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**UNITED STATES ARMY
ENVIRONMENTAL HYGIENE
AGENCY**

ABERDEEN PROVING GROUND, MD 21010-5422

RADIATION PROTECTION STUDY NO. 27-43-0002-88
U.S. ARMY CHEMICAL SCHOOL
FORT MCCLELLAN, ALABAMA
29 MARCH - 1 APRIL 1988

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Command, ATTN: ATMD, Fort Monroe, VA 23651-5451.

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DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-6422



REPLY TO
ATTENTION OF

HSHB-MR-HI

9 August 1988

MEMORANDUM FOR: Commander, U.S. Army Training and Doctrine Command, ATTN:
ATMD, Fort Monroe, VA 23651-5451

SUBJECT: Radiation Protection Study No. 27-43-0002-88, U.S. Army Chemical
School, Fort McClellan, Alabama, 29 March - 1 April 1988

EXECUTIVE SUMMARY

The purpose and recommendations of the enclosed report follow:

a. Purpose. To measure the levels of radioactive material contamination in the soil and to measure the radiation levels above background in the areas surrounding the "Hot Cell" Building (Building 3192) at Fort McClellan. In addition, this study was performed to make recommendations on whether the area around the "Hot Cell" should be released for unrestricted use.

b. Recommendations.

(1) Ensure that all areas that are still contaminated with Cobalt-60 contamination above 8 picocuries per gram (pCi/g) and Cesium-137 contamination above 15 pCi/g are decontaminated before the areas around Building 3192, the "Hot Cell," and near the southwest corner of Building 3182 are released for unrestricted use.

(2) Ensure that the control pit is decontaminated to guidelines for unrestricted use.

(3) Ensure that Building 3180 is decontaminated to Nuclear Regulatory Commission guidelines for unrestricted use.

FOR THE COMMANDER:

ERIC G. DAXON
Major, MS
Chief, Health Physics Division

Encl

CF:
HQDA(DASG-PS) (w/encl)
Comdt, AHS, ATTN: HSHA-IPM (w/encl)
Cdr, U.S. Army Chemical School, ATTN: ATZN-CM-AHP
Cdr, DDEAMC, ATTN: PVNTMED Svc (w/encl)
Cdr, MEDDAC, Ft McClellan, ATTN: PVNTMED Svc (2 cy) (w/encl)



DEPARTMENT OF THE ARMY
U. S. ARMY ENVIRONMENTAL HYGIENE AGENCY
ABERDEEN PROVING GROUND, MARYLAND 21010-6422



REPLY TO
ATTENTION OF

HSHB-MR-HI

RADIATION PROTECTION STUDY NO. 27-43-0002-88
U.S. ARMY CHEMICAL SCHOOL
FORT McCLELLAN, ALABAMA
29 MARCH - 1 APRIL 1988

1. AUTHORITY. Letter, U.S. Army Chemical School, ATZN-CM-AHP, 30 July 1987, subject: Request for AEHA Survey, with 1st Endorsement, HQ TRADOC, ATOS, 11 August 1987.

2. PURPOSE. This study was performed to measure the levels of radioactive material contamination in the soil and to measure the radiation levels above background in the areas surrounding Building 3192, the "Hot Cell", at Fort McClellan. In addition, this study was performed to make recommendations on whether the area around the "Hot Cell" should be released for unrestricted use.

3. GENERAL.

a. An entrance interview and an exit briefing, to include a discussion of the findings and recommendations, was held with Mr. Gregory R. Komp, DAC, RPO.

b. The most recent survey of the overall radiation protection program at Fort McClellan, by USAEHA, was conducted during the period 25-26 October 1986 (Radiation Protection Survey No. 28-43-0417-86).

c. Abbreviations used in this report are given as Appendix A.

d. Instrumentation, to include a description of quality assurance procedures is included as Appendix B.

4. BACKGROUND.

a. In 1973, approximately 15 curies of Co-60 were accidentally released into the environment around Building 3192, the "Hot Cell." In addition, radioactive materials were also used in Building 3180, on a loading dock between Buildings 3180 and 3192, and in a control pit between the loading dock and Building 3192 (see Appendix C for a map of the area).

b. The USACMLS currently possesses an NRC License BML 01-02861-04, expiration date 30 September 1989, which authorizes the control and clean-up of the radioactive contamination.

(1) Water samples have been periodically taken from monitoring wells installed by the U.S. Geological Survey and from surrounding streams and creeks to monitor any movement of the contamination. All results have shown negative movement.

(2) An NRC inspection conducted on 30 January 1987 found no unusual levels of radiation.

(3) The NRC has provided to the USACMLS specific guidelines for allowable levels of external gamma radiation and acceptable radioactive contamination levels in soil, which must be met before the area around the "Hot Cell" may be released for unrestricted use (see Appendix D).

(a) The maximum permissible radionuclide concentrations above background are 8 pCi/g for Co-60 and 15 pCi/g for Cs-137. The sum of the ratios of the individual radionuclide concentrations to their respective concentration limit cannot exceed 1.

(b) The maximum external radiation gamma exposure cannot exceed 10 uR/hr above background for any area greater than 30 ft by 30 ft and 20 uR/hr for any area less than 30 ft by 30 ft.

c. The inside of Building 3192, the "Hot Cell" had not been decontaminated at the time of the survey. Thus no measurements were made inside Building 3192, the "Hot Cell".

5. FINDINGS.

a. Background Radiation Measurements.

(1) Five random measurements of the background radiation were taken outside the "Hot Cell" area. An external gamma measurement and a soil sample were taken at each location. The results of the measurements are provided as Appendix E. All measurements and samples were taken outside the control fence to the east of the "Hot Cell" area.

(2) The average external gamma radiation background was 11 uR/hr.

(3) The average concentration of Co-60 in the soil was 0.7 ± 0.2 pCi/g and the average concentration of Cs-137 in the soil was 1.4 ± 0.2 pCi/g.

b. General External Radiation Measurements.

(1) Measurements were taken with an ESP-2 with a SPA-3 probe. The measurements were taken in the areas around Building 3192, in 3 ft by 3 ft grid areas previously identified as contaminated and in 6 ft by 6 ft grid areas previously identified as not suspected of being contaminated. All measurements were taken at the intersection of the grid lines.

(2) A diagram explaining the grid used and the results are included in Appendix F. All instrument measurements were taken approximately one meter from the surface of the ground. All instrument measurements included background radiation.

(3) The results indicate that the external radiation levels in a 30 ft by 30 ft area did not average greater than 10 uR/hr and that the external radiation in any discrete area did not exceed 20 uR/hr.

c. General Soil Samples.

(1) A total of 103 soil samples were taken in the potentially contaminated areas. The samples were taken in areas where increases in the external radiation levels indicated that soil contamination was possible. The soil samples were taken at the intersection of the grid lines.

(2) Each sample contained approximately 200 grams of soil and was taken from 3 to 6 inches deep in the soil.

(3) The results of the samples are included in Appendix G. The last column in the table is the sum of the ratios of the individual radionuclide concentrations to their respective concentration limit with background radiation subtracted, any number in the last column greater than 1 indicates a soil sample that exceeds NRC guidelines for unrestricted use.

(4) Samples, 2-5, 51, 69, 73-76, 80, and 83-85 exceeded the NRC limits for combined Co-60 and Cs-137 contamination above background.

d. Southwest Corner of Building 3182.

(1) Separate external radiation readings and soil samples were collected near the southwest end of Building 3182. The measurements are separate because the grid system used to take measurements did not extend far enough to take these measurements.

(2) These results of the soil samples, external radiation measurements, and a diagram of the area are included in Appendix H. All external radiation measurements were taken approximately 1 meter from the surface of the ground. All soil samples were collected 3 to 6 inches deep. All measurements include background radiation.

(3) The external radiation measurements averaged greater than 10 uR/hr above background for a surface area of greater than 30 ft by 30 ft.

(4) The combined Co-60 and Cs-137 contamination ratios in three of the soil samples exceeded NRC guidelines.

e. The "Control Pit".

(1) External radiation measurements were taken in the "Control Pit." A diagram of the pit and the results of the measurements taken are included in Appendix I. All instrument measurements were taken at least 1 foot from the wall.

(2) The external radiation exposures near the pipe in the southeast corner of the pit at a depth of 15 ft from the surface, exceeded the NRC guidelines.

f. Building 3180.

