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ABSTRACT

The approach and methods to be used to demonstrate that all areas of the SRE facility are acceptable for release to unrestricted use, from radiological considerations, are described. This Detailed Working Procedure satisfies the requirement of N704ACR990027, "SRE Activity Requirement No. 29, Final Closeout of the SRE Facility."

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FORM 734-C REV. 11-77

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1.0 INTRODUCTION

The SRE facility consists of a major reactor building composed of a high bay, ground floor and mezzanine offices, and various rooms housing support equipment; a surrounding paved area; several out-buildings; and natural ground with drainage paths and a retention pond. During the operation of this facility, various portions became radioactively contaminated by neutron activation and from work with fission products and activation products. The goal of the D&D Program at this facility is to rehabilitate the major building to the point of being structurally sound and free of radioactivity to the extent that will permit release for unrestricted use. Radioactivity in all remaining portions of the facility will be reduced (by decontamination or by disposal) to levels that are as low as practicable and that do not exceed the limits stated in Table I.

TABLE I

SURFACE CONTAMINATION LIMITS FOR DECONTAMINATION AND DISPOSITION AT THE SRE

	Total	Removable
Beta-gamma emitters	0.1 mrad/hr at 1 cm thru 7 mg/cm^2 absorber	100 dpm/100 cm^2
Alpha emitters	100 dpm/100 cm^2	20 dpm/100 cm^2

Remaining activated or contaminated soil and concrete will generally be below 100 pCi/g, with exceptions determined for specific conditions. Water, in the retention ponds, and any pits or sumps, will be below MPC for Sr-90, the most restrictive radionuclide with which this water could be contaminated. This concentration limit is 3×10^{-7} μCi/cm^3.

2.0 FACILITY REGIONS

The facility may be divided into several regions on the basis of past use, contamination history, and D&D operations. These regions are shown marked on a map of the facility, in Figure 1, and will be treated as geographical units in releasing the facility.

Region I

This area contained the Hot Oil-Sodium Cleaning Facility, Building 724, and related structures, roadways, and drainage paths. Building 724 has been relocated to Region IV, and is now identified as Building 133. This building has been released for unrestricted use (IL, R. J. Tuttle to R. A. Johnson, "Release of Building T724," January 23, 1978, and IL, F. E. Begley to R. J. Tuttle, "Unconditional Release of Building T724 for Unrestricted Use," January 18, 1978). Survey data for this building will be included in the report for Region IV.

Region II

This area contains the east end of Building 163 (this end being the Box Shop) and the surrounding paved surfaces.

Region III

This area adjoins the contaminated work area of Building 163 and comprises the entrance approaches to the SRE and the Region IV.

Region IV

This area consists of the roadway to the SRE West Parking Lot and the slope to the west of the SRE and includes the building moved from

