

		Number: EA CRAD EA-30-09 Revision: 0 Effective Date: 09/23/2022
Occupational Radiation Protection Program Criteria and Review Approach Document		
Authorization and Approval	Kevin G. Kilp, Director Office of Environment, Safety and Health Assessments	David Olah, Lead Occupational Safety and Health Manager Office of Worker Safety and Health Assessments

1.0 PURPOSE

The mission of the U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments (EA-30) is to assess the effectiveness of safety and emergency management systems and practices used by line and contractor organizations and to provide clear, concise, rigorous, and independent evaluation reports of performance in protecting workers, the public, and the environment from the hazards associated with DOE activities.

In addition to the general independent oversight requirements and responsibilities specified in DOE Order 227.1A, *Independent Oversight Program*, this criteria and review approach document (CRAD), in part, fulfills the responsibility assigned to EA in DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, and DOE Order 440.1B, *Worker Protection Program for DOE (Including the National Nuclear Security Administration) Federal Employees*, to ensure contractors implement the requirements of 10 C.F.R. 835, *Occupational Radiation Protection* and DOE Policy 450.4A, *Integrated Safety Management Policy*.

The CRADs are available to DOE line and contractor assessment personnel to aid them in developing effective DOE oversight, contractor self-assessment, and corrective action processes. The current revision of EA's CRADs are available at <https://www.energy.gov/ea/criteria-and-review-approach-documents>.

2.0 APPLICABILITY

The following CRAD is approved for use by the Office of Environment, Safety and Health Assessments (EA-30) and sub-tier offices.

3.0 FEEDBACK

Comments and suggestions for improvements on this CRAD can be directed to the Director, Office of Environment, Safety and Health Assessments.

4.0 CRITERIA AND REVIEW APPROACH

The review of Occupational Radiation Protection assesses the effectiveness of programs and processes for ensuring the safety and health of workers during radiological work. The *Integrated Safety Management Policy*, DOE Policy 450.4A, establishes the Department's policy for work to be conducted safely and efficiently and in a manner that ensures protection of workers, the public, and the environment. To achieve this, implementation of Integrated Safety Management (ISM) requirements are established through directives, and for contractor organizations through contract clauses. This includes identification of existing and potential workplace hazards and assessment of risk, development and implementation of hazard controls, assurance that work is performed within established hazard controls, and implementation of a formal mechanism and process to gather feedback and implement continual improvement by the site contractor. Additionally, assessments can include an evaluation of the DOE field element's process to assess the adequacy of procedures and implementation of the contractor's occupational Radiation Protection Program.

The objectives and lines of inquiry are supported by the following regulations and orders:

- 10 C.F.R. § 835.101 Radiation Protection Programs
- 10 C.F.R. § 835.102 Internal Audits
- 10 C.F.R. § 835.103 Education Training and Skills
- 10 C.F.R. § 835.104 Written Procedures
- 10 C.F.R. § 835.401 General Requirements
- 10 C.F.R. § 835.402 Individual Monitoring
- 10 C.F.R. § 835.403 Air Monitoring
- 10 C.F.R. § 835.405 Receipt of Packages Containing Radioactive Material
- 10 C.F.R. § 835.501 Radiological Areas
- 10 C.F.R. § 835.502 High and Very High Radiation Areas
- 10 C.F.R. § 835.601 General Requirements
- 10 C.F.R. § 835.602 Controlled Areas
- 10 C.F.R. § 835.603 Radiological Areas and Radioactive Material Areas
- 10 C.F.R. § 835.801 Reports to Individuals
- 10 C.F.R. § 835.1003 Workplace Controls
- 10 C.F.R. § 835.1101 Control of Material and Equipment
- 10 C.F.R. § 835.1102 Control of Areas.
- 10 C.F.R. § 835.1201 Sealed Radioactive Source Control
- 10 C.F.R. § 835 Subpart C, Standards for Internal and External Exposure
- 10 C.F.R. § 835 Subpart H, Records

- 10 C.F.R. § 835 Subpart J, Radiation Safety Training
- 10 C.F.R. § 851.26(b) Reporting and Investigation.
- 48 C.F.R. § 970.5223-1 Integration of Environment, Safety, and Health into Work Planning and Execution.
- DOE O 210.2A DOE Corporate Operating Experience Program
- DOE O 226.1B Implementation of Department of Energy Oversight Policy

The following functional areas are designed as stand-alone sections to be used in any combination based on the need of the specific appraisal.

