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August 12, 1999

Mr. Theodore S. Sherr
Chief, Regulatory and International Safeguards Branch
U.S. Nuclear Regulatory Commission
Two White Flint North 8A33
Washington, D.C. 20555

Reference: Comments on the June, 1999 Draft Version of NUREG-1520 '*Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*': Chapter 4 – Radiation Safety

Dear Mr. Sherr:

The Nuclear Energy Institute (NEI)[1] and its industry members are undertaking detailed reviews of each chapter of the draft Standard Review Plan (SRP) released on June 2, 1999 as part of SECY-99-147. To provide effective guidance on implementation of 10 CFR 70, we believe the SRP should be concisely written and accurately reflect the 'risk-informed, performance-based' regulatory approach incorporated into the Part 70 rule revisions.

Accompanying this letter are NEI's comments on Chapter 4 ('*Radiation Safety*') of the draft SRP. The review is presented in two parts: (i) general comments on the sub-chapter, and (ii) specific language (or stylistic) improvements presented on a red-lined version of the draft SRP sub-chapter. In view of the number and complexity of NEI's proposed improvements, a second copy of SRP Chapter 4 has been prepared from which the red-lined text deletions have been removed. This version of draft

[1] NEI is the organization responsible for establishing unified nuclear industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include all utilities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel fabrication facilities, materials licensees, and other organizations and individuals involved in the nuclear energy industry.

SRP Chapter 4 will enable you to more clearly understand the improvements which NEI is recommending.

NEI is pleased that many improvements to the draft SRP developed in public meetings and workshops and proposed by industry have been incorporated into this latest draft of the SRP. The June, 1999 revision is markedly improved over earlier versions issued in 1998 and we compliment the staff for this accomplishment.

We look forward to working with you and your staff to make NUREG-1520 a clear and concise document that will facilitate implementation of the new provisions of 10 CFR Part 70. Please feel free to contact me should you have any questions concerning the proposed improvements in the attachment to this letter.

Sincerely,

Felix M. Killar, Jr.
Director, Material Licensees and Nuclear Insurance

c. Mr. Marvin S. Fertel
Dr. Carl J. Paperiello, Director NMSS

Ref: I:\Files\Part 70\SRP (June 1999 Version) Cover Letter5.msw

COMMENTS ON THE JUNE, 1999 DRAFT VERSION OF NUREG-1520 '*STANDARD REVIEW PLAN FOR THE REVIEW OF A LICENSE APPLICATION FOR A FUEL CYCLE FACILITY*'

CHAPTER 4: RADIATION SAFETY

I. General Comments

Draft SRP Chapter 4 prescribes very detailed *Acceptance Criteria* for a radiation protection program. NEI has five principal concerns with the June, 1999 revision of this SRP chapter:

(i) **Overly Prescriptive *Acceptance Criteria*:** The proposed regulatory *Acceptance Criteria* far exceed the regulatory authority granted to the NRC in 10 CFR Parts 19, 20 and 70. The *Acceptance Criteria* are weighted towards ensuring compliance with NRC regulatory guidelines, ANSI standards and NRCP reports. While these sources of guidance are helpful in evaluating the acceptability of a radiation safety program, they are not, and should not, be considered as having the same weight as the actual 10 CFR regulations. NEI's concern is that establishment of regulatory *Acceptance Criteria* in this manner, and use of very specific and prescriptive language, will create a pseudo-regulatory environment with which licensees shall have to abide. So as not to exceed its authorized authority, the SRP should not state regulatory *Acceptance Criteria* that are not specifically and directly linked to the controlling regulations. NRC reviewers should be expected to apply professional judgment and use the regulations as the standard against which to establish the acceptability of a radiation protection program. NEI recommends that the *Acceptance Criteria* sections of the SRP be simplified to include only those actual regulatory requirements that are directly and specifically linked to a rulemaking, be goal-oriented and be written with a minimum of prescriptive detail.

(ii) **Incorporation of the Facility ISA**: Draft SRP Chapter 4 should be revised to clearly tie the design of the radiation protection program to the ISA. The draft *Acceptance Criteria* apply blanket criteria to the entire facility (every process and operation) regardless of the differing radiation risks posed by specific processes or operations. The SRP reviewer must focus attention on operations analyzed in the ISA to have accident sequences with potentially significant radiological consequences. Draft SRP Chapter 4 includes a section requiring evaluation of the ISA (§4.4.13). The adequacy of the ISA, as judged by review of the ISA Summary, was performed as an SRP Chapter 3 activity and does not need to be repeated. Furthermore, the reviewer does not review or approve the ISA, but only the

ISA Summary. The erroneous references to the ISA in §§4.3 and 4.4.13 must be corrected. In summary, Chapter 4 should include very clear and unambiguous statements that: (1) the radiation protection program is designed and implemented based on the results of the ISA (as summarized in the ISA Summary), (2) the reviewer should first read those sections of the ISA Summary that address plant operations and accident sequences potentially having radiological impacts, an then evaluate the acceptability of the proposed radiation protection program, and (3) review and approval of neither the ISA nor the ISA Summary is required.

(iii) **Commitments *versus* Prescriptive Performance Criteria**: Other than for existing licensees, an applicant will be unable to provide much of the information now solicited in draft SRP Chapter 4. Chapter 4 should be revised to focus on review of an applicant's license commitments and proposed performance indicators. The SRP should not demand specific details as to how a performance indicator will be met. For example, the draft SRP frequently solicits detailed information on the type, model, range, sensitivity, etc. of various items of equipment. Changing this item of equipment would, therefore, necessitate a license amendment, regardless of its safety significance. There is, firstly, no need for such detailed information by a reviewer and secondly, its inclusion goes against the NRC's 'risk-informed, performance-based' regulatory philosophy that seeks to reduce NRC involvement in a plant's operations to safety-significant issues. SRP Chapter 4 must be written to reflect this regulatory approach in which risk information, reported in the ISA Summary, is used in concert with operating experience and engineering judgment to design an acceptable radiation protection program.

(iv) **Trend Analyses**: The draft SRP requires a licensee to undertake '*trend analyses*' of specific radiation protection parameters within the context of a facility's ALARA program. There is no regulatory requirement for trend analyses. While a prudent plant operator will follow trends, for example, of an individual's performance, the reliability of a piece of equipment or the frequency of radiation exposures, the NRC's only concern should be: "*Are all performance criteria being met*?" An applicant must provide reasonable assurance that the licensee's radiation safety program will meet the detailed performance criteria of 10 CFR Parts 19, 20 and 70. If a performance indicator is exceeded, such violation will be addressed by a licensee's corrective action program. There is no need to undertake the comprehensive '*trend analyses*' required by the SRP. Requiring '*trend analyses*' without specifying the time frame(s) over which the trends are to be examined has little meaning. A one-day trend will differ substantially from a life-of-facility (30 year) trend. Finally, many of the parameters for which the SRP seeks trends are unclear. What exactly does trending of the '*…operation of radiation measurement*

instrumentation…' mean? Such trending is of little safety concern, so long as effective management measures have been selected and implemented as part of the ISA process (e.g. calibration and maintenance in accordance with the manufacturer's recommendations).

(v) **Design Requirements**: Draft SRP Chapter 4 imposes specific design requirements for ventilation systems, regardless of the safety significance of such equipment in differing areas of the facility. Such design requirements may require backfits of existing, licensed facilities. They must be deleted from the SRP

While not a serious concern, the regulatory requirements for each of the twelve areas of review identified in draft SRP Chapter 4, tend to be over-stated. Many of the CFR citations are only peripherally relevant to the topic of review. Others are duplicative and unnecessary. NEI would recommend that only the principal regulatory citation (or citations) for each topic be stated so as to immediately direct the reviewer to the most important regulatory guidance. If the secondary citations remain, NEI recommends that the most important citation(s) be highlighted in some manner.

Consolidation of several of the thirteen areas of review is recommended to simplify the guidance. For example, discussion of the Respiratory Protection Program could consolidate into a single area of review the issues discussed in sections 4.4.5 ('*Ventilation Systems*') and §4.4.6 ('*Air Sampling*'). By combining existing sections §4.4.7 ('*Contamination Control*'). §4.4.8 ('*External Exposure*'), §4.4.9 ('*Internal Exposure*'), §4.4.10 ('*Combining Internal and External Exposure*') into a condensed chapter entitled '*Radiation Surveys and Monitoring Programs*' and omitting the duplicate regulatory citations as well as prescriptiuve detail, the SRP can be appreciably shortened and its guidance significantly clarified.

Several instances exist where inconsistent terminology is used. For example, the draft SRP interchangeably uses the terms '*radiation safety program*' and '*radiation protection program*'. To be consistent with the 10 CFR regulations, the latter term should be used throughout the SRP.

NEI has added one additional area of review to Chapter 4 entitled '*Additional Program Commitments*' to address several additional requirements of 10 CFR 20 that pertain to the radiation protection program. This section addresses, for example, an applicant's commitments to maintain records of the radiation protection program, to report occupational exposures to radiation in excess of the 10 CFR 20 dose limits to the NRC, to prepare annual reports of worker monitoring, to use the plant's corrective action program when required and to perform the required annual review of the content and implementation of the program.

Generally speaking, the draft SRP is well-intentioned, but implementation in its current format will result in creation of new "pseudo regulations" via the back-door, require NRC attention to non safety-significant issues and impose considerable burdens on both the NRC and license applicant that will not enhance facility safety. NEI recommends that draft SRP Chapter 4 be substantially revised to focus the reviewer on assessment of the adequacy of a license applicant's commitments and performance indicators, omit the descriptive and prescriptive prose and requirements, delete peripherally important regulatory citations, consolidate existing sub-chapters and only seek more detailed information for those operations identified in the ISA Summary to have radiological, safety-significant accident sequences. Of greatest importance, however, is the need to emphasize the role of the ISA (as presented in the ISA Summary) as the cornerstone for designing a suitable radiation protection program.

II. Specific Comments

Specific comments are noted on the attached copy of draft SRP Chapter 4.

Ref: I\Files\Part 70\SRP (June 1999 Version) Sec 4.msw

4.0 RADIATION ~~SAFETY~~PROTECTION

4.1 PURPOSE OF REVIEW4.1PURPOSE OF REVIEW

[Comment: Section 4.1 must clearly state that design of the radiation protection (RP) program is based upon the results of the ISA. For example, the results of the ISA will be used to determine which workers need to have their external and/or internal radiation exposures monitored. The ISA was previously evaluated (through review of the ISA Summary) as an SRP Chapter 3 task that incorporated review of those safety-significant accident sequences having potential radiological impacts. A second review of those portions of the ISA Summary pertaining to radiation protection is not expected or required as an SRP Chapter 4 task. However, the reviewer should first acquire familiarity with the ISA Summary, and specifically the processes and areas of the plant where the ISA found a possibility of radiation exposure exceeding the occupational dose limits of 10 CFR 20. The Introduction to §4.1 should also emphasize that the SRP Chapter 4 review must focus on evaluation of an applicant's commitments to design and implement a RP program that will satisfy the performance requirements of 10 CFR Parts 19, 20 and 70. The SRP should allow the applicant to ***commit*** to performance indicators and not seek specific details as to how compliance with a particular indicator will be achieved.]

The purpose of this review is to determine whether the applicant's radiation protection program is adequate to protect the radiological health and safety of workers and to comply with the regulatory requirements in 10 CFR Parts 19, 20, and 70. Design of the radiation protection program is based upon the results of the ISA . The ISA, as summarized in the ISA Summary, was evaluated in SRP Chapter 3 ('*Integrated Safety Analysis (ISA) Commitments and ISA Summary*'). The ISA evaluated and ranked the radiological risks posed by potential accident sequences throughout the facility and assessed the adequacy of items relied on for safety (and complementary management measures) to ensure that the radiation exposure performance criteria of 10 CFR 70.61(b) and (c) are satisfied and that the occupational dose limits of 10 CFR 20 will not be exceeded during normal operations. In addition to examining the suitability of such items relied on for safety, assessment of the adequacy of the radiation protection program also requires examination of an applicant's corporate commitments to worker training, radiation exposure monitoring and minimization to occupational radiation exposures. SRP Chapter 4 encompasses review of the applicant's ***commitments*** to design and implement a corporate radiation protection program and to examine the applicant's proposed ***performance indicators***. The focus of the review is, therefore, on commitments and performance indicators rather than on specific details on how a commitment or performance indicator will be met.

~~The content and level of detail in this chapter is more detailed because this chapter provides acceptance criteria for evaluating compliance with 10 CFR Part 20, which has very specific requirements.~~ Review procedures and acceptance criteria for the applicant's program for protecting members of the public and the control of effluent releases are presented ~~is not included in this chapter, but is~~ in Chapter 9, "Environmental Protection," of this SRP.

4.2 RESPONSIBILITY FOR REVIEW4.2RESPONSIBILITY FOR REVIEW

Primary: Health Physicist

Secondary: Licensing Project Manager, Environmental Reviewer~~, and ISA Reviewer.~~ [Comment: the ISA Summary was reviewed as an SRP Chapter 3 task and does not need to be reviewed a second time. Delete the ISA Reviewer from this assignment.]

Supporting: Fuel Cycle Facility Inspector

4.3 AREAS OF REVIEW4.3AREAS OF REVIEW

[Comment: Implementation of the NRC's '*performance-based*' regulatory approach will necessitate a restructuring of §4.3 to focus on an applicant's commitments and performance indicators rather than on specific details to compliance with applicable regulations. The 'Areas of Review' should direct the reviewer to focus on an applicant's ***commitments*** to design and implement a radiation protection program. The thirteen sub-areas of review contained in draft SRP Chapter 4.3 (pp. 4.0-1 to 4.0-4) can generally be referenced back to one or more of the commitments. To simplify and shorten the SRP, NEI recommends that the descriptions of each sub-area of review in §4.3 be deleted. Each commitment is fully discussed in §4.4 ('Acceptance Criteria') and there is, therefore, no need to retain the repetitive language now contained in draft §4.3. Sub-area number 13 ('*Integrated Safety Analysis (ISA)*' should be deleted in its entirety. The work envisioned in this ISA Review has previously be performed as a Chapter 3 task and need not be repeated again. As noted in NEI's suggested language improvements, the radiation protection program reviewer should initially review processes and accident sequences described in the ISA Summary that have potential radiological impacts so as to ensure that the radiation protection program adequately addresses the adequacy of items relied on for safety and management measures. The detailed review of the proposed radiation protection program can subsequently be undertaken.]

