

INSPECTION TECHNICAL PROCEDURE

I-149

RADIOLOGICAL WORK CONTROLS 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

Concur: _____ Date: _____

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INSPECTION TECHNICAL PROCEDURE I-149, DRAFT RADIOLOGICAL WORK CONTROLS ASSESSMENT

1.0 PURPOSE

This procedure provides guidance for assessing elements of the Contractor's Radiological Control Program (RCP) that address radiological work controls. 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:

- Radiological work control procedures
- Work planning and preparation
- Entry and exit controls
- Performance evaluations
- Records.

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 radiological work control program that will ensure: (1) workers do not receive a dose in excess of the RPP limits, (2) the dose received will be maintained as low as is reasonably achievable (ALARA), (3) radiological work practices will be evaluated, and (4) records document the program implementation.

This inspection procedure is a component of a complete RCP inspection. This and other inspection procedures will be used on an on-going basis, as needed, to provide assurance that work involving exposure to ionizing radiation and/or radioactive materials is conducted 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 Radiological Work Control Procedures

The inspector should verify the Contractor has prepared, reviewed, and approved procedures to implement its radiological work control program. (RPP, Section 6, and Requirement 22; QAM, Policy Q-05.1; and ISMP, Section 6.1.4)

3.2 Adequacy and Effectiveness of Work Planning and Preparation

The inspector should verify the Contractor has implemented adequate and effective radiological controls in the work planning and preparation process. (RPP, Requirements 112 and 113; SRD, Safety Criterion (SC) 5.1-1 and 5.1-2; and ISMP, Section 6.1)

3.3 Adequacy and Effectiveness of Entry and Exit Controls

The inspector should verify the Contractor has established adequate and effective entry and exit controls. (RPP, Requirements 55 through 63 and 114 through 121)

3.4 Adequacy and Effectiveness of Performance Evaluations

The inspector should verify the adequacy and effectiveness of the Contractor's performance evaluations of radiological work activities. (RPP, Requirement 20; and ISMP, Section 6.1.4, items 5 and 6)

3.5 Adequacy and Effectiveness of Records

The inspector should verify records associated with radiological work control are developed, reviewed, and maintained as required by the procedures. (RPP, Requirements 76, 90, and 92; QAM, Policy Q-17.1; and ISMP, Section 8.0, Table 8-1)

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." 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, the initial observations in any area, or previous inspection reports. The samples should be of sufficient size to provide confidence the inspector can conclude if: (1)

the Contractor has established and implemented an adequate and effective radiological work control program, (2) the effectiveness of the program is periodically reviewed by the Contractor, and (3) records demonstrate compliance with program requirements.

4.1 Adequacy and Effectiveness of Radiological Work Control Procedures

To determine the adequacy and effectiveness of the radiological work control procedures, the inspector should perform the following:

NOTE: During site preparation and construction, if the Contractor elects to use U.S. Nuclear Regulatory Commission (NRC) or Agreement State licensed subcontractors, then the Contractor must comply with the licensee's requirements if it conducts work within the restricted areas established by the licensee. (RPP, Requirement 2; and 10 CFR Parts 20, 30, and 34)

4.1.1 If the procedures identified 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 RCP contains or references procedures that:

- Address the 14 points identified in ISMP, Section 6.1, to, "...implementing work practices that never compromise safety for the sake of production or expediency."
- Specify line management is responsible and accountable for environment, safety, and health (ES&H) and ES&H individuals do not assume roles that are within the line management's responsibility. (ISMP, Section 6.1.1) (Note: There is a history of incidents involving unplanned exposure due to radiological control personnel assuming direct control of work in radiological areas at the expense of their safety responsibilities.)
- Address the lines of authority and responsibility for work in radiological controlled areas. The procedure must make clear that it is the individual's responsibility for implementing the RCP and every worker's responsibility to halt any activity in which they are engaged that is unsafe or potentially harmful to the environment. The procedure should clearly define the radiation protection organization's (RPO) line of authority and individual responsibility for ensuring radiological work is controlled. (ISMP, Section 6.1.2)
- Implement the requirement to ensure only qualified/trained individuals perform or monitor work in radiological controlled areas. (RPP, Requirements 21, 101 through 105; and ISMP, Section 6.1.3)
- Ensure work is planned, hazards evaluated, mitigation strategies developed, radiological controls implemented, surveillances identified, and incidents investigated. (ISMP, Section 6.1.4)