(1) External radiation measurements were taken in Building 3180, a small building in the parking lot near Building 3192, the "Hot Cell". A diagram of the building and the results of the measurements are included in Appendix J. All instrumentation measurements were taken at least 1 foot from any wall surface and the results included background radiation.

(2) In two locations in Building 3180 the external radiation levels exceeded the NRC guidelines.

g. Loading Dock.

(1) External radiation measurements were taken on the loading dock between Buildings 3180 and 3192, the "Hot Cell". A diagram of the loading dock and the results of the measurements are included in Appendix K. All instrumentation measurements were taken on the surface of the loading dock and included background radiation.

(2) All radiation levels were below action levels for the NRC guidelines for external radiation.

h. Building 3182 and the Adjacent Parking Lot.

(1) External radiation measurements were taken along the outside walls of Building 3182 and throughout the adjacent parking lot. The results of the measurements; diagram of the parking lot and walls of Building 3182 are included in Appendix L. All measurements include background radiation. The external radiation measurements above background levels were attributed to thorium in the bricks of the building.

(2) All measurements were below the action levels in the NRC guidelines for external radiation.

6. CONCLUSION.

a. The levels of radioactive material contamination in the soil and the field around the "Hot Cell" exceed the NRC guidelines for release for unrestricted use.

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b. The external radiation levels at the southwest corner of Building 3182, inside the "Control Pit" and inside Building 3180 exceed NRC guidelines.

c. Four areas around Building 3192, the "Hot Cell" area should not be released for unrestricted use until all areas are decontaminated to levels below the guidelines for release to unrestricted use.

7. RECOMMENDATIONS.

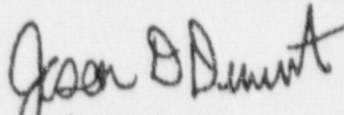
a. Decontaminate the soil surrounding the "Hot Cell" and near the southwest corner of Building 3182 to levels that will ensure that NRC limits for radioactive material contamination concentrations are not exceeded (see Appendix D).

b. Decontaminate the "Control Pit" and Building 3180 to levels that will meet the NRC limits for external radiation levels (see Appendix D).

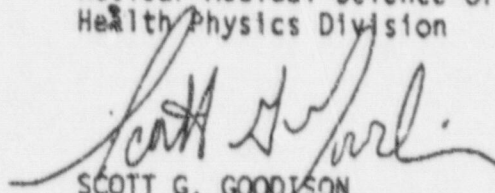
8. REFERENCES.

a. AR 40-5, 30 August 1986, Preventive Medicine.

b. Title 10, CFR, 1987 rev, Chapter I, Nuclear Regulatory Commission.

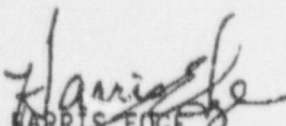

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APPENDIX A
ABBREVIATIONS

APG	- Aberdeen Proving Ground
BML	- Byproduct Material License
CFR	- Code of Federal Regulations
Co	- Cobalt
Cs	- Cesium
DAC	- Department of the Army Civilian
ESP-2	- Eberline smart portable two
ft	- feet
mR/hr	- milliroentgen per hour
NRC	- Nuclear Regulatory Commission
pCi/g	- picocuries per gram
RPO	- Radiation Protection Officer
SN	- serial number
uR/hr	- microroentgen per hour
USACMLS	- U.S. Army Chemical School
USAEHA	- U.S. Army Environmental Hygiene Agency

APPENDIX B

EQUIPMENT USED AND QUALITY ASSURANCE

1. The ESP-2, SN 354, instrument equipped with a SPA-3 micro-R probe was used during the survey.

a. The instrument was calibrated by the APG Calibration Center using a UDM-1A Cs-137 source authorized by NRC License 19-12056-03, expiration date 30 September 1988.

b. The instrument was verified using the J. L. Sheppard range, Model 78-2, equipped with a 130 curie Cs-137 source, Model 6810. The results are as follows:

Actual Exposure

683 uR/hr
68 uR/hr
195 uR/hr

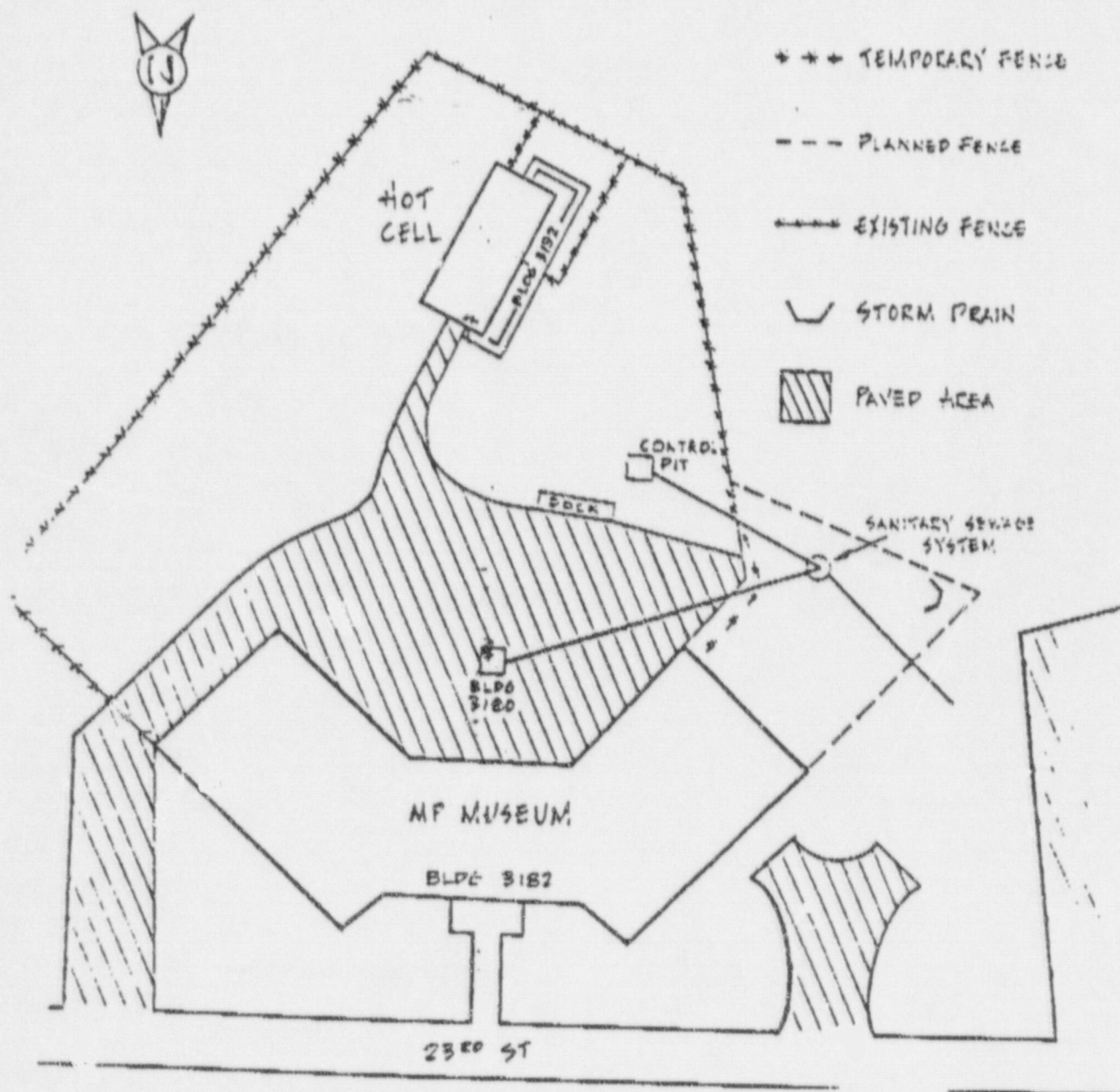
Measured Exposure

580 uR/hr
68 uR/hr
185 uR/hr

2. At the survey site, the proper operation of the ESP-2 was verified using a thorium lantern mantel. The ESP-2 consistently responded between 48 and 53 uR/hr during the three days of the survey.

