0.28
3017-3	Liver	3.48×10^3	44.3	11.1 ± 0.8
3017-4	Lungs	1.21×10^3	48.6	34.4 ± 2.0
3017-5	Hylar lymph nodes	17.6	89.7	0 ± 0.22
3037-1	Femur	1.25×10^3	48.6	0 ± 0.29
3037-2	Kidneys	874	54.8	0 ± 0.25
3037-3	Liver	3.94×10^3	32.7	3.4 ± 0.3
3037-4	Lungs	1.80×10^3	56.6	7.04 ± 0.67
3037-5	Hylar lymph nodes	21.0	63.6	0 ± 0.17
3069-1	Femur	1.05×10^3	39.5	2.2 ± 0.2
3069-2	Kidneys	995	49.5	3.2 ± 0.3
3069-3	Liver	3.90×10^3	33.9	72.5 ± 2.9
3069-4	Lungs	1.43×10^3	70.4	265 ± 4
3069-5	Hylar lymph nodes	16.8	65.9	3.8 ± 0.3
3122-1	Femur	1.21×10^3	42.6	0 ± 0.31
3122-2	Kidneys	1.25×10^3	58.7	0 ± 0.38
3122-3	Liver	4.39×10^3	69.9	123 ± 3
3122-4	Lungs	1.62×10^3	85.5	12.8 ± 0.8
3122-5	Hylar lymph nodes	67.0	40.6	0 ± 0.39
3140-1	Femur	866	56.8	5.4 ± 0.5
3140-2	Kidneys	715	76.8	1.2 ± 0.2
3140-3	Liver	2.40×10^3	58.7	98.9 ± 3.2
3140-4	Lungs	1.30×10^3	26.5	93.0 ± 3.2
3140-5	Hylar lymph nodes	14.9	82.9	5.52 ± 0.37

Table 3.7 Plutonium and Uranium Analyses of Casella Impactor Samples

A. Double Tracks

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2006-L-006	1	87.9	4.25±0.25	0.306	1.04×10^4
	2	89.5	14.9±0.6	0.696	6.76×10^3
	3	93.2	453±11	0.752	2.41×10^2
	4	91.6	2.2±0.2	0.557	3.69×10^4
	5	88.3	145±3	1.11	1.11×10^3
2022-L-038	1	91.7	19.8±0.7		
	2	93.1	0±0.39		
	3	97.4	0±0.41		
	4	98.8	15.7±0.6		
	5	91.2	0±0.37		
2025-L-080	1	82.7	655±14		
	2	92.2	18.3±0.7		
	3	91.6	4.98±0.23		
	4	15.1*	11.9±1.3		
	5	89.7	1.4±0.2		
2030-L-086	1	87.6	134±3	0.231	2.51×10^2
	2	88.8	29.9±1.0	0.229	1.11×10^3
	3	92.5	11.4±0.4	0.562	7.16×10^3
	4	89.3	77.7±2.4	0.331	6.19×10^2
	5	91.0	86.0±2.5	1.39	2.35×10^3
2036-L-060	1	97.6	$1.43 \pm 0.02 \times 10^3$		
	2	89.9	140±3		
	3	93.5	243±4		
	4	94.1	9.42±0.32		
	5	87.5	23.2±0.5		
2060-L-062	1	94.3	$4.61 \pm 0.06 \times 10^3$		
	2	80.8	329±3		
	3	90.3	50.9±0.8		
	4	93.8	23.7±0.4		
	5	91.2	369±4		
2063-L-068	1	97.7	$1.55 \pm 0.02 \times 10^3$		
	2	98.6	892±16		
	3	93.1	249±2		
	4	89.4	37.7±0.9		
	5	92.1	78.4±1.3		

* Sample spilled during analysis

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2133-KM-003	1	97.1	786±15		
	2	94.4	30.0±1.0		
	3	90.9	0±0.33		
	4	88.7	0±0.33		
	5	96.2	0±0.29		
2135-KM-004	1	84.3	785±5		
	2	89.7	34.7±1.1		
	3	86.2	0±0.19		
	4	93.8	0±0.28		
	5	93.7	0.93±0.09		
2152-L12,P21	1	90.3	$3.02\pm0.06\times10^{4}$	1.75	8.41
	3	88.1	$1.46\pm0.04\times10^{3}$	0.232	22.9
	4	91.2	23.8±1.1	0.143	8.72×10^{2}
	5	87.8	850±28	0.018	3.7
2181-KM-002	1	98.7	$2.10\pm0.02\times10^{3}$		
	2	88.6	0±0.38		
	3	92.1	0±0.41		
	4	87.5	0±0.42		
	5	98.8	0±0.31		
2436-L2,P13	1	88.1	836±31	0.0203	3.5
	2	83.3	338±10	0.172	73.8
	3	90.0	72.6±2.5	0.107	2.13×10^{2}
	4	92.7	18.6±0.8	0.248	1.94×10^{3}
	5	89.5	66.5	0.007	15.3
2476-L4,P6	1	93.3	94.7±1.8		
	2	96.2	19.9±0.7		
	3	98.4	5.47±0.28		
	4	84.8	0.68±0.10		
	5	89.1	3.2±0.4		
2477-J-B2,L4,P1	1	95.3	$1.06\pm0.03\times10^{4}$	0.435	6.3
	2	88.2	$2.21\pm0.07\times10^{3}$	0.318	20.6
	4	90.8	283±9	0.0840	43.1
	5	94.1	173±7	0.083	69.6
2485-L8,P6	1	88.6	0±0.39		
	2	86.3	0±0.28		
	3	98.9	0±0.18		
	4	88.5	0±0.39		
	5	91.3	0±0.31		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2486-L8,P13	1	93.2	0±0.38		
	2	86.5	8.29±0.38		
	3	97.9	0±0.35		
	4	92.2	0±0.44		
	5	93.3	0.78±0.08		
2724-H-068	1	90.6	451±14	0.291	94.5
	2	92.3	246±6	0.067	40
	3	92.9	545±14	0.397	1.06×10^2
	4	93.1	79.4±2.2	0.030	55
	5	87.4	196±5	1.82	1.35×10^3
2790-J-074	1	86.6	872±10		
	2	81.1	33.9±1.4		
	3	95.5	20±0.5		
	4	86.1	3.42±0.20		
	5	95.6	5.27±0.24		
2797-J-068	1	97.7	163±3		
	2	91.3	206±3		
	3	91.8	89.0±2.6		
	4	91.4	17±0.9		
	5	92.8	1.5±0.1		
2801-J-056	1	92.7	551±8		
	2	95.3	174±3		
	3	87.9	137±2		
	4	92.3	16.5±0.9		
	5	96.8	42.7±0.6		
2804-J-062	1	91.2	$6.06 \pm 0.07 \times 10^3$		
	2	96.1	$3.03 \pm 0.03 \times 10^3$		
	3	94.8	$1.39 \pm 0.02 \times 10^3$		
	4	87.3	173±3		
	5	92.5	36.8±1.5		
2807-J-044	1	89.1	353±7		
	2	89.9	$1.90 \pm 0.02 \times 10^3$		
	3	98.6	3.9±0.3		
	4	92.2	3.3±0.2		
	5	89.9	20.1±1.5		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2811-J-050	1	88.1	$5.07 \pm 0.05 \times 10^3$		
	2	86.8	38.6 ± 1.4		
	3	84.9	2.4 ± 0.1		
	4	92.5	0 ± 0.41		
	5	89.2	1.5 ± 0.1		
2814-J-038	1	90.4	0 ± 0.18		
	2	85.8	0 ± 0.36		
	3	89.9	1.9 ± 0.2		
	4	83.7	0 ± 0.34		
	5	95.2	0 ± 0.24		
2818-J-032	1	95.4	0 ± 0.27		
	2	90.8	0 ± 0.33		
	3	85.9	0 ± 0.17		
	4	98.2	0 ± 0.31		
	5	83.5	2.6 ± 0.2		
2906-L5,P9	1	91.5	$2.03 \pm 0.02 \times 10^5$	15.6	11.1
	2	96.5	$1.43 \pm 0.01 \times 10^4$	0.561	5.7
	3	89.9	$6.10 \pm 0.07 \times 10^3$	0.420	15.6
	4	84.8	$9.82 \pm 0.12 \times 10^3$	1.54	22.7
	5	90.6	$2.34 \pm 0.04 \times 10^3$	0.643	39.9
2947-R-056	1	89.8	498 ± 17	0.075	22
	2	93.7	434 ± 15	0.047	16
	3	90.7	351 ± 12	0.173	68.6
	4	91.2	95.7 ± 2.6	0.208	3.16×10^2
	5	86.7	112 ± 3	0.0494	64.0
9625-E-056	1	95.2	55.6 ± 1.7	0.014	37
	2	82.6	13.4 ± 0.4	0.008	90
	3	94.7	20.8 ± 0.7	0.016	1.1×10^2
	4	90.5	10.7 ± 0.4	0.007	70
	5	87.4	496 ± 17	0.152	44.5
9626-G-060	1	88.9	989 ± 31	0.376	55.3
	2	89.9	110 ± 4	0.231	3.05×10^2
	3	92.8	45.7 ± 1.8	0.111	3.54×10^2
	4	90.1	69.2 ± 2.3	0.106	2.23×10^2
	5	88.6	96.7 ± 3.1	0.575	8.64×10^2
9627-G-054	1	91.7	863 ± 20	1.68	2.83×10^2
	2	88.6	110 ± 3	0.916	1.21×10^3
	3	86.9	117 ± 3	0.135	1.77×10^2
	4	90.2	86.5 ± 2.8	0.313	5.25×10^2
	5	85.5	74.3 ± 2.7	0.0977	1.91×10^2

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
9628-I-059	1	97.7	0.86±0.12		
	2	95.4	5.18±0.46		
	3	86.4	0±0.29		
	4	88.0	1.9±0.2		
	5	86.6	9.77±0.58		
9655-I-057	1	94.8	$2.33\pm0.02\times10^3$		
	2	90.4	259±6		
	3	85.7	147±3		
	4	90.6	33.1±0.9		
	5	91.8	113±4		
9675-I-059	1	87.9	$1.95\pm0.03\times10^3$		
	2	96.3	917±20		
	3	88.5	631±17		
	4	92.4	713±18		
	5	85.6	211±5		
9676-I-061	1	89.2	$5.07\pm0.05\times10^3$	0.133	3.81
	2	99.1	$2.58\pm0.02\times10^3$		
	3	98.2	$1.19\pm0.01\times10^3$		
	4	94.9	209±4		
	5	98.4	298±3		
9693-I-059	1	93.5	111±2		
	2	97.7	205±5		
	3	91.4	161±3		
	4	97.6	42.6±1.6		
	5	91.3	63.8±1.8		

Table 3.7 (Continued)

B. Clean Slate I

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2558-F-054	1	86.7	3.2 ± 0.2	0.094	4.3×10^3
	2	96.9	134 ± 4	0.209	2.27×10^2
	3	87.3	114 ± 3	0.145	1.85×10^2
	4	91.6	1.9 ± 0.2	0.062	4.7×10^3
	5	88.3	28.3 ± 0.6	0.057	2.9×10^2
2589-F-024	1	90.2	12.9 ± 0.3	0.083	9.3×10^2
	2	92.5	3.1 ± 0.2	0.036	1.7×10^3
	3	83.2	3.2 ± 0.2	0.015	6.8×10^2
	4	90.4	3.0 ± 0.2	0.094	3.1×10^3
	5	85.9	3.0 ± 0.2	0.107	5.4×10^3
3317-P-024	1	89.2	2.0 ± 0.2	0.074	5.3×10^3
	2	89.3	0 ± 0.28	0.087	- -
	3	87.4	3.0 ± 0.2	0.026	1.3×10^3
	4	94.0	0 ± 0.29	0.093	- -
	5	92.3	0 ± 0.34	0.008	- -
3332-N-024	1	84.5	0 ± 0.34	1.009	- -
	2	93.5	29.5 ± 0.9	0.112	5.46×10^2
	3	84.9	2.1 ± 0.2	0.214	1.5×10^4
	4	90.6	2.0 ± 0.2	0.026	1.9×10^3
	5	88.3	0 ± 0.36	0.034	- -
3335-N-038	1	85.3	83.7 ± 2.6	0.332	5.81×10^2
	2	91.7	4.9 ± 0.3	0.048	1.4×10^3
	3	89.9	0 ± 0.31	0.009	- -
	4	89.4	2.3 ± 0.2	0.035	2.2×10^3
	5	91.6	26.5 ± 1.0	0.128	7.1×10^2
3415-L6,P21	1	89.7	309 ± 3		
	2	87.1	46.9 ± 0.8		
	3	98.9	33.1 ± 0.7		
	4	93.6	1.5 ± 0.2		
	5	89.0	5.12 ± 0.22		
3416-L5,P17	1	94.4	1.5 ± 0.1		
	2	93.5	0.94 ± 0.09		
	3	87.7	0 ± 0.42		
	4	98.3	2.5 ± 0.2		
	5	89.7	0.91 ± 0.09		
3417-L3,P17	1	89.7	18.3 ± 0.7		
	2	88.4	1.1 ± 0.1		
	3	90.3	2.7 ± 0.1		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}
3417-L3,P17	4	98.7	1.1 ± 0.2
	5	85.3	1.9 ± 0.2
3418-L2,P5	1	91.0	11.9 ± 0.4
	2	85.8	3.8 ± 0.3
	3	88.7	0 ± 0.38
	4	89.0	3.7 ± 0.2
	5	98.7	0 ± 0.22
3419-L6,P13	1	92.2	0 ± 0.28
	2	91.2	3.8 ± 0.3
	3	88.9	3.6 ± 0.2
	4	86.5	3.0 ± 0.3
	5	92.0	0 ± 0.34
3420-L5,P1	1	99.1	0 ± 0.24
	2	95.1	2.6 ± 0.2
	3	99.3	0 ± 0.22
	4	95.1	0 ± 0.35
	5	94.5	0 ± 0.36
3421-L3,P1	1	96.1	0 ± 0.37
	2	97.8	0 ± 0.36
	3	83.4	0 ± 0.44
	4	88.1	0 ± 0.39
	5	88.4	0 ± 0.46
3426-L9,P9	1	91.4	0 ± 0.29
	2	86.7	0 ± 0.34
	3	95.7	0 ± 0.32
	4	85.9	0 ± 0.27
	5	90.2	0 ± 0.32
3427-L8,P21	1	-*	$4.60 \pm 0.15 \times 10^3$
	2	93.3	$1.29 \pm 0.02 \times 10^3$
	3	99.5	64.3 ± 0.6
	4	89.0	27.9 ± 0.4
	5	90.3	385 ± 3
3428-L11,P17	1	94.5	0 ± 0.21
	2	87.1	0 ± 0.32
	3	90.2	0.96 ± 0.10
	4	98.0	0.95 ± 0.10
	5	92.9	0.88 ± 0.09

* Split analysis; see Table 3.23

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}		
3429-L9,P1	1	92.3	379 ± 5		
	2	83.5	30.7 ± 0.8		
	3	87.7	186 ± 5		
	4	96.9	33.2 ± 0.7		
	5	98.7	10.3 ± 0.3		
3430-L11,P1	1	91.0	2.8 ± 0.2		
	2	94.1	4.19 ± 0.21		
	3	89.7	81.0 ± 3.2		
	4	97.0	1.6 ± 0.1		
	5	88.4	2.7 ± 0.2		
3433-L15,P1	1	94.8	4.40 ± 0.22		
	2	85.8	6.34 ± 0.34		
	3	88.2	3.2 ± 0.2		
	4	88.2	5.12 ± 0.31		
	5	88.1	7.02 ± 0.32		
3435-L14,P5	1	-*	$3.58 \pm 0.12 \times 10^3$		
	2	85.6	$1.62 \pm 0.02 \times 10^3$		
	3	97.5	$1.55 \pm 0.03 \times 10^3$		
	5	91.9	446 ± 7		
3439-L12,P5	1	88.8	158 ± 5		
	2	91.6	71.4 ± 1.7		
	3	84.0	156 ± 4		
	4	89.1	99.0 ± 1.1		
	5	87.6	57.8 ± 0.9		
3440-L17,P17	1	97.9	$3.59 \pm 0.04 \times 10^3$		
	2	88.2	122 ± 3		
	3	97.7	129 ± 3		
	4	88.4	42.2 ± 0.8		
	5	95.3	32.2 ± 0.5		
3441-L21,P9	1	98.7	$3.12 \pm 0.03 \times 10^5$	0.942	0.438
	2	95.6	$6.54 \pm 0.08 \times 10^4$	0.247	0.549
	3	-*	$8.39 \pm 0.17 \times 10^3$	0.0257	0.445
	4	-*	$1.74 \pm 0.07 \times 10^4$	0.0871	0.726
	5	98.7	747 ± 10		
3442-L17,P9	1	89.0	$3.18 \pm 0.03 \times 10^3$	1.04	47.4
	2	87.1	$7.67 \pm 0.09 \times 10^3$	0.967	18.3
	3	88.3	879 ± 13	0.110	18.2
	4	90.2	257 ± 7	0.234	1.32×10^2

