Submitted By (Signature/Date):

Position: RSO Jay Maisler, CHP	J Maisler 2/12/2021

Approved By (Signature/Date):

Trust Administrator: Bill Halliburton	Bill Halliburton 2/23/2021
Project Manager: Jeff Lux	Jeff Lux Digitally signed by Jeff Lux Date: 2021.02.23 13:51:02 -06'00' Type text here
Radiation Safety Officer: Jay Maisler	Jay Maisler, CHP Digitally signed by Jay Maisler, CHP Date: 2021.02.26 08:33:42 -05'00'
Quality Assurance Coordinator: Chuck Beatty	Charles Beatty Jr. Digitally signed by Charles Beatty Jr. Date: 2021.02.26 08:46:48 -05'00'

1.0 Description of Proposed Revision, Test, and/or Experiment:

Revision 3.2 of the Cimarron Site Radiation Protection Plan (RPP) is being revised as shown in the attachment to this evaluation. The changes that will be incorporated into Revision 4 of the RPP include the following:

- To support submittal of Revision 1 to the Decommissioning Plan (DP) to the NRC, a draft version of Rev. 4 to the RPP was developed to ensure the RPP included appropriate provisions to support implementation of the DP. These changes are incorporated in Rev. 4 with some modifications noted in the following bullets.
- NRC staff acceptance review of draft Rev. 4 to the RPP identified supplemental information that is incorporated into Rev. 4 of the RPP.
- Further changes are incorporated to ensure consistency with DP, Rev. 2.
- Changes driven by internally identified deficiencies or opportunities for improvement are incorporated.
- Changes influenced by the 2020 NRC inspection findings.
- Changes identified during the annual ALARA Committee review of the RPP.

Specific changes are identified in the attached markup of Rev. 3.2. Comments are provided for explanation of each of the changes.

Proposed provisions that are directly related to supporting implementation of the groundwater processing scheme contained in Rev. 2 of the DP require NRC approval and cannot be implemented at this time. Consistent with the ALARA Committee decision to include these proposed provisions in Rev. 4 of the RPP, these changes are shown in GRAY HIGHLIGHTED TEXT. Additional changes are expected from NRC review of Rev. 4 to the RPP, which will be incorporated in Rev. 5.

2.0 Does the proposed revision, test, and/or experiment ("action") represent a change to the NRC-approved Decommissioning Plan or Radiation Protection Plan?

X	Yes	If "Yes", proceed to section 4.0 for evaluation of the action. If "No", proceed to section 3.0 for evaluation of the action. *Comments: Rev. 4 of the RPP includes changes that do not conflict with the current Decommissioning Plan and are compliant with existing license conditions. Other proposed changes are identified in GRAY-HIGHLIGHTED TEXT indicating the need for NRC approval. As they related to groundwater processing, which is neither authorized nor conducted, these highlighted provisions are not applicable.*
	No	

3.0 Is the proposed test or experiment present in the NRC-approved Decommissioning Plan or applicable license conditions?

N/A	Yes	If "Yes", there is no need to conduct an evaluation.
N/A	No	If "No", proceed to Section 4.0 for evaluation of the action.

4.0 Evaluation:

	LICENSE REQUIREMENT	YES	NO	N/A
4.1	**Does the action conflict with requirements specifically stated in the license, other than the RPP or DP?**			
	a) Does the action involve material not authorized by the license?		x	
	b) Are either the use or the place of use different from what the license authorizes? *Comment: Changes identified in GRAY-HIGHLIGHTED TEXT address proposed facilities that will be built in an area of the Site that has been previously removed from the license (subarea O). NRC authorization is required prior to handling and processing licensed radioactive material at this location.*	x		
	c) Will the action violate training requirements?		x	
	d) Are there procedures or procedure revisions which have not been approved by the RSO? *Comment: Some changes being implemented require procedure changes, such as the clarifications to radiation safety training. Other changes associated with groundwater processing will require procedure changes but cannot be implemented without NRC approval, as previously discussed.*	x		

	LICENSE REQUIREMENT	YES	NO	N/A
	e) Does the action involve work in Restricted Areas or with licensed material not addressed in RP Procedures? *Comment: Changes identified in GRAY-HIGHLIGHTED TEXT include facilities (e.g., places) not currently authorized to handle and process licensed radioactive material.*	x		
	f) Doe the action conflict with requirements in tie-downs stipulated in license conditions 10, 26, 27(a), or 27(c)?		x	
	g) Does the action result in contamination exceeding limits stipulated in license condition 27?		x	
4.2	**Does the action impair Cimarron Environmental Response Trust's ability to meet all applicable NRC regulations?**			
	a) Will the action cause an exceedance of dose limits for workers and members of the public?		x	
	b) Does the action establish limits other than approved decommissioning criteria?		x	
	c) Does the action violate requirements for surveys and monitoring, control of internal and external exposure, and control of licensed material?		x	
	d) Will the action violate precautionary procedures (posting, labeling, etc.)?		x	
	e) Does the action violate waste disposal or record keeping requirements?		x	
4.3	**Does the action result in degradation of safety or environmental commitments addressed in the NRC-approved RPP and/or DP, or health and safety?**			
	a) Does the action result in greater release of licensed material to air or liquid effluents than planned actions?		x	
	b) Does the action result in the spread of licensed material to uncontaminated areas more than planned actions?		x	
	c) Does the action result in the loss of control over licensed material?		x	
	d) Have data quality objectives been established that achieve the required level of data quality?		x	

	LICENSE REQUIREMENT	YES	NO	N/A
4.4	**Does the action pose a significant adverse effect on the quality of the work or the remediation objectives?**			
	a) Does the action modify the intent to release the site for unrestricted use?		x	
	b) Does the action result in significant increase in the volume of material contaminated above license criteria?		x	
	c) Does the action contaminate unrestricted areas to the extent they will require decommissioning?		x	
4.5	**Does the action conflict with the conclusions of actions analyzed in the Environmental Assessment, dated July 29, 1999 and Safety Evaluation Report dated August 20, 1999?**			
	a) Does the action render the environmental monitoring program unable to detect a release of licensed material to the environment?		x	
	b) Does the action increase the release of licensed material to groundwater, surface water, or air?		x	
	c) Does the action create the potential for an accident worse than that in the dose assessment?		x	
	d) Does the action result in an adverse socioeconomic impact to the community?		x	
	e) Does the action create other than short duration and minor impacts to air?		x	
	f) Does the action adversely impact potential future land use?		x	
	g) Does the action adversely impact transportation plans for shipments to a licensed disposal site?		x	
	h) Does the action adversely impact endangered species?		x	
	i) Does the action impact historic or archeological sites?		x	

NOTE: If "YES" was answered in ***any*** of the Section 4 evaluation questions, the action cannot be performed without NRC approval. Provide any basis for determination of each answer provided in Section 4 as comments in Section 5.0, as appropriate.

5.0 Comments:

In order to continue operations under the current radiological status of the Site, the ALARA Committee determined that Rev. 4 of the RPP should be issued to update the Plan to address current operating improvements and address program deficiencies identified in the radiation protection program and 2020 NRC inspection findings. The ALARA Committee is not attempting to approve decommissioning actions or those aspects of the RPP that cannot be implemented without NRC approval. These changes are indicated in GRAY-HIGHLIGHTED TEXT, as discussed throughout this evaluation.

6.0 Results:

Revision, Test, or Experiment Approved:	Yes	x	No	

environmental properties management, LLC	Cimarron Environmental Response Trust	
	Radiation Protection Plan	
Document No. RPP-001	Rev. ~~3.2~~4	Effective date: ~~9/15/2019~~3/1/2021
		Page i

Review and Approvals	
Prepared: Jay Maisler	
Signature:	Date:
Reviewed by Todd Brautigam	
Signature:	Date:
Reviewed by Quality Assurance Coordinator: Chuck Beatty	
Signature:	Date:
Approved by Radiation Safety Officer: Jay Maisler, CHP	
Signature:	Date:
Approved by Trustee Project Manager: Jeff Lux	
Signature:	Date:
Approved by Administrator, Cimarron Environmental Response Trust: Bill Halliburton	
Signature:	Date:

NOTE

The content of ~~r~~Revision 4 to the Radiation Protection Plan (RPP) includes provisions that apply to activities proposed in the Decommissioning Plan (DP) that is under review by the U.S. Nuclear Regulatory (NRC. This RPP is incorporated as Appendix O of that DP. Upon approval by the NRC, this RPP will be revised to incorporate any changes required by the NRC staff agreed to during the review process, as documented in a Safety Evaluation Report. RPP provisions that cannot be implemented without NRC approval are identified in GRAY HIGHLIGHTED TEXT. Other changes in Rev. 4 have been reviewed in accordance with license condition 27(e) of SNM-928 by the ALARA Committee and determined that they may be implemented as they do not:

- Conflict with the ALARA principle or decommissioning process.
- Conflict with requirements specifically stated in the license or impair the Cimarron Environmental Response Trust's ability to meet all applicable NRC regulations.
- Cause degradation in safety or environmental commitments addressed in the NRC-approved RPP and/or DP or have a significant adverse effect on the quality of the work, the remediation objectives, or health and safety.
- Conflict wit the conclusions analyzed in the Environmental Assessment, dated July 29,1999, and Safety Evaluation Report, dated August 20,1999.

Commented [JM1]: Rev. 3.2 to Rev. 4: Added Note to discuss the ALARA Committee's approach to incorporating changes identified for current Site activities and changes that are necessary to support groundwater processing following NRC review and approval of the RPP. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Summary of Changes

Revisions to this document will be identified, and revisions or addenda will be issued as needed. ~~The Trustee Project Manager maintains the signed original of this document; no controlled copies are issued.~~ The end user is responsible to verify ~~with the Trustee Project Manager~~ that any hard copy being ~~referenced~~ used is the current revision. A current version of the RPP is maintained on the Cimarron SharePoint site. A hard copy is available at the Site office. A summary description of each revision or addenda will be noted in the following table.

Commented [JM2]: Rev. 3.2 to Rev. 4: Edits made to reflect practices implemented at the Site in 2020. This comment applies to the footers on each page. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Revision Number	Date	Comments
Rev. 0	April 11, 2011	Original
Rev. 1	Feb. 3, 2012	Revision 1 to the Cimarron RPP contains numerous administrative changes and editorial changes. Specific changes are identified in a separate 27(e) evaluation and attached markup of changes from RPP Rev. 0.
Rev. 2	Feb. 24, 2014	Revision 2 to the RPP includes clarifications addressing groundwater processing and editorial changes. Specific changes are identified in a separate 27(e) evaluation and attached markup of changes from Rev. 1.
Rev. 3	April 15, 2016	Revision 3 provides changes to support the proposed Decommissioning Plan and includes editorial changes. Clarifications were added to address how radiological controls for routine activities are handled when an Activity Plan is not required or used. Specific changes are identified in a separate 27(e) evaluation and attached markup of changes from Rev. 2.

Revision Number	Date	Comments
Rev. 3.1	Dec. 31, 2018	Revision 3.1 is an interim revision This is an interim revision pending approval of draft Revision 4 by the NRC. Accordingly, it is labeled Revision 3.1. This revision to the RPP incorporates changes identified during the submittal of the Cimarron Facility Decommissioning Plan, Rev. 1, that the ALARA Committee determined can be implemented prior to NRC approval of the Decommissioning Plan. This revision also addresses and clarifies issues discussed with the NRC staff during the November 2018 inspection at the Site.
Rev. 3.2	Sep. 15, 2019	Includes editorial corrections. Corrected error in Section 8.2 that implied personnel access logs were required for entry into areas posted solely as Radioactive Materials Areas. Corrected typographical area regarding Radioactive Materials Area in Table 8.1 and Section 10.2.

Revision Number	Date	Comments
Rev. 4	March 1, 2021	Added signature blocks to Reviews and Approvals page to identify preparer and technical reviewer. Changed language on verification of the current version of the RPP in accordance with Site practices in Summary of Changes and footers. Includes changes made to conform with the Cimarron Site Decommissioning Plan under review by the NRC for approval Added a Note on the cover page to indicate that certain changes identified within the RPP cannot be implemented until NRC approves the Decommissioning Plan. After NRC approval, Rev. 5 to the RPP will be issued to reflect NRC approved RPP language. Other changes have been to clarify Site implementation of the RPP or to make editorial corrections and clarifications. Specific changes approved for implementation are identified in a separate 27(e) evaluation and attached markup of changes from Rev. 3.2.

TABLE OF CONTENTS

Commented [JM3]: The entire table of contents has been reformatted to match formatting in the DP.

1.0 INTRODUCTION

1.1 Purpose

This Radiation Protection Plan (RPP) establishes radiation protection requirements implemented at the Cimarron Site to achieve compliance with applicable regulatory requirements and License SNM-928. As provided in the Cimarron Site Decommissioning Plan, the RPP will be implemented during decommissioning (extraction and treatment of uranium-impacted groundwater).

Commented [JM4]: This paragraph was included in the Draft Rev. 4 reviewed by the NRC Staff but has been edited. This provision is not applicable to current Site activities. Accordingly, GRAY HIGHLIGHTED TEXT is used to reflect that the statement does not apply for current Site activities.

1.2 Scope

The RPP applies to all radiological operations, routine and emergency, at the Cimarron Site. The RPP applies to the following personnel when present at the Cimarron Site:

- Licensee employees
- Contractors and their employees
- Visitors~~, when work involves radioactive material, under the supervision of trained personnel as authorized by the Radiation Safety Officer (RSO)~~

Commented [JM5]: Deleted per ALARA Committee comment – Visitors who do not work with RAM is addressed in the RPP.

~~1.3 License Transfer~~

~~The U.S. Nuclear Regulatory Commission (NRC) transferred the license (SNM-928) for the Cimarron Site (the Site) to the Cimarron Environmental Response Trust (licensee) on February 14, 2011. The license is administered by the Trustee, Environmental Properties Management, LLC (EPM). EPM's maintenance of the Site and administration of the Site in accordance with License SNM-928 will provide adequate protection of the public health and safety and reasonable assurance of compliance with the NRC's regulations.~~

Commented [JM6]: Deleted section 1.3 per ALARA Committee comment – This is information, while relevant nearly ten years ago, is no longer relevant and is deleted.

2.0 TRAINING REQUIREMENTS AND POLICY

2.1 Section Overview

This section describes radiation safety training requirements for individuals who enter a Restricted Area (RA), handle radioactive material, or work in the vicinity of radioactive material at the Site.

2.2 Responsibilities

The RSO is responsible for the radiation safety training program which includes:

- Approving radiation safety training materials
- Approving personnel ~~conducting~~ performing radiation safety training
- Performing radiation safety training ~~or approving other individuals to perform the training~~
- Verifying that those individuals who require radiation safety training receive appropriate training

Commented [JM7]: Edited for consistency with next bullet.

Commented [JM8]: Deleted per ALARA Committee comment as it is redundant to previous bullet.

2.3 Training Requirements

Radiation ~~Safety~~ safety ~~Training~~ training requirements are tiered to provide an appropriate level of training based on the potential for radiation exposure of an individual at the Cimarron Site. Individuals who visit or work at the Site but do not require unescorted access to RAs or Radioactive Material Areas must complete Radiological Orientation. In addition to Radiological Orientation, General Worker Radiological Training is required for individuals requiring unescorted access to RAs or Radioactive Material Areas whose duties do not involve working

Commented [JM9]: Rev. 3.2 to Rev. 4: Editorial change. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

with or handling radioactive material. Radiation Worker Training is required for individuals who handle or work directly with radioactive materials.

Commented [JM10]: Rev. 3.2 to Rev. 4: This change provides clarification on the three levels of radiation safety training required at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

The Licensee shall not assume that radiation safety training has been adequately covered by prior employment or academic training.

Inspectors and representatives of the NRC and the Oklahoma Department of Environmental Quality, Land Protection Division, Radiation Management Section are exempt from radiation safety training. Site-specific information may be provided to agency personnel if deemed necessary by the RSO.

~~Ancillary personnel (e.g., clerical, housekeeping, security, etc.) whose duties may require them to work in the vicinity of radioactive material (escorted or not) shall receive information about radiation hazards and the appropriate precautions.~~

Commented [JM11]: Rev. 3.2 to Rev. 4: The paragraph is deleted because it is redundant to changes made that clarify the three tiers of radiation safety training. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

A prospective evaluation of radiological conditions and potential doses to workers for the groundwater treatment process will be performed. Based on the results of this evaluation, the RSO will determine the need for individual monitoring, and General ~~or Site Specific~~Worker Radiological Training (Subsection 2.3.2) or Radiation Worker Training (Subsection 2.3.3) for workers accessing RAs, and the boundaries of any required RA(s).

Commented [JM12]: Rev. 3.2 to Rev. 4: Editorial change to conform to training tier clarifications. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

2.3.1 *Radiological Orientation*

Radiological Orientation is required for visitors and individuals visiting or working at the Cimarron Site but not permitted to enter RAs or Radioactive Material Areas. Individuals who complete Radiological Orientation will be granted escorted (i.e., under direct supervision of a Qualified Escort) access to RAs and Radioactive Material Areas but working with or handling radioactive materials is not permitted. Entry into Contaminated

Areas, Airborne Radioactive Material Areas, or areas requiring either bioassay or respiratory protection is not permitted. ~~Radiological Orientation is provided for individuals performing routine activities that do not require access into RAs other than Radioactive Materials Areas, but does not include working with or handling radioactive materials.~~ Activities these individuals undertake may include, but is not limited to general office work, housekeeping, and tours and inspections of the property~~, annual environmental monitoring campaigns, and installation of new monitoring wells~~.

~~Radiological Orientation is required prior to permitting individuals to have unescorted access to the Cimarron Site.~~ Information required for Radiological Orientation may be presented in a classroom setting or provided as a "read-and-sign" document. A test is not required for Radiological Orientation. Documentation will be maintained for all individuals completing Radiological Orientation. The following topics will be addressed:

- Radioactive materials that are present at the Site
- NRC Form 3, "Notice to Employees"
- Information regarding radiation safety requirements for work to be performed (e.g., groundwater sampling, well installation, groundwater processing, packaging and shipping for disposal, etc.)
- Site access and egress (typically covered in Site Safety & Health Orientation);
- Response to emergency conditions (including weather, fires, personnel injuries) (typically covered in Site Safety & Health Orientation);
- Site industrial safety requirements (~~including personal protective clothing and equipment, etc.~~typically covered in Site Safety & Health Orientation)

~~This document must be verified with Project Manager~~Verify version is current prior to use

Commented [JM13]: Rev. 3.2 to Rev. 4: This change provides clarification on the three levels of radiation safety training required at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM14]: Rev. 3.2 to Rev. 4: These changes provide clarification related to the three levels of radiation safety training required at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM15]: Rev. 3.2 to Rev. 4: Clarifies that no test is required for Radiological Orientation due to low-risk from radiological exposures associated with authorized access at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM16]: Rev. 3.2 to Rev. 4: Clarifies where the information is provided. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM17]: Rev. 3.2 to Rev. 4: Clarifies where the information is provided. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM18]: Rev. 3.2 to Rev. 4: Clarifies where the information is provided. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Refresher training for Radiological Orientation shall be conducted annually (within 12 months).

2.3.2 *General ~~or Site-Specific~~Worker Radiological Training*

~~In addition to Radiological Orientation,~~ General ~~or Site-Specific~~Worker Radiological Training is required for workers who are ~~permitted~~ granted unescorted access to RAs ~~and will include~~Radioactive Material Areas but who are not permitted:

- Work with or handle radioactive material.
- Enter Contaminated Areas or Airborne Radioactive Material Areas.
- Enter areas where bioassay or respiratory protection is required.

Information required for General Worker Radiological Training may be presented in a classroom or virtual classroom setting or provided as a "read-and-sign" document. Documentation will be maintained for all individuals completing General Worker Radiological Training. General Worker Radiological Training will include:

- Information covered in Radiological Orientation described above;
- Information regarding the principles and practices of radiation protection;
- Information regarding the purpose and functions of protective and monitoring devices that will be used, as applicable;
- Information regarding protection available for the embryo/fetus, as applicable.

General Worker Radiological Training will include a test to verify an adequate understanding of the training. Each test shall have a minimum passing grade of 80%. If an individual does not pass the test, the test may be administered a second time. If the

Commented [JM19]: Rev. 3.2 to Rev. 4: Clarified that annual refresher Orientation is required.. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM20]: Rev. 3.2 to Rev. 4: Editorial change to conform to training tier clarifications. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM21]: Rev. 3.2 to Rev. 4: These changes provide clarification related to the three levels of radiation safety training required at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM22]: Added per ALARA Committee comment. Allows for more efficient implementation of training requirements.

candidate fails the test a second time, the candidate must repeat the entire General Worker Radiological Training course before he/she can take another test.

A candidate who does not achieve a minimum of 80% on the General Worker Radiological Training test will not be granted unescorted access to any RA or Radioactive Material Area.

Refresher training for General Worker Radiological Training shall be conducted annually (within 12 months) and does not require re-testing.

