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PLANNED SPECIAL EXPOSURE

A. INTRODUCTION

This regulatory guide provides guidance on the conditions and prerequisites for permitting planned special exposure(s) (PSE(s)), as allowed by Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20, "Standards for Protection against Radiation" (Ref. 1), the associated specific monitoring and reporting requirements, and examples of acceptable means of satisfying these requirements.

Occupational dose limits are established in 10 CFR 20.1201, "Occupational Dose Limits for Adults." 10 CFR 20.1201(b), and 10 CFR 20.1206, "Planned Special Exposures," provide the conditions and limits for PSEs of adult workers (i.e., radiation doses in addition to and accounted for separately from the doses received under the limits specified in 10 CFR 20.1201). In addition, 10 CFR 20.2104(b) and 10 CFR 20.2104(e)(2) specify the requirements for obtaining prior occupational dose information, 10 CFR 20.2105, "Records of Planned Special Exposures," and 10 CFR 20.2106, "Records of Individual Monitoring Results," specify the requirements for exposure and monitoring records applicable to PSEs. The requirements for reporting PSEs appear in 10 CFR 20.2202, "Notification of Incidents," (10 CFR 20.2202(e)), and 10 CFR 20.2204, "Reports of Planned Special Exposures."

This regulatory guide contains information collection requirements covered by 10 CFR Part 20 that the Office of Management and Budget (OMB) approved under OMB control number 3150-0014. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection request or requirement unless the requesting document displays a currently valid OMB control number.

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This guide was issued after consideration of comments received from the public.

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B. DISCUSSION

The regulations restrict PSEs to those special situations that could result in a higher exposure than allowed by the normal limits of 10 CFR 20.1201 and that, if not provided for, could create a severe problem in the licensee's operations. Problems might include unscheduled facility shutdowns or high radiation levels that impede operations important to safety. Accordingly, a special set of limitations and reporting and recordkeeping requirements apply if licensees decide to use PSEs. Approval of PSEs for an adult worker must be in writing before the exposure occurs and, once it occurs, the exposure cannot be treated as a routine occupational exposure (see 10 CFR 20.1206). Furthermore, minors are not allowed to participate in PSEs.

Efforts should be made to maintain the doses received during PSEs as low as reasonably achievable (ALARA). Methods for reducing the dose received by the individual authorized to perform the PSE should be considered while planning the activity. A more detailed discussion of reducing radiation doses appears in Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable" (Ref. 2).

In determining the amount of dose to assign to the PSE in advance of the exposures, licensees must be aware of the individual's current year exposure and lifetime PSE dose history to avoid unnecessary overexposure affecting a worker's occupational dose (see 10 CFR 20.2104).

C. REGULATORY POSITION

1. Use of Planned Special Exposures

a. The PSEs are to be used only under exceptional circumstances, not as a routine method of increasing dose limits applicable to routine exposures. However, licensees may consider the use of PSEs to permit workers who have critical skills and who are necessary for a particular job to receive an exposure in addition to the routine occupational exposure limit.

b. The rule does not require that participation in PSEs be voluntary on the part of the individual workers. However, licensees may establish a program of voluntary PSEs. In any case, licensees should consider the potential benefits of involving the worker in the planning and preparation for the PSE. The NRC believes that the health risk from these limited exposures is small and that the use of PSEs may be necessary for licensees to accomplish important tasks vital to continued safe operations. Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure" (Ref. 3), discusses the issue of a worker accepting the risks associated with an assigned task.

c. Exposures in excess of the routine occupational dose limits received during accident or emergency situations that require immediate action to save human lives or to prevent the failure of equipment important to safety are not PSEs. However, all exposures in excess of the routine occupational dose limits received during accident and emergency situations must be determined and subtracted from the annual 50-millisievert (mSv) (5-rem)) PSE limit and the 250 mSv (25 rem) allowed for lifetime PSEs (see 10 CFR 20.1201(b)). A PSE can be authorized if the conditions associated with an accident or emergency permit complying with the conditions specified in 10 CFR 20.1206(a) through (e).

2. Conditions for Use of Planned Special Exposures

The seven conditions listed in 10 CFR 20.1206 must be satisfied if a licensee authorizes an adult worker to receive a PSE. The following list summarizes these conditions:

(1) A PSE is reserved for an exceptional situation when alternatives are unavailable or impractical.

(2) The PSE is authorized in writing before the exposure occurs.

(3) Individuals involved are informed of the purpose, the estimated doses, and the associated potential risks, and are instructed in the measures to take to keep the dose ALARA.