APPENDIX C

HOT CELL AREA



Building 3192, the "Hot Cell" and the Sounding Area

APPENDIX D



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAY 06 1987

ENCLOSURE C

MEMORANDUM FOR: William E. Cline, Chief
Nuclear Materials Safety and Safeguards
Region II

FROM: John W. N. Hickey, Chief
Operations Branch
Division of Fuel Cycle, Medical, Academic and
Commercial Use Safety

SUBJECT: EVALUATION OF ACCEPTABILITY OF PROPOSED
DECOMMISSIONING ACTIVITIES

In your memorandum of April 16, 1987, you requested guidance on the acceptable concentration of Co-60 and Cs-137 in soil to allow the release of the Department of the Army, Fort McClellan, Alabama, facility. The primary pathway for exposure of individuals for these nuclides is by direct radiation. Therefore, the determination of acceptability for surface contamination of ground areas should be based on the following criteria:

External Radiation

The gamma exposure at 1 meter above the ground surface shall not exceed 10 uR/h above background for an area of greater than 30 ft x 30 ft and shall not exceed 20 uR/h above background for any discrete area (i.e., less than 30 ft x 30 ft).

Concentration criteria have also been developed for Co-60 and Cs-137 for situations in which subsurface contamination may be present, such as when burials of material have been made. These criteria are as follows:

<u>Radionuclide</u>	<u>Concentration Limit Above Background (pCi/g)</u>
Co-60	8
Cs-137	15

Where more than one radionuclide is present, the sum of the ratios of the individual radionuclide concentrations to their respective concentration limits shall not exceed 1.

I hope that this information is satisfactory as you evaluate the adequacy of the Department of the Army's decommissioning. If you have further questions, please feel free to contact me.

John W. N. Hickey
John W. N. Hickey, Chief
Operations Branch
Division of Fuel Cycle, Medical,
Academic, and Commercial Use Safety

Enclosures:

1. Ltr to Mr. Rourke fm JLDascario dtd 4/6/87.
2. Draft ltr to Dept of Army and Memo to JPotter fm JBKahle dtd 3/12/87.

Official Copy

APPENDIX E

BACKGROUND RADIATION MEASUREMENTS DATA

A. RESULTS OF BACKGROUND SAMPLES.

1. Sample One.

- $\mu\text{R/hr.}$
- a. External radiation measured at a meter from the surface: 11.0
 - b. External radiation measured at the surface: 12.0 $\mu\text{R/hr.}$
 - c. Co-60 in the soil sample: 0.8 ± 0.1 pCi/g.
 - d. Cs-137 in the soil sample: 1.0 ± 0.1 pCi/g.

2. Sample Two.

- $\mu\text{R/hr.}$
- a. External radiation measured at a meter from the surface: 9.5
 - b. External radiation measured at the surface: 10.2 $\mu\text{R/hr.}$
 - c. Co-60 in the soil sample: 0.3 ± 0.2 pCi/g.
 - d. Cs-137 in the soil sample: 1.2 ± 0.2 pCi/g.

3. Sample Three.

- $\mu\text{R/hr.}$
- a. External radiation measured at a meter from the surface: 11.3
 - b. External radiation measured at the surface: 12.3 $\mu\text{R/hr.}$
 - c. Co-60 in the soil sample: <0.1 pCi/g.
 - d. Cs-137 in the soil sample: 1.4 ± 0.2 pCi/g.

4. Sample Four.

- $\mu\text{R/hr.}$
- a. External radiation measured at a meter from the surface: 9.7
 - b. External radiation measured at the surface: 11.0 $\mu\text{R/hr.}$
 - c. Co-60 in the soil sample: <0.3 pCi/g.
 - d. Cs-137 in the soil sample: 0.8 ± 0.2 pCi/g.

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5. Sample Five.

- a. External radiation measured at a meter from the surface: 12.5 $\mu\text{R/hr.}$
- b. External radiation measured at the surface: 13.6 $\mu\text{R/hr.}$
- c. Co-60 in the soil sample: $1.9 \pm 0.3 \text{ pCi/g.}$
- d. Cs-137 in the soil sample: $2.4 \pm 0.3 \text{ pCi/g.}$

B. LOCATION OF SAMPLES.

- 1. All background samples were taken east of the hot cell area outside the security fence.
- 2. The samples were taken 10 feet intervals on a slope to match the derrain in the "Hot Cell" area.

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APPENDIX F

EXTERNAL RADIATION MEASUREMENT
AROUND BUILDING 3192, THE "HOT CELL" AREA

EXPLANATION OF THE DATA

1. Measurements were taken in a 3 ft by 3 ft grid in areas previously identified as contaminated and in a 6 ft by 6 ft grid in areas previously identified as not suspected of being contaminated. The zero point of the grid is the point next to Building 3192, the "Hot Cell", the driveway up to Building 3192, and the sidewalk to the northeast of the front door to Building 3192.

2. The first column in the table is the y-coordinate and the top row is the x-coordinate.

GRAPHICAL ILLUSTRATION

For use of this form see AEHA Form 6 SOP; the proponent is HSE-AT.

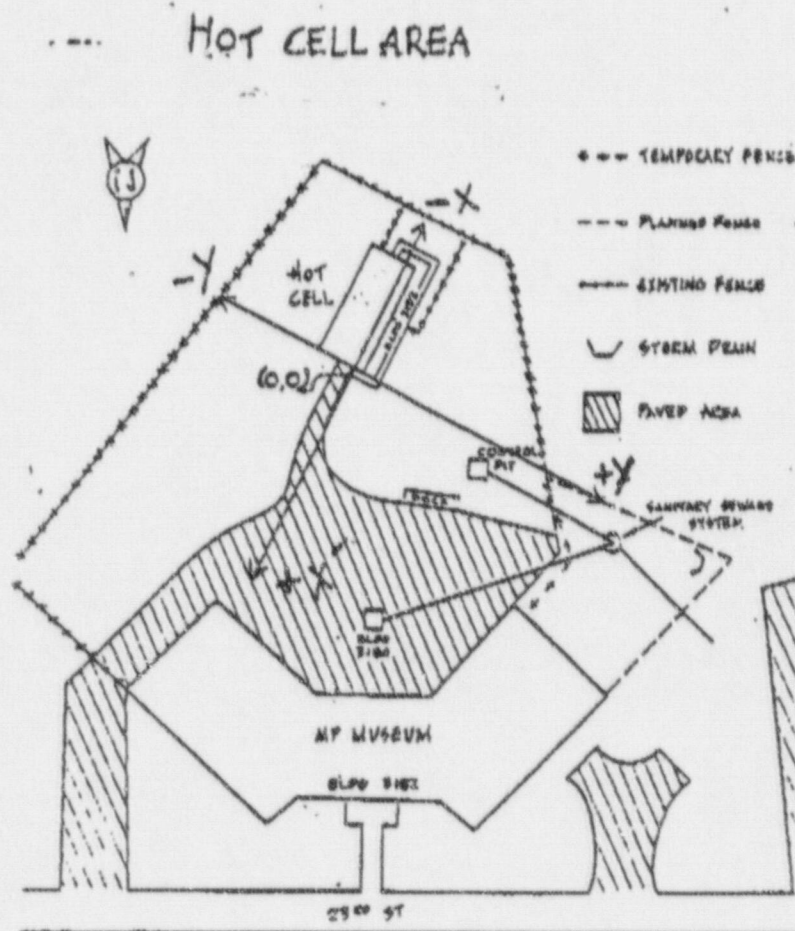


Diagram of grid system used to take external radiation and soil samples

DATE 1 JUN 68

DRAWN JDD

APPROVED EGD

SCALE _____ NTS

PLATE 1

U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY

UNITED STATES ARMY MEDICAL DEPARTMENT

AEHA Form 6, 1 Jun 80

F-3

Replaces USAEHA Form 15, 12 Aug 74, which will be used.

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Building 3192

The "Hot Cell"

Driveway

Parking lot

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APPENDIX G

EXPLANATION OF TABLE OF RESULTS

1. The results in the first six columns are self-explanatory.
2. The BCK Co-60 column contains the results from each soil sample of the Co-60 contamination with the background Co-60 subtracted from the result.
3. The BCK Cs-137 column contains the results from each soil sample of the Cs-137 contamination with the background Cs-137 subtracted from the result.
4. The BCK RATIO column contains the result of the sum of the ratios of the BCK Co-60 column to the concentration limit above background and the BCK Cs-137 column to the concentration limit above background.
5. The soil samples were taken at the intersection of the grid lines where external radiation measurements indicated the possible presence of contamination. Samples were taken 3 to 5 inches deep and contained approximately 200 grams of soil.

