FEB 09 1994

ALL AGREEMENT STATES
MASSACHUSETTS, OHIO, OKLAHOMA, PENNSYLVANIA

TRANSMITTAL OF STATE AGREEMENTS PROGRAM INFORMATION
(SP-94-025)

Your attention is invited to the attached correspondence which contains:

INCIDENT AND EVENT INFORMATION.....

PROGRAM MANAGEMENT INFORMATION.....

TRAINING COURSE INFORMATION.....

TECHNICAL INFORMATION.....

OTHER INFORMATION.....XX Seventh set of Q&As on Revised Part 20 and Electronic Copy of Part 20 Regulatory Guides

Supplementary information: Enclosed for your information is the seventh set of questions and answers on the revision to Part 20. This document is to be used to help clarify the meaning of the revised Part 20. In addition there is a revision to Question 96 which is consistent with the answer to Question 428 in the seventh set. We are also enclosing a disk with the new Regulatory Guides for the revised Part 20. The files are in Wordperfect format.

If you have further questions regarding this correspondence, please contact the individual named below.

POINT OF CONTACT: Dennis M. Sollenberger
TELEPHONE: (301) 504-2819
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/S/

Paul H. Lohaus, Deputy Director
Office of State Programs

Enclosure:
As stated

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

February 9, 1994

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Enclosure 1

PREFACE TO THE SEVENTH SET OF QUESTIONS AND ANSWERS ON THE NEW PART 20

Following are questions and answers concerning the new 10 CFR Part 20 (10 CFR Part 20 Sections 20.1001 - 20.2401) and its implementation. These questions and answers have been compiled primarily for use in training NRC regional inspection staff members, but they are being made publicly available for information of interested organizations and to encourage communications between the public and the NRC staff concerning this new rule. Additional questions and answers are being compiled and will be made publicly available at a later date.

The questions included here were provided by individuals and organizations outside the NRC and by NRC staff members. Answers to these questions have been prepared by, and reviewed by NRC staff members in the NRC Offices of Nuclear Reactor Regulation, Nuclear Material Safety and Safeguards, Nuclear Regulatory Research, and the five NRC Regional Offices. The questions and answers also have been reviewed by an attorney in the NRC Office of the General Counsel.

The answers to questions do not constitute official legal interpretations, which can only be provided by the General Counsel, and they do not reflect official NRC policy as approved by the Commission. The answers do reflect NRC staff decisions and technical opinions on specific aspects of regulatory requirements.

Additional information about the questions and answers follows:

- Questions and answers are arranged in the order of appearance in Part 20 of the section of Part 20 to which the question appears to be most closely related. Questions on Part 20 itself are followed by related questions concerning 10 CFR Part 19, reactor technical specifications, and regulatory guides.

- The questions are not in numerical order. The number assigned to each question is merely a unique identification number. This identification number has no relationship to the subject of the question.

- Unless otherwise indicated in an answer, a reference to a Federal Register volume and page number (e.g., 56 FR 23377) refers to a page number in the May 21, 1991 edition of the Federal Register, which contained the new Part 20 and related information, on pages 23360-23474.

- The first six sets of questions and answers are identified by their dates of issuance and their NRC accession numbers in the following table. The accession numbers can be used by the NRC staff to retrieve these documents from the NUDOCS system and by members of the public to obtain the documents from the NRC Public Document Room.

Set	Date	Accession No.
First	12/06/91	9112190258
Second	04/17/92	9205010117
Third	07/23/92	9207300261
Fourth	09/14/92	9209230012
Fifth	06/08/93	9306110303
Sixth	09/28/93	9310070005

SEVENTH SET OF QUESTIONS AND ANSWERS ON NEW PART 20

NOTE: Questions 412-422, inclusive, refer to answers provided in the first four sets of questions and answers on new Part 20. Questions 429-433, inclusive, refer to answers in the fifth set of questions and answers.

10 CFR 20.1003 Definitions

QUESTION 412: This question refers to the answer to Question 26(b) in the fourth set under § 20.1003. What is the basis for using a dose threshold to decide whether a person is categorized as a member of the public or as occupationally exposed? The definitions do not specify a dose threshold.

ANSWER: Question 26(b) asked whether occupational or public dose limits apply to individuals, described in three different scenarios, who are exposed within controlled areas (outside any restricted areas) at a nuclear power plant. These scenarios described (1) a fossil plant worker, (2) a pregnant taxi driver, and (3) construction workers building a second nuclear power plant and secretaries in the administrative building. The answer to Question 26(a) states that the public dose limits apply to the individuals in all three scenarios, but the answer also states that if turbine shine from the nuclear plant is such that fossil plant workers, construction workers, or secretaries (but not the pregnant taxi driver) "...are likely to exceed the dose limits for members of the public, the licensee should consider the individual doses to be occupational doses and meet the requirements for individuals who receive occupational doses." The basis for this answer is the NRC staff's understanding of the intent of the definition of "occupational dose", specifically, that portion which states that "occupational dose means the dose received by an individual...in the course of employment in which the individual's assigned duties involve exposure to radiation...." This understanding of the definition is also expressed in more general terms in the answer to Question 26(a). (Reference: 10 CFR 20.1003)

QUESTION 413: This question refers to the answers to Questions 66 and 31 in the second set of questions and answers under § 20.1003 and § 20.1201, respectively, and to Question 26(d) in the fourth set of questions and answers under § 20.1003. Simply designating an area as a restricted area so you can control everyone at occupational dose limits is a perversion of every radiation protection principle published. Of course, this is just my opinion. I hope NRC will revise its interpretation of this definition.

