

**INSPECTION TECHNICAL PROCEDURE**

**I-146**

**POSTING AND LABELING PROGRAM ASSESSMENT**

June 21, 2001  
DRAFT

This procedure was written based on in-process revisions to the RPP and the QAM, and on anticipated revisions to several other authorization basis documents that were necessary to bring them in line with the new RPP. Requirements that are typed in **BOLD** will be reviewed once these authorization basis documents have been changed, and following corrections, if needed, this procedure will be issued as Revision 0.

Approved: \_\_\_\_\_ Date: \_\_\_\_\_  
Verification and Confirmation Official

Date: \_\_\_\_\_ Date: \_\_\_\_\_

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# INSPECTION TECHNICAL PROCEDURE I-146, DRAFT POSTING AND LABELING PROGRAM ASSESSMENT

## 1.0 PURPOSE

This inspection procedure provides guidance for assessing elements of the Contractor's Radiological Control Program (RCP) that address posting and labeling. This guidance is based on the requirements in the Radiation Protection Program (RPP), Safety Requirements Document (SRD), Quality Assurance Manual (QAM), and the Integrated Safety Management Plan (ISMP).

This inspection procedure assesses the adequacy and effectiveness of the following:

- Posting and labeling implementing procedures
- Controlled area posting
- Radiological areas and radioactive materials area posting
- Labeling of items and containers.

**NOTE: This procedure references RPP sections as the basis of many of the requirements. At the time of its writing, the RPP was approved for design and construction. When the revised RPP is approved for operations, this procedure will be reviewed to ensure the inspection attributes and references are appropriate.**

## 2.0 OBJECTIVES

This procedure is used by the Office of Safety Regulation (OSR) to verify the Contractor has developed and implemented an effective posting and labeling program that will ensure: (1) effective communication of the radiological hazard to individuals, (2) allow individuals to take appropriate precautions, and (3) facilitate the control of radioactive material.

This inspection procedure is a component of the RCP inspection program. This and other inspection procedures will be used on an on-going basis, as needed, to provide assurance that radiation and radioactive material is posted and labeled as required by the RCP, authorization basis commitments, and Contractor procedures. This procedure will be used throughout the entire life cycle of the River Protection Project Waste Treatment Plant (RPP-WTP). However, the entire inspection procedure may not be completed during any one inspection and/or every time the inspection procedure is used.

### **3.0 INSPECTION REQUIREMENTS**

#### **3.1 Adequacy and Effectiveness of Posting and Labeling Implementing Procedures**

The inspector should verify the Contractor has prepared, reviewed, and approved procedures to implement its posting and labeling requirements. (RPP, Requirements 22 and 64 through 75; and QAM, Policy Q-05.1)

#### **3.2 Adequacy and Effectiveness of Controlled Area Posting**

The inspector should verify the Contractor has posted its controlled areas. (RPP, Requirements 4, 67 and 68)

#### **3.3 Adequacy and Effectiveness of Radiological Areas and Radioactive Material Area Posting**

The inspector should verify the Contractor has posted its radiological and radioactive materials areas. (RPP, Requirements 64 through 66, and 69 through 72)

#### **3.4 Adequacy and Effectiveness of Labeling of Items and Containers**

The inspector should verify the Contractor has labeled its radioactive materials and containers of radioactive materials. (RPP, Requirements 64 through 66, 73 through 75; and SRD, **Safety Criterion (SC) 5.1-6**)

### **4.0 INSPECTION GUIDANCE**

Inspection guidance is provided to assist the inspector in addressing the inspection requirements set forth in Section 3.0 of this procedure.

The inspector should review the applicable parts of the authorization basis. The inspector should also be familiar with the content of the documents listed in Section 5.0, References.

Note: While the Contractor is not committed to the DOE implementation guidance for posting and labeling (DOE G 441.1-10), this document provides useful information describing an effective posting and labeling program.