- Mandate consideration of special time saving and remote handling devices, such as protective equipment, contamination control devices, hazard isolation, or other techniques to maintain dose ALARA during radiological work. (RPP, Requirements 112 and 113; and ISAR, Appendix 5A, Section 4.4)
 - Specify entry requirements, as a function of radiological hazard, for work in radiological controlled areas. The entry requirements should address process and equipment configuration, installed radiation monitoring equipment, special engineering controls, monitoring or survey requirements, respiratory protection equipment, specialized dosimetry evaluations, and special training requirements. This document is usually referred to as the Radiation Work Permit (RWP) procedure. (RPP, Requirements 43 through 50, 55 through 58, 121; and ISAR, Appendix 5A, Section 4.3)
 - Ensure adequate hardware and administrative controls are in place for entry into high or very high radiation areas. (RPP, Requirements 60 through 63; and SRD, SC 5.1-1)
 - Ensure workers exit radiological controlled areas in accordance with RWP requirements and personnel personal monitoring and dosimetry requirements. (RPP, Requirements 118 through 121; and ISAR, Section 5.8)
 - Ensure radiological work is evaluated to assess the effectiveness of work control activities. (ISAR, Appendix 5A, Section 4.5)
 - Ensure the contamination control program is audited at least every three years (RPP, Requirement 20)
 - Ensure radiological work control records are maintained. (RPP, Requirements 86 through 88)
- 4.1.2 If ITP I-140 related inspection reports describe the radiological work control procedures as being adequate or if this procedure has been previously performed then:
- 4.1.3 The inspector should select five radiation work control procedures and verify the procedures continue to ensure that requirements from the authorization basis will be implemented.
- 4.1.4 The inspector should review the results of audits or assessments performed since the last inspection. Follow-up selected identified deficiencies to determine if corrective actions were taken, if they were effective, and if the auditors found the procedures adequate or improving.
- 4.1.5 The inspector should verify that any changes made to the procedures were reviewed and approved consistent with **QAM, Policy Q-06.1**.

- 4.1.6 Based on observations from Section 4.2 through 4.5 that follow, the inspector should determine whether the procedures are adequate to ensure work planning, entry, and exit controls, and performance evaluations are effectively controlling work in radiological areas.

4.2 Adequacy and Effectiveness of Work Planning and Preparation

To determine the adequacy and effectiveness of the radiological work planning and preparations, the inspector should perform the following:

Since line management is responsible for ES&H during the conduct of all work, the focus of this portion of the inspection extends beyond the RPO. The best inspection results will be obtained if planning and preparation for specific tasks can be observed well before the work takes place. Observation should then, if possible, progress through hazard assessment, ALARA review, RWP generation, pre-job special training, tool and equipment staging, radiological area entrance, work performance, exit, and post job reviews. By observing the entire process, the inspector will be able to assess the adequacy and effectiveness of the planning and preparation effort.

- 4.2.1 The inspector should select three non-routine jobs that require work in the radiological controlled area. The jobs should represent significant radiological challenges due to radiation or the potential for significant contamination. The inspector should assess the jobs early by discussion with the job planner and responsible line manager or supervisor to determine the job most likely to demonstrate the breadth of the Contractor's acumen in conducting radiological work. The OSR should request to be advised of all planning and preparation meetings associated with all three jobs. Without informing the Contractor, the inspector should decide which job should be followed to completion. The inspector should attend all the meetings for the job selected, and a few meetings for the other jobs so as to minimize the performance bias OSR presence might cause.

The inspector should observe implementation of the RCP procedures as the job is planned. Do not become a participant. If examples of failure to implement the procedures are observed, bring those to the attention of the line management or RPO representative, as appropriate. If deficiencies that might result in a safety violation or significant unplanned dose are observed, immediately inform line management or the RPO so the decision can be made to stop work. Failure of line management or RPO to mitigate the hazard should cause the OSR to initiate its policy for "Stop Work."

Following observation of the work, the inspector should attend the post-job debriefings and develop conclusions on the adequacy of the planning and preparation.

