

14804

REMEDIAL ACTION PROGRAM ON JEFFERSON COUNTY OPEN SPACE

LAND IN SECTION 7, T2S, R69W,

SOUTH OF GREAT WESTERN RESERVOIR

EAC-420-87-1

January 15, 1987

Prepared by: C. T. Illsley
Rockwell International
Rocky Flats Plant
P. O. Box 464
Golden, CO 80402-464

REVIEWED FOR CLASSIFICATION

BY S. L. CUNNINGHAM

Date 2/12/87 (U)

A-DU03-000280

INTRODUCTION

Regulations promulgated by the Colorado Department of Health (CDH) under Colorado Statutes require that land in an "area of concern" in the vicinity of the Rocky Flats Plant be sampled and analyzed for plutonium before construction activities may proceed. Furthermore, as part of the recent Federal Court Settlement Agreement for the Rocky Flats Plant land litigation, it was agreed that certain lands adjacent to the Plant would be evaluated for plutonium contamination. If it was determined that soil on these lands contains plutonium at concentrations greater than the CDH guideline, remedial actions would be initiated. The permissible level of radioactive material in uncontrolled areas as specified in RH4.27 of the Rules and Regulations Pertaining to Radiation Control, circulated by CDH in 1978 is 2 disintegrations per minute per gram (2 d/m/g) of dry soil or 0.90 pCi/g.

This report describes the sample collection, analytical data, evaluation of results for a parcel of land located immediately east of Rocky Flats. Remedial actions taken to fulfill the requirements of the State of Colorado on this land are also summarized.

SITE LOCATION

The sampled site is owned by the City of Broomfield and Jefferson County and lies within the "area of concern" as outlined by CDH. The land is located in the southern half of Section 7 and western half of Section 18, T2S, R69W. The area sampled is south of Great Western Reservoir, east of Indiana Street and north of West 96th Avenue (see Figure 1).

