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SUMMARY REPORT OF SOIL REMOVAL
PRELIMINARY EXCAVATIONS

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SUMMARY REPORT OF SOIL REMOVAL PRELIMINARY EXCAVATIONS

I. SUMMARY

This report discusses a proposed technique to remove small areas, $<2,000 \text{ m}^2$, of contaminated soil and the results of an actual excavation. Based on the results of a trial excavation in uncontaminated soil and an excavation of two trenches in contaminated soil, it is concluded that the techniques described are a satisfactory means of contaminated soil removal. It can be done safely with a release of airborne plutonium a factor of 10 or more below the Environmental Protection Administration (EPA) limit.

II. INTRODUCTION

The removal of approximately 2,000 m² of ²³⁹Pu contaminated soil was planned for the summer of 1975 at Rocky Flats. Contamination levels were from 5,000 to 22,000 d/m/g. An environmental assessment was prepared covering the project. Waste Management was assigned the responsibility of preparing a plan to do the soil removal and do the actual excavation. The plan describes in detail the equipment and supplies to be used, personnel requirements, air monitoring plan, technique for soil removal, and packaging requirements.

One stipulation in the plan was to perform a practice excavation on uncontaminated soil simulating all aspects of the procedure to be followed when removing contaminated soil. This report is a summary of that trial excavation which was performed on May 5, 1975. Photos are included which illustrate some of the equipment and techniques used.

Also included in this report are the results of an excavation of contaminated soil by representatives of Health and Safety Laboratory (HASL). Two trenches, approximately 5' x 3' x 2', were dug in the contaminated zone with the aid of Rocky Flats personnel utilizing the techniques employed in the trial run.

III. UNCONTAMINATED SOIL REMOVAL, TRIAL EXCAVATION

A. Equipment used:

1. Mobile trailer, 10' x 60'
2. Portable shed, 8' x 16', equipped with 400 cfm air mover and 8" HEPA filter
3. Water spray can
4. Shovels and picks
5. Wheelbarrow
6. Waste box, 4' x 4' x 7'
7. Plastic bags
8. Plywood walkway
9. Staplex 40 cfm hi volume portable air sampler with micro solvent filter
10. Portable air sampler, 2 cfm
11. Johnson scintillation counter

B. Excavation Description

The trial excavation was performed on May 5, 1975. The weather was dry and the wind velocity was greater than 15 miles per hour from a southerly direction. The wind conditions would have precluded an excavation of contaminated soil but were considered inconsequential to the trial run. All other details of the specified plan were adhered to.

The portable shed was placed in an uncontaminated area and staked down. A staplex hi-volume air sampler was placed approximately 20 feet downwind from the shed. A 2 cfm air sampler was placed in the shed. The air mover was turned on to provide a slight negative pressure in the shed. This resulted in air flow into the doorway exhausting through a fiberglass prefilter, 8" HEPA filter, and the air mover filter bag.

Two decontamination workers, clothed in white coveralls, booties, cap and rubber surgeon gloves, performed the actual excavation. Wearing respirators, the 2 workers and a Health Physics monitor entered the shed. The soil was stabilized by sprinkling with water. Excavation was begun at an extreme corner from the entrance. The soil was shoveled into a plastic-lined metal container which contained a plastic bag. Approximately one cubic foot of soil was placed in the plastic bag. The bag was then closed, taped and removed from the metal container. The monitor checked the exterior of the bag for alpha activity. After determining that the bag was uncontaminated, it was passed through the doorway to a worker who placed the bag in a wheelbarrow. Filled bags were transported to and placed in a standard waste box. A standard waste box

is a 4' x 4' x 7' plywood box coated with fiberglass reinforced plastic (FRP), lined with fiberboard and two (2) plastic liners, and containing 50# of absorbent spread over the bottom.

After excavating 3 bags of soil the trial run was terminated. According to the plan, this procedure would be repeated until contamination levels of the soil were reduced to below the detection level of the FIDLER probe, 250 d/m/g.