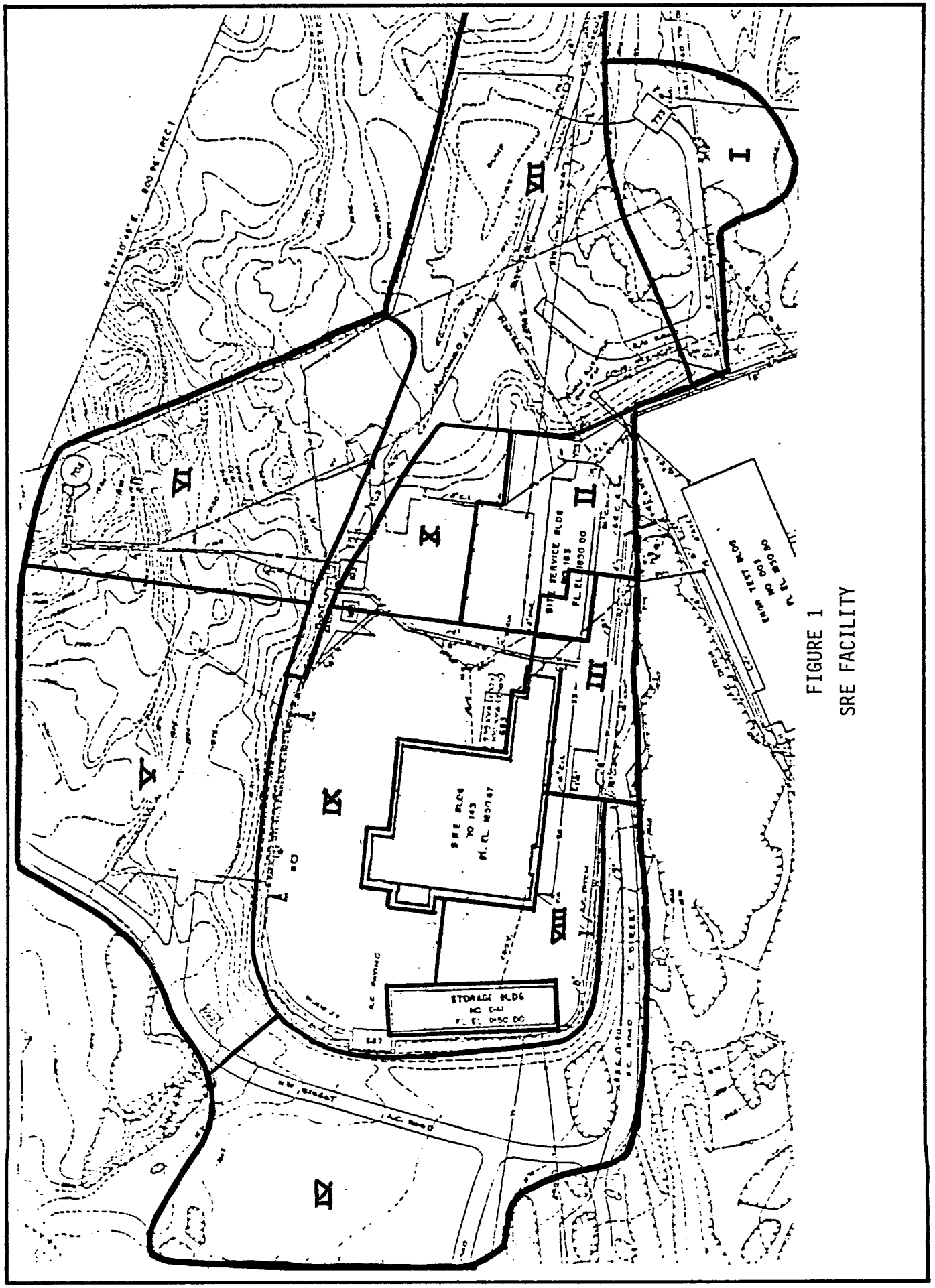

FIGURE 1
SRE FACILITY

Region I. It does not include the fenced yard used for storage of casks by the RMDF. This yard is assigned to the RMDF. Since surface drainage from this yard runs into Region IV, part of this region will need to be resurveyed following cleanup of the yard.

Region V

This area contained the Gas Storage Vault (Building 653) and the Temporary R/A Waste Storage Area. Both these structures have been demolished.

Region VI

This area contained the water supply storage tank and some Southern California Edison Company structures.

Region VII

This area contains the retention pond, the old leach field, the sanitary sewer pumping system, and the SRE drainage channel back to the fence line. It includes the retention pond overflow channel downstream for a distance of about 200 feet.

Region VIII

This area consists of the paving to the south and west of Building 143 to approximately the enclosure for the T1/T2 and T3 pits. It includes the drainage channel along the southwest to south edge of the paved area. It does not include Building 041.

Region IX

This area consists of the balance of the paved area around Building 143 and includes the drainage path along the north side to the fence

line at the northeast corner. Certain areas of the paving and the subsurface soil are known to be contaminated and will be removed prior to the final site survey.

Region X

This area is now in use as a parking lot and includes the natural ground to the east of the parking lot.

Building 163

This area is the contaminated work area of the building and includes the change room and the concrete ramp at the west entrance.

Building 143

This is the major reactor building and consists of nonradioactive areas and areas with surface and/or distributed contamination. Portions of the structure and subsurface soil will be removed. The ground level and certain below-grade rooms are shown in Figure 2. The mezzanine is shown in Figure 3. It is assumed that the majority of the floor and below-grade structures in the high bay will be removed.

Building 041

The north portion of this building is now being used for interim storage of radioactive waste prior to shipment for disposal. The south portion is used by LMEC for storage of controlled items.