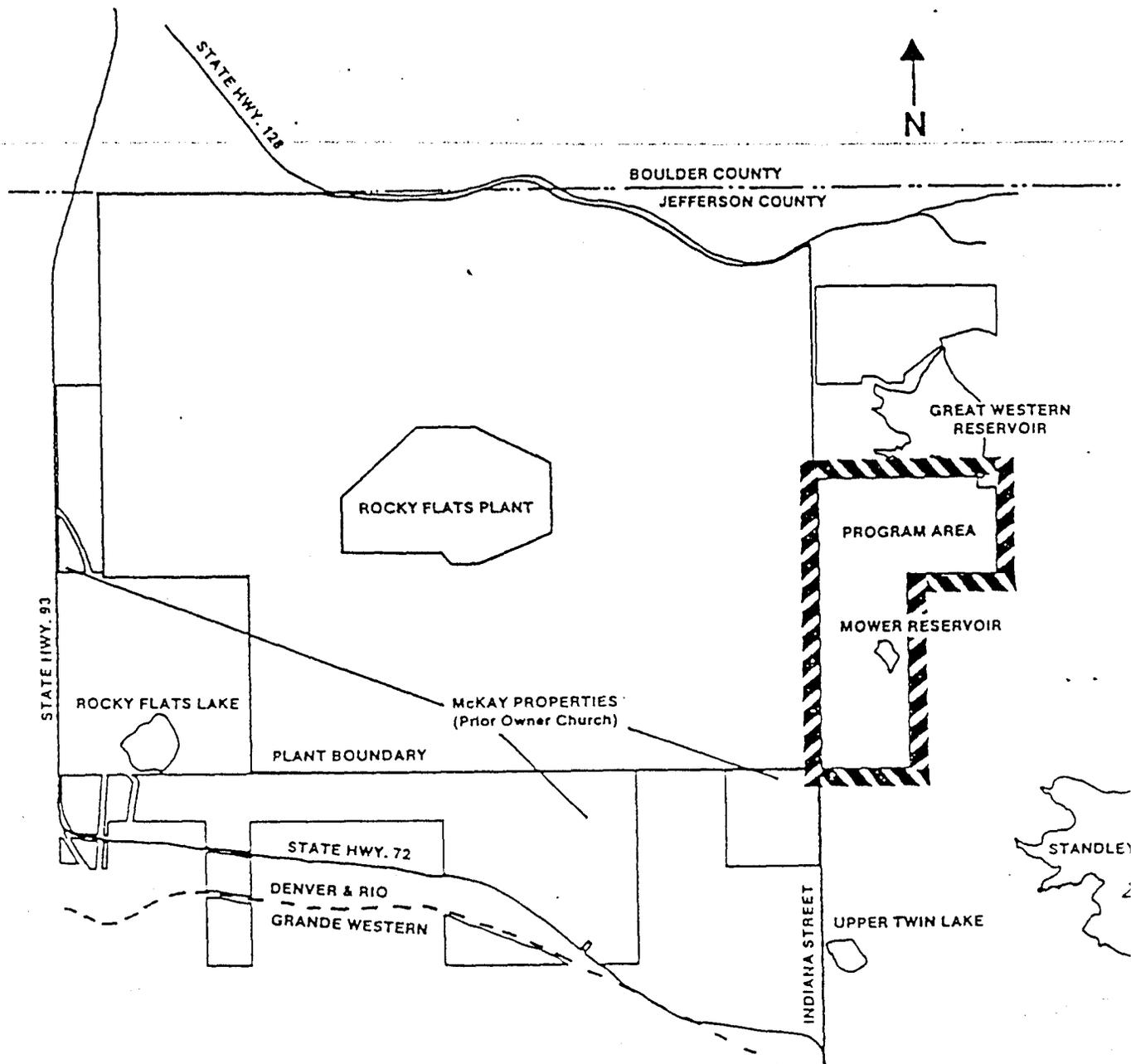


FIGURE 1. INDEX MAP SHOWING LOCATION OF PROGRAM AREA

LAND USE

The land was originally utilized as pasture for grazing livestock and as cropland for growing winter wheat. The cropland has been tilled for 25 years or more. Woman Creek flows eastward across the southern portion of the area into Standley Lake. A small irrigation ditch delivers water from Woman Creek to Mower Reservoir. The vegetation in the area consists of native grasses, various shrubs and small trees along Woman Creek and wheat stubble and weeds in wheat fields abandoned since 1980.

SAMPLE COLLECTION PROCEDURES

The boundaries of the area are well defined by barbed wire fences on all four sides. These boundaries were checked by professional surveyors from C. R. Moore and Associates (Rockwell contractor) and ADG Engineering Inc. (Jefferson County contractor). The site includes about 640 acres and the CDH guideline of one composite sample per each 10 acres was followed with minor modifications. The City of Broomfield land was divided into 10 - ten acre plots in order to include the entire triangular shaped area. This resulted in some overlap with two 10 acre plots in the recently acquired Jefferson County Open Space land. Fourteen 10 acre plots were established on the latter. The centers of each of these plots were located by professional surveyors from Drexel, Barrell and Company. These sites were selected from those utilized in the original soil sample testing program conducted by Rockwell and DOE in 1977.¹ The identities of these sites were agreed upon by CDH and Rockwell, based on the Rocky Flats Settlement Agreement. Each sample site was

divided into a sampling grid on a spacing of 165 feet. Sector and site boundaries were located using a Rolatape^R (Model 400). The locations for all subsamples were made by pacing. Soil samples were collected at each location using the CDH prescribed template and scoop. The 5 x 6 cm template was forced into the ground surface and the scoop was used to remove the top 1/8 inch (0.32 cm) of soil. The intent was to collect only the fine fraction of the topsoil. Most of the grass, sticks, seeds and rocks were removed from each sample before it was placed in a new one gallon paint can.

ANALYTICAL PROCEDURES

Sample preparation and analysis were performed according to standard procedures, approved by the Colorado Department of Health.^{2,3,4} The entire sample was dried at 100°C, sieved through a 10 mesh sieve, weighed and the fine portion was ball milled. The milled portion was sieved through a 35 mesh sieve and stored in plastic screw cap bottles. Ten gram aliquots of each sample were analyzed for plutonium. Blank soil and synthetic standard soils were blindly batched with every group of seven field samples in a random manner as quality controls in the radio-chemical laboratory.

Plutonium analyses were performed by Accu-Labs Research, Inc., 11485 W. 48th Avenue, Wheat Ridge, Colorado.

The soil samples were totally dissolved using a 40 percent solution of hydrofluoric acid. A plutonium-236 tracer was added to the soil before dissolution in order to determine chemical yield. After fuming with HF, the sample was brought to volume with nitric acid (HNO₃). Plutonium was separated from the solution with an anion exchange column.

The purified material was then eluted from the column and electroplated onto a polished steel disc. The radioactivity on the disc was measured in a solid state alpha spectrometer and recovery was determined from the tracer peak.

QUALITY CONTROL

During sample analysis, quality control consisted of blank soil analysis, standard soil analysis, reagent blank analysis and duplicate sample analysis. All samples were submitted to the analytical laboratory in a random and blind manner.

Accu-Labs Research, Inc. (ALR) operates under a rigorous Quality Assurance (QA) Program designed to comply with the Criteria for Nuclear Power Plants set forth in Title 10, Code of Federal Regulations, Part 50, Appendix B (10CFR50). This program also complies with the U.S. Nuclear Regulatory Commission (NRC) Quality Assurance specifications described in Regulatory Guide 4.15. The stringent system of controls and checks inherent in ALR's QA program ensures analytical results of the highest caliber.

ALR employs a number of procedures to monitor instrument efficiency, technician performance, method performance and overall accuracy and precision. Utilizing their QA program, ALR has been successful in becoming certified for radiochemical analyses by the Environmental Protection Agency (EPA) and other regulatory authorities.

RESULTS OF INITIAL ANALYSES

Table I summarizes the results of the initial radiochemical analyses of soil samples collected in 1985 before remedial action. Deviations reported are for the variability of the radioactive disintegration process (counting error) at the 95 percent confidence level (1.96 sigma). The data are also depicted on Figure 2 along with historical data from 1977.

CONCLUSIONS FROM INITIAL TESTING

The results of the radiochemical analyses show that three averaged analysis values for the soil standard (1.12, 1.02 and 1.01) agreed well with the standard value of 1.0 pCi/g. The average blank values (0.10, 0.01 and 0.005 pCi/g) are typical of many replicate analyses of the same soil sample.