A licensee must develop, document and implement a radiation protection program ~~is required to be established and implemented per~~ in accordance with 10 CFR 20.1101. Additionally, 10 CFR 20.2102 requires the licensee to keep records of the radiation protection program, including description of the program components, audits and other aspects of program implementation. The reviewer should first consult the ISA Summary to identify those facility operations analyzed in the ISA to have radiological consequences and both the items relied on for safety and management measures implemented to prevent or mitigate such radiological risks. The radiation protection program must address these process-specific risks as well as general occupational radiation protection measures.

The staff will review an applicant's commitments pertaining to ~~areas of~~ the radiation protection program ~~that the staff will review include:~~in the following areas:

(1) commitment to establish and maintain a corporate radiation protection program
(2) commitment to keep occupational exposures to radiation as low as reasonably achievable (ALARA)
(3) commitment to appoint radiological protection staff that are suitably qualified and trained in radiation protection and health and safety
(4) commitment to prepare written radiation protection procedures
(5) commitment to train employees in radiation protection, including use of protective devices and protection from exposure to radiation
(6) commitment to design and implement a respiratory protection program including ventilation systems, containment procedures and use of respirators
(7) commitment to conduct radiation surveys and monitoring programs to document radiation levels, concentrations of radioactive materials in the facility and occupational exposures to radiation by workers
(8) commitment to refer to the facility's corrective action program any incidents resulting in occupational exposures to radiation exceeding 10 CFR 20, Appendix B or 10 CFR 70.61 dose limits
(9) commitment to maintain records of radiation protection programs, facility surveys and monitoring of workers

(10) commitment to report to the NRC occupational exposures to radiation exceeding the dose limits stated in 10 CFR 70.61 within the timeframes specified in 10 CFR 70.74 and 10 CFR 20 Subpart M

(11) commitment to review at least annually the content and implementation of the radiation protection program

(12) commitment to evaluate modifications to operating and maintenance procedures and plant equipment that may substantially reduce radiation exposures at a reasonable cost

The reviewer shall then examine the applicant's programs, procedures and performance indicators to implement each of these commitments:

~~As Low As Reasonably Achievable (ALARA), organizational relationships and personnel qualifications, radiation safety procedures and radiation work permits (RWPs), training, ventilation systems, air sampling, contamination control, external exposure, internal exposure, summing internal and external exposures, respiratory protection, and instrumentation. In addition to reviewing the radiation protection program, the staff will also review the radiation safety consequences to workers and associated items relied on for safety that are identified in the applicant's ISA summary and other ISA documentation as needed.~~

~~1. ALARA~~

~~The staff will review the applicant's policy and procedures that are used to ensure that occupational radiological exposures are maintained ALARA including: (a) the organization structure and how units interact to maintain ALARA; (b) internal and external audits; (c) integration with the ISA; and (d) trend analysis to examine the historical patterns of exposures, concentrations of airborne radioactivity, contamination levels, instrumentation performance, respiratory protection equipment performance, and filter performance.~~

~~2. Organizational Relationships and Personnel Qualifications~~

~~The staff will review the applicant's organization of the radiological protection program, the qualification requirements for the radiological protection personnel, and the assignment of specific responsibilities and authorities for key functions.~~

~~3. Radiation Safety Procedures and Radiation Work Permits (RWPs)~~

~~The staff will review the applicant's commitments regarding the need for, the development and control of, and the use of approved written radiation safety procedures and RWPs for activities related to radiological safety.~~

~~4. Training~~

~~The staff will review the applicant's radiological safety training for all personnel who have authorized access to a restricted area. The review will include training objectives, management oversight, methodology of training, who receives the training, a description and the frequency of the training and refresher training, and the effectiveness of the training. Further aspects of training are covered in Section 11.3 of this SRP.~~

~~5. Ventilation Systems~~

The staff will review the applicant's requirements of and operation of the ventilation systems including the minimum flow velocity at hood openings, the types of filters and the maximum differential pressure across filters, and the frequency and types of tests required to measure ventilation system performance.

6. Air Sampling

The staff will review the applicant's radiological air sampling objectives and procedures, including: (a) the frequency and methods of analysis of airborne concentrations, (b) sampling methods and frequency, (c) counting techniques, (d) lower limits of detection for specific radionuclides, (e) action levels and actions to be taken when the levels are exceeded, and (f) location of continuous air monitors (CAMs), if used, and annunciators and alarms associated with CAMs.

7. Contamination Control

The staff will review the applicant's control of radiological contamination within the facility including the types and frequencies of surveys, limits for contamination levels, the methods and choice of instruments used in the surveys, and the action levels and actions to be taken when the actions levels are exceeded. In addition, the staff will review the design features of the facility that control access including: (a) the types and availability of contamination monitoring equipment; (b) specific limits established for personnel contamination; (c) minimum provisions for personnel decontamination; (d) minimum types of protective clothing necessary for individuals to enter restricted areas; (e) technical criteria and levels for defining contamination areas; (f) release criteria for radiological contaminated material, and (g) frequency of periodic reviews of all aspects of access control.

8. External Exposure

The staff will review the applicant's program for monitoring personnel external radiation exposure including the means to measure, assess, and record personnel exposure to radiation. In addition, the staff will review the type, range, sensitivity, accuracy, and frequency for analyzing personnel dosimeters and the action levels and actions to be taken when the actions levels are exceeded.

9. Internal Exposure

The staff will review the applicant's program for monitoring personnel internal radiation exposure, including: (a) the criteria for determining when it is necessary to monitor an individual's internal exposure; (b) methods for determining the worker intake; (c) frequency of analysis; (d) minimum detection levels; and (e) action levels and actions to be taken based on the results.

10. Summing Internal and External Exposure

The staff will review the applicant's program for summing internal and external exposure in order to demonstrate compliance with the dose limits, including the procedure used for assessing worker's exposures in accordance with NRC regulatory requirements.

11. Respiratory Protection

~~The staff will review the applicant's respiratory protection program, including the equipment to be used, the conditions under which respiratory protection will be required for routine and nonroutine operations, the protection factors that will be applied when respirators are being used, and the locations of respiratory equipment within the plant.~~

~~12. Instrumentation~~

[Comment: this paragraph is not needed. The responsibility lies with the applicant to use adequate and sufficient equipment to meet the occupational exposure criteria of 10 CFR 20, Appendix B and 10 CFR 70.61. Detailed information on the selected manufacturer's equipment is irrelevant to the NRC reviewer. As noted earlier, the performance indicators are established; the details of how a particular performance indicator are achieved is the responsibility of the applicant. Maintenance is a management measure addressed adequately in SRP Chapter 11. Delete the prescriptiveness.] ~~The staff will review the applicant's requirements for radiological measurement instrumentation, including the policy for the maintenance and use of operating instrumentation and the types of instruments that are available, including their ranges, counting mode, sensitivity, alarm setpoints, planned use, and frequency of calibration.~~

~~13. Integrated Safety Analysis (ISA)~~

[Comment: the ISA , by means of the ISA Summary, was reviewed as a Chapter 3 task and need not be repeated as a Chapter 4 task] Delete this entire paragraph.].~~In addition to the radiation protection program elements discussed above, the primary reviewer will review a sample of the postulated, higher-risk accidents in the ISA summary and other ISA documentation as needed which have radiation safety consequences for the workers (See Section 3.0, "Integrated Safety Analysis."). At a minimum, the review of the ISA summary and other ISA documentation as needed will include a review of a sample of the higher risk accident sequences that result in worker radiation exposures of concern before any controls are applied. The methodology in assessing the accident consequences, likelihood, and risk index associated with each of these accident sequences will be reviewed. Items relied on for safety established by the applicant to prevent or mitigate each accident sequence, and the levels of assurance applied to the items relied on for safety will be reviewed.~~

4.4 ACCEPTANCE CRITERIA4.4ACCEPTANCE CRITERIA

The applicant's radiation protection program is acceptable if the applicant identifies performance indicators to be used in fulfilling each of the following commitments: ~~provides data and information that meet the acceptance criteria for each element in this section.~~

4.4.1 Commitment to Radiation Protection Program Implementation

4.4.1.1 Regulatory Requirements

Regulations applicable to establishment of a corporate radiation protection program are present in 10 CFR 20.1101 (Subpart B) ('*Radiation Protection Programs*').

4.4.1.2 Regulatory Guidance

NRC regulatory guides applicable to the commitment to design and implement a corporate radiation protection program are:

Regulatory Guide 8.2 February 2, 1973	*Guide for Administrative Practice in Radiation Monitoring*

4.4.1.3 Regulatory Acceptance Criteria

The reviewer will determine that the applicant's corporate radiation protection program commitment is adequate if it fulfills the following criteria:

(1) the applicant commits to design and implement a radiation protection program that meets the regulatory requirements of 10 CFR 20 Subpart B
(2) the applicant outlines a program structure and defines the responsibilities of key program personnel
(3) the applicant commits to staff the program with suitably trained people, to provide sufficient resources and to implement it within an acceptable timeframe prior to operation of the facility
(4) the applicant commits to the independence of the radiation protection function from facility operations
(5) the applicant commits to the overriding importance of radiation safety within the facility's operations
(6) the applicant commits to review, revise and improve, when appropriate, the radiation protection program by means of the ISA to reflect facility changes, new technologies or other process enhancements that could improve the overall program effectiveness

4.4.2 Commitment to ALARA Occupational Exposures ~~4.4.1 ALARA (As Low As Is Reasonably Achievable) 4.4.1ALARA (As Low As Is Reasonably Achievable)~~

4.4.2~~1~~.1 Regulatory Requirements 4.4.1.1 Regulatory Requirements

Regulations applicable to the ALARA program are present in 10 CFR 20.1101 ('*Radiation Protection Programs*')~~the following from Title 10, CFR~~: [Comment: for clarity, NEI suggests limiting regulatory citations to those principal ones (10 CFR 20.1101 and omit the peripheral ones.]

~~1. Section 19.12 "Instructions to workers"~~

~~2. Section 20.1101 "Radiation protection programs"~~

~~3. Section 20.2102 "Records of radiation protection programs"~~

~~4. Section 20.2110 "Form of records"~~

~~5. Section 20.2105 "Records of Planned Special Exposures"~~

4.4.2~~1~~.2 Regulatory Guidance 4.4.1.2 Regulatory Guidance

NRC regulatory guides applicable to the ALARA program ~~that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.1.1~~ are:

atory Guide 8.2 *Guide for Administrative Practice in Radiation*
February 2, 1973 *Monitoring*

atory Guide 8.10, *Operating Philosophy for Maintaining Occupational*
Rev. 1-R, May 1977 *Radiation Exposures As Low As Is Reasonably Achievable*

atory Guide 8.13, Rev. 3 *Instructions Concerning Prenatal Radiation*
Draft DG 8014, October 1994 Exposure

atory Guide 8.29 *Instructions Concerning Risks from Occupational*
February 1996 *Radiation Exposure*

4.4.2~~1~~.3 Regulatory Acceptance Criteria 4.4.1.3 Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitment to keep occupational exposures to radiation ALARA ~~program~~ is acceptable if it fulfills the following criteria:

(1) the applicant commits to prepare policies and procedures to ensure occupational radiation exposures are maintained ALARA and that such exposures are consistent with the requirements of 10 CFR 20.1101
(2) the applicant commits to outline specific program goals, to propose a program organization and structure and to detail procedures for its implementation in plant design and operations
(3) the applicant commits to staff the ALARA program with sufficient staff, resources and clear responsibilities to ensure that the occupational radiation exposure dose limits of 10 CFR 20 are not exceeded under normal operations
(4) the applicant commits to use the ALARA program as a mechanism to facilitate interaction between radiation protection and operations personnel to apply the program's principles to facility operations
(5) the applicant commits to regularly reviewing and revising, when appropriate, the ALARA program goals and objectives to incorporate new approaches, technologies, operating procedures or changes to the ISA

~~(1) the applicant commits to a comprehensive, effective, and written ALARA program; (2)~~ [Comment: The entire write-up provided for the ALARA area of review presumes the establishment of an "*ALARA Committee*". An "*ALARA Committee*" is not required to facilitate interaction between radiation protection personnel and production personnel. There are other ways this interaction can be fostered. Issues regarding ALARA can be addressed by the Radiation Safety program directors or corporate management in the absence of a committee. Too prescriptive. Delete.] ~~the ALARA committee is evidenced by an organizational structure in which radiation protection personnel interact, in a timely manner, with production personnel to ensure that methods and techniques for reducing occupational radiation exposure are incorporated in facility operation and design; (3) the ALARA committee, or other similar safety committee, is responsible for conducting periodic reviews of the radiation protection program at least annually and documenting their results. The committee's membership includes management representatives of radiation protection, environmental, safety, and production; (4) the ALARA committee considers the ISA in determining whether further reduction in occupational radiation exposures are reasonable;~~[Comment: this is not the function of an ISA – "…*to determine whether further reductions…are reasonable*"] ~~and (5) the recommendations of the ALARA committee are documented and tracked to completion.~~

[Comment: there is no regulatory requirement to perform 'trend analysis'. The draft SRP fails to specify over what intervals the trend analyses would have to be conducted. Trends over a one week period could differ substantially from those over the life-of-plant and may be meaningless in the absence of a specified timeframe. So long as the radiation protection program performance criteria are being satisfied, trends should not need to be analyzed or reported to the NRC. The safety impact of documenting trend analyses is not apparent.] ~~The committee's review includes evaluation of the results of audits made by the radiation protection organization, reports of radiation levels, contamination levels, employee exposures, waste management, and effluent releases. The review determines:~~

ers or types of

1. ~~operations, or effluent releases.~~

th the ALARA

2. ~~concept.~~[Comment: ALARA is a pursuit or goal of excellence. It is impractical to have all exposures at all times be ALARA.]

aintained, and

3. ~~inspected.~~[Comment. Not needed. Reports of inspections, use and maintenance of equipment should not have to be reported to a committee or to management. The effects of proper operation are reflected in the effluent and exposure analytical results.]

~~Trend analysis is performed in the following areas:~~

s of the public.

1. ~~Trends in plant areas.~~

quid effluents.

2. ~~Trends on equipment.~~

on equipment.

3. ~~Trends in instrumentation.~~[Comment: what is meant by trend analysis of this term? Definition needed.]

on equipment.