Commented [JM23]: Rev. 3.2 to Rev. 4: These changes provide new requirements related to providing a test for General Worker Training and clarifies requirements for annual refresher training. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

2.3.3 *Radiation Worker Training*

Radiation ~~Workers~~ Worker Training ~~are~~ is required for individuals who in the course of employment are likely to receive an occupational dose to radiation greater than 100 mrem (1 millisievert) in a year or whose duties require them to ~~routinely~~ work in an RA, Radioactive Material Area, Contaminated Area, Airborne Radioactive Material Area, or routinely work with or handle radioactive material, or use respiratory protection equipment (for radiation protection). Such workers may include groundwater processing operators and their supervision, health physics technicians, and environmental sampling personnel.

Commented [JM24]: These changes provide clarification related to the Radiation Worker Training requirements at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Radiation Worker training will include:

- Information covered in General ~~or Site-Specific~~Worker Radiological Training described above;
- Radioactivity measurements, monitoring techniques, and usage of monitoring instrumentation;

Commented [JM25]: Change made per ALARA Committee comment. Allows for more efficient implementation of training requirements.

Commented [JM26]: Rev. 3.2 to Rev. 4: Editorial change to conform to training tier clarifications. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

- Basic calculations involved in using and measuring radioactivity;
- Types of radiation, range and effects;
- Regulatory and ~~site~~Site-specific dose limits to the general public and occupationally exposed persons;
- Storage, transfer, or use of radiation and/or radioactive material;
- Biological effects of radiation;
- Health protection problems associated with exposure to radiation and/or radioactive material;
- Precautions or procedures to minimize exposure;
- Purposes and functions of protective devices employed;
- Applicable NRC regulations and license requirements for the protection of personnel from exposure to radiation and/or radioactive material including ~~Radiation Workers requirement~~responsibility to observe regulatory and license requirements to the extent within the worker's control;
- Workers' responsibility to report promptly to the licensee any condition which may lead to or cause a violation of Commission regulations and licenses or unnecessary exposure to radiation and/or radioactive material;
- Appropriate response to warnings made in the event of any unusual occurrence or malfunction that may involve exposure to radiation and/or radioactive material;
- Radiation exposure reports which workers may request pursuant to 10 CFR 19.13.

Initial Radiation Worker Training will include a test to verify an adequate understanding of the training. Each test shall have a minimum passing grade of 80%. Each test question answered incorrectly shall be reviewed with the test participant and noted on

Commented [JM27]: Rev. 3.2 to Rev. 4: Editorial change. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM28]: Editorial change made per ALARA Committee comment.

test. If an individual does not pass the test, the test may be administered a second time. If the candidate fails the test a second time, the candidate must repeat the entire Radiation Worker Training course before he/she can take another test.

A candidate who does not achieve a minimum of 80% on the Radiation Worker training test will not be permitted to perform work in an RA or to handle radioactive material until such time as the Radiation Worker training and test is successfully completed. The individual may continue unescorted access to RAs or Radioactive Material Areas if they successfully completed General Worker Radiological Training.

Commented [JM29]: Rev. 3.2 to Rev. 4: Editorial change. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM30]: Rev. 3.2 to Rev. 4: Editorial change to clarify limitations on access at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

2.3.4 *Training Delivery*

Any of the following techniques, or combination thereof, may be used for radiation safety training:

- Classroom training
- Audiovisual media
- Reading assignments (Self Study)
- Computer-based or on-Line training (Internet)
- On-the-job training (OJT) under the presence of an individual trained in the specific activity being observed;
  - ~~Using survey instrumentation~~
  - ~~Sample collection~~
  - ~~Sample analysis, etc.~~
- Demonstrations

Commented [JM31]: Editorial change made per ALARA Committee comment.

- Drills
- Discussions

2.3.5 *Training Frequency*

- Initial ~~training~~ Radiation Worker Training shall be conducted before ~~routinely~~ working in ~~an RA or routinely~~working with or handling radioactive material.
- A training update for Radiological Orientation, General Worker Radiological Training, or Radiation Worker Training shall be provided, as appropriate, ~~Whenever~~ whenever there is a significant change in duties, regulations, or terms of the license~~; and~~.
- Refresher for ~~Radiological Orientation and~~ Radiation Worker ~~training~~ Training shall be conducted annually (within 12 months) and does not require re-testing.

2.4 Refresher Training

Refresher training for Radiological Orientation, General Worker Radiological Training, and Radiation Worker may be satisfied by the RSO or designee issuing required reading that is formally acknowledged by the individual in an email or signed acknowledgement form. Other methods for conducting refresher training may be required by the RSO based upon lessons learned throughout the year.

~~2.4~~2.5 Training Records

Training records shall include the following documentation:

~~This document must be verified with Project Manager~~Verify version is current prior to use

Commented [JM32]: Rev. 3.2 to Rev. 4: Editorial change. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM33]: Rev. 3.2 to Rev. 4: These changes are made to conform to training tier clarifications. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM34]: Rev. 3.2 to Rev. 4: These changes are made to conform to training tier clarifications. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM35]: This section was revised to address comments from the 2020 audit of the radiation protection program. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

- Rosters of individuals attending Radiological Orientation briefings.
- Rosters of individuals attending General Worker Radiological Training.
- Rosters of individuals completing Radiation Worker Training.
- Completed General Worker Radiological Training graded tests.
- Completed Radiation Worker Training graded tests.
- Documentation of completion of refresher for General Worker Radiological Training.
- Documentation of completion of refresher for Radiation Worker Training.

~~, including a copy of the graded tests,~~Records for all individuals shall be maintained in accordance with the Quality Assurance Program Plan (QAPP).

3.0 ADMINISTRATION AND RESPONSIBILITIES

3.1 Section Overview

This section describes the radiation protection organization and responsibilities of those individuals implementing the RPP.

Administration of the ~~RPP~~ radiation protection program requires coordination among the following individuals:

Commented [JM36]: Editorial change in response to ALARA Committee comment.

- Trust Administrator
- Trustee Project Manager (Trustee PM)
- RSO
- Quality Assurance Coordinator (QAC)
- Task Specific Project Managers (PMs)
- Activity Leaders
- Individual Workers
- ALARA Committee

3.2 Radiation Protection Organization

The radiation protection organizational structure for the Cimarron Site is shown in Figure 3-1.

Trust Administrator – The Trust Administrator has expertise in management and has managerial and financial responsibility for the decommissioning of the Cimarron Site. The Trust Administrator is a permanent member of the Site ALARA Committee~~, having responsibility for management of Trust assets and provides resources needed to complete the decommissioning of the Site~~.

Commented [JM37]: Rev. 3.2 to Rev. 4: This is a conforming change to Draft Rev. 4 previously provided for NRC staff review.

The language has been edited in response to ALARA Committee comments and is consistent with License Condition 27(e)3

Trustee PM – The Trustee PM is responsible for overseeing the construction and operation of decommissioning systems, the implementation of radiation ~~and~~ safety, industrial health and safety, quality assurance, and environmental compliance programs. The Trustee PM is responsible for ensuring that all personnel performing decommissioning activities, or working in radiation protection, health and safety, quality assurance, or environmental compliance functions receive training and have the skills and experience required to perform those functions.~~.~~ The Trustee PM, having expertise in decommissioning and responsibility for implementing decommissioning changes, is a permanent member of the ALARA Committee~~, having expertise in decommissioning and responsibility for implementing decommissioning changes~~.

RSO (Jay Maisler) – The RSO is responsible for maintenance and implementation of the radiation protection program. The RSO is also responsible for review and revision of the RPP and procedures, radiation exposure monitoring, dose reporting, the radiological instrument program, and all levels of radiation safety training. The RSO is responsible ~~to ensure~~for ensuring that all activities comply with license requirements, chair the ALARA Committee, and manage the health physics staff. ~~The RSO chairs the ALARA Committee and is responsible for bringing radiation protection and safety issues to the attention of the ALARA Committee.~~ The RSO is given specific authority to implement and manage the licensee's radiation protection program, either directly or through qualified individuals who are designated in writing as having authority to exercise specific functions. All radiation protection personnel have stop work authority.

The responsibility for the implementation and review of the Material Control and Accountability (MC&A) program is assigned to the RSO for the Cimarron Site. The RSO establishes training programs for individuals who implement activities in accordance with MC&A procedures and designates specific individuals are qualified to implement those activities.

Commented [JM38]: Rev. 3.2 to Rev. 4: This is a conforming change to Draft Rev. 4 previously provided for NRC staff review.

Commented [JM39]: Rev. 3.2 to Rev. 4: Editorial change. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM40]: Rev. 3.2 to Rev. 4: This is a conforming change to Draft Rev. 4 previously provided for NRC staff review.

Reflects ALARA Committee comments.

Commented [JM41]: Rev. 3.2 to Rev. 4: Editorial change. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM42]: Rev. 3.2 to Rev. 4: This is a conforming change to Draft Rev. 4 previously provided for NRC staff review.

Reflects ALARA Committee comments.

QAC – The QAC is responsible for the maintenance and implementation of the quality assurance program. The QAC performs or schedules periodic and/or ad hoc audits and observations of all decommissioning and program management functions. All quality assurance personnel have stop work authority. The QAC is also responsible to perform periodic evaluations of the effectiveness of the quality assurance program and to ensure that all personnel performing quality-critical tasks have received the appropriate level of training on the Site-specific quality assurance program. The QAC ~~routinely~~ attends the Site ALARA Committee.

PMs – PMs are responsible for the preparation of plans, procurement of services and materials, and the ~~performance~~ execution of decommissioning projects. PMs ensure that all personnel working on projects have received all the training needed and are qualified to perform the tasks for which they are responsible to perform. PMs are responsible for monitoring the schedule, cost, and quality of the project work.

Activity Leader and Front-Line Supervisor – Activity Leaders (ALs) are the front-line supervisors over non-routine work performed at the Cimarron Site. ALs are responsible for the preparation of activity plans and procurement of services and materials for non-routine activities. Front-line supervisory personnel are responsible for procurement of services and materials and the performance of decommissioning operations for routine operations. ALs and front-line supervisors ensure that all personnel working on projects are familiar with the activity plan under which the work is being performed, and that they have received all the training needed and are qualified to perform the tasks for which they are responsible to perform. ALs and front-line supervisors are responsible for monitoring the schedule, cost, and quality of the project work. ~~Each Activity Leader is responsible for the preparation for Activity Plans, procurement of services and materials, and the performance of decommissioning operations. Activity Leaders~~

Commented [JM43]: Rev. 3.2 to Rev. 4: This is a conforming change to Draft Rev. 4 previously provided for NRC staff review.

Commented [JM44]: Editorial change made per ALARA Committee comments.

~~ensure that all personnel working on projects are familiar with the Activity Plan under which the work is being performed, and that they have received all the training needed and are qualified to perform the tasks for which they are responsible to perform.~~

Individual Worker – Each worker is responsible for their own protection and the protection of their co-workers. Workers should know how NRC requirements relate to their work and should follow them. If a worker observes violations of the requirements or has a safety concern, they should report them as discussed in section 3.3.2 of this Plan. Workers are provided training related to their responsibilities in Radiological Orientation, General Worker Radiological Training, and Radiation Worker Training.~~Each Worker is responsible for complying with regulatory requirements and applicable radiation protection procedures to the best of his/her ability and knowledge.~~

ALARA Committee – The ALARA Committee is responsible for ensuring that ALARA policy and regulatory compliance are integrated into Site work activities as appropriate. The Committee reviews and approves ALARA goals for the Cimarron Site and the effectiveness of the ALARA program in meeting these goals. The Committee also reviews plans for new Site activities to ensure that ALARA principles have been considered, reviews the radiation protection program annually to ensure regulatory compliance and incorporate any necessary changes, and evaluates and approves changes to the DP or the RPP in accordance with License Condition 27(e).

Commented [JM45]: Rev. 3.2 to Rev. 4: This is a conforming change to Draft Rev. 4 previously provided for NRC staff review.

Commented [JM46]: Rev. 3.2 to Rev. 4: Clarification of requirement for individuals to comply with training they receive. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM47]: Change made in response to ALARA Committee comments. The change reflects language provided in NRC Form 3 (8/2017 Version

3.3 Policies

~~3.2.1~~3.3.1 *Stop Work Authority*

All Site personnel have ~~Each individual listed in Section 3.2 has~~ the authority to stop work:

- If radiological health and safety of workers is compromised
- If radiological health and safety of the general public is compromised
- If radiological regulatory non-compliance may occur (includes NRC regulations, license conditions, and radiation protection procedures)

3.3.2 *Reporting Safety Concerns and Regulatory Violations*

All workers at the Site have the right to report safety concerns and observations of potential regulatory or license violations. Individuals are encouraged to contact the RSO first if they have a radiation safety concern or ~~feel there is~~observe a potential regulatory or license violation. This is not a requirement.

Individuals who are not satisfied with the response to an expressed concern have the right to contact the NRC for resolution. See NRC Form 3, "Notice to Employees." No penalty or retribution will result to an individual who contacts the NRC.

Commented [JM48]: Editorial change made per ALARA Committee comments.

Commented [JM49]: Rev. 3.2 to Rev. 4: This is a conforming change to Draft Rev. 4 previously provided for NRC staff review.

Commented [JM50]: Change made per ALARA Committee comment. The change clarifies policy with respect to reporting employee concerns and observation.

Commented [JM51]: Change made per ALARA Committee comments. This change clarifies that an individual can contact NRC directly without fear of retribution from the employer.

~~3.3~~3.4 Radiation Protection Program Document Hierarchy

The order of precedence in regulating the Cimarron Site is:

1. Federal radiation protection regulations (10 CFR)
2. License SNM-928, including the RPP which is incorporated into the license via a license condition
3. Radiation protection program procedures

~~3.4~~3.5 Procedure Development

Radiation protection procedures have been developed to provide consistent, effective performance of radiation protection activities. Radiation protection procedures include, but are not limited to, the sampling and analysis of influents and effluents to monitor the accumulation of special nuclear material in resins, the sampling of loaded resin and biomass for waste characterization, and the sampling, analysis, handling, storage, manifesting, transportation, and disposal of low-level radioactive waste.

Commented [JM52]: Rev. 3.2 to Rev. 4: This is a conforming change to Draft Rev. 4 previously provided for NRC staff review.

Includes changes based on ALARA Committee comments.

Radiation protection procedures shall be developed in accordance with the QAPP.

Radiation protection procedures shall comply with regulatory requirements, license conditions, and the RPP.

Radiation protection procedures may incorporate or reference applicable technical guidance documents (e.g., NRC Regulatory Guides and NUREGs, National Council on Radiation Protection and Measurements (NCRP) guidance, International Council on Radiation Protection (ICRP) guidance, American National Standards Institute (ANSI) documents, etc.).

~~3.5~~3.6 Procedure Review, Approval, and Control

Radiation protection procedures shall undergo technical verification and review to ensure compliance with regulatory requirements, applicable licenses and permits, and the RPP, as well as conformance, to the extent practicable, with applicable industry standard practices.

Commented [JM53]: Rev. 3.2 to Rev. 4: Editorial clarification. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

- Radiation protection procedure review shall assess compatibility with all other Licensee plans, manuals, and procedures.
- Radiation protection procedure review shall ensure that the procedure can be performed as written.
- All radiation protection procedures shall be reviewed and approved by the RSO.
- All radiation protection procedures shall by reviewed by the QAC or designee for conformance with quality assurance program requirements.

All radiation protection procedures shall be controlled in accordance with ~~regulatory requirements and~~ the QAPP.

Commented [JM54]: Deleted per ALARA Committee comments. Regulatory requirements related to control of procedures is addressed in the QAPP.

~~3.6~~3.7 Desk Instructions

Desk Instructions may be developed and implemented to provide guidance on radiation protection program implementation or to clarify program implementation expectations from the RSO. Desk Instructions serve as a reference guide on specific topics that help the user implement various aspects of the RPP. Desk Instructions may be written to ~~address use of specific radiation survey instrumentation~~ provide instructions for performing routine or special radiological surveys, qualify or requalify individuals to perform radiological surveys, or identify RSO designees.~~or details associated with electronic survey form completion~~. Desk Instructions are issued by the RSO or designee and expire 12 months after approval. Desk Instructions may be

Commented [JM55]: Rev. 3.2 to Rev. 4: Clarifying language. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM56]: Change made per ALARA Committee comments. This change clarifies that an individual can contact NRC directly without fear of retribution from the employer.

renewed at additional 12-month increments. All Desk Instructions shall be controlled in accordance with the QAPP.

Commented [JM57]: This change was made to address a comment from the 2020 audit of the radiation protection program to ensure DIs are controlled as records. The statement is the same as used for RP procedures. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

~~3.7~~3.8 Notifications and Reports

Notifications and reports shall be made in accordance with the requirements of 10 CFR 19, 10 CFR 20 and 10 CFR 70. Detailed instructions for regulatory requirements related to notifications and reports are provided in radiation protection procedure, RP-05, "Radiation Protection Reports and Assessments."

3.8.1 *Required Notices and Postings*

The RSO responsible for ensuring the following postings and reports available to employees and contractors working at the Site. In some cases, where the volume of pages associated with a required posting or report is impractical to physically post, notice informing workers where the information is available or how it can be obtained may be posted:

- Current NRC Form 3, "Notice to Employees"
- 10 CFR 19 and 10 CFR 20 regulations
- A copy of SNM-928 and documents incorporated by license, reference, and amendments to the license.
- Operating procedures applicable to licensed activities.

- Any notice of violation involving radiological working conditions, proposed imposition of civil penalty, or order issued by the NRC, and any response from the Trust.

Commented [JM58]: Rev. 3.2 to Rev 4: These changes were identified as a gap in ensuring policy-level requirements are reflected in the RPP and not just relegated to procedures. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

3.9 RSO Designees and Task Qualification

Prior to designating an individual, the RSO should consider the following:

3.9.1 *Education*

The designated individual should have a Bachelors' degree in the physical sciences, industrial hygiene or engineering from an accredited college or university or an equivalent combination of training and relevant experience in radiological protection. Two years of relevant experience are considered equivalent to 1 year of academic study.

3.9.2 *Health Physics Experience*

The designated individual should have at least 1 year of work experience in applied health physics, industrial hygiene or similar work relevant to radiological hazards associated with site remediation. This experience should involve actually working with radiation detection and measurement equipment, not simply administrative or "desk" work.

3.9.3 *Specialized Knowledge*

The designated individual should have a thorough knowledge of the proper application and use of all health physics equipment used for the radionuclides present at the Site, the chemical and analytical procedures used for radiological sampling and monitoring, and

methodologies used to calculate personnel exposure to the radionuclides present at the Site. The individual must have the appropriate specialized knowledge to perform the designated responsibility.

Designated individuals may be qualified to perform specific tasks approved by the RSO. A modified "systematic approach to training" is employed to qualify individuals on specific tasks. Task qualifications must be documented and include the following:

- Verification that the selected individual has sufficient experience (e.g., related technical experience, such as environmental remediation, industrial hygiene, use of scientific instruments, etc.), education (including physical science and math), and prior training (related to the specific task, which may include electronic equipment use and handling, computer applications, etc.).
- Learning objectives based on the procedural requirements to perform the task.
- On-the-job training including performance terminal objectives that the individual must satisfy through performance, simulation, or discussion. Each performance terminal objective should include the behavior being evaluated (e.g., task being performed), conditions associated with the task, standards that must be met (e.g., applicable procedures), and the steps necessary to perform the specific task.

3.9.4 *Expiration of Task Qualifications.*

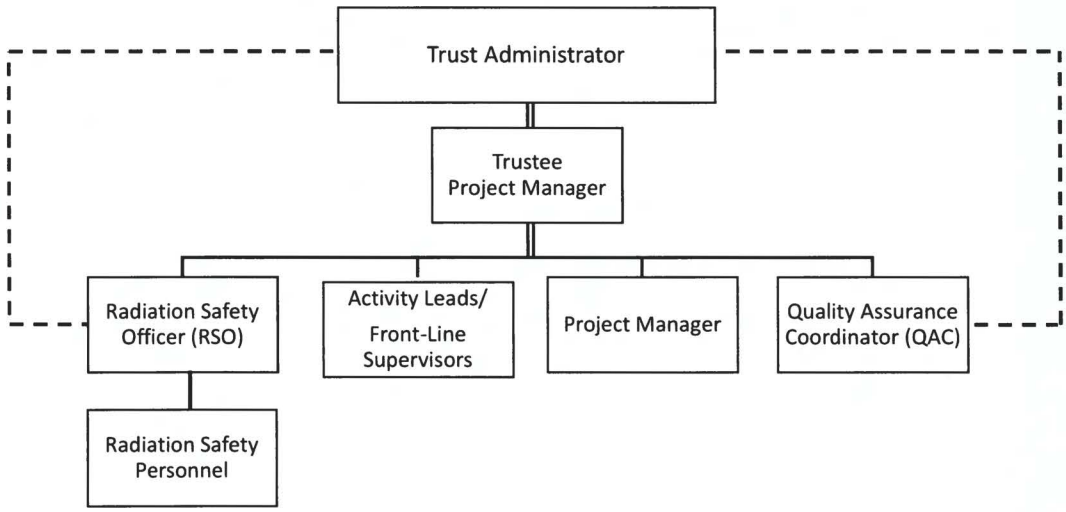
Task qualifications are typically valid for 12 months and may be extended with refresher training and RSO or designee approval.