The sample results are within the range from 0.46 to 5.6 pCi of plutonium per gram of dry soil. Fifteen values are greater than the Colorado Department of Health plutonium-in-soil standard of 0.90 pCi/g. It should also be noted that the maximum value of 5.6 pCi/g is about 30% of the EPA proposed screening level.⁵

It can be seen from Figure 2 that a comparison of the 1985 and 1977 results shows, with a few exceptions, that the more recent plutonium in soil concentrations are significantly less than the prior data at the same locations. These reductions are probably due to the eight year time

TABLE I
 ANALYSES OF SOIL SAMPLES FROM SECTION 7 AND 18,
 T2S, R69W.
 (Plutonium Concentrations in pCi/g)

<u>Sample No.</u>	<u>Site No.</u>	<u>Plutonium 239</u> + <u>Counting Error</u>
GWS 85-1	1	5.6 \pm 0.5
GWS 85-2	2	5.0 \pm 0.5
GWS 85-3	3	2.9 \pm 0.4
GWS 85-4	4	2.2 \pm 0.4
GWS 85-5	5	2.5 \pm 0.4
GWS 85-6	6	0.86 \pm 0.3
GWS 85-7	7	1.0 \pm 0.2
GWS 85-8	8	0.74 \pm 0.2
GWS 85-9	9	3.6 \pm 0.4
GWS 85-10	10	2.2 \pm 0.4
I 85-2	9	0.46 \pm 0.2
I 85-4	10	0.61 \pm 0.2
I 85-5	3	0.96 \pm 0.2
I 85-6	4	1.0 \pm 0.3
I 85-7	11	0.52 \pm 0.2
I 85-11	12	0.81 \pm 0.3
I 85-12	7	0.03 \pm 0.1
I 85-16	8	0.12 \pm 0.1
I 85-17	18	0.82 \pm 0.2
I 85-18	19	1.8 \pm 0.2
I 85-19	22	3.0 \pm 0.5
I 85-20	21	2.1 \pm 0.4
I 85-21	17	1.0 \pm 0.2
I 85-22	20	1.4 \pm 0.2