4. ~~Trends~~ [Comment: what is meant by trend analysis of this term? Definition needed.]

ation systems.

5. ~~Trends~~ [Comment: what is meant by trend analysis of this term? Definition needed.]

4.4.3~~2~~ Organization ~~al Relationships~~and Personnel Qualifications4.4.2 Organizational Relationships and Personnel Qualifications

[Comment: Organization and administration of the licensed facility – including the reporting hierarchy for radiation protection programs -- are also assessed as an SRP Chapter 2 task. References to SRP Chapter 2 should be made when appropriate.]

4.4.3~~2~~.1 Regulatory Requirements4.4.2.1Regulatory Requirements

Regulations applicable to the organization ~~organizational relationships~~ and ~~personnel~~ qualifications of the radiological protection staff are presented in 10 CFR 70.22 (“Contents of Applications”)~~the following from Title 10CFR~~:

Section ~~7~~10.22 ~~"Contents of applications."~~

Section ~~7~~20.23 ~~“Requirements for the approval of applications”~~

4.4.3~~2~~.2 Regulatory Guidance 4.4.2.2Regulatory Guidance

NRC regulatory guides applicable to the organization~~organizational relationships~~ and personnel qualifications of radiation protection program staff ~~that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.2.1~~ are:

atory Guide	18.2	*"Guide for Administrative Practice in Radiation*
	February 1973	*Monitoring"*
atory Guide	28.10,	*"Operating Philosophy for Maintaining Occupational*
	Rev. 1-R, May 1977	*Radiation Exposures As Low As Is Reasonably Achievable"*

4.4.3~~2~~.3 Regulatory Acceptance Criteria 4.4.2.3Regulatory Acceptance Criteria

[Comment: this paragraph is unnecessarily prescriptive in specifying the qualifications for radiation protection personnel. There are many diverse ways to achieve the desired level of qualification without, for example, meeting the education requirements specified in points (1)-(3) below. For example, an individual trained in the nuclear navy as reactor operator and who subsequently earns a bachelors degree in science would not meet the “*5-years qualification as a Health Physicist*” criterion, but could most certainly serve as a knowledgeable, experienced radiation protection officer. The detailed qualifications criteria (below) must be deleted. The responsibility must lie with facility management to establish what educational or equivalent experience levels are appropriate for radiation protection personnel.]

The reviewer will determine that the applicant’s commitment to organize and staff a radiation protection program is~~The reviewer will determine that the applicant’s radiation safety program organizational relationships and personnel qualifications are~~ acceptable if it~~they~~ fulfills the following criteria:

(1) the applicant commits to appoint radiation protection personnel and to identify ~~identifies and includes~~ the authority and responsibility of each position ~~identified~~;

(2) the applicant commits to establish ~~describes the~~ organizational relationships amongst ~~that are to exist between~~ the individual positions responsible for the radiation protection~~safety~~ program and other line managers

~~(3) the Plant Manager, or equivalent, has overall responsibility and authority for safety;~~ [Comment: all officers of the operation have responsibility for safety. Too prescriptive.]

~~(3)~~ (4) the applicant commits to designate a radiation protection program director (typically referred to as the Radiation Safety Officer) who will be responsible ~~The Radiation Safety Manager, or equivalent, has direct responsibility~~ for establishing and implementing the radiation protection program ~~and has direct access to the Plant Manager;~~

~~(4)~~ (5) the applicant commits to assign responsibility to the radiation protection program staff ~~Radiation Safety Specialist(s) are responsible~~ for implementation of program

functions ~~specific activities assigned to the radiation safety program with radiation safety technicians implementing these functions. Certain radiation safety technical support and/or audit activities may be supplied by qualified off-site corporate or consultant organizations.~~

(5) the applicant commits to specify minimum training requirements and qualifications for the radiation protection staff

[Comment: the educational requirements specified in the following three points are too prescriptive and fail to acknowledge an individual's practical experience. The responsibility for fixing minimum educational and practical experience qualifications for radiation protection staff should be developed and proposed by the licensee. Delete these requirements.] ~~Radiation Protection personnel meet the following education and experience criteria:~~

least 5 years ~~1.~~ ~~experience as a Health Physicist, and at least 1 year of experience as a Health Physicist in a uranium fuel fabrication facility.~~

ear of applied ~~2.~~ ~~health physics experience at a nuclear facility.~~

n a technician ~~3.~~ ~~trainee program.~~

4.4.4~~3~~ Commitment to Written Procedures ~~Radiation Safety Procedures and Radiation Work Permits (RWPs)~~ ~~4.4.3Radiation Safety Procedures and Radiation Work Permits (RWPs)~~

4.4.4~~3~~.1 Regulatory Requirements 4.4.3.1Regulatory Requirements

The regulations applicable to radiation protection ~~approved operating~~ procedures and Radiation Work Permits (RWPs) are presented in 10 CFR 70.22(8) ('Content of Applications') ~~the following from Title 10, CFR:~~

~~1. Section 70.22 "Contents of applications"~~

~~2. Section 70.23 "Requirements for the approval of applications"~~

4.4.4~~3~~.2 Regulatory Guidance 4.4.3.2Regulatory Guidance

Regulatory guidance applicable to procedures and RWPs ~~that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.3.1.~~ is Regulatory Guide 8.10, Rev., 1-R, May 1977, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable."

4.4.4~~3~~.3 Regulatory Acceptance Criteria 4.4.3.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitment to prepare written radiation protection~~safety~~ procedures and RWPs are acceptable if they fulfill the following criteria:

~~(1)~~ (1) the applicant commits to prepare written, approved radiation protection~~safety~~ procedures ~~and RWPs are used~~ to carry out activities related to the radiation protection~~safety~~ program

(2) the applicant specifies how all written radiation protection procedures will be prepared, authorized and approved~~.~~

(3) the applicant commits to review, revise and update the radiation protection procedures periodically and to incorporate any facility or operational changes or changes to the facility's ISA~~and the procedures and RWPs are reviewed, revised, and updated periodically~~
(4) the applicant commits to distribute current radiation protection procedures to facility workers who work with licensed material
(5) the applicant commits to prepare written procedures for the use of RWPs for activities involving licensed material. RWP procedures should define authorized activities, approval procedures, information requirements, period of validity, expiration and termination procedures, safety procedures and record-keeping requirements~~(2) a mechanism for providing a current copy of the procedures to personnel is established; (3) procedures are reviewed and approved by the Radiation Safety Manager, or an individual who has the qualifications of the Radiation Safety Manager, and at intervals no longer than every 2 years, the procedures are revised and updated as necessary; (4) the applicant makes a commitment to use special reviews and approvals before conducting an activity involving licensed materials with an RWP that is not covered by a written radiation safety procedure (5) the applicant specifies how the determination is made to use an RWP, the positions within the organization authorized to approve and issue an RWP, the types of information that will be included in an RWP, informationthe provisions for updating and terminating an RWP, and the records to be kept for the RWPs; (6) the applicant specifies the levels of approval necessary for an RWP before it can become effective and that the RWP is approved and signed by a supervisor or specialist in radiation protection; (7) approvals are required from other involved groups unnecessarycostlyto ensure that the provisions of the RWP cover all potential hazards and that the operations are conducted according to proper standards; and (8) the applicant commits to a system that ensures that RWPs are not used past their termination dates. The system includes what types of records are to be kept, the retention times for these records, and the final disposition of the RWP. The record system is sufficient to allow independent auditors to reconstruct the circumstances necessitating the RWP, the factors included, and the results.~~

~~The applicant commits to using RWPs for specific purposes only and RWPs are reissued when significant changes in the task or changes that affect the safety of the worker are made. The applicant states that the RWP includes a list of the safety requirements for work conducted under the authorization and includes at least the following, as applicable: (1) the type and frequency of personal monitoring to be conducted; (2) the total time allotted for the authorization; (3) special shielding or ventilation to be used; (4) personal protective equipment; (5) work limitations; (6) radiological conditions; and (7) special instructions.~~

4.4.5~~4~~ Training4.4.4Training

An applicant's commitments to employee training are addressed in SRP Chapters 4 and 11. SRP Chapter 4 addresses corporate radiation protection training programs, while SRP Chapter 11 addresses training which serves as a management control to ensure that an administrative control (or item relied on for safety) is available and reliable when required. Administrative control items relied on for safety may or may not pertain to accident sequences having potential radiological consequences,

4.4.5~~4~~.1 Regulatory Requirements4.4.4.1Regulatory Requirements

Regulations applicable to the radiation safety training program are the following from Title 10, CFR:

1. Section 19.12 "Instructions to workers"

2. Section 20.2110 "Form of records"

4.4.5~~4~~.2 Regulatory Guidance 4.4.4.2Regulatory Guidance

NRC regulatory guides and ~~ANSI and~~ American Society for Testing and Materials (ASTM) standards pertaining to radiation protection training ~~provide information, recommendations and guidance, and, in general, describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.4.1.~~ are:

1.	Regulatory Guide 8.10, Rev. 1-R May 1977	*"Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable"*
2.	Regulatory Guide 8.13, *Draft DG-801 proposed* R-3 October 1994	*"Instructions Concerning Prenatal Radiation Exposure"*
3.	Regulatory Guide 8.29, *Draft DG-8012 proposed* R-1 December 1994	*"Instructions Concerning Risks from Occupational Radiation Exposure"*
4.	ASTM C986-89 Reapproved 1995	"Developing Training Programs in the Nuclear Fuel Cycle"
5.	ASTM E1168-95	"Radiological Protection Training for Nuclear Facility Workers"

4.4.5~~4~~.3 Regulatory Acceptance Criteria 4.4.4.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitment to train its employees in radiation protection ~~training program~~ is acceptable if it fulfills the following criteria:

(1) the applicant commits to design and implement an employee radiation protection training program that complies with the requirements of 10 CFR Parts 19 and 20

(2) the applicant commits to grade the comprehensiveness of an individual's radiation protection training to reflect the potential radiological health risks associated with that employee's work responsibilities

(3) the applicant commits to provide training to ~~(1)~~ all personnel and visitors entering restricted areas that is commensurate with the health risk to which they may be exposed~~either receive training in radiation protection or are escorted by an individual who has received such training;~~ [Comment: this requirement is too prescriptive. For example, a plant visitor making a brief visit does not need to know the radiation exposure dose limit to the lens of the eye. It is sufficient to say "…*Radiation protection training is commensurate with the health risk*…". The SRP should be written in "risk-informed"]

(4) the applicant commits to incorporate in the radiation protection training program instruction in topics such as:

- correct handling of radioactive materials
- minimization of exposures to radiation and/or radioactive materials,
- ~~(2) the technical content of the training program is commensurate with the potential radiological health protection problems in the restricted area and meets the requirements of 10 CFR Parts 19 and 20; (3) the training covers the following areas, as appropriate, in sufficient depth~~

for the specific types of functions: (a) access and egress controls and escort procedures;

- (b) radiation safety principles, policies, and procedures;
- (c) monitoring for internal and external exposures; (d) personnel dosimeters
- (e) monitoring instruments;
- (f) contamination control, including protective clothing and equipment; (g) radiation area and airborne radioactive area; (h) use, storage, and transfer of radioactive materials; (i) posting and labeling requirements;
- (j) ALARA and exposure limits;
- (k) radiation hazards and health risks; (l) practical training; and
- (m) emergency response requirements for individuals

(15) the applicant commits to revising the radiation protection training programs and to conducting refresher training to address all safety-significant changes in policies, procedures, requirements and facilities and in the facility ISA; (4) refresher training is completed not later than 2 years [Comment: why 2 years? The licensee should establish the frequency of training and testing. Retraining should not be mandated if the individual is able to demonstrate competency, for example, through testing or work experience and performance. Not all training and re-training requires a test.] following the most recent training and consists of a condensed version of the initial training, with emphasis on changes in policies, procedures, requirements, and facilities;

(16) the applicant commits to implement procedures to evaluate and (5) the effectiveness and adequacy of the training program is evaluated by written tests or other methodologies and includes evaluation of the curriculum and instructors the instructor's qualifications.

4.4.65 Respiratory Protection Program Ventilation Systems 4.4.5Ventilation Systems

[Comment: NEI recommends consolidation of two areas of review (§4.4.5 '*Ventilation Systems*' and §4.4.11 '*Respiratory Protection*' into a single area of review entitled 'Respiratory Protection Program'. The regulatory citations for both are identical.]