Commented [JM59]: Rev. 3.2 to Rev. 4: Details provided to capture the requirements related to RSO designees and HP Task Qualified individuals. This change was provided in response to supplemental information on the Draft Rev. 4 requested by the NRC staff. This information has been reformatted for consistency with the DP.

Figure 3-1

The Cimarron Environmental Response Trust Organization

Commented [JM60]: Rev. 3.2 to Rev. 4: Editorial change to add "Front-Line Supervisor" to Activity Leader block for consistency with Section 3.2. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.



4.0 ALARA PROGRAM

4.1 Section Overview

This section describes the philosophy, requirements, and responsibilities of the Cimarron Site As Low As Reasonably Achievable (ALARA) program.

4.2 ALARA Policy

The Cimarron Site radiation protection program uses, to the extent practicable, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and dose to members of the public that are ALARA. The licensee is committed to providing resources such as personnel, training programs, engineering controls, monitoring devices, activity planning, etc. to achieve the goals of the ALARA principle.

Radiation Protection Procedure, RP-10, "ALARA Program," is the implementing procedure for the ALARA program. In addition, the licensee encourages individuals working at the Site to provide input regarding improvements that would minimize dose and improve the safety and efficiency of activities.

Commented [JM61]: Editorial change.

~~At a minimum, the ALARA Committee meets once each calendar quarter.~~

4.3 ALARA Committee ~~Responsibilities~~

At a minimum, the ALARA Committee meets once each calendar quarter.

4.3.1 ~~ALARA Committee Responsibilities~~ ALARA Committee Responsibilities

~~4.2.1~~

The responsibilities of the ALARA Committee include:

- Ensuring that ALARA policy and regulatory compliance are integrated into all Site work activities as appropriate
- Reviewing and approving ALARA goals for the Cimarron Site (if individual monitoring is required)
- Reviewing the effectiveness of the ALARA Program (if individual monitoring is required)
- Reviewing plans for new activities to ensure that ALARA principles have been considered
- Reviewing liquid effluent discharges to address the need to incorporate ALARA principles
- Annual review of the RPP to ensure regulatory compliance and to incorporate any necessary changes
- Evaluate and approve changes to the DP or the RPP in accordance with License Condition 27(e)

4.3.2 Annual ALARA Committee Report

The ALARA Committee ensures that a formal annual report is ~~provided~~ submitted to the NRC that includes:

Commented [JM62]: Rev. 3.2 to Rev. 4: Editorial changes. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM63]: Rev. 3.2 to Rev. 4: Change made for consistency with DP. The change was included in the Draft Rev. 4 reviewed by the NRC staff. This provision is not applicable to current Site activities. Accordingly, GRAY HIGHLIGHTED TEXT is used to reflect that the statement does not apply for current Site activities.

Commented [JM64]: Rev. 3.2 to Rev. 4: Editorial change: This section was added in Rev. 3.1 of the RPP and was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM65]: Editorial change made per ALARA Committee comments.

- A description of all changes, tests, and experiments made or conducted pursuant to License Condition 27(e), including a summary of the safety and environmental evaluation of each action.
- Any DP or RPP pages revised pursuant to License Condition 27(e).

A formal report shall also be submitted to the NRC annually if no changes, tests or experiments were approved by the ALARA Committee.

~~4.2.2~~4.3.3 *ALARA Committee Membership*

~~As stipulated in~~ License Condition 27(e)~~, which~~ states:

"The ALARA Committee shall consist of a minimum of three individuals, one of whom shall be designated as the ALARA Committee chairman. Of these three designees, one shall have expertise in management and shall have managerial and financial responsibility for the decommissioning of the site; one shall have expertise in decommissioning and shall be responsible for site decommissioning, and one shall be the site Radiation Safety Officer or equivalent and shall ensure conformance to radiation safety and environmental requirements. The designee with managerial and financial responsibility shall be employed by the licensee's Trustee. The designee for decommissioning of the site and the Radiation Safety Officer or equivalent, shall be retained by the Trustee. Except for the representative of management, ALARA Committee members may be consultants."

In accordance with this License Condition, the ALARA Committee shall consist of a minimum of three individuals:

Commented [JM66]: Rev. 3.2 to Rev. 4: Format change. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM67]: Editorial changes made per ALARA Committee comments.

- The Trust Administrator is a permanent (voting) member who has managerial and financial responsibility for the decommissioning of the Site. ~~The Trustee is stipulated in the Cimarron Environmental Response Trust Agreement dated February 14, 2011.~~
- The Trustee PM is a permanent (voting) member who is responsible for Site decommissioning and groundwater remediation.
- The ~~Site~~ RSO ~~chairs~~ is a permanent (voting) member of the ALARA Committee who ~~and~~ ensures conformance to radiation safety and environmental requirements. ~~The RSO is a permanent (voting) member of the ALARA Committee.~~

Commented [JM68]: Deleted per ALARA Committee comments. Sentence is redundant to information provided in Section 3.2.

Commented [JM69]: Editorial changes made per ALARA Committee comments. Changes conform to format used to describe the Trust Administrator and Trustee PM.

The licensee is authorized to make certain changes to the NRC-approved DP and RPP without NRC's approval, if these changes are consistent with the ALARA principle and the decommissioning process. ~~These changes are discussed~~The criteria for approval of these changes are stipulated in License Condition 27(e) and require ALARA Committee approval. Formal approval of such changes shall require a majority of the voting members and documented in minutes from the ALARA Committee meeting where these changes were approved.

Commented [JM70]: Editorial changes made per ALARA Committee comments.

Additional may be nominated and approved by the three voting members identified in License Condition 27(e)3. These members shall be identified in radiation protection procedure RP-11, "ALARA Committee Reviews and Evaluations." ~~non~~Non-voting members may be included, as appropriate, to address technical issues such as quality assurance, decommissioning activities, health physics, hydrogeology, etc. The QAC routinely attends ALARA Committee meetings to monitor Committee activities and report on QAPP issues. Others may periodically be appointed to the Committee including, PMs and Activity Leaders involved with radiological work activities.

4.3.4 *ALARA Committee Meetings*

ALARA Committee meetings will include reports on the following aspects of decommissioning work:

- Radiological exposures
- Compliance with license possession limits
- Compliance with Material Control & Accountability requirements
- Compliance with OPDES Discharge Permit limits

- Active Activity Plans
- Quality control/quality assurance performance issues
- Chemical concerns
- Health and safety performance and issues
- Radiological waste characterization and disposal

Commented [JM71]: Re. 3.2 to Rev. 4: This change was added to ensure compliance with the DP submitted to the NRC for approval. This change was included in the Draft Rev. 4 reviewed by the NRC staff. Much of this provision is not applicable to current Site activities. Accordingly, GRAY HIGHLIGHTED TEXT is used to reflect that the statement does not apply for current Site activities

5.0 ASSESSMENTS

5.1 Section Overview

Audits and/or surveillances provide a review of decommissioning and radiation protection activities to evaluate compliance with regulatory requirements, license conditions, ~~and~~ the RPP and, radiation protection procedures. Audits and/or surveillances identify unsatisfactory performance and/or weaknesses in procedures, training, or work practices. The results of all audits and surveillances are reviewed by the ALARA Committee.

Commented [JM72]: Rev. 3.2 to Rev. 4: Editorial changes. These changes were not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM73]: Rev. 3.2 to Rev. 4: Editorial change. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

5.2 Audits

10 CFR 20.1101(c) requires that a licensee shall, at least annually, review the radiation protection program content and implementation. To satisfy this requirement, an annual audit is performed by the QAC and/or other individuals appointed by the Trustee PM. The audit is based upon various NRC guidance documents ~~(e.g.,~~ including Appendix ~~L~~H, NUREG-1556, Vol. 7~~)~~, which provides ~~provide~~ sample audit forms to assist ~~the~~ licensees in meeting this requirement.

Commented [JM74]: Rev. 3.2 to Rev. 4: Editorial changes and correction to NUREG 1556 Vol. 7 Appendix. These changes were not included in the Draft Rev. 4 reviewed by the NRC staff.

Periodic audits (review of documentation and records), the ALARA Committee review of the RPP and an annual audit modeled on NRC's sample audit form are used to meet this requirement. Periodic audits are conducted, as required, under the QAPP. Audits shall be documented, as well as program changes resulting from audit findings or observations.

Corrective action for non-conformances and incidents is implemented through the "Notice of Deficiency" reporting process. The Notice of Deficiency is used to report conditions adverse to safety, and to report accidents that occur. Notices of Deficiency document stop-work actions initiated by anyone working at the Site, deficiencies in procured items or services, documents,

procedure content, or adherence to procedures in the performance of work. Notices of Deficiency document failure to comply with specified requirements. The adoption of this single reporting mechanism simplifies deficiency reporting and integrates the resolution of issues that impact quality at the Site.

This process provides for the prompt identification of conditions adverse to quality, determination of their cause, and resolution of the specific conditions adverse to quality. A log of deficiencies and corrective actions is maintained to permit trending analysis if appropriate. The trend analysis can be used to identify timely corrective actions to prevent recurring problems and improve performance. Deficiency reporting and the corrective action process are controlled by a single procedure under the QAPP.

Commented [JM75]: Rev. 3.2 to Rev. 4: Additional discussion to ensure consistency with the DP and to reflect how Site activities are conducted. The change was made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

5.3 Surveillances

Surveillances are observations of activities being performed. Surveillances of Site activities are done by, or under the direction of, the QAC and/or the RSO. The goal of surveillances is to determine whether or not an activity is being performed in accordance with applicable procedures, plans, accepted industry standards, etc. Surveillances shall be documented, as well as program changes resulting from findings or observations made during surveillances. Surveillances are conducted once each calendar quarter at a minimum.

Commented [JM76]: Rev. 3.2 to Rev. 4: This change was made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. The change does not reflect current Site practices. Accordingly, GRAY HIGHLIGHTED TEXT is used to reflect that the statement does not apply for current Site activities

5.4 Records

Records of audits and surveillances are maintained in accordance with the QAPP.

Commented [JM77]: Note: Draft Rev. 4 reviewed by the NRC staff spelled out "Quality Assurance Program Plan" which, based on Site document editorial practices is inappropriate. Accordingly, this change is not promulgated in Rev. 4.

Audit and surveillance records shall include the following information:

- The date(s) the audit/surveillance was conducted.
- Name of person(s) conducting the audit/surveillance.
- Audit/surveillance findings, corrective actions, and follow-up.

Commented [JM78]: Rev. 3.2 to Rev. 4: This change was made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4

6.0 PERSONNEL MONITORING

6.1 Individual Monitoring of Occupational Dose

NRC regulation 10 CFR 20.1502 requires the licensee to monitor occupational exposures from both licensed and unlicensed radiation sources. Monitoring is required of any adult likely to receive, in 1 year from sources external to the body, a dose in excess of 10 percent of the Occupational Dose Limits for Adults and/or who are likely to receive, in 1 year, an intake in excess of 10 percent of the applicable annual limit on intake (ALI) in Table 1, Columns 1 and 2, of Appendix B to 10 CFR 20.1001-20.2402. Monitoring for minors is required when they are likely to receive, in 1 year, from radiation sources external to the body, a deep dose equivalent (DDE) in excess of 0.1 rem, a lens dose equivalent in excess of 0.15 rem, or a shallow dose equivalent to the skin or the extremities in excess of 0.5 rem and/or likely to receive, in 1 year, a committed effective dose equivalent (CEDE) in excess of 0.1 rem. Monitoring of declared pregnant women is required when they are likely to receive during the entire pregnancy, from radiation sources external to the body, a DDE in excess of 0.1 rem and/or likely to receive during the entire pregnancy, a CEDE in excess of 0.1 rem.

Personnel monitoring has not been performed at the Site since 2006 because there was no potential to receive a dose that would require monitoring under 10 CFR 20.1502. During the design of groundwater extraction and treatment systems, new work activities, such as groundwater processing, were evaluated to determine if they may result in exposure requiring personnel monitoring. The threshold dose for personnel monitoring will not be approached; accordingly, ~~neither~~ monitoring of workers is not required for external or internal occupational dose ~~is required~~. Area radiation monitoring was established (Section 10.5) to confirm the results

Commented [JM79]: Editorial change per ALARA Committee comments.

of this evaluation. Air sampling during spent ion exchange resin handling activities will be performed as discussed in Section 6.6, below, and Section 11.1 of the Decommissioning Plan.

Commented [JM80]: Rev. 3.2 to Rev. 4: This change was made for consistency with the DP. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Two calculations were performed to determine the potential radiological conditions that may be encountered when the groundwater treatment system is operational. One calculation was performed to determine the potential intake from the groundwater processing operations. The other calculation was performed to determine potential external dose rates from spent resin vessels.

- Potential intakes from airborne exposure to uranium while handling spent resins are documented in Appendix A (EPM028-CALC-001, Potential Intake Calculation). Appendix A also provides the potential intake calculation for oral ingestion of uranium, airborne exposure to Tc-99, and oral ingestion of Tc-99. A sensitivity analysis to estimate potential intakes through inhalation of U-235 progeny (Th-231 and Pa-231) and U-238 progeny (Th-234 and Pa-234). These calculations demonstrate that the potential intakes of radioactive materials are very low. The contamination control program described in this RPP is designed to ensure workers are not exposed to airborne radioactive material. The air sampling program described in the RPP is based on the results of these analyses and will be used to confirm conclusion of the calculations.
- Appendix B (EPM017-CALC-001, Dose Rate Near Uranium Treatment Train) provides the results of external dose rate calculations from spent resin vessels. Dose rates less than 0.3 mrem/hour were considered in the development of the radiation dose monitoring program described throughout this RPP.

These calculations were based on the 60% design of the groundwater treatment system. The potential intake calculation supported the decision that internal monitoring (e.g., bioassay) and

respiratory programs were not needed at the Site. This calculation also informed the development of the air sampling program described in Section 10.7. The dose rate calculation supported the decision that personnel dosimetry was not required at the Site.

Both calculations will be reviewed at 90% design, updated, if necessary, and reevaluated to determine if the RPP should be updated. In addition, periodically through groundwater processing, these supporting calculations will be reviewed to ensure they reflect operational experience and determine if changes to the RPP are necessary. If additional activities are identified or planned, the radiological consequences of those activities will be evaluated to determine if personnel monitoring for occupational dose is required.

Commented [JM81]: Rev. 3.2 to Rev. 4: This change was added in response to supplemental information requested by the NRC. This provision is not applicable to current Site activities. Accordingly, the font is PURPLE to reflect that the statement does not apply for current Site activities

Commented [JM82]: Change made per ALARA Committee comments. This change ensure new activities are evaluated to determine the need for personnel monitoring.

6.2 Occupational Dose Limits

NRC Regulation 10 CFR 20.1201 establishes a total effective dose equivalent (TEDE) limit and a total organ dose equivalent (TODE) limit for occupationally exposed adults. The TEDE is the sum of the DDE from external exposures and the CEDE from internal exposures. The TODE is the sum of the DDE and the committed dose equivalent (CDE) to the organ receiving the highest dose. The following annual dose limits apply to all the licensee employees, contractors, and visitors who receive occupational dose at the Cimarron Site.

Occupational dose is defined ~~as the radiation dose an individual receives in an RA and other work-related radiation dose the person receives. Occupational dose does not include medical dose, dose due to background radiation, or dose received while a member of the public~~Section 16 of the RPP.

Commented [JM83]: Change made per ALARA Committee comments. There is no need to define a term that is already defined in the glossary.

6.2.1 *Occupational Dose Limits for Adults (10 CFR 20.1201)*

- Whole Body - The more limiting of a TEDE equal to 5 rem or the sum of the DDE and CDE to any individual organ or tissue, other than the lens of the eye, equal to 50 rem.
- Skin of the whole body or skin of any extremity - A shallow dose equivalent equal to 50 rem.
- Lens of the Eye - A lens dose equivalent equal to 15 rem.

6.2.2 *Occupational Dose Limits to Minors (10 CFR 20.1207)*

- ~~The dose limits for minors shall be~~ 10 percent of the corresponding limit for adults.

Commented [JM84]: Change made per ALARA Committee comments. Editorial change made for consistency with previous subsection.

6.2.3 *Occupational Dose Limits to Embryo/Fetus (10 CFR 20.1208)*

- ~~The dose~~ Dose to the embryo/fetus ~~of declared pregnant women~~ shall be limited to 500 mrem during the entire time of pregnancy of a declared pregnant woman . Substantial variations in dose rate over the gestation period shall be avoided.

Commented [JM85]: Editorial changes made per ALARA Committee comments.

6.3 Dose Limits for Individual Members of the Public (10 CFR 20.1301)

The TEDE received by individual members of the public from licensed operations shall not exceed 100 mrem in a year, exclusive of the dose contributions from background radiation, from any administration the individual has received, from exposure to individuals administered radioactive material and released under 10 CFR 35.75, or from voluntary participation in medical research programs~~above background in a year in RAs~~. In addition, the dose in any Unrestricted

Commented [JM86]: Change made per ALARA Committee comments. Language is aligned with 10 CFR 20.1301(a)(1).

Area from external sources shall not exceed 2 mrem above background in any one hour. Members of the public are not subject to the individual monitoring, record keeping, and reporting requirements of 10 CFR 20.

6.4 Determination of Prior Occupational Exposure

The occupational dose during the current year shall be determined and an attempt shall be made to obtain records of lifetime dose for all personnel who are likely to receive a dose in excess of 10% of the annual dose limit. The prior dose history shall be documented on Form NRC-4, or equivalent. Forms NRC-4 and NRC-5 and records used in their preparation shall be retained by the licensee until the regulating agency terminates each pertinent license requiring this record and in accordance with the QAPP.

6.5 Personnel Monitoring for External Radiation

As discussed in Section 6.1, individual monitoring for external exposure is not expected to be required during groundwater extraction and processing and related activities. Passive area radiation monitoring using thermoluminescent dosimeters (TLDs) or optically stimulated luminescent dosimeters (OSLDs) will be performed to demonstrate that individuals will not exceed the requirements for individual monitoring provided in the RPP. However, individual monitoring devices will be assigned if any of the following conditions are encountered or expected to be encountered: ~~Individual monitoring devices shall be issued to:~~

- Any individual likely to receive, from radiation sources external to the body, a dose in excess of 10 percent of the 10 CFR 20 occupational dose limits in a year.

Commented [JM87]: Editorial change made per ALARA Committee comment.

Commented [JM88]: Rev. 3.2 to Rev. 4: This change ensures consistency with commitments in the DP. Portions of this change that are not applicable for current Site activities are shown in GRAY HIGHLIGHTED TEXT. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

- Any minor likely to receive, in 1 year, from radiation sources external to the body, a DDE in excess of 0.1 rem, a lens dose equivalent in excess of 0.15 rem, or a shallow dose equivalent to the skin or the extremities that exceeds 0.5 rem.
- Any declared pregnant woman likely to receive during the entire pregnancy, from radiation sources external to the body, a DDE that exceeds 0.1 rem.

When external exposure is determined by measurement with an external personal monitoring device, the DDE ~~must~~ will be used in place of the effective dose equivalent, unless the effective dose equivalent is determined by a dosimetry method approved by the NRC. Dosimetry devices shall be processed by a laboratory or vendor maintaining accreditation by the National Voluntary Laboratory Accreditation Program (NVLAP).

Commented [JM89]: Editorial change made per ALARA Committee comment.

If the need to perform external monitoring for workers is identified, RP procedures will be implemented that consider guidance provided in Regulatory Guides 8.4, Rev. 1, 8.28, Rev. 0, and 8.34, Rev.0, as applicable. The following information will be addressed in these procedures:

- A description of the individual-monitoring devices that will be provided to workers who meet the criteria in 10 CFR 20.1502(a) and 20.1601 for external exposures.
- The type, range, sensitivity, and accuracy of each individual-monitoring device.
- Use of extremity and whole body monitors when the external radiation field is non-uniform.
- When audible-alarm dosimeters and pocket dosimeters will be provided, and a description of their performance specifications.
- How external dose from airborne radioactive material is determined.

- The procedure to ensure that surveys necessary to supplement personnel monitoring are performed.

Action levels for workers' external exposure, including the technical bases and actions to be taken when they are exceeded.

6.6 Internal Exposure Monitoring

Based on anticipated radiological work involving extraction and treatment of groundwater at the Site, a bioassay program is not warranted. If radiological conditions change or evaluation of the final groundwater processing equipment design indicates that an individual worker could be exposed to 2% of the ALI in a year, then bioassay shall be performed. ~~In-vivo and/or in-vitro bioassay sampling~~ Bioassay shall be performed whenever a calculated intake of 40 Derived Air Concentration (DAC)-hours could have occurred in any one incident based on air sampling data, accident conditions, equipment failure, external contamination, or other conditions. ~~In-vitro and /or in-vivo bioassay bioassay~~ Bioassay sampling shall also be performed whenever it is likely that an individual may have received an intake of 10 milligrams of uranium in any one week. ~~In-vivo and/or in-vitro bioassay~~ Bioassay shall be considered upon termination of all Radiation Workers who may have had intakes of radioactive materials. The need for bioassay sampling shall be determined by the RSO/designee. Requirements for the ~~Determination~~ determination of internal exposure ~~requirements~~ are ~~listed~~ provided in 10 CFR 20.1204.