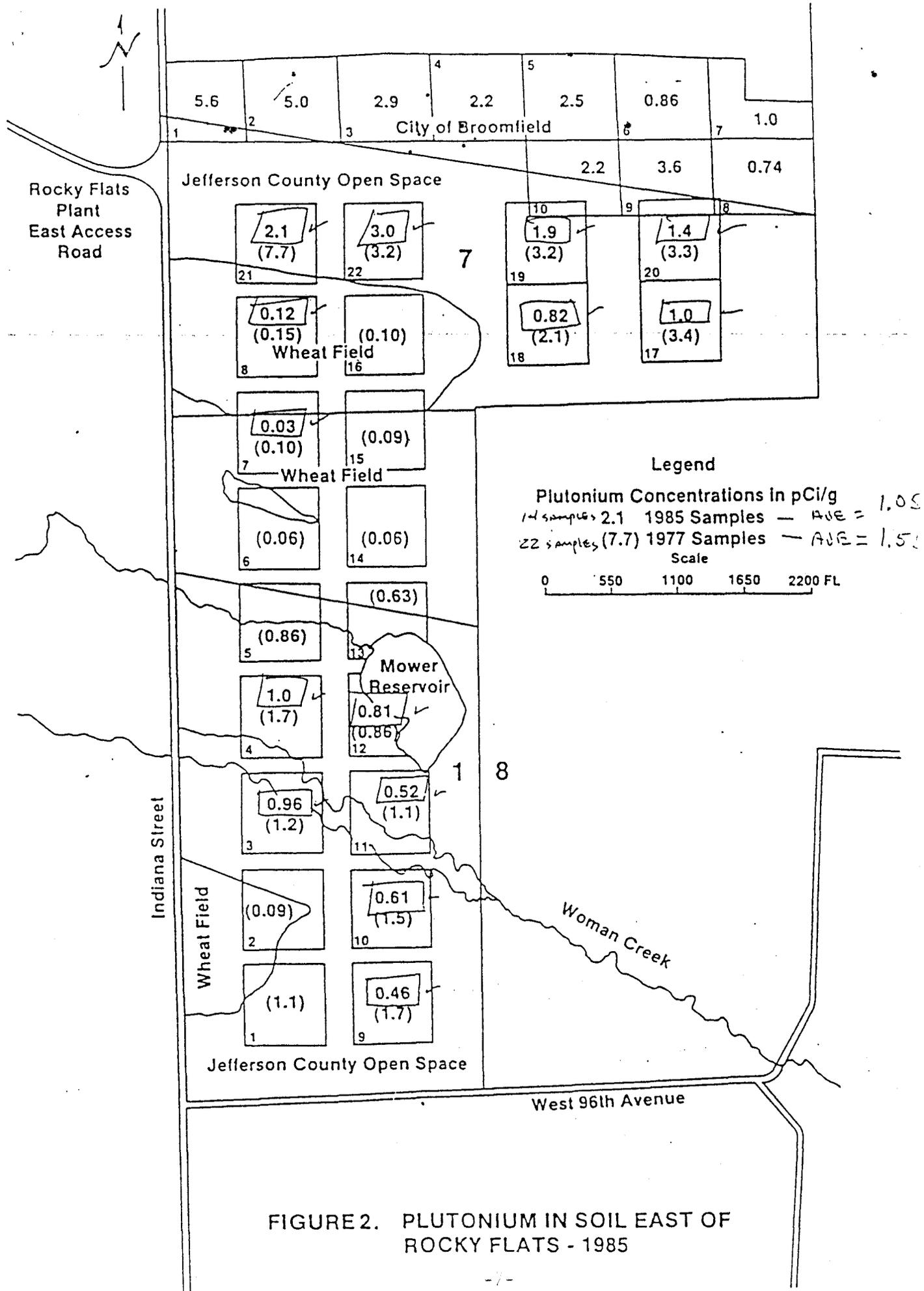


FIGURE 2. PLUTONIUM IN SOIL EAST OF ROCKY FLATS - 1985

difference which could have allowed for plutonium weathering and migration, the larger surface area represented by the 1985 samples [10 acres per sample as compared to the 1977 samples (0.2 acre per sample)], and the fact that a different laboratory utilizing a slightly different radiochemical procedure performed the analyses.

Figure 2 also shows the locations of the three abandoned wheat fields, one in Section 7 and two in Section 18. The 1985 data substantiate the earlier conclusion that the plutonium concentrations in the soil in the previously tilled plots are about 4% of the CDH standard. It is therefore reasonable to conclude that ripping, plowing and disking will reduce the plutonium concentrations in the other areas to levels below the state standard.

Based on the 1985 data, about 75 acres of the newly acquired City of Broomfield land will require remedial action. Most of the remainder of Section 7, purchased by Jefferson County, but excluding the abandoned wheat fields, will require remedial action. The Jefferson County land in Section 18 will require remedial action on about 40 acres. This is the area along Woman Creek between Indiana Street and Mower Reservoir.

REMEDIAL ACTION PROGRAM PLAN

Remedial action recommendations were prepared by Gary Finstad of the US Soil Conservation Service.⁶ These recommendations included tillage on alternating strips (standard strip farming techniques) laid out along the contour to minimize wind and water erosion. Remedial action should not be undertaken on the unbroken strips until the first set is re-established in protective grass. Strips with a width of 120 to 150 feet were recommended.

Following tillage a cover crop of sorghum was suggested to control erosion until native grasses could be planted in the fall. The sorghum could be cut if necessary, to provide an improved seed bed for the grass seeding.

Prior to initiation of the ground preparation activities, a Fugitive Dust Permit (No. 85JED52L) was obtained from the Colorado Department of Health (CDH). This permit requires constant monitoring of wind speed and soil density during soil disturbance activities to control blowing dust. If the wind speed exceeds 15 mph or if the soil moisture falls below 15%, all activities on the soil will cease. Vehicle speeds on all disturbed areas must not exceed 15 mph. All disturbed surface areas must be revegetated and snow fences must be installed if found necessary by CDH.

Air samplers must be operated during the soil tillage activities and samples will be analyzed for alpha radioactivity and plutonium concentrations. If the alpha activity exceeds 0.06 pCi/m^3 , all soil disturbance actions will be stopped.

REMEDIAL ACTION PLAN IMPLEMENTATION

Eleven strips of land were surveyed and staked at an approximate spacing of 140 feet. The strips ran almost exactly east-west, except where slight variations in topography caused shifts to northwest or northeast. The longest strip was about 3000 feet long and the shortest was about 750 feet long.

Rocky Flats type air samplers were set up at the north edge and at the mid south edge of the work area. The samplers received electrical power from portable 1600 watt gas powered generators. Operation was continuous from June 12 through July 28, 1986 and samples were collected and analyzed once every 24 hours.

Soil moisture test holes were drilled at three locations, one at the north edge, one in the center and one at the south edge of the work area. Aluminum tubes were inserted in each test hole and the locations were marked with flagged stakes. Soil moisture measurements were taken each day that soil disturbance activities were underway. Measurements were made with a Troxler Electronic Laboratories neutron moisture gauge Model 3321. Instrument readings were verified by soil samples analyzed gravimetrically in the Rockwell Rocky Flats General Laboratory.

Tilling the soil on the Jefferson County Open Space lands began on June 11, 1986. The first operation consisted of ripping the soil with an agricultural implement having point chisel rippers, spaced 12 inches apart in three rows. Power was supplied by a four wheel drive 350 horsepower farm tractor. The ripping procedure was applied four times.

The second operation consisted of three passes with an implement having chisel plow curved rippers. The rippers were spaced 12 inches apart in three rows. The third and finish process was performed by one pass with a vibrashank ripper. These smaller rippers were spaced 6 inches apart in 3 rows.

Seed bed preparation in the cultivated area also required removal of thousands of yucca plants because they would interfere with proper operation of the seeder. The many ripping operations dislodged the plants by uprooting or breaking off the roots. It was then necessary to manually collect the plants. A crew of "yucca pickers" placed the plants on a tractor mounted hay fork rack and the tractor operator made piles of yucca plants throughout the worked fields. The piles were later removed using a front-end loader and 10 ton dump truck. 300 loads of yucca were hauled to the Rocky Flats Plant sanitary landfill for final disposal.