For example, a secretary in a nuclear medicine clinic without any direct person-to-person contact with patients should not be subject to occupational limits just because she is in a restricted area. Many other examples could be cited, and some that are more in the gray area should be examined carefully. Clearly, there is a significant population of exposed persons that are not being held to the proper standard. The following statement refers to the answer to Question 26(d) concerning "individual E." In spite of the definition of occupational dose, mere geography is not justification for classifying a person as a radiation worker.

ANSWER: The questioner appears to object to the definition of "occupational dose" that states that "occupational dose means the dose received by an individual in a restricted area or ...." The NRC cannot change this definition by revising its "interpretation of this definition." The definition can only be changed by rulemaking.

While there may have been a lack of clarity in the referenced answers, our intention is that licensees should not engage in a practice of "simply designating an area as a restricted area so you can control everyone at occupational dose limits." Question 66 asks if a simple fenced area can qualify as a restricted area and the answer is yes, provided it is the licensee's purpose to limit access for the purpose of controlling radiation exposures. Question 31 asks if students and volunteers (such as nuclear medicine students and "candy stripers" who transport nuclear medicine patients or perform volunteer work in a nuclear medicine department) are subject to occupational dose limits. The answer to this question is that these individuals are subject to the occupational dose limits because, and provided that (as the question implies), the type of work they are assigned involves exposure to radiation; it does not matter where (in which area) they are working Question 26(d) asks if the occupational dose limits or public dose limits apply to "Individual E," a secretary for a radiography company, who works in a "controlled area" next to a "restricted area" containing a hot cell. The answer is that the occupational dose limits apply), again because the type of work assigned presumably involves exposure to radiation since it must be performed near the hot cell. (References: 10 CFR 20.1003, 20.1201).

QUESTION 434: **How are occupational dose limits applied in regard to the revised Part 20 definition of "year"?** The purpose of this question is to obtain additional clarification of the intent and application of the "year" as it is defined in the revised Part 20 and discussed previously in Question 40 of the first set of Questions and Answers. Apparently, licensees may establish a year that is other than January 1 through December 31 (e.g., Question 40 addresses a year that is from January 31 of one year through January 30 of the following year). In responding to the question, consider the following example. A worker receives dose sequentially at facilities of two different licensees, the first licensee using a year of January 1 - December 31, and the second licensee using a year of January 31 - January 30. The worker receives 4 rems total effective dose equivalent (TEDE) at the facility of the first licensee during the period January 1 - January 30, and then transfers to the second licensee's facility, arriving for work on February 1. For work performed at the second licensee's facility, is the individual's remaining available TEDE 1 rem or 5 rems?

ANSWER: Five rems. For a particular licensee, the relevant time period for determining compliance with an annual dose limit is the year beginning and ending on the dates specified by that licensee, providing that the time period chosen by the licensee is consistent with the definition of "year" in 10 CFR 20.1003. In the example provided, the worker started work at the facility of the second licensee at the beginning of that licensee's "year" and, therefore, the worker had no prior occupational dose during that licensee's "year." (Reference: 10 CFR 20.1003).

10 CFR 20.1201 Occupational Dose Limits for Adults

QUESTION 414: This question refers to the answer to Question 6 in the first set of questions and answers under § 20.1201. This answer does not directly answer the implied question, which is, "if a person is assessed a history of 5 rem or more for the current year, is that person permitted to receive any occupational dose?"

Implied in the answer is that if monitoring is not required, that person can receive an occupational dose, presumably up to 500 mrem for an adult. Conceptually, this is not consistent with normal protection standards, i.e., "if you don't measure it, it is not there" is not a normally accepted practice. The Commission allowance for an explicit 100 mrem (SECY-90-387, November 26, 1990) would seem a much more reasonable approach. Both of these positions appear to conflict with the answer to Question 113 in the third set. Hopefully, a position similar to that taken for the declared pregnant woman with a pre-existing dose history will be taken. That is, an additional small increment of exposure is not biologically significant.

ANSWER: "If a person is assessed a history of 5 rem or more for the current year", that individual is not permitted to receive any additional occupational dose during that year (except a planned special exposure). The answer to Question 6 does not imply that the individual can receive any additional occupational dose (except in a planned special exposure). As noted in the preamble to new Part 20 (56 FR 23369, second column), "the allowance of an additional 1 rem per quarter following an exposure in excess of the limits has been deleted" from the final rule published on May 21, 1991. The answer to Question 6 is consistent with the rule and the answer to Question 113, which states that "...if the 5 rem CEDE was received during the current year, this individual would not be allowed any further exposure for the balance of the year." (Reference: 10 CFR 20.1201, 20.2104).

QUESTION 415: This question refers to the answer to Question 41 in the first set of questions and answers under § 20.1201. This answer leaves open what is an acceptable frequency for querying monitored workers. (This is only an issue of monitored workers, isn't it?) In the interest of workload minimization, I suggest that an annual query/reminder along with the required annual 10 CFR 19 dosimetry report is adequate.

ANSWER: The requirements of 10 CFR 20.1201(f) and the answer to Question 41 apply to any individual who will receive an occupational dose, not just those individuals for whom individual monitoring is required. The frequency for querying/reminding workers should be determined by the licensee; however, given that the dose limit is annual, the frequency should be no less than annually. (Reference: 10 CFR 20.1201).

QUESTION 435: The rule requires that "the assigned deep-dose equivalent... must be for the part of the body receiving the highest exposure. [The dose] may be assessed from surveys or other radiation measurements for the purpose of demonstrating compliance with the occupational dose limits, if the individual monitoring device was not in the region of highest potential exposure." In the event of a hot particle exposure to a portion of the whole body, it is unlikely that the associated deep dose equivalent (DDE) resulting from the hot particle gamma radiation would be appropriately measured by an individual monitoring device due to the localized nature of the exposure. **Is it required that the DDE associated with a hot particle exposure be assessed and added to the monitored DDE for the purpose of demonstrating compliance with the occupational dose limits?**

ANSWER: Yes. Although, for a hot particle on the skin, the deep dose equivalent is generally a small fraction of the shallow dose equivalent, it does need to be assessed. (Reference: 10 CFR 20.1201).

