AD103

GREAT WESTERN RESERVOIR SPILLWAY SEDIMENT SAMPLING PROGRAM PHASE II REPORT

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ENVIRONMENTAL SCIENCES
Environmental Studies

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KWIC Index
Activity Analysis
Americium
Great Western Reservoir
Plutonium
Spillway Sediment

Reviewed for Classification/UCNI/OUO
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1/10

GREAT WESTERN RESERVOIR
SPILLWAY SEDIMENT SAMPLING PROGRAM
PHASE II REPORT

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INTRODUCTION

Sampling of the sediment accumulated in the Great Western Reservoir Spillway was a project divided into two phases Phase I sampling completed March 16 1979 consisted of taking 14 5 dm deep surface samples and 14 23 cm deep shallow core samples The results of the first phase sampling effort are reported in the Great Western Reservoir Spillway Sediment Sampling Phase I Report May 2 1979[1]

This report summarizes the materials methods and analytical procedures used, as well as the data obtained, from the second and final phase sampling of the Great Western Reservoir Spillway

PHASE II SAMPLING PROGRAM

In compliance with the Rocky Flats Area Office (RFAO) request to sample sediment accumulated at Great Western Reservoir Spillway (GWRS) the second phase sampling effort was completed March 11 1980 The second phase of the program involved obtaining seven samples from the vertical surface of a three meter high wall of sediment The sampling site A0 + 00 C-9 was selected on the basis of a survey by the Broomfield City Engineer estimating the greatest accumulation of sediment within the spillway (Figure 1) One sample was taken per 30 cm depth of accumulated sediment Each of the seven samples extended approximately 16 cm into the wall of sediment Samples collected during the Phase II sampling were analyzed for plutonium-239 + 240 and americium-241

PHASE II SAMPLING

The seven samples obtained March 11 1980 were collected by Health and Environmental Laboratory personnel under the supervision of J D Hurley

