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SUBJECT: PRELIMINARY RADIOLOGICAL CHARACTERIZATIONS OF THE
WASTE EVAPORATOR FACILITY (BLDG. 3506) AND THE
FISSION PRODUCT PILOT PLANT (BLDG. 3515)

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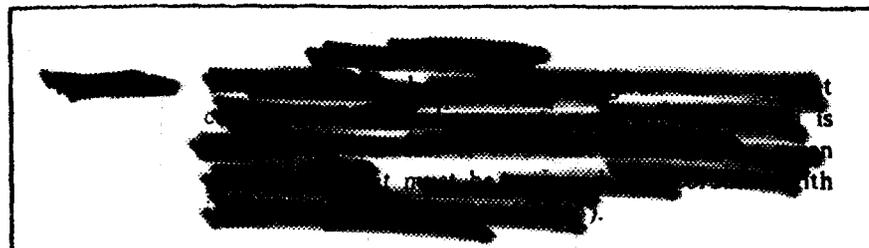
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ABSTRACT

Preliminary radiological characterization studies have been made of the Fission Product Pilot Plant (FPPP) (Bldg. 3515) and the old Waste Evaporator Facility (WEF) (Bldg. 3506), both located in the south tank farm. The FPPP has been entombed for a number of years and little direct information is available about it. However, there are indications of extensive contamination within the facility. Further work will be required to fully characterize the hazards. On the other hand, the WEF has been extensively decontaminated in the past and contains only limited areas of contamination. It should present no significant radiological hazards to decommission.

Publicly Releasable

This document has received the necessary patent and technical information reviews and can be distributed without limitation.



1. INTRODUCTION

1.1 General

This report describes the preliminary radiological characterization studies of the old Waste Evaporator Facility (WEF) (Bldg. 3506) and the Fission Product Pilot Plant (FPPP) (Bldg. 3515) located on the west (Bldg. 3506) and east (Bldg. 3515) sides of the south tank farm (see Fig. 1).

These facilities are being analyzed for decommissioning as part of the ORNL Surplus Facilities Management Program (SFMP). This preliminary characterization was conducted to identify the significant hazards associated with the facility in order to aid the initial assessment of decommissioning alternatives. Both of these facilities are small buildings that have been out of service for some time. The WEF operated from 1949 to 1954 receiving liquid waste from various areas of ORNL. It has since been used for other purposes; most recently as a change area for work in the south tank farm.

The FPPP operated from 1948 to 1958 in a fission product recovery development program and was abandoned when it was replaced by the Fission Product Development Laboratory (FPDL). Subsequently, the building was entombed in a concrete block shell which remains today.

2. SURVEY PLAN

For both facilities, the initial effort was a review of any information available to assist in planning the field work. Preliminary radiation surveys were made of both facilities as possible; however, no surveys were made of the immediate environment as both facilities are located on the south tank farm which is being surveyed in another effort.¹

Instrumentation for this survey consisted of standard ORNL portable Health Physics survey instruments (i.e., GM survey meter), and a portable Gamma Spectroscopy System. Smear samples taken over 100 cm² areas were counted in sample counters to detect low-level amounts of transferable alpha and beta-gamma contamination.

