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**Civilian Radioactive Waste Management System  
Management & Operating Contractor (CRWMS M&O)**

**MGR Compliance Program Guidance Package  
For  
Radiation Protection Equipment, Instrumentation, and Facilities**

**TDR-SSS-MD-000001 REV 00**

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<p>3. Document Identifier (Including Rev. No.)</p> <p>TDR-SSS-MD-000001 REV 00</p>			
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00		Initial issue	

Use additional sheets if necessary

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## COMPLIANCE PROGRAM (CP) GUIDANCE SHEET

1. **CP Guidance Package Title:**

MGR Compliance Program Guidance Package for Radiation Protection Equipment, Instrumentation, and Facilities

2. **CP Guidance Package Document Identifier (DI) (including Rev. No.):**

TDR-SSS-MD-000001 REV 00

2a. **CP Guidance Package Objective:**

The objective of this CP Guidance Package is to provide acceptance criteria for topical areas regarding conformance with regulatory precedence.

2b. **CP Guidance Package Scope:**

The scope of this CP Guidance Package includes guidance applicability relevant to radiation protection equipment, instruments, and facilities.

3. **Structure, System, or Component (SSC) Name:**

N/A

3a. **SSC Description (including Quality Assurance (QA) Classification Information):**

N/A

3b. **QA Classification Document Title:**

N/A

3c. **QA Classification Document DI (including Rev. No.):**

N/A

3d. **Quality Assurance:**

This CP Guidance Package is subject to the requirements of DOE/RW-0333P, *Quality Assurance Requirements and Description* (DOE 1998).

**4. Topical Area Name and Description:**

MGR Compliance Program Guidance Package for Radiation Protection Equipment, Instrumentation, and Facilities.

This Compliance Program Guidance Package identifies the regulatory guidance and industry codes and standards addressing radiation protection equipment, instrumentation, and support facilities considered to be appropriate for radiation protection at the Monitored Geologic Repository (MGR). Included are considerations relevant to radiation monitoring instruments, calibration, contamination control and decontamination, respiratory protection equipment, and general radiation protection facilities. The scope of this Guidance Package does not include design guidance relevant to criticality monitoring, area radiation monitoring, effluent monitoring, and airborne radioactivity monitoring systems since they are considered to be the topics of specific design and construction requirements (i.e., “fixed” or “built-in” systems). This Guidance Package does not address radiation protection design issues; it addresses the selection and calibration of radiation monitoring instrumentation to the extent that the guidance is relevant to the operational radiation protection program. Radon and radon progeny monitoring instrumentation is not included in the Guidance Package since such naturally occurring radioactive materials do not fall within the NRC’s jurisdiction at the MGR.

**5. Assumptions and Clarifications Used:**

- 5a.** In some cases, the NRC has issued proposed or draft revisions to regulatory guides and NUREGs but has not finalized the revisions. With one exception, it is not standard practice to cite draft guidance in Guidance Packages. The exception is draft NUREG-1567, *Standard Review Plan for Spent Fuel Dry Storage Facilities* (NRC 1996a). Draft NUREG-1567 provides detailed guidance on NRC’s expectations for the content of license applications for independent spent fuel storage installations (ISFSI) and, due to the similarities between an ISFSI and the Monitored Geologic Repository (MGR), provides a valuable resource that should be considered when preparing the License Application. It should be noted that the NRC is in the process of revising several radiation protection regulatory guides in response to recent, or pending, changes in the applicable regulations. Changes to some of the industry guidance referenced in the industry standards are also anticipated.
- 5b.** Industry standards referenced in regulatory guides or other NRC documents may have been revised subsequent to the issuance of the applicable NRC guidance document. Where no apparent conflict exists between the NRC guidance document and the updated version of a standard, the current version of the industry document has been included in the following guidance instead of the cited NRC version. NUREG/CR-5973, *Codes and Standards and other Guidance Cited in Regulatory Documents* (NRC 1996b) was used to evaluate the revision status of industry standards. Traceability to the NRC’s original citation and any applicable updates are provided in the appropriate rationale statements.

- 5c. Subordinate codes and standards may be listed within the industry codes and standards that are cited in NRC guidance. This subordinate guidance has not been included in Section 7. However, consideration should be given to the subordinate standards as appropriate.
- 5d. The industry codes and standards included in Section 7 of this Guidance Package consist of the following: (a) codes and standards cited in guidance documents from regulatory documents listed in Section 6; (b) codes and standards identified to be applicable, provided they are cited as “acceptable” or “partially acceptable” in NUREG/CR-5973, *Codes, Standards, and other Guidance Cited in Regulatory Documents* (NRC 1996b), or listed in Table A-4 of draft NUREG-1567, *Standard Review Plan for Spent Fuel Dry Storage Facilities* (NRC 1996a); and (c) codes and standards found to be applicable but not listed in (a) or (b).
- 5e. The *Development Plan for the Compliance Program Guidance Packages* (CRWMS M&O 1999) defines four Guidance Types for use in CP Guidance Packages. Type “A” guidance statements reflect precedent or NRC guidance mandatory to development of programs related to a topical area. Type “B” guidance statements reflect precedent or NRC guidance applicable to the development of programs related to a topical area. Type “C” guidance identifies generally accepted guidelines or subsidiary industry practice to be considered in the preparation of related programs. Type “D” guidance is associated with future activities that are programmatic in nature. Guidance Types “A” and “B” are considered to be mandatory, and are expressed as “shall”.
- 5f. The *Development Plan for the Compliance Program Guidance Packages* (CRWMS M&O 1999) defines eleven Guidance Categories for use in CP Guidance Packages. The Guidance Categories are used to identify guidance statements relating to or affecting the listed MGR activities. Refer to the Development Plan for a detailed definition of each Guidance Category.
- 5g. As noted in Section 4, the content of this Compliance Package does not include guidance relevant to the selection, capabilities, and installation of fixed radiation protection equipment, instrumentation and facilities (systems) that require specific MGR design criteria. Instead, the scope of this package is limited to portable/“hand-carried” protective equipment and instruments, laboratory measurement instruments, and other radiation protection equipment that is not “built-in” and that does not constitute a “system” in the design context. For example, some equipment such as hand and foot monitors and constant air samplers may either be part of a system (“fixed”), or may be “non-fixed” to the extent that the unit can be relatively easily relocated to the point of need in response to specific operating needs. This Compliance Package addresses only the latter category.