*Split analysis; see Table 3.23

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
3443-L21,P1	1	90.0	12.9 ± 0.4		
	2	89.2	36.8 ± 0.5		
	3	96.1	28.0 ± 0.6		
	4	84.8	5.71 ± 0.27		
	5	85.1	4.34 ± 0.23		
3447-L20,P21	1	-*	$1.50 \pm 0.02 \times 10^4$		
	2	93.8	532 ± 12		
	3	89.9	48.7 ± 0.8		
	4	83.5	5.47 ± 0.30		
	5	91.5	37.6 ± 0.7		
3450-L20,P5	1	97.2	$2.29 \pm 0.03 \times 10^5$	0.765	0.484
	2	65.9[a]	$1.14 \pm 0.02 \times 10^5$	0.0916	0.117
	3	96.9	$9.91 \pm 0.14 \times 10^3$	0.0790	1.16
	4	86.6	$8.85 \pm 0.09 \times 10^3$	0.108	1.77
	5	96.9	526 ± 13		
3451-L18,P5	1	90.3	111 ± 2		
	2	84.2	$2.24 \pm 0.04 \times 10^3$		
	3	93.3	$1.63 \pm 0.03 \times 10^3$		
	4	88.1	309 ± 10		
	5	91.1	210 ± 5		
3452-L20,P13	1	91.7	$8.66 \pm 0.24 \times 10^3$	3.37	56.5
	2	88.2	363 ± 10	0.132	1.32×10^2
	3	91.7	52.6 ± 1.3	0.243	6.71×10^2
	4	94.8	34.0 ± 1.0	0.066	2.82×10^2
	5	90.4	64.0 ± 1.7	0.149	3.44×10^2
3454-L23,P17	1	-*	$3.26 \pm 0.03 \times 10^4$	0.0944	0.421
	2	-*	$6.86 \pm 0.05 \times 10^3$	0.0126	0.267
	3	98.5	886 ± 13		
	4	96.9	$2.40 \pm 0.03 \times 10^3$		
	5	90.5	55.0 ± 1.1		
3458-L24,P5	1	86.3	$6.75 \pm 0.07 \times 10^4$		
	2	93.0	$1.34 \pm 0.02 \times 10^4$		
	3	95.6	$5.70 \pm 0.07 \times 10^3$		
	4	56.0[a]	$6.96 \pm 0.11 \times 10^3$		
	5	87.0	598 ± 13		
3460-L26,P13	1	83.5	$5.27 \pm 0.07 \times 10^3$		
	2	90.7	723 ± 15		
	3	90.7	424 ± 10		
	4	95.9	551 ± 12		
	5	99.1	199 ± 5		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}
3461-L26,P21	1	89.7	$1.21 \pm 0.03 \times 10^3$
	2	86.7	337 ± 8
	3	91.7	25.5 ± 0.8
	4	89.4	30.0 ± 0.9
	5	98.1	7.51 ± 0.44
3462-L26,P17	1	82.4	$3.02 \pm 0.03 \times 10^4$
	2	-*	$7.39 \pm 0.19 \times 10^3$
	3	-*	$3.96 \pm 0.19 \times 10^3$
	4	94.3	704 ± 11
	5	89.4	$1.29 \pm 0.02 \times 10^3$
3467-L29,P17	1	-*	$7.89 \pm 0.15 \times 10^3$
	2	89.1	$1.47 \pm 0.03 \times 10^3$
	3	87.6	168 ± 5
	4	88.0	376 ± 11
	5	91.4	68.4 ± 1.2

*Split Analysis; see Table 3.23

Table 3.7 (Continued)

C. Clean Slate II

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2229-D-028	1	90.3	$1.46 \pm 0.03 \times 10^3$	0.709	70.1
	2	85.3	227±7	0.454	2.91×10^2
	3	89.4	119±3	0.053	65
	4	98.1	15.6±0.4	0.064	6.0×10^2
	5	85.5	1.9±0.2	0.746	5.7×10^4
2273-DM-036-P11	1	93.6	$4.51 \pm 0.12 \times 10^3$	3.75	1.21×10^2
	2	89.5	$1.07 \pm 0.03 \times 10^3$	0.510	68.9
	3	86.2	263±7	0.176	97.3
	4	90.9	52.4±1.3	0.259	7.19×10^2
	5	92.4	36.7±1.6	0.057	2.3×10^2
2281-A-114	1	92.0	$6.48 \pm 0.14 \times 10^3$	0.952	21.3
	2	87.2	$1.72 \pm 0.03 \times 10^3$		
	3	97.0	621±14		
	4	87.6	291±9		
	5	88.2	407±10		
2282-A-102	1	92.7	$6.62 \pm 0.15 \times 10^3$	3.97	87.1
	2	99.6	$1.33 \pm 0.02 \times 10^3$		
	3	86.1	921±20		
	4	88.8	704±19		
	5	89.6	514±13		
2283-A-090	1	88.9	$7.53 \pm 0.17 \times 10^3$	3.49	67.4
	2	91.2	496±12		
	3	86.9	698±20		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2282-A-090	4	85.9	$1.46 \pm 0.02 \times 10^3$		
	5	90.8	257 ± 8		
2284-A-078	1	87.6	$6.73 \pm 0.16 \times 10^3$	3.81	82.3
	2	86.3	951 ± 17		
	3	85.6	563 ± 12		
	4	89.7	258 ± 5		
	5	85.1	407 ± 9		
2285-A-066	1	86.8	$8.76 \pm 0.20 \times 10^3$	3.17	52.6
	2	96.1	$2.14 \pm 0.04 \times 10^3$		
	3	86.2	$1.32 \pm 0.03 \times 10^3$		
	4	87.5	$1.57 \pm 0.03 \times 10^3$		
	5	91.2	384 ± 7		
2287-A-042	1	93.7	$1.99 \pm 0.04 \times 10^4$	2.54	18.5
	2	88.5	$2.06 \pm 0.04 \times 10^3$	0.546	38.5
	3	87.6	$1.69 \pm 0.03 \times 10^3$	1.40	1.20×10^2
	4	91.8	$4.66 \pm 2.11 \times 10^3$	4.32	1.35×10^2
	5	94.1	372 ± 10	0.434	1.69×10^2
2288-A-030	1	96.6	$2.60 \pm 0.05 \times 10^4$	6.75	37.7
	2	96.7	$1.35 \pm 0.02 \times 10^4$	5.22	56.2
	3	94.8	$4.29 \pm 0.06 \times 10^3$		
	4	93.8	$4.71 \pm 0.08 \times 10^3$		
	5	85.8	397 ± 8		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	Mean μg U	μg U/μg Pu
2289-A-018	1a 1b	94.9	$7.86 \pm 0.15 \times 10^3$	3.78 3.84	3.81	70.4
	2	98.7	$3.98 \pm 0.05 \times 10^3$			
	3	94.6	$2.11 \pm 0.04 \times 10^3$			
	4	88.5	$1.34 \pm 0.03 \times 10^3$			
	5	89.3	232 ± 6			
2290-A-006	1a 1b	96.1	$3.88 \pm 0.08 \times 10^3$	1.58×10^3 1.43×10^3	1.51×10^3	5.66×10^4
	2	93.5	959 ± 19			
	3	51.8[a]	315 ± 14			
	4	87.1	87.9 ± 2.2			
	5	96.7	60.8 ± 1.5			
2291-BM-04	1	89.5	$1.31 \pm 0.02 \times 10^4$	3.17		35.1
	2	92.1	$5.98 \pm 0.11 \times 10^3$			
	3	93.2	$1.15 \pm 0.02 \times 10^4$			
	4	90.6	$2.07 \pm 0.05 \times 10^3$			
	5	94.0	697 ± 15			
2292-BM-06	1	91.3	$1.71 \pm 0.03 \times 10^4$	11.7		99.4
	2	87.0	$9.33 \pm 0.16 \times 10^3$	6.28		97.7
	3	91.3	$6.68 \pm 0.15 \times 10^3$	5.33		1.16×10^2
	4	87.7	383 ± 12	0.416		1.58×10^2
	5	82.5	47.8 ± 2.1	0.162		4.92×10^2
2293-BM-08	1	85.4	$8.19 \pm 0.17 \times 10^3$	10.8		1.91×10^2
	2	86.6	$7.74 \pm 0.12 \times 10^3$			
	3	98.7	$2.99 \pm 0.05 \times 10^3$			

a - Sample spilled during analysis

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2293-BM-08	4	85.8	$1.45 \pm 0.03 \times 10^3$		
	5	92.0	23.6 ± 0.8		
2294-BM-10	1	88.5	$2.67 \pm 0.04 \times 10^4$	11.1	60.3
	2	93.7	$1.78 \pm 0.03 \times 10^3$		
	3	86.5	$1.13 \pm 0.03 \times 10^3$		
	4	96.1	62.9 ± 2.2		
	5	92.0	43.4 ± 0.9		
2295-BM-12	1	----	b		
	2	89.9	$6.46 \pm 0.11 \times 10^3$		
	3	95.8	$2.47 \pm 0.05 \times 10^3$		
	4	97.2	$2.15 \pm 0.05 \times 10^3$		
	5	87.5	905 ± 20		
2298-BI-13	1	98.4	$4.40 \pm 0.09 \times 10^3$		
	2	89.8	$1.00 \pm 0.02 \times 10^3$		
	3	94.4	5.02 ± 0.33		
	4	91.3	0 ± 0.44		
	5	97.4	2.0 ± 0.2		
2299-BI-03	1	96.4	$3.28 \pm 0.05 \times 10^3$		
	2	85.8	$4.12 \pm 0.07 \times 10^3$		
	3	95.3	61.3 ± 1.3		
	4	90.4	3.22 ± 0.21		
	5	88.8	80.1 ± 1.7		

b - Sample lost in analysis

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	Mean μg U	μg U/μg Pu
2302-TA-002	1	91.7	$1.85 \pm 0.08 \times 10^5$	105		82.7
	2	86.6	$4.02 \pm 0.07 \times 10^5$	61.9		22.3
	3	----	b			
	4	90.7	14.8 ± 0.6			
	5	68.6[a]	$2.87 \pm 0.04 \times 10^3$			
2303-TA-001	1a 1b	93.9	$1.60 \pm 0.02 \times 10^6$	8.35 9.11	8.73	0.794
	2	----	b			
	3a 3b	95.1	$3.64 \pm 0.05 \times 10^5$	154 177	166	66.1
	4	92.5	938 ± 22			
	5	89.9	59.2 ± 1.9			
2304-TB-001	1	92.2	$1.50 \pm 0.03 \times 10^5$	7.04		6.83
	2	85.9	$2.46 \pm 0.05 \times 10^3$			
	3	93.9	24.6 ± 0.9			
	4	90.4	5.37 ± 0.27			
	5	94.9	22.1 ± 0.7			
2309-L2,P21	1	86.9	$3.70 \pm 0.12 \times 10^3$	2.73		1.07×10^2
	2	88.7	870 ± 20	0.576		96.4
	3	95.2	235 ± 7	0.570		3.52×10^2
	4	86.3	184 ± 5	0.515		4.09×10^2
	5	90.2	53.7 ± 14	0.176		4.76×10^2
2348-L30,P5	1	89.8	42.5 ± 1.7	0.101		3.47×10^2
	2	82.7	21.1 ± 0.5	0.0216		1.49×10^2
	3	87.8	32.2 ± 0.9	0.150		6.44×10^2

a - Sample spilled during analysis
b - Sample lost in analysis

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2348-L30,P5	4	93.1	30.9±0.8	0.0930	4.37×10^2
	5	87.8	5.18±0.27	0.0385	1.09×10^3
2367-BBI-008	1	89.8	$4.96 \pm 0.11 \times 10^3$	12.3	3.61×10^2
	2	88.5	$5.25 \pm 0.16 \times 10^3$		
	3	99.4	$6.16 \pm 0.14 \times 10^3$		
	4	89.0	4.00±0.26		
	5	92.4	14.2±0.4		
2368-B-078	1	91.5	$6.80 \pm 0.15 \times 10^3$	29.4	6.28×10^2
	2	98.0	$1.03 \pm 0.02 \times 10^3$		
	3	84.4	779±17		
	4	88.9	365±8		
	5	87.5	122±3		
2372-B-026	1	88.8	$4.10 \pm 0.09 \times 10^3$		
	2	89.9	$1.32 \pm 0.03 \times 10^3$		
	3	91.2	640±10		
	4	90.7	185±4		
	5	90.2	12.1±0.4		
2373-B-054	1	91.0	$1.01 \pm 0.02 \times 10^4$	34.9	5.30×10^2
	2	88.4	$3.05 \pm 0.07 \times 10^3$		
	3	97.8	883±20		
	4	85.8	879±21		
	5	90.5	109±2		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2374-B-038	1	92.4	$3.41 \pm 0.06 \times 10^3$		
	2	93.0	$1.27 \pm 0.03 \times 10^3$		
	3	92.9	602 ± 15		
	4	93.0	201 ± 5		
	5	92.8	124 ± 5		
2375-B-080	1	86.1	$4.04 \pm 0.09 \times 10^3$		
	2	88.5	$1.38 \pm 0.04 \times 10^3$		
	3	89.7	282 ± 5		
	4	87.9	56.8 ± 2.4		
	5	96.3	86.4 ± 1.8		
2376-B-028	1	89.4	$5.18 \pm 0.13 \times 10^4$	23.9	66.9
	2	85.7	507 ± 12		
	3	88.8	652 ± 14		
	4	96.3	210 ± 5		
	5	86.4	60.3 ± 1.4		
2377-B-032	1	93.0	$2.67 \pm 0.05 \times 10^3$		
	2	92.9	954 ± 19		
	3	92.5	671 ± 15		
	4	91.6	$1.83 \pm 0.04 \times 10^3$		
	5	88.8	44.0 ± 0.9		
2378-B-022	1	88.1	$6.22 \pm 0.15 \times 10^3$	1.53	35.7
	2	89.5	$2.74 \pm 0.06 \times 10^3$		
	3	98.6	$1.17 \pm 0.03 \times 10^3$		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2378-B-022	4	92.6	751±15		
	5	89.5	62.6±1.7		
2379-B-050	1	91.2	$9.87\pm0.19\times10^3$	4.14	60.9
	2	90.8	$1.62\pm0.03\times10^3$		
	3	97.9	398±7		
	4	93.2	683±14		
	5	86.7	217±6		
2380-B-056	1	96.5	$4.41\pm0.09\times10^3$		
	2	96.3	$1.23\pm0.03\times10^3$		
	3	88.8	608±16		
	4	88.2	205±5		
	5	88.6	82.6±2.9		
2382-B-074	1	96.5	$5.09\pm0.14\times10^3$	7.59	2.17×10^2
	2	87.9	$1.66\pm0.03\times10^3$		
	3	97.4	902±20		
	4	88.7	375±8		
	5	89.2	137±3		
2383-B-062	1	91.0	$7.93\pm0.19\times10^3$		
	2	98.4	845±20		
	3	89.7	836±20		
	4	91.5	734±15		
	5	92.7	176±3		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}
2384-B-106	1	89.1	638±15
	2	95.8	867±20
	3	95.1	224±6
	4	91.9	22.6±0.6
	5	87.7	95.4±2.1

Table 3.7 (Continued)

D. Clean Slate III

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
4827-B-078	1	88.2	$2.28 \pm 0.04 \times 10^3$	0.193	12.3
	2	95.3	760±18	0.717	1.37×10^2
	3	86.8	149±5	0.075	73
	4	92.3	21.9±0.7	0.333	2.21×10^3
	5	86.1	9.92±0.27	0.504	7.48×10^3
4837-H-030	1	96.1	529±12		
	2	90.8	108±2		
	3	97.4	1.6±0.1		
	4	97.4	2.1±0.2		
	5	91.2	48.7±1.1		
4839-H-030	1	88.4	73.5±2.1		
	2	91.0	102±3		
	3	85.5	0±0.39		
	4	89.1	0±0.22		
	5	86.7	0±0.30		
4840-H-060	1	91.2	76.1±2.0		
	2	93.9	441±11		
	3	92.4	0±0.37		
	4	95.1	97.9±3.8		
	5	92.9	0±0.41		
4841-H-060	1	86.2	167±4		
	2	85.4	1.8±0.2		
	3	95.6	12.7±0.5		
	4	86.6	2.2±0.2		
	5	93.8	1.4±0.1		
4842-H-030	1	92.7	349±10	0.236	98.3
	2	96.3	13.4±0.4	0.221	2.40×10^3
	3	90.8	15.1±0.4	0.442	4.24×10^3
	4	87.7	9.95±0.26	0.229	3.34×10^3
	5	86.0	2.1±0.2	0.066	3.1×10^3
4843-H-030	1	99.6	493±12		
	2	89.9	58.1±2.3		
	3	90.8	0±0.31		
	4	92.4	537±11		
	5	91.7	12.9±0.3		

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}
4844-H-060	1	99.4	163±3
	2	91.3	19.2±0.7
	3	86.6	4.25±0.19
	4	93.2	2.8±0.3
	5	88.9	0±0.39
4845-H-030	1	90.5	676±13
	2	85.3	112±3
	3	98.2	0±0.22
	4	94.8	0±0.35
	5	86.7	6.62±0.38
4846-H-030	1	90.7	582±12
	2	94.1	6.75±0.28
	3	94.2	360±11
	4	89.0	41.6±1.5
	5	87.1	0±0.37
4847-H-030	1	98.9	693±17
	2	94.2	509±14
	3	90.6	61.5±1.5
	4	93.3	0±0.36
	5	96.5	0.82±0.08
4848-H-060	1	94.1	90.1±2.4
	2	87.9	0±0.29
	3	90.8	0±0.31
	4	92.6	0±0.35
	5	86.1	5.96±0.31
4849-H-060	1	86.5	132±3
	2	91.0	0±0.40
	3	98.6	0±0.34
	4	90.4	3.06±0.22
	5	88.0	2.0±0.2
4850-H-030	1	86.1	838±20
	2	91.8	64.9±2.4
	3	91.5	4.62±0.3
	4	91.4	176±5
	5	85.4	1.7±0.2
4851-H-060	1	93.4	0±0.31
	2	94.8	0±0.42
	3	94.7	0.72±0.07
	4	90.7	0±0.26
	5	88.9	0±0.45

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}
4852-H-060	1	88.2	134±3
	2	95.5	0±0.28
	3	88.0	5.42±0.42
	4	91.7	133±3
	5	98.9	0±0.27
4853-H-060	1	98.4	87.3±2.1
	2	92.6	3.80±0.23
	3	97.6	8.14±0.29
	4	96.2	10.1±0.4
	5	93.7	51.6±1.3
4854-H-090	1	93.2	30.2±1.2
	2	91.2	70.1±2.2
	3	98.2	16.0±0.4
	4	94.2	5.29±0.21
	5	98.1	27.8±0.9
4855-H-090	1	88.2	29.3±0.9
	2	97.4	41.4±1.2
	3	97.3	18.6±0.7
	4	93.5	5.54±0.34
	5	96.7	0±0.22
4856-H-090	1	90.3	4.39±0.37
	2	89.3	19.2±0.6
	3	98.7	6.73±0.29
	4	93.3	0±0.38
	5	89.3	3.32±0.25
4857-H-090	1	97.7	8.19±0.31
	2	91.4	39.6±1.1
	3	88.9	20.2±0.6
	4	89.6	7.49±0.34
	5	87.1	10.1±0.3
4858-H-060	1	92.3	124±3
	2	95.1	3.41±0.21
	3	93.3	0±0.28
	4	89.7	0±0.42
	5	90.2	2.93±0.20
4859-H-090	1	93.5	17.4±0.6
	2	96.1	29.6±1.0
	3	83.6	20.4±0.8
	4	95.2	4.00±0.26
	5	90.4	20.1±0.8