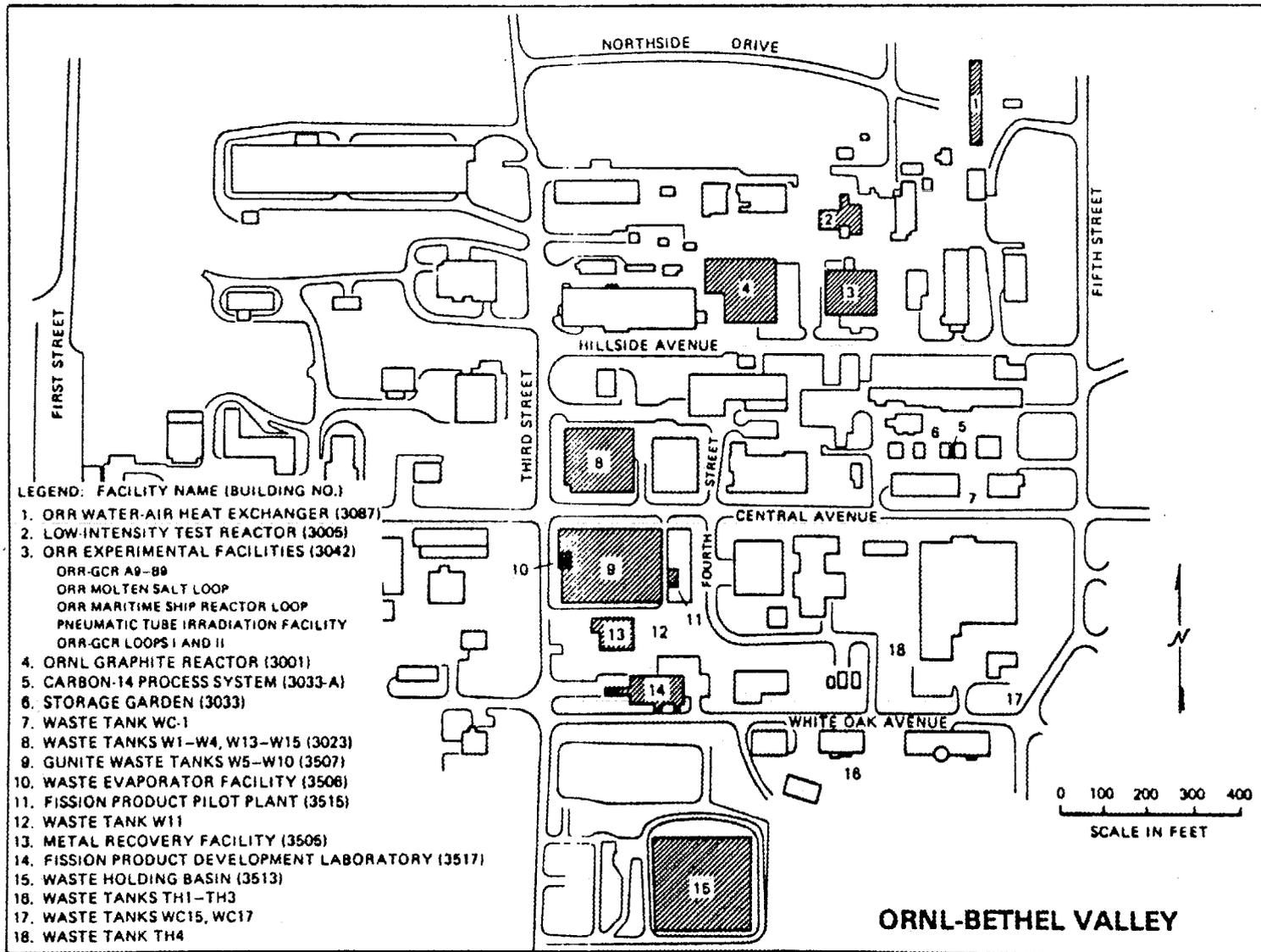


Fig. 1. Location of SFMP sites at ORNL.

3. CHARACTERIZATION RESULTS

3.1 FPPP

Figure 2 displays results of a radiation survey made around the exterior of the FPPP facility. No access to the interior of the facility could be made. The only area found to have radiation levels above background was on the west side. An analysis of this area with a portable gamma spectroscopy system indicated the source of radiation was ^{137}Cs . Records and discussions with Operations Division also indicate that ^{90}Sr is present within the structure, although it would be impossible to detect through the block walls.² Accurate inventory estimates are impossible from this survey; however, the past inventory estimates of 10-100 Ci (ref. 2) are consistent with the survey results since much larger inventories of ^{137}Cs would be readily detectable through the block walls while a much lower inventory would not be detectable at all.