The filter paper on the hi-volume air monitor was analyzed for ^{239}Pu . The results were 0.00004 pCi/m^3 . This compares with background due to fallout and natural radiation of approximately 0.00003 pCi/m^3 . The Environmental Protection Administration (EPA) allowable limit for the general population for plutonium in air is 0.02 pCi/m^3 .

IV. HEALTH AND SAFETY LABORATORY (HASL) EXCAVATION

On May 13 and 14, 1975, representatives from HASL with the aid of Rocky Flats personnel, excavated two trenches in the contaminated area utilizing the techniques employed in the trial run. Stabilizing the soil was not required because the work was done

following a day of rain which dampened the ground sufficiently to minimize any dust production. The purpose of the Health and Safety Laboratory (HASL) excavation was to take core samples at varying depths to determine a profile of the plutonium migration in soil.

The contaminated soil from these excavations was packaged per the plan, but placed in 55-gallon drums instead of fiberglass reinforced plastic (FRP) coated waste boxes. The soil contained a specific activity of less than 10 nCi/g of Pu. Eight drums of contaminated soil were removed from the two trenches. Photos were also taken of these excavations. Analysis of the filter paper on the hi-volume air monitor showed 0.00258 pCi/m³ of ²³⁹Pu. Results from the 2 cfm air sampler located in the shed indicated total alpha activity of 0.09 pCi/m³ on May 13 and 0.002 pCi/m³ on May 14. These results compare with allowable limits in a work area of 4.05 pCi/m³ for insoluble Pu and 1.98 pCi/m³ for soluble Pu. A comparison of these results with those of the trial excavation in uncontaminated soil indicate a small amount of plutonium became airborne due either to personnel activities in the area and/or the actual excavation. The levels released were well below established limits.

V. DESCRIPTION OF PHOTOS

1. Westward View of Rocky Flats Plant
2. Planned Soil Removal Sites
3. Plutonium Concentrations (d/m/g)
4. Anemometer to measure wind velocity and direction
5. Trailer 10' x 60' for storage of equipment and supplies, also used as a clothes change area. Tank in foreground to supply water for stabilizing soil
6. Portable shed 8' x 16' with portable air mover and 8" HEPA filter. Shed is anchored to prevent capsizing in the wind. Plywood walkway with wheelbarrow and standard fiberglass reinforced plastic (FRP) coated wastebox to left
7. Temporary anchoring technique
8. Sky hook to relocate portable shed with crane
9. Apparel worn by decon workers, coveralls, booties covered with plastic, cap, surgeon's gloves and respirator
10. Radiation monitor using FIDLER probe to determine alpha activity of the soil
11. Fiberglass prefilter inside shed

12. Stabilizing the soil with water
13. Shoveling soil into plastic bag in plastic lined container
14. Closing and sealing bag with tape
15. Checking for contamination on exterior of bag with portable alpha detector
16. Placing bag in wheelbarrow
17. Placing 50# of absorbent material in bottom of fiberglass reinforced plastic (FRP) coated waste box
18. Placing plastic bag of dirt in standard fiberglass reinforced plastic (FRP) coated waste box lined with fiberboard and two 0.006" polyethelene liners
19. Monitoring personnel for contamination with portable alpha detector
20. Monitoring personnel for contamination with portable alpha detector
21. Monitoring personnel for contamination with portable alpha detector
22. Scintillation counter to determine activity on portable air sampler filter paper
23. Set up for Health and Safety Laboratory (HASL) excavation of contaminated soil

24. Excavating contaminated soil. Note portable 2 cfm air sampler in background
25. No alpha activity detected on rock removed from trench
26. Monitoring plastic bag of contaminated soil with portable alpha detector
27. Air sample results
28. Air sample results

CONTAMINATED SOIL
REMOVAL SITES

Figure 1. Westward View of the Rocky Flats Plant.

