U.S. NUCLEAR REGULATORY COMMISSION
STANDARD REVIEW PLAN
OFFICE OF NUCLEAR REACTOR REGULATION

SECTION 12.5 HEALTH PHYSICS PROGRAM

REVIEW RESPONSIBILITIES

Primary - Radiological Assessment Branch (RAB)

Secondary - None

I. AREAS OF REVIEW

The following areas of the applicant's safety analysis report (SAR) related to the health physics program are reviewed as part of the radition protection program.

1. ORGANIZATION
   a. The administrative organization of the health physics program, including the authority and responsibility of each position identified (preliminary safety analysis report, PSAR and update in the final safety analysis report, FSAR).
   b. The experience and qualifications of the personnel responsible for the health physics program and for handling and monitoring radioactive material. Reference may be made to SAR Chapter 13 as appropriate (final safety analysis report, FSAR).
   c. Information describing the implementation of Regulatory Guides 8.8, 8.10, 8.2 and 1.8. Information describing alternatives, if such are proposed (PSAR and update in FSAR).

2. EQUIPMENT, INSTRUMENTATION, AND FACILITIES
   a. The criteria for selecting portable and laboratory technical equipment and instrumentation for performing radiation and contamination surveys, for in-plant airborne radioactivity monitoring and sampling, for area radiation monitoring, and for personnel monitoring for normal operation, anticipated operational occurrences and accident conditions (PSAR and update in FSAR).
   b. The description of instrument storage, calibration, and maintenance facilities (PSAR and update in FSAR).
   c. The description and location of the health physics facilities (including locker and shower rooms, counting room, laboratories' decontamination facilities), protective clothing, respiratory protective equipment, and other contamination control equipment and areas (PSAR and update in FSAR).
   d. The location of items in 2a, b, and c and the description of types of detectors and monitors, sensitivity, range, and frequency and methods of calibration (FSAR).
   e. Information describing the implementation of Regulatory Guides 8.4, 8.8 and 8.9. Information describing alternatives, if such are proposed.

3. PROCEDURES

a. The description of physical and adminstrative measures for controlling access and stay time in radiation areas (FSAR).

b. The description of procedures and methods of operation for assuring that occupational radiation exposure (ORE) will be as low as is reasonably achievable (ALARA) (FSAR).

c. The description of methods, frequencies, and procedures for conducting radiation surveys (FSAR).

d. The description of the bases and methods for monitoring and control of personnel and equipment and of surface contamination including reporting practices (FSAR).

e. The description of methods and procedures for evaluating and controlling potential airborne radioactivity concentrations, for special air sampling and the issue and use of respiratory equipment, and for handling and storage of sealed and unsealed byproduct, source and special nuclear materials (FSAR).

f. The description of radiation protection training programs (FSAR).

g. Information describing the implementation of Regulatory Guides 8.8, 8.10, 8.2, 8.7, 8.9, 1.16, 1.39, and 1.8. Information describing alternatives, if such are proposed (PSAR and update in FSAR).

II. ACCEPTANCE CRITERIA

The descriptive information in the SAR is considered to be sufficient if it meets the minimum information needs set forth in Section 12.5 of the "Standard Format and Contents of Safety Analysis Reports for Nuclear Power Plants," Revision 2.

Apecific acceptance criteria for the areas of review given above are as follows:

1. ORGANIZATION

Acceptance will be based on a determination that the orgar.zation described, along with the duties, qualifications, and training of the individuals responsible for assuring that ORE will be ALARA are in accordance with Regulatory Guides 8.8, 8.10, 8.2, and 1.8. Alternatives will be evaluated on the basis of a comparison with the referenced Regulatory Guides.

2. EQUIPMENT, INSTRUMENTATION, AND FACILITIES

The following shall be included in order that these items are acceptable:

a. The radiochemistry laboratory is equipped to perform routine analyses required for personnel protection, surveys, and related health physics functions.

b. The counting room (low background) is equipped and has the necessary instrumentation to perform routine counting on all plant radioactivity samples (water, air, swipe survey, etc.) in conformance with 10 CFR Part 20. Counting room equipment to normally include the following:

(1) Multichannel gamma pulse height analyzer.

(2) Low background alpha-beta proportional counter and gamma ray and alpha-beta scintillation counters. Regulatory Guide 5.9 provides specifications for Ge(Li) spectroscopy systems that may be useful for application to the gamma ray system.

