

## **CONDUCT OF RADIOLOGICAL WORK**

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### **1.0 SCOPE**

This Performance Assessment Guide for Conduct of Radiological Work will be used to carry out the oversight responsibility of the U.S. Department of Energy (DOE) Brookhaven Group. This guide was prepared to assist in conducting performance-based assessments of both DOE prime contractors and subcontractors to ensure that their radiological protection programs identify, disposition, and take corrective action on issues that affect satisfactory facility performance. The goals are to ensure that laboratory employees and the public do not experience injuries and illness as a result of radiological activities and that there is little or no economic loss to the Government.

Conduct of radiological work assessments will be directed at all prime contractors and subcontractors working at DOE sites. DOE line management must ensure that these contractors comply with DOE Orders and Federal and State regulations. Information developed from this assessment will determine the degree to which this is being done as well as the effectiveness of the laboratory's program.

### **2.0 ATTRIBUTES AND LINES OF INQUIRY**

This section provides lines of inquiry to help assess whether organization has established and implemented a program that ensures that radiological protection issues are incorporated into the line activities. This section will also be used to evaluate the laboratory's line organization.

**2.1** The laboratory's oversight organization has identified and established planning criteria and methods.

- Are maintenance and modification plans and procedures reviewed to identify and incorporate radiological requirements?
- Are radiological work permits (RWPs) or equivalent documents used to establish radiological controls for intended work activities? Are the RWPs approved by responsible radiation protection personnel?

**2.2** The laboratory's oversight organization has identified and established radiological work preparation requirements.

- Does the site-specific radiological control manual identify trigger dose and contamination levels that require a formal radiological review of work activities?
- Are the installation, use, and removal of temporary shielding controlled by procedure?
- Are current RWPs meeting the requirements of the site/facility posted at entrances to work areas? Do the RWPs reflect actual working conditions? Are out-of-date RWPs removed in a timely manner?
- Are RWPs established for specific tasks, except for routine, repetitive tasks?

**2.3** The laboratory's oversight organization has identified and established radiological entry and exit requirements.

- Do workers sign that they have read and understood, and will comply with, the RWP prior to initial entry and after the RWP is revised?
- Have entry and exit requirements been specified in the RWP and adhered to by personnel?

**2.4** The laboratory's oversight organization has identified and established radiological work control requirements.

- Does the sequence of work provide the lowest reasonable exposure and establish challenging exposure goals using facility and industry experience?
- Are limitations identified and set with respect to stay times and other work control requirements, and are they based on accurate and timely information regarding levels encountered?
- Are special hazards such as "hot spots" identified in the RWP or attachments such as surveys?
- Is work involving high exposure rates controlled through use of special tools, shielding, monitoring, and timekeeping?

- Is traffic routed through lower exposure rate areas, and are waiting/staging areas established?
- Are engineering controls used to the maximum extent practical? Such controls might include use of glove bags or glove boxes with high-efficiency particulate air (HEPA) filtration, directed air flows and containments, and use of unique fittings on breathing air systems to prevent inadvertent contamination of the breathing air.
- Do controls exist for radiological work in localized areas, such as fume hoods, sample stations, and locations where "hot particle" exposures are possible?

**2.5** The laboratory's oversight organization has identified and established a method of evaluating radiological work performance.

- Are current practices analyzed and exposure controls compared with industry standards on an ongoing basis to achieve minimum exposures?
- Are RWPs critiqued upon completion or periodically during long-term tasks to determine any lessons learned or to address occurrences?
- Do radiological control personnel maintain logs to document the status of work activities?

**2.6** The laboratory's oversight organization has identified and established radiological work control requirements for specialty operations.

- Are special controls being used to protect personnel from transient high radiation levels, such as moving of radioactive materials or radiography source usage?
- Are radiological hold points incorporated into special procedures, such as temporary procedures for use of special equipment?

**2.7** The laboratory's oversight organization has identified and established radiological work control requirements for radiation-generating devices (RGDs).

- Are ANSI N43.2 and N43.3 used as applicable in establishing radiological safety programs for RGDs?
- Are fail-safe interlocks used, tested, and documented on RGDs?