QUESTION 436: Licensees are required to "reduce the dose that an individual may be allowed to receive in the current year by the amount of occupational dose received while employed by any other person." **How should this provision be applied to dose categories that are required to be monitored by the current licensee, for which the individual's dose report (e.g., NRC Form 5) from previous employment during the current year at another licensee's facility indicates "NR" (not required), "ND" (not detectable), or is left blank?** May the dose in categories denoted on the dose record as "NR", "ND", or left blank be assumed to be zero, and therefore no reduction be made to the dose that the individual may be allowed to receive in the current year?

ANSWER: Yes, for cases in which "NR" or "ND" have been recorded. However, if there is no recorded dose for a dose category and no reason for this omission has been provided (i.e., "NR" or "ND" have not been entered), the licensee should determine if the dose value has been omitted erroneously before assuming it to be zero (e.g., by checking with the licensee that provided the Form 5 with a dose category left blank). If the licensee cannot determine why there is no recorded dose for a dose category, the licensee has been unable to obtain a complete record of the individual's dose history for that dose category and the individual's exposure must be limited in accordance with 10 CFR 20.2104(e)(1).
(Reference: 10 CFR 20.1201, 20..2104, Reg. Guide 8.7, Rev. 1).

10 CFR 20.1202 Compliance with Requirements for Summation of External and Internal Dose

QUESTION 438: In general, the nuclear power industry has concluded that workers are not likely to exceed 10% of the annual limit on intake, and therefore internal dose monitoring would not be required. However, some

nuclear power plant licensees plan to continue internal dose monitoring and record and report monitoring results on a voluntary basis. (a) If the results of both voluntary monitoring of the committed effective dose equivalent (CEDE) and required monitoring of the deep dose equivalent (DDE) are reported on an individual's NRC Form 5, with appropriate comments indicating that the CEDE monitoring results are not required (i.e., are voluntary), are the CEDE and the DDE required to be summed as the total effective dose equivalent on the NRC Form 5? (b) If so, is the remaining available TEDE for the current year in which the results were obtained determined as 5 rems minus the year-to-date DDE plus CEDE, or as 5 rems minus the year-to-date DDE only? (Note: the question assumes that the doses described are the only doses received by the individual in the current year.)

ANSWER: (a) No. If monitoring for DDE is required and monitoring for CEDE is not required, there is no requirement to sum the DDE and CEDE. (b) [No answer to this question is needed because the answer to question (a) is "no".] [Note: This question and answer apply to all licensees, not just nuclear power plants.] (Reference: 10 CFR 20.1202).

10 CFR 20.1204 Determination of Internal Exposure

QUESTION 437: The rule provides for disregarding certain radionuclides in a mixture of radionuclides in air if three conditions are met. The conditions are:

a. The licensee uses the total activity of the mixture in demonstrating compliance with occupational dose limits and monitoring requirements;

b. The concentration of any radionuclide disregarded is less than 10% of its derived air concentration (DAC); and

c. The sum of the percentages for all radionuclides disregarded in the mixture does not exceed 30%.

As used in this provision, what is the intent of the phrase "total activity of the mixture" and how is it to be applied? Please provide an example that illustrates how this provision may be properly used.

ANSWER: See the answer to Question 121 in the third set of questions and answers under the heading 10 CFR 20.1204. That answer states that the term "total activity" in 10 CFR 20.1204 refers to "gross activity" measurements that are correlated with other measurements of individual radionuclides; an example of the use of this provision is provided in that answer. (Reference: 10 CFR 20.1204).

10 CFR 20.1208 Dose to an Embryo/Fetus

QUESTION 416: This question refers to the answer to Question 84 in the second set of questions and answers under § 20.1208. It has also been asserted that the declared pregnant woman (DPW) declaration can be prospective. Is there any limit on how frequently or how long a duration a person can declare they are in a DPW, e.g., 10 years?

ANSWER: No. There is no limit in 10 CFR Part 20 "on how frequently or how long a duration a person can declare they are in a DPW status." A woman can state that she is pregnant any time she feels it is necessary for her to do so. However, by definition (in Part 20) a DPW has voluntarily informed her employer, in writing, of her pregnancy and of the estimated date of conception. Furthermore, there can be no "prospective" declaration of pregnancy. In the definition of a "declared pregnant woman," the words "...informed her employer of her pregnancy..." mean that the woman has informed her employer that she is pregnant, not that she will be, or intends to become, pregnant at some time in the future.
(References: 10 CFR 20.1003, 20.1208).

QUESTION 439: If the employer has been informed, in writing, by a female worker that she is pregnant, and the employer is not the licensee (e.g., the employer is a contractor to the licensee), may the employer notify the licensee of the declaration of pregnancy to establish applicability of § 20.1208, *Dose to an Embryo/Fetus*, or must the woman herself make the declaration to the licensee?

ANSWER: The employer may notify the licensee that the woman has declared her pregnancy in accordance with the definition of a "declared pregnant woman" in 10 CFR 20.1003. However, there is no NRC requirement to do so.
(References: 10 CFR 20.1208, 20.1003).

QUESTION 440: In order to terminate a declaration of pregnancy, i.e., due to termination of the pregnancy or otherwise, must the female worker inform the licensee or employer in writing?

ANSWER: No. There is no requirement in the regulation specifying how to terminate a declaration. However, since the declaration of pregnancy is required to be in writing, it would be a good practice to terminate the declaration in the same manner. (References: 10 CFR 20.1208, 20.1003).