OBJECTIVES

RP.1: Radiation protection program design including organizational structure and administration are sufficient to provide for effective implementation and control of all radiological protection activities. (10 CFR 835 Subpart B)

Criterion:

Management and administrative requirements are sufficient in the areas of radiation protection program documents, conduct of internal audits, worker qualifications, and existence and use of appropriate written implementing procedures. (10 CFR 835 Subpart B)

Lines of inquiry:

- Is there a documented Radiation Protection Program (RPP) that adequately addresses the flowdown of regulatory requirements including how each element of 10 CFR 835 is implemented?
- Are updates to the RPP submitted to DOE: whenever a change or addition to the RPP is made (if the change decreases the effectiveness of the RPP); prior to the initiation of a task not within the scope of the RPP; within 180 days of any modification to 10 CFR 835?
- Are the organizational responsibilities for radiological protection well defined and understood with staffing and resources sufficient to accomplish assigned tasks?
- Do individuals responsible for developing and implementing measures necessary for ensuring compliance have the appropriate education, training, and skills to discharge these responsibilities?
- Are written procedures developed and implemented as necessary to ensure compliance.
- Are radiological protection requirements actively administered by site/facility management and supervision and adhered to by personnel, and do managers and supervisors observe radiological protection activities to ensure adherence to established policies and procedures and to identify and correct problems?
- Are appropriate and effective internal and external audits scheduled and performed to determine the effectiveness of the radiological protection program to identify problems, root causes, and execute appropriate corrective actions?
- Do internal audits of the RPP ensure that all functional elements of the program are reviewed at least every 36 months?
- Are appropriate radiological protection performance indicators established and periodically assessed to enhance radiological protection effectiveness?
- Are radiological protection problems adequately documented and evaluated? Are evaluations properly reviewed for trends, and are actions taken to correct the causes?

RP.2: Radiological work planning processes are formally defined, designed, and implemented in a manner that adequately defines work scopes, integrates with other safety and health disciplines,

minimizes the potential for spread of contamination, and ensures radiological exposures to personnel are maintained as low as reasonably achievable (ALARA). (110 CFR 835 Subpart F; 10 CFR 835 Subpart K)

Criterion:

Written work authorizations such as radiological work permits or other technical work documents approved by the radiological control organization are used to control entry into and perform work in all radiological areas, and these authorizations adequately specify the hazards and appropriate radiological control measures (i.e., radiological conditions, personal protective equipment (PPE), limiting conditions, hold points, void limits, etc.). (10 CFR 835 Subpart F; 10 CFR 835.1003)

Lines of inquiry:

- Is work scope sufficiently defined and conveyed such that radiological controls are tailored to the work being performed?
- Are radiological work authorizations followed as written?
- Are pre-job briefings used and effective in conveying radiological hazards and controls?
- Are workers appropriately trained and qualified prior to performing radiological work?
- Are there methods in place to integrate radiological work control processes with other site work planning and control processes to ensure synergy of controls for different hazards?
- Is the ALARA process formally defined and effectively used to evaluate and control all occupational exposures?
- Are appropriate radiological controls for both external and internal exposure evaluated and applied to radiological work?
- Is the appropriate hierarchy of controls effectively implemented including engineering and administrative controls, followed by PPE?
- Do Radiological Control Technicians (RCT's) provide effective radiological job coverage including surveys and sampling during work in radiological areas?
- Do workers use good work practices to prevent the spread of contamination to their skin or personal clothing while handling radioactive material or while working in and exiting contaminated areas?
- Are postings and boundary controls adequate?
- During work with radiation sources and radioactive materials, are appropriate measures defined and implemented to prevent unintentional exposures and/or the spread of contamination to clean areas?

RP.3: Monitoring of individuals and areas is performed to demonstrate compliance, document radiological conditions, detect changes in radiological conditions, detect the gradual buildup of radioactive material, verify the effectiveness of engineering and administrative controls in containing radioactive material and reducing radiation exposure and identify and control potential sources of individual exposure to radiation and/or radioactive material. (10 CFR 835 Subpart E; 10 CFR 835 Subpart L)

Criterion:

Adequate routine and non-routine radiological surveys and monitoring are performed for external radiation, fixed and removable contamination, and airborne radioactivity, as needed to characterize radiological conditions and ensure safety of personnel. (10 CFR 835.401; 10 CFR 835.403; 10 CFR 835.1102)