- 4.2.2 The inspector should review ALARA reports since the last inspection and identify three jobs that resulted in dose significantly greater than the planned dose. Based on review of post-job critiques and discussion with line management representative, the inspector should determine if the planning and preparation requirements played a role in the unexpected dose. If it did, the inspector should determine if the RCP requirements were implemented or if the requirements were inadequate or ineffective.

- 4.2.3 The inspector should select two routine maintenance jobs that incur a large portion of the routine maintenance dose. Review the history of these jobs with line management and the RPO and determine based on these discussions and record review if the planning and preparations comply with the RCP procedures. If possible, the inspector should observe one of the jobs from start to finish to confirm RCP procedures are being implemented.

4.3 Adequacy and Effectiveness of Entry and Exit Controls

To determine the adequacy and effectiveness of the radiologically controlled area entry and exit controls, the inspector should perform the following:

All work, including routine process activities involving access to the radiological controlled areas requires elements of the RCP to be implemented. The extent of controls for entry and exit will be graded to provide safety precautions consistent with the radiological hazard present. The focus of this part of the inspection effort is to observe implementation of access control procedures.

- 4.3.1 During the observation of the five jobs observed pursuant to Sections 4.2.1 and 4.2.3 above, the inspector should determine if personnel entry and exit controls required by the RCP were implemented for work in the radiological controlled areas. (RPP, Requirements 5 and 6; and **QAM, Policy Q-05.1**)
- 4.3.2 With a representative of the RPM qualified to enter radiological controlled areas, equipped with appropriate radiation monitoring instruments, and authorized by a RWP, the inspector should conduct a extensive tour of more than one of the major buildings to confirm the following:
- High radiation areas are posted (RPP, Requirement 69), equipped with a control device (RPP, Requirement 61), and nothing would prevent rapid evacuation of the personnel from the area. (RPP, Requirement 62)
- Prior to starting the inspection tour, the inspector should meet with line management and review the high radiation access control procedure. Inventory high radiation area door and lock keys against logbook entries to verify the expected conditions. Request permission to pull doors and locks to verify they are locked. Radiation surveys should be continuously conducted during this tour to protect the inspector and identify any high radiation areas that might not be posted. Do not enter actual high radiation areas unless it is necessary. This tour must be performed consistent with the ALARA criteria.
- In addition to the above controls for high radiation areas, the inspector should verify that additional measures have been taken to ensure individuals are not able to gain unauthorized or inadvertent access to very high radiation areas. (RPP, Requirement 62)

- The inspector should verify that each access point to a radiological controlled area is posted with the appropriate warning signs required pursuant to the RCP and any barriers required by the procedures are in place. (RPP, Requirements 56 through 57)

NOTE: ITP I-146, "Posting and Labeling Program Assessment," is intended to be used for the review of the Contractor's posting and labeling program. This tour should focus on verifying the controls are in place to ensure that workers don't inadvertently enter radiological controlled areas without being informed of the nature and extent of the radiological hazard.

4.3.3 During the above tour, or on a separate tour, the inspector should determine from review of the RWP database what work is authorized in the building being toured. The inspector should select one or two jobs and verify by observation the following:

- The RWP correctly reflects the work activity described in the work package
- The RWP has been completed in accordance with its procedure
- The RWP contains appropriate radiation, contamination, and airborne activity monitoring results
- The RWP prescribes appropriate radiation protection measures (RPP, Requirement 58)
- Only RWP authorized individuals are in the work area (RPP, Requirements 55 and 56)
- Workers are implementing the RWP in compliance with specific radiation protection measures (RPP, Requirement 58)
- Workers can rapidly evacuate the area under emergency conditions. (RPP, Requirement, item 59)

NOTE: ITP I-143, "Radiation Monitoring and Control Assessment," should be used to determine the adequacy of radiation monitoring.

4.3.4 The inspector should observe the radiological controlled area exits during the above tours and during at least one shift change. Based on these observations, the inspector should verify the following:

- Workers are following procedures regarding the removal of protective clothing and equipment
- Personal dosimeters were worn at the location specified on the RWP and are removed and controlled in accordance with procedures

- Material and equipment removed from the controlled areas are monitored for contamination and meet the release criteria
- Personnel are monitored for contamination
- Contaminated personnel are monitored and decontaminated in accordance with procedures
- Records are made to satisfy RWP, work control, and monitoring procedures.