Radn Prot Study No. 27-43-0002-88, 29 Mar - 1 Apr 88

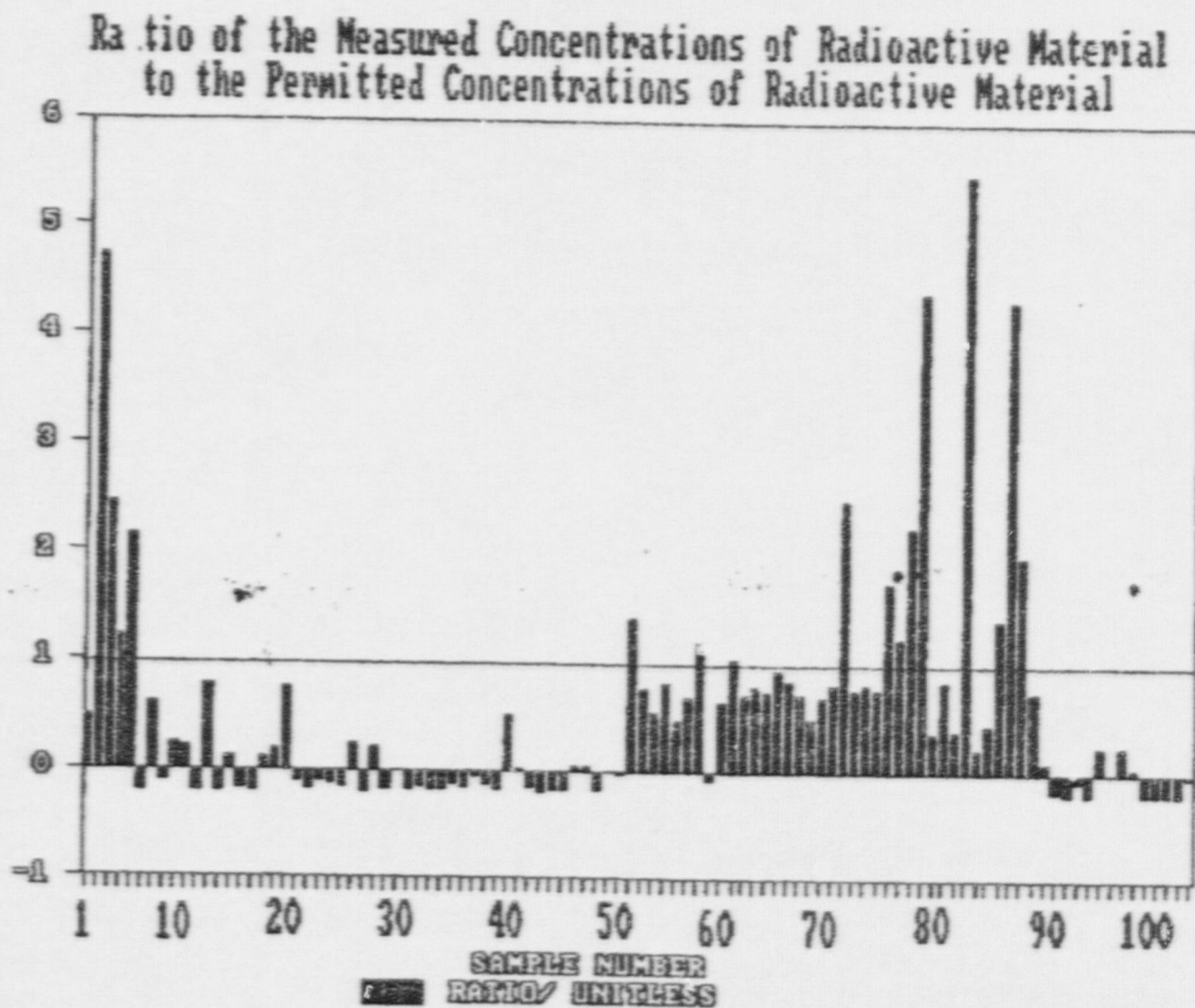
RESULTS OF SOIL SAMPLES FROM HOT CELL
AT McLELLAN, ALABAMA

SAMPLE NO.	X-COOR	Y-COOR	CS-60	ERROR	CS-137	ERROR	RATIO	BCK CS-60	BCK CS-137	BCK RATIO
1	8	0	4.6 +/-	0.3	0.5 +/-	0.1	0.004761	3.0	-0.0	0.400476190
2	18	0	34 +/-	1	1.4 +/-	0.4	4.9504761	33.3	0	4.750476190
3	33	0	17 +/-	1	3.2 +/-	0.5	2.0419047	16.7	1.0	2.441904761
4	48	0	0 +/-	0.5	1.0 +/-	0.3	1.4123809	8.3	0.5	1.212380952
5	18	12	10 +/-	1	1.2 +/-	0.4	3.3657142	15.3	-0.2	2.165714285
6	33	12	<0.1 +/-		<0.1 +/-		0	-0.7	-1.4	-0.2
7	51	12	5.1 +/-	0.5	1.3 +/-	0.3	0.8152380	4.4	-0.1	0.615238095
8	18	15	0.7 +/-	0.1	<0.2 +/-		0.1	0	-1.4	-0.1
9	27	15	1.8 +/-	0.4	0.7 +/-	0.2	0.4466666	2.1	-0.7	0.246666666
10	51	15	2.4 +/-	0.4	1 +/-	0.3	0.6095238	1.7	-0.4	0.209523809
11	24	18	<0.3 +/-		<0.3 +/-		0	-0.7	-1.4	-0.2
12	51	18	0 +/-	0.5	1.7 +/-	0.2	0.0704761	5.3	0.3	0.770476190
13	24	21	<0.4 +/-		<0.2 +/-		0	-0.7	-1.4	-0.2
14	33	21	1.0 +/-	0.3	0.8 +/-	0.1	0.3104761	1.1	-0.6	0.110476190
15	51	21	<0.3 +/-		0.2 +/-	0.1	0.0133333	-0.7	-1.2	-0.186666666
16	21	24	<0.2 +/-		<0.2 +/-		0	-0.7	-1.4	-0.2
17	42	24	1.0 +/-	0.3	0.8 +/-	0.1	0.3104761	1.1	-0.6	0.110476190
18	54	24	1.0 +/-	0.4	1.0 +/-	0.4	0.3838095	1.1	0.5	0.183809523
19	57	24	4.0 +/-	0.4	4.5 +/-	0.3	0.0571428	3.0	3.1	0.757142857
20	30	27	0.7 +/-	0.3	<0.2 +/-		0.1	0	-1.4	-0.1
21	39	27	<0.3 +/-		0.3 +/-	0.2	0.02	-0.7	-1.1	-0.18
22	48	27	0.5 +/-	0.2	0.2 +/-	0.1	0.0047619	-0.2	-1.2	-0.11523809
23	30	30	0.5 +/-	0.2	<0.2 +/-		0.0714285	-0.2	-1.4	-0.12857142
24	48	30	<0.4 +/-		0.5 +/-	0.2	0.0333333	-0.7	-0.9	-0.186666666
25	54	30	1.0 +/-	0.3	2.4 +/-	0.2	0.4314285	1.2	1	0.231428571
26	27	33	<0.4 +/-		<0.2 +/-		0	-0.7	-1.4	-0.2
27	51	33	1.0 +/-	0.3	2.1 +/-	0.3	0.4114285	1.2	0.7	0.211428571
28	30	36	<0.4 +/-		0.4 +/-	0.2	0.0286666	-0.7	-1	-0.17333333
29	48	36	1 +/-	0.2	0.8 +/-	0.1	0.1061904	0.3	-0.6	-0.00380952
30	27	39	<0.2 +/-		0.4 +/-	0.1	0.0286666	-0.7	-1	-0.17333333
31	39	39	<0.2 +/-		0.5 +/-	0.1	0.0333333	-0.7	-0.9	-0.166666666
32	48	39	<0.4 +/-		0.4 +/-	0.2	0.0286666	-0.7	-1	-0.17333333
33	24	42	<0.2 +/-		0.3 +/-	0.1	0.02	-0.7	-1.1	-0.18
34	27	42	0.4 +/-	0.1	<0.2 +/-		0.0571428	-0.3	-1.4	-0.14285714
35	42	42	<0.4 +/-		0.5 +/-	0.3	0.0333333	-0.7	-0.9	-0.166666666
36	45	42	0.6 +/-	0.2	1 +/-	0.1	0.1523809	-0.1	-0.4	-0.04761904
37	24	45	0.4 +/-	0.1	0.3 +/-	0.1	0.0771428	-0.3	-1.1	-0.12285714
38	42	45	<0.3 +/-		0.3 +/-	0.2	0.02	-0.7	-1.1	-0.18
39	45	45	2 +/-	0.2	0.4 +/-	0.4	0.7123809	1.3	5	0.512380952
40	36	48	1 +/-	0.2	1.2 +/-	0.2	0.2228571	0.3	-0.2	0.022857142
41	42	51	<0.4 +/-		0.6 +/-	0.2	0.04	-0.7	-0.8	-0.16
42			+/-		+/-		0	-0.7	-1.4	-0.2
43	24	51	<0.2 +/-		0.2 +/-	0.1	0.0133333	-0.7	-1.2	-0.186666666
44	27	51	<0.2 +/-		0.2 +/-	0.1	0.0133333	-0.7	-1.2	-0.186666666
45	36	51	1.5 +/-	0.2	1 +/-	0.2	0.2523809	0.6	-0.4	0.052380952
46	45	51	1.2 +/-	0.2	0.9 +/-	0.1	0.2314285	0.5	-0.5	0.031428571
47	33	54	<0.3 +/-		0.3 +/-	0.1	0.02	-0.7	-1.1	-0.18

