WORK PLAN ON THE RELEASE OF SITES AT PRR-1

Objective:

- The objective of performing a hazards characterization of the PRR-1 is to obtain reliable data on the quantity, type, location, distribution, and physical and chemical states of radionuclides and other hazards in the facility through field survey, sampling and laboratory analysis.
- The data should be appropriate for use in planning the decommissioning of the facility such that
  - decontamination and dismantling procedures and techniques may be properly delineated,
  - the safety of the workers and the public may be properly provided for,
  - hazardous waste may be properly disposed of or managed.
- regulatory requirements may be met
- costs may be properly estimated.

Field Survey:

- Scope:
  - Perform an initial radiation protection survey of the location or item.
  - This survey should be used to reveal radiation fields, removable surface contamination, and airborne contamination that could be significant in terms of the exposure limits for radiation workers. This survey will determine the radiation protection measures (if any) that will be used with the location or item.
  - Perform an in-situ wide-area gamma survey and will be based on a category bases such as a graded approach.
  - There are many locations in the facility, but only a few are expected to have radioactive contamination above clearance levels. To avoid wasting survey effort on clean areas, the various locations or items in the reactor will be classified into categories according to their potential level of radioactive contamination.

Category level of contamination

Category 1- low likelihood of contamination

- locations include spaces that were used exclusively as offices or for the storage of non-radioactive materials.
- to verify that there is indeed no contamination in the location.
- wide-area radiation scan will need to be done.

Category 2- some likelihood of contamination

- include laboratory rooms now believed to be clean but where radionuclides were used in the past, passages through which radionuclides were carried out of the reactor, and places where liquid spills could have spread.
- Specific places where contamination is more likely shall be hand scanned ,samples will be taken for gross radiation counting. If any radioactivity is found that is above the natural radioactivity reference, the location will be promoted to Category 3.

Category 3- high likelihood of contamination

- locations include the parts of the concrete biological shield that were remote from the core but were reached by leaking water, the interior of the primary coolant piping that may have deposits, and the underground piping that drains the sump of the Reactor Building.
- to determine whether there are places in the location where radionuclides exceed the clearance level.
- it shall be scanned and sampled on a grid. If any place is found where the clearance level is exceeded, the location will be promoted to Category 4.

Category 4- known to be contaminated

- these are assumed or known to be contaminated above clearance level.
- locations include those that were irradiated with neutrons from the reactor core, those containing known radioactive sources and the locations of known spills. The parts of the biological shield that are closest to the core, the entire thermal column, the beam tubes, and the ion-exchange column of the pool water purification system are all
- objective of the characterization survey in a Category 4 location is to provide input data for the decisions to be made on how to remove the contamination.
- the survey must therefore identify the radionuclides and quantitatively determine their spatial distribution, including possible migration along cracks.
- in addition to the surveys done in a Category 3 location(perhaps in a tighter grid), core samples will be taken for detailed laboratory analysis where subsurface contamination could exist.

Category 5- known occupational hazard

- these are assumed or known to produce radiation doses that are significant in comparison with limits on occupational exposure, or were part of the reactor core. The entire core box, the fuel elements, the neutron sources, in-core irradiation rigs and baskets, and Co-60 gamma irradiation sources that were stored in the reactor pool are Category 5.
- objective of the characterization survey on a Category 5 item is to provide data for radiation protection during the dismantling and removal of the item (or decontamination on-site, although less likely).
- radiation fields will be accurately measured and the possible mobilization of contaminants shall be assessed to provide input data for the delineation of procedures, protective equipment and shielding.

Clearance Level:

- Compliance with the Code of PNRI Regulations and with the IAEA safety standards.
  - a. Code of PNRI Regulations: CPR Part 3, *Standards for Protection Against Radiation. 6* September 2004.
  - b. IAEA Safety Requirement: Safety Series No. 115, *International Basic Safety Standards for Protection Against Ionizing Radiation and for the Safety of Radiation Sources. February* 1996. STI/PUB/996.
  - c. IAEA Safety Guide: Safety Standards Series No. RS-G-1.7, *Application of the Concepts of Exclusion, Exemption and Clearance. August 2004. STI/PUB/1202*

Field Survey Preparations:

1. Survey equipment
   - Gamma spectrometer with sensitive NaI(Tl) detector for wide-area radiation measurements;
   - Scaler/rate meters with appropriate detectors for scanning for alpha, beta and gamma contamination of surfaces.
2. Work procedures
   - These are the procedures that will be used to perform the characterization survey with portable instruments taken to the actual locations in the facility.

- Procedures will be written for:
  - a. Wide-area gamma survey;
  - b. Surface contamination survey;
    - 1. Gamma;
    - 2. Beta
    - 3. Alpha;
  - c. Non-radiological hazard identification

Sample-taking Preparation:

1. Sample-taking equipment
   - Work will be done by the reactor staff to obtain and test a diamond coring system. This equipment will primarily be used to obtain core samples from biological shield concrete, but can also be used to obtain cores from other hard materials.
   - The equipment will be obtained through IAEA technical assistance
2. Work Procedures
   - These are the procedures that will be used to take samples for laboratory analysis.

