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RADIOLOGICAL STATUS REPORT
DEACTIVATION STATUS - F PLANT

AUTHOR

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RADIOLOGICAL STATUS REPORT
DEACTIVATION STATUS - F PLANT

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RADIOLOGICAL STATUS REPORT
DEACTIVATION STATUS - F PLANT

INTRODUCTION

This report describes the radiological status of deactivated buildings and systems at 100-F Area. It provides a record for use in post-deactivation surveillance and future salvage of material and equipment. It includes the reactor and water plant buildings, but not the office and separate shop buildings which will continue in use. The portions of the effluent system which are outside of the 105-F exclusion area will be discussed in a separate report entitled, "Underground Radioactive Materials in 100-H and F Plants". (RL-REA-2514).

SUMMARY

The F Plant deactivation surveys, decontamination efforts, and radiation zone posting were performed in accordance with established guides and procedures. Seventy-three major locations were involved in the radiation and contamination surveys. As necessary, radiation zones were appropriately posted. At some locations barricades and tags were installed as additional control and information measures. The transfer and storage areas were not deactivated at this time. Upon deactivation, their status will be recorded in a supplement to this report.

It is believed that the status of the deactivated buildings and systems at F Plant is such that occasional surveillance surveys should be sufficient to maintain the radiological records upon which to base necessary radiation control measures. It is urged, however, that special precautions be taken for any future work which could possibly alter the status of zones, areas, and systems.

DISCUSSION

The criteria for radiological control of deactivated reactor plants are stated in "Reactor Plant Deactivation Guide", and "RPD System Instructions" for 100-F Area. In accordance with those guides loose contamination was cleaned to less than 3000 c/m in most open areas. Locations from which it was expected that a spread of contamination could readily occur, or where dose rates were significantly above 10 mrem/hr, were sprayed with a sealant or barricaded and marked with tags which described their status.

Decisions concerning the amount of effort to expend in decontamination of specific locations were also based, in part, on previous experience in the deactivation of DR and H Plants. Establishment of radiation zones was based on Department radiation control standards.

Radiation and contamination surveys were conducted in accordance with Department radiation control procedures, using C.P. portable dose rate meters and portable G.M. counters. Smears for loose contamination were made with cloth swabs and shoe covers.

DISCUSSION (Continued)

Two locations, the storage and transfer areas, in the 105-F Building will not be deactivated until metal shipments are completed. When they are deactivated, a description of their final status will be issued as a supplement to this report.

Listed below are the locations which were surveyed for beta-gamma radiation, with a description of their final status. In each case, contamination levels and dose rates represent the maximum which were observed.

105-F BUILDINGWinch Level

2000 c/m smearable; less than 3 mr/hr at 1 foot.

Basket Level

1000 c/m smearable; less than 3 mrem/hr at 1 foot.

D Machinery Room

Less than 1000 c/m smearable and less than 3 mrem/hr at 1 foot.

C Machinery Room

1000 c/m smearable; less than 3 mrem/hr at 1 foot.

Top of Unit Balcony

5000 c/m smearable; less than 3 mrem/hr at 1 foot.

Top of Unit

a. Inside VSR Enclosure

50,000 c/m smearable; 50 mrad/hr including 30 mr/hr at 2 inches from hopper number 35. Average dose rate 6 mrem/hr field.

b. Outside VSR Enclosure

6000 c/m smearable. Cask containing irradiated VSR tip - 30 mr/hr at 2 inches. Vacuum lines - 70 mr/hr at 2 inches. Average dose rate 3 mrem/hr field.

X-Level

a. Floor and Walls - 3500 c/m smearable.

b. Equipment - 25,000 c/m smearable.

c. Cave containing irradiated step plug - 70 mr/hr at 2 inches.

d. Average background 3 mr/hr field.

105-F BUILDING (Continued)

Far Front Stairs

Less than 1000 c/m smearable; less than 3 mrem/hr at 1 foot.

Far Rear Stairs

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Far Sample Room

Less than 1000 c/m smearable; 600 mrad/hr, including 20 mr/hr at 2 inches from troughs. Average background less than 3 mrem/hr field.

Near Sample Room

Less than 1000 c/m smearable; 250 mrad/hr including 5 mr/hr at 2 inches from troughs. Average background less than 3 mrem/hr field.

Lead Room

Less than 200 c/m smearable; less than 3 mrem/hr at 1 foot.

Near Rear Stairs and Landings

a. 0-Foot to 10-Foot Landing

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

b. Above 10-Foot Level

3000 c/m smearable; less than 3 mrem/hr at 1 foot.