QUESTION 441: If the declared pregnant woman's estimated date of conception encompasses a previous period of employment at another licensee's facility, what assumptions should be made by the current licensee for compliance purposes under each of the following conditions?

a. Until records are received from the previous licensee;

b. If previous monitoring records are incomplete or otherwise unavailable; and

c. If monitoring by the previous licensee of the woman's deep dose equivalent and/or the committed effective dose equivalent was not required, and therefore dose records were not maintained, but the woman is likely to have received dose due to the nature of her employment at the previous licensee's facility.

ANSWER: See Question 406 and answer in the fifth set of questions and answers under the heading for Regulatory Guide 8.36.
(a) As provided in 10 CFR 20.2104(c), the licensee may accept, as a record of the prior dose to the embryo/fetus, a signed statement from the declared pregnant woman. ("Records from the previous licensee" are not required; however, as indicated in the answer to Question 371 in the fifth set of questions and answers, it is considered good health physics practice to verify the information on prior exposure provided by the individual.)

(b) The answer to this question is the same as the answer to part (a) of the question if the woman can provide the information on the prior dose to the embryo/fetus; that is, the licensee may accept, as a record of the prior dose to the embryo/fetus, a signed statement from the woman. If the woman cannot provide this information, the licensee should [as indicated in the answer to Question 406(b)] make an effort to make a reasonable estimate of the dose using other information that the woman and her previous employer have concerning her exposure.

(c) As indicated in the answer to part (b) of the question and in the answer to Question 406, the licensee should make an effort to make a reasonable estimate of the dose using other information that the woman and her previous employer have concerning her exposure.
(References: 10 CFR 20.1208, 20.2104).

QUESTION 442: **Is the licensee required to advise personnel of the provisions for declaring pregnancy, who work in the controlled area, have been classified as "members of the public," and do not "work in or frequent" any restricted area?**

ANSWER: No. However, it would be a good practice to do so. The provisions of 10 CFR 20.1208, for limiting dose to the embryo/fetus, apply only to declared pregnant women who receive doses from occupational exposure.
(Reference: 10 CFR 20.1208).

QUESTION 443: **Are licensees required to advise personnel of the provisions for declaring pregnancy, who enter a restricted area, but do not "work in or frequent" any restricted area (e.g., visitors on tours)?**

ANSWER: No. (Reference: 10 CFR 20.1208).

10 CFR 20.1302 Compliance with Dose Limits for Members of the Public

QUESTION 417: This question refers to the answer to Question 29 in the first set of questions and answers under § 20.1302. The statement that a licensee can require members of the public to exit a controlled area at any time is not obvious, based on the published rule. A controlled area is one to which access can be limited, but that condition might exist only at certain times or under certain conditions or the access limits might be of a nature other than strict prohibition. For instance, it might be a control that specifically limits the stay time. Does NRC expect procedures to reflect the changing nature of such an area, i.e., controlled at one time but unrestricted at other times, or is an area that meets the requirements to be designated a controlled area for some portion of time simply a controlled area all the time? (The latter, I hope).

ANSWER: The words "...access to which can be limited..." in the definition of "controlled area" mean that access can be limited at any and all times, regardless of whether or not access is limited at any particular time. An area designated by a licensee as a controlled area continues to be a controlled area until that designation is changed; it does not change from being a controlled area, and become an unrestricted area, simply because access is not being limited at some particular time. [See discussions of "Licensee Discretion" and "Controlled Areas" in the answer to Question 26(a).] (References: 10 CFR 20.1003, 20.1302).

QUESTION 427: The word "external" in 10 CFR 20.1302(b)(2)(ii) refers to any radiation source which could irradiate an individual from outside the body. Since sources include both airborne radioactive materials and contained sources, the dose from airborne radioactive materials could be double-counted -- as a concentration pursuant to 10 CFR 20.1302(b)(2)(i) and as direct radiation pursuant to 10 CFR 20.1302(b)(2)(ii). In a situation where the licensee was approaching the 50 mrem/yr limit from direct radiation from contained sources, the additional direct radiation component from airborne releases may cause this limit to be exceeded. Clearly, this situation could be addressed through use of 10 CFR 20.1302(b)(1); however, the intent of the revised Part 20 appears to be to provide viable alternatives to complying with the regulations whenever feasible. Must a licensee who elects to use the method of 10 CFR 20.1302(b)(2) for demonstrating compliance with the public dose limits "double-count" the dose from airborne radioactive materials?

ANSWER: No. External sources ordinarily include all radiation sources outside of the body, such as direct radiation from contained sources and direct radiation from airborne radioactive materials. To the extent that doses from airborne radioactive materials (e.g., noble gases) are accounted for as concentration values pursuant to 10 CFR 20.1302(b)(2)(i), they need not be accounted for as external sources under 10 CFR 20.1302(b)(2)(ii) in determining compliance with the 50 mrem/yr limit. (However, airborne radioactive material does need to be accounted for in determining compliance with the limit of 2 mrem in any one hour).
(References: 10 CFR 20.1302, 20.1301).