(4) The licensee shall determine the doses from all previous PSEs and all doses in excess of the limits (including doses from accidents and emergencies) received during the lifetime of the individual.

(5) The dose from the PSE must be under the dose limit for 1 year and 5 times annual dose limits for a lifetime.

(6) Records shall be maintained of the details of the PSE and shall be submitted to the NRC.

(7) The estimated dose from the PSE shall be recorded, and the individuals who received the PSE should be informed of the dose within 30 days of the PSE.

2.1 Exceptional Situation Exists

a. Licensees should authorize PSEs only for exceptional situations. The use of PSEs must be justified and well documented (see 10 CFR 20.2105). Licensees should not use PSEs as a routine method of increasing occupational exposure limits. The NRC staff will review the justification for the PSE when it examines the licensee's records of the PSE. To request an NRC review before initiating a PSE, the licensee may contact the appropriate regional office directly.

b. The following are examples of exceptional situations in which a PSE might be justified:

(1) <u>The work is to be performed by one individual rather than several</u>. A source becomes disconnected during radiography. It may not be practical or feasible for the source to be recovered in two or three steps by different persons. Authorization for one person to receive up to 50 mSv (5 rem) total effective dose equivalent, in addition to his or her routine occupational exposure, may be reasonable for the recovery. The NRC regulations permit the licensee to use previously approved procedures in carrying out work under a PSE. For example, the licensee could have an approved generic procedure for source retrieval that, among other things, addresses all the administrative and recordkeeping requirements of 10 CFR 20.1206. Provided that the situation is exceptional and alternatives that might avoid higher exposures are unavailable or are impractical, an individual's exposure received during a source retrieval may be considered a PSE. The licensee must meet all the conditions of 10 CFR 20.1206 and document them as required by 10 CFR 20.2105.

(2) The use of dose-averting methods is not possible. Work must be performed on instrumentation in a high-radiation area where space is very limited and shielding or other dose-averting methods are not possible. It may be necessary to authorize a PSE to make the necessary repairs to the instrumentation.

(3) The collective dose to personnel may be reduced. It may be more dose-effective to keep certain skilled workers on a particular job because they will be able to perform the job more rapidly than lesser skilled workers and thus reduce the overall dose to personnel. For example, if two persons can weld in a high-radiation area and collectively receive 120 mSv (12 rem) (60 mSv (6 rem) per person, 20 mSv (2 rem) under a PSE and 40 mSv (4 rem) of routine exposure)) while four less skilled workers would receive 160 mSv (16 rem) (40 mSv (4 rem) per person of routine exposure), the collective dose would be reduced from 160 mSv to 120 mSv (16 rem to 12 rem) by using the two skilled workers. The PSEs are not intended to be used only as a routine collective dose reduction technique. However, reducing collective dose could contribute to the justification of a PSE.

2.2 Prior Written Authority Obtained

a. The licensee (and employer if the employer is not the licensee) must specifically authorize the PSE in writing before the exposure occurs (see 10 CFR 20.1206(b)). A contractor employer may authorize the use of PSEs by a licensee in advance to accommodate any urgent circumstances that may arise.

b. In planning for a PSE, the licensee is permitted to assign a portion of the dose to routine exposure and the rest to the PSE. This should be authorized prior to the planned activity, see 10 CFR 2105(a)(2). When the postexposure evaluation is made, the dose amount that the licensee planned to assign to a PSE should be recorded as a PSE. If the total dose received for the actual PSE is less than the planned PSE, the actual PSE dose received must be recorded as the PSE dose (see 10 CFR 20.2105(a)(6)). If the total dose received is more than the planned PSE but is not an overexposure, the extra portion may be recorded as a PSE or as a routine dose. In other words, the planned PSE dose should not be reassigned, postexposure, to routine exposure if it is later determined that a PSE was not needed. The intent of the regulation is that a PSE would be used infrequently. Once a licensee decides to authorize a PSE, all the unique limitations and reporting and recordkeeping requirements are to apply, even if the doses actually received fall within the dose limits for routine operations. For example, if a job planned with a PSE of 50 mSv (5 rem) and a routine dose of 20 mSv (2 rem) to an individual actually results in a dose of 40 mSv (4 rem), the entire 40 mSv (4 rem) dose must be recorded as a PSE dose (see 10 CFR 20.2105(a)(6)). If, before initiating a PSE, it is found that a PSE is not needed, and it is canceled, the resulting exposure can be recorded as routine.

c. The procedures for the radiation protection program should specify the management level of the person who may authorize a PSE. The responsible person should be at a sufficiently senior level to ensure worker protection and to judge the appropriateness of the PSE for the exceptional circumstances. This person would normally be the radiation safety officer, the radiation protection manager, or someone in the organization with equivalent qualifications.