If the need for internal monitoring is identified, RP procedures will be implemented that ~~include the requirements for worker intakes are determined:~~

~~Using measurements of quantities of radionuclides excreted from, or retained in the human body.~~

Commented [JM90]: Rev. 3.2 to Rev. 4: This change was added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. It is not applicable for current Site activities and is shown in GRAY HIGHLIGHTED TEXT.

Commented [JM91]: Rev. 3.2 to Rev. 4: Change to ensure consistency with DP. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM92]: Rev. 3.2 to Rev. 4: Changes made to ensure consistency with DP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM93]: Rev. 3.2 to Rev. 4: Changes made to ensure consistency with DP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM94]: Editorial change per ALARA Committee comments.

Commented [JM95]: Rev. 3.2 to Rev. 4: Changes made to ensure consistency with DP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM96]: Editorial changes per ALARA Committee comments.

~~By measurements of the concentrations of airborne radioactive materials in the workplace.~~

~~For an adult, a minor, and a declared pregnant woman using any combination of the measurements above, as necessary.~~

consider guidance provided in Regulatory Guides 8.9, Rev. 1, 8.15, Rev. 1, 8.34 Rev. 0, and 8.36, Rev. 0, as applicable. The following information will be addressed in these procedures:

- How worker intakes are determined using measurements of quantities of radionuclides excreted from or retained in the human body. Specifically, the procedures will address how frequencies for bioassay measurements for baseline, periodic, special, and termination assays are assigned.
- How radioactivity measured in the human body by bioassay techniques are converted into worker intake; and action levels for bioassay samples, actions to be taken when they are exceeded, and their technical bases.
- How worker intakes are determined by measurements of the concentrations of airborne radioactive materials in the workplace. Specifically, the procedures will address how airborne concentrations of radioactivity are measured; how airborne concentrations are converted to determine intakes; action levels for a worker's intake based on dose, and actions to be taken when they are exceeded; and action levels for a worker's intake based on chemical toxicity if soluble uranium is present in the work area.
- How worker intakes, for an adult, a minor, and a declared-pregnant woman are determined using any combination of the measurements above.
- How worker intakes are converted into committed effective dose equivalent (and organ-specific committed dose equivalent), Including how intake of radioactivity by a DPW will be converted into dose to the embryo/fetus.

Commented [JM97]: Rev. 3.2 to Rev. 4: Changes made to ensure consistency with DP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

6.7 Declared Pregnant Woman Exposure Policy

Based on recommendations of the NCRP and on regulatory requirements, controls are established for the protection of the embryo/fetus during a declared female workers pregnancy. These controls shall ensure compliance with regulatory requirements and protect the rights of the female worker.

Declaration of pregnancy is at the discretion of the woman (medical proof is not required). Any woman who does not declare her pregnancy shall be subject to the normal occupational dose limits and shall not be subject to special controls or treatment with respect to work assignments involving exposure to radiation even if she is pregnant. The ~~Licensee~~ licensee shall ensure the dose to the embryo/fetus of a declared pregnant woman does not exceed regulatory limits due to occupational dose during the entire pregnancy.

Commented [JM98]: Rev. 3.2 to Rev. 4: Editorial change (consistency in usage). This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

If internal monitoring for declared pregnant workers is determined to be necessary, procedures for determining dose to the embryo/fetus will be developed and implemented. Dose to the embryo/fetus will be determined based on guidance provided in Regulatory Guide 8.36 and ICRP Publication 88.

Commented [JM99]: Rev. 3.2 to Rev. 4: Editorial change (moved to appropriate section) was made per ALARA Committee comments. This change was added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

6.8 Summation of Internal and External Dose

Internal and external doses are summed whenever positive doses are measured. Procedures will be used to document the methodology for the summation of internal and external doses to workers and internal dose contribution from maternal intakes to the embryo/fetus of a declared pregnant worker. If internal and external monitoring is performed, RP procedures will be implemented that consider guidance provided in Regulatory Guides 8.7, Rev. 4, 8.34, Rev. 0, and 8.36, Rev. 0, as applicable. The following information will be addressed in these procedures:

- How the internal and external monitoring results are used to calculate TODE and TEDE doses to occupational workers.
- How internal doses to the embryo/fetus, which is based on the intake of an occupationally-exposed, declared-pregnant woman, will be determined.
- A description of the monitoring of the intake of a declared-pregnant woman if determined to be necessary.
- A description of the program for the preparation, retention and reporting of records for occupational radiation exposures.

Commented [JM100]: Rev. 3.2 to Rev. 4: This change was added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

~~6.8~~6.9 ALARA Dose Goals

As discussed in Section 4.3, ALARA dose goals will be set if individual monitoring is required. Until such time, the annual Administrative Dose Goals for the Site is effectively 100 mrem TEDE. ~~In cases where~~If the Administrative Dose Goals are exceeded without prior authorization, the RSO or designee shall investigate to determine the cause and prepare a written report to document the results of the investigation and any corrective actions taken or planned.

Commented [JM101]: Editorial change made per ALARA Committee comments.

Commented [JM102]: Rev. 3.2 to Rev. 4: Editorial change for consistency with the DP. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

~~6.9~~6.10 P ersonnel Exposure Reports

An annual report of the individual radiation dose received shall be sent to each worker who was issued individual dosimetry and/or was subject to the requirements for monitoring as specified in Section 6.1. When requested by an individual, a written exposure report shall be provided to each such individual within 30 days of the request or within 30 days of exposure determination, whichever is later.

Internal and external doses shall be summed whenever positive doses are measured. The dose to the lens of the eye, skin, and extremities are not included in the summation. Intakes through wounds or skin absorption shall be evaluated and, to the extent practical, accounted for in summation of internal and external doses independent of intakes by ingestion or inhalation.

~~6.10~~6.11 D osimetry Records

Records of individual monitoring shall be kept in accordance with 10 CFR 20.2106 and the ~~Trust~~ QAPP. These records shall be updated at least annually for any radiation monitoring data collected. All radiation exposure records shall use the units curie, rem, rad, or multiples thereof.

Records of doses received by individuals for whom monitoring was required pursuant to 10 CFR 20.1502, and records received during planned special exposures, accidents, and emergency conditions shall be maintained. These records must include the following, when applicable"

- The DDE to the whole body, lens dose equivalent, shallow-dose equivalent to the skin, and shallow dose-equivalent to the extremities;
- The estimated intake of radionuclides (10 CFR 20.1202);
- The CEDE assigned to the intake of radionuclides;
- The specific information used to assess the CEDE pursuant to 10 CFR 20.1204(a) and (c), when required by 10 CFR 1502;
- The TEDE when required by 10 CFR 20.1202; and
- The total of the DDE and the committed dose to the organ receiving that highest total dose. ~~and shall clearly and specifically indicate the quantities (e.g., DDE) and units (e.g., rem or mrem) of all recorded values.~~

Commented [JM103]: Rev. 3.2 to Rev. 4: Editorial change. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM104]: Editorial change per ALARA Committee comments.

Procedure RP-19, "Dosimetry Records," provides for the preparation, retention, and reporting of records of occupational dose. This procedure addresses: recordkeeping frequency (10 CFR 20.2106(b), recordkeeping format (10 CFR 20.2106(c), privacy protection (10 CFR 20.2106(d). RP-19 provides instructions for maintaining ~~Records~~ records of embryo/fetus ~~dose shall be maintained~~ with those of the mother, including the declaration of pregnancy (10 CFR 20.2106(f).

Commented [JM105]: Rev. 3.2 to Rev. 4: Change for consistency with the DP. The changes included in the Draft Rev. 4 reviewed by the NRC staff have been edited extensively.

Changes were made per ALARA Committee comments and to ensure consistency with regulatory requirements.

7.0 RADIATION PROTECTION INSTRUMENTATION

7.1 Calibration

Calibration of radiation monitoring, counting, and air sampling instruments shall be performed in accordance with the manufacturers' recommendation unless otherwise approved by the RSO. These calibrations shall be consistent with regulatory requirements.

The calibration frequency for portable radiation monitoring instruments and portable air sampling equipment shall be at least every 12 months. ~~Semi-portable (e.g., continuous) air monitors) and fixed (e.g., count room/laboratory instrumentation, portal monitors) instrumentation~~ Benchtop smear/sample instrumentation shall be calibrated at least annually.

Calibration of radiation protection instruments is performed by an approved vendor except for air samplers. Air sampler flow rate indicators are calibrated in accordance with manufacturer's recommendation using a reference air flow calibrator (calibrated annually by an approved vendor). The air sampler flow rate indicator is adjusted as necessary to ensure reported values are correctly stated and valid under the actual operating conditions of the air sampler. Detailed instructions for air sampler calibrations are provided in procedures.

~~As discussed in Section 13.0, instruments~~ Instruments used to perform release surveys must be calibrated using National Institute of Science and Technology (NIST) traceable, or equivalent, standards for energies and geometries similar to material being released. The energy dependence of the instruments to alpha, beta, and gamma radiation, as applicable, shall be known and documented.

Commented [JM106]: Rev. 3.2 to Rev. 4: Change made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

Commented [JM107]: Rev. 3.2 to Rev. 4: Change made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

Commented [JM108]: Edit made per ALARA Committee comments.

7.2 Operation and Response Tests

Operation and response tests of radiation monitoring, counting, and air sampling instruments, shall only be performed by personnel trained in the use of the instrument and following approved procedures. ~~Desk instructions may be used to provide guidance on certain aspects of operation and response tests.~~ At a minimum, on a daily basis, prior to use, each radiation protection instrument shall be subject to the following:

- The instrument and detector are in good physical condition.
- Verification of current calibration.
- Checking the battery, if applicable, and replacing the battery, if necessary.
- Source check.
- Background determination.

Detailed instructions for each radiation protection instrument on operation and response tests are provided in radiation protection procedures.

7.3 Maintenance and Repair

Individuals authorized by the RSO may perform routine maintenance and limited field repairs, such as replace batteries, cables, or mylar windows. Other ~~Maintenance~~ maintenance and repair of radiation protection instrumentation shall be performed by an approved vendor. All maintenance and repair affecting calibration shall be documented.

7.4 Quality Control/Quality Assurance

Quality Control (QC) measures for instruments shall be established and maintained to ensure reliability of counting results and sensitivities. ~~Quality Assurance for laboratory instrumentation~~

Commented [JM109]: Rev. 3.2 to Rev. 4: Change made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

Commented [JM110]: Rev. 3.2 to Rev. 4: Change made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

Commented [JM111]: Rev. 3.2 to Rev. 4: Change made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. Provisions added as Section 7.5 that are not applicable to current activities are shown in PURPLE font. Note that the last two sentences at the end of the new section 7.5 remain applicable for Site activities.

In 7.5, changes per ALARA Committee comments removed the reference to "maintenance facilities" as there are no such facilities planned for the Cimarron Site. Procedures address instrument storage, calibration, and maintenance.

~~shall be proceduralized and consistent, to the extent practicable, with the requirements of NRC Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) – Effluent Streams and the Environment.".~~

7.5 Radiation Protection Instrumentation Inventory

Table 7-1 provides a list of equipment available to perform radiological surveys at the Site. Minimum quantities that need to be available when groundwater processing commences are provided for each instrument. The specified quantity may be reduced when an instrument is sent for calibration or repair. The RSO or designee will determine if there is a need to rent or purchase additional instruments when an instrument is being calibrated or repaired.

Radiation protection instrumentation and exempt quantity check sources will be stored in a secure storage area at the Western Area Treatment Facility.

Procedures provide implementing requirements for the program and instructions for using specific instruments, including the following information:

- Instrumentation storage, calibration, and maintenance for instruments used in field surveys, including analyses of smears and air samples collected during surveys
- MDC or MDA (at the 95 percent confidence level) for each type of radiation to be detected, as appropriate
- Instrumentation storage, calibration, and maintenance for instruments

NOTE:

1. The minimum detectable activity (MDA) for portable survey instruments is calculated by the following equation:

$$MDA = 3 + 3.29\frac{\sqrt{R_b T_s (1 + {}^{T_s}/_{T_b})}}{E \times T_s}$$

Where:

R_b is background count rate (counts/minute)
T_s is sample count time (minutes)
T_b is background count time (minutes)
E is instrument efficiency (counts/disintegration)

This equation is equivalent to Eq 3-11 of NUREG-1507. The surface efficiency is taken into account in the determination of the instrument efficiency. The following surface efficiencies factors are used in the development of the instrument efficiency:

- Alpha emitters – 0.25
- Beta emitters – 0.5
- Gamma emitters – 1.0

A surface efficiency factor is not applied to measurements of wipe sample or air samples.

2. For air sampling, the equation above is adjusted to account for the volume of air sampled. The minimum detectable concentration (MDC) for air sampling is calculated by the following equation:

$$MDC(\frac{\mu Ci}{mL}) = \frac{\frac{3}{T_s} + 3.29\sqrt{\frac{R_b}{T_s} + \frac{R_b}{T_b}}}{EVC}$$

Where:

R_b is background count rate (counts/minute)
T_s is sample count time (minutes)
T_b is background count time (minutes)
E is instrument efficiency (counts/disintegration)
V is Volume of air of air sampled (mL)
C is conversion of µCi to dpm (i.e. 2.22E+06)

For the Ludlum 3030E, the typical minimum detectable activity, for a one-minute count, is 16 dpm for alpha (Th-230) and 60 dpm for beta (Tc-99) or 7.2E-06 µCi and 2.7E-05, respectively. In the case of a four-hour air sample taken at 56 Lpm, the alpha MDC is 5.4E-13 µCi/mL and beta MDC is 2.0E-13 µCi/mL.

Table 7-1

Radiation Protection Instrument List

Manufacturer	Model	Probe	Min. Quantity	Description
Ludlum	12	44-9	2	Instrument Type: Handheld analog ratemeter with a GM pancake-type detector. Use: Contamination surveys, equipment and materials restricted release, personnel frisking. Ranges: 0-500 cpm; 0-5,000 cpm; 0-50,000 cpm; 0-500,000 cpm Counting Modes: Ratemeter. Alarm Set Point: N/A
Ludlum	19	N/A	2	Instrument Type: Gamma micro-R meter (0 to 5000 µR/hr). Use: Low-level gamma dose rate measurements. Ranges: 0-25 µR/hr; 0-50 µR/hr; 0-250 µR/hr; 0-500 µR/hr; 0-5,000 µR/hr; Counting Modes: Ratemeter. Alarm Set Point: N/A
Ludlum	2360	43-93	3	Instrument Type: Alpha-Beta Ratemeter, Scaler, and Data Logger with a dual phosphor scintillation probe. Use: Contamination surveys, material and equipment unrestricted and restricted release, personnel frisking. Ranges: 0-500 cpm; 0-5,000 cpm; 0-50,000 cpm; 0-500,000 cpm Counting Modes: Ratemeter, scaler, data logger. Alarm Set Point: N/A
Ludlum	3030E	43-10-1	1	Instrument Type: Dual channel, scaler-type sample counter with a dual phosphor detector. Use: Alpha and beta smear counting, air sample analysis. Ranges: Counting Modes: Count times are specified by procedure. Alarm Set Point: N/A

Manufacturer	Model	Probe	Min. Quantity	Description
Ludlum	2221	44-10	2	Instrument Type: Handheld ratemeter and scaler with an analog display for viewing the count rate with a 2" X 2" NaI(Tl) scintillator. Use: Walk-over (qualitative) surveys. Ranges: 0-999,999 counts Counting Modes: cpm and dpm, data logging Alarm Set Point: Not used.
Air Sampling Equipment				
Manufacturer	**Model**	**Filter Head**	**Min. Quantity**	**Description**
RADEco	AVS-28A	2500-42	2	Portable, low volume, continuous flow air sampler with a 47 mm diameter open face filter head Air Flow Rate: 15-100 Lpm Elapsed Time Meter: 99,999 hours and 59 minutes

QC for instruments shall be consistent with the manufacturer's instructions and be consistent with regulatory requirements.

Review and evaluation of instrumentation operability shall be performed on an on-going basis by the RSO or designee.

8.0 ACCESS CONTROL

8.1 Section Overview

This section provides the access control requirements for entry into and exit from RAs. Access control is designed to ensure that individuals have appropriate qualifications, training, and authorization for entry. Access control requirements are applicable to personnel, contractors and visitors who enter RAs. RAs are areas within the Site boundary for which access is controlled for the purpose of protecting individuals against undue risk from exposure to radiation and/or radioactive materials.

The tentative designation of Restricted Areas during initial groundwater treatment are provided in the following figures:

- Figure 8-1: Western Area Treatment Facility
- Figure 8-2: BA#1 Treatment Facility (If Phase II is implemented)

NOTE: These figures are annotated versions of drawings taken from the Decommissioning Plan. Restricted Areas will be periodically reviewed and may be expanded, reduced, or reconfigured based on RSO evaluation of potential exposure to radioactive material. Additional areas may be designated as Restricted Areas if appropriate. The RPP will be updated accordingly.

RAs will be established based on the potential for accumulating radioactive material greater than ten times the 10 CFR 20 Appendix C quantities or requiring posting as Radiation Areas, High Radiation Area, Contaminated Area, or Airborne Radioactivity Areas. No High Radiation Areas are anticipated based on the groundwater treatment facility design. Documentation of RAs and any changes to designated RAs shall be maintained as a decommissioning record.

~~This document must be verified with Project Manager~~Verify version is current prior to use

Commented [JM112]: Rev. 3.2 to Rev. 4: These changes were provided in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. These provisions do not apply to current Site activities and are shown in GRAY HIGHLIGHTED TEXT.

Commented [JM113]: Change made per ALARA Committee comment. Calculations based on conservative resin loading assumption provided in Appendix do not indicate that Radiation Area and certainly no High Radiation Area postings will be required.

Commented [JM114]: Rev. 3.2 to Rev.4: Clarified that RA designations must be maintained as a decommissioning record which is necessary for ultimate development of the License Termination Plan. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

8.2 Restricted Area Access Controls

Only properly trained or escorted personnel shall be permitted inside any RA. Personnel who enter RAs may be required to wear dosimetry. RAs include Radioactive Materials Areas, Radiation Areas, High Radiation Areas, Contaminated Areas, and Airborne Radioactivity Areas. RAs can be controlled through the use of guards, barriers, fences, signs, gates, or doors.

RA boundaries shall be defined by the use of postings, barriers, walls, tape, ropes, markings, or locked doors. A log of personnel entry and exit to any RA, other than Radioactive Material Areas, at the Site will be maintained by the RSO or designee. A log of personnel entry into areas posted solely as Radioactive Materials Areas is not required.

8.3 Posting and Labeling Requirements

Posting of areas within each RA shall be performed in accordance with 10 CFR 20 Subpart J. Containers of radioactive materials shall be labeled in accordance with 10 CFR 20.1904. Exceptions to posting requirements found in 10 CFR 20.1903 and exceptions to labeling requirements found in 10 CFR 20.1905 shall be approved by the RSO or designee.

Signs used for posting radiological areas within an RA shall include the wording provided in Table 8-1 when the associated requirements are expected to be encountered or expected to be encountered:

Commented [JM115]: No change. Citation was incorrectly presented in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM116]: No change. Citation was incorrectly presented in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM117]: Rev. 3.2 to Rev. 4: Editorial change. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Table 8-1

Radiological Posting Requirements

POSTING WORDING	REQUIREMENT
"CAUTION, RADIATION AREA"	Accessible area in which radiation levels could result in an individual receiving 5 mrem in one hour 30 cm from the radiation source or surface that the radiation penetrates.
"CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA"	Accessible area in which radiation levels could result in an individual receiving ~~5~~ 100 mrem in one hour 30 cm from the radiation source or surface that the radiation penetrates.
"CAUTION, AIRBORNE RADIOACTIVITY AREA" or "DANGER, AIRBORNE RADIOACTIVE MATERIALS AREA"	Licensed airborne radioactive materials in a room, enclosure, or area exists in concentrations exceeding the DACs specified in 10 CFR 20 Appendix B, Table I, or when an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6% of the ALI or 12 DAC–hours.
"CAUTION, CONTAMINATED AREA"	Accessible area in which removable contamination levels exceed 1,000 dpm/100 cm^2 beta/gamma contamination or 1000 dpm/ 100 cm^2 alpha contamination.
"CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)"	Areas or rooms in which there is used or stored an amount of licensed radioactive material exceeding 10 times the quantity of such material in 10 CFR 20 Appendix C.