Radn Prot Study No. 27-43-0002-88, 29 Mar - 1 Apr 38

68	42	54	0.0 +/- 0.2	1	+/- 0.1	0.2019047	0.2	-0.3 : 0.001904761
69	33	87	0.0 +/- 0.2	0.0	+/- 0.1	0.1685714	0.2	-0.8 : -0.03142857
90	42	87	1.0 +/- 1	2.3	+/- 0.2	1.5819047	0.3	0.0 : 1.381904761
91	30	60	4.0 +/- 0.6	4.7	+/- 0.5	0.9501904	3.6	3.3 : 0.756190476
92	36	63	4.1 +/- 0.3	1.3	+/- 0.2	0.7390476	3.4	0.0 : 0.539047619
93	30	63	5.4 +/- 0.5	3.4	+/- 0.3	0.8060052	4.7	2 : 0.706005238
94	33	66	4.1 +/- 0.3	1.2	+/- 0.1	0.6871428	3.4	-0.3 : 0.465714285
95	36	66	4.0 +/- 0.6	3.5	+/- 0.5	0.8904761	3.0	2.1 : 0.690476190
96	30	66	5.0 +/- 0.4	8	+/- 0.4	1.5619047	5.1	6.6 : 1.161904761
97	30	69	0.0 +/- 0.2	0.2	+/-	0.1142857	0.1	-1.4 : -0.08571428
98	33	69	4.0 +/- 0.5	1.1	+/- 0.3	0.84	4.2	0.7 : 0.84
99	30	69	5.7 +/- 0.4	6.1	+/- 0.4	1.2209523	9	4.7 : 1.020952381
100	30	72	5.4 +/- 0.5	2.1	+/- 0.3	0.9114285	4.7	0.7 : 0.711428571
101	33	72	5.4 +/- 0.5	3	+/- 0.3	0.8714285	4.7	1.6 : 0.771428571
102	30	72	5 +/- 0.5	3.2	+/- 0.3	0.9276190	4.3	1.8 : 0.727619047
103	30	72	5.4 +/- 0.4	2.4	+/- 0.3	1.1314285	4.7	4 : 0.931428571
104	30	75	6 +/- 0.6	2.5	+/- 0.3	1.0238095	5.3	1.1 : 0.823809523
105	36	75	5 +/- 0.4	3	+/- 0.2	0.9142857	4.3	1.6 : 0.714285714
106	27	78	4.2 +/- 0.5	1.3	+/- 0.3	0.6666666	3.5	-0.1 : 0.486666666
107	33	78	4.6 +/- 0.5	3.2	+/- 0.3	0.8704761	3.9	1.8 : 0.870476190
108	27	81	6.1 +/- 0.4	2.1	+/- 0.3	1.0114285	5.4	0.7 : 0.811428571
109	30	81	17 +/- 1	4.1	+/- 0.5	2.7019047	10.3	2.7 : 2.501904761
110	33	81	0.3 +/- 0.5	2.0	+/- 0.3	0.9504761	4.6	1.5 : 0.750476190
111	36	81	6 +/- 0.5	2.3	+/- 0.3	1.0104761	5.3	0.9 : 0.810476190
112	30	84	5.5 +/- 0.5	2.6	+/- 0.3	0.9504761	4.8	1.2 : 0.750476190
113	36	84	12 +/- 1	3.3	+/- 0.3	1.0342857	11.3	1.0 : 1.734285714
114	30	87	8.0 +/- 0.5	3	+/- 0.2	1.4285714	7.0	1.6 : 1.228571428
115	33	87	15 +/- 1	4.6	+/- 0.4	2.4495238	14.3	3.2 : 2.349523809
116	36	87	31 +/- 1	2.8	+/- 0.4	4.6152380	30.3	1.4 : 4.415238095
117	30	90	3.1 +/- 0.3	1.8	+/- 0.2	0.5628571	2.4	0 : 0.362857142
118	27	93	6.4 +/- 0.5	1.8	+/- 0.3	1.0342857	5.7	0.4 : 0.634285714
119	30	96	3.4 +/- 0.3	1.6	+/- 0.2	0.5923809	2.7	0.2 : 0.392380952
120	33	99	34 +/- 3	13	+/- 1	5.7238095	33.3	11.6 : 5.523809523
121	30	101	2.1 +/- 0.3	1.7	+/- 0.3	0.4133333	1.4	0.3 : 0.213333333
122	27	105	3.4 +/- 0.4	2.3	+/- 0.3	0.6390476	2.7	0.0 : 0.439047619
123	30	108	8.1 +/- 0.6	4.3	+/- 0.4	1.5806666	8.4	2.0 : 1.580666666
124	33	111	19 +/- 1	6.2	+/- 0.4	4.9501904	28.3	4.9 : 3.561904761
125	30	114	0.2 +/- 0.5	13	+/- 1	2.1809523	8.5	11.6 : 1.960952381
126	27	117	6 +/- 0.6	1.2	+/- 0.3	0.8371428	5.3	-0.2 : 0.737142857
127	30	120	1.7 +/- 0.2	0.0	+/- 0.2	0.3028571	1	-0.5 : 0.102857142
128	30	123	0.2 +/-	0.2	+/- 0.1	0.0133333	-0.7	-1.2 : -0.18666666
129	27	126	0.2 +/-	0.1	+/-	0	-0.7	-1.4 : -0.2
130	30	129	0.5 +/- 0.2	0.6	+/- 0.2	0.1114285	-0.2	-0.8 : -0.0857142
131	27	132	0.2 +/-	0.1	+/-	0	-0.7	-1.4 : -0.2
132	30	135	2.5 +/- 0.4	1.3	+/- 0.2	0.4438095	1.6	-0.1 : 0.243809523
133	27	138	1.3 +/- 0.3	0.4	+/-	0.1857142	0.6	-1.4 : -0.01428571
134	30	141	2.3 +/- 0.3	1.5	+/- 0.2	0.4285714	1.6	0.1 : 0.228571428
135	27	144	1.7 +/- 0.4	0.3	+/-	0.2428571	1	-1.4 : 0.042857142
136			+/-	+/-		0	-0.7	-1.4 : -0.2
137			+/-	+/-		0	-0.7	-1.4 : -0.2
138			+/-	+/-		0	-0.7	-1.4 : -0.2
139			+/-	+/-		0	-0.7	-1.4 : -0.2
140	-12	12	0.7 +/- 0.2	0.8	+/- 0.2	0.18	0	-0.5 : -0.04
141	-21	18	2.3 +/- 0.3	2.3	+/- 0.3	0.4819047	1.6	0.9 : 0.381904761
142	0	-21	0.6 +/- 0.2	0.7	+/- 0.2	0.1323809	-0.1	-0.7 : -0.06761904
143	-30	-30	0.2 +/-	0.3	+/- 0.1	0.02	-0.7	-1.1 : -0.18

010110



Radn Prot Study No. 27-43-0002-88, 29 Mar - 1 Apr 88

APPENDIX H

1. Separate external radiation measurement and soil samples were taken near the southwest corner of Building 3182.
2. The results include background radiation.