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}
4860-H-090	1	92.9	7.31±0.29
	2	85.8	30.6±0.8
	3	86.0	19.0±0.6
	4	86.7	6.44±0.29
	5	86.8	10.1±0.3
4861-H 090	1	87.6	45.7±1.5
	2	95.1	42.5±1.6
	3	94.2	24.3±1.0
	4	91.5	5.56±0.31
	5	89.4	7.37±0.29
4862-H-090	1	89.5	46.8±1.5
	2	87.7	32.2±1.3
	3	91.9	194±5
	4	89.7	12.5±0.4
	5	94.2	2.3±0.2
4863-H-090	1	98.2	24.8±0.9
	2	93.7	432±10
	3	96.1	14.1±0.4
	4	89.7	9.92±0.43
	5	99.2	9.59±0.4
4864-H-002	1	89.7	0±0.36
	2	98.7	0±0.31
	3	88.4	0.93±0.08
	4	91.3	0±0.27
	5	89.3	0±0.41
4868-H-026	1	91.7	8.52±0.32
	2	86.3	0±0.29
	3	85.8	3.7±0.3
	4	91.5	0±0.39
	5	99.0	0±0.42
4869-H-038	1	- -	b
	2	85.6	$1.04 \pm 0.02 \times 10^3$
	3	97.4	34.8±1.2
	4	87.2	0±0.33
	5	90.2	2.0±0.2
4871-H-050	1	94.6	332±5
	2	98.4	11.5±0.4
	3	94.8	0±0.21
	4	96.5	0±0.32
	5	93.6	10.5±0.4

b: Sample lost in processing

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}
4873-H-062	1	88.8	309±7
	2	90.3	10.1±0.4
	3	92.8	0.84±0.08
	4	84.3	43.1±1.1
	5	90.1	3.26±0.24
4874-H-086	1	90.7	146±5
	2	88.4	68.2±0.2
	3	93.9	19.6±0.5
	4	90.8	5.37±0.39
	5	89.3	6.33±0.33
4875-H-080	1	91.7	387±7
	2	87.9	151±5
	3	92.6	38.9±0.8
	4	93.6	10.2±0.4
	5	86.5	12.2±0.4
4877-H-098	1	99.2	0.53±0.05
	2	91.2	14.0±0.3
	3	98.8	6.90±0.47
	4	86.8	6.31±0.38
	5	89.8	1.5±0.1
4878-H-074	1	- -	b
	2	88.6	138±5
	3	89.4	28.0±0.9
	4	94.7	17.5±0.4
	5	- -	b
4879-H-110	1	82.7	12.6±0.4
	2	86.8	6.36±0.43
	3	93.0	2.2±0.2
	4	90.3	0±0.41
	5	99.6	0±0.34
4880-H-060	1	89.7	57.1±1.3
	2	90.5	66.2±1.5
	3	92.2	0.79±0.08
	4	88.4	15.6±0.6
	5	93.2	0±0.39

b: Sample lost in processing

Table 3.7 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	Mean μg U	μg U/μg Pu
4886-F-038	1	86.9	$3.54 \pm 0.06 \times 10^3$	1.60		65.5
	2	84.9	$1.77 \pm 0.04 \times 10^3$	1.13		94.3
	3	89.2	326 ± 7	0.289		1.31×10^2
	4	80.9	368 ± 8	0.444		1.77×10^2
	5	88.4	50.3 ± 1.6	0.129		3.78×10^2
4916-D-098	1	89.7	171 ± 5	0.159		1.37×10^2
	2	90.2	101 ± 3	0.205		2.97×10^2
	3	94.2	74.7 ± 2.5	1.15		2.27×10^3
	4	87.0	31.3 ± 1.1	0.150		5.40×10^2
	5	83.8	13.3 ± 0.4	0.024		2.7×10^2
4926-D-038	1	85.7	$1.29 \pm 0.03 \times 10^3$	0.753		86.5
	2	89.6	342 ± 8	0.240		1.03×10^2
	3	83.7	385 ± 9	0.227		86.5
	4	82.8	65.7 ± 2.1	0.177		3.97×10^2
	5	93.4	0 ± 0.43	0.127		- - -
4948-L-088	1a	94.1	240 ± 6	1.94	1.98	1.20×10^3
	1b			2.01		
	2	91.7	144 ± 3	0.469		4.73×10^2
	3	87.8	156 ± 3	0.313		2.93×10^2
	4	94.2	86.4 ± 1.9	0.303		5.09×10^2
	5	87.9	29.5 ± 0.6	0.219		1.08×10^3
4949-L-110	5	86.2	0 ± 0.42	0.975		- - -
5257-TB,P3	1	92.6	$8.43 \pm 0.20 \times 10^5$	6.78×10^2		1.17×10^2
	2	89.2	$5.71 \pm 0.07 \times 10^5$	4.16×10^2		1.07×10^2
	3	94.2	$3.64 \pm 0.05 \times 10^3$	9.84		3.96×10^2
	4	93.9	211 ± 5	0.0916		63.1
	5	90.6	0 ± 0.36	0.114		- - -

Table 3.8 Plutonium and Uranium Analyses of Andersen Impactor Samples

A. Double Tracks

Sample No.	Stage	Yield, %	dpm Pu^{239}
2011-L-058	1	89.7	$2.41 \pm 0.02 \times 10^3$
	2	91.8	39.4 ± 1.3
	3	96.1	43.5 ± 0.9
	4	91.2	24.7 ± 1.1
	6	86.0	10.5 ± 0.5
	7	87.9	11.7 ± 0.4
2023-L-040	1	98.4	0 ± 0.40
	2	99.1	0 ± 0.31
	3	90.1	0 ± 0.35
	4	94.4	0 ± 0.32
	6	87.1	0 ± 0.24
	7	89.7	0 ± 0.28
2027-L-034	1	89.2	0 ± 0.19
	2	88.8	0 ± 0.29
	3	90.1	0 ± 0.43
	4	98.9	0.73 ± 0.12
	6	90.7	0 ± 0.41
	7	90.1	0 ± 0.48
2058-L-070	1	87.5	141 ± 2
	2	97.0	$80.7 + 0.8$
	3	91.0	148 ± 2
	4	96.9	63.9 ± 1.2
	6	84.2	31.9 ± 1.3
	7	98.9	30.5 ± 0.7
2061-L-046	1	91.0	$1.43 \pm 0.01 \times 10^3$
	2	99.5	0 ± 0.22
	3	96.2	0 ± 0.44
	4	98.4	0 ± 0.31
	6	90.7	0 ± 0.29
	7	91.2	0 ± 0.33
2064-L-052	1	88.6	$1.73 \pm 0.02 \times 10^3$
	2	92.9	0 ± 0.31
	3	86.7	0 ± 0.42
	4	95.6	0 ± 0.26
	6	96.7	0 ± 0.29
	7	97.8	0 ± 0.39

Table 3.8 (Continued)

A. Double Tracks

Sample No.	Stage	Yield, %	dpm Pu^{239}
2809-J-046	1	89.1	936±11
	2	96.2	5.71±0.49
	3	92.9	7.63±0.58
	4	85.7	3.40±0.33
	7	90.6	1.2±0.1
2816-J-052	1	85.7	$1.32\pm0.02\times10^{3}$
	2	92.5	194±5
	3	95.5	13.3±0.8
	4	89.9	5.90±0.46
	6	90.4	51.0±2.0
	7	93.2	44.0±1.3
2819-J-034	1	88.5	0±0.33
	2	96.2	0.75±0.13
	3	95.6	0±0.31
	4	93.3	0±0.37
	6	93.3	0±0.31
	7	98.9	0±0.32

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2965-R-064	1	95.4	492±11	0.043	13
	2	91.3	502±8	1.26	364
	3	89.4	291±7	0.118	59.0
	4	83.9	579±12	0.073	18
	6	93.1	101±3	0.030	43
	7	87.8	98.0±2.5	0.008	1×10^{1}
3948-L-058	1	86.6	0±0.42	0.053	-
	2	90.6	0±0.34	0.0865	-
	3	88.1	9.41±0.32	0.369	5.69×10^{3}
	4	89.5	0±0.31	0.068	-
	7	91.8	108±3	0.076	1.02×10^{3}

Table 3.8 Plutonium and Uranium Analyses of Anderson Impactor Samples

B. Clean Slate I

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2608-D-034	1	93.4	3.8±0.3	0.192	7.4×10^3
	2	84.7	2.8±0.3	0.220	1.2×10^4
	3	84.2	2.6±0.2	0.047	2.6×10^3
	4	87.0	37.0±1.1	0.714	2.8×10^3
	6	91.6	5.3±0.3	0.086	2.4×10^3
	7	93.3	0±0.36	0.013	-
2646-L-034	1	96.2	627±17	0.496	115
	2	90.6	583±16	0.214	53.4
	3	84.5	48.4±1.4	0.012	37
	4	93.7	70.6±2.3	0.0312	64.2
	6	86.7	13.1±0.4	0.084	9.3×10^2
	7	88.5	$1.03 \pm 0.03 \times 10^3$	0.044	6.2
3385-H-034	1	90.4	3.7±0.2	0.115	4.6×10^3
	2	88.1	0±0.33	0.0794	-
	3	92.3	0±0.30	0.0852	-
	4	91.2	0±0.34	0.187	-
	6	86.5	1.2±0.1	0.007	1×10^3
	7	92.7	8.61±0.37	0.260	4.4×10^3

Table 3.8 (Continued)

C. Clean Slate II

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
3161-J-034	1	89.8	25.2±0.7	0.025	1.4×10^2
	2	91.9	7.80±0.29	0.050	9.3×10^2
	3	87.2	22.0±0.6	0.370	2.44×10^3
	4	90.7	9.94±0.28	0.067	1.0×10^3
	6	84.9	3.2±0.3	0.617	1.9×10^4
	7	85.2	0±0.38	0.008	- -
3171-L-046	1	92.1	29.5±0.7	0.075	3.7×10^2
	2	87.0	0±0.32	0.075	- -
	3	92.6	0±0.28	0.016	- -
	4	84.6	0±0.29	0.110	- -
	6	89.7	0±0.28	0.209	- -
	7	93.5	0±0.26	0.012	- -
3214-BC-06	1	89.1	0.99±0.12		
	2	93.4	0±0.45		
	3	90.9	0±0.28		
	4	91.7	0±0.38		
	6	97.7	0±0.41		
	7	91.7	0±0.33		
3217-BC-12	1	91.3	941±19		
	2	84.6	0±0.33		
	3	89.6	0±0.35		
	4	93.4	1.2±0.1		
	6	89.8	1.1±0.1		
	7	88.6	0±0.29		
3219-B-064	1	88.9	971±21	0.025	3.74
	2	89.0	377±10	$<5 \times 10^{-3}$	- -
	3	96.7	256±7	0.0261	14.8
	4	89.5	144±3	0.0379	38.2
	6	91.7	95.3±2.2		
	7	85.3	32.5±0.8		
3220-B-052	1	86.7	285±7		
	2	91.6	0±0.39		
	3	85.8	1.7±0.1		
	4	88.7	0.64±0.06		
	6	94.4	1.9±0.2		
	7	92.2	0±0.48		

Table 3.8 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	Mean μg U	μg U/μg Pu
3221-B-058	1	88.8	$4.01 \pm 0.09 \times 10^3$	0.796		28.8
	2	86.4	598 ± 18	0.176		42.6
	3	86.7	267 ± 7	0.080		30
	4	90.7	514 ± 14	0.276		78.1
	6	91.9	62.1 ± 2.0	0.110		257
	7	85.1	30.5 ± 0.9	0.228		1.04×10^3
3222-B-078	1a	92.2	$7.41 \pm 0.16 \times 10^3$	3.75	3.71	72.7
	1b				3.66	
	2	87.3	$5.13 \pm 0.12 \times 10^3$	1.82		51.6
	3	95.6	494 ± 10	0.966		284
	4	89.5	216 ± 5	0.270		181
	6	91.7	83.0 ± 1.9			
	7	88.9	61.4 ± 1.7			
3223-B-026	1	87.4	$8.03 \pm 0.17 \times 10^4$	20.6		37.3
	2	92.0	$1.06 \pm 0.03 \times 10^3$			
	3	92.4	0.83 ± 0.08			
	4	87.4	9.35 ± 0.31			
	6	95.5	5.52 ± 0.28			
	7	92.0	3.68 ± 0.21			
3224-B-042	1	91.5	2.4 ± 0.2			
	2	89.9	7.65 ± 0.31			
	3	89.4	0 ± 0.41			
	4	87.1	0 ± 0.47			
	6	92.4	2.2 ± 0.2			
	7	94.5	5.41 ± 0.19			
3227-B-034	1	93.7	$2.88 \pm 0.05 \times 10^3$			
	2	86.3	$1.20 \pm 0.03 \times 10^3$			
	3	92.1	$1.64 \pm 0.04 \times 10^3$			
	4	87.8	35.5 ± 0.9			
	6	90.7	2.5 ± 0.3			
	7	95.1	5.81 ± 0.37			

Table 3.8 (Continued)

D. Clean Slate III

Sample No.	Stage	Yield, %	dpm Pu^{239}
3249-H-070	1	88.9	38.2±1.0
	2	89.8	80.4±1.9
	3	86.7	54.0±1.4
	4	89.4	21.1±0.5
	6	84.2	16.6±0.4
	7	88.4	7.68±0.25
3251-H-094	1	85.3	0±0.42
	2	88.3	30.3±0.8
	3	92.2	15.5±0.4
	4	87.7	9.17±0.43
	6	87.9	7.79±0.38
	7	96.0	3.38±0.21
3252-H-106	1	87.5	0±0.47
	2	89.3	1.8±0.1
	3	94.2	4.42±0.21
	4	87.9	3.47±0.19
	6	89.2	0±0.32
	7	99.4	0.82±0.08
3253-H-118	1	91.4	0±0.32
	2	89.4	12.1±0.5
	3	84.2	0±0.26
	4	91.4	0±0.48
	6	86.8	0±0.38
	7	92.3	0±0.27
3254-H-010	1	90.9	0±0.35
	2	86.7	0±0.29
	3	90.5	0.74±0.07
	4	87.6	0±0.41
	6	89.9	0±0.43
	7	96.6	0±0.34
3255-H-034	1	88.1	$3.36\pm0.05\times10^{3}$
	2	94.3	0±0.35
	3	90.1	3.1±0.2
	4	91.2	0±0.28
	6	86.7	6.71±0.47
	7	95.5	0±0.39

Table 3.8 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
3288-L-010	1	91.8	0±0.43		
	2	89.1	6.11±0.32		
	3	93.5	1.9±0.2		
	4	89.2	2.0±0.2		
	6	93.6	1.4±0.1		
	7	98.6	0±0.34		
3277-J-082	1	90.4	99.4±3.5	0.061	90
	2	85.2	28.9±0.8	0.065	$3.3x10^2$
	3	97.6	88.8±2.2	0.126	$2.06x10^2$
	4	89.5	24.0±0.9	0.083	$5.0x10^2$
	6	89.8	29.0±0.8	0.092	$4.8x10^2$
	7	86.5	8.54±0.29	0.195	$3.31x10^3$
3289-L-022	1	98.7	0±0.41		
	2	90.4	1.0±0.1		
	3	88.0	0±0.22		
	4	86.9	0±0.27		
	6	93.7	0±0.39		
	7	89.5	0±0.32		
3290-L-046	1	94.4	$9.85±0.17x10^3$		
	2	93.3	5.83±0.32		
	3	94.3	0±0.28		
	4	96.6	0±0.37		
	6	90.7	0.87±0.09		
	7	98.2	0±0.39		
3295-L-094	1	97.8	6.63±0.22		
	2	91.4	8.02±0.31		
	3	84.8	12.7±0.4		
	4	95.1	0.94±0.09		
	6	88.5	11.6±0.3		
	7	86.7	28.0±0.7		
3296-L-082	1	90.1	12.5±0.4	0.304	$3.54x10^3$
	2	88.5	37.7	0.078	$3.0x10^2$
	3	91.9	115±3	0.027	34
	4	90.7	15.7±0.4	0.275	$2.65x10^3$
	6	93.2	12.4±0.4	0.210	$2.44x10^3$
	7	84.0	2.8±0.3	0.010	$5.3x10^2$

Table 3.8 (Continued)

Sample No.	Stage	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
3297-L-070	1	97.3	92.2±2.6		
	2	89.4	66.8±1.5		
	3	92.8	15.3±0.5		
	4	91.7	3.1±0.3		
	6	94.3	1.3±0.1		
	7	85.6	2.34±0.18		
4980-A-102	1	90.4	$1.11\pm0.03\times10^{3}$	0.294	38.5
	2	89.3	203±5	0.154	73.9
	3	87.0	187±6	0.209	1.62×10^{2}
	4	85.7	84.7±0.25	0.220	3.77×10^{2}
	6	90.2	57.5±1.8	0.768	1.94×10^{3}
	7	86.4	45.2±1.4	4.36	1.40×10^{4}
4985-BM-10	1	87.8	857±25	0.506	85.7
	2	92.3	688±20	0.463	97.4
	3	91.0	590±16	0.455	1.12×10^{2}
	4	84.7	111±4	0.083	1.1×10^{2}
	6	88.3	88.0±0.24	0.384	6.33×10^{2}
	7	89.3	17.9±0.4	0.247	2.01×10^{3}