Commented [JM118]: Rev. 3.2 to Rev. 4: Editorial change (removed underline). This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM119]: Rev. 3.2 to Rev. 4: Correction of dose rate defining the threshold for posting an HRA. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM120]: Rev. 3.2 to Rev. 4: Correction to indicate that CAs are posted based on removable contamination, which does not include fixed contamination. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Figure 8-1

Western Area Treatment Facility

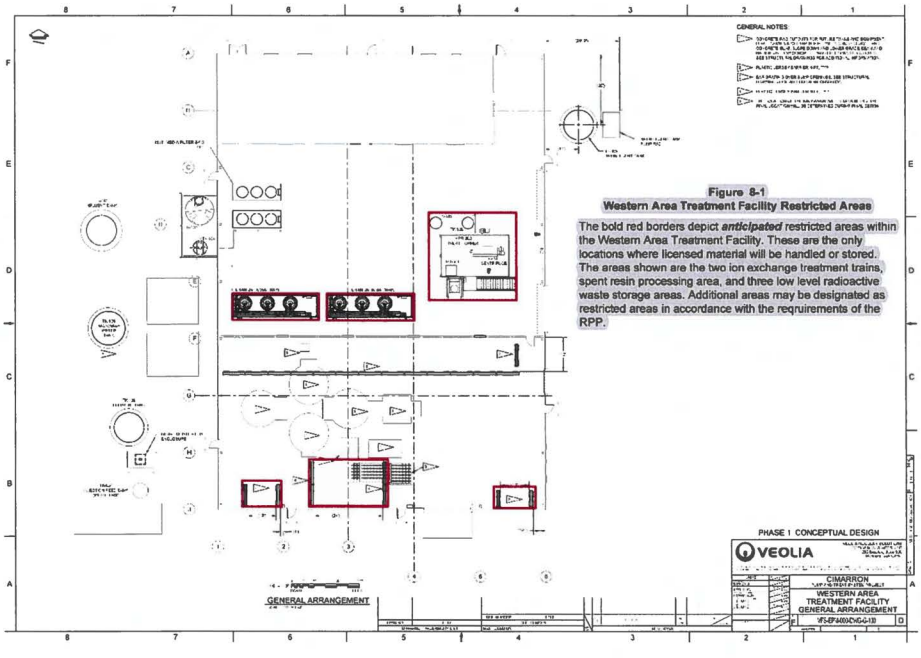


Figure 8-1
Western Area Treatment Facility Restricted Areas

The bold red borders depict ***anticipated*** restricted areas within the Western Area Treatment Facility. These are the only locations where licensed material will be handled or stored. The areas shown are the two ion exchange treatment trains, spent resin processing area, and three low level radioactive waste storage areas. Additional areas may be designated as restricted areas in accordance with the requirements of the RPP.

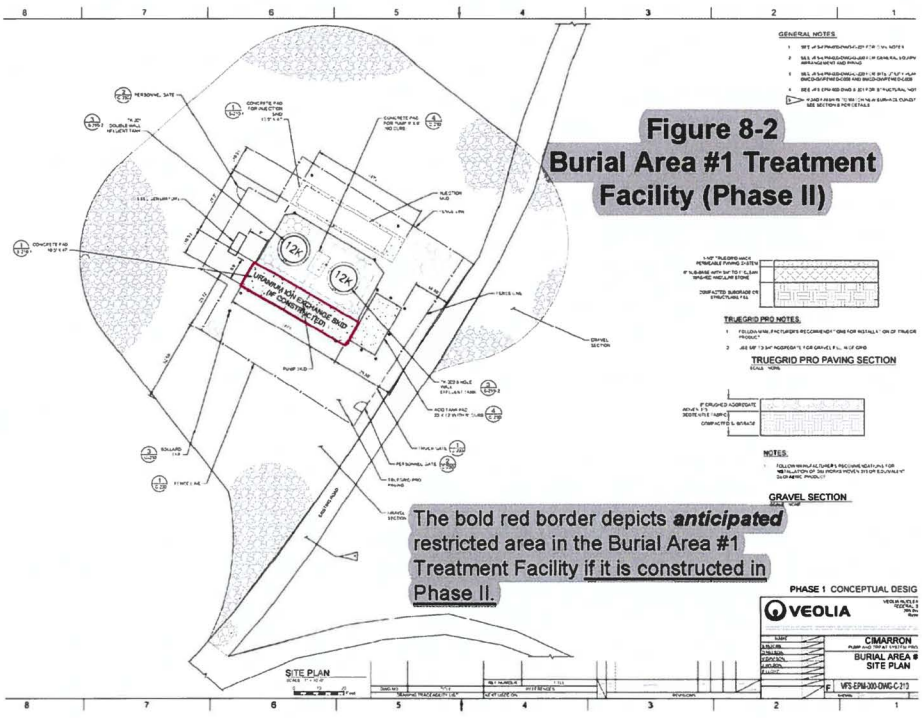
Figure 8-2

BA#1 Treatment Facility

(This figure is applicable if Phase II of Site decommissioning is undertaken. The BA#1 Treatment Facility will not be constructed during Phase I of the DP.)

Commented [JM121]: Change made per ALARA Committee comments.

Commented [JM122]: Rev. 3.2 to Rev. 4: Figures 8-1 and 8-2 have been updated from those that were provided in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. These figures do not apply to current Site activities and are shown in GRAY HIGHLIGHT.



9.0 RADIOLOGICAL WORK CONTROLS

9.1 Section Overview

Radiological work within RAs is controlled through two mechanisms: Site procedures and Activity Plans.

- Site procedures include quality assurance procedures, radiation protection procedures, sampling and analysis procedures, operations and maintenance procedures, waste management procedures, etc. Site procedures cover routine work or repetitive tasks that may include radiological work. Any necessary radiological controls are included in Site procedures.
- Activity ~~plans~~ Plans cover ~~specific~~ non-routine work activities and include information on the conditions that exist in the work area and radiological and non-radiological safety requirements. To ensure compliance with the RPP and regulatory requirements, Activity Plans involving radiological work must include the information identified in Section 9.2.

Work within posted ~~Radiation Areas,~~ High Radiation Areas, Airborne Radioactivity Areas, and Contaminated Areas, or requiring the use of respiratory protection or protective (i.e., anti-contamination) clothing shall be controlled through the use of an Activity Plan unless specifically authorized by the RSO or designee. Workers entering any RA, other than Radioactive Materials Areas, shall sign in daily on the sign-in sheet maintained in the Site Office or at the location of the routine activity.

Commented [JM123]: Change made per ALARA Committee comments. Activity Plans cover non-routine work. Routine work is covered by procedures.

Commented [JM124]: Rev. 3.2 to Rev. 4: Format change. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM125]: Change made per ALARA Committee comments. If routine work is encountered in Radiation Areas, then procedures will address radiation protection requirements. Non-routine work will still require and Activity Plan.

9.2 Activity Plan Requirements

The Activity Plan job description and job location shall be consistent with the activities or task to be performed. The Activity Plan shall identify potential radiological hazards, methods to address radiological hazards, and protective equipment needed for the work. Activity Plans shall, as a minimum, include:

- A description of the work,
- Anticipated radiological conditions,
- Reference to applicable radiation protection procedures,
- Radiation safety requirements,
- Required personal protective clothing and equipment,
- Radiological survey and/or monitoring requirements,
- Radiation safety ~~Training~~ training requirements,
- Special radiation protection sampling requirements.

Commented [JM126]: Editorial clarification per ALARA Committee comments.

Commented [JM127]: Editorial clarification per ALARA Committee comments.

Commented [JM128]: Editorial clarification per ALARA Committee comments.

9.2.1 *Activity Plan Approval/Closeout*

Activity Plan approval and closeout is addressed in the QAPP and implementing procedures.

9.2.2 *Activity Plan Training*

Training and qualifications for individuals working under an Activity Plan are addressed in the QAPP. All Radiation Workers operating under an Activity Plan are required to review and comply with the ~~measures required by the~~ Activity Plan.

Commented [JM129]: Rev. 3.2 to Rev. 4: Editorial correction (missing space). This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM130]: Editorial change per ALARA Committee comments.

9.2.3 *Record Keeping*

~~The QAC is responsible for maintaining the Activity Plan and all related documents in accordance with QA procedures~~Activity Plan records are maintained in accordance with the QAPP.

Commented [JM131]: Editorial correction per ALARA Committee comments.

9.3 Receipt of Potentially Contaminated Tools, Equipment, Parts, and Material

Commented [JM132]: Section 9.3 was incorporated into Rev. 3.1. This section was not provided in the Draft Rev. 4 reviewed by the NRC staff.

~~9.3.1~~ Tools, equipment, parts, and material that have been used at oil and pipeline facilities and sites may be contaminated with naturally occurring radioactive material (NORM) or other radioactive material used as tracers. Qualified individuals shall perform receipt surveys to document the radiological conditions of all tools, equipment, parts and equipment potentially used at oil and pipeline facilities or sites prior to use at the Cimarron Site.

~~9.3.2~~ Procurement specifications for tools, equipment, parts, and material previously used at oil and pipeline facilities and sites shall require thorough cleaning of these procured items prior to shipment to the Site.

~~9.3.3~~ The Site cannot receive tools, equipment, parts, and material that are potentially contaminated with radioisotopes other than NORM or uranium.

Commented [JM133]: Rev. 3.2 to Rev. 4: Editorial correction (comma added).

~~9.3.4~~ If the receipt survey detects fixed or removable contamination or if dose rates two times background are detected, these items shall be segregated and the RSO and Trustee PM notified. The RSO and Trustee PM will determine disposition of these items.

Commented [JM134]: Rev. 3.2 to Rev.4: Format changes removing subsection numbers consistent with DP formatting.

10.0 RADIATION PROTECTION SURVEYS

10.1 General Requirements

Radiological ~~Survey~~ survey information is used to:

- assist in the development of Activity Plans,
- inform individuals of the radiological conditions/hazards in the area,
- evaluate the need for area postings,
- identify needed personnel protective equipment,
- verify the effectiveness of engineering and administrative controls,
- ensure personnel exposures to radiation and radioactive materials are maintained ALARA,
- determine the decommissioning status of material, equipment, and/or environmental media, and
- determine compliance with regulatory and/or license criteria.

Radiation and contamination surveys, air sampling, and sample collection will be performed as appropriate to assess radiological conditions and to establish specific radiological controls for work to be performed. Radiation protection surveys that are required by the license shall be conducted in accordance with specified requirements.

Two types of dose rates measurements may be used. Contact dose rates are used to locate and identify radiation levels detected within 1 cm (0.5 in) from the surface being surveyed. General area dose rates are used to identify radiation levels detected at approximately 30 cm (1 ft) from the surface being surveyed.

Surveys for removable and direct contamination are performed to detect and/or quantify radioactive contaminants. Removable contamination surveys ~~should be~~are performed when ~~necessary~~ appropriate to ensure that radioactive contamination has not inadvertently spread.

Commented [JM135]: Editorial changes per ALARA Committee comments.

NRC Regulatory Guide 8.25, "Air Sampling in the Workplace" provides an acceptable method for meeting certain survey and dose assessment requirements of 10 CFR 20. Air samples shall be collected whenever the airborne radioactivity levels are expected to exceed ~~10~~ 1 percent of the DAC as listed in Appendix B, Table 1 "Occupational" of 10 CFR 20.

Commented [JM136]: Rev. 3.2 to Rev. 4: Change made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

Breathing zone air sampling shall be performed whenever respiratory protection devices are worn by personnel. If air sample data indicates a measured level greater than 40 DAC-hours in any shift or operation, whichever is shorter in time duration, the RSO or designee shall conduct an investigation and ~~take~~ identify corrective actions to that are needed to reduce airborne ~~contamination~~ radioactivity levels. The RSO or designee shall work with the Activity Leader to implement the necessary corrective actions for reducing airborne radioactivity levels.

Commented [JM137]: Rev. 3.2 to Rev. 4: Changes made to clarify process for addressing airborne radioactivity levels exceeding the trigger discussed. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Air sample collection media shall be appropriate to address the radionuclide mixture(s) present. The analysis of air samples (including preliminary field screening) shall be performed in a timely and expeditious manner.

10.2 Routine Surveys

Routine radiological monitoring shall be performed to ensure that surveys are performed at a frequency that is consistent with the existing and potential hazards and activities planned in the RAs. The following radiation dose rate and contamination survey frequencies ensure area hazards are adequately characterized:

- Weekly, in office space located in areas surrounding or adjacent to RAs, other than Radioactive Materials Areas, where the potential exists for external radiation exposure or contamination spread.
- Weekly, in routinely occupied RAs, other than Radioactive Materials Areas.
- Monthly, or upon entry, if entries are less frequent than monthly, for Radioactive Materials Areas.

During routine contamination surveys, if contamination levels exceed action levels discussed in Table 12-1, the RSO or designee will determine the cause for the contamination and determine appropriate corrective actions, including decontamination, increasing the frequency of surveys, need for additional engineering or administrative controls, etc.

10.3 Job Coverage Surveys

Job-coverage surveys are specified in Activity Plans and routine operations procedures. The types of radiological surveys (i.e., radiation, contamination, airborne radioactivity), frequency (e.g., number of times during a shift, at a specific step in the activity, etc.), and location are determined by the RSO or designee based on the radiological hazards associated with the work to be performed. Special survey requirements may be provided by the RSO or designee, when needed.

Commented [JM138]: Rev. 3.2 to Rev. 4: These changes were made in response to supplement information requested during NRC staff review of Draft Rev. 4.

Editorial changes per ALARA Committee comments have been made.

Commented [JM139]: Rev. 3.2 to Rev. 4: Format change in section numbering to reflect new section insertion.

~~10.3~~10.4 nvestigative Surveys

Investigative surveys shall be performed as soon as practicable following the discovery or indication of abnormal radiological conditions.

10.5 Final Status Surveys

Final status surveys will be required to support license termination. During the post-remediation monitoring period, a final status survey plan will be developed and submitted for approval by the NRC.

~~10.4~~10.6 ersonnel Contamination Monitoring

P

Personnel shall routinely perform contamination monitoring (frisking) prior to exiting RAs that have the potential for spreading contamination or per Activity Plan or procedural requirement. At a minimum, hands and feet shall be frisked when exiting these areas. Documentation of routine personnel frisking is maintained in field notes maintained by the HP Technician. Notification of the RSO or designee is required when personnel contamination in excess of twice the background count rate is detected. RP procedures provide specific instructions approved by the RSO for performing, documenting, and reporting personnel contamination monitoring reports.

Commented [JM140]: Rev. 3.2 to Rev. 4: These changes are to ensure consistency with the DP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff. These provisions do not apply to current Site activities. Accordingly, they are shown in GRAY HIGHLIGHTED TEXT.

Correction made per ALARA Committee comments. The "License Termination Plan" is under the License Termination rule; the Site is under the SDMP.

Commented [JM141]: Format change in section numbering to reflect new section insertion.

~~10.5~~10.7 rea Radiation Monitoring

A

The RSO or designee will determine when and where area radiation monitoring is appropriate. Area radiation monitoring may be performed using either passive devices, such as dosimeters (e.g., thermoluminescent or optically stimulated luminescent) or real-time radiation monitors. Dosimeters are posted at the Cimarron Site to confirm that no occupational worker is likely to receive 100 mrem DDE in a year.

Commented [JM142]: Rev. 3.2 to Rev. 4: Changes are made to clarify the Site's policy with respect to personnel contamination monitoring. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM143]: Format change in section numbering to reflect new section insertion.

~~10.6~~10.8 A

ir Monitoring

Air monitoring is required whenever airborne radioactivity levels are expected to exceed ~~10~~1 percent of the DAC as listed in Appendix B, Table 1 "Occupational Values" of 10 CFR 20. Considering the types of work activities described in the Decommissioning Plan, airborne suspension of licensed radioactive material is not anticipated to generate airborne radioactivity approaching 1% of a DAC. However, the Decommissioning Plan requires that General Area (GA) air sampling, using either low or high volume portable air samplers, will be performed throughout the resin unloading and packaging process for at least the first three resin exchanges. Lapel samplers will be used in conjunction with the GA samplers to demonstrate that GA samplers are representative of the air breathed by workers. Following analysis of the air sampling results from each of these resin exchanges, the RSO will determine the need for and frequency of additional air sampling and types of air sampling to be performed (e.g., GA or lapel). In addition, the same air sampling regime will be conducted during the first three operations involving loading biomass from the filter press into the cart for disposal. Following analysis of the air sampling results from each of these biomass loading operations, the RSO will determine the need for and frequency of additional air sampling and types of air sampling to be performed (e.g., GA or lapel).

NOTE: A prospective evaluation of potential intake during groundwater processing operations was performed. The calculation supporting this evaluation is provided in Appendix A of the RPP. This calculation was based on the 60% design of the groundwater treatment system and supported the decision that internal monitoring (e.g., bioassay) and respiratory programs would not be needed at the Site. The evaluation also informed the development of the air sampling

Commented [JM144]: Format change in section numbering to reflect new section insertion.

Commented [JM145]: Rev. 3.2 to Rev. 4: This change was made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

program described in Section 10.8. The supporting calculation will be reviewed at 90% design, updated, if necessary, and re-evaluated to determine if the RPP should be updated. In addition, periodically through groundwater processing, the supporting calculation will be reviewed to ensure it reflects operational experience and to determine if changes to the RPP are necessary.

The results of this evaluation indicate that continuous air monitors are not needed as the potential for an individual to be exposed to 40 DAC-hours in week does not exist at the Cimarron Site. Updates to this calculation are reviewed to ensure this conclusion remains applicable.

Selection of air samplers is based on the following criteria:

- GA air sampling will be accomplished by using portable air samplers, as discussed, above. Sampling heads will be placed within the breathing zone to ensure that the air sample is representative of the air breathed by the individual worker.
- GA air samplers typically sample at a rate of approximately 3-25 liters per minute (lpm) (less than 1 cubic foot per minute (cfm)) for a low volume sampler to 1900 lpm (70 cfm) for a high volume sampler. Based on the nature of the low enriched uranium encountered, the detection capability of the air sampling equipment and associated radiological analysis (e.g., sample counting) will be used to determine the total volume of air needed to be collected to ensure that 1% of the DAC. The enrichment of the uranium will be based on either the actual enrichment being collected on the resin or a conservative basis (i.e. 4%). This calculation will be documented in a Site procedure or technical basis document. As the actual enrichment of recovered uranium in each area changes (i.e., WA or BA1), the 1% DAC value may be recalculated Minimum collection

times will be determined so adequate sensitivities are achieved for a given monitoring period.

- The need for air sampling will be prospectively determined based on the final process system design and potential for generation of airborne radioactivity. Due to the chemical and physical nature of the uranium-bearing media (e.g., water and moist ion exchange resin), minimal, if any airborne radioactivity is expected to be generated. Engineering and physical controls incorporated into the process equipment design will also be considered in determining the need for air monitoring.
- The frequency of calibration of the flow meters on the air samplers will be based on manufacturers' recommendations (typically annually).
- Specific action levels (i.e., specific projected or actual airborne radioactive material concentration levels) will be developed for assigning respiratory protection, collecting bioassay samples, and stopping work.
  - Respiratory protection shall be considered if a worker's intake is expected to exceed 40 DAC-hours in a week.
  - A bioassay program must be implemented for any worker whose intake is expected to exceed 10% ALI or 40 DAC-hours in a week.
  - Work shall be ceased if air sampling results show greater than 10% DAC is present. The RSO shall evaluate the situation and provide recommendations for restarting work for the approval of the EPM PM.

Air samples will be counted on-site using existing laboratory bench top scalers (e.g., Ludlum Model 3030 or similar equipment). MDAs based on various sample count times will be calculated and used to determine the sample volume needed to detect less than 1% DAC for 4%

enriched uranium. This information will be documented and used to determine the minimum sampling time for GA and lapel air samplers.

~~10.7~~10.9 S urvey Training ~~and Documentation~~

Surveys shall be performed by personnel who have been trained commensurate with the type of surveys to be performed. Training will address the following, as applicable:

- Appropriate instrumentation to be used,
- Operational and response checks for survey instrumentation,
- Survey methods, recording of data,
- Calculations, data evaluation, and
- Action levels.

~~10.8~~10.10 Survey Documentation

Radiation, ~~and~~ contamination, and airborne radioactivity surveys performed for compliance purposes, or radiation and contamination surveys performed to demonstrate that decommissioning criteria have been met, shall be documented and maintained in accordance with 10 CFR 20, Subpart L and the QAPP.

Commented [JM146]: Rev. 3.2 to Rev. 4: These changes were made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. These changes do not apply to current Site activities. Accordingly, the changes are shown in PURPLE font.

Note includes editorial changes per ALARA Committee comments.

Commented [JM147]: Change made in response to a comment provide in the 2020 audit of the radiation protection program. Combining training and documentation was not the intention of previous changes to this section. The change corrects this error. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM148]: Format change in section numbering to reflect new section insertion.

Commented [JM149]: Changes made in response to a comment provided in the 2020 audit of the radiation protection program. Language clarified with respect to types of radiological survey records maintained. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

11.0 RADIOACTIVE MATERIALS CONTROL

11.1 Section Overview

This section addresses radioactive material controls employed at the Cimarron Site. This section includes requirements related to the following:

- Material Control and Accountability
- Receipt, Labelling, and Storage of Radioactive Material
- Shipment and Transfer of Radioactive Material
- Controls for Radioactive Sources.
- Theft or Loss of Radioactive Material ~~to control the spread of contamination in RAs, prevent inadvertent release of radioactive material to Unrestricted Areas, protect members of the public and workers, and minimize the amount of radioactive waste generated during decommissioning operations.~~
- ~~This section of the RPP addresses receipt, labeling, storage, shipment, transfer, controls, theft and loss of radioactive materials.~~

Commented [JM150]: Changes made per ALARA Committee comments. These changes were made to reflect what requirements are contained in this Section of the RPP.

