

**INSPECTION TECHNICAL PROCEDURE**

**I-145**

**CONTAMINATION MONITORING AND CONTROL ASSESSMENT**

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Revision 1

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

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# INSPECTION TECHNICAL PROCEDURE I-145, REV. 1

## CONTAMINATION MONITORING AND CONTROL ASSESSMENT

### 1.0 PURPOSE

This procedure provides guidance for assessing elements of the Contractor's Radiological Control Program (RCP) addressing contamination monitoring and control. This guidance is based on the requirements in the Radiation Protection Program (RPP), the Safety Requirements Document (SRD), Quality Assurance Manual (QAM), Integrated Safety Management Plan (ISMP), and the Preliminary Safety Analysis Report (PSAR).

This procedure assesses the adequacy and effectiveness of the following:

- Contamination monitoring and control implementing procedures
- Physical design features for contamination control
- Administrative controls
- Records.

**NOTE: This procedure references RPP sections as the basis of many of the requirements. At the time of its writing, the RPP for design and construction was approved. 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 verifies the Contractor's development and implementation of an effective radioactive contamination monitoring and control program to ensure: (1) the facility is designed to minimize and control radioactive contamination; (2) personnel are not unnecessarily exposed to radiation from radioactive contamination during the life cycle of River Protection Project Waste Treatment and Immobilization Plant (WTP); and (3) records are maintained to document the effectiveness of the program.

This inspection procedure is a component of the RCP inspection program. This and other inspection procedures will be used, as necessary, to provide assurance radioactive contamination monitoring and control activities are conducted as required by the RCP, authorization basis commitments, and Contractor procedures. This procedure will be used throughout the entire life cycle of the 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 Contamination Monitoring and Control Procedures**

The inspector should verify the Contractor has prepared, reviewed, and approved procedures to implement its radioactive contamination monitoring and control program. (RPP, Requirements 22, and 114 through 121; and QAM, Policy Q-05.1)

#### **3.2 Adequacy and Effectiveness of Physical Design Features for Contamination Control**

The inspector should verify the Contractor has adequate and effective physical design features to control radioactive contamination. (RPP, Requirements 106, 107, 111, 117, and 118; and SRD, Safety Criterion (SC) 5.1-2)

#### **3.3 Adequacy and Effectiveness of Administrative Controls**

The inspector should verify the Contractor has adequate and effective administrative controls to control radioactive contamination. (RPP, Requirements 22, 43, 52, 53, 54, 56, 69, 70, 71, 107, 113 through 121, and 124 through 127; SRD SC 5.1-4; and PSAR, Vol. I, Section 7.5)

#### **3.4 Adequacy and Effectiveness of Records**

The inspector should verify records for radioactive contamination monitoring and control are developed, reviewed, and maintained as required by the procedures. (RPP, Requirements 88, 91, 94, and 95; and QAM, Policy Q-17.1)

### **4.0 INSPECTION GUIDANCE**

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 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: Although the Contractor is not committed to the DOE implementation guidance for radioactive contamination control (DOE G 441.1-9), this document provides useful information describing an effective contamination control 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, 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 contamination

monitoring and control program; (2) physical design features, both temporary and permanent, are adequate and effective in controlling radioactive contamination; (3) administrative controls are adequate and effective in controlling radioactive contamination; and (4) there is adequate documentation and records to demonstrate compliance with the requirements.

#### **4.1 Adequacy and Effectiveness of Contamination Monitoring and Control Procedures**

The inspector should review the RCP to identify those procedures addressing contamination monitoring and control. 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, the inspector should:

4.1.1 Verify the Contractor has developed a Technical Basis Document (TBD) addressing topics necessary to ensure instruments and equipment used to monitor for contamination are: (RPP, Requirements 43 and 44)

- Appropriate for the type(s), levels, and energies of the radiation encountered
- Suitable for the environmental conditions where they will operate
- Periodically maintained and calibrated at established frequencies

NOTE: Use ITP I-148, "RCP Instrument Calibration and Maintenance," to establish the veracity of the calibrations.

- Routinely tested for operability.