**6. Guidance from Applicable NRC Regulatory Guidance Documents:**

**6.1a. Document Type:** Regulatory Guide

**6.1b. Document No.:** 1.21

**6.1c. Document Date:** June 1974

**6.1d. Document Rev. No.:** 1

**6.1e. Document Title:** Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants

**6.1f. Rationale for the Applicability of Guidance:**

Regulatory Guide 1.21 (NRC 1974) describes acceptable programs for measuring, evaluating, and reporting releases of radioactive material in liquid and gaseous effluents and solid waste from nuclear power plants. It also provides guidelines for calculating potential annual radiation doses to individuals and populations using appropriate models and parameters and pertinent recorded effluent and meteorological data. The use of this regulatory guide is cited in draft NUREG-1567 (NRC 1996a) as being applicable to an Independent Spent Fuel Storage Installation (ISFSI) or a Monitored Retrievable Storage (MRS) facility. Effluent monitoring systems at the Monitored Geologic Repository (MGR) are assumed to require the use of permanently installed monitoring equipment; permanently installed equipment is not within the scope of this guidance package. However, Regulatory Guide 1.21 (NRC 1974) is considered to be applicable to the MGR to the extent that it addresses calibration of monitoring equipment.

**6.1g. Guidance Statements:**

**6.1g1** Monitoring equipment shall be calibrated using standards certified by, or traceable to, the National Institute of Standards and Technology (NIST) (formerly National Bureau of Standards), and having appropriate accuracy, stability and range for their intended use. (Section C.11.c)

**Guidance Type: B**  
**Guidance Category: SA**

**6.1g2** Calibration standards shall be representative of the full range of the readout device. (Section C.11.c)

**Guidance Type: B**  
**Guidance Category: SA**

- 6.2a. Document Type:** Regulatory Guide
- 6.2b. Document No.:** 3.48
- 6.2c. Document Date:** August 1989
- 6.2d. Document Rev. No.:** 1
- 6.2e. Document Title:** Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation or Monitored Retrievable Storage Installation (Dry Storage)

**6.2f. Rationale for the Applicability of Guidance:**

Regulatory Guide 3.48 (NRC 1989) provides the format and identifies the content for an application under 10 CFR 72 to store spent fuel or high-level waste in a dry storage type ISFSI or MRS. The inherent similarities between the MGR and an ISFSI make this regulatory guide appropriate for the development of MGR guidance relevant to the plans for use of portable instrumentation, sampling devices, and exposure measurement and contamination control at the MGR.

**6.2g. Guidance Statements:**

**6.2g1** MGR layout considerations should include accommodations for:

- Personnel and equipment decontamination
- Location of fixed airborne radioactive material monitors and area radiation monitors
- Analytical and counting facilities
- Other required health physics facilities, and
- Special radiation monitoring and associated equipment appropriate for the MGR. (Section 7.3.1)

**Guidance Type: C**

**Guidance Category: SA**

**6.2g2** The locations and the basis for the determination of alarm set points for area radiation monitors and continuous airborne radiation monitors (including sampling points) shall be described in the License Application. (Section 7.3.4)

**Guidance Type: B**

**Guidance Category: SA**

**6.2g3** The License Application shall describe the portable and laboratory equipment and instrumentation to be used for:

- Performing radiation and contamination surveys
- Airborne radioactive material sampling



- Area radiation monitoring
- Personnel monitoring (dosimetry) during normal operations, anticipated operational occurrences, and accident conditions. (Section 7.5.2)

**Guidance Type: B**  
**Guidance Category: SA**

**6.2g4** Instrument storage, maintenance and calibration facilities shall be described. (Section 7.5.2)

**Guidance Type: B**  
**Guidance Category: SA**

**6.2g5** The License Application shall contain descriptions of contamination control equipment and health physics facilities, including:

- Laboratory facilities for radiological analyses
- Protective clothing
- Respiratory protective equipment, and
- Personnel and equipment decontamination. (Section 7.5.2)

**Guidance Type: B**  
**Guidance Category: SA**

**6.2g6** A justification of instrumentation sensitivity and reliability shall be provided for “non-fixed” liquid and gaseous effluent monitoring, and solid waste monitoring instrumentation. (Section 7.6.1)

**Guidance Type: B**  
**Guidance Category: SA, SD**

- 6.3a. Document Type:** Regulatory Guide
- 6.3b. Document No.:** 3.60
- 6.3c. Document Date:** March 1987
- 6.3d. Document Rev. No.:** 0
- 6.3e. Document Title:** Design of an Independent Spent Fuel Storage Installation (Dry Storage)

**6.3f. Rationale for the Applicability of Guidance:**

Regulatory Guide 3.60 (NRC 1987a) is referenced in draft NUREG-1567 (NRC 1996a) as providing acceptable guidance for the design of an ISFSI. As such, it is considered to

be applicable to the MGR. Regulatory Guide 3.60 emphasizes design considerations that are outside of the scope of this Guidance Package. However, it also endorses ANSI/ANS 57.9-1984 (not referenced for guidance) as generally acceptable guidance for an ISFSI. ANSI/ANS 57.9-1992, *Design Criteria for an Independent Spent Fuel Storage Installation*, is the version considered to be applicable to the MGR in those cases where the guidance is relevant to general radiological monitoring instrumentation and radiation control facilities at the MGR.

**6.3g. Guidance Statements:**

**6.3g1** ANSI/ANS 57.9-1992, *Design Criteria for an Independent Spent Fuel Storage Installation*, shall be considered to be applicable to radiation monitoring programs and facilities at the MGR to the extent that it contains guidance relevant to non-design related radiation protection facilities and equipment. (Section C)

**Guidance Type: B**

**Guidance Category: SA**

**6.4a. Document Type:** Regulatory Guide

**6.4b. Document No.:** 4.1

**6.4c. Document Date:** April 1975

**6.4d. Document Rev. No.:** 1

**6.4e. Document Title:** Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants

**6.4f. Rationale for the Applicability of Guidance:**

The use of Regulatory Guide 4.1 (NRC 1975) is endorsed in draft NUREG-1567 (NRC 1996a). The principles presented in this guide are considered an acceptable basis for establishing preoperational and operational monitoring programs to provide information needed to determine whether exposures in the environment are within established limits and to ensure that long-term buildup of specific radionuclides in the environment will not become significant. The guide includes information relevant to the detection capability of analytical instrumentation.

**6.4g. Guidance Statements:**

**6.4g1** The sensitivity of analytical equipment used at the MGR for environmental radiation measurements should be as low as is reasonably achievable, and preferably should be capable of measurement at a few percent of the applicable exposure limits. (Section C.3)

**Guidance Type: C**  
**Guidance Category: SA**

- 6.5a. **Document Type:** Regulatory Guide
- 6.5b. **Document No.:** 4.16
- 6.5c. **Document Date:** December 1985
- 6.5d. **Document Rev. No.:** 1
- 6.5e. **Document Title:** Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants

**6.5f. Rationale for the Applicability of Guidance:**

Regulatory Guide 4.16 (NRC 1985) is endorsed in draft NUREG-1567 (NRC 1996a) for application at Independent Spent Fuel Storage Installations (ISFSI). While the regulatory guide was prepared for application at nuclear fuel processing facilities, it contains information that is considered to be applicable to the capabilities of radiological analytical equipment that will be used for effluent analysis at the MGR.