11.2 Material Control and Accountability ~~(Reserved)~~

The potential for a nuclear criticality event during the proposed decommissioning program at the Cimarron Site is extremely unlikely because both the concentration and the enrichment of uranium in material generated during decommissioning are low. Treatment of groundwater to remove the enriched uranium from groundwater will result in a more concentrated form of uranium on the ion-exchange resin. The accumulation of enriched uranium on resin has been evaluated by an analysis to demonstrate nuclear criticality safety.

The RSO is responsible for evaluating proposed changes to the groundwater treatment system and/or process in consultation with an individual with experience in nuclear criticality safety evaluation. The RSO will review and approve any changes made to the groundwater treatment system and will periodically conduct inspections of the system and operations to confirm that process and administrative controls assure that the license possession limits are not exceeded.

All personnel responsible for the operation of the process systems will receive training on the potential for nuclear criticality and the need to comply with the controls established to maintain nuclear criticality safety during treatment and processing operations. The training will address:

- Awareness of the significance of exceeding the basic parameters necessary to stay within the Nuclear Criticality Safety analysis which are:
  - Any measurement of an enrichment >7.33% U-235,
  - Any measurement of the U-235 concentration on the resin >8g/kg,
  - The need to assure that the U-235 concentration in packaged waste containers is <0.5g U-235 per kg of waste,
  - The need to assure that the process system inventory does not exceed 1,200 grams of U-235,
  - The need to assure that the total Site inventory does not exceed 0.5 effective kilograms of U-235, and
  - Any change in the storage of containers or process equipment that would result in a height >7 feet.
- Awareness that any measurement of an enrichment >5% requires downgrading action in accordance with the license possession limits.

- Awareness that all individuals are required to implement an immediate "stop work" response if any of the above listed parameters are violated.

  These necessary controls are addressed in the Material Control and Accountability procedures. If any of these parameters are exceeded, the Nuclear Criticality Safety analysis has been invalidated and it would be necessary to stop processing operations until either the analysis is redone and/or the situation corrected that led to the exceedance.

Administrative controls are implemented in Material Control and Accountability procedures to ensure that the SNM inventory complies with the following requirements:

- Uranium mass determinations will be based on analytical measurements using the ICP-MS (EPA 200.8) method to report the U-235 and U-238 mass concentrations.
- The enrichment values will be calculated using analytical measurements of U-235 and U-238. The enrichment of the uranium is calculated (ignoring the U-234 mass contribution) by:

  $E = M_{U\text{-}235} / (M_{U\text{-}235} + M_{U\text{-}238})$

  Where:

  E = the Uranium enrichment level in wt. % U-235

  M_i = the mass of the isotope in micrograms isotope per liter or gram of sample

- SNM mass contents of process lines transporting and influent tanks storing groundwater will be conservatively estimated based on reasonable concentrations and enrichments of the uranium. These components will contain minor quantities of SNM. These conservatively established mass values may be re-evaluated and revised as appropriate if

information is obtained that the difference in calculated mass of U-235 is significant to the mass inventory value.

- The SNM contents of resin vessels will be established based on the total flow of groundwater through the vessel and the difference between the input and output uranium concentrations of the flow. The enrichment of the SNM will be initially based on conservatively established values until analytical results provide actual enrichment values. The following points describe in greater detail the process for establishing the total U-235 inventory for the resin material:
  - During the initial system startup phase the sample analysis turn-around time will be reduced to obtain data on an expedited basis
  - Water samples for each treatment train will be taken from the influent and the effluent from each of the lead, lag and polish vessels
  - The enrichment of the uranium for each train will initially be the assumed values presented in Appendix O of the DP and will be revised when analytical results are obtained from samples of processed resin
  - The mass of U-235 added to each vessel will be calculated based on the total flow of water processed through the vessel for each time-period between sampling events times the difference between the influent and effluent water concentration for that vessel. The total inventory of the vessel is the sum of all mass determinations over the entire period the vessel has been in the treatment process
  - The total U-235 inventory of the resin material is the sum of the U-235 contained in:
    - all the resin vessels in all three treatment systems

- vessels containing spent resin if any are being stored while awaiting the blending process
- resin in the blending equipment
- packages of processed resin that have not been transferred to storage

- Once a vessel has been emptied of resin the inventory value for that vessel will be set to zero
- The minimum quantity of absorbent material to be blended with the resin to yield a fissile exempt, dry resin mixture will be calculated based on assumed enrichment and the uranium mass derived from process measurements (with safety factor)
- The resin from the lead vessel changeout will be blended with the absorbent and loaded into waste packages
- The sampling of the prepared resin waste will be performed in accordance with an approved sampling procedure
- Initially the SNM content of packages of waste will be based on process measurements. Upon receipt and validation of analytical data the SNM content of the packaged waste material will be finalized, the container inventory log updated, and the packages will be relocated to the "Ready-to-Ship" area of the Secure Storage Facility
- Waste containers which are awaiting final analytical data will be stored in an "In-Process" area within the Secure Storage Facility

- Once a package of waste has been determined to meet the transportation and waste disposal requirements, the SNM contents of the package will be removed from the "Mass

Inventory Log" and the package and SNM contents will be entered on the "Container Inventory Log."

- When a package is shipped to disposal the package and SNM contents will be removed from the "Container Inventory Log."

Commented [JM151]: Rev. 3.2 to Rev. 4: These changes ensure consistency with the DP. These changes were provided in Draft Rev. 4 reviewed by the NRC staff. These changes are not applicable to current Site activities and is shown on PURPLE font.

Editorial changes made per ALARA Committee comments.

11.3 Receipt, Labeling, and Storage of Radioactive Material

All radioactive materials shall be received in accordance with radioactive material license possession limits and 10 CFR 70.19. The individual responsible for radioactive material receipt shall ~~perform~~ ensure that all surveys ~~as~~ required by 10 CFR 20.1906 are performed and review shipment paperwork to ensure compliance with 49 CFR.

Commented [JM152]: Rev. 3.2 to Rev. 4: This change recognizes that the individual responsible for receiving RAM may not necessarily be qualified to perform the required surveys but is responsible for making sure they are done. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Each container of radioactive material shall be labeled as required by 10 CFR 20.1904.

Radioactive material shall be secured against unauthorized access or removal. Radioactive material storage areas shall be posted and controlled using appropriate barriers and radiological postings.

11.4 Shipment and Transfer of Radioactive Material

Radioactive Materials shipments shall comply with NRC (10 CFR) and U.S. Department of Transportation (49 CFR) regulations. Low-level radioactive waste shipments transferred for disposal shall be accompanied by a shipment manifest prepared in accordance with 10 CFR 20.2006. Radioactive material shall only be transferred to authorized individuals in accordance with the appropriate regulations in 10 CFR 20, and 10 CFR 70.

11.5 Controls for Radioactive Sources

The RSO shall approve all requisitions for radioactive sources and ensure that source inventories are performed on a quarterly basis. Radioactive sources shall be tested for leakage and/or contamination upon receipt and on a quarterly basis, except that any licensed sealed source is exempt from leak tests if the source contains less than 0.1 microcuries of plutonium or uranium, 100 microcuries of beta and/or gamma emitting radioactive material or 10 microcuries of other alpha emitting radioactive material. Leak testing and inventory of Exempt Quantity radioactive sources is not required; however, these sources should be stored in a secure area to prevent unauthorized removal or access.

Unless specifically authorized by the RSO, electroplated sources are not smear tested for leakage to prevent removal of radioactive material from the electroplating.

Commented [JM153]: Rev. 3.2 to Rev. 4: This change was made to clarify that the RSO may allow smearing of electroplated sources based on recent concerns with a potentially leaking electroplated source at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

The RSO shall approve locations for storage of radioactive sources. Radioactive source storage areas shall be secured against unauthorized removal or access of licensed radioactive material and posted per 10 CFR 20.1902.

~~Leak testing and inventory of Exempt Quantity radioactive sources is not required; however, these sources should be stored in a secure area to prevent unauthorized removal or access.~~

~~Electroplated sources are not smear tested for leakage to prevent removal of radioactive material from the electroplating.~~

Commented [JM154]: Editorial changes made per ALARA Committee comments.

11.6 Theft or Loss of Radioactive Material

Any individual who discovers that radioactive material is lost, stolen, or missing shall immediately notify the RSO. The RSO shall evaluate the physical and radiological

characteristics of the missing material and the potential hazards to workers and the general public, initiate an investigation to locate the material, and perform a root cause evaluation of the incident. The RSO shall determine the need for notifications to regulatory authorities and make notifications as necessary per 10 CFR 20.2201.

12.0 CONTAMINATION CONTROL

12.1 Section Overview

The purpose of contamination control is to prevent and/or minimize the spread of radioactive contamination to individuals, areas, and equipment. Control of radioactive surface contamination prevents or minimizes possible inhalation or ingestion of radioactive material by personnel, skin dose from small particles of radioactivity, and the spread to or build-up of radioactive material in the facility or environment from decommissioning operations. Controls to prevent the spread of contamination shall be proposed by the Activity Leaders and approved by the RSO or designee prior to implementation.

12.2 ~~General~~Contaminated Buildings and Equipment

Commented [JM155]: Editorial change made per ALARA Committee comments.

Radioactive contamination of buildings and equipment located within an RA shall be maintained below the removable contamination limit of 1,000 dpm/100 cm^2 alpha. In addition, Contaminated Area controls, including posting, shall be implemented whenever removable contamination in an Unrestricted Area exceeds 1,000 dpm/100 cm^2 alpha or 1,000 dpm/100 cm^2 beta-gamma. The Site incorporates the ALARA philosophy when selecting decontamination methods and practices.

As a general rule, decontamination is performed by working from areas of low contamination to areas of high contamination if possible. Decontamination materials should be limited to the minimum required for the task. All decontamination materials shall be collected, monitored, and properly dispositioned. Table 12-1 provides a summary of contamination action levels and associated actions to be taken.

Commented [JM156]: Rev. 3.2 to Rev. 4: This change was made in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

12.3 Contaminated Personnel

Decontamination of personnel shall be performed under the guidance of health physics personnel and shall incorporate good health physics practices and ALARA principles. An individual whose skin or personal clothing is found contaminated above background shall not exit an RA without prior approval of the RSO. Appropriate surveys and monitoring shall be performed to evaluate dose to the individual resulting from contamination.

12.4 Spill of Radioactive Material

A spill of radioactive material requires immediate actions which include:

- Stop the spill
- Warn other personnel
- Isolate the area
- Minimize radiation exposure
- Secure the area and stand guard (until otherwise direct by health physics personnel)

Supplementary actions should include the performance of radiological surveys in immediate and adjacent areas, including downwind.

Commented [JM157]: Rev. 3.2 to Rev. 4: The final "S" in SWIMS was missing. Change made for consistency with Radiation Worker Training. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

~~Groundwater Processing (Reserved)~~

12.5 Contamination Control During Groundwater Processing

Contamination control during groundwater processing involves both process operations and activities necessary to supply groundwater to the processing facility. This section of the RPP is intended to implement contamination control commitments identified in the DP. Other contaminated materials that will be handled, including the filtered suspended solids and

biodenitrification system waste, will have lower concentrations and are covered by the discussion of the resin material.

Subsurface soil will be brough to the surface during installation of injection and extraction trenches, monitoring wells, trenches for piping and utilities, etc. These soils have been previously released from license controls. Surveys shall be performed during these activities to determine if soil contamination is encountered. Survey requirements will be consistent with RP procedures and limits specified in associated Activity Plans to ensure compliance with license conditions.

Low-enriched uranium will be processed through ion exchange resins that will concentrate the uranium in the resins. The concentration of uranium on these resins represents a source of potential contamination. The following contamination controls ensure that contamination is contained and not spread throughout the processing facilities or across the Site.

- Influent piping contains low concentrations of uranium with little potential for generating contamination. Routine monitoring is performed during operations to ensure that contamination is controlled and not being spread at well heads where the groundwater is extracted. Connections to the water treatment systems are inspected and monitored to identify and repair leaks.
- Engineering controls are included in the design of the groundwater treatment system to contain contamination during ground water processing. Double walled tanks are used to contain the influent groundwater awaiting processing. Ion exchange resins are contained in stainless steel vessels. Spent resins are processed through a wet process that ensures airborne radioactivity is not generated. The spent resin is processed in an enclosed system. Spent resin is packaged as discussed in the DP. Procedures for contamination

monitoring and air sampling are provided to demonstrate the effectiveness of these engineering controls.

- Engineering controls are incorporated in the design to eliminate or minimize the potential for drips and leaks during sampling, resin vessel changeout, and spent resin processing. Protective clothing shall be prescribed for maintenance activities involving potential exposure to spent resins.
- Effluent from treatment systems must contain uranium at concentrations below drinking water standards, as demonstrated by discharge sampling requirements specified in the discharge permit issued by the Oklahoma Department of Environmental Quality. Leaks or unintentional releases of effluent do not constitute contamination control concerns.

The QAPP requires that only appropriately trained workers (Section 2.3) are permitted access to ~~Contamination~~ Contaminated Areas. Work performed in Contamination Areas will be performed in accordance with procedures that require measures incorporated into the design to prevent or contain drips, leaks, etc. are correctly implemented.

Commented [JM158]: Rev. 3.2 to Rev. 4: These changes were made for consistency with the DP. These changes were included in the Draft Rev. 4 reviewed by NRC staff. These changes do not apply to current Site activities and are shown in GRAY HIGHLIGHTED TEXT.

Includes editorial changes per ALARA Committee comments.

Commented [JM159]: Editorial change made per ALARA Committee comments.

Commented [JM160]: Rev. 3.2 to Rev. 4: These changes were included in the Draft Rev. 4 reviewed by NRC staff. These changes do not apply to current Site activities and are shown in GRAY HIGHLIGHTED TEXT.

Commented [JM161]: Editorial clarification per ALARA Committee comments.

Table 12-1

Contamination Action Levels

Commented [JM162]: Rev. 3.2 to Rev. 4: This table was provided in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4.

Location/Type of Contamination	Contamination Action Level	Actions to be Taken	Radiological Monitoring
Unrestricted Area – Removable Contamination	1,000 dpm/100 cm^2 beta/gamma or 1,000 dpm/100 cm^2 alpha	1. Post area/restrict access. 2. Investigate for spread and determine personnel affected. 3. Decontaminate the area and de-post, as appropriate. 4. Determine corrective actions to prevent recurrence, if necessary.	RSO or designee determines the need for increased frequency of contamination surveys.
Unrestricted Area – Fixed Contamination	1,000 dpm/100 cm^2 beta/gamma or 1,000 dpm/100 cm^2 alpha	1. Post area/restrict access. 2. Investigate cause and corrective actions. 3. Determine whether to decontaminate or implement controls to prevent spreading contamination.	RSO or designee determines the need for increased frequency of contamination surveys.
Restricted Area – Removable Contamination	1,000 dpm/100 cm^2 beta/gamma or 1,000 dpm/100 cm^2 alpha	1. Post area, if not already posted. 2. Determine source of contamination, if area was not posted and actions necessary to prevent further contamination spread. 3. Decontaminate, if appropriate.	RSO or designee determines the need for increased frequency of contamination surveys.

Location/Type of Contamination	Contamination Action Level	Actions to be Taken	Radiological Monitoring
Restricted Area – Fixed Contamination	1,000 dpm/100 cm^2 beta/gamma or 1,000 dpm/100 cm^2 alpha	1. Post area, if not posted. 2. Determine the source of contamination and necessary actions to prevent further contamination spread. 3. Decontaminate, if appropriate.	RSO or designee determines the need for increased frequency of contamination surveys.
Release of materials for unrestricted use	See Section 13.3	1. Decontaminate or dispose of as radioactive waste.	See Section 13.3
Personnel/clothing contamination	Detectable contamination (e.g. 2 times background) on clothing or skin	1. Decontaminate personnel in accordance with Section 12.3. 2. Decontaminate or discard contaminated personal clothing if unrestricted release criteria cannot be satisfied	1. See Section 12.3 regarding personnel contamination monitoring. 2. RSO or designee authorizes release of personal clothing, if appropriate.

13.0 ~~UNCONDITIONAL~~ RELEASE FOR UNRESTRICTED USE OF MATERIALS

13.1 Section Overview

Site personnel are authorized to ~~unconditionally~~ release tools, equipment, parts, and materials for unconditional use provided that radiation levels and surface contamination levels do not exceed the limits in ~~condition~~ Condition 27(c) of the license. Such surveys will be performed and documented by qualified individuals.

Tools, equipment, parts, and material that do not come into contact with subsurface soil or groundwater containing ~~licensed~~ radioactive material above the unrestricted release criteria do not require surveys prior to release from the Site.

13.2 Survey Instrumentation

Instruments used to perform ~~release~~ surveys for release for unrestricted use must be calibrated using NIST traceable, or equivalent, standards for energies and geometries similar to material being released. The energy dependence of the instruments to alpha, beta, and gamma radiation, as applicable, shall be known and documented.

13.3 Release Surveys of Materials

As provided in License Condition 27(c), the Site uses the unrestricted release criteria listed in the August 1987 "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for Byproduct, Source or Special Nuclear Material" for surfaces of buildings and equipment, and the October 23, 1981, BTP "Disposal or Onsite

Commented [JM163]: Editorial change per ALARA Committee comments.

Commented [JM164]: Editorial clarification per ALARA Committee comments.

Commented [JM165]: This is information that was incorporated into Rev. 3.1 but was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM166]: Rev. 3.2 to Rev. 4: These editorial changes are made for consistency with wording used in license condition 27(c). These changes were not included in the Draft Rev. 4 reviewed by the NRC staff.

Storage of Thorium or Uranium Wastes from Past Operations," for soils or soil-like material. The specific values are listed in paragraphs 13.3.1, 13.3.2, and 13.3.3.

Commented [JM167]: Rev. 3.2 to Rev. 4: This change was made to incorporate language provided in the Draft Rev. 4 reviewed by the NRC staff.

Release surveys will consist of direct (fixed + removable) and removable (smears) contamination monitoring. The Site is authorized to release materials provided that the direct and removable levels do not exceed the limits stated in the Trust license and summarized below. Such surveys will be performed and documented by qualified individuals.

Survey plans may be developed for the release of property or equipment associated with non-routine activities. Such survey plans will include the methods used to estimate uncertainty bounds for each type of instrument measurement.

Commented [JM168]: Rev. 3.2 to Rev. 4: This change was made to incorporate language provided in the Draft Rev. 4 reviewed by the NRC staff. This provision does not apply to current Site activities and is shown in GRAY HIGHLIGHTED TEXT.

13.3.1 *Surfaces of Buildings, Equipment, and Outdoor Areas*

- ~~Direct – 15,000 dpm/100 cm^2 alpha or beta/gamma, maximum over 1 m^2~~
- ~~Direct – 5,000 dpm/100 cm^2 alpha or beta/gamma, average over 1 m^2~~
- ~~Removable – 1,000 dpm/100 cm^2 alpha or beta/gamma~~
- 5,000 dpm alpha/100 cm^2 averaged over 1 m^2 (direct)
- 5,000 dpm beta-gamma/100 cm^2 averaged over 1 m^2 (direct)
- 15,000 dpm alpha/100 cm^2 maximum over 1 m^2 (direct)
- 15,000 dpm beta-gamma/100 cm^2 maximum over 1 m^2 (direct)
- 1,000 dpm alpha/100 cm^2 averaged over 1 m^2 (removable)
- 1,000 dpm beta-gamma/100 cm^2 averaged over 1 m^2 (removable)

Commented [JM169]: Rev. 3.2 to Rev. 4: This change was made to incorporate language provided in the Draft Rev. 4 reviewed by the NRC staff.

13.3.2 *Soils*

- Natural Uranium - 10 pCi/g total uranium

- Enriched Uranium – 30 pCi/g total uranium
- Depleted Uranium – 35 pCi/g total uranium
- Natural Thorium – 10 pCi/g total thorium

13.3.3 *Exposure Rates*

Commented [JM170]: Rev. 3.2 to Rev. 4: Formatting were made for consistency with the DP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

- ~~a.~~ Surface of buildings and equipment
  - 5 µR/hr – above background at 1 meter
- ~~b.~~ Soils
  - 10 µR/hr – average above background at 1 meter
  - 20 µR/hr – maximum above background at 1 meter

14.0 RESPIRATORY PROTECTION

14.1 Section Overview

The need for a respiratory protection for radiological work is not envisioned at the Cimarron Site. Work activities that could potentially expose workers to airborne radioactive material have been evaluated to determine the potential intakes during groundwater treatment and spent resin processing. The evaluation employed the methods discussed in Regulatory Guide 8.25, Rev. 1, "Air Sampling in the Workplace" and NUREG-1400, "Air Sampling in the Workplace." If processes or operations change, then a re-evaluation of potential intakes shall be performed to determine the potential intake that could result from these changes. If the potential intake determined from this evaluation is 2% ALI or greater, the RSO will perform an ALARA evaluation when it is not practical to apply engineering controls or procedures that demonstrates that he use of respiratory protection equipment is ALARA. If the ALARA evaluation demonstrates that use of respiratory protection equipment is ALARA, then the RSO will implement the respiratory protection program described in this section.