2.3 Individual Informed and Instructed

a. Before authorizing a PSE, the licensee must ensure that the individuals involved are (1) informed of the purpose of the planned operation, (2) informed of the expected radiation levels, estimated

doses, and associated risks or other conditions that may be involved in performing the task, and (3) instructed in measures to take to keep the dose ALARA, while considering other risks that may be present (see 10 CFR 20.1206(c)).

b. To ensure that the intent of the plan is realized, the workers who are to receive a PSE should be fully informed and aware of the circumstances under which the PSE was authorized. These workers should understand the importance of keeping their exposure ALARA. They should also understand the procedures and controls to be used in the particular PSE to keep their exposures ALARA. Licensees have an obligation to inform workers (before they receive a PSE) of the expected radiation levels, estimated doses, associated risks, or other significant conditions that might be involved in performing the task so that the individuals are aware of and understand the health and safety significance of the PSE. The authorization for the PSE should include this information.

2.4 Prior Doses Determined

a. According to 10 CFR 20.1206(d), before authorizing the PSE, the licensee must ensure that all previous PSEs and all doses in excess of the routine occupational limits in effect at the time of the exposures (10 CFR 20.1201(a)(1) and the former 10 CFR 20.101) for the individual's lifetime have been determined from records for each individual who will participate in the PSE. The licensee must also determine the doses received during accidents and emergencies that exceed the routine occupational dose limits in effect at the time of the exposures (see 10 CFR 20.1206(d)) and must subtract those doses from the limits for PSEs (see 10 CFR 20.1201(b)). (Accident doses are doses resulting from an unexpected event involving exposure to radiation or radioactive material. Emergency doses are doses resulting from any immediate action taken in response to a situation or occurrence of a serious nature that develops suddenly and unexpectedly.)

b. If complete records (including the provisions of 10 CFR 20.2104) of the worker's current and previously accumulated occupational dose history, such as a completed NRC Form 4, are not available, the individual cannot be authorized to receive a PSE (see 10 CFR 20.2104(e)(2)). Regulatory Guide 8.7, "Instructions for Recording and Reporting Occupational Radiation Dose Data" (Ref. 4), provides guidance on records of occupational exposure.

2.5 Planned Special Exposures and Exposure Limits Determined

a. Individuals receiving PSEs can receive a maximum dose in 1 year of any or all of the following:

(1) 100 mSv (10 rem) total effective dose equivalent (50 mSv (5 rem) from routine operations and 50 mSv (5 rem) from PSEs), or

(2) 1 Sv (100 rem) to any individual organ or tissue, including any deep-dose equivalent plus the committed dose equivalent for the organ or tissue (500 mSv (50 rem) from routine operations and 500 mSv (50 rem)) from PSEs, and

(3) 300 mSv (30 rem) dose equivalent to the eye (150 mSv (15 rem) from routine operations and 150 mSv (15 rem) from PSEs), and

(4) 1 Sv (100 rem) to the skin or to any extremity (500 mSv (50 rem) from routine operations and 500 mSv (50 rem) from PSEs).

b. Individuals can receive a lifetime dose from PSEs of any or all of the following:

(1) 250 mSv (25 rem) total effective dose equivalent; or 2.5 Sv (250 rem) to any individual organ or tissue, and

(2) 750 mSv (75 rem) to the eye, and

(3) 2.5 Sv (250 rem) to the skin or to any extremity.

2.6 Worker's Planned Special Exposure Dose Recorded and Worker Informed

a. The licensee must record its best estimate of the dose (dose of record) resulting from the PSE in each affected individual's record and inform the individual, in writing, of the dose within 30 days of the PSE (10 CFR 20.1206(g)). The 30-day time period for notifying the worker of the dose received is to allow sufficient time for the licensee to make its best estimate of internal and external exposures received as part of the PSE. The best estimate is understood to mean the dose of record as determined by accredited dosimetry, bioassay, air sampling, or other analyses, such as time and motion studies. If the intake of Class Y material (i.e., materials that remain in the body for time periods on the order of years) is being assessed, the licensee may delay the recording and reporting of the results of its assessments for periods of up to 7 months to allow for the additional measurements necessary for the assessments (10 CFR 20.1204(d)). However, the internal dose reported within the 30 days may be identified as an initial best estimate pending completion of a final assessment, after which the actual dose assigned should be recorded and reported.