The guidance below includes suggested sample sizes of documents and records to be reviewed, and personnel to be interviewed. The inspector may wish to choose a different sample size based on the life cycle of the facility, on the initial observations in any area, or on information provided in previous inspection reports. The samples should be of sufficient size to provide confidence the inspector can conclude if the Contractor has established and implemented an adequate and effective radiological posting and labeling program.

#### 4.1 Adequacy and Effectiveness of Posting and Labeling Implementing Procedures

The inspector should review the RCP and RPP to identify those procedures that address posting and labeling and perform the following:

4.1.1 If those procedures have not been reviewed pursuant to Inspection Technical Procedure (ITP) I-140, "RCP Programmatic Assessment," and found to contain all the required safety elements from the authorization basis, then the inspector should verify the Contractor has developed and approved procedures that address the following:

- The design of radiological signs and labels
- Criteria to ensure that posting is conspicuous
- Criteria that describes what additional information should be placed on signs and labels
- Radiological criteria that establish when an area is to be posted; the criteria should be conservative such that RPP limits are not inadvertently exceeded
- Exceptions to posting requirements
- Responsibilities and authorities that describes how frequently posting is checked, who posts areas, and who is authorized to remove postings
- Responsibilities and authorities that describe who labels radioactive material, how frequently labeling is checked, and who is authorized to remove labels
- Quality assurance audits of posting and labeling, and
- Records related to posting and labeling.

4.1.2 If previous ITP I-140 related inspection reports describe the posting and labeling procedures as being adequate or if this procedure has been previously performed then the inspector should:

4.1.2.1 Select a few procedures and verify the procedures continue to ensure that requirements from the authorization basis will be implemented.

4.1.2.2 Review the results of audits or assessments performed since the last inspection to determine if changes to procedures were necessary to improve performance. Follow-up selected identified deficiencies to determine if corrective actions were implemented.

4.1.2.3 Verify that any changes made to the procedures were reviewed and approved consistent with **QAM, Policy Q-06.1**.

4.1.2.4 Determine, based on observations from 4.2 through 4.4 that follow, if the procedures are adequate to ensure an effective posting and labeling program.

## 4.2 Adequacy and Effectiveness of Controlled Area Posting

To assess the Contractor's identification and posting of "Controlled Areas," the inspector should perform the following:

- 4.2.1 Review the preliminary or final Safety Analysis Report (SAR), as appropriate to the status of the facility, to determine from the radiation shielding diagrams the location and intensity of radiation expected in the controlled areas. This information may also be located in a "Classification of Areas Report" developed as a part of *the RPP-WTP ALARA Program*.
- 4.2.2 Prior to operation, verify by review of radiation shielding diagrams and discussion with the radiation protection organization (RPO), that individuals permitted to enter controlled areas but not radiological or radioactive material areas should not receive more than a total effective dose equivalent (TEDE) of 100 mrem in a calendar year. In addition, ISAR Table 5-4 "Radiation Control Zones" indicates the design maximum radiation level in a controlled area will be 0.05 mrem/hr and the design target level will be less than 0.025 mrem/hr. (ISAR, Section 5.3.3)
- 4.2.3 During construction, determine if the Contractor has developed plans to post controlled areas associated with the use of radioactive materials or sources of radiation for non-destructive testing. In addition, the inspector should:

NOTE: If the radioactive material is used by individuals licensed by the State of Washington or the U.S. Nuclear Regulatory Commission, they are responsible for meeting the posting requirements specified in their license and any additional controls imposed by the Contractor.

- Tour the controlled area perimeter, if posted, to determine if the posting meets requirements by observing Contractor radiation monitoring, when possible, or reviewing monitoring records
- If radioactive materials or sources of radiation are used during construction, verify that plans and procedures for posting of controlled areas are implemented by direct observation
- Verify that signage meets the procedural requirements
- By discussion with Contractor staff, and review of training records if necessary, confirm that workers entering the controlled areas have received General Employee Radiological Training, if that requirement is on the posting