Soil samples were then collected from the ten strips to determine the effectiveness of tilling in reducing plutonium concentrations. Samples were collected according to CDH prescribed procedures as previously described. Samples were taken at the edges and center of each strip at a spacing of 150 feet. Strip number one (the westernmost) yielded 24 subsamples which were composited into one sample for analysis. The next strip, number two, was separated into two sections and 24 subsamples were composited from each section labeled "east" and "west." Strips three and four were sampled in a like manner. The remaining seven strips were shorter and were sampled by compositing 14 subsamples for each strip.

The results of soil analyses for plutonium in nine of the eleven strips were all less than the CDH guideline of 0.90 pCi/g (2 d/m/g). The plutonium concentrations in strip #1 and the west half of strip #2 were still greater than 0.90 pCi/g. Approximately 20 acres in these two strips were then tilled three more times with the chisel plow rippers and two more composite samples were collected. The results of analyses for these samples were still greater than 0.90 pCi/g plutonium.

The next attempt at tilling included the use of a three bottom moldboard plow. The 20 acres was plowed three times to a depth of 12 inches and finished with one application with the vibrashank ripper. Ten soil samples were collected from these 20 acres and analyzed individually for plutonium. The average of the four values from strip #1 was 0.83 pCi/g and the average of the six values from strip #2 (west) was 0.63 pCi/g plutonium. The final results of soil analyses on all eleven strips are shown on Figure 3.

The final results of soil analyses from the area showed that the concentrations of plutonium were less than 0.90 pCi/g (2 d/m/g) and ready for seeding as agreed to by CDH. Application of sorghum seed at the rate of 10 pounds per acre was initiated on July 24, 1986. The first sprouts of sorghum appeared on August 4, 1986. The final 20 acres of ground that required deep plowing and ripping was planted with sorghum on August 2, 1986.

The sorghum plants grew to a maximum height of 12 inches and did not generate any seeds. The plants stopped growing in early October and wilted back after the first local frost. The application of wild grass seed began on October 29, 1986 and was completed on November 17, 1986. This long time period was