GRAPHICAL ILLUSTRATION

For use of this form see AEHA Form 6 SOP; the proponent is HSE-AT.

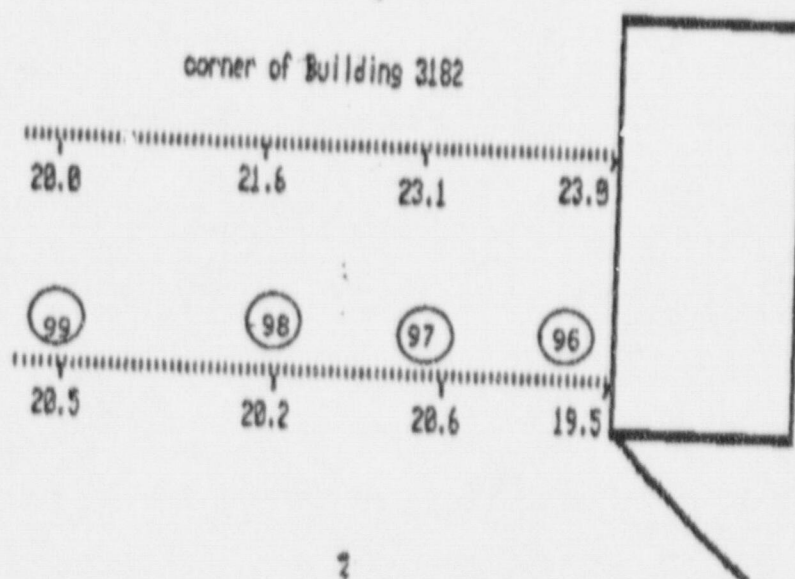


Diagram of survey meter readings taken in two foot intervals
Measured in $\mu\text{R/hr}$ and soil sample from southwest corner of
Bldg 3182 (meter readings include background radiation)

U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY
UNITED STATES ARMY MEDICAL DEPARTMENT

DATE 1 JUN 88
DRAWN JPD
APPROVED EGD
SCALE NTS
PLATE 2

Radn Prot Study No. 27-43-0002-88, 29 Mar - 1 Apr 88

RESULTS OF SOIL SAMPLES TAKEN
NEAR THE CORNER OF BUILDING 3182

<u>Sample No.</u>	<u>CO-60 Results</u> <u>in pCi/g</u>	<u>CS-137 Results</u> <u>in pCi/g</u>	<u>Ratio</u>
96	21 +/- 1	8.2 +/- 0.4	3.1
97	4.1 +/- 3.8	3.8 +/- 0.4	0.8
98	34 +/- 1	62 +/- 1	8.4
99	23 +/- 1	67 +/- 1	7.3
Background	0.7 +/- 0.2	1.4 +/- 0.2	0.2

APPENDIX I

GRAPHICAL ILLUSTRATION

For use of this form see AEHA Form 6 SOP; the proponent is HSE-AT.

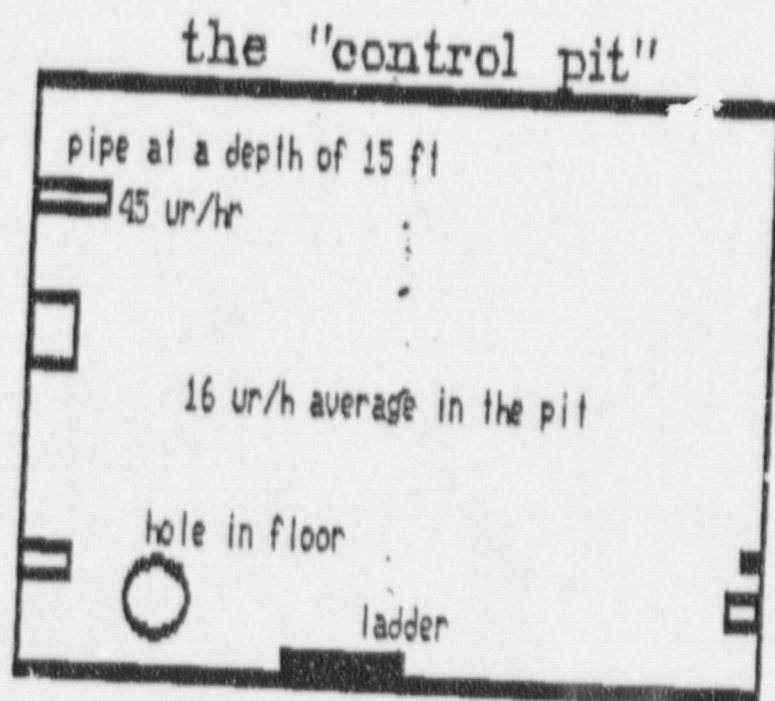
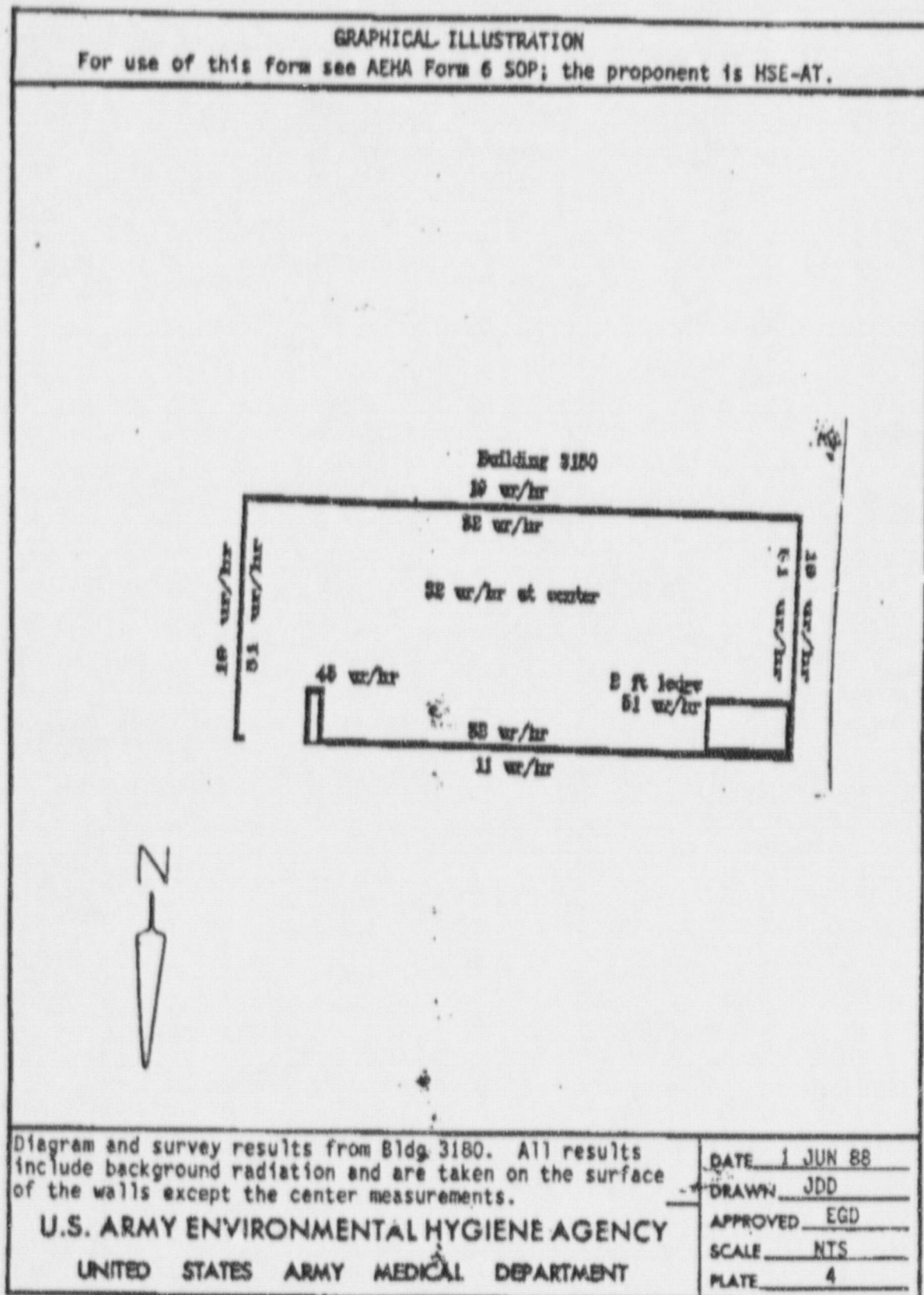


Diagram and results from "control pit" between Bldg 3192 and the loading dock. All measurements include background radiation.