**6.5g. Guidance Statements:**

- 6.5g1 Analytical capability at the MGR shall include the ability to measure gross alpha and beta activity, and to conduct radionuclide analysis of gaseous and liquid samples. (Section C.3.1)

**Guidance Type: B**  
**Guidance Category: SA**

- 6.5g2 For gaseous and liquid effluent samples, the lower detection limits shall be 5% or less of the applicable concentration limits specified in Table 2 of Appendix B to 10 CFR 20. (Section C.3.2)

**Guidance Type: B**  
**Guidance Category: SA**

- 6.6a. **Document Type:** Regulatory Guide
- 6.6b. **Document No.:** 8.4
- 6.6c. **Document Date:** February 1973

**6.6d. Document Rev. No.:** 0

**6.6e. Document Title:** Direct-Reading and Indirect-Reading Pocket Dosimeters

**6.6f. Rationale for the Applicability of Guidance:**

Regulatory Guide 8.4 (NRC 1973a) is referenced in draft NUREG-1567 (NRC 1996a) and in Regulatory Guide 3.48 (NRC 1989) as a source of acceptable guidance for the use of pocket dosimeters at an ISFSI. Consequently Regulatory Guide 8.4 is considered to be potentially applicable to the MGR.

**6.6g. Guidance Statements:**

**6.6g1** ANSI N13.5-1972, *Performance Specifications for Direct Reading and Indirect Reading Pocket Dosimeters for X- and Gamma Radiation*, shall be considered to be applicable to the use of indirect- and direct-reading pocket dosimeters at the MGR. (Section C)

**Guidance Type: B**

**Guidance Category: SA**

**6.6g2** Direct and indirect-reading pocket dosimeters should be tested for calibration response and leak rate:

- Prior to initial use
- After being subjected to possible damage (dropping, etc.)
- At intervals not to exceed 6 months (3 months if the dosimeters are used as the primary means of demonstrating compliance with 10 CFR 20). (Section C.1.c)

**Guidance Type: C**

**Guidance Category: SA**

**6.6g3** Dosimeter calibration accuracy should be within +/- 10% of an exposure to a National Institute of Science and Technology (NIST) certified source. (Section C.2)

**Guidance Type: C**

**Guidance Category: SA**

**6.6g4** Direct and indirect-reading gamma dosimeters should be used in mixed gamma/neutron fields only if (1) the neutron equivalent dose rate and the exposure rate are known from separate measurements, and (2) the neutron to gamma ratio is known and essentially constant for the exposure period. (Section C.3)

**Guidance Type: C**

**Guidance Category: SA**

- 6.7a. **Document Type:** Regulatory Guide
- 6.7b. **Document No.:** 8.6
- 6.7c. **Document Date:** May 1973
- 6.7d. **Document Rev. No.:** 0
- 6.7e. **Document Title:** Standard Test Procedure for Geiger-Muller Counters
- 6.7f. **Rationale for the Applicability of Guidance:**

Regulatory Guide 8.6 (NRC 1973b) is referenced in NUREG-0800 (NRC 1987b) as providing acceptable guidance for the testing of Geiger-Muller (GM, also Geiger-Mueller) detector operating characteristics prior to calibration. NUREG-0800 is referenced in draft NUREG-1567 (NRC 1996a) as providing appropriate guidance for an ISFSI. Therefore, to the extent that GM detectors are used for radiation protection purposes at the MGR, Regulatory Guide 8.6 is considered to be potentially applicable where on-site testing is conducted at the MGR.

Regulatory Guide 8.6 cites ANSI N42.3-1969 (not referenced for guidance purposes) as providing acceptable guidance for testing GM detectors. ANSI N42.3-1969 was replaced by IEEE 309-1970, *American National Standard and IEEE Standard Test Procedure for Geiger-Muller Counters* (not referenced for guidance purposes). IEEE 309-1970 was subsequently revised and re-issued as IEEE 309-1999, *IEEE Standard Test Procedures and Bases for Geiger-Mueller Counters*, and that version is considered applicable for the purposes of this guidance.

6.7g. **Guidance Statements:**

- 6.7g1 To the extent that GM detector-operating characteristics are tested at the MGR, IEEE 309-1999, *American National Standard and IEEE Standard Test Procedures and Bases for Geiger-Mueller Counters*, should be considered to be applicable to such testing.

**Guidance Type: C**  
**Guidance Category: SA**

- 6.8a. **Document Type:** Regulatory Guide
- 6.8b. **Document No.:** 8.8
- 6.8c. **Document Date:** June 1978
- 6.8d. **Document Rev. No.:** Rev. 3

**6.8e. Document Title:** Information Relevant to Ensuring that Occupational Radiation Doses at Nuclear Power Stations will be As Low As Is Reasonably Achievable

**6.8f. Rationale for the Applicability of Guidance:**

10 CFR Part 20, *Standards for Protection Against Radiation*, Section 20.1101 requires in part, that licensees make every reasonable effort to maintain radiation exposures as far below the limits in Part 20 as is reasonably achievable (As Low as is Reasonably Achievable/ALARA). Regulatory Guide 8.8 (NRC 1978) provides information relevant to attaining goals and objectives for planning, designing, constructing, operating and decommissioning light-water reactor (LWR) nuclear power stations to meet the criterion that exposures of station personnel to radiation will be ALARA. The guide addresses instrumentation and facility considerations that are applicable to supporting compliance with the ALARA requirement. Although initially directed to nuclear power plants, Regulatory Guide 8.8 has been adopted throughout the nuclear industry, and is specifically referenced in draft NUREG-1567 (NRC 1996a) as a primary guidance document on the subject of radiation protection and ALARA for Independent Spent Fuel Storage Installations. It is therefore considered to provide guidance applicable to the MGR due to the similarity between the facilities.

**6.8g. Guidance Statements:**

**6.8g1** Activities involving the potential for significant exposure should be evaluated in advance to assure that provisions are made for the availability of appropriate protective and monitoring equipment, including air sampling/monitoring devices, dosimeters, and protective clothing and equipment. (Section 3.a.8)

**Guidance Type: C**

**Guidance Category: SA**

**6.8g2** Appropriate radiation monitoring instruments shall be made available in sufficient quantities to support accurate measurement and rapid evaluation of the radiological environment when needed. (Section 3.a.14)

**Guidance Type: B**

**Guidance Category: SA**

**6.8g3** Personnel monitoring equipment (direct-reading and alarming dosimeters, and personal dose rate meters) should be used to provide rapid evaluation of exposures where warranted by the radiological environment. (Section 3.b.2)

**Guidance Type: C**

**Guidance Category: SA**

- 6.8g4** Low background radiological analysis capability shall be available at the MGR. Counting/analytical instrumentation types shall include, as applicable to MGR radiological source characteristics:
- Multichannel pulse height analysis instrumentation
  - Low-background alpha/beta proportional and/or scintillation counters
  - End-window GM counters
  - Whole-body and bioassay counting and analysis instrumentation (if such analyses are performed at the MGR rather than by a contract service). (Section C.4.a)