903-AREA

100 ft.
(30-metres)

A dimension line with arrows at both ends, indicating a width of 100 feet or 30 metres.

FIGURE 3. PLUTONIUM CONCENTRATIONS (D/M/G)

FIGURE 4

Anemometer to Measure
Wind Velocity and Direction

FIGURE 5

Trailer 10' x 60' for Storage of Equipment and supplies, also used as a Clothes Change Area. Tank in Foreground to Supply Water for Stabilizing Soil

FIGURE 6
Portable Shed 8' x 16' With Portable
Air Mover and 8" HEPA Filter. Shed is
Anchored to Prevent Capsizing in the
Wind. Plywood Walkway with Wheelbarrow
and FRP Coated Wastebox to Left

FIGURE 7
Temporary Anchoring Technique

FIGURE 8
Sky Hook to Relocate
Portable Shed with Crane

FIGURE 9
Apparel Worn by Decon Workers, Coverall
Booties Covered with Plastic, Cap,
Surgeon's Gloves and Respirator

FIGURE 10
Radiation Monitor Using FIDLER
Probe to Determine Alpha
Activity of the Soil

FIGURE 11
Fiberglass Prefilter
Inside Shed

FIGURE 12
Stabilizing the Soil with Water

FIGURE 13
Shoveling Soil into Plastic Bag
in Plastic Lined Container

FIGURE 14
Closing and Sealing Bag with Tape

FIGURE 15
Checking for Contamination on Exterior
of Bag with Portable Alpha Detector

FIGURE 16
Placing Bag in Wheelbarrow

7730-219-1272
ABSORBENT MATERIAL
OIL & WATER (FOR FLOORS AND DECKS)
1 BAG NET WT. 50 LBS.

GR. WT. 51 LBS. 1.3 CU. FT.
STORE IN A DRY PLACE
DATE MFG. OCT 28 1974

U. D-W-97223-1

005-28252

EXCEL MINERAL CO.
SANTA ANA, CALIF.

FIGURE 17
Placing 50# of Absorbent Material in
Bottom of FRP Coated Waste Box

FIGURE 18
Placing Plastic Bag of Dirt in
Standard FRP Coated Waste Box Lined
with Fiberboard and two 0.006"
Polyethelene Liners

FIGURE 19
Monitoring Personnel for Contamination
with Portable Alpha Detector

FIGURE 20
Monitoring Personnel for Contamination
with Portable Alpha Detector

FIGURE 21
Monitoring Personnel for Contamination
with Portable Alpha Detector

FIGURE 22
Scintillation Counter to Determine
Activity on Portable Air Sampler
Filter Paper

FIGURE 23
Set Up for Health and Safety
Laboratory (HASL) Excavation
of Contaminated Soil

FIGURE 24
Excavating Contaminated Soil
Note Portable 2 cfm Air Sampler
in Background

FIGURE 25
No Alpha Activity Detected
on Rock Removed from Trench

FIGURE 26
Monitoring Plastic Bag of Contaminated
Soil with Portable Alpha Detector

AIR SAMPLE RESULTS

BACKGROUND 0.00003 pCi/M³ Pu

EPA LIMIT 0.02 pCi/M³ Pu

HI-VOL AIR SAMPLER 20 FEET DOWNWIND FROM EXCAVATION

TRIAL RUN 0.00004 pCi/M³ Pu

HASL RUN 0.00258 pCi/M³ Pu

FIGURE 27
Air Sample Results

AIR SAMPLE RESULTS

ROCKY FLATS LIMIT
WITHIN WORK AREA

INSOLUBLE - 40.5 pCi/m³ Pu

SOLUBLE - 1.98 pCi/m³ Pu

HASL RUN
2 CFM AIR SAMPLER
IN SHED

MAY 13 - 0.09 pCi/m³ Pu

MAY 14 - 0.002 pCi/m³ Pu

FIGURE 28
AIR SAMPLE RESULTS