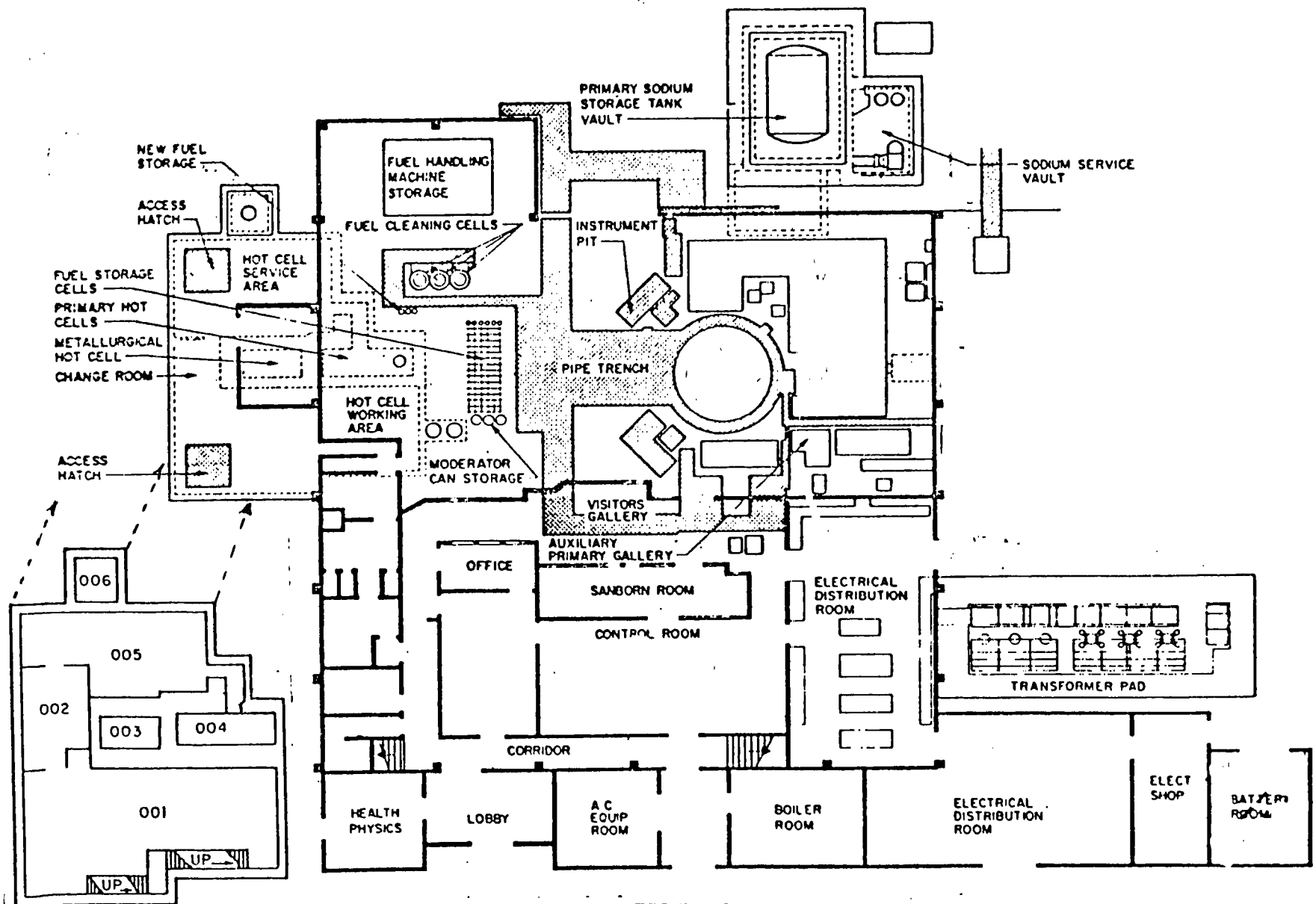

FIGURE 2

BUILDING 143 - GROUND LEVEL AND BELOW-GRADE STRUCTURES

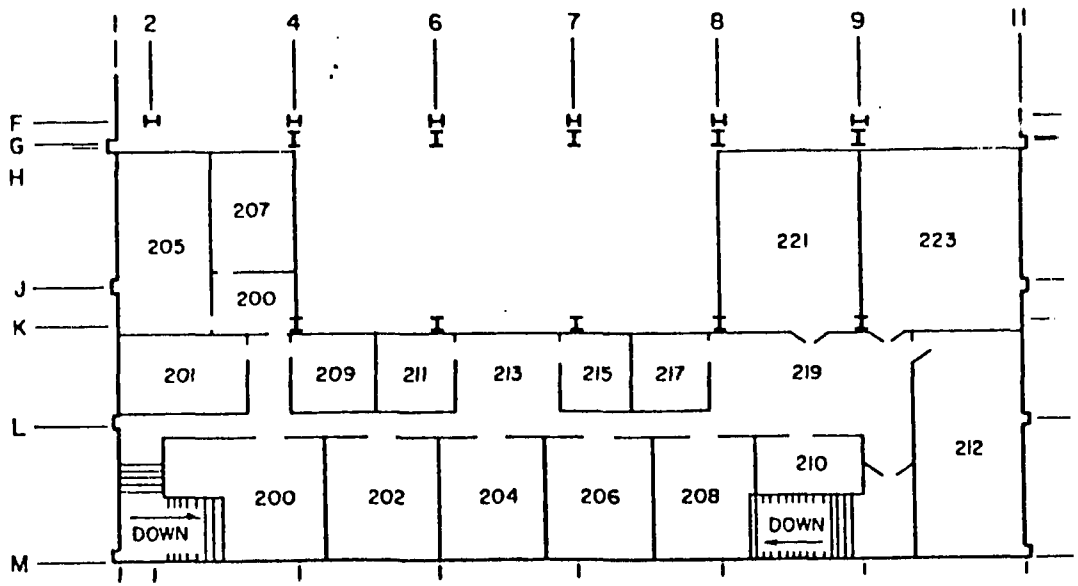

FIGURE 3

BUILDING 143 - MEZZANINE.

3.0 SURVEY PROCEDURES

All areas with significant known contamination are surveyed during the process of decontamination or disposal. Data obtained during this work will provide the major record demonstrating that an area is below the limits for release to unrestricted use. Sampling and supplemental surveys will be performed to verify that levels of radioactivity are acceptable and that recontamination has not taken place.

Surveys will rely primarily on the following methods:

1) Search for contamination by use of a pancake-probe G-M instrument or other high-sensitivity survey meter.
2) Smear checks for removable contamination to show compliance with Table I. Smears will cover 100 cm^2 each, taken at approximately 1-m intervals.
3) Measurement of radiation exposure rate with the special CP-6M (CP-7) to show compliance with Table I.
4) Counting of soil, concrete, and water samples to show compliance with a limit of 100 pCi/g for solids and 3×10^{-7} $\mu Ci/cm^3$ for water.

Any areas found to be above the applicable limits will be reworked by decontamination or disposal until the levels of radioactivity are reduced below those limits.

Since no significant contamination by highly active alpha emitters occurred, the above methods are adequate and the beta-gamma limits will be applied. Some areas, judged to have the greatest probability of being contaminated by fuel material, will be tested for alpha emitters, also. The hot cells or the wash cell valve pit may be appropriate locations.

The requirements for survey measurements in each region are shown in Table 2:

TABLE 2

SURVEY MEASUREMENT REQUIREMENTS

Region	Removable Contamination	Surface Radiation	Soil Samples	Concrete Samples	Water Samples
I	X	X	X	X	X
II	X	X	X		
III		X			
IV	X	X	X		
V		X	X	X	
VI		X	X		
VII		X	X		X
VIII		X			
IX	X	X	X		
X	X	X			
041	X	X			
163	X	X			
143 Offices	X	X			
143 High Bay	X	X	X	X	X

Measurements of removable contamination are omitted from those areas that consist solely of soil or asphalt-paved surfaces.