**Guidance Type: B**

**Guidance Category: SA**

- 6.8g5** The following types of portable radiation monitoring instrumentation shall be available at the MGR:
- Low-range ion chamber or GM dose rate meters (<5 R/hour)
  - High-range ion chambers (100 mR-500 R/Hour)
  - Alpha scintillation or proportional counters
  - Neutron dose-equivalent rate meters (if required)
  - Portable air samplers and monitors. (Section C.4.b)

**Guidance Type: B**

**Guidance Category: SA**

- 6.8g6** Personnel monitoring instrumentation shall include, as applicable to radiation control needs at the MGR:
- Low-level “friskers” and portal and hand and foot monitors
  - Direct-reading low (0-200 mR) and intermediate-range (0-1000 mR) pocket dosimeters, and alarming dosimeters
  - Film badges or thermoluminescent (TLD) dosimeters. (Section C.4.c)

**Guidance Type: B**

**Guidance Category: SA**

- 6.8g7** The use and types of respiratory protective equipment used at the MGR shall be consistent with the guidance provided in ANSI Standard Z88.2-1992, *American National Standard for Respiratory Protection*, and NUREG-0041, *Manual of Respiratory Protection Against Radioactive Materials* (NRC 1976). (Section C.4.d)

**Guidance Type: B**

**Guidance Category: SA**

- 6.8g8** Radiation protection support capability should include:
- Personnel decontamination capability located so as to allow rapid cleanup
  - Decontamination and maintenance/repair capability for protective and monitoring equipment

- Control stations for access to, and egress from, radiation or contamination controlled areas (including airborne radioactivity areas). (Section C.4.e)

**Guidance Type: C**

**Guidance Category: SA**

- 6.9a. **Document Type:** Regulatory Guide
- 6.9b. **Document No.:** 8.14
- 6.9c. **Document Date:** August 1977
- 6.9d. **Document Rev. No.:** 1
- 6.9e. **Document Title:** Personnel Neutron Dosimeters

6.9f. **Rationale for the Applicability of Guidance:**

Regulatory Guide 8.14 (NRC 1977) is cited in draft NUREG-1567 (NRC 1996a) as providing acceptable guidance for the use of personnel neutron dosimeters at an ISFSI. To the extent that neutron dosimeters are used at the MGR, the guidance relevant to instrument performance and calibration requirements found in Regulatory Guide 8.14 is considered to be applicable. In addition to the performance requirements, the guide addresses operational and usage guidance which is outside of the scope of this Guidance Package.

6.9g. **Guidance Statements:**

- 6.9g1 To the extent that personnel neutron dosimeters are used at the MGR, the lower detection limit of the dosimetry system shall not exceed 300 mrem per quarter. (Section C.2)

**Guidance Type: A**

**Guidance Category: SA**

- 6.9g2 A 30% limit on the standard deviation of the precision standard shall be applied. (Section C.2)

**Guidance Type: A**

**Guidance Category: SA**

- 6.9g3 The average accuracy of a set of 10 dosimeters exposed to an unmoderated Californium-252 source in the range of 100 mrems to 3 rems shall be no worse than +/- 50%. (Section C.2)



**Guidance Type: A**  
**Guidance Category: SA**

- 6.10a. Document Type:** Regulatory Guide
- 6.10b. Document No.:** 8.15
- 6.10c. Document Date:** October 1999
- 6.10d. Document Rev. No.:** 1
- 6.10e. Document Title:** Acceptable Programs for Respiratory Protection
- 6.10f. Rationale for the Applicability of Guidance:**

Regulatory Guide 8.15 (NRC 1999) is listed in draft NUREG-1567 (NRC 1996a) as providing acceptable guidance for the use of respiratory protection equipment at an ISFSI. This guidance is generally considered to be applicable throughout the nuclear industry, and is therefore applicable to the MGR.

Regulatory Guide 8.15 has recently been extensively revised and expanded by the NRC to be consistent with 10 CFR Part 20 requirements for protection against radioactive materials. The revised regulatory guide also notes that respiratory protection against non-radiological hazards is under Occupational Health and Safety Administration jurisdiction, and may necessitate additional considerations. Among the changes to Regulatory Guide 8.15 are increased reference to ANSI Z88.2-1992, *American National Standard for Respiratory Protection*, decreased reference to NUREG-0041 (NRC 1976), and the inclusion of additional specific technical detail within the regulatory guide itself.

**6.10g. Guidance Statements:**

- 6.10g1** Regulatory Guide 8.15 (NRC 1999) shall be considered to be applicable to the selection, maintenance and use of respiratory protection devices at the MGR. (Sections A, C)

**Guidance Type: B**  
**Guidance Category: SA**

- 6.10g2** NUREG-0041 (NRC 1976) should be consulted as a source of additional detailed advice and technical information relative to the selection, maintenance and use of respiratory protection equipment. (Section B)

**Guidance Type: D**  
**Guidance Category: SA**

**6.10g3** ANSI Z88.2-1992, *American National Standard for Respiratory Protection*, shall be considered to be applicable to the selection, maintenance and use of respiratory protection equipment to the extent that the guidance in ANSI Z88.2-1992 is consistent with the guidance in Regulatory Guide 8.15. (Section C.1)

**Guidance Type: B**  
**Guidance Category: SA**

**6.10g4** Respiratory protective equipment used for radiological protection at the MGR shall be NIOSH (National Institute of Occupational Health and Safety)-certified, unless a specific variance has been obtained in accord with 10 CFR Part 20. (Section C.4.1)

**Guidance Type: B**  
**Guidance Category: SA**

**6.11a. Document Type:** Regulatory Guide

**6.11b. Document No.:** 8.25

**6.11c. Document Date:** June 1992

**6.11d. Document Rev. No.:** 1

**6.11e. Document Title:** Air Sampling in the Workplace

**6.11f. Rationale for the Applicability of Guidance:**

Regulatory Guide 8.25 (NRC 1992a) provides guidance on air sampling in restricted areas (as defined in 10 CFR 20) of the workplace. In this guide, the term "air sampling" includes the collection of samples for later analysis as well as real-time monitoring in which samples are analyzed as they are collected. This guide is intended to be applied to facilities which are not nuclear power plants. Regulatory Guide 8.25 is specifically endorsed in draft NUREG-1567 (NRC 1996a), and is considered to be applicable to the MGR.

**6.11g. Guidance Statements:**

**6.11g1** Regulatory Guide 8.25 (NRC 1992a) shall be considered to be applicable to the selection, location, calibration repair and use of portable, fixed, and lapel air sampling units at the MGR. (Section C).