10-Foot Near Rear Tool Room

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Rear Viewer

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Discharge Area

During the deactivation of F Plant, tentative plans for post-deactivation visits to the facility were being considered. For that reason it was desired to establish, if possible, conditions permitting entry to the rear platform with a minimum of protective clothing. Complete cleaning of the discharge area was recognized to be prohibitively expensive. Accordingly,

105-F BUILDING (Continued)Discharge Area (Continued)

the rear platform was positioned at the 10-foot level and sprayed with sealant to fix contamination in place. The 10-foot entrance labyrinths, landings, and railings, at near and far sides were also sprayed. Subsequent smears of all surfaces an observer might normally contact at these locations were less than 100 c/m.

The ends of the platform, which are not in the path an observer would follow, were still smearable to 5000 c/m after spraying. They were barricaded with chains.

Over-all conditions in the discharge area are described as follows:

a. 10-Foot Labyrinths

Less than 100 c/m smearable; less than 3 mrem/hr at 1 foot.

b. 0, 20, and 30-Foot Labyrinths

17,000 c/m smearable; less than 3 mrem/hr at 1 foot.

c. Hardware

20,000 c/m smearable; 135 mr/hr at railing. A detail survey of the rear face is contained in the Appendix.

d. Rear Wall

9000 c/m smearable; 50 mr/hr average at platform railing.

e. Work Platform at 10-Foot Level

Less than 100 c/m smearable on floor gratings and railings between chains. 5000 c/m smearable at ends of platform, behind chains. 60 mr/hr average background in center of platform.

f. Pads below Work Platform

1500 c/m smearable; 30 mr/hr field.

g. Downcomer Room

Less than 1000 c/m smearable; less than 3 mrem/hr at 1 foot.

105-F BUILDING (Continued)Charge Face

a. Hardware

20,000 c/m smearable; 18 mr/hr at platform railing. A detail survey of the charge face is contained in the Appendix.

b. Work Platform

5000 c/m smearable; 10 mr/hr field.

c. Pit Below Platform

Less than 1000 c/m smearable; 120 mrad/hr, including 80 mr/hr, at 6 inches from ducts. Average background 30 mr/hr field.

d. Process Tubes and Empty Channels

Through-pile decontamination of process tubes was not attempted. Process tubes were left capped at front and rear. Empty channels were shielded and sealed at front and rear.

Work Area

Less than 200 c/m smearable; 6 mr/hr field at railing. Average background less than 1 mrem/hr field.

Inner Rod Room

a. Floor and Walls

60,000 c/m smearable; 1500 mrad/hr, including 400 mr/hr at 2 inches near unit.

b. Rods and Rod Rack

100,000 c/m smearable; 5 rad/hr, including 1 r/hr at 3 inches from grating near unit.

c. Step-plug bushing on upper grating - 3 r/hr at 2 inches

d. Average background 5 mr/hr field.

Outer Rod Room

a. Outside Rod Enclosure

Less than 200 c/m and less than 1 mrem/hr at 1 foot.

Outer Rod Room (Continued)

b. Inside Rod Enclosure

1200 c/m smearable; 4 mr/hr field.

Accumulator Room

Less than 100 c/m smearable and less than 1 mrem/hr at 2 inches.

0-Foot Far

a. Ducts and reactor surface behind railing.

5000 c/m smearable, 5 mr/hr at 1 foot.

b. Lead Cave in Corner

2000 c/m smearable; 10 mr/hr field.

c. Steel Vault

2000 c/m smearable on inside surfaces; less than 1 mrem/hr at 2 inches.
Less than 100 c/m smearable on outside surface.

d. Floor and Walls Outside of Roped Area

Less than 200 c/m smearable and less than 3 mrem/hr at 1 foot.

0-Foot Near

10,000 c/m smearable; less than 3 mrem/hr at 1 foot.

Inner and Outer Instrument Rooms

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Minus 9-Foot Near

25,000 c/m smearable; less than 3 mrem/hr at 1 foot.

Minus 9-Foot Far

5000 c/m smearable; less than 3 mrem/hr at 1 foot.

Riser Tunnels Near and Far

20,000 c/m smearable; less than 3 mr/hr at 1 foot.

Riser Pits Near and Far

45,000 c/m smearable; 3 mr/hr field.

