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R. C. DeYoung, Assistant Director for Pressurized Water Reactors, L

REVIEW OF RADIATION PROTECTION TECHNICAL SPECIFICATIONS FOR CRYSTAL RIVER  
UNIT 3

Plant name: Crystal River Unit 3  
 Licensing stage: OL  
 Docket number: 50-302  
 Responsible branch: PWR-4  
 Project Manager: B. Buckley  
 Requested completion date: 10/23/73  
 Description of response: Proposed Specification  
 Review Status: Awaiting Applicant Response

Section 15.6.7, Radiation Controls, of the Crystal River Technical Specifications has been reviewed by RAB. The specification as written shows only minor differences from the draft "Standard Technical Specifications" dated February 20, 1973. The appropriate section of this draft standard is enclosed (enclosure 1).

Specific comments on the proposed specifications are enclosed (enclosure 2).

This review was performed by J. Graf, RAB.

Original signed by

H. R. Denton

Harold R. Denton, Assistant Director  
 for Site Safety  
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## Enclosure:

As stated

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## RADIATION AND RESPIRATORY PROTECTION PROGRAM

### 6.9.1 Radiation Protection Program

Procedures for personnel radiation protection shall be prepared and adhered to for all station operations. These procedures shall be formulated to maintain radiation exposures received during operation and maintenance as far below the limits specified in 10 CFR 20 as practicable. The procedures shall include planning, preparation and training for each operation and maintenance activity. They shall also exclude exposure allocation, radiation and contamination control techniques, and final debriefing.

### 6.9.2 Respiratory Protection Program

- a. Pursuant to 10 CFR 20.103(c)(1) and (3), allowance shall be made for the use of respiratory protective equipment in conjunction with activities authorized by the operating license for this plant in determining whether individuals in restricted areas are exposed to concentrations in excess of the limits specified in Appendix B, Table I, Column 1, of 10 CFR 20, subject to the following conditions and limitations.
  1. The limits provided in Section 20.102(a) and (b) shall not be exceeded.
  2. If the radioactive material is of such form that intake through the skin or other additional route is likely, individual exposures to radioactive material shall be controlled so that the radioactive content of any critical organ from all routes of intake averaged over 7 consecutive days does not exceed that which would result from inhaling such radioactive material for 40 hours at the pertinent concentration values provided in Appendix B, Table I, Column 1, of 10 CFR 20.
  3. For radioactive materials designated "Sub" in the "Isotope" column of Appendix B, Table I, Column 1 of 10 CFR 20, the concentration value specified shall be based upon exposure to the material as an external radiation source. Individual exposures to these materials shall be accounted for as part of the limitation on individual dose in §20.101. These materials shall be subject to applicable process and other engineering controls.

- b. In all operations in which adequate limitation of the inhalation of radioactive material by the use of process or other engineering controls is impracticable, the licensee shall permit an individual in a restricted area to use respiratory protective equipment to limit the inhalation of airborne radioactive material, provided:
1. The limits specified in paragraph a. above are not exceeded.
  2. Respiratory protective equipment is selected and used so that the peak concentrations of airborne radioactive material inhaled by an individual wearing the equipment do not exceed the pertinent concentration values specified in Appendix B, Table I, Column 1, of 10 CFR 20. For the purposes of this subparagraph, the concentration of radioactive material that is inhaled when respirators are worn may be determined by dividing the ambient airborne concentration by the protection factor specified in Table 6.9-1 for the respirator protective equipment worn. If the intake of radioactivity is later determined by other measurements to have been different than that initially estimated, the later quantity shall be used in evaluating the exposures.
  3. The licensee advises each respirator user that he may leave the area at any time for relief from respirator use in case of equipment malfunction, physical or psychological discomfort, or any other condition that might cause reduction in the protection afforded the wearer.
  4. The licensee maintains a respiratory protective program adequate to assure that the requirements above are met and incorporates practices for respiratory protection consistent with those recommended by the American National Standards Institute (ANSI-Z38.2-1969). Such a program shall include:
    - (a) Air sampling and other surveys sufficient to identify the hazard, to evaluate individual exposures, and to permit proper selection of respiratory protective equipment.
    - (b) Written procedure to assure proper selection, supervision, and training of personnel using such protective equipment.

- (c) Written procedures to assure the adequate fitting of respirators; and the testing of respiratory protective equipment for operability immediately prior to use.
  - (d) Written procedures for maintenance to assure full effectiveness of respiratory protective equipment, including issuance, cleaning and decontamination, inspection, repair, and storage.
  - (e) Written operational and administrative procedures for proper use of respiratory protective equipment including provisions for planned limitations on working times as necessitated by operational conditions.
  - (f) Bioassays and/or whole body counts of individuals (and other surveys, as appropriate) to evaluate individual exposures and to assess protection actually provided.
5. The licensee shall use equipment approved by the U. S. Bureau of Mines under its appropriate Approval Schedules as set forth in Table 6.9-1. Equipment not approved under U. S. Bureau of Mines Approval Schedules shall be used only if the licensee has evaluated the equipment and can demonstrate by testing, or on the basis of reliable test information, that the material and performance characteristics of the equipment are at least equal to those afforded by U. S. Bureau of Mines approved equipment of the same type, as specified in Table 6.9-1.
6. Unless otherwise authorized by the Commission, the licensee shall not assign protection factors in excess of those specified in Table 6.9-1 in selecting and using respiratory protective equipment.
- c. These specifications with respect to the provisions of §20.103 shall be superseded by adoption of proposed changed to 10 CFR 20, Section 20.103, which would make this specification unnecessary.