Table 3.9 Plutonium and Uranium Analyses of Total Air Samples

A. Double Tracks

Sample No.	TAS Type	Yield, %	dpm Pu^{239}	μgU	μg U/μg Pu
2005-L-066	II	97.7	764 ± 9		
2007-L-020	D	93.8	194 ± 5	0.0762	56.9
2035-L-060	II	87.6	740 ± 15		
2038-L-048	D	95.4	$2.59 \pm 0.04 \times 10^3$		
2039-L-036	II	89.7	3.0 ± 0.2		
2055-L-054	II	88.8	18.7 ± 0.5		
2057-L-074	D	89.7	66.8 ± 2.8		
2062-L-090	D	92.9	85.9 ± 2.2	0.191	323
2527-A-072	D	86.3	287 ± 10	0.025	12
2709-H-060	II	94.2	$1.44 \pm 0.03 \times 10^3$	0.223	22.5
2783-J-078	D	97.2	17.6 ± 0.6		
2786-J-040	II	99.1	7.48 ± 0.41		
2793-J-060	II	84.8	97.2 ± 2.1		
2796-J-054	II	89.2	$1.02 \pm 0.01 \times 10^3$		
2805-J-048	II	94.8	10.4 ± 0.4		
2808-J-072	D	98.2	65.8 ± 2.8		
2810-J-066	II	99.1	$1.98 \pm 0.03 \times 10^3$		
2813-J-030	II	96.4	0 ± 0.45		
2888-N-068	D	90.1	541 ± 11	0.030	8.1
2939-R-054	II	88.9	47.7 ± 1.7	0.011	34
2989-B,L10,P21	I	----	a		
9648-I-057	D	98.2	$1.84 \pm 0.03 \times 10^3$		
9671-I-057	I	89.5	$1.74 \pm 0.03 \times 10^3$		
9692-I-059	D	99.1	$5.37 \pm 0.08 \times 10^3$		

a - Lost in analysis

Table 3.9 Plutonium and Uranium Analyses of Total Air Samples

B. Clean Slate 1

Sample No.	TAS Type	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
3012-L19,P17		94.6	$7.83 \pm 0.16 \times 10^4$	14.1	26.2
3014-L19,P1	I	97.3	98.1 ± 2.7		
3015-L-13,P17	I	87.9	8.77 ± 0.42		
3016-L13,P1	I	85.0	34.1 ± 1.1		
3018-L13,P9	I	85.6	$1.00 \pm 0.01 \times 10^5$	0.375	0.545
3019-A31,P9		91.5	136 ± 3	0.748	799
3022-L28,P5		87.7	22.7 ± 0.7	0.836	5.36×10^3
3026-L4,P21		94.3	69.0 ± 1.5	0.589	1.24×10^3
3027-L4,P5		93.8	4.36 ± 0.28	0.195	6.50×10^3
3029-L10,P21		93.7	$1.24 \pm 0.03 \times 10^4$	3.32	38.9
3033-L10,P5		94.7	25.6 ± 0.7	0.335	1.90×10^3
3035-L22,P5	I	91.8	$2.11 \pm 0.03 \times 10^4$	1.79	12.3
3036-L25,P17	I	86.0	$2.41 \pm 0.03 \times 10^4$	0.0190	0.114
3039-L22,P13	I	89.4	$2.72 \pm 0.02 \times 10^4$	0.0260	0.139
3040-L22,P21	I	57.0[a]	$1.51 \pm 0.03 \times 10^3$		
3070-P-048	II	90.5	3.3 ± 0.3	0.086	3.7×10^3
3078-P-024	D	88.6	$5.92 \pm 0.08 \times 10^4$	11.4	27.9
3491-J-026	II	89.2	13.3 ± 0.4	0.009	1×10^2
3505-J-040	D	94.6	0 ± 0.28	0.016	-----
3522-H-036	II	89.6	0 ± 0.37	0.028	-----
3543-F-036	II	87.9	1.9 ± 0.2	0.042	3.2×10^3
3570-N-030	II	94.7	0 ± 0.41	0.053	-----
3579-N-040	D	91.1	0 ± 0.36	0.021	-----

a - Reanalysis Date

Table 3.9 Plutonium and Uranium Analyses of Total Air Samples

C. Clean Slate II

Sample No.	Type	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
4036-F-018	II	88.5	$7.64 \pm 0.22 \times 10^3$		
4053-H-030	II	97.6	157 ± 12	0.004	4
4060-H-024	II	92.8	486 ± 13	0.243	72.5
4061-H-018	II	89.7	574 ± 14		
4070-L-024	II	76.1	320 ± 6		
4075-L-036	II	88.5	647 ± 15	0.247	55.5
4079-L-060	II	92.2	287 ± 7	0.146	73.7
4080-BM-03	D	83.8	$6.57 \pm 0.15 \times 10^4$		
4081-BM-05	D	98.8	$6.85 \pm 0.10 \times 10^4$	28.1	59.5
4083-BM-09	D	88.4	$3.35 \pm 0.05 \times 10^4$		
4085-BM-13	D	98.3	$2.93 \pm 0.04 \times 10^4$		
4086-BI-17	D	92.0	324 ± 7		
4089-BI-05	D	90.6	$3.86 \pm 0.04 \times 10^5$		
4090-BI-01	D	97.4	708 ± 14		
4091-BI-01	D	94.9	145 ± 3		
4092-BC-03	D	96.4	354 ± 8		
4094-BC-07	D	92.7	53.8 ± 1.4		
4095-BC-09	D	98.2	526 ± 11		
4096-BC-11	D	97.1	872 ± 15		
4098-A-120	D	88.1	$4.71 \pm 0.09 \times 10^3$	1.53	47.2
4099-A-108	D	97.5	$3.98 \pm 0.05 \times 10^4$	5.12	18.7
4100-A-096	D	97.3	$5.25 \pm 0.11 \times 10^3$	2.65	73.4
4115-A-084	D	89.4	$6.13 \pm 0.15 \times 10^3$	4.79	114
4117-A-048	D	86.7	$9.22 \pm 0.15 \times 10^3$	4.63	72.9
4118-A-072	D	95.1	$4.74 \pm 0.11 \times 10^3$	3.54	109

Table 3.9 (Continued)

Sample No.	Type	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu	Mean μg U
4119-A-024	D	86.7	$1.85 \pm 0.02 \times 10^5$	155	122	
4120-A-012	D	97.8	$4.34 \pm 0.08 \times 10^5$	176	36.5	
4121-A-000	D	99.1	$7.24 \pm 0.12 \times 10^4$	32.7	65.7	
4122-A-060	D	96.6	$2.43 \pm 0.04 \times 10^4$	18.2	109	
4138-J-054	II	94.8	48.4 ± 1.6	0.035	1.1×10^2	
4141-J-024	II	77.7	397 ± 8			
4153-D-020	D	98.5	$2.99 \pm 0.07 \times 10^4$			
4801-B-068	D	97.6	$2.03 \pm 0.05 \times 10^3$	1.24	88.6	
4802-B-040	D	98.3	$4.23 \pm 0.08 \times 10^3$	3.07	105	
4803-B-092	D	92.9	$3.92 \pm 0.05 \times 10^3$	2.65	98.1	
4804-B-014	--	97.6	$1.85 \pm 0.04 \times 10^4$	10.7	84.3	
4805-B-000	--	90.5	173 ± 5	0.0632	53.1	
4806-B-120	D	98.3	$4.97 \pm 0.11 \times 10^3$	2.34	68.4	
4807-B-064	I	96.1	$9.02 \pm 0.17 \times 10^3$			
4808-B-056	I	84.3	$9.31 \pm 0.15 \times 10^3$	0.756	11.8	
4809-B-060-a	II	95.5	$2.28 \pm 0.05 \times 10^3$	1.57	98.0	1.54
4809-B-060-b				1.50		
4811-B-078	II	88.4	66.7 ± 1.8			
4813-B-066	II	92.9	$3.08 \pm 0.07 \times 10^3$			
4814-B-068	D	92.8	$3.53 \pm 0.08 \times 10^3$	0.933	38.4	
4816-B-042	II	96.6	262 ± 5			
4817-B-024	II	81.7	$6.89 \pm 0.18 \times 10^3$			
4818-B-072	II	97.2	$3.42 \pm 0.05 \times 10^3$	1.22	51.9	
4819-B-036	II	90.0	$1.32 \pm 0.03 \times 10^3$	1.01	111	

Table 3.9 Plutonium and Uranium Analyses of Total Air Samples

D. Clean Slate III

Sample No.	TAS Type	Yield,%	dpm Pu^{239}	μg U	μg U/μg Pu
5033-H-060	II	85.9	34.7 ± 1.1		
5035-H-042	II	88.7	39.4 ± 1.2		
5037-H-054	II	94.6	$2.13 \pm 0.05 \times 10^3$	0.732	49.8
5038-H-006	II	97.8	47.0 ± 1.1		
5041-H-114	II	87.6	12.1 ± 0.4		
5043-H-090	II	91.2	45.0 ± 1.3	1.92	6.19×10^3
5044-H-064	I	94.4	444 ± 10		
5046-H-020	D	97.8	676 ± 14		
5047-H-100	D	87.5	710 ± 18		
5050-H-074	D	98.4	15.2 ± 0.5		
5059-F-090	II	89.3	319 ± 8	0.848	385
5090-K-084	I	88.1	115 ± 3	0.142	179
5109-L-006	II	93.9	28.4 ± 0.8		
5110-L-042	II	91.8	15.5 ± 0.4	0.274	2.56×10^3
5113-L-054	II	86.3	$1.67 \pm 0.03 \times 10^3$		
5118-L-114		90.2	25.9 ± 0.6	0.0625	35.1
5120-L-020	D	97.7	16.2 ± 0.5		
5126-B-030	II	84.7	143 ± 3	0.147	149
5132-B-090	II	88.2	591 ± 17	0.497	122
5166-A-024	D	90.6	$3.27 \pm 0.07 \times 10^3$	2.57	114
5186-CSI-N-096	D	93.9	46.6 ± 1.3	1.57	4.89×10^3
5191-CSI-N-090	D	92.9	122 ± 4	1.46	1.74×10^3

Table 3.9 (Continued)

Sample No.	TAS Type	Yield,%	dpm Pu^{239}
5207-CSI-02-MR	D	94.6	7.35 ± 0.38
5208-CSI-01-MR	D	96.3	204 ± 5
5209-CSI-04-MR	D	98.1	14.3 ± 0.4
5210-CSI-03-MR	D	97.6	48.3 ± 1.4
5214-CSI-05-MR	D	98.2	10.9 ± 0.3
5218-CSI-0-000	D	99.1	868 ± 20

Table 3.10 Plutonium Analysis of Double Tracks Gelman Sequential Air Samples

Sample Number	Position*	Yield, %	dpm Pu^{239}
3989-F-048	7:3.4	90.0	0±0.28
	7:4.7	88.1	0±0.35
	7:6.0	88.7	36.3±0.9
	7:7.3	93.9	79.1±0.20
	7:8.6	85.9	0±0.38
3994-F-068	22:9.3	83.9	0±0.41
	22:10.6	90.7	0±0.39
	23:1.2	92.4	31.4±0.9
	23:3.8	88.9	45.5±1.1
	23:6.4	83.4	205±5
	23:9.0	84.4	294±5
	23:11.6	86.8	347±7
	24:2.2	82.9	351±7
	24:4.8	88.3	258±6
	24:7.4	93.5	177±4
	24:10.0	84.9	174±5
	25:0.6	89.3	69.1±2.0
	25:3.2	92.0	38.5±0.8
	25:5.8	86.6	32.5±0.8
	25:8.4	84.7	22.9±0.7
	25:11.0	90.2	26.0±0.5
	26:1.6	90.0	6.61±0.32
	26:2.9	87.1	4.50±0.25

* In (feet:inches) from beginning of tape.

Table 3.11 Plutonium and Uranium Analyses of Fallout Collector Film Samples

A. Double Tracks

Sample No.	Yield,%	dpm Pu^{239}	μg U	μg U/μg Pu
8042-N-034	95.1	$3.04 \pm 0.04 \times 10^4$		
8042-N-036	a	$7.21 \pm 0.13 \times 10^4$		
8042-N-038	89.5	$7.04 \pm 0.09 \times 10^4$		
8042-N-042	89.6	$1.65 \pm 0.01 \times 10^5$	0.0478	0.0419
8042-N-044	95.6	$1.15 \pm 0.02 \times 10^5$		
8042-N-046	88.7	$2.12 \pm 0.02 \times 10^5$		
8042-N-062	89.1	$6.23 \pm 0.14 \times 10^4$		
8042-N-064	a	$3.63 \pm 0.08 \times 10^4$		
8042-N-066-A	87.6	$8.32 \pm 0.09 \times 10^3$		
8043-H-066-A	92.7	$5.29 \pm 0.09 \times 10^3$		
8043-H-066-B	98.7	$4.83 \pm 0.07 \times 10^3$		
8047-J-034	89.4	$2.36 \pm 0.02 \times 10^4$		
8047-J-040	94.2	$1.53 \pm 0.02 \times 10^5$		
8047-J-056	98.2	$1.46 \pm 0.02 \times 10^5$		
8049-L-040	99.0	$6.86 \pm 0.09 \times 10^4$		
8049-L-036	88.4	$8.38 \pm 0.06 \times 10^4$		
8049-L-040	99.0	$6.86 \pm 0.09 \times 10^4$		
8049-L-042	86.3	$1.97 \pm 0.02 \times 10^5$		
8049-L-044	87.3	$8.82 \pm 0.07 \times 10^4$		
8049-L-046-A	87.2	$1.49 \pm 0.02 \times 10^5$		
8049-L-046-B	93.4	$1.19 \pm 0.01 \times 10^5$		
8049-L-048	92.5	$2.61 \pm 0.01 \times 10^5$		
8049-L-050	a	$2.85 \pm 0.02 \times 10^5$	0.0521	0.0266
8049-L-052	89.1	$2.31 \pm 0.02 \times 10^5$		
8049-L-056	94.1	$1.64 \pm 0.02 \times 10^5$	0.0516	0.0457
8049-L-060	97.9	$9.08 \pm 0.07 \times 10^4$		
8049-L-062	84.9	$8.54 \pm 0.08 \times 10^4$		
8049-L-064	----	b		
10005-Stk-21	96.3	151 ± 4		
10005-Stk-23	97.2	308 ± 6		
10005-Stk-25	99.4	268 ± 5		
10005-Stk-27	89.9	399 ± 8		
10005-Stk-29	83.8	451 ± 6		
10005-Stk-31	84.8	395 ± 7		
10005-Stk-33	92.2	278 ± 4		
10005-Stk-35	95.9	237 ± 4		
10007-Stk-38	88.4	127 ± 3		
10007-Stk-39	92.3	95.9 ± 2.2		
10007-Stk-41	81.8	219 ± 2		
10007-Stk-43	88.9	460 ± 5		
10007-Stk-45	98.9	312 ± 6		
10007-Stk-47	94.1	395 ± 5		
10007-Stk-49	88.8	348 ± 7		
10007-Stk-51	90.4	$4.24 \pm 0.06 \times 10^3$		

a - Split analysis, see Table 3.23
b - Lost in analysis

Table 3.11 (Continued)

Sample No.	Yield,%	dpm Pu^{239}	μg U	Mean μg U	μg U/μg Pu
8108-BO-13	86.8	$1.88 \pm 0.02 \times 10^6$			
8108-BO-15	85.7	$1.25 \pm 0.02 \times 10^6$			
8108-BO-16	96.4	$8.12 \pm 0.09 \times 10^5$			
8108-CM-05.0	93.7	$3.64 \pm 0.04 \times 10^6$			
8108-CM-05.2	94.4	$1.51 \pm 0.01 \times 10^7$			
8108-CM-05.3	98.5	$1.99 \pm 0.02 \times 10^7$			
8108-CM-05.4	93.7	$1.04 \pm 0.02 \times 10^7$			
8108-CM-07.0A	92.9	$2.71 \pm 0.03 \times 10^7$			
8108-CM-07.0B	84.1	$1.05 \pm 0.01 \times 10^7$			
8108-CM-07.3-a	92.9	$5.91 \pm 0.07 \times 10^6$	371	365	8.97
8109-CM-07.3-b			359		
8109-BD-10	97.4	$3.25 \pm 0.05 \times 10^5$			
8109-BF-02	b	$7.87 \pm 0.12 \times 10^4$			
8109-BH-02	b	$4.44 \pm 0.10 \times 10^5$			
8109-BH-12	92.2	$3.45 \pm 0.04 \times 10^6$			
8109-BH-16	97.1	$4.09 \pm 0.06 \times 10^5$			
8109-BK-02	b	$4.45 \pm 0.03 \times 10^6$			
8109-BK-04	88.4	$1.27 \pm 0.02 \times 10^6$			
8109-BK-14	97.5	$1.25 \pm 0.02 \times 10^6$			
8109-BK-16	b	$7.80 \pm 0.06 \times 10^5$			
8112-D-026	89.4	$2.06 \pm 0.04 \times 10^6$			
8115-G-022	90.2	$3.08 \pm 0.5 \times 10^6$			
8113-E-020	91.6	$5.72 \pm 0.09 \times 10^6$			
8116-H-022	87.4	$2.33 \pm 0.05 \times 10^6$			
8117-J-024	85.7	$1.04 \pm 0.02 \times 10^6$			
818-L-024	94.5	$3.27 \pm 0.08 \times 10^5$			

Table 3.11 (Continued)

C. Clean Slate II

Sample No.	Yield,%	dpm Pu^{239}	μg U	μg U/μg Pu
8108-BM-00	----	a		
8108-BM-02	95.2	$1.10 \pm 0.01 \times 10^{7}$		
8108-BM-03	----	a		
8108-BM-05	88.3	$7.28 \pm 0.18 \times 10^{6}$		
8108-BM-06	b	a		
8108-BM-07	b	$2.83 \pm 0.04 \times 10^{6}$		
8108-BM-09	92.7	$3.01 \pm 0.03 \times 10^{6}$		
8108-BM-10	b	$3.91 \pm 0.04 \times 10^{6}$		
8108-BM-11	94.9	$4.79 \pm 0.04 \times 10^{6}$		
8108-BM-12	b	$3.94 \pm 0.06 \times 10^{6}$		
8108-BM-13	97.3	$3.05 \pm 0.03 \times 10^{6}$		
8108-BM-14	84.9	$1.32 \pm 0.01 \times 10^{6}$		
8108-BM-16	98.5	$4.63 \pm 0.05 \times 10^{5}$		
8108-BO-00	90.3	$2.04 \pm 0.05 \times 10^{6}$		
8108-BO-01	94.1	$1.35 \pm 0.01 \times 10^{7}$		
8108-BO-02	b	$2.26 \pm 0.02 \times 10^{7}$		
8108-BO-08	95.1	$2.13 \pm 0.03 \times 10^{6}$	180	12.2
8108-BO-09	84.6	$2.79 \pm 0.03 \times 10^{6}$		
8108-BO-10	97.7	$2.77 \pm 0.03 \times 10^{6}$		
8108-BO-11	87.8	$2.89 \pm 0.04 \times 10^{6}$		
8108-BO-12	91.2	$1.73 \pm 0.11 \times 10^{6}$		

a - Lost in analysis
b - Split analysis; see Table 3.23

Table 3.11 (Continued)