4.4.65.1 Regulatory Requirements 4.4.5.1Regulatory Requirements

Regulations applicable to a respiratory protection program for the ventilation system are presented in 10 CFR 20, Subpart H ('*Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas*'). the following from Title 10, CFR:

1. Section 20.1701 *Use of process or other engineering controls*

2. Section 20.2110 *Form of records*

4.4.65.2 Regulatory Guidance 4.4.5.2Regulatory Guidance

NRC regulatory guides, ANSI standards, and National Council on Radiation Protection and Measurements (NCRP) report applicable to the design of a respiratory protection program regulatory requirements related to the ventilation system that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.5.1. are:

1.	Regulatory Guide 8.24, Rev. 1 October 1979	*"Health Physics Surveys during Enriched Uranium-235 Processing and Fuel Fabrication"*
2.	ANSI N510-1980	"Testing of Nuclear Air Cleaning Systems"
3.	ERDA 76-21	"Nuclear Air Cleaning Handbook," C. A. Burchsted, A. B. Fuller, J. E. Kahn
4.	NCRP Report No. 59 December 15, 1978	"Operational Radiation Safety Program"
5.	Regulatory Guide 8.15	*Acceptable Programs for Respiratory Protection*
6.	ANSI Z88.2-1992	*Practices for Respiratory Protection*

4.4.65.3 Regulatory Acceptance Criteria4.4.5.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitments to implement a respiratory protection program ~~ventilation systems~~ are acceptable if they fulfill the following criteria:

(1) the respiratory protection program meets the requirements of 10 CFR Part 20, Subpart H
(2) the applicant commits to installation of appropriately-sized ventilation systems in areas of the plant identified in the ISA Summary as having the potential to expose workers to radiation or licensed material and to provide reasonable assurance that the air concentrations of radionuclides will not exceed the occupational, derived air concentration values specified in 10 CFR Part 20, Appendix B during normal operations.
(3) whether or not the ventilation system is classified in the ISA Summary as an item relied on for safety (e.g. for an airborne radioactive area), the applicant describes appropriate management measures, including preventive and corrective maintenance and performance testing, to ensure that the system operates when required and within its design specifications
(4) the applicant commits to implement additional procedures, as may be required by the ISA Summary, to control the concentration of radioactive material in air (e.g. control of access, limitation of exposure times to licensed materials, use of respiratory protection equipment)
(5) the applicant commits to prepare written procedures for the selection, fitting, issuance, maintenance, testing, training of personnel, monitoring and recordkeeping for individual respiratory protection equipment and for specifying when such equipment is to be used
(6) the applicant commits to design and undertake an air sampling program in areas of the plant identified in the ISA Summary where the radiation occupational dose limits could potentially be exceeded, to conduct air surveys and to calibrate and maintain the sampling equipment in accordance with the manufacturers' recommendations
(7) the applicant commits to refer to the facility's corrective action program any incident that results in an occupational exposure to radiation that exceeds the dose limits in 10 CFR 20 - Appendix B or 10 CFR 70.61 and to report to the NRC both the corrective action taken (or planned) to ensure against a recurrence and schedule to achieve compliance with the applicable license condition(s)
(8) the applicant commits to maintain records of the respiratory protection program including program provisions, audits and reviews of the program content and implementation and respiratory protection equipment training and maintenance

(9) the applicant commits to revising the written procedures for use of individual respiratory protection equipment to reflect processing, facility or equipment changes or changes to the ISA

[Comment: the following Acceptance Criteria are unnecessarily prescriptive. The Acceptance Criteria should focus on commitments and on performance indicators, rather than on specific details explaining how a performance criterion will be met. For example, the detail required in (2) on filter specifications should not be included in the license as a license amendment would be required to change the type of filter – not a safety-significant regulatory concern.] ~~(1) the applicant commits to a policy for designing and operating the ventilation systems in the facility in a manner that protects workers and the public from airborne radioactive material and assures that the limits of 10 CFR Part 20 are not exceeded during normal operations; (2) the applicant specifies criteria for the ventilation systems, including minimum flow velocity at openings of hoods, maximum differential pressure across filters, and types of filters to be used, where applicable; (3) the applicant specifies the frequency and types of tests required to measure ventilation system performance, the acceptance criteria, and the actions to be taken when the acceptance criteria are not satisfied; (4)~~ [Comment: the following are just management measures.]~~the applicant describes the maintenance, QA, fire safety, criticality safety, and chemical process safety activities associated with the ventilation systems' structures, systems, and components that are identified in the ISA summary as items relied on for safety; (5) airflow patterns are from areas of lesser contamination potential to areas of greater contamination potential; and (6) engineering controls are used to limit the intake of radioactive material, including portable filtration systems~~ [Comment: the decision to use portable ventilation systems should be left to the plant operators – not a license commitment.]. ~~used to control airborne contaminants and containment structures to protect personnel working in adjacent areas, when feasible.~~

4.4.76 Radiation Surveys and Monitoring Programs ~~Air Sampling~~4.4.6Air Sampling

[Comment: NEI recommends that SRP Chapter §4.4.7 be renamed '*Radiation Protection Surveys and Monitoring Programs*' to incorporate all of the surveys now detailed in §4.4.6 ('*Air Sampling*'), §4.4.7 ('*Contamination Control*'), §4.4.8 ('*External Exposure*'), §4.4.9 ('*Internal Exposure*') and §4.4.10 ('*Summing Internal and External Exposure*'). This recommended consolidation will appreciably shorten SRP Chapter 4 through deletion of duplicative regulatory citations and prescriptive detail and yet not detract from the survey and monitoring program objectives.]

Radiation surveys are conducted for two purposes: (1) to ascertain radiation levels, concentrations of radioactive materials and potential radiological hazards that could be present in the facility, and (2) to detect contamination of plant equipment from leaks, spillage or process upsets. Radiation surveys will focus on those areas of the plant identified in the ISA Summary where the occupational radiation dose limits could potentially be exceeded. Survey measurements of airborne radioactive material and bioassays are used to determine that internal and external occupational exposures to radiation do not exceed the dose limits specified in 10 CFR 20 - Subpart C or 10 CFR 70.61. The results of contamination surveys in areas of the plant identified in the ISA Summary as more likely to have contamination can be used to initiate clean-up activities and to establish appropriate procedures to protect worker health and safety.

4.4.76.1 Regulatory Requirements4.4.6.1Regulatory Requirements

NRC regulations applicable to radiation surveys and monitoring programs ~~the air sampling/monitoring program~~ are the following from Title 10, CFR Part 20:

[Comment: NEI recommends that only the most applicable regulatory citations be included in this listing. The peripheral citations (e.g. form of records, caution signs, etc.) are really not essential in this section, but will, of course, be addressed in an applicant's commitments.]

1. Part F *Surveys and Monitoring*

2. Part C *Occupational Dose Limits*

3. Part L *Records*

4. Part M *Reports*

~~1. Section 20.1204 *Determination of internal exposure*~~

~~2. Section 20.1703 *Use of individual respiratory protection equipment*~~

~~3. Section 20.1902 *Posting requirements of airborne radioactive areas*~~

~~4. Section 20.2103 *Records of surveys*~~

~~5. Section 20.2110 *Form of records*~~

~~6. Section 20.2203(a)(3)(i) and (ii), (b), and (d) *Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the limits*~~

4.4.7~~6~~.2 Regulatory Guidance 4.4.6.2Regulatory Guidance

NRC regulatory guides, NUREGs, and ANSI standards applicable to radiation surveys and monitoring programs ~~the air sampling/monitoring program that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.6.1.~~ are:

1. Regulatory Guide 8.2 February 1973 *"Guide for Administrative Practice in Radiation Monitoring"*

2. Regulatory Guide 8.4 February 1973 *Direct-Reading and Indirect-Reading Pocket* Dosimeters

3. Regulatory Guide 8.7, *Rev. 1 June 1992* *Instructions for Recording and Reporting Occupational Radiation Exposure Data*

4. Regulatory Guide 8.9, *Rev. 1* July 1993 *Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program*

5~~2~~. Regulatory Guide 8.24, Rev. 1 October 1979 "Health Physics Surveys During Enriched *Uranium-235 Processing and Fuel Fabrication"*

6~~3~~. Regulatory Guide 8.25, Rev. 1 June 1992 *"Air Sampling in the Workplace"*

7.	Regulatory Guide 8.34 July 1992	*Monitoring Criteria and Methods to Calculate Occupational Radiation Doses*
8~~4~~.	NUREG-1400 September 1993	*"Air Sampling in the Workplace"*
9~~5~~.	ANSI N13.1-1969 Rffirmed 1993	*"Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities"*
10.	ANSI N328-1978	*Radiation Protection Instrumentation Test and Calibration*
11.	ANSI N13.11-1983	*Dosimetry-Personnel Dosimetry Performance-Criteria for Testing*
12.	ANSI N13.15-1985	*Radiation Detectors-Personnel Thermoluminescence Dosimetry Systems-Performance*
13.	ANSI.HPSN 13.22, 1995	*"Bioassay Program for Uranium"*
14.	ANSI N13.27-1981	*Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters*
15.	ANSI.HPSN 13.30, 1996	"Performance Criteria for Radiobioassay"
16.	ANSI N13.6-1966 Reaffirmed 1989	"Practice for Occupational Radiation Exposure *Records Systems"*

4.4.7~~6~~.3 Regulatory Acceptance Criteria 4.4.6.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitments to implement radiation surveys and monitoring programs are ~~air sampling program is~~ acceptable if they~~it~~ fulfill~~s~~ the following criteria:

(1) the radiation surveys and monitoring programs are consistent with the requirements of 10 CFR 20 - Subpart F
(2) the applicant commits to prepare written procedures for radiation survey and monitoring programs that outline, based upon the results of the ISA, program objectives, sampling procedures, data analysis methods, types of equipment and instrumentation to be used, frequency of measurements, recordkeeping and reporting requirements, and actions to be taken when exposure measurements exceed 10 CFR 20 occupational dose limits or permissible contamination levels established by the applicant
(3) the applicant commits to use radiation survey and monitoring programs consistent with the results of the ISA to monitor occupational radiation levels, concentrations of radioactive material and potential radiological hazards in the facility
(4) the applicant commits to design and implement a personnel monitoring program for external occupational radiation exposures based on the results of the ISA that outlines methods or procedures to:

- measure, assess and record personnel exposure to radiation
- identify the types of radiation to be monitored

- identify the type and sensitivity of individual monitoring devices to be used
- specify when personal dosimeters are to be used
- interpret dosimetry results
- identify specific exposure levels at which corrective actions are to be taken

(11) the applicant commits to design and implement a personnel monitoring program for internal occupational radiation exposures based on the results of the ISA that outlines methods or procedures to:

- identify workers to included in the program
- identify the type and frequency of measurements and analyses
- determine worker intake from airborne radioactive materials, quantities of radionuclides in the body and quantities of radionuclides excreted from the body
- interpret the analytical results
- identify radionuclide concentration levels at which corrective actions are to be taken
- ensure the precision and accuracy of the program bioassay measurements

(18) the applicant commits to comply with the requirements of 10 CFR 20.1202 for summation of external and internal occupational radiation exposures through use of procedures such as those outlined in Reg. Guide 8.7 or 8.34

(19) the applicant commits to implement air sampling programs to measure occupational does from airborne radioactivity in work areas defined in the ISA Summary~~(1) the applicant commits to provide representative air sampling for all areas~~ to possibly have~~in which a potential exists for~~ airborne radioactive materials, using acceptable methods and instrumentation and at a frequency appropriate to the potential health risk.

(20) the applicant commits to implement bioassay programs to ascertain the intake of radionuclides into the body (e.g. by oral ingestion, skin absorption, wounds)~~;~~ ~~(2) the air sampling data is provided that demonstrates exposures do not exceed established limits and that exposures are maintained ALARA; (3) the applicant provides for each work area a determination that the frequency for analyzing the airborne level of radioactivity, the counting techniques, and the method for determining the airborne concentration are adequate~~;

(21) the applicant commits to conduct contamination survey programs in areas of the plant identified in the ISA Summary to have a greater possibility of radiological contamination to document both removable and fixed contamination

(22) the applicant commits to use equipment and instrumentation with sufficient sensitivity to the type(s) of radiation being measured for quantitative radiation measurements and to calibrate and maintain such equipment and instrumentation in accordance with the manufacturers' recommendations ~~(3) the calibration methods and frequencies that ensure proper operation of the instrumentation, including the operation of flow rate meters, and the calculations of airborne concentrations, in various areas, to obtain the airborne levels, are described;~~

(23) the applicant commits to establish policies to ensure equipment and materials removed from an area identified to be contaminated are not contaminated above specified release levels

(24) the applicant commits to refer to the facility's corrective action program any instances in which the results of personnel monitoring or a contamination survey exceed the permissible personnel contamination levels (clothing, skin, bioassay) of 10 CFR 20 or permissible contamination levels established by the licensee, to investigate and document as to source, probable cause and other pertinent information, prepare records of the investigation and document any corrective actions that were taken or which are planned ~~(4) the application contains a description of action levels, alarm setpoints, frequency of measurements, and action to be taken when action levels are exceeded; (5) the application includes a description of where CAMs are used, the readouts, annunciators, and alarms; and (6) the applicant demonstrates that the action levels used are based on appropriate technical criteria to determine the necessary controls. The demonstration includes the minimum detectable activities (MDAs) for the specific radionuclides of interest.~~

(25) the applicant commits to reporting to the NRC within the timeframes established in 10 CFR Part 20 - Subpart M or 10 CFR Part 70.74 any releases of radioactive material or exposures of workers to radiation exposure doses exceeding the permissible levels of 10 CFR 20.

4.4.8 Additional Program Commitments

4.4.8.1 Regulatory Requirements

Regulations applicable to the reporting and record-keeping requirements of the radiation protection program, to its revision and to implementation of corrective actions are described in Title 10, CFR:

1.	Subpart L	"Records"
2.	Subpart M	"Reports"
3.	Section 70.61	"Performance Requirements"
4.	Section 70.74	"Additional Reporting Requirements"

4.4.8.2 Regulatory Guidance

There are no NRC regulatory guidelines applicable to these additional program requirements.

4.4.8.3 Acceptance Criteria

The reviewer will determine that the applicant's commitments to report, maintain records, revise the program and to refer issues for corrective action are acceptable if they fulfill the following criteria:

(1) the applicant commits to maintain records of the radiation protection program, including program provisions, audits and reviews of the program content and implementation, radiation survey results (air sampling, bioassays, external exposure data from monitoring of individuals, internal intakes of radioactive material), results of corrective action program referrals, RWPs and planned special exposures

(2) the applicant commits to report to the NRC within the timeframes specified in 10 CFR 20.2202 and 10 CFR 70.74 any event that resulted in an occupational exposure to radiation

exceeding the 10 CFR 20 dose limits or a release of licensed material that could have resulted in an intake exceeding the annual occupational intake limit

(3) the applicant commits to preparing and submitting to the NRC an annual report of the results of individual monitoring as required by 10 CFR 20.2206(b)

(4) the applicant commits to refer to the facility's corrective action program any incident that results in an occupational exposure to radiation that exceeds the dose limits in 10 CFR 20 - Appendix B or 10 CFR 70.61 and to report to the NRC both the corrective action taken (or planned) to ensure against a recurrence and the proposed schedule to achieve compliance with the applicable license condition(s)

(5) the applicant commits to review at least annually the content and implementation of the radiation protection program as required by 10 CFR 20.1101(c)

(6) the applicant commits to use the ISA procedure to evaluate modifications and improvements to the radiation protection program that would reduce potential radiation exposures at a reasonable cost.

~~**4.4.7 Contamination Control**~~4.4.7Contamination Control

[Comment: the contents of §4.4.7 have been incorporated into the new §4.4.7 '*Radiation Surveys and Monitoring*' section. A few specific comments on the content of the old section are noted below. Regulatory citations and references have been consolidated.]