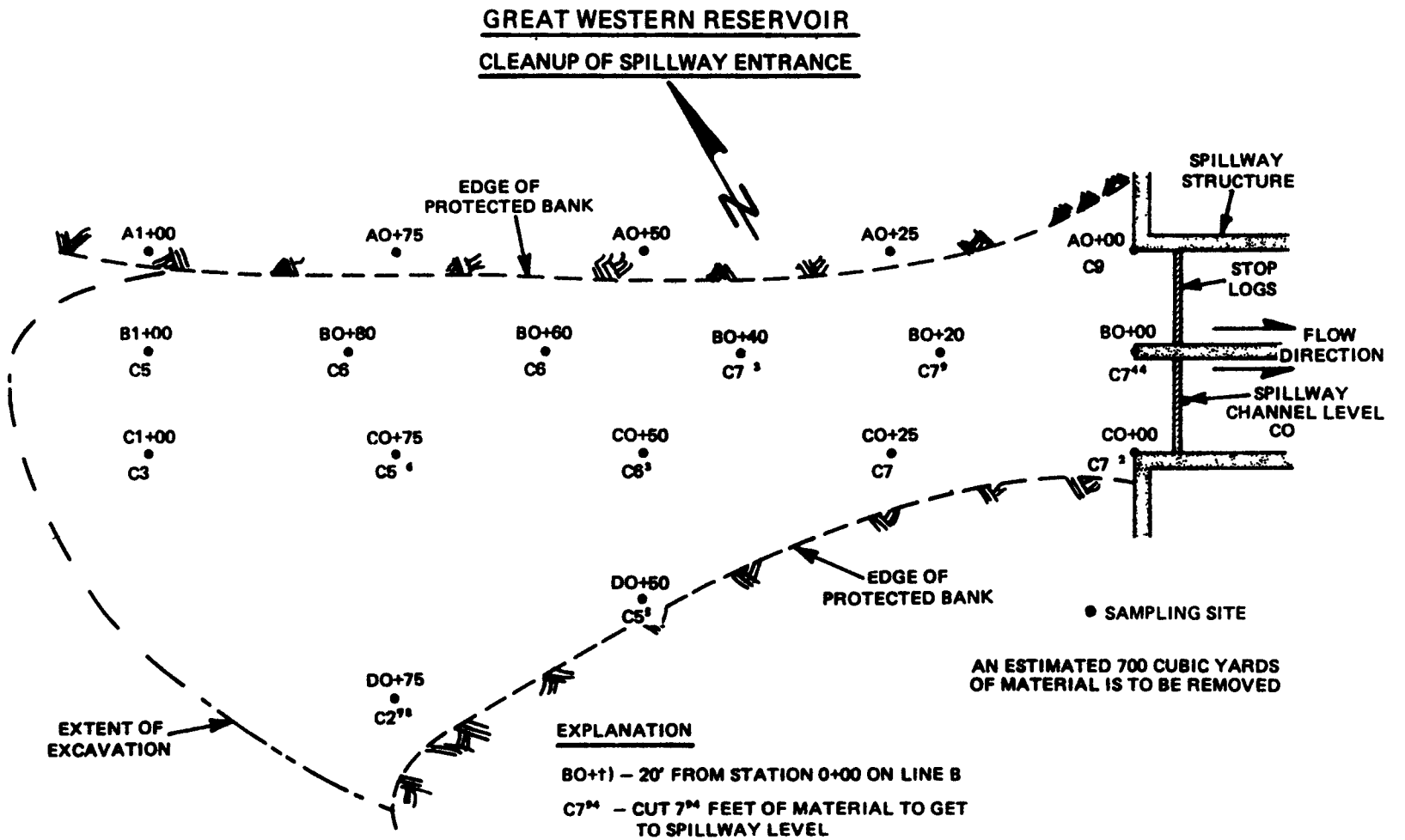

GREAT WESTERN RESERVOIR
CLEANUP OF SPILLWAY ENTRANCE
N
EDGE OF PROTECTED BANK
SPILLWAY STRUCTURE
A1+00
AO+75
AO+50
AO+25
AO+00
C9
STOP LOGS
B1+00
C5
BO+80
C6
BO+60
C6
BO+40
C7 3
BO+20
C7 9
BO+00
C7 44
FLOW DIRECTION
SPILLWAY CHANNEL LEVEL CO
C1+00
C3
CO+75
C5 4
CO+50
C8 3
CO+25
C7
CO+00
C7 2
DO+50
C5 8
EDGE OF PROTECTED BANK
SAMPLING SITE
AN ESTIMATED 700 CUBIC YARDS OF MATERIAL IS TO BE REMOVED
DO+75
C2 98
EXTENT OF EXCAVATION
EXPLANATION
BO+t) – 20' FROM STATION 0+00 ON LINE B
C7 84 – CUT 7 84 FEET OF MATERIAL TO GET TO SPILLWAY LEVEL

Figure 1

3

the project leader At the time of sample collection the weather conditions were overcast and calm with wind speeds ranging from 0-10 mph The temperature ranged from 45°F at 9 00 a m to 55 F by late afternoon All samples were taken from a sediment wall located at the eastern end of the GWR spillway supported by nine 15 cm X 30 cm X 3 5 m wooden stoplogs A 30 cm^2 section was cut from each log providing easy access to the desired sampling area and continued support for the 3M sediment wall (Figure 2)

A standard Orchard Auger* (with an 8 3 cm diameter 16 cm long barrel) was used to obtain the seven samples A volume of about 750 cm^3 of soil was obtained for each sample The sample collection procedure is illustrated in Figure 3 All samples were taken according to established Rocky Flats sampling procedures

SAMPLE PRETREATMENT AND ANALYSIS

Samples were handled and analyzed according to Rocky Flats laboratory procedures The procedures include drying ballmilling sieving and aliquoting of the collected material prior to alpha and gamma analysis Control samples prepared at the two sigma level were also submitted for alpha analysis to determine the quality of the results