10 CFR 20.1501 Surveys and Monitoring - General

QUESTION 458: Some Part 50 power reactor licensees have developed "weighted" or "effective" derived air concentration (DAC) values for airborne mixtures of radionuclides, on the basis that the mixtures are well known and relatively stable, as demonstrated through periodic analysis of primary sources (e.g., reactor coolant and other process fluids), airborne and removable contamination samples, and waste streams (i.e., 10 CFR 61 analysis). These weighted DACs utilize a known ratio of the readily detectable radionuclides in a mixture to the more-difficult-to-detect radionuclides, to infer the total activity and the DAC fraction of a mixture from gross counting methods (i.e., without having to perform isotopic analysis of each and every sample). **Given adequate quality control measures, is the use of such "weighted" or "effective" DACs acceptable for posting, survey and monitoring purposes?**

ANSWER: Yes, in general, the "weighted" or "effective" DACs can be used for inferring the total activity and the DAC fraction of a mixture from gross counting methods provided that the method(s) for calculating the "weighted" or "effective" DACs (which are not described in the question) are appropriate, have been validated, and that the uses of these weighted/effective values are not inconsistent with other regulatory requirements, such as 10 CFR 20.1203, 20.1204, 20.1502, 20.1902, and the Footnotes and Note to Appendix B. The DAC values used in the calculation of the "weighted" or "effective" values (and the DAC values used for any other purpose) must be the values listed in Appendix B to Part 20 unless the licensee has obtained approval, under the provisions of 10 CFR 20.1204(c)(2) or 20.2301, to use other values. (References: 10 CFR 20.1501, 20.12203, 20.1204, 20.1502, 20.1902, Appendix B).

10 CFR 20.1502 Conditions Requiring Individual Monitoring

QUESTION 429: A "Note" added to the answer to question 126, in the fifth set of questions and answers, clarifies the answer with respect to nuclear power plants. Does this clarification also apply to non-power reactor facilities?

ANSWER: Yes. As indicated in that "Note", workers at nuclear power plants, for whom individual monitoring is required and who are outside restricted areas need not wear personal dosimeters to measure external doses from effluents. However, they should wear personal dosimeters when performing work with or near licensed materials that are sources of external occupational exposure (e.g., when performing a radiation survey of a vehicle loaded with radioactive material ready for shipping.)
(Reference: 10 CFR 20.1502).

NOTE: Questions 444, 445, and 446 relate to determining whether occupational radiation dose monitoring of an individual is required (i.e., is the individual likely to exceed 10% of an applicable limit?)

QUESTION 444: In this example, it has been determined that an individual will receive less than 100 mrems in a year while in the controlled area, and the individual has therefore been classified as a member of the public while in the controlled area. The individual also accesses and performs work in the restricted area. **In evaluating whether the individual requires monitoring in the restricted area, may the evaluation be limited to only the dose likely to be received in the restricted area, i.e., may the potential dose received in the controlled area be disregarded for the purpose of the evaluation?**

ANSWER: The answer to the question is yes, assuming that the basis for classifying the individual as a member of the public while in the controlled area is the type of work the individual will do in the controlled area.

As emphasized in the answer to question 26(a) [in the fourth set of questions and answers under section 10 CFR 20.1003], whether the dose to an individual outside a restricted area is an occupational dose or a public dose depends on what the individual is doing and not on what area (controlled or unrestricted area) the individual is in when the dose is received. Furthermore, it is possible, and acceptable (as indicated in many previous questions and answers), for the licensee to consider the dose (other than background, etc.) that individual receives in a controlled area to be an occupational dose, even though, as stated in the question, the dose the individual receives in the controlled area is less than 100 mrem per year. Regardless of the magnitude of the dose, the dose is an occupational dose if it is received (in accordance with the definition of occupational dose) "...in the course of employment in which the individual's assigned duties involve exposure to radiation and to radioactive material..." For example, an individual who performs a radiation survey, in any area, of a vehicle loaded with radioactive material prepared for shipment would be receiving an occupational dose as a result of exposure to the radiation from the radioactive material on the vehicle regardless of the magnitude of the dose. However, the dose (other than background, etc.) received by a worker performing office work in a controlled area could be considered to be either an occupational dose or a public dose; either choice would be considered to be consistent with the definition of "occupational dose." See question 26 and answer for additional information concerning licensee options with respect to area designations and dose categories. See question 126 in (in the fifth set of questions and answers on 10 CFR 20.1502) concerning the use individual monitoring of occupational doses from effluents. (References: 10 CFR 20.1502, 20.1003).

QUESTION 445: In this example, it has been determined that an individual is not likely to exceed 5 rems shallow dose equivalent from any sources with the possible exception of dose from hot particles. There is a potential that exposure to an individual from a hot particle may occur and that the dose to the individual from a hot particle, should it occur, may potentially exceed 5 rems shallow dose equivalent. **In this circumstance, may the potential dose resulting from a potential exposure to a hot particle be disregarded for the purpose of the evaluation on the basis that the dose is not likely to exceed 10% of the applicable limit?** Note that the scope of this question is limited to the requirements for individual monitoring (§ 20.1502) and is not intended to address the general requirements for radiological surveys (§ 20.1501).

ANSWER: Yes. The fact that an individual has the potential to receive a dose does not mean that the individual is likely to receive the dose. [Note: It should also be recognized that individual monitoring devices (personal dosimeters) are not appropriate for measuring doses from hot particles on or near the skin.] (Reference: 10 CFR 20.1502).

QUESTION 446: In this example, an individual has worked at the licensee's facility earlier in the current year and was required to be monitored because the individual accessed a high radiation area. During this period, the individual's monitored dose did not exceed 10% of a limit. Now the individual is performing other work at the licensee's facility in the restricted area, but no longer has access to high radiation area. An evaluation based on the individual's new job scope shows that the individual is not likely to exceed 10% of a limit for their entire period of work during the year at the licensee's facility. (a) **May the personnel dose monitoring of the individual be discontinued on the basis that the individual is not likely to exceed 10% of a limit and the individual no longer has access to high radiation areas?** (b) If so, must the individual's dose monitoring results, acquired during the period of required monitoring, still be reported in accordance with § 20.2206, *Reports of Individual Monitoring*? The purpose of these questions is to determine under what conditions required individual monitoring may be discontinued as no longer required.