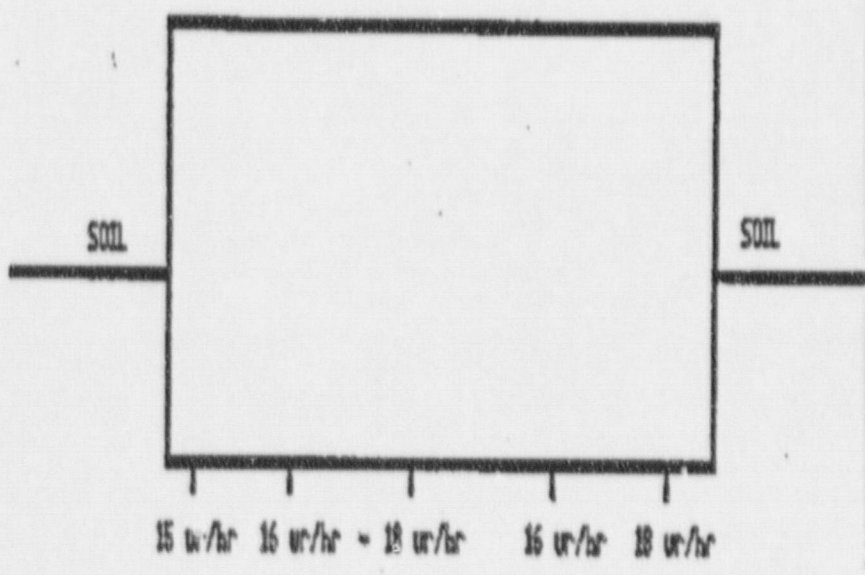
DATE 1 JUN 88
DRAWN JDD
APPROVED EGD
SCALE NTS
PLATE 3

U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY
UNITED STATES ARMY MEDICAL DEPARTMENT

APPENDIX J



APPENDIX K

GRAPHICAL ILLUSTRATION	
For use of this form see AEHA Form 6 SOP; the proponent is HSE-A7.	
<p style="text-align: center;">LOADING DOCK</p> 	
<p>Diagram and results from Loading Dock. All measurements are taken on the surface of the loading dock and include background radiation.</p>	
<p>U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY UNITED STATES ARMY MEDICAL DEPARTMENT</p>	
DATE <u>1 JUN 88</u>	DRAWN <u>JDD</u>
APPROVED <u>EGD</u>	SCALE <u>NTS</u>
PLATE <u>5</u>	

GRAPHICAL ILLUSTRATION

For use of this form see AEHA Form 6 SOP; the proponent is HSE-AT.

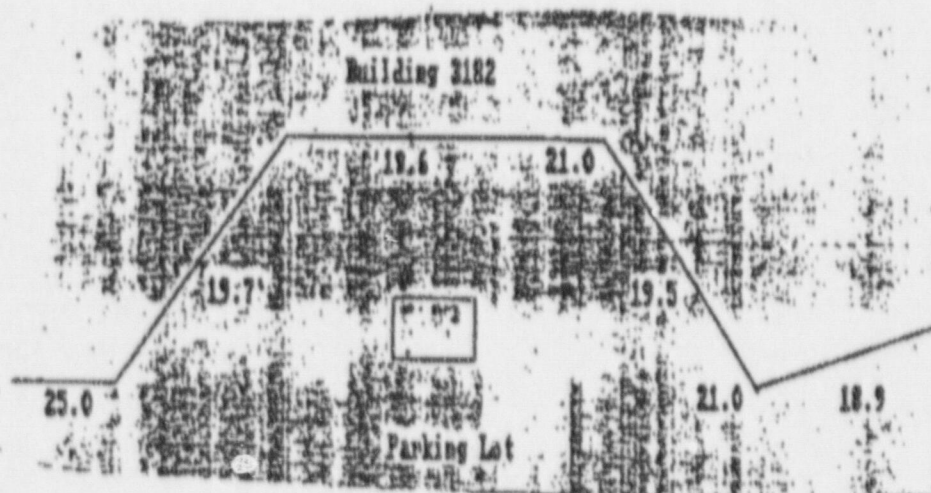


Diagram and results from exterior walls of Bldg 3182.
All measurements are in $\mu\text{R/hr}$ include background radiation
and were taken off the surface.

U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY
UNITED STATES ARMY MEDICAL DEPARTMENT

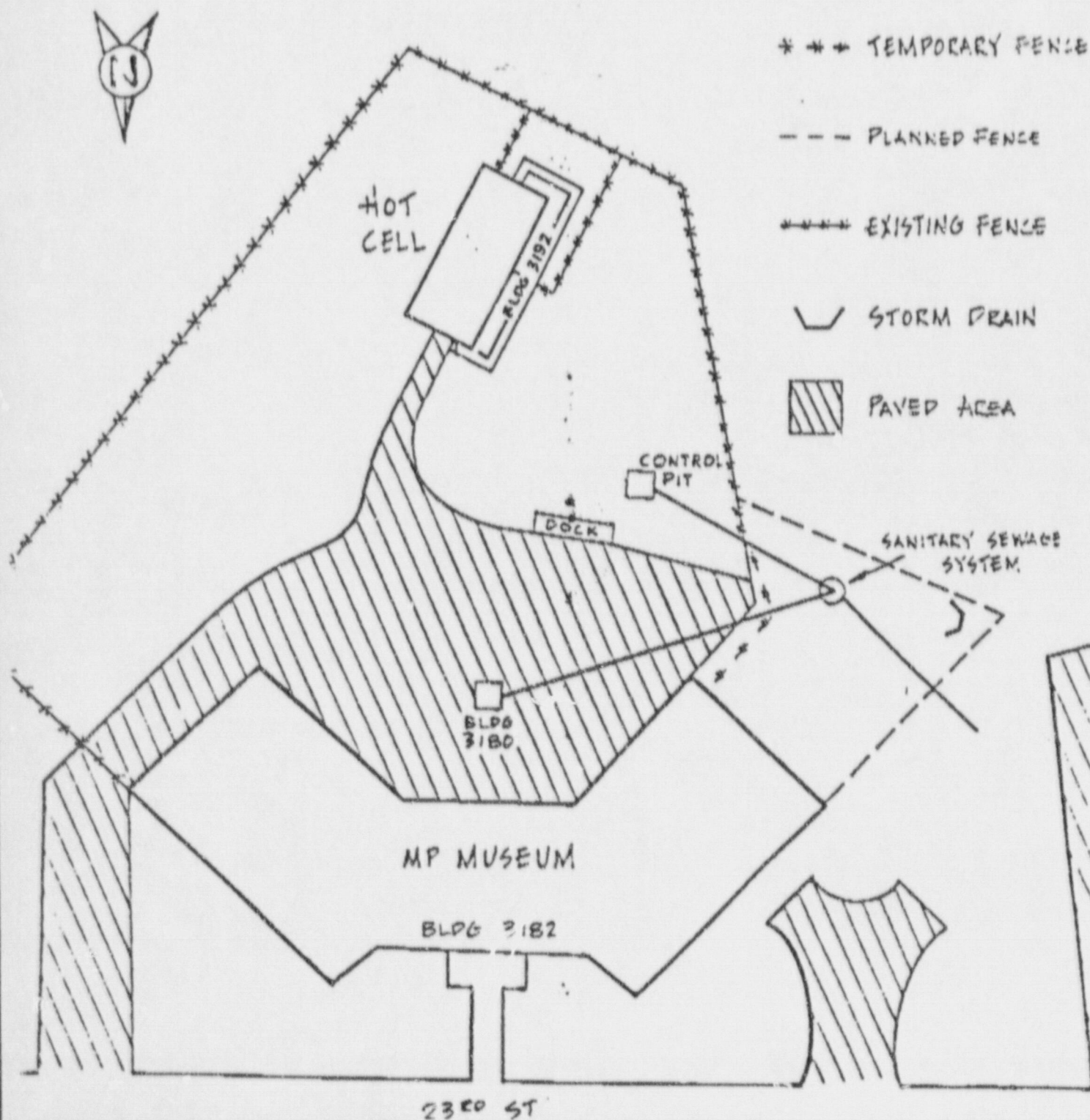
DATE 1 JUN 88
DRAWN JDD
APPROVED EGD
SCALE 7
PLATE