(3) End window G-M type counter.

c. Portable instruments for measuring radiation or radioactivity to include:
   (1) Low and high range ion chamber rate meter type instruments.
   (2) Portable G-M detectors.
   (3) Alpha scintillation or proportional counter rate meters.
   (4) Neutron dose rate detector.
   (5) Air samplers for use with particulate filters and iodine collection devices (such as charcoal cartridges) and airborne radioactivity monitors.

d. Personnel monitoring instruments to include:
   (1) Friskers for detecting radioactive contamination.
   (2) Self-reading low and intermediate pocket dosimeters (for early evaluation of individual doses). Performance and other requirements shall conform to Regulatory Guide 8.4, or to appropriate proposed alternatives.
   (3) Count rate meters or personnel air samplers to be worn on protective clothing.
   (4) Film badges and/or thermoluminescent dosimeters (TLD).
   (5) Provisions for bioassay and whole body counting to meet the requirements of 10 CFR Part 20 and Regulatory Guide 8.9, or to appropriate proposed alternatives.

e. Utility-issued personnel protection equipment to include:
   (1) Anti-contamination clothing.
   (2) Plastic suits for liquid contamination control.
   (3) Head covers, shoe covers, gloves, and safety related items.
   (4) Pressure/Demand full-face-piece air line respirators.
   (5) Continuous air flow two-piece plastic suits for covering whole body.
   (6) Pressure demand full-face-piece self-contained breathing apparatus.
   (7) Full-face mechanical filter respirators.

f. Personnel protective clothing and equipment that meet the requirements of the American Standards Institute ANSI Z88.2-1969 and the U.S. Bureau of Mines approved schedules for use in atmospheres containing radioactive materials.

g. As a minimum the following health physics support facilities or areas be provided:
   (1) Portable instrument calibration and storage area. The latter should be easily accessible.
   (2) Personnel decontamination area with necessary monitoring equipment. This facility should be located and designed to expedite rapid cleanup of personnel and should not be used as multiple purpose area.
   (3) Facility and equipment to clean, sanitize, repair, and decontaminate personnel protective equipment, monitoring instruments, respirators, etc.
   (4) A change room.
   (5) Control points for entrance or exit into controlled access areas of the plant.
   (6) One or more health physics stations, which may be used as the location for portable radiation survey equipment, respiratory protective equipment, personnel monitoring equipment, and contamination control supplies.

These stations and the equipment should be readily accessible and equipped to facilitate communication throughout the plant.

Acceptance will also be based on implementation of the guidance of Regulatory Guide 8.8 or the provision of acceptable alternatives.

3. PROCEDURES

Plans and procedures will be acceptable if they meet the criteria provided in Regulatory Guides 8.8, 8.10, and 8.2 or proposed appropriate alternatives. There should be provisions for a special control procedure for any zone 4 or higher area that includes a special survey of the area before entry and the development of a radiation work permit program. The work permit program should include the following: data on radiation levels in the area, allowable working time, protective clothing and respiratory protective equipment, special tools, portable shielding, and health physics and special personnel monitoring devices. For major dose accumulating functions, a post-operation review should be conducted to evaluate the effectiveness of the work permit program in assuring that occupational radiation exposures (ORE) will be as low as is reasonably achievable (ALARA). There should be provisions for supervision and control of the handling or movement of material within and from radiation or controlled access areas. Acceptance criteria for contamination control limits are being developed. There shall also be provisions for personnel monitoring procedures, bioassay, keeping records of personnel doses, and the reporting of personnel doses. 10 CFR § 20.102, .201, .401, and .407 provide the criteria for radiation surveys, personnel monitoring, bioassay, record keeping, and reporting. Guidance regarding these areas is provided by Regulatory Guide 8.2 (surveys and personnel monitoring), 8.3 (personnel monitoring equipment), 8.9 (bioassay), and 1.16, 8.2, 8.7 (record keeping and reporting), and 8.8 (decontamination, inspection, radiation protection program, and operations).

The acceptability of the health physics program will also be based on provisions for the indoctrination and personnel training and retraining programs. Regulatory Guides 8.8, 8.10, and 1.8 provide information regarding these areas. Section 19.12 of 10 CFR Part 19 requires instruction of personnel on radiation protection. There should be a regular review of the radiation protection program, which should include updating procedures, equipment, and facilities where improvements are possible. The program should include regular audits to determine where occupational radiation exposures are occurring and to review possible methods for reducing these exposures. With regard to plant cleanliness, which is critical where radioactive material is concerned, Regulatory Guide 1.39 discusses housekeeping requirements that are applicable to operation as well as construction. Finally 10 CFR Part 70 provides the guidance on special nuclear, source, and byproduct materials.

III. REVIEW PROCEDURES

The information furnished in the SAR is reviewed for completeness in accordance with the "Standard Format and Contents of Safety Analysis Reports for Nuclear Power Plants," Revision 2.

RAB reviews all the areas discussed in I., evaluating acceptability by making the referenced comparisons with Regulations, Regulatory Guides, and industry standards. These can be summarized as follows:

1. The organizational position, functional responsibilities, experience, and qualifications of persons responsible for the health physics program. The plant organization, the functional responsibilities, and the qualifications of personnel are the primary responsibility of the Quality Assurance Branch, and are reviewed as part of Chapter 13. RAB reviewers of these items for the health physics/radiation protection function and personnel qualifications will communicate their findings to the QAB in this area of review.