~~**4.4.7.1 Regulatory Requirements**~~4.4.7.1Regulatory Requirements

~~NRC regulations applicable to the contamination control program are the following from Title 10, CFR:~~

~~1.~~	~~Section 20.1501(a)(2)(ii) and (iii)~~	~~"Surveys and Monitoring - General"~~
~~2.~~	~~Section 20.1703(a)(3)(ii)~~	~~"Use of individual respiratory protection equipment"~~
~~3.~~	~~Section 20.1901~~	~~"Caution signs"~~
~~4.~~	~~Section 20.1902(e)~~	~~"Posting requirements"~~
~~5.~~	~~Section 20.1904~~	~~"Labeling containers"~~
~~6.~~	~~Section 20.1906~~	~~"Procedures for receiving and opening packages"~~
~~7.~~	~~Section 20.2103~~	~~"Records of surveys"~~
~~8.~~	~~Section 20.2110~~	~~"Form of records"~~
~~9.~~	~~Section 20.2203(a)(3)(i) and (ii), and (b)~~	~~"Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the limits"~~

~~**4.4.7.2 Regulatory Guidance**~~4.4.7.2Regulatory Guidance

~~NRC regulatory guides, NRC Branch Technical Positions, and ANSI standards applicable to the contamination control program that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.7.1 are:~~

1. Regulatory Guide 8.1 February 1973 — *Radiation Symbol*

2. Regulatory Guide 8.2 February 1973 — *Guide for Administrative Practice in Radiation Monitoring*

3. Regulatory Guide 8.24, Rev. 1 October 1979 — *Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication*

4. ANSI N328-1978 — *Radiation Protection Instrumentation Test and Calibration*

5. ANSI N512-1974, Appendix A — *Protective Coatings (Paints) for the Nuclear Industry*, *Leak Test Methods*

6. ANSI N542-1977 — *Sealed Radioactive Sources Classification*

7. NRC Branch Technical Position — *License Condition for Leak Testing Sealed Byproduct Material Sources, April 1993*

8. NRC Branch Technical Position — *License Condition for Leak Testing Sealed Plutonium Sources, April 1993*

9. NRC Branch Technical Position — *License Condition for Plutonium Alpha Sources, April 1993*

10. NRC Branch Technical Position — *License Condition for Leak Testing Sealed Source Which Contains Alpha and/or Beta-Gamma Emitters, April 1993*

11. NRC Branch Technical Position — *License Condition for Leak Testing Sealed Uranium Sources, April 1993*

12. NRC Branch Technical Position — *Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material, April 1993*

4.4.7.3 Regulatory Acceptance Criteria4.4.7.3 Regulatory Acceptance Criteria

[Comment: This section describes contamination criteria in Reg. Guide 8.24 for both removable and fixed contamination. The Reg. Guide does not have criteria for fixed contamination. This section also describes a “whole body survey” when leaving contaminated areas. These requirements are far too detailed. Surveys should be performed for areas of the body or clothing which have the potential for becoming contaminated.] The reviewer will determine that the applicant’s contamination control program is acceptable if it fulfills the following criteria: (1) the applicant commits to establishing a contamination survey program, based on the specifications in Regulatory Guide 8.24, [Comment: the applicant should not be expected to commit to the contamination requirements in Reg. Guide 8.24, but rather select dose-based standards using realistic re-suspension factors.] that includes the types and frequencies of surveys, limits for contamination levels, and methods and instruments used in the surveys; (2) contamination surveys are conducted routinely for the areas of the plant site where contamination is likely [Comment: i.e. defined in the ISA Summary], and the methods and types of instruments used in

the surveys are adequate to allow accurate assessment of working conditions; (3) [Comment: fixed contamination surveys are not routinely performed. They generally have little safety significance for normal plant operations. Those areas, such as maintenance or contaminated areas, are specifically surveyed prior to the job. Prescribing routine fixed contamination surveys will only serve to increase RCT time and exposure with no net safety benefit.] information is provided about survey frequency for each area, the types of radiation, the criteria for contamination levels for both removable and fixed contamination and the action levels and actions (including the time frame for action initiation and completion) to be taken when the levels are exceeded; (4) instruments with sufficient sensitivity to measure contamination at or below the action level are available for use; (5) the features of the facility that help control contamination including step-off pads, personal monitoring equipment at exits, and change rooms are described; (6) the following are specified: (a) the types and availability of contamination monitoring equipment, (b) the specific limits established for personnel contamination, (c) the minimum provisions for personnel decontamination, (d) the minimum types of protective clothing necessary for individuals to enter restricted areas, and (e) the technical criteria and levels for defining contamination areas; and (7) [Comment: Fuel fabrication licensee personnel typically monitor hands and feet, as a minimum, and any other body areas they suspect for contamination when exiting contaminated areas. Most use hand-held friskers and automated hand and feet monitors to accomplish the task. Whole body frisking would be time-consuming and current practice demonstrates that it is not warranted. Automated alpha whole body counting is very expensive, time-consuming and has not proven reliable or superior to the current methods.] the policy on the use of personnel monitoring equipment is stated and personnel perform a whole body survey each time they leave known contaminated areas, or a minimum of a hand and shoe survey each time they leave restricted areas that are potentially contaminated.

The applicant's sealed sources are leak tested on a regular basis in accordance with NRC's Branch Technical Positions: (1) "License Condition for Leak Testing Sealed Byproduct Material Sources," April 1993; (2) "License Condition for Leak Testing Sealed Plutonium Sources," April 1993; (3) "License Condition for Plutonium Alpha Sources," April 1993; (4) "License Condition for Leak Testing Sealed Source Which Contains Alpha and/or Beta-Gamma Emitters," April 1993; and (5) "License Condition for Leak Testing Sealed Uranium Sources," April 1993. The applicant has written procedures for leak testing sealed sources in accordance with NRC's Branch Technical Positions described above. The procedures include at least the acceptable contamination levels, test frequencies, and actions to be followed, if limits are exceeded.

The applicant commits to a periodic review of all aspects of access control to determine that: (1) signs, labels, and other access controls are properly posted and operative; (2) restricted areas established to prevent the spread of contamination are identified with appropriate signs; and (3) step-off pads, change facilities, protective clothing facilities, and personnel monitoring instruments are provided in sufficient numbers and locations. The reviews are documented, along with any deficiencies, and the corrective actions taken.

A system is established to ensure that equipment and materials removed from contaminated areas are not contaminated above specified release levels. The radiological contamination levels of items (e.g., tools, equipment, material, premises, or scrap) given clearance for release for unrestricted use are in accordance with NRC's Branch Technical Position, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated April 1993. Maximum permissible personnel contamination levels (skin and clothing) are established. Detected contamination in excess of these levels is investigated and documented as to source, probable cause, and other pertinent information. Records of these investigations are maintained and

reviewed by radiation protection management for trends and corrective action taken, as necessary.

4.4.8 External Exposure4.4.8External Exposure

[Comment: the contents of §4.4.8 have been incorporated into the new §4.4.7 '*Radiation Surveys and Monitoring*' section. A few specific comments on the content of the old section are noted below. Regulatory citations and references have been consolidated.]

4.4.8.1 Regulatory Requirements4.4.8.1Regulatory Requirements

NRC regulations applicable to the measuring, documenting, and maintaining the external exposure of personnel are the following from Title 10, CFR:

1.	Section 19.13	*Notifications and reports to individuals*
2.	Section 20.1201(a)(1)(2) and (c)	*Occupational dose limits for adults*
3.	Section 20.1301(a)(1) and (2), (b) and (c)	*Dose limits for individual members of the public*
4.	Section 20.1302 (a), (b)(1), and (b)(2)(ii)	*Compliance with dose limits for individual members of the public*
5.	Section 20.1501(a)(2)(i) and (c)	*Surveys and Monitoring-General*
6.	Section 20.1502(a)	*Conditions requiring individual monitoring of external and internal occupational dose*
7.	Section 20.1601	*Control of access to high radiation areas*
8.	Section 20.1901	*Caution signs*
9.	Section 20.1902(a)	*Posting requirements*
10.	Section 20.1906	*Procedures for receiving and opening packages*
11.	Section 20.2101	*Records-General Provisions*
12.	Section 20.2103	*Records of surveys*
13.	Section 20.2106	*Records of individual monitoring results*
14	Section 20.2110	*Form of records*
15.	Section 20.2202(a), (b), (c), and (d)	*Notification of incidents*
16.	Section 20.2203(a)(2), (a)(3)(i) and (ii), (b), and (d)	*Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the limits*

17. Section 20.2206 *Reports of individual monitoring*

4.4.8.2 Regulatory Guidance 4.4.8.2Regulatory Guidance

NRC regulatory guides and ANSI standards applicable to measuring, documenting, and maintaining the external exposure of personnel below the applicable external exposure limits that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.8.1. are:

1. Regulatory Guide 8.1 *Radiation Symbol* February 1973

2. Regulatory Guide 8.2 *Guide for Administrative Practice in Radiation Monitoring* February 1973

3. Regulatory Guide 8.4 *Direct-Reading and Indirect-Reading Pocket* Dosimeters February 1973

4. Regulatory Guide 8.7, *Instructions for Recording and Reporting Occupational Radiation Exposure Data* *Rev. 1 June 1992*

5. Regulatory Guide 8.24, *Health Physics Survey During Enriched Uranium-235 Processing and Fuel Fabrication* *Rev. 1 October 1979*

6. Regulatory Guide 8.34 *Monitoring Criteria and Methods to Calculate Occupational Radiation Doses* July 1992

7. ANSI N13.11-1983 *Dosimetry-Personnel Dosimetry Performance-Criteria for Testing*

8. ANSI N13.15-1985 *Radiation Detectors-Personnel Thermoluminescence Dosimetry Systems-Performance*

9. ANSI N13.27-1981 *Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters*

10. ANSI N322-1977 *Inspection and Test Specifications for Direct and Indirect Reading Quartz Fiber Pocket Dosimeters*

4.4.8.3 Regulatory Acceptance Criteria 4.4.8.3Regulatory Acceptance Criteria

[Comment: an applicant should not have to commit to monitoring external doses unless conditions exist whereby the dose limit thresholds in 10 CFR 20 may be met. This is, the program should be designed to be risk-based.] ~~The reviewer will determine that the applicant's external exposure program is acceptable if it fulfills the following criteria: (1) the applicant commits to a personnel monitoring program for external radiation, that provides a method to measure, assess, and record personnel exposure to radiation and commits to an ALARA philosophy; (2) the types of monitoring equipment that are used and the types of radiation that are measured are described and justified.. Regulatory Guide 8.34, *"Monitoring Criteria and Methods to Calculate Occupational Radiation Doses"*, provides guidance for determining who is required to wear personnel monitoring dosimeters; (3) the type, range, sensitivity, accuracy,~~ [Comment: no need to specify this level of detail, 10 CFR 20 requires the dosimetry to be NVLAP-approved (see §20.1501(c)(2)). That should be sufficient.]~~and frequency for reading personnel dosimeters and recording the radiation dose of the dosimeter reading are stated and justified; (4) the use of dosimetry results as a guide to operational planning are described and justified~~ [Comment: dosimetry results can help in planning, but whatever particular processing method is used, the difference in external dose is insignificant for LEU facilities. The applicant must commit to an ALARA program. This should be sufficient for the reviewers.] ~~; (5) the specific exposure levels below the regulatory requirements at which action are taken to investigate the cause of the exposures and to reduce exposures are specified~~[Comment: a licensee should not be expected to review external dosimetry results that are below the 10 CFR 20 threshold limits.] ~~; and (6) all personnel dosimeters (except for those specified in 10 CFR 20.1501(c)) are processed and evaluated by a dosimetry processor holding accreditation from the National Voluntary Laboratory Accreditation Program of the National Institute of Standards and Technology.~~

~~4.4.9 Internal Exposure4.4.9Internal Exposure~~

[Comment: the contents of §4.4.9 have been incorporated into the new §4.4.7 '*Radiation Surveys and Monitoring*' section. A few specific comments on the content of the old section are noted below. Regulatory citations and references have been consolidated.]

~~4.4.9.1 Regulatory Requirements~~4.4.9.1Regulatory Requirements

~~NRC regulations applicable to the measuring, documenting, and maintaining the internal exposure of personnel below the applicable internal exposure limits are the following from Title 10, CFR:~~

~~1.~~	~~Section 19.13~~	~~*Notifications and reports to* individuals~~
~~2.~~	~~Section 20.1201 a(1),(d), and (e)~~	~~*Occupational dose limits for adults*~~
~~3.~~	~~Section 20.1204~~	~~*Determination of internal exposure*~~
~~4.~~	~~Section 20.1301(a)(1), (b),(c)~~	~~*Dose limits for individual members of the public*~~
~~5.~~	~~Section 20.1302(a) and (b)(1)~~	~~*Compliance with dose limits for individual members of the public*~~
~~6.~~	~~Section 20.1502(b)~~	~~*Conditions requiring individual monitoring of external and internal occupational dose*~~

7. Section 20.1703(a)(3)(ii) and (b) — *Use of individual respiratory protection equipment*

8. Section 20.1901 — *Caution signs*

9. Section 20.1902(d) — *Posting requirements*

10. Section 20.2101 — *Records-General Provisions*

11. Section 20.2103 — *Records of surveys*

12. Section 20.2106 — *Records of individual monitoring results*

13. Section 20.2110 — *Form of records*

14. Section 20.2202(a), (b), (c), and (d) — *Notification of incidents*

15. Section 20.2203(a)(2), (b), and (d) — *Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the limits*

16. Section 20.2206 — *Reports of individual monitoring*

4.4.9.2 Regulatory Guidance 4.4.9.2Regulatory Guidance

NRC regulatory guides and ANSI standard applicable to the measuring, documenting, and maintaining the internal exposure of personnel below the applicable internal exposure limits that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.9.1. are:

1. Regulatory Guide 8.1 February 1973 — *Radiation Symbol*

2. Regulatory Guide 8.2 February 1973 — *Guide for Administrative Practice in Radiation Monitoring*

3. Regulatory Guide 8.7, *Rev. 1 June 1992* — *Instructions for Recording and Reporting Occupational Radiation Exposure Data*

4. Regulatory Guide 8.9, *Rev. 1* July 1993 — *Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program*

5. Regulatory Guide 8.24, *Rev. 1 October 1979* — *Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication*

6. Regulatory Guide 8.25, Rev. 1 June 1992 — *Air Sampling in the Workplace*

7. Regulatory Guide 8.34 July 1992 — *Monitoring Criteria and Methods to Calculate Occupational Radiation Doses*

8. ANSI.HPSN 13.22, 1995 — *"Bioassay Program for Uranium"*

9. ANSI.HPSN 13.30, 1996 "Performance Criteria for Radiobioassay"

4.4.9.3 Regulatory Acceptance Criteria 4.4.9.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's program for internal exposure is acceptable if the applicant meets the requirements of 10 CFR 20.1201, 20.1204, and 20.1502(b). Regulatory Guides 8.25, *"Air Sampling in the Workplace"*; 8.34, *"Monitoring Criteria and Methods to Calculate Occupational Radiation Doses"*; 8.9, Rev. 1, *"Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program"* and ANSI.HPSN 13.22, 1995, "Bioassay Program for Uranium" provide information, recommendations, and guidance and a basis acceptable to the staff for implementing the internal exposure program.