TABLE 4.5-1  
PROTECTION FACTORS FOR RESPIRATORS

DESCRIPTION	MODES <sup>1/</sup>	PROTECTION FACTORS 2/ PARTICULATES AND VAPORS AND GASES EXCEPT TRITIUM OXIDE <sup>3/</sup>	GUIDES TO SELECTED SCHEDULES BUREAU OF MINES (29 CFR 11.4) FOR EQUIPMENT CAPABLE OF PROVIDING AT LEAST EQUIVALENT PROTECTION. *or *or schedule superseding for equipment of type listed
I. <u>AIR-PURIFYING RESPIRATORS</u> Facepiece, half-mask <u>4/</u> <u>7/</u> Facepiece, full <u>7/</u>	NP NP	5 100	21B 30 CFR § 11.4(b)(4) 21B 30 CFR § 11.4(b)(1); 14E 30 CFR § 11.4(b)(1)
II. <u>ATMOSPHERE-SUPPLYING RESPIRATOR</u> 1. <u>Airline respirator</u> Facepiece, half-mask Facepiece, full Facepiece, full <u>7/</u> Facepiece, full Hood Suit	CF CF D PD CF CF	100 1,000 <u>500</u> <sup>100</sup> 1,000 <u>5/</u> <u>5/</u>	19B 30 CFR § 12.2(c)(2) Type C(1) 19B 30 CFR § 12.2(c)(2) Type C(1) 19B 30 CFR § 12.2(c)(2) Type C(11) 19B 30 CFR § 12.2(c)(2) Type C(111) <u>6/</u> <u>6/</u>
2. <u>Self-contained</u> <u>breathing apparatus</u> <u>(SCBA)</u> Facepiece, full <u>7/</u> Facepiece, full Facepiece, full	D PD R	<u>500</u> <sup>100</sup> 1,000 1,000	13E 30 CFR § 11.4(b)(2)(i) 13E 30 CFR § 11.4(b)(2)(ii) 13E 30 CFR § 11.4(b)(1)
III. <u>COMBINATION RESPIRATOR</u> Any combination of air- purifying and atmosphere- supplying respirator		Protection factor for type and mode, or operation as listed above	19B CFR § 12.2(c) or applicable schedules as listed above

1/, 2/, 3/, 4/, 5/, 6/, 7/, [These notes are on the following pages]

TABLE 6.9-1 (Cont'd)

See the following symbols:

CF: continuous flow  
D: demand  
NP: negative pressure (i.e., negative phase during inhalation)  
PD: pressure demand (i.e., always positive pressure)  
R: recirculating (closed circuit)

- 2/ (a) For purposes of this specification the protection factor is a measure of the degree of protection afforded by a respirator, defined as the ratio of the concentration of airborne radioactive material outside the respiratory protective equipment to that inside the equipment (usually inside the facepiece) under conditions of use. It is applied to the ambient airborne concentration to estimate the concentration inhaled by the wearer according to the following formula:

$$\text{Concentration Inhaled} = \frac{\text{Ambient Airborne Concentration}}{\text{Protection Factor}}$$

- (b) The protection factors apply:

- (i) only for trained individuals wearing properly fitted respirators used and maintained under supervision in a well-planned respiratory protective program.
- (ii) for air-purifying respirators only when high efficiency [above 99.9% removal efficiency by U. S. Bureau of Mines type dioctyl phthalate (DOP) test] particulate filters and/or sorbents appropriate to the hazard are used in atmospheres not deficient in oxygen.
- (iii) for atmosphere-supplying respirators only when supplied with adequate respirable air.

- 3/ Excluding radioactive contaminants that present an absorption or submersion hazard. For tritium oxide approximately half of the intake occurs by absorption through the skin so that an overall protection factor of not more than approximately 2 is appropriate when atmosphere-supplying respirators are used to protect against tritium oxide. Air-purifying respirators are not recommended for use against tritium oxide. See also footnote 5/, below, concerning supplied-air suits and hoods.

TABLE 6.9-1 (Cont'd)

is of the type only. Not recommended for use where it might be possible for the ambient airborne concentration to reach instantaneous values greater than 50 times the pertinent values in Appendix B, Table I, Column 1 of 10 CFR, Part 20.

- 5/ Appropriate protection factors must be determined taking account of the design of the suit or hood and its permeability to the contaminant under conditions of use. No protection factor greater than 1,000 shall be used except as authorized by the Commission.
- 6/ No approval schedules currently available for this equipment. Equipment must be evaluated by testing or on basis of available test information.
- 7/ Only for shaven faces.

NOTE 1: Protection factors for respirators, as may be approved by the U. S. Bureau of Mines according to approval schedules for respirators to protect against airborne radionuclides, may be used to the extent that they do not exceed the protection factors listed in this Table. The protection factors in this Table may not be appropriate to circumstances where chemical or other respiratory hazards exist in addition to radioactive hazards. The selection and use of respirators for such circumstances should take into account approvals of the U. S. Bureau of Mines in accordance with its applicable schedules.

NOTE 2: Radioactive contaminants for which the concentration values in Appendix B, Table I of this part are based on internal dose due to inhalation may, in addition, present external exposure hazards at higher concentrations. Under such circumstances, limitations on occupancy may have to be governed by external dose limits.

Enclosure #2

RAB COMMENTS ON SECTION 15.6.7 OF  
CRYSTAL RIVER TECHNICAL SPECIFICATIONS

1. The essential portions of the specification are complete and are acceptable.
2. The format of the specification does not conform to the format of the draft standard.
3. The specification does not contain the stipulation, "The limits provided in Section 20.102(a) and (b) shall not be exceeded." See draft standard §6.9.2.a.1.
4. Specification 15.6.7.A.3 could be replaced with draft standard specification 6.9.2.a.3.
5. The approved protection factor for full facepiece respirators operated in the demand mode has been reduced from 500 to 100 as indicated in Table 6.9-1 of enclosure 1.