3.2 WEF

A survey was made of the control room (east end) of the Waste Evaporator Facility. No transferable contamination was found on the floor or concrete walls. However, some pipe openings on the west wall leading from the control room into the cell read 1 to 10 mrad/h. A smear from inside one of these pipes indicated 1,350 dpm alpha contamination and 11,400 dpm beta-gamma contamination.³

The cell area appears to have several feet of water in it due to leaks in the roof so no interior survey was possible. However, past surveys of this area have indicated no transferable contamination on surfaces and only low-level radiation readings (1 to 10 mrad/h) primarily associated with piping.⁴

Two additional sources of contamination may exist within the WEF but were not accessible to be surveyed. A section of the cell floor was broken out several years ago and recovered with concrete according to Operations staff. The new concrete covered the contamination that remained on the floor. Also an enclosed valve pit north of the structure is believed to contain some radioactive contamination.

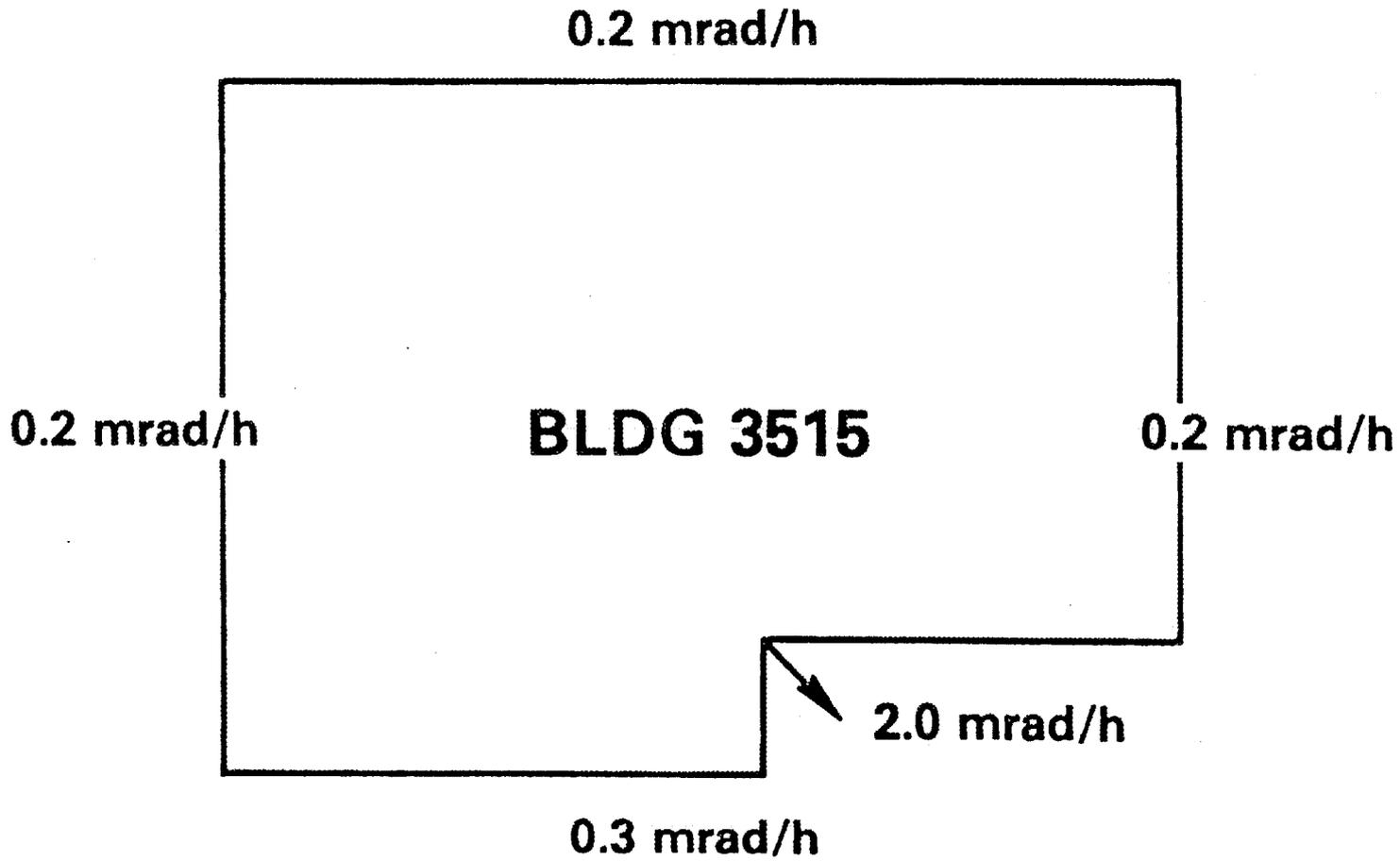


Fig. 2. Radiation survey results around the exterior of the FPPP.

4. IDENTIFICATION OF ENVIRONMENTAL CONSIDERATIONS

No environmental studies were made of these facilities for this report as they are both located within the boundaries of the south tank farm. This tank farm is being surveyed by the Department of Environmental Management as a part of the preliminary radiological characterization effort and will be documented in a separate report.¹

5. IDENTIFICATION OF RISK CONSIDERATIONS

No significant sources of health or safety risk were noted during the surveys at either facility. However, the roof of the WEF cell area appears to be in poor condition, creating a potential hazard for anyone working on the roof.

6. IDENTIFICATION OF SPECIAL TECHNICAL OR R&D REQUIREMENTS FOR FUTURE DISPOSAL

No special technical or R&D requirements were identified as necessary for the safe disposal of the WEF. However, before decommissioning the FPPP, a more accurate assessment will need to be made of the interior. This will not require any special Health Physics equipment but will require that an access be cut through the concrete block walls or through the roof.

7. SUMMARY AND CONCLUSIONS

7.1 FPPP (Building 3515)

The FPPP is a difficult facility to characterize because it is completely enclosed and few records exist documenting its status prior to entombment.