Sample No.	Yield,%	dpm Pu^{239}	µg U	µg U/µg Pu
10009-Stk-253	99.1	$3.31 \pm 0.04 \times 10^3$		
10009-Stk-254	88.4	$1.05 \pm 0.03 \times 10^4$		
10009-Stk-255	87.9	$4.30 \pm 0.05 \times 10^3$	0.0117	0.395
10009-Stk-256	96.3	$8.98 \pm 0.10 \times 10^3$		
10009-Stk-257	95.9	$7.03 \pm 0.08 \times 10^4$		
10009-Stk-258	92.6	$1.39 \pm 0.02 \times 10^4$		
10009-Stk-259	86.7	$5.61 \pm 0.05 \times 10^4$		
10009-Stk-260	87.3	$4.31 \pm 0.04 \times 10^4$		
10009-Stk-261	92.2	$5.11 \pm 0.05 \times 10^4$		
10009-Stk-262	95.8	$3.77 \pm 0.03 \times 10^4$		
10003-Stk-301	94.1	447 ± 6		
10003-Stk-302	95.2	668 ± 7		
10003-Stk-303	95.8	766 ± 8		
10003-Stk-304	93.9	980 ± 9		

B. Clean Slate I

Sample No.	Yield,%	dpm Pu^{239}	µg U	Mean µg U	µg U/µg Pu
8121-BM-13	86.5	$2.47 \pm 0.06 \times 10^3$			
8121-BO-04	98.7	$4.40 \pm 0.05 \times 10^6$			
8121-BO-05	91.8	$2.18 \pm 0.02 \times 10^7$			
8121-BO-06-a -b	86.5	$6.92 \pm 0.15 \times 10^6$	283 292	288	6.05
8121-BO-07	----	c			
8121-BO-08	----	c			
8121-BO-09	----	c			
8121-BO-12	----	c			
8121-BO-16	90.4	913 ± 22			
8121-CM-05.4	----	c			
8121-CM-07.0	98.8	$2.46 \pm 0.02 \times 10^7$			
8121-CM-07.1	99.4	$4.39 \pm 0.04 \times 10^6$			
8121-CM-07.2	98.0	$8.07 \pm 0.12 \times 10^5$	129		23.2
8121-CM-07.3	----	c			
8121-CM-07.4	----	c			

c - Lost in fire

Table 3.11 (Continued)

Sample No.	Yield,%	dpm Pu^{239}
8121-CM-11.0	----	c
8121-CM-11.1	----	c
8121-CM-11.2	----	c
8121-CM-11.4	----	c
8123-D-038	----	c
8124-H-036	88.8	$5.40 \pm 0.06 \times 10^4$
8125-J-026	----	c
8125-L-036	----	c
8125-L-040	93.4	$5.17 \pm 0.08 \times 10^3$
8125-L-046-A	87.3	$1.26 \pm 0.03 \times 10^3$
9924-Stk-807	91.2	692 ± 15
9924-Stk-808	95.1	714 ± 17
9924-Stk-809	87.1	932 ± 20
9924-Stk-810	86.6	485 ± 12
9924-Stk-811	88.1	295 ± 6
9924-Stk-812	88.3	984 ± 21

c - Lost in fire

Table 3.11 (Continued)

Sample No.	Yield,%	dpm Pu^{239}	μg U	μg U/μg Pu
10032-Stk-906	90.2	5.43 ± 0.33		
10032-Stk-907	92.0	50.8 ± 1.8	2.49	7.11×10^3
10032-Stk-915	98.8	23.0 ± 0.7	0.713	4.51×10^3
10032-Stk-919	97.4	23.3 ± 0.8	1.06	6.63×10^3
10059-Stk-829	96.6	74.8 ± 2.3		
10059-Stk-832	92.7	18.9 ± 0.6	1.53	1.18×10^4
10059-Stk-840	87.3	$8.52 \pm 0.19 \times 10^3$		
10059-Stk-845	92.8	209 ± 5		
10059-Stk-847	93.7	316 ± 5		

Table 3.11 (Continued)

D. Clean Slate III

Sample No.	Yield,%	dpm Pu^{239}	μg U	μg U/μg Pu
8160-H-030Y-1	95.4	$3.79 \pm 0.05 \times 10^5$	0.0127	0.0049
8160-H-030Y-2	92.7	$3.87 \pm 0.05 \times 10^5$	0.607	0.228
8160-H-030Y-3	98.3	$3.84 \pm 0.04 \times 10^5$	0.294	0.111
8160-H-030Y-4	95.5	$3.37 \pm 0.04 \times 10^5$	0.0753	0.0325
8160-H-030Y-5	93.6	$4.31 \pm 0.04 \times 10^5$	0.948	0.319
8160-H-030Y-6	98.4	$4.62 \pm 0.05 \times 10^5$	1.11	0.349
8160-H-030Y-7	97.3	$3.99 \pm 0.04 \times 10^5$	0.289	0.105
8160-H-030Y-8	92.8	$2.44 \pm 0.03 \times 10^5$	0.121	0.0720
8160-H-030Y-9	97.4	$2.81 \pm 0.03 \times 10^5$	0.166	0.0860
8160-H-030Y-10	95.8	$3.30 \pm 0.04 \times 10^5$	0.840	0.371
8160-H-060Y-1	86.5	$1.76 \pm 0.03 \times 10^3$		
8160-H-060Y-2	87.6	$1.84 \pm 0.03 \times 10^3$		
8160-H-060Y-3	92.6	$1.65 \pm 0.04 \times 10^3$		
8160-H-060Y-4	90.0	$1.81 \pm 0.04 \times 10^3$		
8160-H-060Y-5	94.2	$2.05 \pm 0.05 \times 10^3$		
8160-H-060Y-6	89.8	$2.60 \pm 0.06 \times 10^3$		
8160-H-060Y-7	88.8	$1.46 \pm 0.03 \times 10^3$		
8160-H-060Y-8	86.6	$2.10 \pm 0.05 \times 10^3$		
8160-H-060Y-9	85.4	$2.86 \pm 0.07 \times 10^3$		
8160-H-060Y-10	94.4	$2.01 \pm 0.05 \times 10^3$		
8160-H-074	93.9	$2.96 \pm 0.07 \times 10^3$		
8160-H-076	89.8	$2.67 \pm 0.07 \times 10^3$		
8160-H-086	90.7	622 ± 14		

Table 3.11 (Continued)

Sample No.	Yield,%	dpm Pu^{239}	μg U	μg U/μg Pu
8160-H-090Y-1	84.4	133 ± 4		
8160-H-090Y-2	87.3	117 ± 3		
8160-H-090Y-3	93.9	109 ± 3		
8160-H-090Y-4	89.0	132 ± 3		
8160-H-090Y-5	86.1	94.5 ± 2.9		
8160-H-090Y-6	87.1	119 ± 3		
8160-H-090Y-7	91.3	99.0 ± 2.8		
8160-H-090Y-8	84.6	93,2 ± 2.8		
8160-H-090Y-9	92.4	119 ± 3		
8160-H-090Y-10	95.4	118 ± 3		
8160-H-108	93.5	16.1 ± 0.4		
8161-J-034	96.7	$1.13 \pm 0.01 \times 10^6$		
8161-J-040	98.2	$8.77 \pm 0.09 \times 10^5$		
8161-J-042	92.7	$5.74 \pm 0.07 \times 10^5$		
8161-J-044	99.1	$3.78 \pm 0.04 \times 10^5$		
8161-J-046	92.4	$2.26 \pm 0.03 \times 10^5$		
8161-J-048	98.3	$9.85 \pm 0.10 \times 10^4$		
8161-J-050	96.3	$7.75 \pm 0.08 \times 10^4$		
8161-J-052	94.5	$4.86 \pm 0.06 \times 10^4$		
8161-J-054	92.9	$2.84 \pm 0.03 \times 10^4$		
8161-J-056A	----	a		
8161-J-072	----	a		
8162-L-006	86.6	514 ± 12	0.0141	3.98

a - Lost in analysis

Table 3.11 (Continued)

Sample No.	Yield,%	dpm Pu^{239}	μg U	μg U/μg Pu
8162-L-018	92.5	555 ± 13	0.0472	12.4
8162-L-034	94.4	$3.70 \pm 0.04 \times 10^5$	0.309	0.121
8162-L-036	96.7	$7.52 \pm 0.11 \times 10^5$	0.998	0.193
8162-L-040	97.2	$4.84 \pm 0.08 \times 10^5$	0.446	0.134
8162-L-042	97.5	$6.85 \pm 0.15 \times 10^5$		
8162-L-046	95.8	$2.58 \pm 0.05 \times 10^5$		
8162-L-048	93.9	$1.67 \pm 0.02 \times 10^5$		
8162-L-050	89.0	$9.47 \pm 0.16 \times 10^4$	0.114	0.175
8162-L-052	----	a		
8162-L-054	94.4	$3.10 \pm 0.07 \times 10^4$		
8162-L-056	87.3	$6.44 \pm 0.15 \times 10^3$		
8162-L-058	89.5	$4.94 \pm 0.07 \times 10^3$	0.0067	0.197
8163-F-024-1	93.1	495 ± 12		
8163-F-024-4	89.1	$2.35 \pm 0.05 \times 10^3$		
8163-F-032-1	94.1	$3.67 \pm 0.95 \times 10^4$		
8163-F-032-2	88.7	$3.18 \pm 0.05 \times 10^4$		
8163-F-032-3	83.9	$3.99 \pm 0.06 \times 10^4$		
8163-F-032-4	86.5	$5.56 \pm 0.11 \times 10^4$		
8163-F-032-5	91.4	$1.32 \pm 0.02 \times 10^5$		
10064-Stk-901	89.4	201 ± 5	3.73	2.70×10^3
10068-Stk-801	92.2	393 ± 9	2.01	742
10069-Stk-848	97.7	380 ± 9	5.04	1.92×10^3
10075-Stk-100	93.4	47.8 ± 1.5	1.95	5.93×10^3
10076-Stk-120	91.6	33.3 ± 1.4	1.64	7.16×10^3

a - Lost in analysis

Table 3.12 Plutonium and Uranium Analyses of Fallout Deposition Slides

A. Double Tracks

Sample No.	Yield %	dpm Pu^{239}	μg U	μg U/μg Pu
8035-B-066A	90.6	$2.10 \pm 0.05 \times 10^3$	0.131	9.02
8035-D-058	87.3	$1.14 \pm 0.03 \times 10^3$	0.058	7.3
8038-CM-09.0	91.2	$6.42 \pm 0.15 \times 10^3$	0.373	8.44
8038-F-046H	88.5	$1.25 \pm 0.02 \times 10^4$	0.279	3.24
8038-F-046B	89.7	$3.10 \pm 0.05 \times 10^3$	0.123	5.77
8038-F-056	93.8	$3.96 \pm 0.09 \times 10^3$	0.128	4.75
8038-H-044	92.9	$2.01 \pm 0.04 \times 10^4$	0.519	3.76
8038-H-048	96.4	$8.20 \pm 0.09 \times 10^3$	0.404	7.16
8038-L-046A	95.4	$1.30 \pm 0.04 \times 10^3$	0.057	6.4
8038-L-056	87.7	$5.72 \pm 0.09 \times 10^3$	0.729	18.5
8038-P-050	83.3	$2.31 \pm 0.04 \times 10^3$	0.242	15.2
10027 Stk. 261	87.6	$3.31 \pm 0.04 \times 10^3$	0.308	13.5

B. Clean Slate I

Sample No.	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
8080-BO-05	95.9	$6.31 \pm 0.09 \times 10^5$	449	103
8080-CO-05.2	87.2	$3.31 \pm 0.05 \times 10^5$	212	93.0
8080-B-024	91.6	$1.52 \pm 0.03 \times 10^5$	23.2	22.1
8080-D-030	90.9	$1.35 \pm 0.02 \times 10^4$	3.05	32.8
8082-F-030	95.9	$4.96 \pm 0.07 \times 10^4$	14.0	41.2
8082-J-028	89.5	$5.27 \pm 0.09 \times 10^4$	12.5	34.5
8082-L-028	93.1	$4.42 \pm 0.09 \times 10^4$	3.87	12.7
8084-N-034	88.9	$2.79 \pm 0.06 \times 10^3$	0.924	48.1
8084-O-030	89.3	$1.70 \pm 0.03 \times 10^4$	8.68	74.2
8084-P-032	92.6	$1.75 \pm 0.03 \times 10^4$	7.98	66.5
9908-Stk. 822	88.7	$1.36 \pm 0.04 \times 10^3$	1.43	153

Table 3.12 (Continued)

C. Clean Slate II

Sample No.	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
8101-C-066	91.5	$9.22 \pm 0.16 \times 10^3$	5.95	93.7
8101-E-024	88.3	$8.62 \pm 0.15 \times 10^4$	51.4	86.4
8103-G 020	86.6	$7.50 \pm 0.09 \times 10^4$	24.3	47.1
8103-L 026	89.2	$1.43 \pm 0.02 \times 10^4$	4.83	49.1
10057-Stk. 840	92.8	7.64 ± 0.38	0.296	5.63×10^3

D. Clean Slate III

Sample No.	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
8165-BH-04	- -	a		
8165-BM-14	84.8	$3.42 \pm 0.05 \times 10^4$	21.3	90.7
8165-B-028	93.3	$1.80 \pm 0.02 \times 10^5$	100	81.0
8167-C-022	86.4	$1.44 \pm 0.03 \times 10^5$	53.4	53.9
8167-E-034	90.3	$2.76 \pm 0.03 \times 10^5$	132	69.5
8167-G-032	86.7	$1.50 \pm 0.03 \times 10^5$	25.5	24.8
8167-H-034	90.2	$1.12 \pm 0.02 \times 10^5$	31.0	40.2
8167-L-040	87.3	$1.96 \pm 0.03 \times 10^4$	15.4	114
10072-Stk. 59	90.4	279 ± 7	0.659	343

a: Lost in analysis

Table 3.13 Gamma Spectrometric Analyses of Balloon Disk Samples

Sample Number	Event	dpm Am^{241}	dpm Pu^{239*}	Counting Date
3109-L12,P9	C. S. I	$5.95 \pm 0.07 \times 10^3$	$3.81 \pm 0.04 \times 10^5$	6/26/64
3110-L14,P9	"	$1.75 \pm 0.02 \times 10^4$	$1.12 \pm 0.01 \times 10^6$	6/26/64
3112-L20,P9	"	$2.38 \pm 0.02 \times 10^4$	$1.52 \pm 0.02 \times 10^6$	6/26/64
3113-L20,P17	"	$8.60 \pm 0.09 \times 10^3$	$5.50 \pm 0.06 \times 10^5$	6/26/64
3114-L19,P5	"	$4.02 \pm 0.05 \times 10^4$	$2.57 \pm 0.03 \times 10^6$	6/27/64
3118-L28,P9	"	$2.63 \pm 0.03 \times 10^4$	$1.68 \pm 0.02 \times 10^6$	5/ 8/64
3119-L28,P17	"	$7.52 \pm 0.08 \times 10^3$	$4.81 \pm 0.05 \times 10^5$	5/ 8/64
3120-L25,P5	"	$4.32 \pm 0.06 \times 10^3$	$2.76 \pm 0.04 \times 10^5$	5/ 8/64
3122-L24,P10	"	$4.09 \pm 0.04 \times 10^4$	$2.62 \pm 0.03 \times 10^6$	6/27/64
4105-L4,P17	C. S. II	$7.97 \pm 0.09 \times 10^3$	$5.10 \pm 0.06 \times 10^5$	5/14/64
4169-UK3,P8	"	$6.03 \pm 0.08 \times 10^3$	$3.86 \pm 0.05 \times 10^5$	5/15/64
4171-UK3,P12	"	$1.84 \pm 0.02 \times 10^4$	$1.18 \pm 0.02 \times 10^6$	5/14/64
4172-UK2,P14	"	$9.96 \pm 0.12 \times 10^3$	$6.37 \pm 0.08 \times 10^5$	5/12/64
4173-UK2,P12	"	$8.05 \pm 0.09 \times 10^3$	$5.15 \pm 0.06 \times 10^5$	5/15/64

* Plutonium activity based on the C. S. III dpm Pu^{239}/dpm Am^{241} of 64 (Ref. H. E. Menker, 5.2/5.3a Status Report and Presentation, April 14, 1964).