Respiratory protection measures shall be employed when necessary to protect workers from airborne hazards. Groundwater treatment results in the generation of moist treatment media with little potential to generate airborne radioactivity. However, ~~as~~ if future conditions change and the RSO or designee determines, through review of field conditions or anticipated work functions, that respiratory protection is required, procedures and controls will be instituted in accordance with the requirements found in 10 CFR 20, Subpart H, "Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas" for radiological hazards and the ~~Code of Federal~~

Commented [JM171]: Rev. 3.2 to Rev. 4: These changes were made to address supplemental information requested by the NRC staff during their review of Draft Rev. 4. This information does not apply to current Site activities and is shown in GRAY HIGHLIGHTED TEXT.

Includes editorial changes per ALARA Committee comments.

Commented [JM172]: Editorial change per ALARA Committee comments.

~~Regulations Title 29 Part~~29 CFR 1910.134 for non-radiological hazards. Section 14.2 provides specific requirements for the respiratory protection program, if needed.

Commented [JM173]: Rev. 3.2 to Rev. 4: Editorial change. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

If a respiratory protection program is determined to be necessary, the program will be based on guidance provided in Regulatory Guide 8.15, Rev. 1, "Acceptable Programs for Respiratory Protection," and NUREG/CR-0041, Rev. 1, "Manual of Respiratory Protection Against Airborne Radioactive Material."

Commented [JM174]: Rev. 3.2 to Rev. 4: This information was provided in response to supplemental information requested by the NRC staff during their review of the Draft Rev. 4.

14.2 Respiratory Protection Program

Respiratory protection will be required if work activities could potentially expose workers to 40 or more DAC-hours in a week. Respiratory protection will also be required for any areas where airborne radioactive material concentrations are expected to exceed 1 DAC. If either of these trigger levels are encountered, as required by 10 CFR 20.1703(c), the respiratory protection program ~~procedure or procedures will be established to~~ will include:

- ~~Process controls, engineering controls or procedures to control concentrations of radioactive material in air.~~
- ~~Evaluations performed when it is not practical to apply engineering controls or procedures.~~
- ~~Considerations used to demonstrate respiratory equipment is required.~~
- ~~Required medical screening and respirator fit testing.~~
- ~~Use, maintenance, and storage of respiratory protection devices.~~
- ~~Respiratory protection training program.~~
- ~~Selection of respiratory protection equipment.~~

- Air sampling sufficient to identify the potential hazard, permit proper equipment selection, and estimate doses;
- Surveys and bioassays, as necessary, to evaluate actual intakes;
- Testing of respirators for operability (user seal check for face sealing devices and functional check for others) immediately prior to each use;
- Written procedures regarding—
  - Monitoring, including air sampling and bioassays;
  - Supervision and training of respirator users;
  - Fit testing;
  - Respirator selection;
  - Breathing air quality;
  - Inventory and control;
  - Storage, issuance, maintenance, repair, testing, and quality assurance of respiratory protection equipment;
  - Recordkeeping; and
  - Limitations on periods of respirator use and relief from respirator use;
- Determination by a physician that the individual user is medically fit to use respiratory protection equipment:
  - Before the initial fitting of a face sealing respirator;
  - Before the first field use of non-face sealing respirators, and
  - Either every 12 months thereafter, or periodically at a frequency determined by a physician.

- Fit testing, with fit factor > 10 times the APF for negative pressure devices, and a fit factor > 500 for any positive pressure, continuous flow, and pressure-demand devices, before the first field use of tight fitting, face-sealing respirators and periodically thereafter at a frequency not to exceed 1 year. Fit testing must be performed with the facepiece operating in the negative pressure mode.

Commented [JM175]: Rev. 3.2 to Rev. 4: These changes were made to address supplemental information on the Draft Rev. 4 requested by the NRC staff.

15.0 ENVIRONMENTAL MONITORING

15.1 Section Overview

Environmental monitoring shall be performed at various locations to monitor the migration of licensed material from former (now decommissioned) sources through environmental media. Final surveys have demonstrated that buildings and soils have been decommissioned. Licensed material exceeds decommissioning criteria in groundwater in three areas: Burial Area #1, the Western Upland Area, and the Western Alluvial Area. The ~~Licensee~~ licensee shall maintain an environmental monitoring program in these three areas until superseded by a groundwater remediation work plan.

Commented [JM176]: Rev. 3.2 to Rev. 4: Editorial change for consistency in usage. This change was not included in the Draft Rev. reviewed by the NRC staff.

Effluent from the groundwater treatment process will be monitored to demonstrate that the concentrations of uranium complies with discharge permit limits and underground injection permits. Monitoring will be performed in accordance with permit requirements and the Sampling and Analysis Plan. The Sampling and Analysis Plan will address how background and baseline concentrations of radionuclides in environmental media have been established through appropriate sampling and analysis. The Sampling and Analysis Plan will include the following information:

- A description of known or expected concentrations of radionuclides in effluents;
- A description of the physical and chemical characteristics of radionuclides in effluents;
- A summary or diagram of all effluent locations;
- Justification that samples are representative of actual releases;
- A summary of the sample collection and analysis procedures, including the minimum detectable concentrations of radionuclides;

- A summary of sample collection frequencies; and
- A description of environmental monitoring recording and reporting procedures.

Direct radiation from groundwater processing operations is monitored in the vicinity of the Western Area Treatment Facility and Burial Area #1 Treatment Facility as discussed in Section 15.3.

Commented [JM177]: Rev. 3.2 to Rev. 4: These changes are made in response to supplemental information on the Draft Rev. 4 requested by the NRC. These changes do not apply to current Site activities and are shown in GRAY HIGHLIGHTED TEXT.

15.2 Surface and Groundwater Monitoring

Surface and groundwater samples are collected annually and are analyzed for fluoride, nitrates/nitrites, gross alpha radioactivity, gross beta radioactivity, and uranium isotopes. The locations identified in Table 15-1 shall be sampled on an annual basis.

Upon approval of Decommissioning Plan, the in-process groundwater monitoring plan described in Section 8.7 of the Decommissioning Plan will replace the environmental monitoring program described in the preceding paragraph.

Commented [JM178]: Rev. 3.2 to Rev. 4: This change was made for consistency with the DP. This change was included in the Draft Rev. 4 reviewed by the NRC staff. These changes do not apply to current Site activities and are shown in GRAY HIGHLIGHTED TEXT.

15.2.1 *Quality Control in Sampling*

Sample collection, preservation, shipping, and analysis shall be conducted in accordance with the Site-specific Sampling and Analysis Plan and associated procedures. Data review, reporting, and management will be conducted in accordance with Quality Assurance Implementing Procedure, QAIP-17.1, "Data Management Procedure."

Commented [JM179]: Rev. 3.2 to Rev. 4: Reformatting section numbering. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

~~15.3~~15.2.2 *Reporting*

Environmental monitoring results shall be reported to NRC within 30 days of the completion of data review.

Commented [JM180]: Rev. 3.2 to Rev. 4: Reformatting section numbering. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

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15.3 Direct Radiation

Dosimeters were deployed on October 1, 2019. These dosimeters collected background dose in the vicinity of the Western Area Treatment Facility and Burial Area #1 Treatment facility prior to construction of these facilities. These dosimeters are used to establish the baseline of background radiation levels prior to commencing decommissioning activities. Additionally, one dosimeter was deployed along the haul path between the facilities. Once decommissioning activities commence, these dosimeters will be used to determine radiation levels outside the RA from groundwater processing activities. Figures 15-1 and 15-2 depict dosimeter locations. Table 15-2 provides a verbal description of the dosimeter locations. Dosimeters are changed on a quarterly basis.

NOTE: Dosimeter locations may be reevaluated during construction of these facilities and adjusted, if necessary, by the RSO. The rationale for any location adjustments shall be documented. Additionally, dosimeter locations will be periodically evaluated during decommissioning activities to determine if locations need to be adjusted or removed. Justification for changes shall be documented and approved by the RSO.

Commented [JM181]: Rev. 3.2 to Rev. 4: This change was made for consistency with the DP. These changes recognize the baseline environmental dose monitoring program being conducted at the Site. These changes were not included in the Draft Rev. 4 reviewed by the NRC staff.

Table 15-1

Surface and Groundwater Monitoring Locations

BURIAL AREA #1	WESTERN UPLAND AREA
1314	1351
TMW-08	1352
TMW-09	1354
TMW-13	1356
02W06	
02W08	
02W09	**WESTERN ALLUVIAL AREA**
02W16	MWWA03
02W17	MWWA09
02W27	T-62
02W28	T-64
02W32	T-70R
02W35	T-76
02W42	T-77
02W43	T-79
02W44	T-82
SURFACE WATER	
1201 Cimarron River Upstream	
1202 Cimarron River Downstream	

Table 15-2

Environmental Dosimeter Locations

Location Designation	Description
Western Area Treatment Facility	
WATF-01	Northwest corner of Treatment Building.
WATF-02	Northeast corner of Treatment Building.
WATF-03	Eastern fence line in line with the northern wall of the Treatment Building.
WATF-04	Eastern fence line approximately center of the Secure Storage Facility.
WATF-05	Northwest corner of the Secure Storage Facility.
WATF-06	To the southeast of the Treatment Building along the eastern fence line where the fence runs to the southwest.
WATF-07	Southeast corner of Treatment Building.
WATF-08	South fence line at Treatment Building mid-point.
WATF-09	Southwest corner of Treatment Building.
WATF-10	Point directly west of the southwest corner of the Treatment Building on the western fence line.
WATF-11	Point directly west of the centerline of the Treatment Building on the western fence line.
Burial Area #1 Treatment Facility	
BA1TF-01	Northwest corner of fence line around BA #1 Treatment Facility.
BA1TF-02	Northeast corner of fence line around BA #1 Treatment Facility.
BA1TF-03	East fence line of BA# Treatment Facility at centerline of Uranium IX Treatment Skid.
BA1TF-04	Southeast corner of fence line around BA #1 Treatment Facility.
BA1TF-05	Southwest corner of fence line around BA #1 Treatment Facility.
BA1TF-06	West fence line of BA# Treatment Facility at centerline of Uranium IX Treatment Skid.
Roadway (Haul Path)	
ROAD-01	Approximately half the distance between the WATF and the BA1TF; on the side of the road.

Commented [JM182]: Rev. 3.2 to Rev. 4: This change was made for consistency with the DP. These changes recognize the baseline environmental dose monitoring program being conducted at the Site. These changes were not included in the Draft Rev. 4 reviewed by the NRC staff.

Figure 15-1

Western Area Treatment Facility

Commented [JM183]: Rev. 3.2 to Rev. 4: This figure was included for consistency with the DP. These changes recognize the baseline environmental dose monitoring program being conducted at the Site. These changes were not included in the Draft Rev. 4 reviewed by the NRC staff.

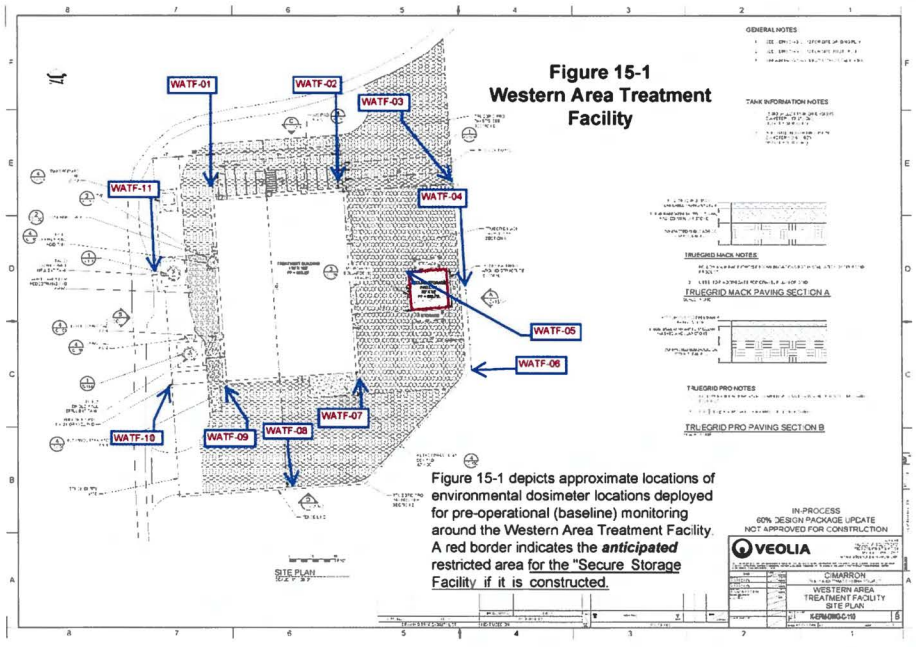
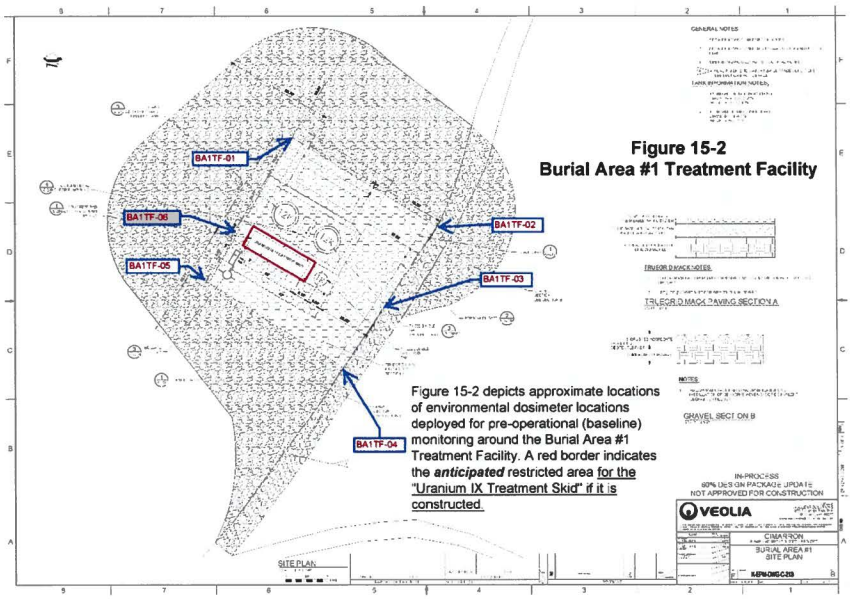


Figure 15-2

Burial Area #1 Treatment Facility



Commented [JM184]: Rev. 3.2 to Rev. 4: This figure was included for consistency with the DP. These changes recognize the baseline environmental dose monitoring program being conducted at the Site. These changes were not included in the Draft Rev. 4 reviewed by the NRC staff.

16.0 DEFINITIONS

Absorbed Dose: Energy imparted by ionizing radiation per unit mass of irradiated material. The units of absorbed dose are the rad and the gray (Gy). 1 Gy = 100 rad.

~~**Administrative Changes:** Administrative changes to documents are defined as editorial corrections (e.g., grammatical, typographical, etc.) or other administrative changes such as personnel title changes, changes in procedure names, or other changes that do not alter the technical or procedural content of a document.~~

~~**Administrative Dose Limit:** A radiation dose limit established by licensee for the purpose of maintaining radiation dose below regulatory limits.~~

Commented [JM185]: Rev. 3.2 to Rev. 4: These definitions were deleted because they are not used in the RPP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

Adult: An individual 18 or more years of age.

Airborne Radioactive Material or Airborne Radioactivity: Radioactive material dispersed in the air in the form of dusts, fumes, particulates, mists, vapors, or gases.

Airborne Radioactive Material Area or Airborne Radioactivity Area: A room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exists in concentrations:

(1) in excess of the derived air concentrations (DAC) specified in appendix B of 10 CFR 20.1001 – 20.2401, or

(2) to such a degree that an individual present in the area without respiratory protection equipment could exceed, during the hours an individual is present in a week, an intake of 0.6% of the Annual Limit on Intake (ALI) or 12 DAC hours.

ALARA: An acronym for "As Low As is Reasonably Achievable". ALARA means making every reasonable effort to maintain exposures to radiation as far below the dose limits in 10 CFR 20 as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest.

ALARA Committee: The Cimarron Site ALARA Committee that has responsibility for overall coordination of the ALARA Program. The Committee is composed of members as described in Section 4.0 of this RPP and meets on a regular basis (typically, quarterly) to review the status of the ALARA Program and to approve changes to the RPP and DP.

Alpha Particle: A positively charged particle ejected spontaneously from the nuclei of some radioactive elements. It is identical to a helium nucleus that has a mass number of 4 and an electrostatic charge of +2, i.e. two protons and two neutrons.

Annual Limit on Intake (ALI): The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year. ALI is the smaller value of intake of a given radionuclide in a year by the reference man that would result in a committed effective dose equivalent of 5 rems (0.05 Sv) or a committed dose equivalent of 50 rems (0.5 Sv) to any individual organ or tissue. (ALI values for intake by ingestion and by inhalation of selected radionuclides are given in Table 1, Columns 1 and 2, of appendix B to 10 CFR 20.1001 thru 20.2401).

Audit: An audit is an evidence gathering process. Audit evidence is used to evaluate how well audit criteria (procedures, requirements, policies) are being met. Audit evidence is used to determine how well policies are being implemented, how well procedures are being applied, and how well requirements are being met.

Atomic Number (Symbol Z): The number of protons in the nucleus of an atom.

Background: Ambient signal response recorded by measurement instruments that is independent of radioactivity contributed by the radionuclide being measured in the person or sample.

Background Radiation: Radiation from cosmic sources; naturally occurring radioactive material, including radon (except as a decay product of source or special nuclear material); and global fallout as it exists in the environment from the testing of nuclear explosive devices or from past nuclear accidents such as Chernobyl that contribute to background radiation and are not under the control of the licensee. "*Background radiation*" does not include radiation from source, byproduct, or special nuclear materials regulated by the NRC.

Becquerel (Bq): The term used to describe one disintegration per second (dps).

Beta Particle: Beta particles are emitted by the nucleus of an atom to attain stability. Beta particles are usually negatively charged, and are emitted from the nucleus of atoms with an excess of neutrons and serve to reduce the number of neutrons in the nucleus. Some beta particles are positively charged. These positively charged beta particles, known as positrons, are emitted from a nucleus and result in an increase in the number of neutrons in the nucleus. Negatively charged beta particles and positively charged positrons have a mass equal to 1/1837 that of a proton. Beta particles are easily stopped by a thin sheet of metal or plastic.

Bioassay (radiobioassay): The determination of kinds, quantities or concentrations and, in some cases, the locations of radioactive material in the human body, whether by direct measurement or by analysis and evaluation of materials excreted or removed from the human body.

Breathing Zone: The breathing zone is that region adjacent to a worker's mouth and nostrils from which air is drawn into the lungs while he/she is performing assigned work.

Breathing Zone Air Sample: Air which is drawn through or into the sample media and is a fair representation of the workers "Breathing Zone."

Byproduct material:

(1) Any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or using special nuclear material;

(2) The tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute "byproduct material" within this definition;

(3) (i) Any discrete source of radium-226 that is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity; or

(ii) Any material that—

(A) Has been made radioactive by use of a particle accelerator; and

(B) Is produced, extracted, or converted after extraction, before, on, or after August 8, 2005, for use for a commercial, medical, or research activity; and

(4) Any discrete source of naturally occurring radioactive material, other than source material, that—

(i) The NRC, in consultation with the Administrator of the Environmental Protection Agency, the Secretary of Energy, the Secretary of Homeland Security, and the head of any other appropriate Federal agency, determines would pose a threat similar to the threat posed by a discrete source of radium-226 to the public health and safety or the common defense and security; and

(ii) Before, on, or after August 8, 2005, is extracted or converted after extraction for use in a commercial, medical, or research activity.

Calendar Quarter(s): First quarter – January 1 through March 31

Second quarter – April 1 through June 30

Third quarter – July 1 through September 30

Fourth quarter – October 1 through December 31

Calendar Year: From January 1 through December 31.

Calibrate: To adjust and/or determine:

(1) The response or reading of an instrument relative to a series of conventionally true values; or

(2) The strength of a radiation source relative to a standard or conventionally true value.

Committed Dose Equivalent (CDE) ($H_{T,50}$): Means the dose equivalent to organs or tissues of reference (T) that will be received from intake of radioactive material by an individual during the 50 year period following the intake.

Committed Effective Dose Equivalent (CEDE) ($H_{E,50}$): The sum of the products of the weighting factors applicable to each of the body organs or tissues that are irradiated and the committed dose equivalent to these organs or tissues ($H_{E,50} = \Sigma_T W_{T,50}$).

Contact Dose Rate: A radiation dose rate as measured with the detector or instrument case within 1/2 inch of the surface being measured.

Contamination, Radioactive: Deposition of radioactive material in any place where it is not desired. Radioactive contamination may be removable (loose) or fixed.

Contaminated Area: Any area that has radioactive contamination at levels greater than the radioactivity release limits for unrestricted use.

Continuous Air Sampling/Monitoring: A method of sampling used to measure airborne radioactivity levels in routinely occupied areas.

Controlled Area: An area outside of a Restricted Area but inside the Site boundary, where access can be limited by the Licensee for any reason.

Corrective Action(s): Action(s) taken to improve areas of performance or to eliminate causes of adverse trends in performance identified during Audits, Surveillances, and as a response to a ~~**Non Conformance Report**~~Notice of Deficiency.