Valve Pit

a. Floor

300 c/m smearable; less than 3 mrem/hr at 1 foot.

b. Catwalks, Stairs and Valves

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Discharge Area Supply Air Tunnel

a. Walls

15 mrad/hr smearable; 150 mr/hr at 1 foot from chute walls.

b. Floor

30 mrad/hr, including 20 mr/hr at 2 inches from sludge on floor. The tunnel floor is presently wet by leakage of water from the storage basin. If water were removed from the basin it is expected that the sludge on the floor would dry out. Should the building ventilation fans be activated under such circumstances, it is possible that the dry sludge might be blown into the discharge area and produce a change of status for that location.

Supply Fan Wing and Supply Filters

a. Filters

Less than 200 c/m smearable; 600 c/m at 1 inch.

b. Supply Fan Wing

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Exhaust Fan Cells

a. Fan Shafts at Ducts

3000 c/m smearable; less than 1 mrem/hr at 2 inches.

b. All Other Surfaces

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

105-F BUILDING (Continued)Blue Tool Room

All tools were removed from the location. All surfaces were less than 200 c/m smearable and less than 1 mrem/hr at contact.

Mask Decontamination Room

a. Decontamination Sink

Less than 1000 c/m smearable; 200 mrad/hr including 2 mr/hr at 2 inches from speck embedded in drain.

b. All Other Surfaces

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Wash Pad

8000 c/m smearable; 35 mr/hr including 15 mr/hr at 2 inches from floor.

Roof Areas

a. Roof over Wash Pad

500 c/m smearable; 2 mr/hr at 2 inches.

b. All Other Surfaces

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Stack House

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

Miscellaneous Locations in 105-F

The following surveyed locations were less than 200 c/m smearable and less than 1 mrem/hr at contact: Maintenance Shop and Basement, Instrument and Electrical Shops, Purge Make-up Room, Electrical Equipment Room, Storage Battery Room, Miscellaneous Storage Room, Clean and Soiled Clothing Rooms, Air Conditioner Room, R. M. Office and Laboratory, Control Room, Lunch Room, Lavatories, Corridors and Offices.*

* Contaminated equipment, wrapped in plastic, was stored in an office adjacent to the Control Room. Contamination levels were 5000 c/m direct, less than 1 mrem/hr at 2 inches.

115-F BUILDING AND GAS TUNNEL

a. Gas Tunnel

20,000 c/m smearable; less than 3 mrem/hr at 1 foot.

b. Dryer Rooms

3000 c/m smearable; less than 3 mrem/hr at 1 foot.

c. The following locations were less than 200 c/m smearable and less than 1 mrem/hr at 2 inches: Corridors, Emergency Equipment Room, Ball 3X Equipment Storage Room, Operations Storage Room, Maintenance Storage Room, Filter Rooms, and Miscellaneous Storage Rooms.

1608-F PUMP BUILDING

a. Ground Level

7000 c/m smearable on inner surfaces of pump motor housings; less than 1 mrem/hr at 2 inches. All other equipment and surfaces less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

b. Minus 9-Foot Level

3000 c/m smearable; less than 3 mrem/hr at 1 foot.

103-F METAL STORAGE BUILDING

Less than 200 c/m smearable; less than 1 mrem/hr at 2 inches.

119-F CONFINEMENT INSTRUMENT BUILDING

Less than 200 c/m smearable; less than 1 mrem/hr at 2 inches.

117-F CONFINEMENT BUILDING

a. Filter Cells and Filters

Less than 1000 c/m smearable; less than 3 mrem/hr at 1 foot.

b. All Other Locations in Building

Less than 200 c/m smearable and less than 1 mrem/hr at 2 inches.

187-F HIGH TANK VALVE ROOMS

Less than 100 c/m smearable; less than 1 mrem/hr at 2 inches.

110-F GAS STORAGE

Less than 100 c/m smearable; less than 1 mrem/hr at 2 inches.

OUTDOOR STORAGE ZONES WITHIN 105-F EXCLUSION AREA

Two zones contain specks to 70,000 c/m embedded in the ground. Smearable contamination less than 1000 c/m; less than 3 mrem/hr at 1 foot.

181-F PUMP PLANT

- a. Screens and Pump Shafts

Less than 500 c/m direct.

- b. All Other Locations

Less than 100 c/m smearable and less than 1 mrem/hr at 2 inches.

183-F FILTER PLANT

- a. Settling Basins and Filters

Less than 500 c/m direct.

- b. All Other Locations

Less than 100 c/m smearable and less than 1 mrem/hr at 2 inches.

189-F OLD HOT SHOP

- a. Floor Drain

20,000 c/m direct, under grating; less than 3 mrem/hr at 1 foot.

- b. All Other Locations

Less than 100 c/m smearable and less than 1 mrem/hr at 2 inches.