4.1.1.1 Verify the procedures implementing the TBD were developed consistent with the QAM, and address topics such as: (QAM, Policy Q-05.1)

- Selection of sampling and monitoring equipment;
- Calibration of sampling and monitoring equipment;
- Placement of monitoring equipment to control the potential spread of contamination;
- Collection of samples, calibration of analytical equipment, and analysis;
- Sample frequency for monitoring of facilities, personnel, release of potentially contaminated materials, shipment of radioactive material, receipt of shipments of radioactive materials, and leak testing of sealed sources;
- Interpretation of sample results, action points, and reporting requirements;
- Posting and de-posting of areas;

- Operation, including set point determination, and interpretation of personnel and equipment monitoring devices such as hand & foot counters, whole body friskers, tool monitors, etc.;
- Correlation of contamination levels with air monitoring results and respiratory protection equipment selection as a function of work activity;
- Methodology used to monitor and document contamination on the skin or clothing of personnel;
- Quality assurance;
- Review, approval, and deposition of monitoring results including records of contamination incidents impacting decommissioning.

4.1.2 If past ITP I-140 inspection reports describe the contamination monitoring and control procedures as being adequate or if this procedure has been previously performed, the inspector should:

4.1.2.1 Select five procedures and verify the procedures continue to ensure requirements from the authorization basis will be implemented and changes are consistent with QAM, Policy Q-06.1.

4.1.2.2 Review the results of selected audits or assessments performed since the last inspection. Follow up selected identified deficiencies related to procedures to determine if corrective actions were taken, if they were effective, and if the auditors found the procedures were adequate. (RPP, Requirement 20)

4.1.2.3 Determine, based on the following observations from Sections 4.2 and 4.3, if the procedures are adequate to ensure physical design features and administrative controls are effective. If procedures appear to need improvement, discuss the matter with the Radiation Protection Manager (RPM) or designee in an attempt to reach agreement if the procedures are a causal factor in the deficient performance.

## **4.2 Adequacy and Effectiveness of Physical Design Features for Contamination Control**

To determine if the Contractor has implemented adequate and effective physical design features to control radioactive contamination, the inspector should:

4.2.1 Determine if ITP I-111, "ALARA Program Assessment," has been recently performed. If the inspection has been performed, review the inspection report to determine the extent the inspection address physical design features to control contamination. If physical design features are not addressed, the inspector should:

- 4.2.1.1 Select three radioactive, or potentially radioactive, systems, one containing liquid, one gas, and one solid, to verify the physical design implements the Contractor's confinement philosophy. Review design documents and walk down the systems if possible.
- 4.2.1.2 For the same three systems, verify they have been designed to minimize the potential for leaks. Also verify interfaces between non-radioactive service systems (e.g. cooling water) and radioactive systems are designed so that any leakage is from the clean, to the radioactive side of the interface. Review design documents and ALARA reviews, discuss the observations with the system engineer, and physically inspect the systems if possible.
- 4.2.1.3 For the same three systems, verify the general physical design ensures leaks involving radioactive material are collected and segregated from non-radioactive waste streams. To the extent possible, radioactive leaks should be returned to the process stream. Discuss this matter with the radiological engineer, review design documents, and walk-down the facilities during various phases of construction and pre-operational testing.
- 4.2.1.4 Verify melter offgas vents are treated to scrub out radioactive particulates before passing through filter media. Discuss this matter with the radiological engineer, review design documents, and walk-down the facilities during various phases of construction and pre-operational testing to confirm observations.
- 4.2.1.5 Verify by review of design documents and discussion with the radiological engineer three components containing radioactive materials and requiring maintenance have been designed to limit the spread of contamination. These might include, for example, melters, pumps, manipulators, filters, and valves.
- 4.2.1.6 Through review of design of selected sampling systems, and discussion with the radiological engineer, verify the systems will not result in a significant potential for contamination incidents. Also, verify by selective review decontamination facilities have no connections that would permit contaminated material to be disposed of into the facility sewer system or result in the spread of contamination. (SRD, SC 5.1-1 and 5.1-2)
- 4.2.1.7 Verify, by reviewing the design of selected systems and physical observation, the facility will minimize the potential spread of contamination by limiting the flow of goods and services across contamination boundaries by use of "hot shops, hot tool cribs, and facilities to remove packing prior to entry into contaminated areas," etc.
- 4.2.1.8 Verify by reviewing the design of selected systems and physical observation of the radiological controlled areas, instruments used to detect radioactive contamination are consistent with the radiological technical basis document (TBD). These should include portable and fixed radiation monitoring equipment. Compare the limitations presented in the instrument or equipment operating procedures against the TBD to determine if the instrument is suitable for the circumstances. Observe the instrument use technique; compare the technique with the limitations expressed in the operating procedure for the types, levels, and energies of the radiations present. (RPP, Requirement 44)