ANSWER: (a) Yes. (b) Yes. (References: 10 CFR 20.1502, 20.2206).

QUESTION 461: Does the word "applicable" in the phrase "applicable ALI(s)" in 10 CFR 20.1502(b)(1) mean that the stochastic ALI(s) [SALI(s)] should be used?

It is noted that 10 CFR 20.1502(b) requires the licensee to monitor the occupational intake and assess the committed effective dose equivalent. We believe that the answer to this question should be yes, if a licensee is operating under the "more limiting" dose limit of 5 rem TEDE. The occupational dose limits in 10 CFR 20.1201 apply to the "more limiting" of 5 rem TEDE or 50 rem TODE. If a licensee's prospective assessment shows that the exposure conditions at their facility is most likely to be limited by the 5 rem TEDE limit, then the "applicable" ALI is the SALI. This is further evidenced by the wording used in 10 CFR 20.1502(b); i. e., use of the "committed effective dose equivalent" terminology.

ANSWER: No, not necessarily. The "applicable" ALI is the ALI for the appropriate radionuclide, the appropriate column (inhalation or ingestion) and, for inhalation ALIs, the appropriate "class" (D, W, or Y). When both a stochastic and a non-stochastic inhalation ALI are listed for a particular radionuclide (e.g., for I-131), the "applicable ALI" in 10 CFR 20.1502(b) means the more limiting ALI, which is listed first (the non-stochastic ALI), not the stochastic ALI, which is listed second and is shown in parentheses. The statements made by the questioner following the question are not relevant to the question. (Reference: 10 CFR 20.1502).

10 CFR 20.1601 Control of Access to High Radiation Areas

QUESTION 430: Question 373, in the fifth set of questions and answers, under the heading for 10 CFR 20.1601, concerns the minimum requirements for height and access restrictions of barriers used to prevent entry to locked high radiation areas (HRAs) and very high radiation areas (VHRAs) at nuclear power plants. Does this question and answer also apply to non-power reactors?

ANSWER: No. Question 373, the answer to question 373, and Regulatory Guide 8.38 (which is referred to in the answer) were all written to address conditions at nuclear power plants and are not necessarily adaptable to all situations at non-power reactors, materials, or fuel cycle facilities. Furthermore, the answer to question 373 states that, in general, there are no prescriptive, specific minimum height requirements for barriers used to prevent entry to locked HRAs and VHRAs.
(Reference: 10 CFR 20.1601, 20.1602).

QUESTION 431: Although Question 385, in the fifth set of questions and answers (under the heading for 10 CFR 20.1601), does not refer to any particular class of licensee (e.g., power reactor, non-power reactor, materials), the answer to the question mentions only power reactor licensees and material licensees. Does the answer to this question also apply to non-power reactor or fuel cycle licensees?

ANSWER: Yes, to the extent that the situations described in the answer apply to non-power reactors or fuel cycle licensees. However, there may be situations at non-power reactors and fuel cycle facilities that are not within the scope of the answer. (Reference: 10 CFR 20.1601).

10 CFR 20.1602 Control of Access to Very High Radiation Areas

QUESTION 423: Standard Technical Specification (STS) 6.12 for nuclear power reactors provides methods for control of access to high radiation areas that are alternatives to the methods specified in a CFR Part 20. Power reactor licensees that have adopted this technical specification are required to provide additional controls for access to high radiation areas with dose rates greater than 1 rem/h in addition to the controls required for access to high radiation areas with dose rates of 1 rem/h or less. Providing the additional controls at 1 rem/h is conservative relative to providing additional controls for areas having dose rates of 500 rads or more in an hour as required for very high radiation areas by 10 CFR 20.1602. Do licensees that have adopted STS 6.12, and that are providing the additional controls required by this STS for areas with dose rates greater than 1 rem per hour or less, have to provide additional controls for very high radiation areas in accordance with 10 CFR 20.1602?

ANSWER: Yes, they do. The alternative controls for high radiation areas in STS 6.12 do not apply to the new requirement in 10 CFR 20.1602 to provide additional controls for very high radiation areas. The compensatory measures in the STS that provide alternative methods of control for areas with dose rates greater than 100 mrem per hour but less than 1000 mrem per hour do not constitute adequate controls over access to very high radiation areas. (References: 10 CFR 20.1601, 20.1602, Reactor T.S.).

QUESTION 447: **Is the spent fuel pool, when containing irradiated fuel, required to be posted and controlled as a Very High Radiation Area under any of the following circumstances:**

a. When there are no activities underway involving the spent fuel pool?

b. When underwater manipulation of irradiated fuel or other irradiated hardware is underway?

c. When diving operations in the spent fuel pool are underway?

d. **Are there other considerations that could affect requirements for posting and controlling access to the spent fuel pool?**

ANSWER:

(a) No.

(b) No.

(c) The answer depends on the particular circumstances of the diving operations. See discussion under (d) below.

(d) See Health Physics Position documents HPPOS-016 and HPPOS-245 (NUREG/CR-5569) for additional information concerning access controls for spent fuel pools and HPPOS-002 (NRC IE Information Notice No. 82-31) for additional information concerning diving operations in a spent fuel pool. These position documents refer to 10 CFR 20.203(c) of Part 20 prior to the 1991 revision with respect to posting and control of high radiation areas; however, these positions continue to be applicable with respect to posting and control of both high and very high radiation areas under 10 CFR 20.1601, 20.1602, and 20.1902(b) and (c) of the revised Part 20. These position documents emphasize that when a diver enters the pool to perform "under pool-surface duties" or upon movement of highly radioactive materials stored in the pool, proper health physics controls must be initiated. IE Information Notice No. 90-33, dated May 9, 1990, provides suggestions for radiological control considerations that can help minimize the possibility of unexpected exposure from radiation sources in spent fuel pools. (References: 10 CFR 20.1602, 20.1902, 20.1003).