b. The dose from a PSE must be tracked separately from the routine occupational dose for the individual (see 10 CFR 20.1206(g)). Thus, a person may have an accumulated routine occupational dose of 30 mSv (3 rem) total effective dose equivalent for the year, receive a dose of 40 mSv (4 rem) total effective dose equivalent from a PSE, and still be able to receive up to an additional 20 mSv (2 rem) of routine occupational exposure for the year, even though the person has had a total dose of 70 mSv (7 rem) for the year. The dose from the PSE is not to be considered in controlling the future occupational dose of the individual under 10 CFR 20.1201(a) but is to be included in evaluations required by 10 CFR 20.1206(d) and (e). The dose resulting from a PSE is to be included in the total for all PSEs for the individual, and it is to be used in determining the dose balance remaining for future PSEs.

2.7 Records and Written Reports Maintained

a. The licensee must maintain records of the conduct of a PSE in accordance with 10 CFR 20.2105 and must submit a written report in accordance with 10 CFR 20.2204. In addition, 10 CFR 20.2106 requires that the records of doses received during PSEs be maintained for all individuals who participated in a PSE. These records should include all the information listed in 10 CFR 20.2105. The NRC has included its revised Form 5, along with guidance on its use, in Regulatory Guide 8.7.

b. A written report of the PSE, notifying the Administrator of the appropriate NRC regional office, is due within 30 days after the PSE has occurred. Any report filed under 10 CFR 20.2204 must contain the information in the records listed in 10 CFR 20.2105. The report allows the NRC to assess the actual frequency of PSEs and determine whether followup inspections may be warranted.

2.8 Internal and External Exposure Considerations

For PSEs, as well as for routine exposures, both internal and external doses are to be summed in calculating the total effective dose equivalent, see 10 CFR 20.1202. This requires controlling the total effective dose equivalent but permits tradeoffs between internal and external exposures to be made to achieve ALARA doses. The sum of external and internal doses during the PSE should be maintained ALARA. Licensees should use the conditions specified in 10 CFR 20.1502, "Conditions Requiring Individual Monitoring of External and Internal Occupational Dose," to determine when monitoring is required.

2.9 Exposures of Minors and Declared Pregnant Women

The PSE provisions of 10 CFR 20.1206 do not apply to minors (10 CFR 20.1207, "Occupational Dose Limits for Minors") or to the embryo or fetus (10 CFR 20.1208, "Dose Equivalent to an Embryo/Fetus"). The rule permits a licensee to authorize only an adult worker to receive PSEs. In addition, the dose limits in 10 CFR 20.1208 would normally preclude a declared pregnant woman from receiving a PSE, since the 10 CFR 20.1208 limits are more restrictive than the annual dose limits in 10 CFR 20.1201. In general, declared pregnant women should not be considered candidates for PSEs. However, the provisions of 10 CFR 20.1206 also apply to the dose limits for the lens of the eye, skin, and extremities. Therefore, in some situations, it may be possible for a declared pregnant woman to receive a PSE to her extremities (or skin or eyes) that would not exceed the dose limits to the embryo or fetus.

D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC's plans for using this regulatory guide. The NRC does not intend or approve any imposition or backfit in connection with its issuance.

In some cases, applicants or licensees may propose or use a previously established acceptable alternative method for complying with specified portions of the NRC's regulations. Otherwise, the methods described in this guide will be used in evaluating compliance with the applicable regulations for license applications, license amendment applications, and amendment requests.

REFERENCES[1]

1. 10 CFR Part 20, "Standards for Protection against Radiation," U.S. Nuclear Regulatory Commission, Washington, DC.

2. Regulatory Guide 8.8, "Information Relevant to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will Be as Low as Is Reasonably Achievable," U.S. Nuclear Regulatory Commission, Washington, DC.

3. Regulatory Guide 8.29, "Instruction Concerning Risks from Occupational Radiation Exposure," U.S. Nuclear Regulatory Commission, Washington, DC.

4. Regulatory Guide 8.7, "Instructions for Recording and Reporting Occupational Radiation Dose Data," U.S. Nuclear Regulatory Commission, Washington, DC.

[1] Publicly available NRC documents are available electronically through the Electronic Reading Room on the NRC's public Web site at: http://www.nrc.gov/reading-rm/doc-collections/. The documents can also be viewed on-line for free or printed for a fee in the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone 301-415-4737 or (800) 397-4209; fax (301) 415-3548; and e-mail PDR.Resource@nrc.gov.