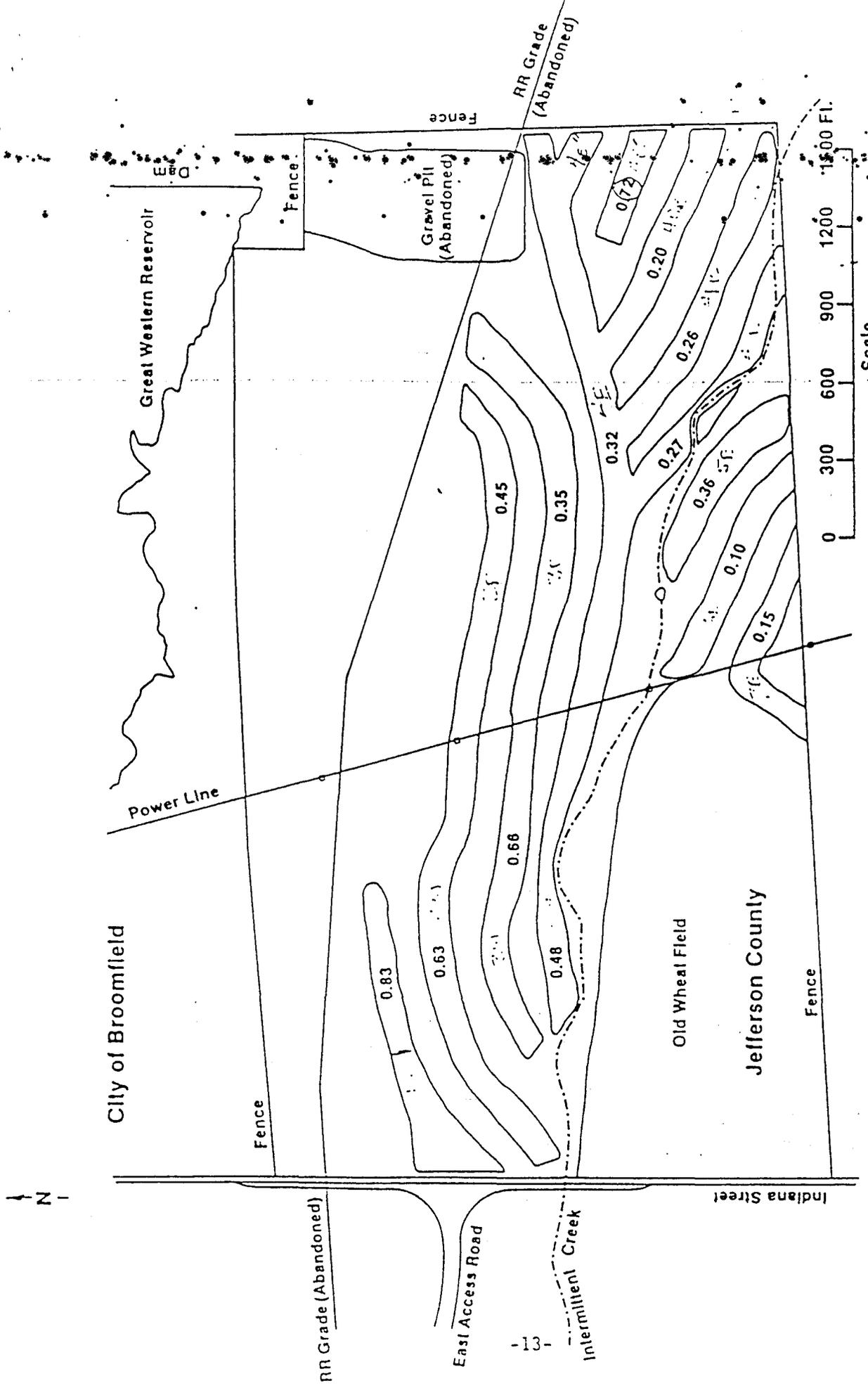


Figure 3. Plutonium (units are pCi/g) in soil east of Rocky Flats — 1986 (after remedial action)

required because of several small snowstorms, winds in excess of the control speed of 15 mph, and below freezing temperatures. The grass seed was applied at a rate of 15 pounds of pure live seed (PLS) per acre and contained a mixture of varieties as indicated below:

Special Grass Seed Mixture

<u>Species</u>	<u>Variety</u>	<u>Purity</u>	<u>Germination</u>	<u>Pure Live Seed</u>
Western Wheatgrass	Arriba	36.03%	84%	30.26%
Sideoats Grama	Vaugh	34.36%	88%	30.24%
Smooth Brome	Lincoln	10.39%	73%	7.58%
Pubescent Wheatgrass	Luna	8.29%	91%	7.54%
Other	----	10.93%	---	-----
TOTAL		100 %		75.62%

$$\text{Planting Rate} = \frac{15 \text{ lb PLS/acre}}{0.7562} = 19.84 \text{ lb/acre}$$

Since the cover crop of sorghum was not as heavy as desired, supplemental mulching was provided by the addition of long stemmed, weed-free native grass hay. This hay was applied at the rate of 4000 pounds per acre and forced into the soil with a tractor drawn crimper. Mulching began on November 24, 1986 and was completed on January 15, 1987. Once again delays in mulch application were caused by freezing temperatures and snowfall.

REFERENCES

1. Hume, M.W., and Illsley, C.T., "Plutonium Concentrations In Soil on Lands Adjacent To The Rocky Flats Plant," LPR-1, March 1979, Rockwell International.
2. ASTM C998-83 "Standard Method for Sampling Surface Soil for Radionuclides," Annual Book of ASTM Standards, Vol. 12.01., 1983.
3. ASTM C999-83 "Standard Method for Soil Sample Preparation for the Determination of Radionuclides," Annual Book of ASTM Standards, Vol. 12.01, 1983.
4. ASTM C1001-83 "Standard Method for Radiochemical Determination of Plutonium in Soil by Alpha Spectrometry," Vol. 12.01, 1983.
5. EPA "Proposed Guidance on Dose Limits for Persons Exposed to Transuranium Elements in the General Environment," EPA 520/4-77-016, September 1977, US Environmental Protection Agency.
6. Finstad, G. D., "Erosion Control and Revegetation Recommendations for Proposed Remedial Action Projects," April 1985, US Soil Conservation Service.



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

November 27, 1985

Page 2 of 4

Mr. Chuck Illsley
Rockwell International
Rocky Flats Plant
P.O. Box 464
Golden, CO 80402-0464

RE: 8890-20831-12

Date Samples Rec'd 10-17-85

P.O. No. 48464

REPORT OF ANALYSIS

ALR Designation	Sponsor Designation	Plutonium-239, ± counting error* pCi/g (dry)	Duplicate Result	Air Dry Loss, %
8890-20831-12-1	GWS-85-1	5.9 ± 0.5	5.2 ± 0.5	4.3
-2	GWS-85-2	4.9 ± 0.5	5.0 ± 0.5	4.6
-3	GWS-85-3	2.5 ± 0.4	3.3 ± 0.4	4.2
-4	GWS-85-4	2.1 ± 0.4	2.2 ± 0.3	4.7
-5	GWS-85-5	2.6 ± 0.4	2.4 ± 0.3	7.3
-6	GWS-85-6	1.0 ± 0.3	0.72 ± 0.19	7.5
-7	GWS-85-7	0.84 ± 0.21	1.2 ± 0.2	4.9
-8	GWS-85-8	0.58 ± 0.20	0.89 ± 0.21	3.0
-9	GWS-85-9	4.2 ± 0.4	2.9 ± 0.4	4.9
-10	GWS-85-10	2.3 ± 0.3	2.0 ± 0.4	7.7
-11	Blank	0.13 ± 0.12	0.07 ± 0.12	--
-12	Standard	0.93 ± 0.19	1.3 ± 0.3	--

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

Bud Summers
Radiochemistry
Supervisor

BS/dh
dh



December 26, 1985

Page 1 of 1

Mr. Chuck Illsley
 Rockwell International
 Rocky Flats Plant
 P.O. Box 464
 Golden, CO 80402-0464