4.0 REPORTS

A technical information (TI) report will be prepared for each region and building identified in Section 2.0 as they are certified for preliminary and final release to unrestricted use. These reports have been pre-assigned document numbers as follows:

Region I

Radiological Survey Results - Release to Unrestricted Use, SRE Region I (Building 724 Area).
N704TI990027

Region II

Radiological Survey Results - Release to Unrestricted Use, SRE Region II (Building 163, Box Shop).
N704TI990028

Region III

Radiological Survey Results - Release to Unrestricted Use, SRE Region III (SRE Entrance).
N704TI990029

Region IV

Radiological Survey Results - Release to Unrestricted Use, SRE Region IV (West Parking Lot).
N704TI990030

Region V

Radiological Survey Results - Release to Unrestricted Use, SRE Region V (Gas Storage Vault).
N704TI990031

Region VI

Radiological Survey Results - Release to Unrestricted Use, SRE Region VI (Water Tank Area).
N704TI990032

Region VII

Radiological Survey Results - Release to Unrestricted Use, SRE Region VII (Retention Pond).

N704TI990033

Region VIII

Radiological Survey Results - Release to Unrestricted Use, SRE Region VIII (SRE Front Lot).

N704TI990034

Region IX

Radiological Survey Results - Release to Unrestricted Use, SRE Region IX (SRE Back Lot).

N704TI990035

Region X

Radiological Survey Results - Release to Unrestricted Use, SRE Region X (SRE Parking Lot).

N704TI990036

Building 041

Radiological Survey Results - Release to Unrestricted Use, SRE Building 041.

N704TI990037

Building 143

Radiological Survey Results - Release to Unrestricted Use, SRE Building 143.

N704TI990038

Building 163

Radiological Survey Results - Release to Unrestricted Use, SRE Building 163.

N704TI990039

In certain cases, a report will be made for preliminary release of an area subject to removal of certain remaining localized areas of contamination or radioactivity. After such an area is prepared and surveyed for final release, the report will be revised and reissued.

The format and content of each of these reports shall be consistent and will include:

I. INTRODUCTION

This section will give a brief statement of the operations conducted in the region or building during the life of the facility (during both the operating phase and the D&D Program) that might have led to activation or contamination. It will include a copy of Figure 1 of this DWP, and if applicable, Figure 2 and/or Figure 3, to provide a definite identification of areas.

The major operations performed under the D&D Program to prepare the area for unrestricted use will also be described.

The types of contamination or activation that existed in the area will be discussed.

II. SURVEYS AND RESULTS

This section will describe survey methods and results. Much of this work is performed in conjunction with the actual D&D work and should be specifically identified as such. Results of final surveys should also be separately identified. If a specific type of survey is not required, the subsection should be included with an explanation as to why this type was omitted.

a. Removable Contamination

Describe the smear technique used and the type of instrument used to count the smear. State the type of radiation detected, the minimum detection level (MDL) used, and the counter background and efficiency factor.

Summarize the results in terms of the approximate number of smears taken as the work progressed towards completion. (Do not include smear surveys performed in continuing support of contamination control during the work--just those taken as the area is finally cleaned up.) Indicate the highest values of surface contamination found and the locations. State which limit in Table I is applied and indicate that the survey shows that this limit is not exceeded. (Or, if a preliminary, provisional release is to be given, what further actions need to be performed before a final survey for release can be done.)

b. Surface Radiation

Describe the instrument survey technique used. State the type of radiation detected, the minimum detection level (MDL) used, and the counter background and calibration.

Summarize the results in terms of the approximate number of radiation levels recorded. Indicate the highest values of surface radiation found and the locations. State which limit in Table I is applied and indicate that the survey shows that this limit is not exceeded. (Or, if a preliminary, provisional release is to be given, what further actions need to be performed before a final survey for release can be done.)

c. Soil Samples

Describe the sampling technique and sample preparation used and the type of instrument used to count the sample. State the type of radiation detected, the minimum detection level (MDL) used, and the counter background and efficiency factor.

Summarize the results in terms of the approximate number of samples taken as the work progressed towards completion. (Do not include sampling performed in continuing support of contamination control during the work--just those taken as the area is finally cleaned up.) Indicate the highest values of soil activity found and the general natural activity. State that soil sampling is performed to assure that no significant radioactivity is distributed in the remaining soil and indicate that the survey shows that this is true. (Or, if a preliminary, provisional release is to be given, what further actions need to be performed before a final survey for release can be done.)

d. Concrete Samples

Describe the sampling technique and sample preparation used and the type of instrument used to count the sample. State the type of radiation detected, the minimum detection level (MDL) used, and the counter background and efficiency factor.