4.2.2 If inspection reports associated with ITP I-111 or ITP I-140 describe review of the contamination monitoring and control design, or if this procedure has been previously performed, the inspector should:

4.2.2.1 Determine through discussion with the radiological engineer or review of records, if any design changes have been made potentially affecting contamination control. Based on using the guidance in Sections 4.2.1.1 through 4.2.1.8, select three changes, if possible, and verify the changes do not result in an inconsistency within the Contractor's documents.

4.2.2.2 Review selected audits or assessments to determine if changes to design features were recommended to facilitate contamination control but not implemented. Determine if the decision was consistent with the Contractor's documents.

4.2.2.3 Review selected temporary modifications to verify engineering controls are used to limit the spread of contamination.

### **4.3 Adequacy and Effectiveness of Administrative Controls**

For the purposes of contamination monitoring and control, administrative controls typically include but are not limited to the following:

- Work authorizations
- Access control
- Entry and exit controls
- Posting and labeling
- Work planning
- Item, material, and personnel decontamination
- Control of airborne contamination
- Use of protective clothing and equipment
- Audits and surveillances
- Incident reports and incident critiques.

Procedures implementing these administrative controls are referenced in the RCP and discussed in Section 4.1.1 above. To verify administrative controls are being implemented and to determine how effective they have been in controlling radioactive contamination, the inspector should:

4.3.1 Verify, during site preparation and construction, monitoring is consistent with the objective to discover legacy or residual contamination and potential contamination associated with use of radioactive materials for testing. The inspector should:

- Verify monitoring is conducted at the procedurally required frequency and at anytime contamination is suspected or should have been suspected;

- Observe field monitoring, if possible, and determine if appropriate instrumentation is used consistent with the manufacturer's recommendations, industry guidance, and operating instructions;
  - If contaminated material is discovered, verify contamination monitoring and control procedures are fully implemented.
- 4.3.2 During construction and pre-operation testing, observe tests intended to validate the design. Select at least one liquid leak test, one ventilation scrubber test, and a few ventilation leak rate and flow differential tests to confirm test procedures are followed and the design performs as intended.
- 4.3.3 During operations, identify three work activities likely to involve exposure to radioactive contamination and:
- Observe these tasks through the entire cycle if possible;
  - Pay particular attention to the planning and preparation effort designed to limit contamination or exposure of workers;
  - Verify by observation if the workers are knowledgeable of the procedural requirements and follow them during the assignment;
  - Observe those steps where implementations of the administrative controls are critical to limiting the spread of contamination;
  - Observe how contamination is monitored at the job site and how radiation protection personnel participate in the monitoring;
  - Following completion of the work activity, observe how the work site is left;
  - Observe how the workers exit the radiologically controlled area;
  - Observe how monitoring is performed by the workers and radiation protection staff;
  - Observe measurements of contamination and verify appropriate instrumentation is used and operating procedures are followed;
  - Review any records of contamination are made to confirm the results are documented in accordance with procedures;
  - Observe any post job critiques and review any post job recommendation;
  - Observe how recommendations are resolved, if actions are taken, and whether the actions taken are consistent with the authorization basis;

- Discuss with the RPM any examples of failure to implement the administrative controls or any examples where the administrative controls are not adequate to ensure compliance with the authorization basis.

NOTE: Activities might include implementation of a Radiation Work Permit (RWP) for maintenance on a contaminated system or component, release of contaminated equipment from the controlled area following decontamination, receipt or shipment of radioactive materials, and semi-annual leak testing of sealed sources.

