

HOUSTON LIGHTING AND POWER COMPANY
SOUTH TEXAS PROJECT
ELECTRIC GENERATING STATION
PLANT PROCEDURES MANUAL

FOR INFORMATION ONLY

SAFETY-RELATED

Radioactive Contamination and
Airborne Radioactivity Guides and Limits

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Rev. 0
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This procedure is described in FSAR Paragraph 12.5.3.4.

1.0 Purpose and Scope

- 1.1 This procedure defines the contamination and airborne radioactivity guides and limits under which HL&P facility activities are to be conducted.
- 1.2 The limits in this procedure are established by federal regulations (Reference 5.1) or state regulations (Reference 5.2). Exceeding these values without regulatory agency approval constitutes a violation. The guides in this procedure are administratively established by HL&P to implement the regulations and can be exceeded when properly authorized by supervision.

2.0 Prerequisites

- 2.1 All personnel who are assigned to a nuclear power facility on a permanent basis, and those temporarily assigned personnel who may be required to enter a Restricted Area, will receive training in radiological protection. This training will be given in sufficient detail to be commensurate with the duties and responsibilities of these individuals.
- 2.2 Personnel that may be required to wear respiratory protective equipment will receive training in the fitting and use of respiratory protective equipment.

3.0 Precautions.

- 3.1 All requirements regarding access to restricted areas shall apply while working in posted areas.

3.2 Every effort shall be made to maintain personnel exposure as low as reasonably achievable.

4.0 Procedure

Radiological Services will establish decontamination priorities considering the conditions that exist and in accordance with the following guidelines:

<u>Contamination Levels (dpm/100cm²)</u>	<u>Priority</u>
Greater than 10,000	Within 12 hours
1,000 - 10,000	Within 48 hours
100 - 1,000	Within 168 hours
Less than 100	As time permits

Contaminated Areas will be decontaminated as soon as practical to prevent removable radioactive material from being spread or becoming airborne and compounding the existing hazard.

4.1 Facility Contamination Guides

4.1.1 Unrestricted Areas

a) Alpha Contamination

No detectable activity above the minimum sensitivity of the instrument, but not to exceed 50 dpm/100 cm² (disc smear).

b) Beta-Gamma Contamination

1) Loose: ≤ 100 dpm/100 cm²

2) Fixed: ≤ 100 cpm above bkgd at contact read with an HP-210 or HP-260 probe

4.1.2 Restricted Areas

4.1.2.1 Alpha Contamination

≤ 100 dpm/100 cm² (disc smear)

4.1.2.2 Beta-Gamma Contamination

a. Not Posted (Low contaminated areas)

1. Loose: $\leq 1000 \text{ dpm}/100 \text{ cm}^2$
2. Fixed: No limit, action to be taken by the Lead Radiological Protection Technician depending upon area and level of contamination.

b. Posted (Contaminated Areas)

1. Loose: $> 1000 \text{ dpm}/100 \text{ cm}^2$
2. Fixed: Limit to be established by the Lead Radiological Protection Technician depending upon area and level of contamination.

c. Posted (High Contaminated Areas)

1. Loose: $> 10,000 \text{ dpm}/100 \text{ cm}^2$
2. Fixed: Limit to be established by the Lead Radiological Protection Technician depending upon area and level of contamination.

4.2 Tool and Equipment Contamination Guides

4.2.1 Unrestricted Area Use of Tools

a. Alpha Contamination

No detectable activity above the minimum sensitivity of the instrument, but not to exceed $50 \text{ dpm}/100 \text{ cm}^2$ (disc smear).

b. Beta-Gamma Contamination

1. Loose: $\leq 100 \text{ dpm}/100 \text{ cm}^2$ (disc smear) or per entire area if tool is $\leq 100 \text{ cm}^2$
2. Fixed: $\leq \text{bkgd}$ at contact.

4.2.2 Restricted Area Use of Tools

- a. Reuse - If tools or equipment are above these levels clean them prior to reuse.

1. General Use Tools and Equipment

- a) Loose: ≤ 1000 dpm/100 cm² or per entire area if tool is ≤ 100 cm²
b) Fixed: ≤ 5 mrad/hr above bkgd at contact

2. Limited Use Tools and Equipment

- a) Loose: $\leq 10,000$ dpm/100 cm² or per entire area if tool is ≤ 100 cm²
b) Fixed: ≤ 10 mrad/hr above bkgd at contact

3. Special Use Tools and Equipment

If the tool or equipment is a special item infrequently used, it may be wrapped in plastic, caged, and stored for this specific use at the discretion of the Lead Radiological Protection Technician.

- b. Bag, seal as applicable, retain at work area, and then notify the Lead Radiological Protection Technician.

1. Loose: $> 10,000$ dpm/100 cm² per entire area if tool is ≤ 100 cm²
2. Fixed: > 10 mrad/hr above bkgd at contact

4.3 Protective Equipment and Personnel Contamination Guides

4.3.1 Protective Clothing (PC's) Contamination Guides, after laundering

a. Reuse of PC's

≤ 2 mrad/hr above bkgd at contact or
 ≤ 8000 cpm (Laundry Monitor) or
 ≤ 8000 cpm above bkgd at contact with an
HP-210 or HP-260 or equivalent detector.