RESULTS

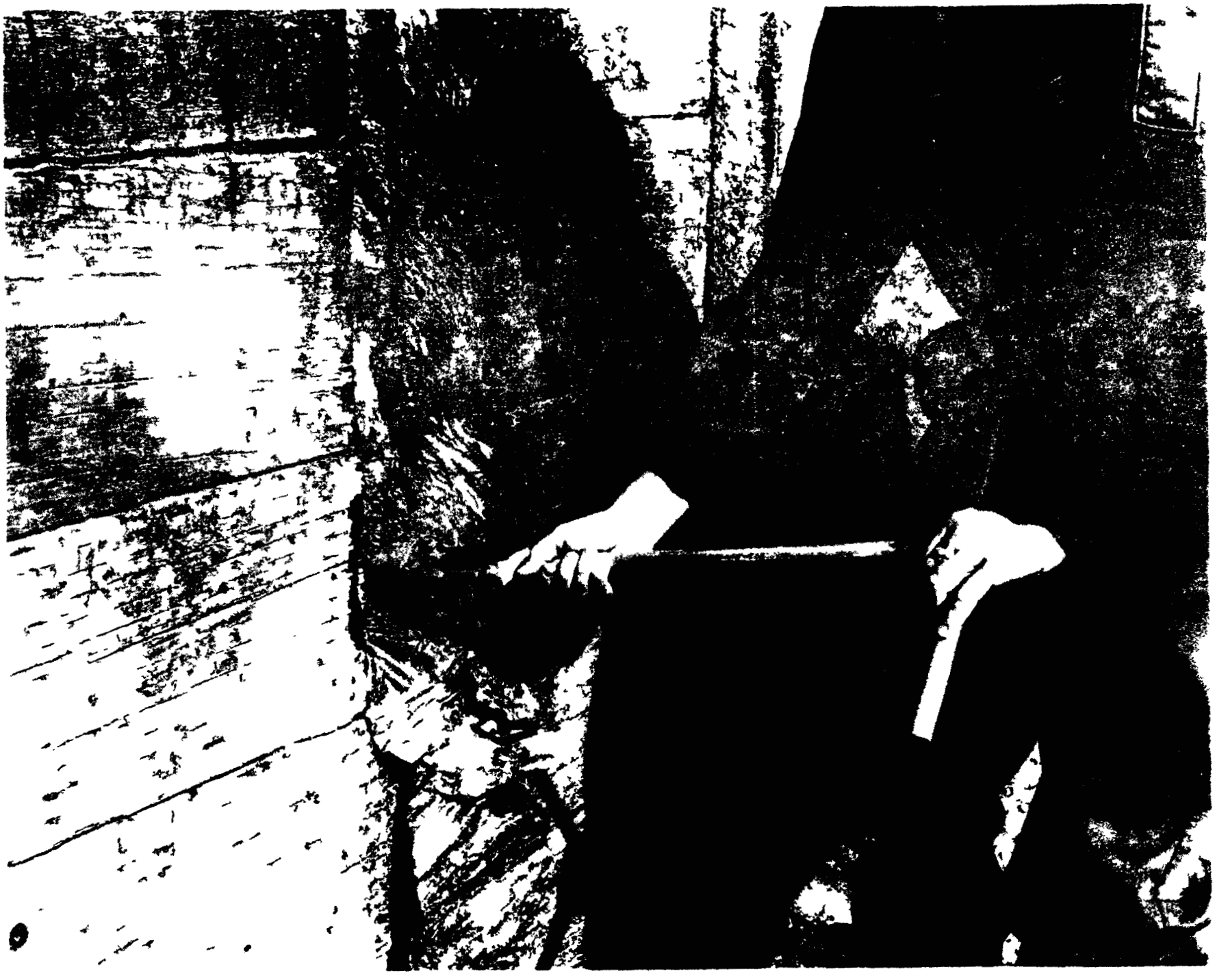
Tables I II and III give the plutonium-239 + 240 and americium-241 activity levels determined for the samples obtained during the second phase sampling effort The information reported in Tables I and II respectively include plutonium-239 + 240 and americium-241 data from chemical separation followed by alpha spectral analysis Table III shows americium-241 activity levels obtained by gamma spectral analysis