Table 3.14 Plutonium Analyses of Double Tracks Wire Swipe Samples

Sample Number	Yield, %	dpm Pu^{239}
5306-L1, P12, W1	99.1	$8.07 \pm 0.12 \times 10^4$
5306-L1, P12, W2	91.9	$4.05 \pm 0.07 \times 10^3$
5306-L1, P15, W1	90.1	$9.93 \pm 0.15 \times 10^4$
5306-L1, P15, W2	94.5	$1.21 \pm 0.01 \times 10^3$
5335-L4, P12, W1	97.2	$7.15 \pm 0.15 \times 10^3$
5335-L4, P12, W2	92.9	164 ± 5
5338-L5, P1	97.2	$1.08 \pm 0.01 \times 10^3$
5338-L5, P2	96.0	$5.67 \pm 0.08 \times 10^3$
5338-L5, P3	96.6	$3.53 \pm 0.05 \times 10^4$
5338-L5, P4	99.1	$6.85 \pm 0.07 \times 10^4$
5338-L5, P5	97.7	$5.08 \pm 0.05 \times 10^4$
5338-L5, P7	99.6	$2.82 \pm 0.04 \times 10^4$
5338-L5, P10	93.4	$2.09 \pm 0.05 \times 10^3$
5338-L5, P17	89.4	15.1 ± 0.4
5338-L5, P18	97.2	18.4 ± 1.4
5338-L5, P19	86.4	30.2 ± 0.7

Table 3.15 Plutonium and Uranium Analyses of Sticky Wire Particulate Samples

A. Double Tracks

Sample No.	Particle No.	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
2121-L12,P20	2	88.5	14.1±0.4	0.146	1.50×10^3
	3	91.7	129 ±3	0.134	151
	5c	96.6	15.5±0.6	0.0614	574
	6c	90.3	299 ±6	0.152	73.8
	8	- -	(1.5×10^3)[a]	- -	- -
	9	89.5	331 ±8	0.047	20.6
	10	91.2	301 ±8	0.0183	8.84
	13	94.6	$1.05 \pm 0.02 \times 10^3$	0.967	134
	14	90.9	946 ±15	0.098	15.1
	15	92.5	252 ±7	0.050	28.9
	16	97.8	$2.15 \pm 0.04 \times 10^3$	0.273	18.4
	18	86.4	$1.99 \pm 0.04 \times 10^3$	0.063	4.50
	19	87.3	19.4±0.9	0.132	985
	20	94.2	291±8	0.075	37.5
	21	91.1	$1.21 \pm 0.05 \times 10^3$	0.081	9.72
	22	90.8	118 ±5	0.0343	42.2
	23	90.5	$1.10 \pm 0.02 \times 10^3$	0.126	16.6
2469-L4,P9	3	- -	(40)[a]	- -	- -
	7	- -	(30)[a]	- -	- -
	8	92.7	199 ±7	0.092	67.2
	10	86.4	311 ±8	0.150	70.7
5306-J-L1,P13	1	92.7	582 ±7	0.070	17.5
	4	86.6	749 ±8	0.143	27.7
	7	89.9	646 ±8	0.310	69.2
5335-J-L4,P13	7	84.7	746 ±19	0.323	62.8
	14	88.6	57.2±2.3	0.107	272
	16	89.8	45.8±2.2	1.86	5.90×10^3
	20	94.2	747 ±9	0.093	18.1
	24	96.7	244 ±7	0.0804	47.9
	30	93.5	450 ±9	0.231	74.5

a: Sample lost in processing; Pu^{239} value from stippled disc of sample solution

Table 3.15 (Continued)

B. Clean Slate I

Sample No.	Particle No.	Yield, %	dpm Pu^{239}	μg U	μg U/μg Pu
5298-L13,P5	1	86.5	196 ±6	0.057	42.2
	2	92.4	126 ±4	0.121	140
	3c	91.4	982 ±15	0.573	84.8
	5c	- -	(250)[a]	- -	- -
	5	87.2	152 ±14	0.229	218
	7	93.8	1.6 ±0.2	0.075	6.8×10^3
5299-L17,P6	2	92.7	$1.40 \pm 0.02 \times 10^3$	0.095	9.85
	5	- -	(70)[a]	- -	- -
	7	86.1	293 ±7	0.010	4.95
5342-L19,P5	1	88.5	24.9±1.1	0.023	135
	2	- -	(70)[a]	- -	- -
	3	95.7	197 ±5	0.014	10.3
	4	92.4	581 ±6	0.291	72.8
	7	90.8	$1.73 \pm 0.03 \times 10^3$	0.634	53.3
	10	90.5	$1.62 \pm 0.02 \times 10^3$	0.377	33.7
	11	93.9	5.18±0.58	0.526	1.47×10^4

a: Sample lost in processing; Pu^{239} value from stippled disc of sample solution

Table 3.16 Plutonium Analysis of Sticky Wires and Shipping Containers

A. Double Tracks

Sample No.	Yield, %	dpm Pu^{239}	Total dpm Pu^{239}*
2121-L12,P20	69.3	$6.69 \pm 0.07 \times 10^5$	6.81×10^5
2445-L17,P13	81.9	$1.12 \pm 0.02 \times 10^6$	1.12×10^6
2469-L4,P8	64.0	$7.62 \pm 0.09 \times 10^5$	7.62×10^5
2469-L4,P9	69.5	$1.27 \pm 0.02 \times 10^6$	1.27×10^6
2908-L5,P7	72.7	$7.50 \pm 0.10 \times 10^5$	7.50×10^5
5306-J-L1,P13	64.3	$2.85 \pm 0.04 \times 10^5$	2.87×10^5
5335-J-L4,P13	59.0	$9.62 \pm 0.15 \times 10^4$	9.85×10^4

B. Clean Slate I

Sample No.	Yield, %	dpm Pu^{239}	Total dpm Pu^{239}*
5298-L13,P5	58.7	$5.56 \pm 0.07 \times 10^5$	5.58×10^5
5299-L17,P6	64.3	$1.15 \pm 0.03 \times 10^6$	1.15×10^6
5342-L19,P5	68.9	$1.46 \pm 0.03 \times 10^6$	1.46×10^6

* By addition of particle data, Table 3.15

Table 3.17 Plutonium Analyses of Solubility Study Samples

A. Clean Slate I

Sample No.	Sample Volume, Liters	Sample pH	dpm Pu^{239} Water[1]	Buffer[2]	0.1 NHCl[2]	Residue	Wash[3]	Total
2393-H-030	1.00	5.2	$1.98 \pm 0.03 \times 10^3$	$4.42 \pm 0.06 \times 10^4$	$7.76 \pm 0.15 \times 10^4$	$1.30 \pm 0.03 \times 10^5$	$1.47 \pm 0.03 \times 10^3$	2.55 ± 10^5
	% of Total		0.78	17.3	30.4	51.0	0.52	
3135-D-032	0.350	6.0	$1.23 \pm 0.02 \times 10^3$	$3.44 \pm 0.05 \times 10^3$	$1.26 \pm 0.03 \times 10^3$	$1.88 \pm 0.03 \times 10^4$	531 ± 14	2.53×10^4
	% of Total		4.9	13.6	5.0	74.3	2.2	

1. Sample filtrate
2. Disodium phosphate-citric acid buffer (pH 6.0) and 0.1 NHCl volumes of 300 ml in contact with the residue, stirred for 24 hours, and filtered
3. 100 ml hot, concentrated HNO_3 washing of sample bottle

Table 3.17 (Continued)

B. Clean Slate II

Sample No.	Sample Volume, Liters	Sample pH	dpm Pu^{239} Water[1]	Buffer[2]	0.1 NHCl[2]	Residue	Wash[3]	Total
2386-B-034	0.625	7.3	$1.92\pm0.03\times10^{4}$	$1.39\pm0.01\times10^{6}$	$4.78\pm0.06\times10^{5}$	$1.62\pm0.01\times10^{6}$	$1.48\pm0.03\times10^{4}$	3.52×10^{6}
	% of Total:		0.55	39.5	13.6	46.0	0.35	
2387-B-010	0.525	6.9	$4.37\pm0.06\times10^{4}$	$1.07\pm0.01\times10^{6}$	$2.37\pm0.03\times10^{6}$	$2.98\pm0.03\times10^{6}$	$3.56\pm0.04\times10^{4}$	6.50×10^{6}
	% of Total:		0.67	16.5	36.5	45.8	0.53	
2388-B-018	0.670	6.6	$1.56\pm0.02\times10^{4}$	$4.65\pm0.06\times10^{6}$	$3.04\pm0.04\times10^{6}$	$6.63\pm0.06\times10^{6}$	$4.04\pm0.06\times10^{4}$	1.44×10^{7}
	% of Total:		0.11	32.3	21.1	46.0	0.49	
2389-B-042	0.600	6.9	$7.36\pm0.09\times10^{4}$	$6.68\pm0.07\times10^{5}$	$1.12\pm0.02\times10^{5}$	$9.86\pm0.10\times10^{5}$	$1.44\pm0.02\times10^{4}$	1.85×10^{6}
	% of Total:		4.0	36.1	6.0	53.2	0.78	
2390-B-026	0.615	6.7	$2.85\pm0.04\times10^{4}$	$4.14\pm0.05\times10^{6}$	$1.04\pm0.01\times10^{6}$	$3.33\pm0.05\times10^{6}$	$4.10\pm0.06\times10^{4}$	4.48×10^{6}
	% of Total:		0.66	0.92	23.2	74.3	0.92	
2395-L-026	0.725	5.7	$1.16\pm0.03\times10^{3}$	$3.45\pm0.05\times10^{4}$	$5.10\pm0.07\times10^{4}$	$1.19\pm0.02\times10^{5}$	$2.10\pm0.04\times10^{3}$	2.08×10^{5}
	% of Total:		0.56	16.6	24.5	57.3	1.0	
2396-L-030	0.770	5.7	$1.74\pm0.03\times10^{3}$	$3.20\pm0.05\times10^{4}$	$1.36\pm0.03\times10^{4}$	$2.45\pm0.25\times10^{4}$	$1.58\pm0.03\times10^{3}$	7.34×10^{4}
	% of Total:		2.4	43.6	18.5	33.4	2.1	
4183-A-010	0.314	7.5	$1.23\pm0.03\times10^{4}$	$4.36\pm0.05\times10^{6}$	$3.83\pm0.04\times10^{6}$	$9.26\pm0.13\times10^{6}$	$3.32\pm0.05\times10^{4}$	1.75×10^{7}
	% of Total:		0.07	24.9	21.9	52.9	0.23	
4184-A-018	0.130	8.3	$1.81\pm0.03\times10^{4}$	$1.20\pm0.01\times10^{7}$	$7.63\pm0.08\times10^{5}$	$1.75\pm0.02\times10^{7}$	$7.11\pm0.09\times10^{4}$	3.04×10^{7}
	% of Total:		0.06	39.5	2.5	57.6	0.34	

Table 3.17 (Continued)

B. Clean Slate II, Continued

Sample No.	Sample Volume, Liters	Sample pH	dpm Pu^{239} Water[1]	Buffer[2]	0.1 NHCl[2]	Residue	Wash[3]	Total
4185-A-026	0.265	8.0	$6.31\pm0.09\times10^{3}$	$6.85\pm0.07\times10^{6}$	$1.94\pm0.02\times10^{6}$	$1.18\pm0.01\times10^{7}$	$3.99\pm0.05\times10^{5}$	2.10×10^{7}
	% of Total:		0.01	32.6	9.2	56.2	1.9	
4186-A-034	0.085	7.7	$4.10\pm0.06\times10^{4}$	$6.52\pm0.07\times10^{6}$	$1.87\pm0.02\times10^{5}$	$5.85\pm0.06\times10^{6}$	$5.67\pm0.07\times10^{4}$	1.27×10^{7}
	% of Total:		0.32	51.5	1.5	46.2	0.45	
	μg U		78.9	19.7	54.6	21.9	0.027	185
	$\frac{\mu g\ U}{\mu g\ Pu}$		280	0.44	42.3	0.543	0.069	2.12
4187-A-042	0.102	8.3	$4.66\pm0.07\times10^{4}$	$3.19\pm0.04\times10^{6}$	$1.13\pm0.02\times10^{5}$	$3.44\pm0.04\times10^{6}$	$3.62\pm0.05\times10^{4}$	6.83×10^{6}
	% of Total:		0.68	46.7	1.7	50.4	0.52	
4191-H-022	0.350	6.7	$5.14\pm0.07\times10^{3}$	$3.41\pm0.04\times10^{5}$	$3.57\pm0.05\times10^{5}$	$6.02\pm0.07\times10^{5}$	$4.04\pm0.06\times10^{4}$	1.35×10^{6}
	% of Total:		0.38	25.4	26.5	44.7	3.0	
4193-H-030	0.560	5.9	$2.69\pm0.05\times10^{3}$	$6.51\pm0.08\times10^{4}$	$5.22\pm0.07\times10^{4}$	$1.42\pm0.02\times10^{3}$	$4.38\pm0.07\times10^{3}$	2.66×10^{5}
	% of Total:		1.0	24.5	19.6	53.4	1.6	

C. Clean Slate III

5231-B-060	0.095	5.7	$2.21\pm0.04\times10^{3}$	$1.95\pm0.03\times10^{4}$	$1.13\pm0.03\times10^{4}$	$1.48\pm0.04\times10^{4}$	$1.55\pm0.03\times10^{3}$	4.94×10^{4}
	% of Total:		4.5	39.5	22.9	30.0	3.1	
5233-B-036	0.205	5.9	$1.31\pm0.02\times10^{4}$	$5.76\pm0.07\times10^{4}$	$5.27\pm0.09\times10^{3}$	$7.78\pm0.17\times10^{4}$	$4.71\pm0.09\times10^{3}$	1.58×10^{5}
	% of Total:		8.3	36.5	3.3	49.2	2.7	
5236-L-030	0.620	5.7	101 ± 3	$1.27\pm0.03\times10^{3}$	264 ± 4	$1.74\pm0.03\times10^{3}$	68.0 ± 1.9	3.44×10^{3}
	% of Total:		2.9	36.9	7.7	50.6	1.9	
5245-D-036	0.270	5.5	$6.33\pm0.18\times10^{3}$	$6.09\pm0.15\times10^{5}$	$2.17\pm0.06\times10^{5}$	$6.39\pm0.14\times10^{5}$	$2.81\pm0.06\times10^{4}$	1.50×10^{6}
	% of Total:		0.42	40.6	14.5	42.6	1.9	

Table 3.18 Plutonium and Uranium Analyses of Aluminum Fallout Collector Samples

Sample No.	Grams	Yield,%	dpm Pu^{239}	μg U	μg U/μg Pu	μg Pu(NRDL)/μg Pu(I.I.)**
A. Double Tracks						
9813-AJ-04	4.77	88.3	$3.85 \pm 0.12 \times 10^{3}$			4.5
9813-AJ-05	4.68	77.4	$1.59 \pm 0.05 \times 10^{6}$	3.83*	3.49	2.5
9813-AJ-06	6.19	87.8	$8.18 \pm 0.09 \times 10^{6}$	291	4.81	4.7
9813-AJ-08	3.13	82.4	$1.22 \pm 0.04 \times 10^{6}$			5.8
B. Clean Slate I						
9830-A-040	0.87	80.2	$1.01 \pm 0.02 \times 10^{7}$	(4.17×10^{3})*	60.0	1.1
9830-A-050	0.76	85.6	$1.94 \pm 0.04 \times 10^{6}$	(1.83×10^{3})*	137	1.1
9830-A-060	0.94	79.7	$7.83 \pm 0.22 \times 10^{5}$	475*	88.1	1.3
9831-BL-05	7.31	94.0	$1.04 \pm 0.02 \times 10^{6}$	232*	32.4	2.7
9831-BL-06	8.09	97.4	$3.05 \pm 0.04 \times 10^{7}$	(2.42×10^{4})*	115	4.2
9831-BL-08	6.14	84.8	$5.[illegible]2 \pm 0.04 \times 10^{7}$	(5.31×10^{3})*	13.7	2.8
9831-BL-09	6.82	98.5	$.62 \pm 0.08 \times 10^{6}$	(8.31×10^{3})*	158	2.7
C. Clean Slate II						
9845-D-070	1.74	84.5	$2.66 \pm 0.05 \times 10^{6}$	(1.29×10^{3})*	70.5	1.3

* U analysis by Project 5.2/5.3b.

** NRDL values by gamma assay **(Reference 1)**.

Table 3.19 Plutonium and Uranium Analysis of CSMRF Sized Soil Samples

A. Double Tracks

Sample No.	Fraction	g. Sample	Yield, %	dpm Pu^{239}	dpm Pu^{239}/g.	μg U	μg U/μg Total Pu
PCMR2-1	1	35.5	66.2	21.7±0.9	0.61	3.99	2.68×10^4
	2	41.5	43.9	46.3±2.5	1.1	6.22	1.95×10^4
	3	40.0	47.4	115 ±4	2.9	2.19	2.76×10^3
	4	89.0	49.1	212 ±8	2.4	5.04	3.45×10^3
PCMR2-2	1	46.6	48.3	15.3±1.1	0.33	3.62	3.45×10^4
	2	30.6	58.7	39.4±1.6	1.3	2.35	8.68×10^3
	3	50.6	39.6	13.6±1.0	0.27	1.24	1.33×10^4
	4	99.7	35.5	55.3±2.2	0.55	3.53	9.27×10^3
PCMR2-4	1	43.1	30.5	0±0.42	- -	3.66	- - -
	2	55.6	56.3	30.7±2.2	0.55	2.57	1.22×10^4
	3	69.1	34.0	10.0±0.6	0.14	0.680	9.89×10^3
	4	79.0	46.2	38.4±1.8	0.49	7.02	2.66×10^4
PCMR2-6	1	2.53	59.1	67.8±2.3	26.8	5.61	1.20×10^4
	2	108	32.4	70.3±4.1	0.65	6.49	1.34×10^4
	3	80.7	39.7	56.2±3.4	0.70	4.22	1.09×10^4
	4	83.1	27.4	35.7±2.1	0.43	5.76	2.34×10^4
PCMR2-7	1	28.0	45.7	71.8±3.9	2.6	18.8	3.81×10^4
	2	33.1	33.4	26.9±1.9	0.81	1.42	7.65×10^3
	3	58.8	62.6	96.0±5.1	1.6	3.60	5.44×10^3
	4	92.5	38.5	360 ±11	3.9	6.62	2.67×10^3
PCMR2-8	1	5.62	70.0	48.3±1.7	8.6	10.2	3.07×10^4
	2	29.7	45.3	$1.05 \pm 0.03 \times 10^3$	35.4	8.68	1.20×10^3
	3	72.8	39.4	323 ±8	4.4	8.08	3.64×10^3
	4	57.1	31.3	144 ±5	2.5	3.46	8.49×10^3
PCMR2-9	1	22.1	56.7	19.9±0.9	0.90	5.01	3.66×10^4
	2	64.5	39.8	$1.63 \pm 0.03 \times 10^3$	25.3	10.2	9.07×10^2
	3	68.2	47.2	83.0±3.3	1.2	2.43	4.25×10^3
	4	27.4	32.6	39.1±2.2	1.4	6.03	2.24×10^4

Table 3.19 (Continued)