Lines of inquiry:

- Is a documented radiation monitoring program in place that includes the frequency and location for routine and non-routine radiation and contamination surveys?
- Are there adequate procedures and criteria used to define radiological air sampling and monitoring needs and is appropriate air monitoring performed during activities with the potential for generating airborne radioactivity and/or when personnel are prescribed respiratory protection?
- Are there adequate procedures and criteria for completion of survey records, chain of custody for samples, acceptable radiation levels, evaluation of survey and sampling results, and for acting upon and/or reporting of off-standard survey results?
- Are radiological survey and monitoring records being effectively used to evaluate facility radiological hazards and conditions prior to the initiation of work activities?
- Are instruments used for surveys, sampling, and monitoring properly calibrated at an appropriate frequency, operationally tested before use, and properly maintained?

RP.4: Compliant radiological postings are used to control access to controlled areas, radiological areas, and areas where radioactive materials are present. (10 CFR 835 Subpart G; 10 CFR 835 Subpart M)**Criterion:**

Radiological postings, access controls, and material controls are sufficient to prevent unauthorized access and avoid unnecessary radiological exposures. (10 CFR 835.601, 10 CFR 835.602, 10 CFR 835.603; 10 CFR 835.1201)

Lines of inquiry:

- Are there appropriate procedures and criteria used for defining radiological areas and associated posting requirements?
- Are signs used to post radiological areas and material clear and conspicuous?
- Are there appropriate procedures and criteria used for labeling radioactive materials including containers and process lines, ducts, vessels, etc.?
- Are there appropriate administrative and engineering controls in place to provide adequate access control for entry into radiological areas including necessary signs, barricades, lights, locks, and/or interlock systems?
- Are current radiological conditions and entry requirements to radiological areas adequately posted and/or readily available to workers?
- Are there appropriate procedures in place for radiological source and inventory control?

RP.5: Programs for external and internal dosimetry are designed to ensure personnel radiation exposures are accurately determined and recorded. (10 CFR 835, Subpart E)**Criterion:**

Whole body and extremity radiation exposures are measured and recorded using appropriate dosimetric methods, and internal doses from potential intakes of radioactive materials are measured and recorded using appropriate in-vitro and/or in-vivo bioassay techniques. (10 CFR 835.402)

Lines of inquiry:

- Is the technical basis for external and internal dosimetry adequately documented and do the technical bases consider all applicable radiation types, energies, and exposure potential?

- Is the technical basis for air sampling and monitoring adequately documented, including types and frequency based on potential hazards, and is this basis adequately integrated with the internal dosimetry program?
- Is all technical basis information adequately flowed down and implemented through formal procedures?
- Do external dosimetry protocols and practices adequately account for potential whole body, skin, and extremity doses?
- Are there adequate methods in place for evaluating, controlling, and acting on potential internal exposures, including routine and/or special bioassay, air monitoring, respiratory protection, workplace indicators, and response procedures?
- Do bioassay and air monitoring protocols and practices provide methodologies to estimate unrecorded internal dose.

RP.6: Individuals responsible for developing and implementing measures necessary for ensuring compliance with the requirements of this part shall have the appropriate education, training, and skills to discharge these responsibilities. (10 CFR 835.103; 10 CFR 835 Subpart J)

Criterion:

Formal radiological training programs are in place and effective in developing and improving the knowledge and skills necessary to perform assigned job functions. (10 CFR 835.103; 10 CFR 835 Subpart J)

Lines of inquiry:

- Are there training programs established and implemented for both initial and continuing training of workers and radiological control personnel?
- Are formal job performance measures in place and used to evaluate the qualification of radiological workers and technicians prior to assignment to independently perform assigned tasks?
- Are radiological training and qualification records maintained and readily available to managers and first-line supervisors?
- Has each individual completed radiation safety training before being permitted unescorted access to controlled areas and before receiving an occupational dose at a DOE site or facility?
- Does radiation safety training include the following topics, to the extent appropriate to each individuals' prior training, work assignments, and degree of exposure to potential radiological hazards: risks of radiation and radioactive materials, including prenatal radiation exposure; basic radiological fundamentals and radiation protection concepts; physical design features, administrative controls, limits, policies, procedures, alarms, and other measures implemented at the facility to manage doses and maintain doses ALARA, including both routine and emergency actions; individual rights and responsibilities as related to the implementation of the facility radiation protection program; individual responsibilities for implementing the ALARA measures required by the RPP; and individual exposure reports that may be requested?