- By discussion with Contractor staff, and review of records if necessary, determine if members of the public located within the controlled area received the orientation required for access. (TFRCM, Figure 2-1)
- 4.2.4 If, during construction, residual radioactive materials are identified that result in an exposure rate in excess of 0.025 mrem/hr or could result in a dose of more than 100 mrem total effective dose equivalent (TEDE) in a year to individuals in the area, verify the area has been posted.
- 4.2.5 During operation and deactivation, verify by record review if the Contractor performed physical surveys to confirm controlled areas have been posted in accordance with procedures.
- 4.2.6 With the cooperation of the RPO, perform the following or observe a Radiological Control Technician (RCT) performing the following:
- A radiation survey, using a calibrated microrem type instrument or equivalent, to verify that exposure rates in areas designated as controlled areas do not exceed the maximum radiation levels stated in Table 5-4 of the SAR. Any anomalous readings should be investigated to determine the source including the possibility of improper storage of radioactive material or spread of contamination
  - Confirmation the controlled areas designated in the design drawings have been conspicuously posted
  - Based on observation and discussion with the RPO, Security staff, and individuals within the controlled area, determine if there is conflict or confusion with respect to security requirements as a result of the controlled area posting technique
  - Based on discussion with the RPO and individuals working in the controlled areas, determine if any of those individuals (that do not enter radiological or radioactive materials areas) are likely to receive more than 100 mrem TEDE in a year as a result of their time spent in the controlled area. This may require estimating the individuals time within the controlled area and consideration of the radiation levels and airborne radioactivity concentrations present. The analysis can be simplified by assuming the maximum dose rate, maximum occupancy, and maximum airborne concentration detected. If the bounding assumptions result in a dose of less than 100 mrem TEDE, then no additional analysis would be required.

#### **4.3 Adequacy and Effectiveness of Radiological Areas and Radioactive Materials Area Posting**

To assess the Contractor's identification and posting of "Radiological Areas," the inspector should perform the following:

- 4.3.1 Verify by review of monitoring records, tours of the controlled areas, and walk-downs of the radiologically controlled areas that RCP and RPP procedural requirements have been implemented. Pay particular attention to those areas that present significant radiological risk.
- 4.3.2 During construction, verify by direct observation, monitoring, and record review that radiography, other use of radioactive material or sources of radiation, and the discovery of residual radioactive material are posted in accordance with the RCP and RPP.

Note: If the radiation hazard results from licensed activities, the focus of OSR effort should be directed towards verifying the licensee is complying with its agreement with the Contractor and is implementing its procedural responsibilities.

**CAUTION: If at any time, posting of high radiation areas, very high radiation areas, or areas containing similar radiological hazard are not adequate to protect individuals, IMMEDIATELY INFORM THE RADIATION PROTECTION ORGANIZATION. Lesser posting violations must be reported to the RPO as soon as possible.**

- 4.3.3 During startup or commissioning, verify by record review, the Contractor performed appropriate radiation monitoring to confirm radiation control zone design objectives presented in the SAR have been achieved and that radiological areas have been posted in accordance with procedures.
- 4.3.4 During startup, operation, and deactivation, verify that radioactive material storage areas have been designated in the SAR and posted.
- 4.3.5 With the cooperation of the RPO, the inspector should perform the following:
- Tour the controlled areas to determine if the radiological area has been clearly identified with signs and barricades in accordance with the RCP and RPP. If the radiological area is clearly posted and the inspector wishes to pursue the adequacy or effectiveness of control over access to the area, ITP I-143, *Radiation Monitoring and Control Assessment*, should be used.
  - Pursuant to an appropriate Radiation Work Permit (RWP), perform or request an RCT perform a radiation survey of the radiological area to verify that dose rates in excess of 5 mrem/hr at 30 cm from a source, or from any surface radiation penetrates are conspicuously posted as radiation areas. Any dose rates in excess of 100 mrem/hr at 30 cm located in a posted radiation area should be posted as a high radiation area.

**Immediately inform the RPO of any improperly posted high radiation areas.**

Note: Areas may be excepted from the posting requirements for periods less than eight continuous hours if they are under observation and control of a knowledgeable individual empowered to implement access and exposure control

measures. A radiation area is also not required to be posted if it is the result of non-degraded, recently received, labeled package of radioactive material not yet monitored by the Contractor.