Commented [JM186]: Rev. 3.2 to Rev. 4: Editorial change to reflect Site practices. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Counts Per Minute (cpm): The rate of ionizing event occurrence in one minute recorded by a radiation detection instrument designed to count ionizing events caused by radiation.

Curie (Ci): A measure of the amount of radioactive material present.

One curie equals 37 billion (3.7 E+10 or 3.7 x 10^{10}) becquerels (dps)or 2.2 trillion (2.2 E+12) radioactive disintegration's per minute (dpm).

A millicurie (mCi) is 2.2 billion (2.2 E+09) dpm

A microcurie (μCi) is 2.2 million (2.2 E+06) dpm

A nanocurie (nCi) is 2.2 thousand (2.2 E+03) dpm

A picocurie (pCi) is 2.2 dpm.

Declared Pregnant Woman: A woman who has voluntarily informed the licensee, in writing, of her pregnancy and the estimated date of conception. The declaration remains in effect until the declared pregnant woman withdraws the declaration in writing or is no longer pregnant.

Decontamination: Means the process of removing or reducing the level of contamination on an item or individual.

Deep Dose Equivalent (H_d): The dose equivalent at a tissue depth of 1 cm (1000 mg/cm^2) Applies to external whole body exposure.

Derived Air Concentration (DAC): The concentration of a given radionuclide in air which, if breathed by the reference man for a working year of 2,000 hours under conditions of light work (inhalation rate 1.2 cubic meters of air per hour), results in an intake of one ALI. DAC values are given in Table 1, Column 3, of appendix B to 10 CFR 20.1001-2401.

Derived Air Concentration-hour (DAC-hour): The product of the concentration of radioactive material in air (expressed as a fraction or multiple of the derived air concentration for each radionuclide) and the time of exposure to that radionuclide, in hours. A licensee may take

2,000 DAC-hours to represent one ALI, equivalent to a committed effective dose equivalent of 5 rems (0.05 Sv).

Detector: That portion of an instrument system sensitive to and used for the quantification of ionizing radiation.

Direct Contamination Survey: This method measures fixed and removable levels of surface contamination. A direct frisk is performed by scanning the survey location using a count rate meter.

Direct Reading Dosimeter (DRD): A monitoring device consisting of a collection chamber coupled with an optical lens and calibrated scale. DRD's can be used as a device to provide individuals with an immediate estimate of their external gamma radiation exposure.

Discrete Source: A radionuclide that has been processed so that its concentration within a material has been purposely increased for use for commercial, medical, or research activities.

Disintegrations Per Minute (dpm): Refers to the number of nuclear transformations occurring per minute.

Disintegrations Per Second (dps): Refers to the number of nuclear transformations occurring per second.

Dose or Radiation Dose: A generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as applicable to context and as defined in 10 CFR 20. The unit for absorbed dose is the rad. 100 rad = 1 Gy.

Dose Equivalent (H_T): Means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units for dose equivalent rem. 100 rem = 1 Sv.

Dose Rate: The quantity of absorbed dose delivered per unit of time.

Dosimeter: Any of several types of devices used to measure radiation dose. Common types include TLD, OSL, film, and direct reading dosimeters.

Effective Dose Equivalent (H_E): The sum of the products of the dose equivalent to the organ or tissue (H_T) and the weighing factors (W_T) applicable to each of the body organs or tissues that are irradiated ($H_E = \Sigma W_T H_T$).

Effluent: Material discharged into the environment from licensed operations.

Embryo/Fetus: The developing human organism from conception until the time of birth.

Exposure: Means being exposed to ionizing radiation or to radioactive material. The unit of exposure is the roentgen.

External Dose: That portion of the dose equivalent received from a source of radiation outside the body.

Extremity: Means hand, elbow, arm below the elbow, foot, knee, or leg below the knee.

~~**Fission:** The splitting of a nucleus into at least two other nuclei and the release of a relatively large amount of energy. Two or three neutrons are usually released during this type of transformation.~~

Frisk: The performance of a direct survey for radioactive contamination.

Commented [JM187]: Rev. 3.2 to Rev. 4: These definitions were deleted because they are not used in the RPP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

Gamma Ray (Gamma Radiation): High-energy, short wavelength electromagnetic radiation (a packet of energy) emitted from the nucleus. Gamma radiation frequently accompanies alpha and beta emissions and always accompanies nuclear fission. Gamma rays are very penetrating and are best stopped or shielded against by dense materials, such as lead or uranium. Gamma rays are similar to x-rays, but are usually more energetic.

General Area Dose Rate: A radiation dose rate measured at 30 cm or more from a surface.

Gray (Gy): The SI unit for absorbed dose: 1 Gy = 1 Joule kg^{-1} = 100 rad.

Groundwater: Water contained in pores or fractures in either the unsaturated or saturated zones below ground level.

~~**Half-Life, Radioactive:** The time required for a radioactive substance to lose 50% of its activity by decay. Each radionuclide has a unique half-life.~~

Commented [JM188]: Rev. 3.2 to Rev. 4: This definition was deleted because it is not used in the RPP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

In-Vitro Bioassay (indirect): The estimation of radioactivity in the human body based upon:

(1) the measurement of radioactivity in excreta or other materials taken from the body, and

(2) a biological model for the radionuclide movement in body tissues and organs.

In-Vivo Bioassay (direct): The measurement of radioactivity in the human body using instrumentation which detects radiation emitted from radionuclides in the body.

Commented [JM189]: No change. These definitions were omitted in the Draft Rev. 4 reviewed by the NRC staff.

Individual Monitoring: The assessment of dose equivalent by use of devices designed to be worn by an individual; the assessment of committed effective dose equivalent by bioassay or by determination of the time-weighted air concentrations to which an individual has been exposed; or the assessment of dose equivalent by the use of survey data.

Individual Monitoring Devices: Devices designed to be worn by a single individual for the assessment of dose equivalent. Examples include thermoluminescence dosimeters (TLD's), optically stimulated luminescent (OSL) dosimeters, direct reading dosimeters, and lapel air samplers.

Instrument: A complete system designed to quantify one or more characteristics of ionizing radiation or radioactive material.

Intake: The amount of radioactive material taken into the body by inhalation, absorption through the skin, injection, ingestion, or through wounds.

Internal Dose: That portion of the dose equivalent received from radioactive material taken into the body.

Isotopes: Nuclides having the same number of protons in their nuclei but differing in the number of neutrons. Isotopes have the same atomic number and different mass numbers.

Lens Dose Equivalent (LDE): Dose equivalent due to external exposure to the lens of the eye. It is taken as the dose equivalent at a tissue depth of 0.3 cm (300 mg/cm^2).

Licensed Radioactive Material: Source material, special nuclear material, or byproduct material received, possessed, used, transferred or disposed of under a general or specific license issued by the NRC.

License: Means the radioactive materials license issued by the NRC to the Trust to possess and/or use radioactive materials. Other licenses may be issued to the Trust by other state or federal agencies.

Licensee: The holder of the radioactive materials license (the Trust).

Limits (dose limits): The permissible upper bounds of radiation doses.

Low-Level Radioactive Waste (LLRW): Those low-level radioactive wastes containing source, special nuclear, or by-product material that are acceptable for disposal in a land disposal facility. Low-level waste has the same meaning as in the Low-Level Waste Policy Act; that is, radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or by-product material as defined in paragraphs (2), (3), and (4) of the definition of *Byproduct material* set forth in 10 CFR 20.1003.

Member of the Public: An individual who is not receiving an occupational dose.

Micro: A prefix meaning "one millionth" (1 E-06), as in microcurie.

Milli: A prefix meaning "one thousandth" (1 E-03), as in millirem, millirad, or millicurie.

Minimum Detectable Activity: The smallest concentration of radioactivity in a sample that can be detected with a 5% probability of erroneously detecting radioactivity, when in fact none may be present (Type I error) and also, a 5% probability of not detecting radioactivity, when in fact it is present (Type II error). Often used interchangeably with Minimum Detectable Concentration, since the difference between the two terms is only one of units conversion.

Minor: An individual less than 18 years of age.

Monitoring (Radiation Monitoring): The measurement of radiation levels, concentrations, surface area concentrations, or quantities of radioactive material, and the use of the results of these measurements to evaluate potential exposures and doses.

Nano: A prefix meaning “one billionth” (1 E-09), as in nanocurie.

NRC: U.S. Nuclear Regulatory Commission or its duly appointed representatives.

Nuclide: Any one of the approximately 1800 isotopes of all the elements, whether radioactive or not. See radionuclide and isotope.

Occupational Dose: The dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to radiation or to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include doses received from background radiation, from any medical administration the individual has received from exposure to individuals administered radioactive material and released under 10 CFR 35.75, from voluntary participation in medical research programs, or as a member of the public.

Occupational Dose Limit: The maximum legally allowable dose to individuals during a specific time period, as defined by 10 CFR 20.

Particulate: Sometimes used to describe alpha and beta radiations, but most often used to mean dust or droplets containing radioactive material.

Pico: A prefix meaning "one trillionth" (1 E-12), as in picocurie.

Planned Special Exposure: An infrequent exposure to radiation, separate from and in addition to the annual dose limits.

Posting: A standardized sign or label which bears the standard trefoil radiation symbol in magenta or purple or black on a yellow background and information concerning a specific radiological hazard.

Protective Clothing: Clothing provided to reduce exposure and prevent the spread of contamination to personnel clothing or the body while performing work with radioactive materials.

Qualification: Certification of the fact that an individual possesses the knowledge, capabilities (e.g., physical) characteristics, or abilities gained through experience, training, or on-the-job training that an individual can perform a required task.

Qualified Escort: An individual that meets the Qualified Escort training requirements set forth in Radiation Protection Procedure RP-14, "Training".

Qualified Individual: An individual who has completed the training and/~~-~~or testing requirements set forth by procedures or regulations, which in turn grants that individual permission to operate specific equipment~~,~~ or instrumentation, or to perform specific work duties.

Commented [JM190]: Rev. 3.2 to Rev. 4: Editorial changes recommended by the ALARA Committee to clarify the defined term as related to activities at the Site. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Rad: The special unit of radiation dose. One rad is equal to an absorbed dose of 100 ergs/gram or 0.01 joule/kilogram (0.01 gray).

Radiation (Ionizing Radiation): Alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation, as used within the context of the Radiation Protection Program does not include non-ionizing radiation such as radio or microwaves and visible, infrared, or ultraviolet light.

Radiation Area: Defined as any accessible area where the dose equivalent to an individual could exceed 5 millirem (.05 mSv) in any one hour at 30 cm from the radiation source or surface that radiation penetrates.

Radiation Safety Officer (RSO): The individual responsible for development and oversight of radiation protection program policies at the Cimarron Site. This individual shall meet the requirements set forth in NUREG-1757, Section 17.2.3.1.

Radiation Worker: An individual who has access to the Restricted Areas to perform work and has completed the training requirements listed in Radiation Protection Procedure RP-14, "Training".

Commented [JM191]: Editorial change

Radioactive Material (49 CFR 173.403): For purposes of transportation, any material containing radionuclides where both the activity concentration and the total activity in the consignment exceed the values specified in the table in 49 CFR 173.436 or values derived according to the instructions in 49 CFR 173.433.

Radioactive Materials Area: Any area or room which is posted and is used to store or contains for use an amount of licensed material exceeding 10 times the quantity of such material as listed in Appendix C to 10 CFR 20.

Radioactivity: Rate of disintegration (transformation) or decay of radioactive material. The units of activity are the curie (Ci) and the becquerel (Bq). Bq = 1 (dps) disintegration per second; Ci = 3.7×10^{10} dps.

~~**Radiologically Controlled Area (RCA): See Restricted Area.**~~

~~**Radiological Occurrence Report (ROR): A report generated to document the facts, record the apparent and/or root cause, track the resolution and aid in trending radiological exposure events.**~~

Commented [JM192]: Rev. 3.2 to Rev. 4: These definitions were deleted because they are not used in the RPP. These changes were included in the Draft Rev. 4 reviewed by the NRC staff.

Radionuclide: Any one of the radioactive nuclides.

Record: A document that provides evidence of the quality of services performed, demonstrates that actions were performed in accordance with radiation protection procedures, or demonstrates conformance of actions to regulatory requirements.

Reference Man: A hypothetical aggregation of human physical and physiological characteristics arrived at by international consensus. These characteristics may be used by researchers and public health workers to standardize results of experiments and to relate biological insult to a common base.

Rem: The special unit for any of the quantities expressed as dose equivalent. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor (1 rem = 0.01 sievert).

Removable Contamination Survey: The method used to measure removable contamination. Removable survey techniques are:

(1) Smear Surveys - A smear is obtained by using an absorbent filter disk to wipe with moderate pressure across the area or item to be evaluated. A smear is usually wiped over an area of 100 cm^2.

(2) Wipe Surveys – A wipe is obtained by wiping an absorbent pad or towel over a large area or the entire surface of the item being surveyed.

Respirator: An apparatus used to reduce the individual's intake of airborne radioactive materials.

Restricted Area: An area having access controlled by the Licensee for the purpose of protecting individuals against undue risk from exposure to radiation and radioactive materials. Restricted Area does not include areas used as residential quarters, but separate rooms in a residential building may be set apart as a Restricted Area.

Sealed Source: Any by-product material that is encased in a capsule designed to prevent leakage or escape of the by-product material.

Shallow Dose Equivalent (SDE): The dose equivalent at a tissue depth of 0.007cm (7 mg/cm^2), averaged over an area of one square centimeter. It applies to external exposure of the skin of the whole body or of an extremity.

Sievert (Sv): The SI unit of any of the quantities expressed as dose equivalent. The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor. 1 Sv = 100 rem.

Site Boundary: The line beyond which the land or property is not owned, leased, or otherwise controlled by the Licensee.

Skin of the Whole Body: The skin of the whole body, exclusive of skin of the extremities.

Smear: A radiation survey technique which is used to determine levels of removable surface contamination. A medium (typically filter paper) is rubbed over a surface (typically of area 100 cm^2), followed by a quantification of the activity on the medium. Also known as a swipe.

Source Material:

(1) Uranium or thorium or any combination of uranium and thorium in any physical or chemical form; or

(2) Ores that contain, by weight, one-twentieth of 1 percent (0.05 percent), or more, of uranium, thorium, or any combination of uranium and thorium. Source material does not include special nuclear material.

Special Nuclear Material:

(1) Plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the Commission, pursuant to the provisions of section 51 of the Act, determines to be special nuclear material, but does not include source material; or

(2) Any material artificially enriched by any of the foregoing but does not include source material.

Stochastic Effects: Health effects that occur randomly and for which the probability of the effect occurring, rather than its severity, is assumed to be a linear function of dose without threshold. Hereditary effects and cancer are examples of stochastic effects.

Survey: An evaluation of the radiological conditions and potential hazards incident to the production, use, transfer, release, disposal, or presence of radioactive materials or other sources of radiation. When appropriate, such an evaluation includes a physical survey of the location of a source of radiation and measurements or calculations of levels of radiation or concentrations or quantities of radioactive material present.

Thermoluminescent Dosimeter (TLD): An integrating detector where radiation energy is absorbed (trapped) and can be read out later by thermal excitation of the detector.

Total Effective Dose Equivalent (TEDE): The sum of the deep dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures).

Total Organ Dose Equivalent (TODE): The sum of the deep dose equivalent and the committed dose equivalent to the organ receiving the highest dose.

Unrestricted Area: Any area to which access is not limited or controlled for purposes of protection of individuals from exposure to radiation and radioactive materials.

Uptake: Quantity of a radionuclide taken up by the systematic circulation (e.g., by injection into the blood, by absorption from compartments in the respiratory or gastrointestinal tracts, or by absorption through the skin or through wounds in the skin).

Uranium (Natural, Depleted and Enriched):

Natural Uranium: Uranium found in nature. Natural uranium contains 0.71 weight percent U-235, 99.3 weight percent U-238, and a trace of U-234.

Depleted Uranium: Uranium in which the U-235 isotope represents less than 0.71 weight percent of the mass of the material. Depleted uranium is less radioactive than natural uranium.

Enriched Uranium: Uranium in which the U-235 isotope represents greater than 0.71 weight percent of the mass of the material. The alpha emission rate increases from 1.5 E3 dpm per mg at 0.71 weight percent enrichment to 1.4 E5 dpm per mg at 93% enrichment.

Visitor: An individual who is not an employee or contractor of the Licensee.

Week: Seven consecutive days starting on Sunday.

Weighting Factor (W_T): The proportion of risk of stochastic effects resulting from irradiation of the organ or tissue to the total risk of stochastic effects when the whole body is irradiated uniformly.

Whole Body (WB): Means, for purposes of whole body exposure, the head, trunk (including male gonads), arms above the elbow, or legs above the knee.

Year: The period of time beginning on January 1 and ending on December 31 that is used to determine compliance with the NRC.

X-Ray: Penetrating electromagnetic radiation having a wavelength much shorter than that of visible light. X-rays are usually produced by a excitation of the electron field around certain nuclei. In nuclear reactions, it is customary to refer to photons originating in the electron field of the atom as X-rays.

17.0 REFERENCES

1. 10 CFR 19, "Notices, Instructions and Reports to Workers; Inspection and Investigations"
2. 10 CFR 20, "Standards for Protection Against Radiation"
3. 10 CFR 30, "Rules of General Applicability to Domestic Licensing of By-Product Material"
4. 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste"
5. 10 CFR 70, "Domestic Licensing of Special Nuclear Material"
6. "Cimarron Facility Decommissioning Plan," Rev. 1
7. EPM017-CALC-001, "Dose Rate Near Uranium Treatment Train"
8. EPM028-CALC-001, "Potential Intake Calculation"
9. ~~5.~~ NCRP 87-1987, "Use of Bioassay Procedures for Assessment of Internal Radionuclide Deposition"
10. NUREG/CR-0041, Rev. 1, "Manual of Respiratory Protection Against Airborne Radioactive Material"
11. NUREG-1400, "Air Sampling in the Workplace" NUREG 1757, "Decommissioning Process for Materials Licensees"
12. NUREG-1507, "Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions," June 1998
13. ~~6.~~ NUREG-1556, Vol. 7, "Consolidated Guidance About Materials Licenses, Program-Specific Guidance About Academic, Research and Development, and Other Licenses of

Commented [JM193]: Rev. 3.2 to Rev. 4: Some references were moved to correct alphabetical order. These changes are not shown.

Commented [JM194]: Rev. 3.2 to Rev. 4: These references are provided for consistency with the DP and to address supplemental information requested by the NRC staff during their review of Draft Rev. 4. These changes are not applicable to current Site activities and are shown in GRAY HIGHLIGHTED TEXT.

Commented [JM195]: Rev. 3.2 to Rev. 4: This reference was added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. The changes support current Site practices.

Commented [JM196]: Rev. 3.2 to Rev. 4: This reference was added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. The changes support current Site practices.

Limited Scope Including Gas Chromatographs and X-Ray Fluorescence Analyzers," Appendix ~~L~~H, "Sample Audit Program," 2018

~~7.~~14. Order Transferring License No. SNM-928 for the Cimarron Site

~~8.~~15. Regulatory Guide 4.15, Rev. 2, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment"

16. Regulatory Guide 8.4, Rev. 1, "Personnel Monitoring Device – Direct-Reading Pocket Dosimeters"

17. Regulatory Guide 8.9, Rev. 1, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program"

18. Regulatory Guide 8.15, Rev. 1, "Acceptable Programs for Respiratory Protection"

~~9.~~19. Regulatory Guide 8.25, Rev. 1, "Air Sampling in the Workplace"

20. Regulatory Guide 8.28, Rev. 0, "Audible Alarm Dosimeters"

21. Regulatory Guide 8.34, Rev. 0, "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses"

22. Regulatory Guide 8.36, Rev. 0, "Radiation Dose to the Embryo/Fetus"

~~10.~~23. The Cimarron Environmental Response Trust Special Nuclear Material License (SNM-928)

~~11.~~24. U.S. NRC, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of License for Byproduct, Source or Special Nuclear Material," August 1987

Commented [JM197]: Rev. 3.2 to Rev. 4: The 2018 revision of NUREG-1556, Vol. 7 moved the sample audit checklist to Appendix H. This change was not included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM198]: Rev. 3.2 to Rev. 4: Editorial change to capture revision of RG 4.15 used at the Site. This change was included in the Draft Rev. 4 reviewed by the NRC staff.

Commented [JM199]: Rev. 3.2 to Rev. 4: These references were added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. The changes support current Site practices.

Commented [JM200]: Rev. 3.2 to Rev. 4: These references were added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. The changes support current Site practices.

~~12.~~25. U.S. NRC, "Disposal or Onsite Storage of Thorium or Uranium Wastes from Past Operations," October 1981

APPENDIX A

POTENTIAL INTAKE CALCULATION (EPM028-CALC-001)

Commented [JM201]: This Appendix was added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. This information doesn't apply to current Site activities and is shown in GRAY HIGHLIGHTED TEXT.

APPENDIX B

DOSE RATE NEAR URANIUM TREATMENT TRAIN (EPM017-CALC-001)

Commented [JM202]: This Appendix was added in response to supplemental information requested by the NRC staff during their review of Draft Rev. 4. This information doesn't apply to current Site activities and is shown in PURPLE font.