RP.7: Radiological records are maintained to demonstrate compliance with 10 CFR 835. (10 CFR 835 Subpart H; 10 CFR 835 Subpart I)

Criteria:

1. Radiological records are legibly recorded and maintained for all individual and area monitoring, external and internal dose evaluation and assessments, release and control of material and

equipment, and maintenance and calibration of all radiological survey and monitoring equipment. (10 CFR 835 Subpart H)

2. Radiation records are provided to monitored individuals annually and upon request. (10 CFR 835 Subpart I)

Lines of inquiry:

- Does the radiological records management program, in use, effectively retain and allow for retrieval of all applicable radiological control documentation including radiological policy statements, manuals, procedures, personnel dosimetry, medical files, bioassay results, training records, ALARA reviews, meeting minutes, survey and monitoring results, radiological inventories, instrument calibrations, quality assurance tests, and other necessary records and reports?
- Are radiological records easily retrievable, allow for appropriate trend analysis, and aid in the protection of personnel and control of radiation exposure?
- Have radiological control record-keeping standards been established with respect to completeness, accuracy, legibility, and modification, and are these records auditable and controlled through all stages of creation, distribution, use, arrangement, storage, retrieval, media conversion, and disposal?
- Have employee radiological work histories (i.e., occupational exposures received at DOE and non-DOE facilities) been established and recorded on suitable forms?
- Are records of individual external and internal radiation doses being maintained in a manner that permits evaluation of compliance with dose limits, monitoring, and reporting requirements?
- Are other personnel radiological records such as incident or occurrence evaluations, formal declarations of pregnancy, results of medical examinations, and fit testing being properly maintained?
- Are radiation dose reports provided to monitored individuals annually, and detailed exposure information made available upon employee request?
- Are records of exposure provided to monitored individuals within 90 days of termination of employment if requested by the terminating employee?

RP.8: Feedback and improvement processes are effective in addressing and preventing the recurrence of issues with the radiation protection program. (DOE O 226.1B)

Criterion:

A formal process is established and implemented to gather feedback and implement continuous improvement of the radiation protection program elements, implementation, and the adequacy of hazard identification, prevention, abatement, and controls. (See DOE O 210.2A, Attachment 1, CRD, Section 1.a; DOE O 226.1B Attachment 1,2.b.(5); 48 CFR 970.5223-1(c)(5); and 10 CFR 851.26(b))

Lines of Inquiry:

- Do the contractor's programs and procedures include written plans and schedules for planned assessments, focus areas for operational oversight, and reviews of the contractor's self-assessment of processes and systems?
- Does the contractor assurance system include credible self-assessments, and feedback and improvement activities?
- How does management communicate the results of these assessments to all affected management and workers?
- What are the procedures for the development of corrective actions?

- How does management ensure the corrective actions are implemented, and effective?
- How does management incorporate lessons learned into future work planning, activities, and training for continuous improvement?
- Does the contractor develop lessons learned that focus on preventing adverse events, trends, and reliability related events, and on performance improvement?
- Does the contractor screen, distribute, and review DOE Corporate Operating Experience Program documents and external operating experience documents for site specific relevance, risks, and vulnerabilities, and take appropriate actions?
- Does the contractor incorporate operating experience into their activities and processes?

REVIEW APPROACH

Record Review:

- Copies of Site Radiation Protection Program (RPP) and Radiation Control Manual, or equivalent document
- Copies of all institutional and facility specific health physics implementing procedures for facilities being reviewed (working level documents)
- Copies of any internal and/or independent radiation protection audits/assessments in the past two years
- Copies of current health physics open items and corrective action status
- Copies of radiological incident/deficiency reports, as applicable for the past two years
- Copies of site technical basis documents/manuals for internal and external dosimetry, air sampling and contamination control, as applicable
- Copies of several current general and specific radiological work permits (RWP) or work permits/standard operating procedures (SOPs), etc. for radiological work for facilities being reviewed, and title only listing for remaining RWPs
- Copies of any recent ALARA reviews associated with above RWPs, as applicable

Interviews:

- Radiological Control Manager
- Radiological Programs Manager
- Radiological Work Planners/Radiological Engineers
- Radiological Field Operations Manager
- Radiological Field Operations Supervisors
- Radiological Control Technicians

Observations:

- Radiological Facility Walkdowns
- Radiological Work Observations