**Guidance Type: B**  
**Guidance Category: SA**

**6.12a. Document Type:** Regulatory Guide

**6.12b. Document No.:** 8.28

**6.12c. Document Date:** August 1981

**6.12d. Document Rev. No.:** 0

**6.12e. Document Title:** Audible-Alarm Dosimeters

**6.12f. Rationale for the Applicability of Guidance**

Regulatory Guide 8.28 (NRC 1981) is cited in NUREG-0800 (NRC 1987b) as an acceptable source of guidance on the use of audible-alarm dosimeters at nuclear power plants, and draft NUREG-1567 (NRC 1996a) recognizes NUREG-0800 as containing guidance applicable to an ISFSI. Due to the similarities between an ISFSI and the MGR, Regulatory Guide 8.28 is considered to be applicable to the MGR to the extent that audible-alarm dosimeters are used.

**6.12g. Guidance Statements:**

**6.12g1** Audible-alarm dosimeters used at the MGR should meet the performance criteria in ANSI N13.27-1981, *Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters*. (Section C.1)

**Guidance Type: C**

**Guidance Category: SA**

**6.12g2** Audible-alarm dosimeters shall not be considered as substitutes for survey meters. (Section C.2.a)

**Guidance Type: B**

**Guidance Category: SA**

**6.12g3** Audible-alarm dosimeters should not be used:

- If the alarm is inaudible due to background noise or so loud as to be annoying
- If the dosimeter is soaked with water, exposed to corrosive chemicals, or dropped (without re-testing). (Section C.2.b)

**Guidance Type: C**

**Guidance Category: SA**

**6.13a. Document Type:** Regulatory Guide

**6.13b. Document No.:** 8.34

**6.13c. Document Date:** July 1992

**6.13d. Document Rev. No.:** 0

**6.13e. Document Title:** Monitoring Criteria and Methods to Calculate Occupational Radiation Doses

**6.13f. Rationale for the Applicability of Guidance:**

Regulatory Guide 8.34 (NRC 1992b) provides guidance on methodologies that are acceptable to the NRC for determining when radiation exposures to radiation workers must be monitored in order to assure compliance with the radiation monitoring and reporting requirements of 10 CFR 20. The regulatory guide is therefore applicable to all licensees and thus to the MGR.

**6.13g. Guidance Statements:**

**6.13g1** Sufficient personnel monitoring devices (film badges, TLDs, extremity monitoring devices) shall be available at the MGR to allow monitoring of all repository personnel whose exposures exceed, or may exceed, 10% of the applicable limits in 10 CFR 20. (Section C.1.3)

**Guidance Type: A**

**Guidance Category: SA**

**6.14a. Document Type:** Regulatory Guide

**6.14b. Document No.:** 8.38

**6.14c. Document Date:** June 1993

**6.14d. Document Rev. No.:** 0

**6.14e. Document Title:** Control of Access to High and Very High Radiation Areas in Nuclear Power Plants

**6.14f. Rationale for the Applicability of Guidance:**

Regulatory Guide 8.38 (NRC 1993) is referenced in draft NUREG-1567 (NRC 1996a) as providing acceptable guidance for the prevention of unplanned exposures in high and very high radiation areas. 10 CFR 20 defines "high radiation area" as an accessible area where an individual could receive a dose equivalent from sources external to the body of greater than 0.1 rem in one hour at 30 centimeters from the radiation source or from any surface that the radiation penetrates. A "very high radiation area" is defined in 10 CFR

20 as an accessible area where an individual could receive an absorbed dose from external sources of greater than 500 rads in one hour at one meter from a radiation source or any surface that the radiation penetrates. Very high radiation areas are generally considered to be immediately hazardous to life, and strict access control prohibitions are maintained. Regulatory Guide 8.38 is considered to be applicable to the selection and use of radiation protection instrumentation at the MGR.

**6.14g. Guidance Statements:**

**6.14g1** If radiation levels are controlled by removable shielding, local radiation monitors with audible and visual alarm capability shall be used to provide warning of shield removal. (Section C.1.6)

**Guidance Type: B**

**Guidance Category: SA**

**6.14g2** MGR personnel entering high radiation areas shall be provided with, or accompanied by another individual with, one or both of the following:

- A radiation dose rate monitoring instrument
- A dose rate integrating and alarming instrument. (Section C.2.4)

**Guidance Type: B**

**Guidance Category: SA**

**6.15a. Document Type:** NUREG

**6.15b. Document No.:** 0041

**6.15c. Document Date:** October 1976

**6.15d. Document Rev. No.:** N/A

**6.15e. Document Title:** Manual of Respiratory Protection Against Airborne Radioactive Materials

**6.15f. Rationale for the Applicability of Guidance:**

NUREG-0041 (NRC 1976) is cited in Regulatory Guide 8.15 (NRC 1999) as providing detailed advice and technical information for a respiratory protection program. The NUREG contains technical information relevant to the selection of respiratory protection equipment, respirator testing facilities and equipment, and maintenance. It is likely that an updated version of NUREG-0041 will be issued in the future. The content of NUREG-0041 is considered to provide potentially useful background information relevant to the selection, testing and maintenance of respiratory protection equipment at the MGR.

**6.15g. Guidance Statements:**

**6.15g1** To the extent that it is consistent with the more current guidance found in Regulatory Guide 8.15 and ANSI Z88.2-1992 (*American National Standard for Respiratory Protection*), the applicable advice and technical information contained in NUREG-0041 should be considered to be applicable to the selection of respiratory protection equipment, respirator testing facilities and equipment, and maintenance.

**Guidance Type: D**

**Guidance Category: SA**

**6.16a. Document Type:** NUREG

**6.16b. Document No.:** 0800

**6.16c. Document Date:** July 1981, Section 11.5

**6.16d. Document Rev. No.:** 3, Section 11.5

**6.16e. Document Title:** Process and Effluent Radiological Monitoring Instrumentation and Sampling Systems

**6.16f. Rationale for the Applicability of Guidance:**

NUREG 0800 (NRC 1987b) provides guidance to NRC staff for reviews of applications to construct or operate nuclear power plants. Section 11.5 addresses process and effluent radiological monitoring instrumentation and sampling systems. NUREG-0800 is cited in draft NUREG-1567 (NRC 1996a) as providing acceptable guidance for ISFSIs.

Section 11.5 of NUREG-0800 (NRC 1987b) emphasizes process and effluent monitoring (instrumentation) and sampling systems that are incorporated in the MGR design. However, laboratory analysis of effluent samples will be required. Due to the similarities between the MGR and an ISFSI, the guidance in NUREG-0800 is considered to be applicable to the MGR.