QUESTION 448: If irradiated hardware, suspended (e.g., on a lanyard) in the spent fuel pool, is potentially reading greater than 500 rads/hour at one meter (i.e., if it were removed from the pool), does access to this hardware require posting and control as a Very High Radiation Area?

ANSWER: No. See Section 4.2, "Materials," in Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants." Also see Health Physics Position document HPPOS-245 (NUREG/CR-5569). Although this position document was written to address access controls for spent fuel pool storage pools under the unrevised Part 20 requirements for high radiation areas, it also applies to these access controls under the revised Part 20 requirements for both high and very high radiation areas. The essential point is that although movement of radioactive material stored in the pool has the potential to create a high, or very high, radiation area around the pool, those areas are not created until movement of the material actually results in a radiation level, in an area that is accessible to individuals, that meets the dose criterion in the definitions of a high, or a very high, radiation area. NRC Information Notice No. 90-33, dated May 9, 1990, is also relevant. After providing reviews of a number of events in which sources of unexpected occupational radiation exposures were encountered in activities associated with spent fuel storage pools, this notice provides suggestions (which are not regulatory requirements) for radiological control considerations that can help minimize the possibility of unexpected exposures from radiation sources in these pools. (References: 10 CFR 20.1602, 20.1601, 20.1003).

10 CFR 20.1702 Use of Other Controls

QUESTION 449: Detectable, minor intakes may result for some individuals who do not wear respirators during specific radiological work activities for the purpose of maintaining the total effective dose equivalent (TEDE) as low as is reasonably achievable (ALARA), as required by regulation. Such resulting intakes may involve substantial follow-up activities in terms of bioassay, internal dose assessment, and responses to various monitor alarms (e.g., hand-held friskers and portal monitors) as the individual continues to perform work in the restricted area in the period following the intake, due to the sensitivity of the monitors and the low monitor alarm set points, established to detect small amounts of contamination or hot particles on individuals exiting work areas or the restricted area. In evaluating whether or not to use respirators in a given situation, may the assessment of costs versus benefits appropriately include the resource costs associated with follow-up activities to potential intakes, and ultimately be factored into the decision making on wearing respirators?

ANSWER: Yes; however, there is no requirement that these costs be considered. (Reference: 10 CFR 20.1702).

10 CFR 20.1703 Use of Individual Respiratory Protection Equipment

QUESTION 418: This question refers to the answer to Question 91 in the third set of questions and answers under § 20.1703. Please clarify this response, as indicated below.

(a) Can NRC envision any purpose by which a licensee can use respiratory protection devices without having an approved respiratory protection program, e.g., meeting the provisions of §20.1703?

(b) For instance, work is being conducted where the licensee has determined there is no requirement for respiratory protection but workers prefer to use it anyway. From the workers perspective it is for protection. From the licensees viewpoint, it is simply for peace of mind, with the added benefit of being an ALARA effort. Is this usage subject to §20.1703?

Discussion: If the answer to these questions is that §20.1703 applies to any conceivable use of respirators then this in essence is a directive for all licensees without approved equipment or an approved program to discard all respiratory protection equipment. It cannot be used even for ALARA purposes at less than DAC levels. It cannot be kept on hand for use in emergency response situations where any protection is useful in initial response conditions. (Note: As a basic presumption, assume that any use of respirators complies with the basic OSHA guidance for medical approval.)

ANSWER: (a) The requirements of 10 CFR 20.1703 must be met if the respiratory protection equipment is used to limit intakes of radioactive material pursuant to 10 CFR 20.1702. 10 CFR 20.1703 does not apply if the respiratory protection equipment is used for other purposes (e.g., for protection against harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors that are not radioactive); however, OSHA regulations (which include a requirement for a minimal acceptable respiratory protection program) do apply to most of these uses.

(b) Yes, assuming that the equipment will be used to limit intake, this usage is subject to 10 CFR 20.1703. The use of respiratory protection equipment without meeting the respiratory protection program requirements of 10 CFR 20.1703 (e.g., respirator not properly maintained, poor fit of respirator to wearer, untrained or improperly trained respirator user) can be hazardous to the worker, can lead to a false sense of protection, and cannot be justified on the basis of ALARA, worker peace of mind, or usefulness in an emergency. (Reference: 10 CFR 20.1703).

10 CFR 20.1801 Security of Stored Materials

QUESTION 419: This question refers to the answer to Question 129 in the fourth set of questions and answers under §20.1801. This is a very useful interpretation, but it certainly is not evident in the cited regulations. Is there related supporting justification somewhere?

ANSWER: The answer to Question 129 is a statement as to how this requirement will be enforced by the NRC staff (i.e., in the same way as similar requirements have been enforced in the past). As indicated in the answer to Question 129, the requirements of 10 CFR 20.1801 and 20.1802 are essentially the same as the requirements of 10 CFR 20.207(a) and 20.207(b) except that 10 CFR 20.1801 and 20.1802 apply to controlled area as well as to restricted areas. The answer is based on the NRC staff's understanding of the intent of these requirements, as reflected in the staff's enforcement of the similar requirements of 10 CFR 20.207(a) and 20.207(b). (Reference: 10 CFR 20.1801).

QUESTION 450: Licensees are required to "secure from unauthorized removal or access" licensed materials in storage, and to "control and maintain constant surveillance" of licensed materials not in storage, in controlled or unrestricted areas. The following questions relate to the security and control of licensed materials in controlled areas only, i.e., the questions are not intended to address unrestricted areas:

a. Would the provisions for security and control be met if the licensed materials are appropriately labeled or marked (e.g., in accordance with § 20.1904) and are located within an area to which access is controlled through the use of barrier ropes and signs restricting access by unauthorized personnel?

b. Would the provisions for security and control be met if the licensed materials were located in an area as described in "a", above, that was located within a Part 50 licensee security protected area?

c. If the area described in "a", above, was posted with radiological caution signs (e.g, "Caution, Radiation Area"), would such an area actually be a restricted area, and therefore the provisions of § 20.1801 and § 20.1802 would not apply?