- b. Limited Reuse of PC's. PC's meeting the following criteria may be used as the outer pair of coveralls in most situations requiring double cloth PC's.

≥ 2.0 mrad/hr but ≤ 5.0 mrad/hr, above bkgd, at contact or
 > 8000 cpm but $\leq 20,000$ cpm (Laundry Monitor) or
 > 8000 cpm but $\leq 20,000$ cpm at contact with an HP-210 or HP-260 or equivalent detector.

- c. Special Reuse of PC's. PC's meeting the following criteria may be used as the outer pair of coveralls for extra "hot" or dirty jobs such as steam generator jumping, reactor stud cleaning and lubricating, etc.

≥ 5.0 and ≤ 10.0 mrad/hr, above bkgd at contact or
 $> 20,000$ but $\leq 40,000$ cpm at contact with an HP-210 or HP-260 or equivalent detector.

- d. Disposal of PC's. When PC contamination level reaches or exceeds 10 mrad/hr or 40,000 cpm above background (after laundering), they shall be removed from service and disposed of as radwaste.

4.3.2 Air-Supplied Hood Contamination Guides

a. Interior Contamination

1. Loose: ≤ 100 dpm/100 cm² (disc smear) or ≤ 100 cpm/ft² (towel or maslin cloth read with an HP-210 or HP-260 or equivalent detector).
2. Fixed: ≤ 0.05 mrad/hr above bkgd at contact or ≤ 200 cpm above bkgd at contact with an HP-210 or HP-260 or equivalent detector for hood section; and ≤ 1 mrad/hr above bkgd at contact with an HP-270 probe or ≤ 4000 cpm above bkgd at contact with an HP-210 or HP-260 or equivalent detector for all other sections.

b. Exterior Contamination

1. Same as outlined in paragraph 4.3.1.

4.3.3 Respirator Equipment Contamination Guides

a. Interior Contamination

1. Loose: ≤ 100 dpm/100 cm² (disc smear) or ≤ 100 cpm/ft² (towel or maslin cloth read with an HP-210 or HP-260 or equivalent detector).
2. Fixed: ≤ 0.05 mrad/hr above bkgd at contact or ≤ 200 cpm above bkgd at contact with an HP-210 or HP-260 or equivalent detector for facepiece and breathing tube sections; and 1 mrad/hr above bkgd at contact or ≤ 4000 cpm above bkgd at contact with an HP-210 or HP-260 or equivalent detector for harness and supply sections.

b. Exterior Contamination

1. Same as outlined in paragraph 4.3.1.

4.3.4 Personnel Contamination Guides

a. Skin

≤ 100 cpm above bkgd with an HP-210 or HP-260 or equivalent detector.

4.4 Airborne Radioactivity Limits With No Respiratory Protection

4.4.1 Unidentified Radionuclide Mixtures

Gross Beta: 3×10^{-9} μ Ci/ml

(assuming it is known that alpha emitters and Sr-90, I-129, Pb-210, Ac-227, Ra-228, Pa-230, Pu-241, and Bk-249 are not present).

4.4.2 Identified Radionuclide Mixtures

$$\frac{\text{conc A}}{\text{MPC}_A} + \frac{\text{conc B}}{\text{MPC}_B} + \frac{\text{conc C}}{\text{MPC}_C} + \dots \leq 1$$

An identified radionuclide may be considered as not present in a mixture if:

- a) The ratio of the concentration of that radionuclide in the mixture to its MPC is ≤ 0.1 ;

$$\frac{\text{conc}}{\text{MPC}} \leq 0.1, \quad \text{and}$$

- b) The sum of such ratios for all the radionuclides considered as not present in the mixture does not exceed 0.25, as per the equation:

$$\frac{\text{conc A}}{\text{MPC}_A} + \frac{\text{conc B}}{\text{MPC}_B} + \dots \leq 0.25.$$

4.5 MPC Hour Exposure Guides and Limits for Airborne Radioactivity

NOTE: THE PERSONNEL EXPOSURE GUIDES AND LIMITS SPECIFIED IN THIS PROCEDURE ARE BASED ON INDIVIDUALS HAVING ATTAINED THE AGE OF 18 YEARS. PERSONS UNDER 18 YEARS OF AGE THAT MAY BE OCCUPATIONALLY EXPOSED TO IONIZING RADIATION AT HL&P FACILITIES SHALL BE LIMITED TO ONE-TENTH OF ALL LIMITS AND GUIDES SET FORTH IN THIS PROCEDURE.

4.5.1 MPC Hour Exposure Limits

No individual shall be permitted to receive more than 520 MPC hours in a calendar quarter or 40 MPC hours per seven (7) consecutive work days.

4.5.2 MPC Hour Exposure Guides

- 4.5.2.1 Unless prior authorization for a higher value has been received from the Radiological Protection Supervisor, the accumulated MPC hour exposure guide for any individual in any period shall be:

Weekly MPC Hour Exposure20 MPC hours
Quarterly MPC Hour Exposure200 MPC hours

5.0 References

- 5.1 Title 10, Code of Federal Regulations, Part 20, Standards for Protection Against Radiation, Nuclear Regulatory Commission Regulations
- 5.2 Texas Regulations for Control of Radiation (TRCR), Part 21, Standard for Protection Against Radiation

6.0 Support Documents

None