MISCELLANEOUS BUILDINGS

The following buildings were less than 100 c/m smearable and less than 1 mrem/hr at 2 inches: 182-F Pump Plant, 182-FA Pump Test House, 184-F Power House, including Coal Handler's Shack, and 190-F Pump Plant, including pipe tunnel.

CONCLUSION

It is believed that adequate measures have been taken to provide the basis for necessary radiation controls. It is recommended, however, that a complete survey of all locations, both radiation zones and non-radiation zones, be made about once a year to review their status. In addition, surveys of frequently travelled locations may be made at more frequent intervals to assure that control is being maintained. In event that future salvage of equipment or other work is planned, special surveys and specific procedures are suggested. In event that water is removed from the storage basin it is recommended that the discharge area supply air tunnel be surveyed and re-evaluated prior to any plans to activate the building ventilation fans.

For work that requires entry into radiation zones, a Radiation Work Procedure is required. For information, a currently valid Radiation Work Procedure is attached in the Appendix. Special attention is recommended to assure that this procedure is updated to reflect current conditions, and has current management approval.

It is suggested that as part of the surveillance responsibility complete survey records be maintained for all work, and any change in the status of zones, areas and systems be appropriately recorded. Such information may be summarized and issued periodically as a supplement to this report.

REFERENCES

1. HW-84269, "Reactor Plant Decontamination Guide", 9-25-64.
2. Reactor Plant Deactivation, Systems Instructions - 100-F.
3. RL-REA-1071, "DR Plant Radiation Zones, Final Status Report," 4-11-65.
4. RL-REA-2501. "Radiological Status Report, Deactivation Status - H Plant", 8-7-65.
5. HW-45674, "Irradiation Processing Department Radiation Control Standards and Procedures".
6. 100-F Radiation Survey Reports, Numbers 78614 through 78954.

APPENDIX

1. Detail Survey of Rear Face
2. Detail Survey of Charge Face
3. Radiation Work Procedure.

Date: 7-12-65

DETAIL SURVEY OF REAR FACEGAMMA DOSE RATES IN mr/hr AT PLATFORM RAILING

	<u>4286</u>	<u>4279</u>	<u>4273</u>	<u>4267</u>	<u>4260</u>	
	36	42	37	30	24	
<u>3692</u>	<u>3686</u>	<u>3679</u>	<u>3673</u>	<u>3667</u>	<u>3660</u>	<u>3654</u>
33	65	80	60	50	43	28
<u>2992</u>	<u>2986</u>	<u>2979</u>	<u>2973</u>	<u>2967</u>	<u>2960</u>	<u>2954</u>
60	105	120	90	75	75	39
<u>2392</u>	<u>2386</u>	<u>2379</u>	<u>2373</u>	<u>2367</u>	<u>2360</u>	<u>2354</u>
55	120	135	95	75	60	41
<u>1792</u>	<u>1786</u>	<u>1779</u>	<u>1773</u>	<u>1767</u>	<u>1760</u>	<u>1754</u>
60	120	135	95	75	70	45
<u>1092</u>	<u>1086</u>	<u>1079</u>	<u>1073</u>	<u>1067</u>	<u>1060</u>	<u>1054</u>
60	115	130	90	75	65	45
	<u>0486</u>	<u>0479</u>	<u>0473</u>	<u>0467</u>	<u>0460</u>	
	90	95	60	50	45	

Date: 7-1-65

DETAIL SURVEY OF CHARGE FACEGAMMA DOSE RATES IN mR/hr AT PLATFORM RAILING

	<u>4286</u> 6	<u>4279</u> 7	<u>4273</u> 7	<u>4267</u> 7	<u>4260</u> 5	
<u>3692</u> 9	<u>3686</u> 9	<u>3679</u> 10	<u>3673</u> 10	<u>3667</u> 10	<u>3660</u> 10	<u>3654</u> 6
<u>2992</u> 8	<u>2986</u> 10	<u>2979</u> 10	<u>2973</u> 12	<u>2967</u> 13	<u>2960</u> 12	<u>2954</u> 11
<u>2392</u> 10	<u>2386</u> 12	<u>2379</u> 13	<u>2373</u> 13	<u>2367</u> 12	<u>2360</u> 10	<u>2354</u> 8
<u>1792</u> 10	<u>1786</u> 12	<u>1779</u> 15	<u>1773</u> 15	<u>1767</u> 14	<u>1760</u> 11	<u>1754</u> 8
<u>1092</u> 15	<u>1086</u> 15	<u>1079</u> 15	<u>1073</u> 15	<u>1067</u> 15	<u>1060</u> 12	<u>1054</u> 12
	<u>0486</u> 17	<u>0479</u> 18	<u>0473</u> 18	<u>0467</u> 17	<u>0460</u> 15	