- Inspect the radiation area posting to determine if it contains the general information such as the trefoil, unique coloring, and words "Caution, Radiation Area." Additional information such as radiological protection instructions, as determined by the Contractor, may also be on the posting.

- 4.3.6 Review records of procedures to implement posting of high radiation and very high radiation areas. Tour the facility to determine if the posting described in the records contains the required information, is conspicuous, and has been maintained. Select one or two high radiation areas that include access to very high radiation areas and, with the cooperation of the Radiation Protection Manager (RPM) and consideration of the as low as is reasonably achievable (ALARA) criteria, request a RWP to enter and monitor the high radiation area to confirm that access to very high radiation areas are posted.

**Warning: At no time should OSR or Contractor representatives enter a Very High Radiation Area (whether or not it is posted or controlled as required) for the purposes of a compliance inspection or assessment!**

Note: Since entrance into a high radiation area will incur some dose, and therefore by definition some risk, the benefit should be maximized. This can be accomplished by not only verifying the required posting but also addressing the required aspects of access control. Accordingly, if ITP I-149, Section 4.3, "Adequacy and Effectiveness of Entry and Exit Controls," or ITP I-143, Section 4.2, "Adequacy and Effectiveness of Radiation Monitoring and Control Procedures," have been performed within a year, this element need not be performed. However, if radiation monitoring, access controls, or posting of high or very high radiation areas have not been performed it is recommended that elements of all three inspection procedures be performed at the same time to reduce exposure.

- 4.3.7 Review records of room or area airborne activity results since the last inspection to establish a set of rooms or areas that indicate airborne radioactivity in excess of 1 for the sum of all isotopes present, divided by their respective derived air concentration (DAC). Also identify from record review, any area occupied by individuals without respiratory protection such that individual might receive an intake in excess of 12 DAC-hours in one week. These rooms or areas might also be revealed by bioassay results. Finally, based on discussion with the RPO, add to the set those rooms or areas that are likely to develop high airborne radioactivity as a result of process operations or up-sets and are not routinely sampled for air activity. From the total set of rooms or areas identified that should be posted, select 10 and verify the Contractor records indicate they were posted. From the set reported to be currently posted by the Contractor's records select three and physically verify the required postings are in place and contain the required information.
- 4.3.8 Review records of contamination monitoring to establish a set of those rooms or areas that should be posted as contamination areas or high contamination areas. Select 10 areas

or rooms and verify the Contractor records indicate they were posted. From the set documented as posted by the Contractor, select three and physically verify the required postings are in place and contain the required information. During the tours of the facility to implement this procedure, arrange with the RPO to collect and analyze smears that you feel necessary to evaluate the contamination posting. If possible, keep the number of smears to less than 20. Immediately notify the RPO of any smears with activity in excess of the ISAR, Appendix 5A, Table 3-2 values.

- 4.3.9 During tours of the radiological areas to satisfy the above inspection requirements the inspector should also determine if radioactive material containing quantities of isotopes in excess of the values presented in 10 CFR 835 Appendix E, are located outside other posted areas and not labeled. If these materials are located, confirm the exceptions stated in 10 CFR 835.604 do not apply. For example, the Contractor may use shielded containers to store highly radioactive materials in a locked cell or vault which are exempt from labeling requirements pursuant to 10 CFR 835.606 but do not create dose rate, contamination, or airborne radioactivity that rises to the level of posting. In this case verify the cell or vault is posted as a radioactive material area and that any individual entering the area is provided sufficient information to avoid or control exposure.

Also, during monitoring of the controlled area, any unexpected indication of exposure rate should be investigated to determine if radioactive material is being used or stored in the controlled area without proper labeling or posting. If unexpected exposure rates are detected, determine if the "Hot Spot" posting criteria has been satisfied. (TFRCM, Article 234)

- 4.3.10 Based on record review, discussion with representatives of the RPO, and tours of the facility, confirm underground radioactive materials are posted as described in Tank Farms Radiological Control Manual (TFRCM) Article 237.