4.3.3.1 Tour the Pre-Treatment, Low-activity Waste, or High-Level Waste buildings with current copies of the monitoring reports and a representative of the RPM qualified to make contamination surveys. The inspector should:

- Verify survey instruments and monitoring equipment are appropriate for the types(s), levels, and energies emitted from the isotope likely to be present according to the TBD and procedures;
- Verify monitoring instruments and equipment have been calibrated at the specified frequency and are in good working order;
- Verify instruments are appropriate for existing environment conditions and have been tested for operability;
- Verify contaminated areas are properly posted, spills are contained, air flows are in the appropriate direction, and measurements (you request the representative to make) confirm the Zone classification described in the Preliminary or Final Safety Analysis Report.

NOTE: Use ITP I-148, "RCP Instrument Calibration and Maintenance," to establish the veracity of the calibrations.

4.3.3.2 Observe a shift change from a radiological exit point to confirm personnel monitoring is being performed consistent with procedures and is technically adequate.

4.3.3.3 Observe the monitoring being performed to release potentially contaminated material from the radiological area to the controlled or uncontrolled area. Determine if the monitoring equipment is appropriate, technique is adequate, and procedures are followed. (RPP, Requirements 43, 44, 114, 115, and 116)

4.3.3.4 Scan the contamination occurrence reports and select three for detailed review. Determine from the review, the root and contributing causes of contamination incidents. Determine if the Contractor's monitoring is adequate and if the corrective actions are likely to correct the causes of the event. Confirm corrective actions are implemented.

4.3.3.5 Review the results of audits of contamination monitoring and control and performance measure trends to determine the performance trend. Determine if the Contractor has a

different impression of its performance level and trend. If so, understand from discussions with the RPM why the Contractor has its impression.

- 4.3.4 During deactivation and decommissioning, perform 4.3.3 above to assess the effectiveness of administrative controls.

#### **4.4 Adequacy and Effectiveness of Records**

ITP I-151, "RCP Documents, Records, and Reports Assessment," and 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 if the documents, records, and reports, related to contamination monitoring and control, meet the technical and regulatory requirements. No additional records need be reviewed to establish the effectiveness of the contamination monitoring and control records.

### **5.0 REFERENCES**

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

DOE G 441.1-1, *Management and Administration of Radiation Protection Programs Guide*, U.S. Department of Energy, 1999.

DOE G 441.1-9, *Radioactive Contamination Control Guide*, U.S. Department of Energy, 1999.

*Integrated Safety Management Plan*, 24590-WTP-ISMP-ESH-01-001, Rev. 3, Bechtel National, Inc., 2003.

*Preliminary Safety Analysis Report to Support Partial Construction Authorization*, 24590-WTP-PSAR-ESH-01-001, Volumes I-IV, latest versions, Bechtel National, Inc.

*Quality Assurance Manual*, 24590-WTP-QAM-QA-01-001, Rev. 4, Bechtel National, Inc., 2003.

*Radiation Protection Program for Design and Construction*, 24590-WTP-RPP-ESH-01-001, Rev. 0, Bechtel National, Inc., 2001.

RL/REG-98-26, *Inspection Technical Procedures (ITP)*, U.S. Department of Energy, Office of River Protection, 2003.

ITP I-111, "ALARA Program Assessment"

ITP I-140, "RCP Programmatic Assessment"

ITP I-148, "RCP Instrument Calibration and Maintenance"

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

*Safety Requirements Document*, 24590-WTP-SRD-ESH-01-001-2, Volume II, Rev. 2j, Bechtel National, Inc., 2003.

## 6.0 LIST OF TERMS

ALARA	as low as is reasonably achievable
BNI	Bechtel National Inc.
DOE	U.S. Department of Energy
ISMP	Integrated Safety Management Plan
ORP	Office of River Protection
PSAR	Preliminary Safety Analysis Report
QAM	Quality Assurance Manual
RCP	Radiological Control Program
RPM	Radiation Protection Manager
RPP	Radiation Protection Program
RWP	Radiation Work Permit
SC	Safety Criterion
SRD	Safety Requirements Document
WTP	Waste Treatment and Immobilization Plant

Attachments: None