NOTE: The focus of the above inspection effort is two fold. First, is to determine if workers are following entry and exit radiological controls. Secondly, and more important, is to determine if the RPO is ensuring workers are following the procedures. It is valuable to observe how the RPO responds to improper actions. However, if the RPO fails to respond, they should be informed of the observation. If an RPO representative is not present, or if they are violating procedures, offenders must be questioned as to their understanding of the requirement. In no case should a worker be allowed to violate radiological controls without being informed of the proper actions to take.

4.4 Adequacy and Effectiveness of Performance Evaluations

To determine the adequacy and effectiveness of the radiological performance evaluations, the inspector should perform the following:

The RCP procedures will address several levels of performance evaluations. These should include post job reviews, quality assurance/control surveillances, and the audit of the radiation protection program required by 10 CFR 835. The focus of this portion of the inspection effort is to confirm if the program evaluations required by procedures have been performed and to determine what information about radiological work control practices and procedures they reveal.

4.4.1 The inspector should observe at least one post job review and review the documentation of three post job reviews that covered work which resulted in dose equal to or greater than pre-job estimates (if possible). For each of the post-job reviews, the inspector should perform the following:

- Determine if the review was conducted according to the procedure
- Determine, if opportunities for radiological improvement were noted, and if a system to ensure they would be considered in the performance of the job was used
- Verify if personal performance was the root cause of serious radiological controls deficiency, and the Contractor's procedure for personnel accountability was implemented.

- 4.4.2 Review the results of at least 10 quality assurance/control surveillances of radiological work controls. For each surveillance the inspector should perform the following:
- Determine if the audit/surveillance plan was prepared and conducted according to procedure
 - Review the findings and when deficiencies are identified, determine whether the requirements were effectively communicated to the responsible work group
 - Verify, if personal performance was the root cause of a serious radiological controls deficiency, and if the Contractor's procedure for personnel accountability was implemented.
- 4.4.3 The inspector should review the results of the RPP audit and determine the following: (RPP, Requirement 20)
- If the audit addresses radiological work controls
 - Corrective actions were taken in response to negative findings
 - Contractor's performance is improving based on review of the audit and the inspection observations.

4.5 Adequacy and Effectiveness of Records

Performance of ITP I-151, "RCP Documents, Records, and Reports Assessment," and the QAM inspections will routinely address the adequacy of the Contractor's radiological program records management system. During the conduct of this inspection, the inspector should confirm that documents, records, and reports used, related to radiological work controls, met the technical and regulatory requirements. No additional records need be reviewed to establish the effectiveness of the radiological work control records.

5.0 REFERENCES

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

10 CFR 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material," *Code of Federal Regulations*, as amended.

10 CFR 34, "Licenses for Industrial Radiography and Radiation Safety Requirements for Industrial Radiographic Operations," *Code of Federal Regulations*, as amended.

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

DOE G 441.1-2, *Occupational ALARA Program Guide*, U.S. Department of Energy, 1999.

NRC Regulatory Guide 8.8, *Information Relevant to Ensuring That Occupational Radiation Exposures At Nuclear Power Stations Will Be As Low As Is Reasonably Achievable*, U.S. Nuclear Regulatory Commission, Rev. 3, 1978.

HNF-5183, *Tank Farm Radiological Controls Manual (TFRCM)*, CH2M Hill, Rev. 0, 2000.

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

ITP I-111, "ALARA Program Assessment"

ITP I-140, "RCP Programmatic Assessment"

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

ITP I-146, "Posting and Labeling Program Assessment"

ITP I-151, "RCP Documents, Records, and Reports Assessment"

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

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

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

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

Radiation Protection Program for Design and Construction, BNFL-TWP-SER-003, Rev. 7, Bechtel National, Inc., 2001.

6.0 LIST OF TERMS

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| ALARA | as low as is reasonably achievable |
| DOE | U.S. Department of Energy |
| ES&H | environment, safety, and health |
| 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 |
| RPO | radiation protection organization |
| RPM | Radiation Protection Manager |
| RPP | Radiation Protection Program |
| RPP-WTP | River Protection Project Waste Treatment Plant |
| RWP | Radiation Work Permit |

SC Safety Criterion
SRD Safety Requirements Document

Attachments: None

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