2. The equipment necessary to measure radioactivity and radiation fields and exposures, including the number, type, range, sensitivity, calibration method and frequency, availability, and planned use of portable, fixed, laboratory, and personnel monitoring instrumentation.

3. The health physics facilities and associated protective equipment for controlling ORE and contamination.

4. The training and indoctrination program and health physics instruction manuals, as well as the respiratory protective equipment fitting program. Plant procedures are the primary responsibility of the Operator Licensing Branch which reviews in Chapter 13 (Section 13.5), such formal procedures as the plant radiation protection procedures. RAB reviewers of health physics/radiation protection procedures should communicate any problems with specific procedures to the OLB.

5. The procedures to control storage and movement of radioactive material, to control exposures, and to control contamination. Where these procedures are part of the formal plant operating procedures, the review will include informing the OLB of any problems as in 4 above.

Based on the review, RAB may request additional information or request the applicant to modify his submission in order to meet the acceptance criteria described in Section II.

IV. EVALUATION FINDINGS

The staff's review should verify that adequate and sufficient information is contained in the SAR and amendments to arrive at conclusions of the following type, which are to be included in the staff's Safety Evaluation report. The report will include a summary of the applicant's coverage, the staff's basis for review and acceptance criteria, and the findings of the review. The following is a brief representation of the evaluation findings:

"12.5 Health Physics Program

"This section of the applicant's SAR has been reviewed to determine that the health physics program will assure that occupational radiation exposure will be as low as is reasonably achievable. The review covered the organization of the program, the qualification of personnel, the equipment and instrumentation related to the program, the

description of all health physics related facilities, and the procedures that are related to the control of radioactive contamination and occupational radiation exposure. The review includes the applicant's description of conformance to applicable industry standards, Regulations and Regulatory Guides, or this provision of acceptable alternatives.

"The basis for acceptance of the program organization and personnel qualifications is conformance with applicable Regulatory Guides. Acceptability of personnel monitoring, reporting and recording of information, and of radiation surveys is based on conformance to the requirements of 10 CFR Part 20, and to appropriate Regulatory Guides. The program contains an effective radiation work permit program, as well as procedures for contamination control that are consistent with assuring that occupational radiation exposures will be as low as is reasonably achievable.

"It is concluded that the health physics program, including organization, equipment and instrumentation, laboratory facilities, and methods and procedures related to personnel protection and contamination control conform to the Commission's Regulations and the applicable Guides and industry standards and is acceptable."

V. REFERENCES

1. 10 CFR Part 20, "Standards for Protection Against Radiation."

2. 10 CFR Part 19, "Notices, Instructions and Reports to Workers; Inspections."

3. Regulatory Guide 1.8, "Personnel Selection and Training."

4. ANSI N18.7-1972, "Administrative Controls for Nuclear Power Plants," American National Standards Institute (1972).

5. Regulatory Guide 8.8, "Information Relevant to Maintaining Occupational Radiation Exposures as Low as Practiable (Nuclear Reactors)."

6. Regulatory Guide 8.6, "Standard Test Procedures for G-M Counters."

7. Regulatory Guide 8.XX, "Control of Radioactive Surface Contamination on Material, Equipment and Facilities to be Released for Uncontrolled Use." (in preparation)

8. Regulatory Guide 1.39, "Housekeeping Requirements for Water Cooled Nuclear Power Plants."

9. USBM-23, "Respiratory Protective Services for Use in Atmospheres Containing Radioactive Materials," U.S. Bureau of Mines (1973).

10. Regulatory Guide 8.7, "Occupational Radiation Exposure Records System."

11. Regulatory Guide 8.4, "Direct Reading and Indirect Reading Pocket Dosimeters."

12. Regulatory Guide 8.3, "Film Badge Performance Criteria."

13. Regulatory Guide 8.2, "Guide for Administrative Practices in Radiation Monitoring."

14. ANSI Z88.2-1969, "Procedures for Respiratory Protection," American National Standards Institute (1969).

15. 10 CFR Part 20, Appendix B, Table 1, "Concentrations in Air and Water Above Natural Background."

16. Regulatory Guide 1.16, "Reporting of Operating Information."

17. Regulatory Guide 1.70, "Standard Format and Contents of Safety Analysis Reports for Nuclear Power Plants."

18. Regulatory Guide 8.9, "Acceptable Concepts, Models, Equation, and Assumptions for a Bioassay Program."

19. 10 CFR Part 70, "Special Nuclear Material."

20. Regulatory Guide 5.9, "Specifications of Ge(Li) Spectroscopy Systems for Natural Protection Measurements - Part I: Data Acquisition."

SRP 13.2