RADIATION WORK PROCEDURE

LOCATION	NUMBER	REVISION	DATE	AREA
105-F	F-101	New	9-1-63	100-F
LOCATION			TITLE - DESCRIPTION	
Area (1) Open radiation zones			Area (1) 105 Bldg. radiation zones	
Area (2) Barricaded zones			Area (2) Rear face and inner rod room	
Area (3) Tagged and Sealed locations			Area (3) Reactor block, Gas circulation system, Process tubes, storage basin.*	
RADIOLOGICAL CONDITIONS			MONITORING	
Area (1) Nominal contamination - no dose rates present.			Area (1) None	
Area (2) Some contamination and dose rates.			Area (2) During initial entry.	
Area (3) Gross beta-gamma contamination which constitutes a significant dose rate if present.			Area (3) Continuous, unless a procedure under instruction #1 specifies otherwise.	
INSTRUCTIONS			PROTECTIVE CLOTHING	
COMPLY WITH IPD RADIATION WORK PROCEDURES GENERAL INSTRUCTIONS.			<input checked="" type="checkbox"/> SINGLE <input checked="" type="checkbox"/> N.P.O.C.	
1. Because of the contamination levels within Area #3 locations, entry requires a written procedure covering radiation - contamination control approved by the F Area custodian.			For location #1 and #2.	
2. Entry into Area #3 locations constitutes breaking a seal or opening an access into any part of it including such items as:			<input checked="" type="checkbox"/> DOUBLE for location #3. Respiratory protection as specified by Radiation Monitoring.	
a. Removing equipment from the storage basin or lowering the water level.				
b. Removing rods from the top or sides of the unit.				
c. Opening an experimental hole.			<input type="checkbox"/> APRON	
d. Removing tube caps, or nozzles at the front or rear face.				
3. Contact Radiation Monitoring to verify radiological conditions, protective clothing and dose rates before entering 105-F Building Radiation Zones.			<input type="checkbox"/> SUIT	
4. Unless advised otherwise by radiation monitoring, obtain a personnel survey or hand-shoe count upon leaving the building if entry is made into Radiation Zone(s).				
* The Storage Basin and Transfer Area will not be deactivated until metal shipment is completed. 105-F RWP #3 is valid for these locations for metal shipment.			APPROVALS Manager - D Reactor <i>[Signature]</i> Supervisor-RA <i>[Signature]</i>	

* RADIOLOGICAL STATUS REPORT
DEACTIVATION STATUS - F PLANT

105-H Building - Status of Metal Storage and Transfer Areas

Transfer Area

- a) Floor - 5,000 c/m smearable; 50 mR/hr at surface in spots.
- b) Ball Washer - 200 mR/hr at 2 inches.
- c) Background - 1 to 10 mR/hr, field.

Storage Area

Less than 100 c/m smearable; average background 2 mR/hr, field.

The Storage Basin will be left in a partially water-filled condition at the instruction of RLOO-AEC. Reactor Plant Deactivation Test RL-REA-2536 produced information which indicated that radiation and contamination could be controlled either by this means, or by the alternative of a nominal amount of earth or cinder fill. In the test, the basin water level was lowered from 18 feet - 3 inches, to a minimum of 2 feet and then restored to 17 feet. There was no significant increase in Storage Area dose rates until the water level reached 4 feet, when a dose rate of 20 mR/hr was observed. At the 2 foot level, a maximum dose rate of 230 mR/hr was observed in the Storage Area, with an average background of 50 mR/hr.

Basin walls and horizontal cross members were hosed with water as the level was lowered. By this means, smearable contamination on the walls was reduced from 20,000 c/m to 5,000 c/m. Direct C.P. readings at 4 inches from cross-members were reduced from 500 mrad/hr (window open, and uncorrected for source size) to less than 5 mrad/hr. No spread of contamination was detected during the test.

Water level in the basin will be maintained between a maximum of 17 feet and a minimum of 8 feet by means of appropriate surveillance procedures.

REFERENCES:

1. "Reactor Plant Deactivation Test, 105-F and H Storage Basin Layaway," RL-REA-2536, dated 9-16-65.
2. "Summary Report, Reactor Plant Deactivation Test, 105-F and H Storage Basin Layaway," RL-REA-2689, dated 10-29-65.

* The radiological status of the metal storage and transfer areas is attached as Supplement A due to their deactivation not having been complete before the report was prepared.