**6.16g. Guidance Statements:**

**6.16g1** The MGR analytical capability shall include the necessary instrumentation to perform gross alpha/beta and necessary isotopic analyses on radiological effluent samples. (Subsection II)

**Guidance Type: B**

**Guidance Category: SA**

**6.17a. Document Type:** NUREG

**6.17b. Document No.:** 0800

**6.17c. Document Date:** July 1981, Section 12.5

**6.17d. Document Rev. No.:** 2, Section 12.5

**6.17e. Document Title:** Operational Radiation Protection Program

**6.17f. Rationale for the Applicability of Guidance:**

NUREG-0800 (NRC 1987b) provides guidance to NRC staff for reviews of applications to construct or operate nuclear power plants. NUREG-0800 is cited in draft NUREG-1567 (NRC 1996a) as providing acceptable guidance for ISFSIs. Section 12.5 of NUREG-0800 (NRC 1987b) addresses the operational safety program, including radiation protection equipment, instrumentation, and facilities. Due to the similarities between the MGR and an ISFSI, the guidance in NUREG-0800 is considered to be applicable to the MGR.

**6.17g. Guidance Statements:**

**6.17g1** The radiochemistry laboratory shall be equipped to perform routine analyses required to support the radiation protection function. (Subsection II)

**Guidance Type: B**

**Guidance Category: SA**

**6.17g2** Low-background counting capability shall be available, and equipped, to support routine analysis of all MGR radiation protection and effluent samples, including, as appropriate:

- Multi-channel pulse height analysis
- Low-background alpha/beta counting
- End window G-M counting (Subsection II)

**Guidance Type: B**

**Guidance Category: SA**

**6.17g3** Portable air sampling, air monitoring, and low and high range monitoring instrumentation for alpha, beta, gamma, and neutron radiation, shall be available. (Subsection II.B)

**Guidance Type: B**

**Guidance Category: SA**

**6.17g4** Personnel monitoring equipment shall be available, including:

- Friskers and/or portal monitors
- Self-reading low and intermediate range pocket dosimeters, including audible alarm dosimeters
- Personal (“lapel”) air samplers
- Film badges and/or thermoluminescent dosimeters
- Bioassay and whole body counting and analysis equipment, to the extent that such services are provided on-site at the MGR. (Subsection II)

**Guidance Type: B**

**Guidance Category: SA**

**6.17g5** The MGR shall provide personnel protective equipment as appropriate to the types of radiological hazards expected to be encountered at the facility, including, as appropriate:

- Anti-contamination clothing, including head covers and shoe covers
- Plastic protective clothing, if appropriate, for liquid contamination control
- Pressure demand air line (if appropriate) and self-contained full-face respiratory protection devices
- Full-face filter respirators with appropriate canisters for expected environments. (Subsection II)

**Guidance Type: B**

**Guidance Category: SA**

**6.17g6** The MGR shall:

- Provide easily accessible portable instrument calibration and storage areas
- Provide for contamination control (including change rooms), and decontamination
- Provide for protective equipment and instrumentation cleaning, repair, and decontamination
- Provide for radiation area access control, including required signs, signals, and labels in accordance with 10 CFR 20
- Provide for storage and control of licensed materials such as calibration sources. (Subsection II)

**Guidance Type: B**

**Guidance Category: SA**

**6.18a. Document Type:** NUREG

**6.18b. Document No.:** 1567

**6.18c. Document Date:** October 1996

**6.18d. Document Rev. No.:** Draft



**6.18e. Document Title:** Standard Review Plan for Spent Fuel Dry Storage Facilities

**6.18f. Rationale for the Applicability of Guidance:**

Draft NUREG-1567 (NRC 1996a) provides guidance to the NRC staff for reviewing applications for license approval for ISFSIs and MRSs. As such, it cites regulatory and industry guidance endorsed by the NRC as acceptable means of achieving compliance with licensing requirements. Due to the similarities between the MGR and an ISFSI, the guidance found in draft NUREG-1567 is considered to be applicable to the repository.

Draft NUREG-1567 (NRC 1996a) provides relatively detailed guidance on permanently installed radiation and effluent monitoring systems that fall outside of the scope of this guidance package (i.e., stack monitors, criticality alarm systems, etc.). Guidance relevant to portable instrumentation and other radiation protection equipment and facilities is generally limited to summary statements and reference to the guidance documents and standards discussed elsewhere in this Guidance Package.

**6.18g. Guidance Statements:**

**6.18g1** Laboratories, personnel protective equipment, and radiation protection support facilities at the MGR shall include the following, as appropriate to the scope of operations:

- Effluent (stack) monitors where appropriate to supplement other (“built in”) effluent monitoring systems
- Alarming area radiation and airborne radioactivity monitors, where appropriate, to supplement existing (“built in”) monitoring systems
- Personnel dosimetry, and dosimeter processing equipment (if dosimeters are processed onsite)
- Portable (hand-held) radiation survey equipment, such as friskers, appropriate to the MGR radiation environment (alpha, beta, gamma, neutron)
- Whole-body radiation monitors
- Personnel protective equipment and facilities including decontamination, shower and changing facilities. (Section 9.4.5.2)

**Guidance Type: B**

**Guidance Category: SA**

**7. Guidance from Applicable NRC-Endorsed Industry Codes and Standards:**

**7.1a. Document Type:** American National Standards Institute (ANSI)/ American Nuclear Society (ANS)

**7.1b. Document No.:** N13.1-1969

**7.1c. Document Date:** 1969

**7.1d. Document Rev. No.:** Reaffirmed 1993

**7.1e. Document Title:** Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities

**7.1f. Rationale for the Applicability of Guidance:**

ANSI Standard N13.1-1969, *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities*, is endorsed in draft NUREG-1567 (NRC 1996a) and Regulatory Guide 1.21 (NRC 1974), as providing acceptable criteria for monitoring airborne contamination.

ANSI N13.1-1969 sets forth the principles that apply for obtaining valid samples of airborne radioactive materials, and prescribes acceptable methods and materials for gas and particulate sampling. The scope of this standard is limited to the collection of samples and does not cover the measurement of the radioactive materials collected. Sections 4 and 5 of the standard provide guidance on sampler location (for the collection of representative samples) and the selection of filter media, respectively. The guidance provided in these sections is considered to be applicable to the MGR since it represents accepted practice within the nuclear industry.

**7.1g. Guidance Statements:**

**7.1g1** To the extent that air sampling is conducted at the MGR for purposes of radiological safety, the guidance provided in Sections 4 and 5 of ANSI N13.1-1969 shall be considered to be applicable to the selection and use of airborne radioactivity sampling equipment.

**Guidance Type: B**

**Guidance Category: SA**

**7.2a. Document Type:** ANSI/ANS Standard

**7.2b. Document No.:** N13.5-1972

**7.2c. Document Date:** 1972

**7.2d. Document Rev. No.:** N/A

**7.2e. Document Title:** Performance Specifications for Direct Reading and Indirect Reading Pocket Dosimeters for X- and Gamma Radiation

**7.2f. Rationale for the Applicability of Guidance:**

ANSI Standard N13.5-1972, *Performance Specifications for Direct Reading and Indirect Reading Pocket Dosimeters for X- and Gamma Radiation*, is cited in Regulatory Guide 8.4 (NRC 1973a) as providing acceptable guidance for the performance of pocket dosimeters used to measure X and/or gamma radiation in the 30 keV to 3 MeV energy range. The performance characteristics discussed include, among others, ruggedness, response to ambient conditions such as temperature, pressure, and accuracy. To the extent that pocket dosimeters are used at the MGR for radiation protection purposes, ANSI N13.5-1972 is considered to be applicable to the selection of pocket dosimeters for use at the repository.