Summarize the results in terms of the approximate number of samples taken as the work progressed towards completion. (Do not include sampling performed in continuing support of contamination control during the work--just those taken as the area is finally cleaned up.) Indicate the highest values of concrete activity found and the general natural activity in the concrete. State that concrete sampling is performed to assure that no significant radioactivity is distributed in the remaining concrete, and indicate that the survey shows that this is true. (Or, if a preliminary, provisional release is to be given, what further actions need to be performed before a final survey for release can be done.)

e. Water Samples

Describe the sampling technique and sample preparation used and the type of instrument used to count the sample. State the type of radiation detected, the minimum detection level (MDL) used, and the counter background and efficiency factor.

Summarize the results in terms of the approximate number of samples taken as the work progressed towards completion. (Do not include sampling performed in continuing support of contamination control during the work--just those taken as the area is finally cleaned up.) Indicate the highest values of water activity found and the locations. State that the most restrictive limit for radionuclides that might be found (Sr-90) is applied and indicate that the survey shows that this limit is not exceeded. (Or, if a preliminary, provisional release is to be given, what further actions need to be performed before a final survey for release can be done.)

III. CONCLUSIONS

Summarize the conclusions of each subsection from the Surveys and Results, stating that:

> All appropriate surveys indicate that currently existing radioactivity in this area is below the applicable limits for release to unrestricted use. (If this area has a conditional release, repeat the conditions here.)

The TI shall have the same or equivalent distribution and approvals as this DWP, with the addition of the Manager, Radiation and Nuclear Safety, for approval.

5.0 EXPLORATORY SURVEYS

Some areas of the Facility are suspected or known to be contaminated at indeterminate levels. In order to plan work, it is necessary to evaluate these areas early. The most significant of these are:

1) High-bay interior walls, structure, and crane. A smear survey on approximate 1-m grid to a height of 2m will be performed on walls and columns. Chip samples of concrete and paint will be taken from the floor within 1 ft of the walls and from the walls at 1-ft and 1-m height. These samples will be taken at 1-m intervals. If significant contamination is found, the survey will be extended to greater elevations in 1-m increments until no contamination is found at two successive elevations. For elevations above 10 ft, some scaffold or man-lift will be required. An instrument survey will be conducted as soon as practical, following elimination of radiation sources in the high-bay that currently prevent such a survey.

2) Drainage channel and retention pond. Soil samples have been taken and analyzed. These indicate some minor areas exceeding 100 pCi/g in the pond. Since considerable sedimentation has occurred in the drainage channel along the north side of the back lot, additional soil samples, to a depth of about 2 ft, will be taken. Monthly water samples will be taken from the pond to detect any significant recontamination. An instrument survey of the drainage channel will be performed as soon as the ambient radiation level is reduced sufficiently low to permit this.

6.0 DEVIATIONS

A single designated working copy of the DWP may be changed in red ink (red lined) by the authorized Development and Test representative as procedural changes dictate. A Health and Safety representative must approve and sign those changes affecting health or safety; the Program Office project manager must approve those changes affecting the scope of task, i.e., cost or schedule; and Quality Assurance must approve and sign those changes affecting quality. At the completion of the task covered by the DWP, the marked-up working copy will be incorporated into the DWP as an appendix, reviewed by Quality Assurance, and released through Engineering Data.

7.0 SCHEDULE

The approximate order in which the regions will be surveyed for preliminary release has been estimated on the basis of completed and planned work schedules. This order is:

Region I - Building 724 area
Region IV - SRE West Parking Lot
Region V - Building 653 area
Region II - Box Shop
Region VI - Water Tank area
Building 143 - Offices
Region X - Parking Lot
Building 163 - Contamination area
Region III - SRE Entrance
Building 041 - Storage Building
Region VIII - Front Lot
Region IX - Back Lot
Building 143 - High Bay
Region VII - Drainage Channel and Retention Pond

Progress of the survey is dependent upon completion of decontamination and disposal efforts and will be paced by this work. The requested completion date of October 1, 1978, does not appear to be achievable.