Sample No.	Fraction	g. Sample	Yield, %	dpm Pu^{239}	dpm Pu^{239}/g.	μg U	μg U/μg Total Pu
PCMR2-11	1	0.181	81.8	5.06±0.29	30.0	2.08	5.98×10^{4}
	2	29.8	73.4	11.2±0.6	0.38	2.75	3.57×10^{4}
	3	153.6	24.8	64.6±2.7	0.42	7.65	1.72×10^{4}
	4	61.9	55.2	8.85±0.73	0.14	6.94	1.14×10^{5}
PCMR2-12	1	54.0	38.3	54.9±3.0	1.0	16.0	4.24×10^{4}
	2	58.9	55.1	107±4	1.8	1.94	2.63×10^{3}
	3	47.8	46.5	301±10	6.3	1.67	8.06×10^{2}
	4	117	33.5	742±25	6.3	2.49	4.87×10^{2}
J-050	1	57.7	52.7	$2.16 \pm 0.02 \times 10^{3}$	37.4	21.5	1.44×10^{3}
	2	100[a]	47.5	$8.35 \pm 0.09 \times 10^{2}$	3.4	19.8	3.45×10^{3}
	3	100[b]	39.6	$2.45 \pm 0.05 \times 10^{2}$	2.5	2.33	1.38×10^{3}
	4	100[c]	62.8	$3.17 \pm 0.05 \times 10^{3}$	31.7	12.9	5.93×10^{2}
	5	28.4	43.9	$7.70 \pm 0.19 \times 10^{3}$	271	17.3	3.27×10^{2}
	6	35.9	60.6	$6.27 \pm 0.06 \times 10^{4}$	1.75×10^{3}	84.7	1.96×10^{2}
	7	11.3	70.7	$1.62 \pm 0.04 \times 10^{4}$	1.43×10^{3}	4.31	3.85×10^{2}
	8	5.57	82.8	$3.05 \pm 0.11 \times 10^{3}$	548	2.58	1.23×10^{2}
	9	2.33	75.5	1.2±0.1	0.51	1.85	2.24×10^{5}
	10	0.183	61.9	476±13	2.60×10^{3}	11.5	3.51×10^{3}
	11	6.55	51.2	$2.06 \pm 0.07 \times 10^{3}$	315	14.5	1.02×10^{3}

a: 100 g aliquot of 154 g
b: 100 g aliquot of 286 g
c: 100 g aliquot of 414 g

Table 3.19 (Continued)

B. Clean Slate I Samples

Sample No.	Fraction	g. Sample	Yield, %	dpm Pu^{239}	dpm Pu^{239}/g.	μg U	μg U/μg Total Pu
PCMR2-A1	1	4.18	77.9	0±0.31	- -	13.7	- - -
	2	35.3	64.4	7.2±0.4	0.20	3.11	6.27×10^4
	3	63.9	39.5	15.7±0.4	0.25	6.97	6.45×10^4
	4	94.2	50.5	21.1±0.6	0.22	5.54	3.82×10^4
PCMR2-A3	1	6.18	68.8	74.5±2.9	12.1	12.1	2.36×10^4
	2	42.7	39.5	6.13±0.95	0.14	3.14	7.44×10^4
	3	88.7	49.3	23.0±0.9	0.26	9.02	5.71×10^4
	4	46.2	41.1	68.6±3.2	1.5	15.3	3.25×10^4
PCMR2-A4	1	22.0	37.9	1.2±0.2	0.05	5.99	7.25×10^5
	2	90.3	31.7	9.01±0.67	0.10	0.75	1.21×10^4
	3	85.4	48.6	11.7±0.9	0.14	4.89	6.07×10^4
	4	77.2	36.2	198±8	2.6	30.9	2.27×10^4
PCMR2-A5	1	16.5	41.7	112±4	6.8	24.8	3.22×10^4
	2	35.7	47.9	24.1±1.8	0.68	5.06	3.05×10^4
	3	43.0	29.7	7.60±0.72	0.18	2.55	4.88×10^4
	4	62.4	39.0	14.9±0.70	0.24	3.16	3.07×10^4

Table 3.19 (Continued)

C. Clean Slate II Samples

Sample	Fraction	g. Sample	Yield,%	dpm Pu^{239}	dpm Pu^{239}/g.	μg U	μg U/μg Total Pu
PCMR2-B1	1	19.9	27.2	537±18	27.0	37.4	1.01×10^{4}
	2	52.7	33.7	176±5	3.3	10.3	8.55×10^{3}
	3	60.5	49.4	262±7	4.3	13.9	7.72×10^{3}
	4	61.8	42.5	487±9	7.9	18.2	5.44×10^{3}
	5	7.39	52.3	621±17	84.0	13.1	3.07×10^{3}
	6	9.42	62.4	522±14	55.3	2.65	7.38×10^{2}
	7	3.04	49.8	537±15	177	1.94	5.24×10^{2}
	8	0.78	85.3	482±9	618	6.24	1.88×10^{3}
	9	0.35	74.7	111±3	317	2.02	2.64×10^{3}
	10	0.038	65.9	27.4±1.7	721	2.51	1.33×10^{4}
	11	0.511	73.1	35.7±1.5	69.9	8.63	3.51×10^{4}
PCMR2-B2	1	39.9	36.2	70.0±4.1	1.8	11.2	2.33×10^{4}
	2	53.5	38.5	291±7	5.4	2.74	1.37×10^{3}
	3	55.5	41.4	317±8	5.7	1.41	6.49×10^{2}
	4	59.7	34.7	344±8	5.8	2.77	1.17×10^{3}
	5	2.15	65.2	425±9	198	6.56	2.24×10^{3}
	6	5.55	53.7	486±11	87.5	5.49	1.64×10^{3}
	7	2.47	64.2	207±5	83.8	8.41	5.92×10^{3}
	8	1.17	81.6	74.5±2.9	63.7	11.7	2.28×10^{4}
	9	0.50	93.0	6.84±0.42	14	1.29	2.74×10^{4}
	10	0.46	81.6	12.8±0.6	28	9.43	1.07×10^{5}
	11	3.58	84.3	26.0±0.8	7.3	15.2	8.48×10^{4}
PCMR2-B3	1	58.7	42.1	54.5±2.6	0.93	15.3	4.07×10^{4}
	2	83.3	52.5	103±4	1.2	18.9	2.66×10^{4}
	3	22.1	40.6	86.0±2.7	3.9	4.30	7.27×10^{3}
	4	45.9	37.3	369±10	8.0	5.45	2.14×10^{3}
EIC-5	1	11.4	78.3	41.0±1.1	3.6	52.9	1.88×10^{5}
	2	19.6	86.2	$2.73\pm0.03\times10^{5}$	1.39×10^{4}	463	2.46×10^{2}
	3	55.6	37.9	$3.14\pm0.04\times10^{5}$	5.65×10^{3}	1.78×10^{3}	8.24×10^{2}
	4	72.1	43.3	$5.77\pm0.06\times10^{5}$	8.00×10^{3}	1.37×10^{3}	3.45×10^{2}

Table 3.19 (Continued)

Sample No.	Fraction	g. Sample	Yield, %	dpm Pu^{239}	dpm Pu^{239}/g.	μg U	μg U/μg Total Pu
EIC-9	1	10.1	80.2	90.9±0.4	9.0	38.2	6.10×10^{4}
	2	21.6	79.9	896±20	41.5	69.8	1.13×10^{4}
	3	498	62.4	$5.51 \pm 0.13 \times 10^{3}$	111	50.8	1.34×10^{3}
	4	74.8	60.7	$1.28 \pm 0.02 \times 10^{4}$	171	276	3.13×10^{3}
	5	1.27	53.5	$2.95 \pm 0.04 \times 10^{4}$	2.33×10^{4}	40.4	198
	6	7.82	65.2	$1.30 \pm 0.02 \times 10^{5}$	1.66×10^{4}	38.4	42.9
	7	3.28	76.1	$6.22 \pm 0.16 \times 10^{4}$	1.90×10^{4}	81.1	189
	8	2.83	81.7	$4.86 \pm 0.11 \times 10^{4}$	1.72×10^{4}	61.3	183
	9	1.56	55.3	$2.05 \pm 0.04 \times 10^{4}$	1.31×10^{4}	28.0	199
	10	1.66	69.6	$8.10 \pm 0.18 \times 10^{3}$	4.88×10^{3}	13.3	238
	11	11.1	73.1	$1.84 \pm 0.04 \times 10^{4}$	1.57×10^{3}	17.6	139
EIC-14	1	16.4	78.5	327±9	19.9	46.1	2.05×10^{4}
	2	19.3	848	$2.74 \pm 0.05 \times 10^{4}$	1.42×10^{3}	267	1.41×10^{3}
	3	49.6	38.9	$4.76 \pm 0.05 \times 10^{5}$	9.60×10^{3}	692	211
	4	75.7	43.7	$7.88 \pm 0.09 \times 10^{5}$	1.04×10^{4}	959	177

Table 3.19 (Continued)

D. Clean Slate III Samples

Sample No.	Fraction	g. Sample	Yield, %	dpm Pu^{239}	dpm Pu^{239}/g.	μg U	μg U/ μg Total Pu
PCMR2-C1	1	3.04	78.2	23.0±0.8	7.6	21.2	1.34×10^5
	2	67.3	57.1	39.4±2.1	0.59	14.3	5.27×10^4
	3	102	42.5	$1.83 \pm 0.04 \times 10^4$	179	81.3	645
	4	70.0	36.2	112±4	1.6	3.76	4.88×10^3
PCMR2-C2	1	24.0	28.6	4.33±0.71	0.18	2.46	8.26×10^4
	2	73.9	36.5	$4.12 \pm 0.08 \times 10^3$	55.8	57.9	2.04×10^3
	3	70.8	41.8	327±10	4.6	13.4	5.96×10^3
	4	54.7	39.9	73.9±3.6	1.4	5.50	1.08×10^4
PCMR2-C3	1	0.185	84.0	44.4±1.9	240	5.42	1.77×10^4
	2	21.1	34.4	6.89±0.47	0.33	1.27	2.68×10^4
	3	66.1	39.4	$1.43 \pm 0.03 \times 10^3$	21.6	29.2	2.97×10^3
	4	74.6	38.3	489±11	6.6	21.1	6.25×10^3
EIC-12B	1	6.59	76.9	$2.05 \pm 0.05 \times 10^3$	311	46.1	3.27×10^3
	2	20.1	87.1	$1.02 \pm 0.02 \times 10^6$	5.07×10^4	1.51×10^3	215
	3	61.4	30.6	$5.72 \pm 0.05 \times 10^5$	9.32×10^3	540	137
	4	65.7	42.7	$6.49 \pm 0.08 \times 10^5$	9.88×10^3	679	152
EIC-13	1	3.82	53.8	32.3±1.3	8.5	16.5	7.43×10^4
	2	16.4	80.7	423±13	25.8	55.3	1.90×10^4
	3	63.5	80.8	$7.77 \pm 0.08 \times 10^5$	1.22×10^4	1.29×10^3	242
	4	87.7	62.0	$5.40 \pm 0.07 \times 10^5$	6.16×10^3	640	172
EIC-14A	1	7.40	69.5	174±6	23.5	25.2	2.10×10^4
	2	15.1	70.9	$3.00 \pm 0.08 \times 10^3$	199	41.7	2.01×10^3
	3	63.8	46.4	$6.77 \pm 0.07 \times 10^5$	1.06×10^4	960	206
	4	67.2	29.4	$1.67 \pm 0.01 \times 10^6$	2.49×10^4	1.54×10^3	134

Table 3.20 Americium -241 Analyses of Clean Slate II Samples

Sample No.	Type	Yield, %	dpm Am^{241}	Counting Date	dpm Pu^{239}/dpm Am^{241}
4036-F-018	TAS II	48.7	149±4	9/19/64	51.3
4061-H-018	TAS II	43.5	12.3±0.6	10/ 7/64	46.7
4070-L-024	TAS II	57.5	7.31±0.66	11/16/64	43.8
4080-BM-03	TAS D	57.6	$1.44\pm0.04\times10^{3}$	11/15/64	50.3
4089-BI-05	TAS D	48.2	$7.76\pm0.19\times10^{3}$	9/19/64	49.8
4119-A-024	TAS D	56.5	$3.67\pm0.12\times10^{3}$	9/19/64	50.3
4141-J-024	TAS II	33.7		11/ 8/64	42.6
4153-D-020	TAS D	41.3	618±17	9/19/64	48.4
4817-B-024	TAS II	46.9	168±5	10/ 7/64	41.0
8108-BM-05	Film collector	60.7	$1.20\pm0.03\times10^{5}$	10/ 9/64	60.4
8108-CM-05.4	Film collector	46.5	$1.85\pm0.03\times10^{5}$	10/ 9/64	56.3
8112-D-026	Film collector	51.6	$3.90\pm0.12\times10^{4}$	9/19/64	52.8
8113-E-020	Film collector	43.7	$1.03\pm0.03\times10^{5}$	10/11/64	55.5
8115-G-022	Film collector	59.4	$5.82\pm0.13\times10^{4}$	10/ 9/64	52.9
8116-H-022	Film collector	67.8	$3.83\pm0.12\times10^{4}$	9/19/64	60.8
8117-J-024	Film collector	63.1	$1.93\pm0.07\times10^{4}$	9/19/64	53.9
8118-L-024	Film collector	47.2	$5.85\pm0.16\times10^{3}$	9/19/64	55.9
10058-Stk-840	Film collector	39.6	162±7	10/9/64	52.6

Table 3.21 Plutonium Analyses of Laboratory Blank Samples

A. Biological Laboratory Blanks

Sample No.	dpm $Pu^{239+236}$	Date	Remarks
1-A	0 ± 0.55^a	9/63	Porcelain evaporating dish leached with hot water containing Pu^{236} spike and processed through complete procedure.
3-A	0 ± 0.59^a	9/63	
2-D	0 ± 0.48^a	9/63	
4-D	0 ± 0.57^a		
2-A	0 ± 0.61^a	9/63	Steel beaker leached with hot water containing Pu^{236} spike and processed through complete procedure.
4-A	0.11 ± 0.33^a	9/63	
1-D	0 ± 0.55^a	9/63	
3-D	0 ± 0.59^a		
Cruc. 112-A	0 ± 0.44^a	9/63	5 mg iron and Pu^{236} spike fused with Na_2CO_3 in a platinum crucible and processed through complete procedure.
Cruc. 114-A	0 ± 0.51^a	9/63	
Cruc. 115-D	0 ± 0.50^a		
Cruc. 1130-D	0 ± 0.48^a		
P-9-T	0 ± 0.61^a	9/63	1 Kg pig kidney spiked with Pu^{236}, ashed in steel beaker, and processed through complete procedure.
P-10-T	0 ± 0.58^a	9/63	
P-11-Au	0.22 ± 0.53^a	9/63	1 Kg pig lung spiked with Pu^{236}, ashed in steel beaker, and processed through complete procedure.
P-12-Au	0.31 ± 0.78^a	9/63	
Cruc. 109-A	0 ± 0.42^a	10/63	- - - - -
Cruc. 111-D	0 ± 0.39^a	10/63	- - - - -
Cruc. 112-T	0 ± 0.38^a	10/63	- - - - -
Cruc. 114-Au	0 ± 0.44^a	10/63	- - - - -

a: dpm of Pu^{239} only

Table 3.21 (Continued)

A. Biological Laboratory Blanks

Sample No.	dpm $Pu^{239+236}$	Date	Remarks
Bl 000	0±0.08	11/4/63	Sample ashing dish leached with hot 6N HNO_3 containing 5 mg iron, evaporated, fused with Na_2CO_3 in a Pt crucible, and processed through complete procedure
Bl 00	0±0.11	11/4/63	
Bl 1	0±0.09	11/4/63	
Bl 2	0±0.15	10/28/63	
Bl 3	0±0.10	10/24/63	
Bl 4	0±0.14	11/5/63	
Bl 5	0±0.06	10/23/63	
Bl 5	0±0.18	11/13/63	
Bl 6	0±0.12	11/13/63	
Bl 10	0±0.13	11/19/63	
Bl 64	0±0.08	11/15/63	
Bl 211	0±0.15	11/18/63	
BKC	0±0.09	11/21/63	Pig livers placed in porcelain ashing dishes and surrounding a sample containing 200 dpm Pu^{236}; blanks ashed and processed through complete procedure.
MKC	0±0.12	11/21/63	
GKC	0±0.14	11/21/63	
KKC	0±0.16	11/21/63	
Bl 2	0±0	11/26/63	Sample ashing dish leached with hot 6N HNO_3 containing 5 mg iron, evaporated, fused with Na_2CO_3 in a Pt crucible, and processed through complete procedure
Bl 3	0±0.14	11/27/63	
Bl 4	0±0.06	11/27/63	
Bl 5	0±0	11/27/63	
Bl 6-1	0±0	12/5/63	
Bl 6-2	0±0	12/5/63	
Bl 7-1	0±0	11/27/63	
Bl 7-2	0±0.12	11/27/63	
Bl 8	0±0.17	11/27/63	
Bl 9	0±0.15	12/10/63	
BI-7	0±0.13	1/17/64	Sample ashing dish leached with hot 6N HNO_3 containing 5 mg iron, evaporated, fused with Na_2CO_3 in a Pt crucible, and processed through complete procedure.
B-4B	0±0	2/7/64	Sample ashing dish leached with hot 6N HNO_3 containing 5 mg iron, evaporated, fused with Na_2CO_3 in a Pt crucible, and processed through complete procedure
B 2	0±0.31	2/7/64	

Table 3.21 (Continued)

A. Biological Laboratory Blanks

Sample No.	dpm $Pu^{239+236}$	Date	Remarks
Bl-3	0±0.22	3/13/64	Sample ashing dish leached with hot 6N HNO_3 containing 5 mg iron, evaporated, fused with Na_2CO_3 in a Pt crucible, and processed through complete procedure
Bl-4	0±0	3/13/64	
Bl-4a	0±0.18	3/13/64	
Bl-5	0±0.10	3/13/64	
Bl-6	0±0	3/14/64	
Bl-7	0±0	3/14/64	
Bl-8	0±0	3/14/64	
Bl-9	0±0.14	3/14/64	
Bl-1q	0±0.26	3/15/64	
Bl-2q	0±0	3/15/64	
Bl-3q	0±0.21	3/15/64	
Bl-5a	0±0	3/15/64	
Bl-12q	0±0.12	3/15/64	
Bl-13q	0±0.10	3/15/64	
Bl-16q	0±0.24	3/15/64	
Bl-10	0±0.12	4/1/64	Sample ashing dish leached with hot 6N HNO_3 containing 5 mg iron, evaporated, fused with Na_2CO_3 in a Pt crucible, and processed through complete procedure
Bl-JM-1	0±0.32	4/15/64	
Bl-JM-2	0±0.21	4/15/64	