#### **4.4 Adequacy and Effectiveness of Labeling of Items and Containers**

To assess the Contractor's program to label containers of radioactive material, the inspector should perform the following:

- 4.4.1 **SRD, SC 5.1-6** establishes labeling requirements based on 10 CFR Part 20, which in some cases are more restrictive, than 10 CFR 835. During the above tours, look for radioactive material not in radiation, contamination, airborne radioactivity, or radioactive material areas that is not labeled. If unlabeled material is found, in concert with the RPO, determine the isotopic activity and if any exemptions from the SRD, 10 CFR 835, or RPP apply.
- 4.4.2 During tours of the radiation, contamination, airborne activity, or radioactive materials storage areas, identify radioactive material not exempt from labeling requirement (**SRD, SC 5.1-6**). Confirm the material is labeled and the label contains the trefoil, "Caution or Danger Radioactive Material" and sufficient information for individuals handling or working around the material to take precautions to avoid or control their exposures.

- 4.4.3 For material stored in water filled canals, vaults, or hot cells, verify the material is inaccessible, or accessible only to individuals authorized to handle, use, or work in the vicinity of the material. In addition, the contents of containers holding the material must be readily available in a written record that must be retained as long as the containers are in use.
- 4.4.4 Review records in an effort to determine if empty containers bearing radioactive material labels have been identified in the unrestricted area. RCP procedures should implement the **SRD, SC 5.1-6** requirement to remove labels from clean empty containers prior release to the unrestricted area.
- 4.4.5 Review any Contractor audits of posting and labeling performed since the last inspection. Follow-up selected identified deficiencies to determine if corrective actions have been implemented.

## 5.0 REFERENCES

10 CFR 20, "Standards For Protection Against Radiation," *Code of Federal Regulations*, as amended.

10 CFR 835, "Occupational Radiation Protection," *Code of Federal Regulations*, as amended.

DOE G-441.1-10, *Posting and Labeling for Radiological Control Guide*, U.S. Department of Energy, 1999.

HNF-5183, *Tank Farms Radiological Control Manual (TFRCM)*, CH2M Hill, 2000.

RL/REG-98-26, *Inspection Technical Procedures*, U.S. Department of Energy, Office of River Protection, 2001.

ITP I-140, "RCP Programmatic Assessment"

ITP I-143, "Radiation Monitoring and Control Assessment"

ITP I-149, "Radiological Work Controls Assessment"

***Initial Safety Analysis Report, BNFL-5193-ISAR-01, Rev.2, Bechtel National, Inc., 2001.***

***Integrated Safety Management Plan, BNFL-5193-ISP-01, Rev. 6, Bechtel National, Inc., 2001.***

***Safety Requirements Document, BNFL-5193-SRD-01, Volume II, Rev. 4, Bechtel National, Inc., 2001.***

***Radiation Protection Program for Design and Construction, BNFL-TWP-SER-003, Rev. 5A, Bechtel National, Inc., 2001.***

***Quality Assurance Manual, Preliminary, QAM-24590-01-00001, Rev. A, Bechtel National, Inc., 2001.***

## 6.0 LIST OF TERMS

ALARA	as low as is reasonably achievable
BNI	Bechtel National, Inc.
CFR	Code of Federal Regulations
DAC	derived air concentration
DOE	U.S. Department of Energy
ISMP	Integrated Safety Management Plan
ISAR	Initial Safety Analysis Report
NRC	U.S. Nuclear Regulatory Commission
OSR	Office of Safety Regulation
QAM	Quality Assurance Manual
RCP	Radiological Control Program
RPP	Radiation Protection Program
RPP-WTP	River Protection Project Waste Treatment Plant
RPM	Radiation Protection Manager
RPO	Radiation Protection Organization
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SC	Safety Criterion
SRD	Safety Requirements Document
TEDE	total effective dose equivalent
TFRCM	Tank Farms Radiological Control Manual

Attachments: None