A survey of the exterior of the entombment structure indicated a maximum reading of 2 mrad/h on the west side. The radiation levels on the other sides of the structure were at background levels for this area (< 0.4 mrad/h). Gamma spectrums obtained on the exterior walls indicate that ¹³⁷Cs is the primary

long-lived isotope responsible for the gamma activity. Sr-90 is also a suspected contaminant based on similar processing activities in other facilities. Both ^{137}Cs and ^{90}Sr have long half-lives (30 years and 28 years, respectively) so current levels of contamination should be no more than a factor of two lower than at the time of entombment. Discussions with individuals familiar with the facility indicate that the unlined concrete cell area of the facility may be highly contaminated due to the practice of backflushing the system causing the tanks to overflow onto the floor.⁵ There are also indications that the drain line from the cell leaked during past operations.⁵

Radionuclide inventories are difficult to estimate at the FPPP, but estimates based on exterior measurements and past records indicate a range of 10 to 100 Ci of ^{137}Cs .² The ^{90}Sr inventory would be expected to be in the same order of magnitude.

The FPPP appears secure and intact at this time. If a decision is made at some time in the future to dismantle the structure, an interior survey will be required to more accurately assess the radiation and contamination levels. In particular, entry into the cell area would require careful planning to prevent undue exposure to radiation and the spread of contamination.

7.2 WEF (Building 3506)

The WEF has undergone extensive decontamination since its use as a waste evaporator facility. The control room of the building has only isolated areas of contamination in piping imbedded in the wall. The cell area currently has water in it due to a leaking roof in need of repair, but is reported to have only low levels of contamination.⁴ The floor of the cell area and the valve pit immediately north of the building are also reported to be contaminated though both were inaccessible for this study. However, most of the facility is free of contamination and will require only limited health physics coverage.

The remaining radionuclide inventory should be very low, most likely less than 1 Ci. A previous report indicates the primary isotopes are ^{137}Cs and ^{90}Sr .²

REFERENCES

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