The applicant establishes a program for monitoring worker internal exposures. The program specifies the criteria for participation, the frequency of measurements, the methods to be used, the frequency of analysis, the minimum detection levels [Comment: for some types of bioassay (e.g. in vivo counting) the minimum detection level is a function of the sample & analyst and cannot be simply stated. This requirement is too prescriptive.] , and the action levels and actions to be taken on the results. In addition, the program specifies: (1) the methods for determining if monitoring of worker internal exposure is needed; (2) the criteria for determining when it is necessary to monitor an individual's internal exposure during work hours; and (3) the methods for determining the worker intake from (a) the concentrations of radioactive materials in the work area air, (b) the quantities of radionuclides in the body, (c) the quantities of radionuclides excreted from the body, or (d) any combination of the above methods as may be necessary for determining the intake. If soluble uranium material is present in work area air, action levels based on the chemical toxicity is established.

[Comment: this is all established in the ISA.]When air sampling measurement results are used for determining worker intake, the applicant specifies the frequency of sampling and data analysis, the minimum detection levels, and the action levels and actions to be taken on the results.

When bioassay results are used for determining worker intake, the applicant specifies the types of bioassay to be used, the frequency of data collection for each type of measurement, the minimum detection levels, and the action levels and actions to be taken on the results. The applicant commits to a continuing quality assurance and control programs on all phases of its bioassay program, including such items as sample collection, qualifications of laboratory personnel [Comment: not possible. If a vendor is used, the licensee cannot control the qualifications of personnel working in the laboratory. The licensee should only determine what qualities the vendor should be offering], laboratory intercomparisons, computational checks, and use of appropriate blanks and standards.

4.4.10 Summing Internal and External Exposure4.4.10Summing Internal and External Exposure

[Comment: the contents of §4.4.10 have been incorporated into the new §4.4.7 '*Radiation Surveys and Monitoring*' section. A few specific comments on the content of the old section are noted below. Regulatory citations and references have been consolidated.]

4.4.10.1 Regulatory Requirements4.4.10.1Regulatory Requirements

NRC regulations applicable to summing internal and external exposures are the following from Title 10, CFR:

1.	Section 20.1201(a)(1) and (f)	*Occupational dose limits for adults*
2.	Section 20.1202	*Compliance with requirements for summation of external and internal doses*
3.	Section 20.1207	*Occupational dose limits for minors*
4.	Section 20.1208	*Dose to an embryo/fetus*
5.	Section 20.2101	*Records-General Provisions*
6.	Section 20.2103	*Records of surveys*
7.	Section 20.2104	*Determination of prior occupational dose*
8.	Section 20.2106	*Records of individual monitoring results*
9.	Section 20.2110	*Form of records*
10.	Section 20.2202(a), (b), (c), and (d)	*Notification of incidents*
11.	Section 20.2203(a)(2), (b), and (d)	*Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the limits*
12.	Section 20.2206	*Reports of individual monitoring*
13.	Section 20, Subpart D	*Radiation Dose Limits for Individual Members of the Public*

4.4.10.2 Regulatory Guidance 4.4.10.2Regulatory Guidance

NRC regulatory guides, and ANSI standards applicable to the summing of internal and external exposures that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.10.1 are:

1.	Regulatory Guide 8.2 February 1973	*Guide for Administrative Practice in Radiation Monitoring*
2.	Regulatory Guide 8.7, *Rev. 1 June 1992*	*Instructions for Recording and Reporting Occupational Radiation Exposure Data*
3.	Regulatory Guide 8.34 July 1992	*Monitoring Criteria and Methods to Calculate Occupational Radiation Doses*
4.	Regulatory Guide 8.36 July 1992	*Radiation Dose to the Embryo/Fetus*

5. ANSI N13.6-1966 Reaffirmed 1989 — "Practice for Occupational Radiation Exposure *Records Systems"*

4.4.10.3 Regulatory Acceptance Criteria 4.4.10.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's method for summing internal and external exposures is acceptable if the applicant commits to a procedure for combining internal and external exposures in accordance with Regulatory Guide 8.7, Rev. 1, *"Instructions for Recording and Reporting Occupational Radiation Exposure Data"*; 8.34, *"Monitoring Criteria and Methods to Calculate Occupational Radiation Doses"*; and 8.36, *"Radiation Dose to the Embryo/Fetus"*.

4.4.11 Respiratory Protection4.4.11Respiratory Protection

[Comment: the contents of §4.4.11 have been incorporated into the new §4.4.6 (*'Respiratory Protection Program*'). A few specific comments on the content of the old section are noted below. Regulatory citations and references have been consolidated.]

4.4.11.1 Regulatory Requirements4.4.11.1Regulatory Requirements

NRC regulations applicable to respiratory protection are the following from Title 10, CFR:

1. Section 20.1701 — *Use of process or other engineering controls*
2. Section 20.1702 — *Use of other controls*
3. Section 20.1703(a), (c), and (d) — *Use of individual respiratory protection equipment*
4. Section 20.2110 — *Form of records*

4.4.11.2 Regulatory Guidance4.4.11.2Regulatory Guidance

The NRC regulatory guide and ANSI standards applicable to the respiratory protection program that in general describe a basis acceptable to the staff for implementing the regulatory requirements Section 4.4.11.1 are:

1. Regulatory Guide 8.15 October 1976 — *Acceptable Programs for Respiratory Protection*
2. ANSI Z88.2-1992 — *Practices for Respiratory Protection*

4.4.11.3 Regulatory Acceptance Criteria4.4.11.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's respiratory protection program is acceptable if it fulfills the following criteria: (1) the applicant commits to establishing a respiratory program that meets the requirements of 10 CFR Part 20, Subpart H; (2) the application describes the equipment to be used, the conditions under which respiratory protection are required for routine and nonroutine operations, the protection factors that are applied when respirators are being used, and the locations of respiratory equipment [Comment: as long as the license requires respiratory equipment to be used in certain situations, why does the NRC really need to know its exact positions? Would movement of the respiratory equipment require a license amendment?. This is unnecessarily prescriptive with little safety significance.] within the plant. ANSI Z88.2,

which defines responsibilities and requirements in the areas of (a) training, (b) control and use of respiratory equipment, (c) mask-fit testing, and (d) breathing-air purity, may be used as guidance; [Comment: the applicant should not have to describe respiratory equipment used, other than by category e.g. full face, PAPR, etc.)(3) the applicant describes: (a) the types of engineering and administrative controls that have been implemented to reduce the risk of internal exposure without the need for respiratory protection and (b) the methods for determining exposure while an individual is using respiratory protection to ensure that a proper estimate of exposure and internal dose is made. Factors that are critical in this calculation include the time of exposure to airborne radioactive materials, the protection factor for the respirator, the proper fitting of the equipment before use, and the measurement of the concentrations of radioactive material during the exposure.

4.4.12 Instrumentation4.4.12Instrumentation

[Comment: the contents of §4.4.12 have been incorporated into the new §4.4.7 '*Radiation Surveys and Monitoring*' section. A few specific comments on the content of the old section are noted below. Regulatory citations and references have been consolidated.]

4.4.12.1 Regulatory Requirements4.4.12.1Regulatory Requirements

NRC regulations applicable to the instrumentation program are the following from Title 10, CFR:

1. Section 20.1501(b)(c) *Surveys and Monitoring-General*
2. Section 20.2103 *Records of survey*

4.4.12.2 Regulatory Guidance4.4.12.2Regulatory Guidance

NRC regulatory guides and ANSI standards applicable to the instrumentation program that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.12.1 are:

1. Regulatory Guide 8.24, Rev. 1, October 1979 *Health Physics Surveys during Enriched Uranium-235 Processing and Fuel Fabrication*
2. ANSI N13.4-1971 *Specification of Portable X- or Gamma-Radiation Survey Instruments*
3. ANSI N42.12-1980 *Calibration and Usage of Sodium Iodide Detector Systems*
4. ANSI N42.15-1980 *Performance Verification of Liquid-Scintillation Counting Systems*
5. ANSI N42.17A-1989 *Performance Specifications for Health Physics Instrumentation-Portable Instrumentation for Use in Normal Environmental Conditions*
6. ANSI N42.17B-1989 *Performance Specifications for Health Physics Instrumentation-Occupational Airborne Radioactivity Monitoring Instrumentation*

7. ANSI N323-1978 *Radiation Protection Instrumentation Test and Calibration*

4.4.12.3 Regulatory Acceptance Criteria4.4.12.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's instrumentation is acceptable if it fulfills the following criteria: (1) the applicant commits to a policy for the maintenance and use of operating instruments in sufficient number and types to meet the requirements specified in 10 CFR Part 20; (2) the applicant has adequate radiation measuring instruments for routine and emergency operations and includes a listing of the types of instruments that are available, including ranges, counting mode, sensitivity, alarm setpoints, planned use, and frequency of calibration; (3) the applicant commits to calibrate instruments at least annually, preferably semiannually, and recalibrates instruments if the equipment is repaired such that the accuracy of the reading is affected;[Comment: the calibration and servicing should be undertaken in accordance with the manufacturer's recommendations.] (4) the applicant justifies the criteria for selecting radiation measurement instruments for: (a) performing radiation and contamination surveys, (b) sampling airborne radioactivity, (c) monitoring area radiation, (d) monitoring personnel, and (e) performing radioactive analyses; (5) instrument calibrations are traceable to a recognized standard such as National Institute of Standards and Technology (NIST); and (6) [Comment: far too detailed and prescriptive.]the applicant describes the (a) instrument storage, calibration, and maintenance facilities; and (b) the laboratory facilities for radiological analyses. Guidance on instrumentation and instrumentation calibration is provided in ANSI N42.17A and ANSI N323.

4.4.13 Integrated Safety Analysis (ISA)4.4.13Integrated Safety Analysis (ISA)

[Comment: there is no need for this §4.4.13 in SRP Chapter 4. The reviews of the ISA Summary, including those of parts of the plant where accident sequences could release radiation or licensed material, were conducted as an SRP Chapter 3 task. SRP Chapter 4 need only include a statement to the reviewer that prior consultation with the ISA Summary is required before the Radiation Protection Program (SRP Chapter 4) commences. Delete this Section §4.4.13]

4.4.13.1 Regulatory Requirements4.4.13.1Regulatory Requirements

The regulation applicable to the ISA is 10 CFR Part 70.62.

4.4.13.2 Regulatory Guidance4.4.13.2Regulatory Guidance

The NRC NUREGs applicable to the ISA that in general describe a basis acceptable to the staff for implementing the regulatory requirements of Section 4.4.13.1 are:

1. NUREG - 1513 Integrated Safety Analysis Guidance Document

2. NUREG/CR-6410 Nuclear Fuel Cycle Facility Accident Analysis Handbook
April 1998

4.4.13.3 Regulatory Acceptance Criteria4.4.13.3Regulatory Acceptance Criteria

The applicant considers accident sequences that could result in radiological consequences of concern as defined in 10 CFR 70.61 as part of the ISA. Radiological safety assessments that support the ISA (1) use appropriate and verified assessment methods, computer codes, and

~~literature values, (2) consider a complete range of credible accident sequences that could adversely affect radiological exposures and cause the consequences of concern, (3) reasonably estimate radiological consequences of accident sequences, (4) identify items relied on for safety to prevent and mitigate accident sequences and radiological consequences of concern, and (5) describe and commit to appropriate management measures to ensure the availability and reliability of items relied on for safety to perform their functions when needed.~~

~~This information will likely appear in the information provided in response to SRP Section 3. The radiation safety reviewer reviews this information, regardless of where it appears in the applicant's submittal. Information provided in one section of the application need not be repeated elsewhere.~~

4.5 REVIEW PROCEDURES4.5REVIEW PROCEDURES

4.5.1 Acceptance Review4.5.1Acceptance Review

The primary reviewer should evaluate ~~will review~~ the application to determine whether it addresses the "Areas of Review" ~~if it contains the topics and information~~ discussed in Section 4.3 ~~"Areas of Review."~~ If significant deficiencies are identified ~~in the application~~, the applicant should ~~will~~ be requested to submit additional material~~information~~ before the start of the safety evaluation. ~~The primary reviewer will then determine that the applicant has provided the information required. If necessary, a request for additional information to the applicant will be prepared in conjunction with the licensing project manager.~~ [Comment: language is changed to be consistent with that of other SRP chapters.]

4.5.2 Safety Evaluation4.5.2Safety Evaluation

~~When an acceptable application is received from the applicant, the~~ The primary reviewer shall perform a safety evaluation against the Acceptance Criteria in Section 4.3. ~~will conduct a complete review of the application and determine its acceptability in accordance with Section 4.4, "Acceptance Criteria."~~ For existing facilities, the reviewer will consult with the cognizant radiation protection NRC inspector to identify and resolve any issues of concern related to the licensing review. The ~~final step for the~~ primary reviewer will ~~be to~~ prepare a safety evaluation report (SER) for ~~a safety evaluation report (SER) in accordance with Section 4.6 "Evaluation Findings."~~ the Licensing Project Manager in support of ~~for the supporting~~ licensing action.

4.6 EVALUATION FINDINGS4.6EVALUATION FINDINGS

The reviewer will write an SER addressing each topic reviewed and explain why the NRC staff has reasonable assurance that the radiation protection part of the application is acceptable and that the health and safety of the workers is adequately protected. License conditions may be proposed to impose requirements where the application is deficient. The following kinds of statements and conclusions will be included in the staff's SER:

> The applicant has committed to an acceptable radiation protection~~safety~~ program based on the results of the ISA that includes: (1) an effective documented program to ensure that occupational radiological exposures are ALARA; (2) an organization with adequate qualification requirements for the radiation protection~~safety~~ personnel; (3) approved written radiation protection~~safety~~ procedures or RWPs for radiation protection~~safety~~ activities; (4) radiation protection~~safety~~ training for all personnel who have access to restricted areas; (5) requirements for the ventilation systems; (6) requirements for radiological air sampling; (7) requirements for control of radiological contamination within the facility; (8) programs for monitoring personnel external and

internal radiation exposure; (9) a respiratory protection program, and~~;~~ (10) requirements for radiological measurement instrumentation.~~; and (11) appropriate radiation controls based on the ISA.~~

The NRC staff concludes that the applicant's radiation protection~~safety~~ program is adequate and ~~that the applicant has the necessary technical staff to administer an effective radiation safety program that~~ meets the requirements of 10 CFR Parts 19, 20, and 70. Conformance to the application and license conditions will ensure safe operation.~~ and will provide early detection of unfavorable trends to allow prompt corrective action.~~

4.7 REFERENCES4.7REFERENCES

Code of Federal Regulations, Title 10, Part 70, "Domestic Licensing of Special Nuclear Material," U.S. Government Printing Office, Washington, DC.