Alpha analysis of all samples were performed in duplicate and were blank corrected The values reported in Tables I and II are average values of the duplicate analyses

* Standard Type #R-HEO ARTS Machine Shop American Falls Idaho

4

Figure 2 Eastern End of Great Western Reservoir Spillway



6

Figure 3 A Demonstration of the Sample Collection Procedure at Great Western Reservo

DISCUSSION

Concentrations of plutonium 239 + 240 in sediment samples taken at GWRS during the second phase sampling effort were well below the 2 d/m/g (approx mately 0 9 pCi/g) activity screening level adopted by the Colorado State Board of Health[2] The mean plutonium concentration value ($\bar{x}$) for plutonium 239 + 240 was 040 pCi/g with a standard deviation (s) of 026

Analysis of americium-241 activity in sediment was performed by alpha and gamma spectral analysis When comparing the alpha and gamma americium-241 activity all less than values were taken as their upper limit A sign test applied to these values showed no difference in the two data sets

Even though the expected plutonium-239 + 240 to americium-241 ratio is of the order of ten[3] the observed average ratio (by alpha analysis) was calculated as being less than 1 This is probably a reflection of the nearness to the detection limits of the americium values obtained by alpha spectroscopy

Inspection of the plutonium and americium results associated with sediment depth indicates sediment activity in GWRS essentially showed little variation with depth This finding was not surprising since it was thought that the sediment sampled in the spillway was deposited as a result of hillside erosion deposition by wave action and mixing

REFERENCES

1 Hurley J D Great Western Reservoir Spillway Sediment Sampling Program Phase I Report May 2 1979

2 State of Colorado Rules and Regulations Pertaining to Radiation Control RH 4 21 Permissible Levels of Radioactive Material in Uncontrolled Areas Adopted by Colorado State Board of Health March 21 1973

3 Final Environmental Impact Statement (Final Statement to ERDA 1545 D) Rocky Flats Plant Site Golden Jefferson County Colorado U S Department of Energy April 1980 Volume 1 of 3 pp 2-92 2 170 and 3-30

TABLE I Great Western Reservoir Spillway
Phase II Sampling Plutonium-239 + 240 in Sediment

Alpha Analysis

Location*	239 + 240 Pu (pCi/g)
A0 + 00 C9-1	055 ± 011
A0 + 00 C9-2	070 ± 017
A0 + 00 C9-3	068 ± 013
A0 + 00 C9-4	048 ± 011
A0 + 00 C9-5	018 ± 006
A0 + 00 C9-6	016 ± 007
A0 + 00 C9-7	006 ± 005
$\bar{x}$	040
s	026

*See text page 1 for sample location explanation

TABLE II Great Western Reservoir Spillway
Phase II Sampling Americium-241 in Sediment

Alpha Analysis

Location	241-Am (pCi/g)
A0 + 00 C9-1	055 ± 040
A0 + 00 C9-2	063 ± 043
A0 + 00 C9-3	055 ± 041
A0 ± 00 C9-4	038 ± 038
A0 ± 00 C9-5	058 ± 041
A0 ± 00 C9-6	117 ± 048
A0 ± 00 C9-7	063 ± 035
$\bar{x}$	064
s	025

*See text page 1 for sample location explanation

TABLE III Great Western Reservoir Spillway
Phase II Sampling Americium-241 in Sediment

Gamma Analysis

Location*	241-Am (pCi/g)**
A0 + 00 C9-1	< 067
A0 + 00 C9-2	< 092
A0 + 00 C9-3	< 069
A0 + 00 C9-4	< 098
A0 + 00 C9-5	< 087
A0 + 00 C9-6	< 077
A0 + 00 C9-7	< 015

* See text page 1 for sample location explanation
** 241-Am results were all below MDA The results of each sample was set equal to MDA thus accounting for the absence of uncertainty values

10/10

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