- Procedures will be written for:
  - a. Surface samples;
    - 1. Smear / Swipe;
    - 2. Paint / Coatings / Surface deposits;
  - b. Subsurface samples;
    - 1. Cracks and cavities;
    - 2. Cores (using diamond coring equipment)
  - i. Concrete;
  - ii. Metal;
  - iii. Wood;
- c. Liquids;
- d. Ion-exchange resin;
- e. Soil;
- f. A generic procedure for other materials

Laboratory Analysis preparations:

1. Laboratory Equipment

- Work will be done by the specialists in laboratory analysis in the task force to obtain, assemble, test and calibrate the following instruments to perform laboratory radionuclide analysis:
  - a. HPGe gamma spectrometer. This instrument will be used to identify and quantify gamma emitting radionuclides. The entire equipment, except for the host computer and shielding, will be obtained through IAEA technical assistance. The host computer will be obtained through DOST-GIA assistance; the shielding is already available at the PNRI. This spectrometer will be set up in a clean air-conditioned room controlled by the reactor staff.
  - b. Liquid scintillation counter. This instrument will be used to identify and quantify beta and alpha-emitting radionuclides. One or more of the liquid scintillation counters already existing in the PNRI will be used.

- c. Alpha/beta/gamma sample counter. This instrument will be used for the gross radiation counting of samples (typically smears and swipes) taken from the facility. The radiation protection unit of the PNRI will provide the counter.

- Work will be done by the reactor staff to prepare a suitable counting room to house the HPGe gamma spectrometer (the other instruments will be used where they are already installed).
- Work will also be done by the reactor staff to prepare a sample preparation room and a sample storage room.