Table 3.21 (Continued)

B. Physical Laboratory Blanks

Sample No.	dpm $Pu^{239+236}$	Date	Remarks
P-1A	0±0.19	11/13/63	Blanks run during digestion of samples nominally containing 0 to 10 dpm Pu^{239}.
P-1B	0±0.13	11/19/63	
P-2A	0±0.15	11/14/63	Blanks run during digestion of samples nominally containing 10 to 100 dpm Pu^{239}.
P-2B	0±0.17	11/14/63	
P-2C	0±0.11	11/15/63	
P-2D	0±0.12	11/14/63	
P-2E	0±0.14	11/15/63	
P-2F	0±0.14	11/15/63	
P-2G	0±0.17	11/15/63	
P-3A	0±0.21	11/7/63	Blanks run during digestion of samples nominally containing 100 to 1000 dpm Pu^{239}.
P-3B	0±0.14	11/7/63	
P-4A	0±0.32	11/4/63	Blanks run during digestion of samples nominally containing 1000 to 10000 dpm Pu^{239}.
P-4B	0±0.19	11/5/63	
P-1C	0±0.11	11/26/63	Blanks run during digestion and analysis of samples nominally containing 0 to 10 dpm Pu^{239}.
P-4C	4.2±0.4	11/11/63	Blanks run during digestion and analysis of samples nominally containing 10^3 to 10^4 dpm Pu^{239}.
P-4F	2.1±0.3	11/19/63	
P-5A	11.9±0.8	12/19/63	Blanks run during digestion and analysis of samples nominally containing $>10^4$ dpm Pu^{239}.
P-5B	7.7±0.6	12/19/63	
P-1D	0±0.14	12/31/63	Blanks run during digestion and analysis of samples nominally containing 0 to 10 dpm Pu^{239}.
P-3C	0±0.26	12/2/63	Blanks run during digestion and analysis of samples nominally containing 100 to 1000 dpm Pu^{239}.
P-3D	0±0.18	12/23/63	
P-3E	0±0.32	12/23/63	
P-4D	1.7±0.2	12/10/63	Blanks run during digestion and analysis of samples nominally containing 10^3 to 10^4 dpm Pu^{239}.
P-4H	0±0.22	12/20/63	
P-4J	1.9±0.2	12/19/63	

Table 3.21 (Continued)

B. Physical Laboratory Blanks

Sample No.	dpm $Pu^{239+236}$	Date	Remarks
P-5D	1.2±0.2	12/10/63	Blanks run during digestion and analysis of samples nominally containing >10^4 dpm Pu^{239}.
P-5E	0±0.33	12/19/63	
P-5F	0±0.11	12/19/63	
P-5G	2.2±0.2	12/19/63	
P-1E	0±0.17	1/22/64	Blanks run during digestion and analysis of samples nominally containing 0 to 10 dpm Pu^{239}.
P-1E	0±0	1/22/64	
P-1G	0±0.22	1/24/64	
P-1H	0±0.34	1/24/64	
P-1J	0±0	1/31/64	
P-1K	0±0.19	1/21/64	
P-1L	0±0	1/21/64	
P-1M	0±0.18	1/26/64	
P-1N	0±0.27	1/27/64	
P-1P	0±0.14	1/27/64	
P-1Q	0±0	1/27/64	
P-2H	0±0	1/9/64	Blanks run during digestion and analysis of samples nominally containing 10 to 100 dpm Pu^{239}.
P-2K	0±0.38	1/10/64	
P-2L	0±0.29		
P-4G	0±0.39	1/3/64	Blanks run during digestion and analysis of samples nominally containing 10^3 to 10^4 dpm Pu^{239}.
P-5C	2.2±0.2	12/26/63	Blanks run during digestion and analysis of samples nominally containing >10^4 dpm Pu^{239}.
P-5H	3.4±0.3	12/30/63	
P-5J	0±0.36	1/3/64	
P-2M	0±0	2/3/64	Blanks run during digestion and analysis of samples nominally containing 10 to 100 dpm Pu^{239}
P-2N	0±0.22	2/4/64	
P-2P	0±0	2/4/64	
P-2a	0±0	2/5/64	
P-2R	0±0.14	2/5/64	
P-2S	0±0	2/5/64	
P-2T	0±0.18	2/6/64	
2-2V	0±0.16	2/6/64	

Table 3.21 (Continued)

B. Physical Laboratory Blanks

Sample Number	dpm $Pu^{239+236}$	Date	Remarks
P-2W	0±0	2/10/64	Blanks run during digestion and analysis of samples nominally containing 10 to 100 dpm Pu^{239}
P-2X	0±0.24	2/10/64	
P-2Y	0±0.18	2/10/64	
P-2Z	0±0	2/11/64	
P-2AA	0±0	2/11/64	
P-2BB	0±0.17	2/11/64	
P-2CC	0±0.10	2/12/64	
P-2DD	0±0.29	2/12/64	
P-2EE	0±0.25	2/12/64	
P-2FF	0±0.33	2/14/64	
P-2GG	0±0	2/14/64	
P-2HH	0±0.24	2/14/64	
P-3F	0±0.20	2/18/64	Blanks run during digestion and analysis of samples nominally containing 100 to 1000 dpm Pu^{239}
P-3G	0±0.34	2/18/64	
P-3H	0±0.29	2/25/64	
P-3J	0±0.32	3/5/64	
P-3K	0±0.12	3/3/64	
P-6A	2.2±0.2	4/6/64	Blanks run during digestion and analysis of samples nominally containing $>10^5$ dpm Pu^{239}.
P-6B	1.9±0.2	4/7/64	
P-7A	5.42±0.28	4/23/64	Blanks run during digestion and analysis of samples nominally containing $>10^6$ dpm Pu^{239}.
P-7B	3.34±0.21	4/24/64	
P-7C	3.55±0.24	4/24/64	

Table 3.22 Plutonium Analyses of Internal Laboratory Standard Samples

A. Biological Standard

Standard Value = 10.3±0.3 dpm Pu^{239}/ml

Std. No.	Pu^{236} Yield,%	dpm Pu^{239}/ml	Date
BAT-1	67.0	10.3±0.5	12/6/63
BAT-2	92.7	9.89±0.44	12/16/63
BAT-3	77.4	10.1±0.4	12/18/63
BAT-4	73.5	9.82±0.40	12/18/63
BAT-5	66.5	10.3±0.4	12/27/63
BAT-6	64.5	9.93±0.43	1/16/64
BAT-7	79.4	9.91±0.38	3/11/64
BAT-8	86.2	9.84±0.35	3/11/64
BAT-9	71.4	10.6±0.3	3/25/64
BAT-10	83.7	10.1±0.3	4/15/64
BAT-11	69.5	9.98±0.37	4/15/64

Mean = 10.1±0.2 or ±2.0% (S.D.)

Table 3.22 (Continued)

B. Physical Laboratory

Std. No.	Pu^{236} Yield, %	dpm Pu^{239}/ml	Date
PAT-1	90.5	84.9 ± 3.1	11/15/63
PAT-2	92.3	87.3 ± 3.1	11/15/63
PAT-3	98.5	92.0 ± 2.3	11/22/63
PAT-4	94.9	87.0 ± 2.1	11/22/63
PAT-5	90.3	94.8 ± 2.4	12/9/63
PAT-6	92.2	89.9 ± 2.0	12/10/63
PAT-7	95.3	88.5 ± 2.1	12/10/63
PAT-8	99.5	93.3 ± 1.8	12/10/63
PAT-9	96.4	92.2 ± 1.1	12/17/63
PAT-10	97.4	94.6 ± 1.4	12/30/63
PAT-11	89.5	89.7 ± 1.8	12/30/63
PAT-12	92.4	92.2 ± 2.1	1/28/64
PAT-13	91.7	91.0 ± 1.9	1/28/64
PAT-14	88.6	88.4 ± 1.9	2/12/64
PAT-15	94.5	91.0 ± 1.8	2/12/64
PAT-16	97.6	92.4 ± 2.0	2/12/64
PAT-17	91.3	89.5 ± 1.8	2/12/64
PAT-18	89.4	92.0 ± 1.9	3/23/64
PAT-19	92.9	91.7 ± 2.0	3/23/64
PAT-20	93.7	88.1 ± 1.7	3/23/64
PAT-21	88.2	87.9 ± 1.9	3/24/64
PAT-22	86.7	91.6 ± 2.0	3/24/64

Mean = 90.5 ± 2.6 or ± 2.9% (S.D.)

Table 3.23 Plutonium Analyses of Split Samples

A. Casella Impactors

Sample No.	Stage	Event	Yield, %	dpm Pu^{239}	Mean dpm Pu^{239}
3427-L8,P21	1a	C.S.1	88.3	$4.74 \pm 0.09 \times 10^3$	$4.60 \pm 0.15 \times 10^3$
	1b	"	94.9	$4.45 \pm 0.07 \times 10^3$	
3435-L14,P5	1a	"	86.8	$3.44 \pm 0.05 \times 10^3$	$3.58 \pm 0.12 \times 10^3$
	1b	"	95.7	$3.67 \pm 0.06 \times 10^3$	
3441-L21,P9	3a	"	88.5	$8.22 \pm 0.11 \times 10^3$	$8.39 \pm 0.17 \times 10^3$
	3b	"	93.4	$8.56 \pm 0.13 \times 10^3$	
	4a	"	86.0	$1.67 \pm 0.03 \times 10^4$	$1.74 \pm 0.07 \times 10^4$
	4b	"	85.8	$1.81 \pm 0.03 \times 10^4$	
3447-L20,P21	1a	"	93.0	$1.51 \pm 0.02 \times 10^4$	$1.50 \pm 0.02 \times 10^4$
	1b	"	98.7	$1.48 \pm 0.02 \times 10^4$	
3454-L23,P17	1a	"	97.4	$3.29 \pm 0.04 \times 10^4$	$3.26 \pm 0.03 \times 10^4$
	1b	"	93.8	$3.23 \pm 0.04 \times 10^4$	
	2a	"	94.3	$6.89 \pm 0.08 \times 10^3$	$6.85 \pm 0.05 \times 10^3$
	2b	"	98.8	$6.80 \pm 0.08 \times 10^3$	
3462-L27,P17	2a	"	95.7	$7.20 \pm 0.09 \times 10^3$	$7.39 \pm 0.19 \times 10^3$
	2b	"	94.3	$7.58 \pm 0.09 \times 10^3$	
3462-L27,P17	3a	"	90.5	$4.15 \pm 0.07 \times 10^3$	$3.96 \pm 0.19 \times 10^3$
	3b	"	98.3	$3.77 \pm 0.06 \times 10^3$	
3467-L29,P17	1a	"	84.9	$7.74 \pm 0.11 \times 10^3$	$7.89 \pm 0.15 \times 10^3$
	1b	"	90.4	$8.03 \pm 0.12 \times 10^3$	

Table 3.23 (Continued)

B. Fallout Film Collectors

Sample No.	Event	Yield, %	dpm Pu^{239}	Mean dpm Pu^{239}
8042-N-036a	D.T.	95.3	$7.08 \pm 0.05 \times 10^4$	$7.21 \pm 0.13 \times 10^4$
8042-N-036b	"	85.3	$7.34 \pm 0.06 \times 10^4$	
8042-N-064a	"	86.8	$3.70 \pm 0.03 \times 10^4$	$3.63 \pm 0.08 \times 10^4$
8042-N-064b	"	81.7	$3.55 \pm 0.04 \times 10^4$	
8049-L-050a	"	85.8	$2.87 \pm 0.03 \times 10^5$	$2.85 \pm 0.02 \times 10^5$
8049-L-050b	"	90.4	$2.82 \pm 0.02 \times 10^5$	
8109-BF-02a	C.S.2	98.7	$7.99 \pm 0.13 \times 10^4$	$7.87 \pm 0.12 \times 10^4$
8109-BF-02b	"	94.2	$7.95 \pm 0.13 \times 10^4$	
8109-BH-02a	"	97.8	$4.34 \pm 0.06 \times 10^5$	$4.44 \pm 0.10 \times 10^5$
8109-BH-02b	"	92.9	$4.53 \pm 0.06 \times 10^5$	
8109-BK-02a	"	94.6	$4.42 \pm 0.04 \times 10^6$	$4.45 \pm 0.03 \times 10^6$
8109-BK-02b	"	99.1	$4.48 \pm 0.04 \times 10^6$	
8109-BK-16a	"	95.4	$7.86 \pm 0.09 \times 10^5$	$7.80 \pm 0.06 \times 10^5$
8109-BK-16b	"	98.3	$7.73 \pm 0.09 \times 10^5$	
8108-BM-07a	"	88.9	$2.79 \pm 0.03 \times 10^6$	$2.83 \pm 0.04 \times 10^6$
8108-BM-07b	"	96.3	$2.87 \pm 0.03 \times 10^6$	
8108-BM-10a	"	96.6	$3.91 \pm 0.04 \times 10^6$	$3.91 \pm 0.04 \times 10^6$
8108-BM-10b	"	95.7	$3.91 \pm 0.04 \times 10^6$	
8108-BM-12a	"	92.9	$3.88 \pm 0.04 \times 10^6$	$3.94 \pm 0.06 \times 10^6$
8108-BM-12b	"	96.6	$4.01 \pm 0.04 \times 10^6$	
8108-BO-02a	"	91.4	$2.24 \pm 0.02 \times 10^7$	$2.26 \pm 0.02 \times 10^7$
8108-BO-02b	"	95.5	$2.27 \pm 0.02 \times 10^7$	

Table 3.24 Plutonium Analyses of University of Rochester Biological Quality-Control Samples

Sample No.	G. Sample	Yield, %	dpm Pu^{239}
1A	162	86.3	$1.18 \pm 0.02 \times 10^3$
2A	171	81.4	$1.99 \pm 0.04 \times 10^3$
3A	158	82.9	695 ± 19
4A	153	88.5	$2.52 \pm 0.05 \times 10^3$
5A	167	78.0	$1.39 \pm 0.03 \times 10^3$
6A	159	75.0	$4.16 \pm 0.10 \times 10^3$
7A	154	82.6	88.2 ± 2.2
8A	153	80.9	$2.03 \pm 0.04 \times 10^3$
9A	173	11.1*	$1.76 \pm 0.05 \times 10^3$
10A	168	79.2	$1.73 \pm 0.04 \times 10^3$
11A	155	78.5	868 ± 21
12A	165	87.1	539 ± 14
13A	170	73.7	$1.07 \pm 0.03 \times 10^3$
14A	162	79.9	721 ± 18
15A	151	36.7	$2.86 \pm 0.09 \times 10^3$
16A	159	67.7	628 ± 17
17A	135	76.1	737 ± 17
18A	146	86.3	182 ± 5
19A	165	49.9	194 ± 8
20A	168	62.7	863 ± 23
21A	164	59.5	578 ± 17
22A	163	60.5	$3.58 \pm 0.08 \times 10^3$
23A	160	69.6	999 ± 26
24A	176	47.7	$2.38 \pm 0.06 \times 10^3$
25A	142	58.7	616 ± 17
26A	159	61.5	$2.99 \pm 0.05 \times 10^3$
27A	166	89.4	81.1 ± 2.1
28A	155	69.3	387 ± 8
29A	149	63.3	331 ± 8
30A	150	72.4	280 ± 4
31A	141	64.0	$3.34 \pm 0.07 \times 10^3$
32A	161	63.7	$1.13 \pm 0.03 \times 10^3$
33A	125	50.4	$2.31 \pm 0.05 \times 10^3$
34A	134	82.2	401 ± 10
35A	157	76.1	$2.05 \pm 0.04 \times 10^3$
36A	174	58.7	$1.05 \pm 0.03 \times 10^3$
37A	186	57.9	175 ± 5
38A	130	37.2	$1.24 \pm 0.03 \times 10^3$
39A	134	66.6	741 ± 19
40A	157	84.2	$3.07 \pm 0.08 \times 10^3$
41A	158	79.0	0 ± 0.19
42A	177	81.4	6.08 ± 0.33
43A	165	44.8	3.95 ± 0.24

* Sample Spilled During Analysis

Table 3.25 Plutonium Analyses of External (Los Alamos) Standard Solutions

Sample Number	Yield, %	dpm Pu^{239}
CA-24	98.5	118 ± 3
CB-18	98.1	526 ± 12
CC-26	97.9	86.4 ± 2.6
CC-61	98.9	91.6 ± 2.7
CD-24	97.4	$5.23 \pm 0.11 \times 10^3$
CD-58	96.9	$5.14 \pm 0.11 \times 10^3$
222	96.1	1.1 ± 0.1
414	92.2	0 ± 0.18
546	95.9	0 ± 0.14
736	98.4	0 ± 0.19

Table 3.26 Uranium Analyses of External (Los Alamos) Standard Solutions

Standard Number	μg U/ml
AA-71	0.173
AB-81	0.488
AC-21	0.719
AC-72	0.761
222	0.143
414	0.187
546	0.129
736	0.302

CHAPTER 4

DISCUSSION

4.1 DATA RELIABILITY

As can be seen from the tables of sample data, plutonium activities encountered in the laboratory ranged through eight orders of magnitude. Since extreme variations in activity levels were to be expected, a stringent quality-control program was instituted at the beginning and maintained throughout the program. Constant monitoring of such items as plating anodes and cells, ion-exchange columns, crucibles, and other associated laboratory ware was provided in addition to the mandatory periodic analyses of blanks, splits, and standards. Absolute minimization of cross-contamination resulted from the exercise of great care in sample handling and processing, as well as a low-high activity schedule of analysis, as evidenced by data of a general order of <0.1% of the activities of the samples run concurrently with the blanks.

The high reliability of plutonium data is further demonstrated by 3% standard deviation from the mean of routinely analyzed sample splits and absolute standards.

REFERENCE

1. "Interim Summary Report-Appendixes"; Operation Roller Coaster, POIR-2500, Volume 2, September 1963; Confidential

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