**7.2g. Guidance Statements:**

**7.2g1** Pocket dosimeters used for radiation protection purposes at the MGR shall be consistent with the performance specifications in ANSI N13.5-1972. (Regulatory Guide 8.4)

**Guidance Type: B**

**Guidance Category: SA**

**7.3a. Document Type:** ANSI

**7.3b. Document No.:** N13.27-1981

**7.3c. Document Date:** 1981

**7.3d. Document Rev. No.:** N/A

**7.3e. Document Title:** Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters

**7.3f. Rationale for the Applicability of Guidance:**

ANSI N13.27-1981, *Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters*, is cited in Regulatory Guide 8.28 (NRC 1981) as providing acceptable guidance for pocket-sized alarm dosimeter and alarming rate meters. The standard includes design and performance guidance covering a number of characteristics including size, power supply, controls, and response characteristics. The guidance in ANSI N13.27-1981 is considered to be applicable to the characteristics of pocket-sized alarming dosimeters and ratemeters selected for use at the MGR.

**7.3g. Guidance Statements:**

- 7.3g1** Pocket-sized alarm dosimeters and alarming ratemeters used for radiation protection purposes at the MGR should be consistent with the performance specifications in ANSI N13.27-1981. (Regulatory Guide 8.28)

**Guidance Type: C**

**Guidance Category: SA**

**7.4a. Document Type:** ANSI/ANS

**7.4b. Document No.:** 57.9-1992

**7.4c. Document Date:** 1992

**7.4d. Document Rev. No.:** N/A

**7.4e. Document Title:** Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)

**7.4f. Rationale for the Applicability of Guidance:**

Draft NUREG-1567 (NRC 1996a) and Regulatory Guide 3.60 (NRC 1987a) endorse ANSI/ANS 57.9-1984 (not cited for guidance). Since the issuance of Regulatory Guide 3.60, the referenced ANSI/ANS standard has been revised and the current revision, ANSI/ANS 57.9-1992, *Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)* is considered to be potentially applicable for implementation at the repository.

ANSI/ANS 57.9-1992 was prepared to provide guidance for the specification of design requirements for ISFSIs. Consequently, the orientation of the standard is towards design criteria for “built-in” systems that fall outside the scope of this guidance package. However, the standard does address concepts that are applicable to those cases where portable or temporary radiation protection instrumentation and facilities may be used at the MGR.

**7.4g. Guidance Statements:**

- 7.4g1** Instruments should be provided for evaluating contamination levels of shipping containers upon receipt at the MGR. (Section 6.1.2.2)

**Guidance Type: C**

**Guidance Category: SA**

**7.4g2** Facilities for donning and removing anti-contamination clothing and for personnel monitoring should be available at access points to contamination controlled areas. (Section 6.2.1.1.13)

**Guidance Type: C**  
**Guidance Category: SA**

**7.4g3** Radioactivity monitoring equipment should be provided for periodic or continuous assessment of the effectiveness of radioactive waste processing equipment. (Section 6.7.3.3)

**Guidance Type: C**  
**Guidance Category: SA**

**7.4g4** Background environmental conditions should be considered in determining audio and light intensity levels for alarms and radiation area access control devices. (Sections 6.8.1.6, 6.13.12)

**Guidance Type: C**  
**Guidance Category: SA**

**7.4g5** Provisions shall be made for monitoring of areas where the potential for airborne radioactivity exists. (Section 6.13.15)

**Guidance Type: B**  
**Guidance Category: SA**

**7.5a. Document Type:** ANSI

**7.5b. Document No.:** N323-1978

**7.5c. Document Date:** 1978

**7.5d. Document Rev. No.:** N/A

**7.5e. Document Title:** Radiation Protection Instrumentation Test and Calibration

**7.5f. Rationale for the Applicability of Guidance:**

ANSI N323-1978, *Radiation Protection Instrumentation Test and Calibration*, is endorsed by draft NUREG-1567 (NRC 1996a) as containing acceptable guidance for the calibration of portable radiation protection instruments for both penetrating radiation fields and surface contamination. Conditions, equipment and techniques for alpha, beta, gamma, and neutron instrument calibration are included along with precision and accuracy considerations.

**7.5g. Guidance Statements:**

**7.5g1** Calibration and check practices as outlined in ANSI N323-1978 should be considered to be potentially applicable to the radiation protection instrumentation calibration program at the MGR. (Sections 3, 4, 5, and 6)

**Guidance Type: D**

**Guidance Category: SD, MA, OP**

**7.6a. Document Type:** ANSI

**7.6b. Document No.:** N323A-1997

**7.6c. Document Date:** 1997

**7.6d. Document Rev. No.:** N/A

**7.6e. Document Title:** Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments

**7.6f. Rationale for the Applicability of Guidance:**

As noted in Section 7.5, ANSI N323-1978, *Radiation Protection Instrumentation Test and Calibration*, has been endorsed in draft NUREG-1567 (NRC 1996a) as containing acceptable guidance for the calibration of portable radiation protection instruments. ANSI is in the process of developing a new series of standards addressing various topics relevant to radiation protection equipment. The first of these standards to be issued is ANSI N323A-1997, *Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments*. ANSI N323-1978 has not been withdrawn. ANSI N323A-1997 has not yet been cited in NRC guidance documents. However, since it represents the most current industry guidance, it has been included in this Guidance Package as containing potentially applicable, state-of-the-art, guidance relative to portable survey instruments. In addition to the calibration and testing topics addressed in ANSI N323-1978, ANSI N323A-1997 contains guidance on operational characteristics, instrument maintenance, and special use conditions.

**7.6g. Guidance Statements:**

**7.6g1** ANSI N323A-1997 should be considered to be potentially applicable to the calibration, testing, maintenance, and use of portable (hand carried) radiation protection instrumentation at the MGR. (Sections 3, 4, 5, and 6)

**Guidance Type: D**

**Guidance Category: SD, MA, OP**

- 7.7a. **Document Type:** ANSI
- 7.7b. **Document No.:** Z88.2-1992
- 7.7c. **Document Date:** 1992
- 7.7d. **Document Rev. No.:** N/A
- 7.7e. **Document Title:** American National Standard for Respiratory Protection

**7.7f. Rationale for the Applicability of Guidance:**

ANSI Z88.2, *American National Standard for Respiratory Protection*, is listed, along with NUREG-0041 (NRC 1976), in Regulatory Guide 8.8 (NRC 1978) as providing acceptable guidance for maintaining radiation exposures ALARA in those cases where respiratory protection against radioactive materials is appropriate. Regulatory Guide 8.8 is referenced in draft NUREG-1567 (NRC 1996a). ANSI Z88.2-1992 is considered to be applicable to the MGR in those cases where respiratory protective devices are used to minimize exposure to airborne radioactivity.