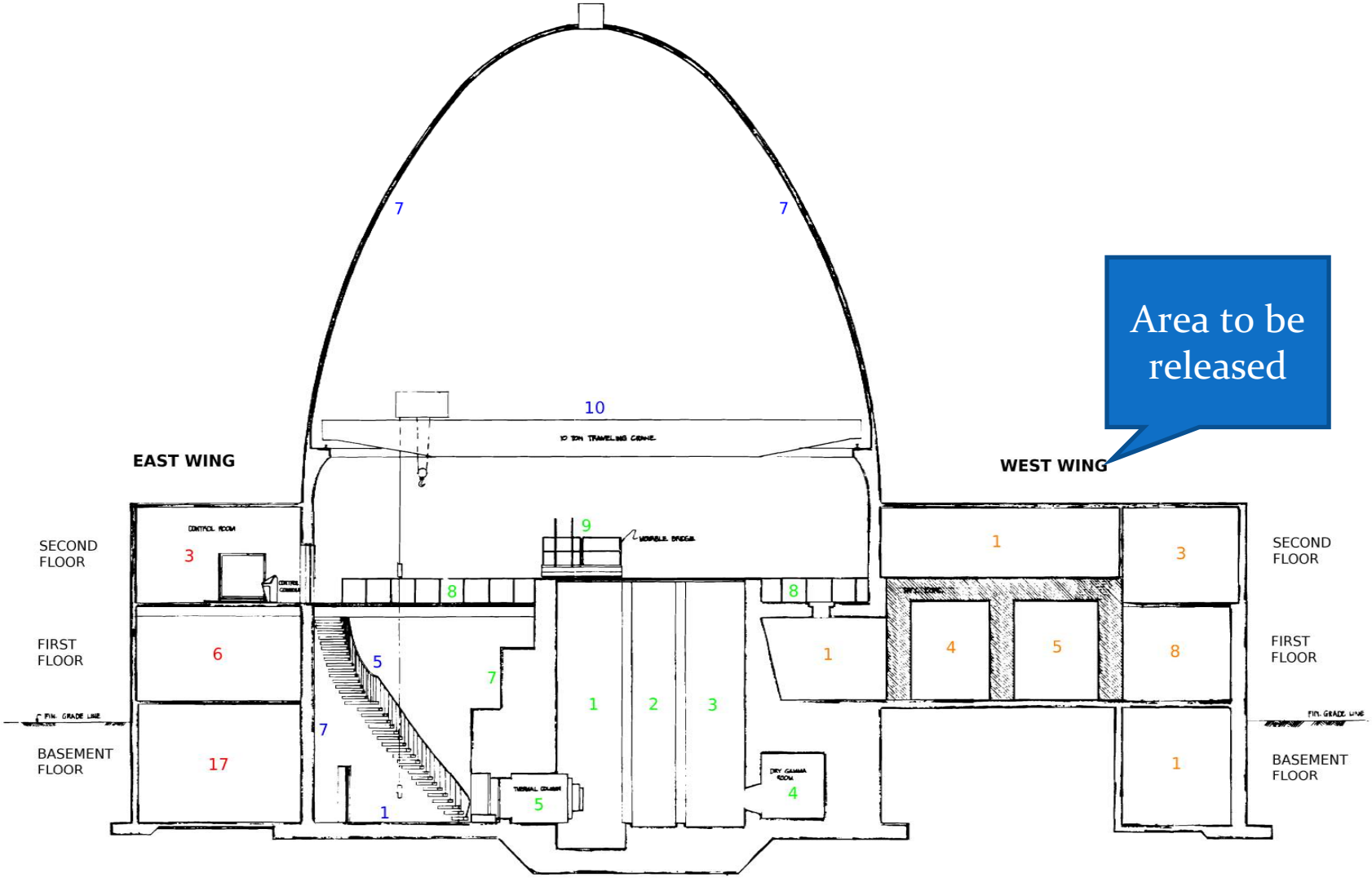
2. Work Procedures

- These are the procedures that will define the use of laboratory instruments for the analysis of samples for radioactivity.
- The procedures will be written by the specialists in laboratory analysis.
- Procedures will be written for:
  - a. Radionuclide identification and quantification using gamma spectroscopy with the HPGe system available to the task force;
  - b. Radionuclide identification and quantification using the liquid scintillation systems available to the task force;
  - c. Gross counting of smear/swipe samples using the counters available to the task force;
  - d. Sample preparation (as required by specific instruments);
  - e. Preparation and use of calibration standards (separate procedures for each instrument type).

Release of West wing area at PRR-1

Removal of Non Reactor related Materials from the West wing at PRR-1

- The West Wing occupies almost a quadrant and extends to about 13.9 m (45.5 ft) beyond the wall of the Reactor Bay.
- The West Wing is of the same height as the East Wing, and also has three floors, two above ground level and one below.
- The second floor houses laboratory and office rooms, and
- The basement floor is used for storage.
- The first floor was originally intended to be a large laboratory for radioisotope processing, but the necessary equipment were never installed and was used only for storage of non-radioactive materials (except for a special room set aside for fresh nuclear fuel). The first floor still has two rooms shielded with heavy concrete that were to be the hot cells
- The entire West Wing of the reactor building is believed to be uncontaminated, which will be confirmed by the hazards characterization survey.
- Much of the reactor equipment is not contaminated below clearance levels.


Area to be released
EAST WING
WEST WING
SECOND FLOOR
FIRST FLOOR
BASEMENT FLOOR
SECOND FLOOR
FIRST FLOOR
BASEMENT FLOOR
10 TON TRAVELING CRANE
MOVABLE BRIDGE
CONTROL ROOM
THERMAL COLUMN
DRY GAMMA ROOM
FIN. GRADE LINE
7
7
10
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17
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1

Purpose

The purpose of this document is to provide the necessary steps to undertake in removing the non-reactor related materials from the East and West Wings in preparation for the characterization activities.

Scope

All radiation field surveys shall be performed according to the provisions of this document.

Bases

Project management shall provide written policies that broadly define how the objectives of the project will be accomplished. Procedures will provide the details and mechanics of performing the work.

Performance

Prerequisites

1. Appropriate storage rooms for the different types of materials to be removed, i.e. a) reusable materials such scrap metals, wood and paper, old furnishings, construction materials, b) items for disposal and c) contaminated items
2. Appropriate instrumentation for scanning of materials.
3. Logbook for the inventory of materials
4. Lifting equipment for heavy materials as necessary
5. Protective equipment such as heavy duty gloves, masks, and safety boots as appropriate
6. A site coordinator personnel must be present to supervise the clearing activities

Precautions

1. Follow radiation protection procedures. Refer to TFE-000-xxx..
2. Always refer to appropriate use of the instrument. Refer to specific work instructions on use of the instruments. Ensure that the instrument is suitable and properly used.
3. Personnel must refrain from eating, drinking, or smoking in any contaminated areas or where removal and monitoring activities are being conducted.

Step 1

Refer to the radiation field monitoring report of the site location to be cleared of junk materials to determine the different hazards present in the area and controls necessary to mitigate the hazards and its corresponding risks

Step 2

Make an inventory of the materials in the survey location. Inventory shall include: the name of the material, classification whether it is reactor or non-reactor related, brief description, estimated dimensions and weight, and other remarks that may deem necessary

Step 3

Prepare and calibrate field scanning instruments according to TFD-001-Rev1 and TFI-001-Rev1. Compare the detection sensitivities of the instrument to the free release limits according to Appendix A. Instrument sensitivities must be below these limits

Step 4

Plan the activities to be performed in taking out all the NON-reactor related items for each site. Prepare the necessary lifting and handling equipment as necessary.

Brief the personnel of the tasks that needed to be performed and the precautions for the hazards presents.

Prepare the designated storage rooms for the items to be removed.

Step 7

Scan each non-reactor related item for contamination using appropriate instruments as stated in Step 3 while referring to corresponding detection limits. Perform scanning in accordance with TFB-00x-Rev1 procedures.

If contamination is detected (i.e. count rate is above the detection limit, or approximately 2- to 3-times the background level), wrap the material with plastic and record the contamination levels. Move the item to the designated storage are for contaminated materials.

If NO contamination is detected, store or dispose the items to designated rooms.

Records generated

The following records are generated after the removal of items: inventory of material and contaminated materials with radioactivity levels

- After the removal of materials
- Grid the surface area
- Survey for hot spot
- Do sampling process of suspected contamination
- Do laboratory analysis process, to determine clearance level.
- Decontaminate the surface area, if necessary