- Are barriers adequately used to ensure the safety of operators and other personnel when RGDs are used?
- Are the setpoints to activate interlocks or other safety systems (e.g., beam shutters, warning lights) associated with RGDs defined?
- Is the radiation field around RGDs and radioactive material well characterized (i.e., type, energy, and dose range known)?
- Are operating procedures, interlock procedures, and warning signs posted at RGD operating consoles and in target areas?
- Are a sufficient number of warning lights installed so that at least one light is visible from occupied areas adjacent to the RGD and from all avenues of approach to such areas?
- Is the shielding design limit for RGDs (i.e., the dose rates allowed in areas adjacent to ALARA dose areas) defined?
- Are appropriate area radiation monitoring systems used for RGDs?
- Do remote and local readouts provided for RGDs have visible and audible alarm capacities?
- Are specialized inspections and surveys of RGDs performed periodically and documented?

**2.8** The laboratory's oversight organization has identified and established radiological work control requirements for construction and restoration projects.

- Does the laboratory's oversight organization have specific plans applicable to the changing conditions related to construction and demolition equipment use (e.g., do excavation procedures or projects include surveys for buried items at appropriate junctures)?
- When an item is to be worked on, does the laboratory's oversight organization know the extent and character of the radiological conditions, or have provisions for finding out through historical or direct survey?

**2.8** The laboratory's oversight organization has formal radiological work procedures.

- Is there a hierarchical system that allows tracing of DOE Order and regulatory requirements, site policies, and site/facility procedures?
- Are radiological protection procedures approved by management?
- Do radiological protection standards, procedures, and work controls have recognizable or formal technical bases for limits, methods, and personnel protection standards?
- Do radiological protection procedures include relevant statutory and regulatory requirements, and incorporate industry standards, in particular those of the American National Standards Institute (ANSI) and the National Council on Radiation Protection and Measurement (NCRP)?
- Do procedures, standards, and controls have a documented review and approval system? Do radiological protection personnel concur in the procedures?
- Do procedures, standards, and controls have a specified review/revision cycle? Is there a tracking system to ensure that procedures and the like are reverified or revised and outdated procedures are removed from use?
- Are procedures developed, as a minimum, for:
  - Site/facility posting?
  - Developing and maintaining all radiation protection records?
  - Reporting unusual radiation occurrences?
  - Operating radiation-generating equipment?
  - Using radiation monitoring instruments?
  - Using radiation sources (e.g., reference and calibration)?
  - Tracking personnel medical evaluation?
  - Reporting radiation exposures?
  - Using protective clothing?
  - Responding to radiological emergency events?
  - Surveying and monitoring?
  - Providing counting room equipment and procedures?
  - Utilizing instrument maintenance and control?

### **3.0 STANDARDS AND REQUIREMENTS**

#### **3.1 Specific DOE Orders and Directives.**

- DOE 5480.4, "Environmental Protection, Safety, and Health Protection Standards."
- DOE/EH-0256T, "U.S. Department of Energy radiological Control manual, Rev. 1."
- DOE P441.1, "Department of Energy Radiological Health and Safety Policy."

#### **3.2 Title 10 CFR Requirements.**

- Title 10 CFR 835, "Occupational Radiation Protection".

#### **3.3 Other Codes and Standards.**

- ANSI N43.2, "Radiation Safety for X-Ray Diffraction and Fluorescence Analysis Equipment."
- ANSI N 43.3, "General Radiation Safety - Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV."
- ANSI N 13.2, "Administrative Practices in Radiation Monitoring (A Guide for Management)."

### **4.0 GUIDANCE TO ASSESSOR**

This assessment guide is intended to assist in conducting a performance assessment of radiological controls. It is not to be considered as all-inclusive, inflexible, or limiting reasonable assessment concentration when lines of inquiry responses dictate that an area must be more thoroughly probed.

The attributes of a comprehensive program are provided above as lines of inquiry regarding procedures, managers, training, and the like, and should give the assessor some insight as to whether there is a working program in place. Talking to the radiological controls workers themselves will let you know if they feel safe working in radiological controls and if they feel the controls are adequate.