RE: 8890-20915-9
 Date Samples Rec'd 11-1-85
 P.O. No. 48464PB

REPORT OF ANALYSIS

ALR Designation	Sponsor Designation	Plutonium-239, ± counting error* pCi/g	Plutonium-239, duplicate, ± counting error* pCi/g
8890-20915-9-1	I-85-2	0.38 ± 0.19	0.53 ± 0.24
-2	I-85-4	0.53 ± 0.22	0.69 ± 0.21
-3	I-85-5	0.83 ± 0.30	1.1 ± 0.2
-4	I-85-6	1.1 ± 0.3	0.89 ± 0.29
-5	I-85-7	0.62 ± 0.22	0.43 ± 0.18
-6	I-85-11	0.74 ± 0.28	0.88 ± 0.36
-7	I-85-12	0.10 ± 0.14	-0.04 ± 0.12
-8	Blank	-0.03 ± 0.08	0.05 ± 0.10
-9	Standard	1.2 ± 0.3	0.84 ± 0.24

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
 These samples are scheduled to be disposed of 45 days after the date of this report.

Bud Summers
 Radiochemistry
 Supervisor

BS/dh *dh*

December 22, 1985
 Page 1 of 2

Mr. Chuck Illsley
 Rockwell International
 Rocky Flats Plant
 P.O. Box 464
 Golden, CO 80402-0464

RE: 8890-20877-9
 Date Samples Rec'd 10-25-85
 P.O. No. 48464PB

REPORT OF ANALYSIS

ALR Designation Sponsor Designation	8890-20877-9-1 185-16	8890-20877-9-2 185-17	8890-20877-9-3 185-18	8890-20877-9-4 185-19	8890-20877-9-5 185-20
Determination: pCi/g					
Plutonium-239, ± counting error*	0.11 ± 0.13	0.70 ± 0.19	1.6 ± 0.2	2.9 ± 0.4	2.3 ± 0.3
Plutonium-239, duplicate, ± counting error*	0.13 ± 0.16	0.93 ± 0.21	2.1 ± 0.3	3.2 ± 0.6	1.9 ± 0.6
Air Dry Loss, %	2.1	1.8	1.1	1.8	1.8

December 12, 1985.
Page 2 of 2

Mr. Chuck Illisley
Rockwell International

RE: 8890-20877-9
Date Samples Rec'd 10-25-85
P.O. No. 48454PB

REPORT OF ANALYSIS

ALR Designation Sponsor Designation	8890-20877-9-6 185-21	8890-20877-9-7 185-22	8890-20877-9-8 Blank	8890-20877-9-9 Standard
--	--------------------------	--------------------------	-------------------------	----------------------------

Determination: pCi/g

Plutonium-239,
± counting error* 0.75 ± 0.17 1.7 ± 0.3 0.03 ± 0.12 1.1 ± 0.2

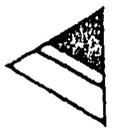
Plutonium-239, duplicate,
± counting error* 1.3 ± 0.3 1.2 ± 0.2 -0.02 ± 0.11 0.92 ± 0.29

Air Dry Loss, % 1.3 1.5 -- --

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

BS/dh 


Bud Summers
Radiochemistry
Supervisor



July 13, 1986
 Page 1 of 4

Mr. Chuck Illsley
 Rockwell International
 Rocky Flats Plant
 P.O. Box 464
 Golden, CO 80402-0464

RE: 8890-22225-16
 Date Samples Rec'd 6-26-86
 P.O. No. 65746 and 78499DR

REPORT OF ANALYSIS

ALR Designation	8890-22225-16-1 STP-1-W	8890-22225-16-2 STP-2-W	8890-22225-16-3 STP-2-E	8890-22225-16-4 STP-3-W	8890-22225-16-5 STP-3-E
-----------------	----------------------------	----------------------------	----------------------------	----------------------------	----------------------------

Determination: pCi/g (dry)

Plutonium-239, ± counting error*	1.8 ± 0.3	1.1 ± 0.3	0.44 ± 0.22	0.85 ± 0.22	0.42 ± 0.19
Plutonium-239, duplicate, ± counting error*	1.3 ± 0.3	3.7 ± 0.4	0.46 ± 0.21	0.47 ± 0.20	0.28 ± 0.19
Plutonium-239, ± counting error*	1.8 ± 0.3	1.2 ± 0.2	--	--	--
Plutonium-239, ± counting error*	2.0 ± 0.3	0.88 ± 0.27	--	--	--
Air Dry Loss, %	<0.1	<0.1	<0.1	<0.1	0.6

SAMPLES TAKEN IN
 OPERATION ON SEC 7 STRIPS
 SOIL subsamples Taken To MAKE 1 OF 2
 samples / strip - 14 samples TOTAL

July 15, 1986
Page 2 of 4

Mr. Chuck Illsley
Rockwell International

RE: 8890-22225-16
Date Samples Rec'd 6-26-86
P.O. No. 65746 and 78499DR

REPORT OF ANALYSIS

ALR Designation	8890-22225-16-6	8890-22225-16-7	8890-22225-16-8	8890-22225-16-9	8890-22225-16-10
Sponsor Designation	STP-4-W	STP-4-E	STP-4-E	SIP-4A-E	SIP-4B-F

Determination: pCi/g (dry)

Plutonium-239, ± counting error* 0.25 ± 0.18 0.35 ± 0.20 0.47 ± 0.21 0.12 ± 0.16 0.32 ± 0.19