ANSI Z88.2-1992 covers a wide range of both technical and administrative topics relevant to the proper use and control of respirators. The types of respiratory equipment covered in this standard range from supplied air and self-contained breathing apparatus to half mask respirators. The limitations, capabilities, and acceptable uses of each are discussed, as are testing, maintenance and fitting criteria.

**7.7g. Guidance Statements:**

- 7.7g1 ANSI Z88.2-1992 shall be considered to be applicable to the selection, testing, maintenance, storage and use of respiratory protective equipment at the MGR. (Sections 4, 7, 9, 10)

**Guidance Type: B**  
**Guidance Category: SA**

- 7.8a. **Document Type:** IEEE
- 7.8b. **Document No.:** 309-1999
- 7.8c. **Document Date:** 1999
- 7.8d. **Document Rev. No.:** N/A

**7.8e. Document Title:** IEEE Standard Test Procedures and Bases for Geiger-Mueller Counters

**7.8f. Rationale for the Applicability of Guidance:**

Regulatory Guide 8.6 (NRC 1973b) cites ANSI N42.3-1969 (not referenced for guidance purposes) as providing acceptable guidance for testing of Geiger-Mueller (G-M, also Geiger-Muller) type radiation detectors. ANSI N42.3-1969 has been replaced by IEEE 309-1999, *IEEE Standard Test Procedures and Bases for Geiger-Mueller Counters*, and that revision is considered to be potentially applicable to the MGR to the extent that G-M detectors are tested at the repository. The standard is intended to identify testing procedures and conditions such that consistent test results are obtained.

**7.8g. Guidance Statements:**

**7.8g1** If the operating characteristics of G-M detectors are subject to testing at the MGR, the testing guidance and procedures in IEEE 309-1999 should be considered to be applicable to the extent necessary to assure that consistent results are obtained. (Section 1)

**Guidance Type: D**

**Guidance Category: SA**

**8. References:**

The following documents were used in the preparation of this guidance package. For documents that are not readily available through public sources, the Office of Civilian Radioactive Waste Management document accession number (ACC) is provided at the end of the reference.

**8.1 DOCUMENTS CITED**

CRWMS M&O (Civilian Radioactive Waste Management System Management and Operating Contractor) 1999. *Development Plan for Compliance Program Guidance Packages*. TDP-MGR-SE-000004 REV 00. CRWMS M&O. ACC: MOL.19991001.0147.

DOE (Department of Energy) 1998. *Quality Assurance Requirements and Description*. DOE/RW-0333P, REV 8. Washington, D.C: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19980601.0022.

**8.2 CODES, STANDARDS, REGULATIONS, AND PROCEDURES**

10 CFR (Code of Federal Regulations) 20. Energy: Standards for Protection Against Radiation. Readily available.



10 CFR 72. Energy: Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste. Readily available.

ANSI (American National Standards Institute, Inc.) N13.1-1969. *Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities*. New York, New York: American National Standards Institute. TIC: 204994.

ANSI N13.5-1972. *Performance Specifications for Direct Reading and Indirect Reading Pocket Dosimeters for X- and Gamma Radiation*. New York, New York: American National Standards Institute. TIC: 205005.

ANSI N323-1978. *American National Standard for Radiation Protection Instrumentation Test and Calibration*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 231657.

ANSI N13.27-1981. *Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters*. New York, New York: American National Standards Institute. TIC: 246175.

ANSI N323A-1997. *American National Standard for Radiation Protection Instrumentation Test and Calibration, Portable Survey Instruments*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 246397.

ANSI/ANS-57.9-1992. *Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)*. La Grange Park, Illinois: American Nuclear Society. TIC: 3043.

ANSI Z88.2-1992. *American National Standard for Respiratory Protection*. New York, New York: American National Standards Institute. TIC: 233859.

IEEE (Institute of Electrical and Electronics Engineers) 309-1999. *American National Standard and IEEE Standard Test Procedures and Bases for Geiger-Mueller Counters*. New York, New York: Institute of Electrical and Electronics Engineers. TIC: 246174.

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NRC 1973b. *Standard Test Procedure for Geiger-Muller Counters*. Regulatory Guide 8.6 REV 00. Washington, D.C.: U.S. Nuclear Regulatory Commission. Readily available.

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NRC 1975. *Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants*. Regulatory Guide 4.1 REV 01. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 3698.

NRC 1976. *Manual of Respiratory Protection Against Airborne Radioactive Materials*. NUREG-0041. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 205227.

NRC 1977. *Personnel Neutron Dosimeters*. Regulatory Guide 8.14 REV 01. Washington, D.C.: U.S. Nuclear Regulatory Commission. Readily available.

NRC 1978. *Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable*. Regulatory Guide 8.8 REV 03. Washington, D.C.: U.S. Nuclear Regulatory Commission. Readily available.

NRC 1981. *Audible-Alarm Dosimeters*. Regulatory Guide 8.28 REV 00. Washington, D.C.: U.S. Nuclear Regulatory Commission. Readily available.

NRC 1985. *Monitoring and Reporting Radioactivity in Releases of Radioactive Material in Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants*. Regulatory Guide 4.16 REV 01. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 2952.

NRC 1987a. *Design of an Independent Spent Fuel Storage Installation (Dry Storage)*. Regulatory Guide 3.60 REV 00. Washington, D.C.: U.S. Nuclear Regulatory Commission. Readily available.

NRC 1987b. *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*. NUREG-0800. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 203894.

NRC 1989. *Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation or Monitored Retrievable Storage Installation (Dry Storage)*. Regulatory Guide 3.48 REV 01. Washington, D.C.: U.S. Nuclear Regulatory Commission. Readily available.

NRC 1992a. *Air Sampling in the Workplace*. Regulatory Guide 8.25 REV 01. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 238394.

NRC 1992b. *Monitoring Criteria and Methods to Calculate Occupational Radiation Doses*. Regulatory Guide 8.34 REV 00. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 237385.

NRC 1993. *Control of Access to High and Very High Radiation Areas in Nuclear Power Plants*. Regulatory Guide 8.38 REV 00. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 238387.

NRC 1996a. *Standard Review Plan for Spent Fuel Dry Storage Facilities*. NUREG-1567 (Draft Report for Comment). Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 226657.

NRC 1996b. *Codes and Standards and Other Guidance Cited in Regulatory Documents*. NUREG/CR- 5973 REV 03. Washington, D.C.: U.S. Nuclear Regulatory Commission. TIC: 232267.

NRC 1999. *Acceptable Programs for Respiratory Protection*. Regulatory Guide 8.15 REV 01. Washington, D.C.: U.S. Nuclear Regulatory Commission. Readily available.

### **8.3 SOURCE DATA, LISTED BY DATA TRACKING NUMBER**

None used.