Code of Federal Regulations, Title 10, Part 20, “Standards for Protection Against Radiation,” U. S. Government Printing Office, Washington, DC.

[Comment: the following references are not directly applicable to the Radiation Surveys and Monitoring Programs and should be deleted for clarity and simplicity.]

~~U.S. Nuclear Regulatory Commission, Branch Technical Position, "License Condition for Leak Testing Sealed Plutonium Sources," April 1993.~~

~~U.S. Nuclear Regulatory Commission, Branch Technical Position, "License Condition for Plutonium Alpha Sources," April 1993.~~

~~U.S. Nuclear Regulatory Commission, Branch Technical Position, "License Condition for Leak Testing Sealed Source Which Contains Alpha and/or Beta-Gamma Emitters," April 1993.~~

~~U.S. Nuclear Regulatory Commission, Branch Technical Position, "License Condition for Leak Testing Sealed Uranium Sources," April 1993.~~

~~U.S. Nuclear Regulatory Commission, Branch Technical Position, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," April 1993.~~

PROPOSED REVISION OF SRP (NUREG-1520) CHAPTER 4
INCORPORATING RECOMMENDATIONS
OF THE
NUCLEAR ENERGY INSTITUTE
(AUGUST, 1999)

4.0 RADIATION PROTECTION

4.1 PURPOSE OF REVIEW4.1PURPOSE OF REVIEW

The purpose of this review is to determine whether the applicant's radiation protection program is adequate to protect the radiological health and safety of workers and to comply with the regulatory requirements in 10 CFR Parts 19, 20, and 70. Design of the radiation protection program is based upon the results of the ISA . The ISA, as summarized in the ISA Summary, was evaluated in SRP Chapter 3 ('*Integrated Safety Analysis (ISA) Commitments and ISA Summary*'). The ISA evaluated and ranked the radiological risks posed by potential accident sequences throughout the facility and assessed the adequacy of items relied on for safety (and complementary management measures) to ensure that the radiation exposure performance criteria of 10 CFR 70.61(b) and (c) are satisfied and that the occupational dose limits of 10 CFR 20 will not be exceeded during normal operations. In addition to examining the suitability of such items relied on for safety, assessment of the adequacy of the radiation protection program also requires examination of an applicant's corporate commitments to worker training, radiation exposure monitoring and minimization to occupational radiation exposures. SRP Chapter 4 encompasses review of the applicant's ***commitments*** to design and implement a corporate radiation protection program and to examine the applicant's proposed ***performance indicators***. The focus of the review is, therefore, on commitments and performance indicators rather than on specific details on how a commitment or performance indicator will be met.

Review procedures and acceptance criteria for the applicant's program for protecting members of the public and the control of effluent releases are presented in Chapter 9, "Environmental Protection," of this SRP.

4.2 RESPONSIBILITY FOR REVIEW4.2RESPONSIBILITY FOR REVIEW

Primary: Health Physicist

Secondary: Licensing Project Manager, Environmental Reviewer

Supporting: Fuel Cycle Facility Inspector

4.3 AREAS OF REVIEW4.3AREAS OF REVIEW

A licensee must develop, document and implement a radiation protection program in accordance with 10 CFR 20.1101. Additionally, 10 CFR 20.2102 requires the licensee to keep records of the radiation protection program, including description of the program components, audits and other aspects of program implementation. The reviewer should first consult the ISA Summary to identify those facility operations analyzed in the ISA to have radiological consequences and both the items relied on for safety and management measures implemented to prevent or mitigate such radiological risks. The radiation protection program must address these process-specific risks as well as general occupational radiation protection measures.

The staff will review an applicant's commitments pertaining to the radiation protection program in the following areas:

(i) commitment to establish and maintain a corporate radiation protection program
(ii) commitment to keep occupational exposures to radiation as low as reasonably achievable (ALARA)
(iii) commitment to appoint radiological protection staff that are suitably qualified and trained in radiation protection and health and safety
(iv) commitment to prepare written radiation protection procedures
(v) commitment to train employees in radiation protection, including use of protective devices and protection from exposure to radiation
(vi) commitment to design and implement a respiratory protection program including ventilation systems, containment procedures and use of respirators
(vii) commitment to conduct radiation surveys and monitoring programs to document radiation levels, concentrations of radioactive materials in the facility and occupational exposures to radiation by workers
(viii) commitment to refer to the facility's corrective action program any incidents resulting in occupational exposures to radiation exceeding 10 CFR 20, Appendix B or 10 CFR 70.61 dose limits
(ix) commitment to maintain records of radiation protection programs, facility surveys and monitoring of workers
(x) commitment to report to the NRC occupational exposures to radiation exceeding the dose limits stated in 10 CFR 70.61 within the timeframes specified in 10 CFR 70.74 and 10 CFR 20 Subpart M
(xi) commitment to review at least annually the content and implementation of the radiation protection program
(xii) commitment to evaluate modifications to operating and maintenance procedures and plant equipment that may substantially reduce radiation exposures at a reasonable cost

The reviewer shall then examine the applicant's programs, procedures and performance indicators to implement each of these commitments:

4.4 ACCEPTANCE CRITERIA4.4ACCEPTANCE CRITERIA

The applicant's radiation protection program is acceptable if the applicant identifies performance indicators to be used in fulfilling each of the following commitments:

4.4.1 Commitment to Radiation Protection Program Implementation

4.4.1.1 Regulatory Requirements

Regulations applicable to establishment of a corporate radiation protection program are present in 10 CFR 20.1101 (Subpart B) ('*Radiation Protection Programs*').

4.4.1.2 Regulatory Guidance

NRC regulatory guides applicable to the commitment to design and implement a corporate radiation protection program are:

Regulatory Guide 8.2 February 2, 1973	*Guide for Administrative Practice in Radiation Monitoring*

4.4.1.3 Regulatory Acceptance Criteria

The reviewer will determine that the applicant's corporate radiation protection program commitment is adequate if it fulfills the following criteria:

(i) the applicant commits to design and implement a radiation protection program that meets the regulatory requirements of 10 CFR 20 Subpart B
(ii) the applicant outlines a program structure and defines the responsibilities of key program personnel
(iii) the applicant commits to staff the program with suitably trained people, to provide sufficient resources and to implement it within an acceptable timeframe prior to operation of the facility
(iv) the applicant commits to the independence of the radiation protection function from facility operations
(v) the applicant commits to the overriding importance of radiation safety within the facility's operations
(vi) the applicant commits to review, revise and improve, when appropriate, the radiation protection program by means of the ISA to reflect facility changes, new technologies or other process enhancements that could improve the overall program effectiveness

4.4.2 Commitment to ALARA Occupational Exposures

4.4.2.1 Regulatory Requirements 4.4.1.1 Regulatory Requirements

Regulations applicable to the ALARA program are present in 10 CFR 20.1101 ('*Radiation Protection Programs*')

4.4.2.2 Regulatory Guidance 4.4.1.2 Regulatory Guidance

NRC regulatory guides applicable to the ALARA program are:

atory Guide 8.2 February 2, 1973	*Guide for Administrative Practice in Radiation Monitoring*
atory Guide 8.10, Rev. 1-R, May 1977	*Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable*
atory Guide 8.13, Rev. 3 Draft DG 8014, October 1994	*Instructions Concerning Prenatal Radiation* Exposure
atory Guide 8.29 February 1996	*Instructions Concerning Risks from Occupational Radiation Exposure*

4.4.2.3 Regulatory Acceptance Criteria 4.4.1.3 Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitment to keep occupational exposures to radiation ALARA is acceptable if it fulfills the following criteria:

(i) the applicant commits to prepare policies and procedures to ensure occupational radiation exposures are maintained ALARA and that such exposures are consistent with the requirements of 10 CFR 20.1101
(ii) the applicant commits to outline specific program goals, to propose a program organization and structure and to detail procedures for its implementation in plant design and operations
(iii) the applicant commits to staff the ALARA program with sufficient staff, resources and clear responsibilities to ensure that the occupational radiation exposure dose limits of 10 CFR 20 are not exceeded under normal operations
(iv) the applicant commits to use the ALARA program as a mechanism to facilitate interaction between radiation protection and operations personnel to apply the program's principles to facility operations
(v) the applicant commits to regularly reviewing and revising, when appropriate, the ALARA program goals and objectives to incorporate new approaches, technologies, operating procedures or changes to the ISA

4.4.3 Organization and Personnel Qualifications4.4.2 Organizational Relationships and Personnel Qualifications

4.4.3.1 Regulatory Requirements4.4.2.1Regulatory Requirements

Regulations applicable to the organization and qualifications of the radiological protection staff are presented in 10 CFR 70.22 ("Contents of Applications"):

4.4.3.2 Regulatory Guidance 4.4.2.2Regulatory Guidance

NRC regulatory guides applicable to the organization and personnel qualifications of radiation protection program staff are:

atory Guide 8.2		*"Guide for Administrative Practice in Radiation*
February 1973		*Monitoring"*
atory Guide 8.10,		*"Operating Philosophy for Maintaining Occupational*
Rev. 1-R, May 1977		*Radiation Exposures As Low As Is Reasonably Achievable"*

4.4.3.3 Regulatory Acceptance Criteria 4.4.2.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitment to organize and staff a radiation protection program is acceptable if it fulfills the following criteria:

(i) the applicant commits to appoint radiation protection personnel and to identify the authority and responsibility of each position ;
(ii) the applicant commits to establish organizational relationships amongst the individual positions responsible for the radiation protection program and other line managers
(iii) the applicant commits to designate a radiation protection program director (typically referred to as the Radiation Safety Officer) who will be responsible for establishing and implementing the radiation protection program

(iv) the applicant commits to assign responsibility to the radiation protection program staff for implementation of program functions
(v) the applicant commits to specify minimum training requirements and qualifications for the radiation protection staff

4.4.4 Commitment to Written Procedures

4.4.4.1 Regulatory Requirements 4.4.3.1Regulatory Requirements

The regulations applicable to radiation protection procedures and Radiation Work Permits (RWPs) are presented in 10 CFR 70.22(8) ('Content of Applications')

4.4.4.2 Regulatory Guidance 4.4.3.2Regulatory Guidance

Regulatory guidance applicable to procedures and RWPs is Regulatory Guide 8.10, Rev., 1-R, May 1977, "Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable."

4.4.4.3 Regulatory Acceptance Criteria 4.4.3.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitment to prepare written radiation protection procedures and RWPs are acceptable if they fulfill the following criteria:

(i) the applicant commits to prepare written, approved radiation protection procedures to carry out activities related to the radiation protection program
(ii) the applicant specifies how all written radiation protection procedures will be prepared, authorized and approved
(iii) the applicant commits to review, revise and update the radiation protection procedures periodically and to incorporate any facility or operational changes or changes to the facility's ISA
(iv) the applicant commits to distribute current radiation protection procedures to facility workers who work with licensed material
(v) the applicant commits to prepare written procedures for the use of RWPs for activities involving licensed material. RWP procedures should define authorized activities, approval procedures, information requirements, period of validity, expiration and termination procedures, safety procedures and record-keeping requirements

4..5 Training 4.4.4Training

An applicant's commitments to employee training are addressed in SRP Chapters 4 and 11. SRP Chapter 4 addresses corporate radiation protection training programs, while SRP Chapter 11 addresses training which serves as a management control to ensure that an administrative control (or item relied on for safety) is available and reliable when required. Administrative control items relied on for safety may or may not pertain to accident sequences having potential radiological consequences,

4.4.5.1 Regulatory Requirements 4.4.4.1Regulatory Requirements

Regulations applicable to the radiation safety training program are the following from Title 10, CFR:

1. Section 19.12 "Instructions to workers"

2. Section 20.2110 "Form of records"

4.4.5.2 Regulatory Guidance 4.4.4.2Regulatory Guidance

NRC regulatory guides and American Society for Testing and Materials (ASTM) standards pertaining to radiation protection training are:

1. Regulatory Guide 8.10, Rev. 1-R May 1977 — *"Operating Philosophy for Maintaining Occupational Radiation Exposures As Low As Is Reasonably Achievable"*

2. Regulatory Guide 8.13, *Draft DG-801 proposed* R-3 October 1994 — *"Instructions Concerning Prenatal Radiation Exposure"*

3. Regulatory Guide 8.29, *Draft DG-8012 proposed* R-1 December 1994 — *"Instructions Concerning Risks from Occupational Radiation Exposure"*

4. ASTM C986-89 Reapproved 1995 — "Developing Training Programs in the Nuclear Fuel Cycle"

5. ASTM E1168-95 — "Radiological Protection Training for Nuclear Facility Workers"

4.4.5.3 Regulatory Acceptance Criteria 4.4.4.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitment to train its employees in radiation protection is acceptable if it fulfills the following criteria:

(i) the applicant commits to design and implement an employee radiation protection training program that complies with the requirements of 10 CFR Parts 19 and 20
(ii) the applicant commits to grade the comprehensiveness of an individual's radiation protection training to reflect the potential radiological health risks associated with that employee's work responsibilities
(iii) the applicant commits to provide training to all personnel and visitors entering restricted areas that is commensurate with the health risk to which they may be exposed
(iv) the applicant commits to incorporate in the radiation protection training program instruction in topics such as:
    (5) correct handling of radioactive materials
    (6) minimization of exposures to radiation and/or radioactive materials,
    (7) access and egress controls and escort procedures
    (8) radiation safety principles, policies, and procedures
    (9) monitoring for internal and external exposures
    (10) monitoring instruments
    (11) contamination control, including protective clothing and equipment
    (12) ALARA and exposure limits
    (13) radiation hazards and health risks

(14) emergency response

(xv) the applicant commits to revising the radiation protection training programs and to conducting refresher training to address all safety-significant changes in policies, procedures, requirements and facilities and in the facility ISA

(xvi) the applicant commits to implement procedures to evaluate the effectiveness and adequacy of the training program curriculum and instructors

4.4.6 Respiratory Protection Program

4.4.6.1 Regulatory Requirements 4.4.5.1Regulatory Requirements

Regulations applicable to a respiratory protection program are presented in 10 CFR 20, Subpart H (‘*Respiratory Protection and Controls to Restrict Internal Exposure in Restricted Areas*’).-

4.4.6.2 Regulatory Guidance 4.4.5.2Regulatory Guidance

NRC regulatory guides, ANSI standards, and National Council on Radiation Protection and Measurements (NCRP) report applicable to the design of a respiratory protection program are:

1.	Regulatory Guide 8.24, Rev. 1 October 1979	*"Health Physics Surveys during Enriched Uranium-235 Processing and Fuel Fabrication"*
2.	ANSI N510-1980	"Testing of Nuclear Air Cleaning Systems"
3.	ERDA 76-21	“Nuclear Air Cleaning Handbook,” C. A. Burchsted, A. B. Fuller, J. E. Kahn
4.	NCRP Report No. 59 December 15, 1978	"Operational Radiation Safety Program"
5.	Regulatory Guide 8.15	*Acceptable Programs for Respiratory Protection*
6.	ANSI Z88.2-1992	*Practices for Respiratory Protection*

4.4.6.3 Regulatory Acceptance Criteria 4.4.5.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant’s commitments to implement a respiratory protection program are acceptable if they fulfill the following criteria:

(i) the respiratory protection program meets the requirements of 10 CFR Part 20, Subpart H

(ii) the applicant commits to installation of appropriately-sized ventilation systems in areas of the plant identified in the ISA Summary as having the potential to expose workers to radiation or licensed material and to provide reasonable assurance that the air concentrations of radionuclides will not exceed the occupational, derived air concentration values specified in 10 CFR Part 20, Appendix B during normal operations.