Plutonium-239, duplicate, ± counting error* 0.71 ± 0.23 0.29 ± 0.20 3.1 ± 0.3 0.29 ± 0.20 0.20 ± 0.19

Plutonium-239, ± counting error* -- -- 0.84 ± 0.17 -- -- --

Plutonium-239, ± counting error* -- -- 0.86 ± 0.17 -- -- --

Air Dry Loss, % 0.5 0.2 0.3 0.2 0.1

Mr. Chuck Malsley
Rockwell International

RE: 8890-22225-16
Date Samples Rec'd 6-26-86
P.O. No. 65746 and 78499DR

REPORT OF ANALYSIS

ALR Designation	Sponsor Designation	8890-22225-16-11	8890-22225-16-12	8890-22225-16-13	8890-22225-16-14	8890-22225-16-15
		STP-4C-E	STP-5-E	STP-6-E	STP-7-E	Standard

Determination: pCi/g (dry)

Plutonium-239,
± counting error*

0.36 ± 0.20 0.93 ± 0.22 0.14 ± 0.17 0.20 ± 0.21 1.0 ± 0.2

Plutonium-239, duplicate,
± counting error*

0.18 ± 0.18 0.18 ± 0.18 0.05 ± 0.16 0.09 ± 0.16 1.2 ± 0.3

Plutonium-239,
± counting error*

-- 0.13 ± 0.16 -- 0.11 ± 0.15 --

Plutonium-239,
± counting error*

-- 0.18 ± 0.16 -- -- --

Air Dry Loss, %

0.2 0.1 0.1 0.4 --

Mr. Chuck Illisley
Rockwell International

RE: 8890-22225-16
Date Samples Rec'd 6-26-86
P.O. No. 65746 and 78499DR

REPORT OF ANALYSIS

8890-22225-16-16
Blank

ALR Designation
Sponsor Designation

Determination: pCi/g (dry)

0.03 ± 0.15

Plutonium-239,
± counting error*

-0.11 ± 0.22

Plutonium-239, duplicate,
± counting error*

0.05 ± 0.16

Plutonium-239,
± counting error*

Air Dry Loss, %

--

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.



Bud Summers
Radiochemistry
Supervisor

BS/dh

July 24, 1986
 Page 1 of 1

Mr. Chuck Hilsley
 Rockwell International
 Rocky Flats Plant
 P.O. Box 464
 Golden, CO 80402-0464

RE: 8890-22307-4
 Date Samples Rec'd 7-14-86

REPORT OF ANALYSIS

MR. Designation Sponsor Designation	8890-22307-4-1 STP 1W2	8890-22307-4-2 STP 2W2	8890-22307-4-3 Blank	8890-22307-4-4 Standard
--	---------------------------	---------------------------	-------------------------	----------------------------

Determination: pCi/g

Plutonium-239, ± counting error*	2.4 ± 0.3	0.86 ± 0.25	0.05 ± 0.06	1.0 ± 0.4
Plutonium-239, duplicate, ± counting error*	2.4 ± 0.3	0.98 ± 0.20	0.08 ± 0.07	0.90 ± 0.21
Alf Dry Loss, %	1.2	2.0	--	--

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ. These samples are scheduled to be disposed of 45 days after the date of this report.

Bud Summers
 Bud Summers
 Radiochemistry
 Supervisor

BS/dh

RESULTS FROM
 OF WEST END STRIPS 142
 IN SEC 7

2 samples



Accu-Labs Research, Inc.

11485 W. 48th Avenue Wheat Ridge, Colorado 80033
(303) 423-2766

August 1, 1986

Page 1 of 1

RESULTS
AFTER 3rd
FILLING OPERATION
ON SEC 4 STIPES

Mr. Chuck Illsley
Rockwell International
Rocky Flats Plant
P.O. Box 464
Golden, CO 80402-0464

RE: 8890-22394-12
Date Samples Rec'd 7-28-86
P.O. No. 65746DD

REPORT OF ANALYSIS

ALR Designation	Sponsor Designation	Plutonium-239, ± counting error*, pCi/g	Plutonium-239, duplicate, ± counting error*, pCi/g
8890-22394-12-1	STP 1W3 A	0.96 ± 0.19	1.7 ± 0.3
-2	STP 1W3 B	0.46 ± 0.13	0.34 ± 0.13
-3	STP 1W3 C	0.51 ± 0.17	1.0 ± 0.2
-4	STP 1W3 D	0.78 ± 0.20	0.85 ± 0.17
-5	STP 2W3 A	0.56 ± 0.15	1.3 ± 0.2
-6	STP 2W3 B	0.54 ± 0.15	0.52 ± 0.15
-7	STP 2W3 C	0.46 ± 0.14	1.1 ± 0.2
-8	STP 2W3 D	0.32 ± 0.13	0.48 ± 0.14
-9	STP 2W3 E	0.60 ± 0.16	0.42 ± 0.15
-10	STP 2W3 F	0.65 ± 0.15	--
-11	Blank	0.00 ± 0.07	--
-12	Standard	1.1 ± 0.2	--

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.
These samples are scheduled to be disposed of 45 days after the date of this report.

Bud Summers
Radiochemistry
Supervisor

BS/dh