APPENDIX L

GRAPHICAL ILLUSTRATION For use of this form see AEHA Form 6 SOP; the proponent is HSE-AT.	
<div style="display: flex; justify-content: space-between;"> <div style="width: 65%;"> <p>Diagram and results from the parking lot of Bldg 3182. All results are in uR/hr. and include background radiation.</p> <p style="text-align: center;">U.S. ARMY ENVIRONMENTAL HYGIENE AGENCY UNITED STATES ARMY MEDICAL DEPARTMENT</p> </div> <div style="width: 30%; border-left: 1px solid black; padding-left: 10px;"> <p>DATE <u>1 JUN 88</u></p> <p>DRAWN <u>JDD</u></p> <p>APPROVED <u>EGD</u></p> <p>SCALE <u>NTS</u></p> <p>PLATE <u>6</u></p> </div> </div>	

APPENDIX C

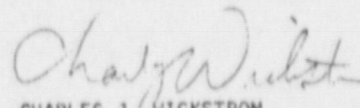
HOT CELL AREA



Memo For Record -
SUBJECT: Final Radiological Clearance

14 June 1973

1. The USAEHA Clearance Team was here 29-31 May 73 and the AEC Region II representative was here 6 Jun 73 to perform final survey and to give us the OK radiologically.
2. Both brought instruments and did some checking, and both gave us the green light.
3. The residual contamination is being held under an AEC license, for which application was made 4 May 73 and which is inclosed in the close-out file.
4. AEHA was to have sent us a "fast" letter, clearing us for inclosure in this file, but it has not arrived as of this date. Thus we are operating under their verbal clearance (the Team had an exit interview with the Commandant).


CHARLES J. WICKSTROM
MAJ, CmlC
Chief, Health Physics Div

Summaries

14 June 1973

The Radiological Decontamination Plan dated 16 Feb 73 included provision for seven summaries which are attached hereto. Mr. Holladay of Dir of Fac Eng, Bldgs & Grounds, has been sent the summaries he was designated to receive in the plan. (The task numbers on the attached summaries refer to the Decon Plan, which is included in the close-out file.)

- -

Task 18: Bldg 3192 and Liquid Waste Disposal System

1. The required instructions are to be found in Fort McClellan Reg 385-8, written by MAJ Wickstrom and Mr. Daniel, dated 4 Jun, contained in the close-out file and in the attached instructions for Liquid Waste Disposal System.
2. The residual contamination resulted in an AEC license requirement imposed by Mr. Fagan at DA. - -

WATER PUMP SYSTEM INSTRUCTIONS

- I. To Sample Water From Hot Cell Liquid Waste Tanks, Remove cap from Breather Pipe Above 1500 Gal Tank, and replace elbows.
 1. Close valve A (valve from sump pump).
 2. Open valve B (low level discharge 1500 gal tank).
 3. Open valve C (main route bypass).
 4. Open valve D (liquid return to 1500 gal tank).
 5. Press "ON" switch for pump motor.
 6. Allow liquid to circulate for about 24 hours.
 7. Obtain a sturdy one quart plastic container which can be sealed.
 8. Open valve E (sampling point) and fill container with liquid using the attached hose.

9. Close valve E, turn pump motor "OFF". Close valves B, C, and D, open valve A.

10. Send sample to AEM for analysis.

11. Replace breather cap.

II. To Pump Water From Hot Cell Liquid Waste Tanks,

Remove 1500 gal tank breather cap and replace elbows.

1. Close valve A (valve from sump pump).
2. Open valve B (low level discharge 1500 gal tank).
3. Open valve C (main route bypass).
4. Unlock valve F (final discharge to sanitary sewer) and open.
5. Press "ON" button for pump motor.
6. When liquid level indicator indicates all water is gone from tanks,

press "OFF" button for pump motor, close valve F and lock it, close valves B and C, and open valve A.

7. Replace breather cap.

- III. The surge pump is a separate motor in the pit and operates to pump water to sewers when the level rises above the float switch located in the pit.
- IV. Maintenance consists of insuring motors are operational and that general repair of system is performed as required.
- -

Task 27: Bldg 3180 and Environs

1. The formerly raised concrete pad surrounding Bldg 3180 has been taken up and repoured, all contamination was below acceptable limits.
2. The inside of the bldg formerly had spots up to 210 mr/hr and has been decontaminated by surface removal, down to acceptable limits.
3. The interior storage well was concrete-filled.
4. The exterior well, just off the SW corner of Bldg 3180, was filled to 1' below surface, lead was melted into the hole, then the rest was poured. This filled well is still contaminated below the lead. Highest reading before filling was 50 mr/hr about 6' down (bottom). This was a storage well, not a water well.
5. This bldg can now be used as a paint or storage shed.

Task 47: Bromine Pad

1. This facility is now ready for use as an installation vehicle wash rack.
2. Maintenance instructions are attached.

MAINTENANCE OF BROMINE PAO
LIQUID WASTE DISPOSAL SYSTEM

1. VALVES SHOWN AS A, B, C, D AND E SHOULD REMAIN OPEN, ALL OTHER VALVES NOT SHOWN SHOULD BE CLOSED.

2. MAINTENANCE CONSISTS OF KEEPING THE DRAIN GUTTER AND DRAIN PIPES FREE OF DEBRIS.

3. IF FOR SOME REASON WATER COLLECTS IN ANY OF THE HOLDING TANKS, IT MAY BE EMPTIED BY OPENING THE VALVE ON THE LARGE PIPE AT THE BOTTOM OF THE TANK.

Task 56: Alpha Field

All decon tasks have been complied with on schedule and this fenced facility is now open for general use, no contamination remaining. The soil has been tilled to a 6" depth according to instructions.

Task 50: Rideout Field

1. The USAEHA Survey Team made up of MAJ Lodde and Mr. Wilborn surveyed this site on their first close-out-associated visit 4-7 Feb 73. At this time, they stated that there was no residual contamination that was above acceptable limits, including the old fenced, former burial ground, and they did not bother to reinspect the site after that.
2. MAJ Anderson's input on the Rideout Field phase-down, which he supervised, is included in the close-out file (his letter is dated 16 Feb 73).

Task 60: Iron Mountain (Rattlesnake Gulch)

1. An excerpt of the report in the Health Physics file is included as the first document in the close-out file.
2. This site was surveyed by USAEHA 4-7 Feb 73 and again 29-31 May 73, having been decontaminated by soil removal in the meantime. Ten drums of soil were removed by troop labor and sent to Kentucky for burial.
3. The site was found to be within acceptable contamination limits at the time of the radiological clearance survey 29-31 May 73.
4. For a map of how to find the site (near Summerall Gate), see the first document in the close-out file.

Task 61: Old Radium Vault (Bldg 812½)

1. This item came up when COL Ladson, formerly Commandant of USACMLCS, recalled its location and asked MAJ Anderson about it.
 2. This was decontaminated by surface removal by MAJ Anderson.
 3. The USAEHA Team found this bldg to be within acceptable contamination limits during their visit 4-7 Feb 73 and did not revisit it thereafter.
 4. This bldg is fine for use as a paint or storage shed.
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Statement of Bldg Clearance

1. The USACMLCS has used several buildings for radiation training areas in the past. These bldgs listed below are free of contamination or have very small amounts of contamination which are within acceptable limits.

Bldg 3182
Bldg 3180
Bldg 3181
SW half of Bldg 3192

These have required some decontamination to achieve this status, but are now OK for unlimited use.

2. The NE half of Bldg 3192 and some associated underground items are still contaminated to a small degree. This is under the control of Mr. Daniel, Post Safety Director and RPO. AEC and DA have approved our measures. Signs have been erected.