(iii) whether or not the ventilation system is classified in the ISA Summary as an item relied on for safety (e.g. for an airborne radioactive area), the applicant describes appropriate management measures, including preventive and corrective maintenance and performance testing, to ensure that the system operates when required and within its design specifications

(iv) the applicant commits to implement additional procedures, as may be required by the ISA Summary, to control the concentration of radioactive material in air (e.g. control of access, limitation of exposure times to licensed materials, use of respiratory protection equipment)

(v) the applicant commits to prepare written procedures for the selection, fitting, issuance, maintenance, testing, training of personnel, monitoring and recordkeeping for individual respiratory protection equipment and for specifying when such equipment is to be used

(vi) the applicant commits to design and undertake an air sampling program in areas of the plant identified in the ISA Summary where the radiation occupational dose limits could potentially be exceeded, to conduct air surveys and to calibrate and maintain the sampling equipment in accordance with the manufacturers' recommendations

(vii) the applicant commits to refer to the facility's corrective action program any incident that results in an occupational exposure to radiation that exceeds the dose limits in 10 CFR 20 - Appendix B or 10 CFR 70.61 and to report to the NRC both the corrective action taken (or planned) to ensure against a recurrence and schedule to achieve compliance with the applicable license condition(s)

(viii) the applicant commits to maintain records of the respiratory protection program including program provisions, audits and reviews of the program content and implementation and respiratory protection equipment training and maintenance

(ix) the applicant commits to revising the written procedures for use of individual respiratory protection equipment to reflect processing, facility or equipment changes or changes to the ISA

4.4.7 Radiation Surveys and Monitoring Programs

Radiation surveys are conducted for two purposes: (1) to ascertain radiation levels, concentrations of radioactive materials and potential radiological hazards that could be present in the facility, and (2) to detect contamination of plant equipment from leaks, spillage or process upsets. Radiation surveys will focus on those areas of the plant identified in the ISA Summary where the occupational radiation dose limits could potentially be exceeded. Survey measurements of airborne radioactive material and bioassays are used to determine that internal and external occupational exposures to radiation do not exceed the dose limits specified in 10 CFR 20 - Subpart C or 10 CFR 70.61. The results of contamination surveys in areas of the plant identified in the ISA Summary as more likely to have contamination can be used to initiate clean-up activities and to establish appropriate procedures to protect worker health and safety.

4.4.7.1 Regulatory Requirements 4.4.6.1Regulatory Requirements

NRC regulations applicable to radiation surveys and monitoring programs are the following from Title 10, CFR Part 20:

1. Part F *Surveys and Monitoring*

2. Part C *Occupational Dose Limits*

3. Part L *Records*

4. Part M *Reports*

4.4.7.2 Regulatory Guidance 4.4.6.2Regulatory Guidance

NRC regulatory guides, NUREGs, and ANSI standards applicable to radiation surveys and monitoring programs are:

1.	Regulatory Guide 8.2 February 1973	*"Guide for Administrative Practice in Radiation Monitoring"*
2.	Regulatory Guide 8.4 February 1973	*Direct-Reading and Indirect-Reading Pocket* Dosimeters
3.	Regulatory Guide 8.7, *Rev. 1 June 1992*	*Instructions for Recording and Reporting Occupational Radiation Exposure Data*
4.	Regulatory Guide 8.9, *Rev. 1* July 1993	*Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program*
5.	Regulatory Guide 8.24, Rev. 1 October 1979	"Health Physics Surveys During Enriched *Uranium-235 Processing and Fuel Fabrication"*
6.	Regulatory Guide 8.25, Rev. 1 June 1992	*"Air Sampling in the Workplace"*
7.	Regulatory Guide 8.34 July 1992	*Monitoring Criteria and Methods to Calculate Occupational Radiation Doses*
8.	NUREG-1400 September 1993	*"Air Sampling in the Workplace"*
9.	ANSI N13.1-1969 Reaffirmed 1993	*"Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities"*
10.	ANSI N328-1978	*Radiation Protection Instrumentation Test and Calibration*
11.	ANSI N13.11-1983 *Criteria for Testing*	*Dosimetry-Personnel Dosimetry Performance-*
12.	ANSI N13.15-1985	*Radiation Detectors-Personnel Thermoluminescence Dosimetry Systems-Performance*
13.	ANSI.HPSN 13.22, 1995	*"Bioassay Program for Uranium"*
14.	ANSI N13.27-1981	*Performance Requirements for Pocket-Sized Alarm Dosimeters and Alarm Ratemeters*
15.	ANSI.HPSN 13.30, 1996	"Performance Criteria for Radiobioassay"

16. ANSI N13.6-1966 Reaffirmed 1989 "Practice for Occupational Radiation Exposure *Records Systems"*

4.4.7.3 Regulatory Acceptance Criteria 4.4.6.3Regulatory Acceptance Criteria

The reviewer will determine that the applicant's commitments to implement radiation surveys and monitoring programs are acceptable if they fulfill the following criteria:

(i) the radiation surveys and monitoring programs are consistent with the requirements of 10 CFR 20 - Subpart F

(ii) the applicant commits to prepare written procedures for radiation survey and monitoring programs that outline, based upon the results of the ISA, program objectives, sampling procedures, data analysis methods, types of equipment and instrumentation to be used, frequency of measurements, recordkeeping and reporting requirements, and actions to be taken when exposure measurements exceed 10 CFR 20 occupational dose limits or permissible contamination levels established by the applicant

(iii) the applicant commits to use radiation survey and monitoring programs consistent with the results of the ISA to monitor occupational radiation levels, concentrations of radioactive material and potential radiological hazards in the facility

(iv) the applicant commits to design and implement a personnel monitoring program for external occupational radiation exposures based on the results of the ISA that outlines methods or procedures to:

(5) measure, assess and record personnel exposure to radiation
(6) identify the types of radiation to be monitored
(7) identify the type and sensitivity of individual monitoring devices to be used
(8) specify when personal dosimeters are to be used
(9) interpret dosimetry results
(10) identify specific exposure levels at which corrective actions are to be taken

(xi) the applicant commits to design and implement a personnel monitoring program for internal occupational radiation exposures based on the results of the ISA that outlines methods or procedures to:

(12) identify workers to included in the program
(13) identify the type and frequency of measurements and analyses
(14) determine worker intake from airborne radioactive materials, quantities of radionuclides in the body and quantities of radionuclides excreted from the body
(15) interpret the analytical results
(16) identify radionuclide concentration levels at which corrective actions are to be taken
(17) ensure the precision and accuracy of the program bioassay measurements

(xviii) the applicant commits to comply with the requirements of 10 CFR 20.1202 for summation of external and internal occupational radiation exposures through use of procedures such as those outlined in Reg. Guide 8.7 or 8.34

(xix) the applicant commits to implement air sampling programs to measure occupational does from airborne radioactivity in work areas defined in the ISA Summary to possibly have airborne radioactive materials, using acceptable methods and instrumentation and at a frequency appropriate to the potential health risk.

(xx) the applicant commits to implement bioassay programs to ascertain the intake of radionuclides into the body (e.g. by oral ingestion, skin absorption, wounds)

(xxi) the applicant commits to conduct contamination survey programs in areas of the plant identified in the ISA Summary to have a greater possibility of radiological contamination to document both removable and fixed contamination

(xxii) the applicant commits to use equipment and instrumentation with sufficient sensitivity to the type(s) of radiation being measured for quantitative radiation measurements and to calibrate and maintain such equipment and instrumentation in accordance with the manufacturers' recommendations

(xxiii) the applicant commits to establish policies to ensure equipment and materials removed from an area identified to be contaminated are not contaminated above specified release levels

(xxiv) the applicant commits to refer to the facility's corrective action program any instances in which the results of personnel monitoring or a contamination survey exceed the permissible personnel contamination levels (clothing, skin, bioassay) of 10 CFR 20 or permissible contamination levels established by the licensee, to investigate and document as to source, probable cause and other pertinent information, prepare records of the investigation and document any corrective actions that were taken or which are planned

(xxv) the applicant commits to reporting to the NRC within the timeframes established in 10 CFR Part 20 - Subpart M or 10 CFR Part 70.74 any releases of radioactive material or exposures of workers to radiation exposure doses exceeding the permissible levels of 10 CFR 20.

4.4.8 Additional Program Commitments

4.4.8.1 Regulatory Requirements

Regulations applicable to the reporting and record-keeping requirements of the radiation protection program, to its revision and to implementation of corrective actions are described in Title 10, CFR:

1.	Subpart L	"Records"
2.	Subpart M	"Reports"
3.	Section 70.61	"Performance Requirements"
4.	Section 70.74	"Additional Reporting Requirements"

4.4.8.2 Regulatory Guidance

There are no NRC regulatory guidelines applicable to these additional program requirements.

4.4.8.3 Acceptance Criteria

The reviewer will determine that the applicant's commitments to report, maintain records, revise the program and to refer issues for corrective action are acceptable if they fulfill the following criteria:

(i) the applicant commits to maintain records of the radiation protection program, including program provisions, audits and reviews of the program content and implementation, radiation survey results (air sampling, bioassays, external exposure data from monitoring of individuals, internal intakes of radioactive material), results of corrective action program referrals, RWPs and planned special exposures
(ii) the applicant commits to report to the NRC within the timeframes specified in 10 CFR 20.2202 and 10 CFR 70.74 any event that resulted in an occupational exposure to radiation exceeding the 10 CFR 20 dose limits or a release of licensed material that could have resulted in an intake exceeding the annual occupational intake limit
(iii) the applicant commits to preparing and submitting to the NRC an annual report of the results of individual monitoring as required by 10 CFR 20.2206(b)
(iv) the applicant commits to refer to the facility's corrective action program any incident that results in an occupational exposure to radiation that exceeds the dose limits in 10 CFR 20 - Appendix B or 10 CFR 70.61 and to report to the NRC both the corrective action taken (or planned) to ensure against a recurrence and the proposed schedule to achieve compliance with the applicable license condition(s)
(v) the applicant commits to review at least annually the content and implementation of the radiation protection program as required by 10 CFR 20.1101(c)
(vi) the applicant commits to use the ISA procedure to evaluate modifications and improvements to the radiation protection program that would reduce potential radiation exposures at a reasonable cost.

4.5 REVIEW PROCEDURES4.5REVIEW PROCEDURES

4.5.1 Acceptance Review4.5.1Acceptance Review

The primary reviewer should evaluate the application to determine whether it addresses the "Areas of Review" discussed in Section 4.3. If significant deficiencies are identified, the applicant should be requested to submit additional material before the start of the safety evaluation.

4.5.2 Safety Evaluation4.5.2Safety Evaluation

The primary reviewer shall perform a safety evaluation against the Acceptance Criteria in Section 4.3. For existing facilities, the reviewer will consult with the cognizant radiation protection NRC inspector to identify and resolve any issues of concern related to the licensing review. The primary reviewer will prepare a safety evaluation report (SER) for the Licensing Project Manager in support of licensing action.

4.6 EVALUATION FINDINGS4.6EVALUATION FINDINGS

The reviewer will write an SER addressing each topic reviewed and explain why the NRC staff has reasonable assurance that the radiation protection part of the application is acceptable and that the health and safety of the workers is adequately protected. License conditions may be proposed to impose requirements where the application is deficient. The following kinds of statements and conclusions will be included in the staff's SER:

> The applicant has committed to an acceptable radiation protection program based on the results of the ISA that includes: (1) an effective documented program to ensure

that occupational radiological exposures are ALARA; (2) an organization with adequate qualification requirements for the radiation protection personnel; (3) approved written radiation protection procedures or RWPs for radiation protection activities; (4) radiation protection training for all personnel who have access to restricted areas; (5) requirements for the ventilation systems; (6) requirements for radiological air sampling; (7) requirements for control of radiological contamination within the facility; (8) programs for monitoring personnel external and internal radiation exposure; (9) a respiratory protection program, and (10) requirements for radiological measurement instrumentation.

The NRC staff concludes that the applicant's radiation protection program is adequate and meets the requirements of 10 CFR Parts 19, 20, and 70. Conformance to the application and license conditions will ensure safe operation.

4.7 REFERENCES4.7REFERENCES

Code of Federal Regulations, Title 10, Part 70, "Domestic Licensing of Special Nuclear Material," U.S. Government Printing Office, Washington, DC.

Code of Federal Regulations, Title 10, Part 20, “Standards for Protection Against Radiation,” U. S. Government Printing Office, Washington, DC.