ANSWER:

(a) No. To secure the material from unauthorized removal means to make certain, to guarantee, and to ensure that there is no unauthorized removal of the material. Using nothing but ropes and signs to control access to the licensed materials does not secure stored material from unauthorized removal in accordance with 10 CFR 20.1801 and does not "maintain constant surveillance" of the material in accordance with 10 CFR 20.1802.

(b) No. This use of barrier ropes and signs within a Part 50 licensee security protected area does not necessarily secure the licensed material from unauthorized removal from that area (in accordance with 10 CFR 20.1801 for stored material) and does not provide the constant surveillance of the material (in accordance with 10 CFR 20.1802 for material that is not in storage). Individuals who are authorized to enter the security protected area are not necessarily authorized to remove the licensed material and, as indicated in the answer to (a), above, this use of ropes and barriers does not secure the material from unauthorized use.

(c) No, not necessarily. Simply posting the area described in part (a) of the question with a "radiological caution sign", such as "Caution, Radiation Area," does not, in the absence of other measures for access control, result in the creation of a "restricted area" and, thereby, make the provisions of 10 CFR 20.1801 and 20.1802 inapplicable. However, the provisions of 10 CFR 20.1801 and 20.1802 would not apply to the area described in part (a), above, if that area is contained within a radiation area within a restricted area, access to which is adequately controlled. (References: 10 CFR 20.1801, 20.1802, 20.1003, 20.1904).

10 CFR 20.1902 Posting Requirements

QUESTION 459: In the answer to Question 379 (in the fifth set of questions and answers under the heading for 10 CFR 20.1902), the NRC addressed the issue of whether noble gases should be included in assessing the requirement to post an area as an airborne radioactivity area. This question is intended to obtain further clarification with regards to the two separate provisions that require posting of airborne radioactivity areas. The first provision requires posting of areas in which concentrations of airborne radioactive materials are "in excess of the derived air concentrations (DACs) specified in Appendix B." As pointed out previously (in the answer to Question 379), Appendix B includes DACs for noble gases, and therefore noble gas concentrations should be included in posting considerations. The second provision requires that posting be established for areas where an individual could "exceed...an intake of 0.6 percent of the annual limit on intake (ALI) or 12 DAC-hours" in a week. The answer to question 379 states, "radioactive noble gases...(which have no inhalation ALI) should be excluded in determining DAC hours for use in determining the committed effective dose equivalent (CEDE)." From this it appears that for the second provision regarding posting of airborne radioactivity areas, which established precautions to limit internal exposures from intakes, one should not take into account noble gas concentrations because tney result in external exposures from submersion. However, noble gas radioactive daughters must be included when determining posting requirements under either provision. **Is this clarification of the differences between the two provisions and respective applicability of radioactive noble gas concentrations correct?**

ANSWER: Yes, assuming that it is understood that the "two provisions" in the statements preceding the question refer to the two parts of the definition (in 10 CFR 20.1003) of "airborne radioactivity area", which are separated by the word "or". There is only one "provision" that requires posting of airborne radioactivity areas, the "provision" of 10 CFR 20.1902(d).
(References: 10 CFR 20.1902, 20.1502, 20.1003).

QUESTION 460: Appendix B contains only one derived air concentration (DAC) value for each radionuclide. The DAC provided in Appendix B is derived from the more limiting of the stochastic or the non-stochastic annual limit on intake (ALI). In Regulatory Guide 8.34 (Section 3.3) the NRC provides guidance that the stochastic DAC should be used, in preference to the non-stochastic DAC, to calculate the committed effective dose equivalent (CEDE). This Regulatory Guide further provides a method for deriving stochastic DACs for radionuclides that only have the non-stochastic DAC listed in Appendix B. In addition, Regulatory Guide 8.7 (Section 2.2) provides guidance that if the CEDE does not exceed 1 rem, then organ doses, which utilize non-stochastic DACs for calculation, need not be calculated. Some licensees have concluded, from their prospective evaluations of potential internal dose to workers at their facility, that workers are not likely to exceed 10% of an ALI (i.e., are not likely to exceed 500 mrem CEDE). **For the situation where the licensee has concluded that workers are not likely to exceed 10% of an ALI, may the licensee derive and use stochastic DACs, in lieu of the non-stochastic DACs listed in Appendix B, for (a) posting and (b) exposure control purposes?** Such an approach, employing the stochastic DACs, would allow licensees to more appropriately assess and control exposures commensurate with the applicable radiological conditions, than would be the case if the more conservative, non-stochastic DACs were used. For example, in evaluating the use of respirators with regard to keeping the total effective dose equivalent (TEDE) ALARA, the use of stochastic DACs, and respective calculated internal dose projections, would provide a more valid comparison with projected doses from external sources of exposure, than would be afforded through the use of non-stochastic DACs.

ANSWER: (a) No, with respect to posting of "airborne radioactivity areas" in accordance with the provisions of 10 CFR 20.1902(d) and the definition of "airborne radioactivity area" in 10 CFR 20.1003. The use of stochastic DACs in lieu of non-stochastic DACs listed in Appendix B would require an exemption, under the provisions of 10 CFR 20.2301 [applications for exemptions], from the posting requirements of 10 CFR 20.1902(d) [posting of airborne radioactivity areas] .

(b) It is not possible to answer the general question with respect to "exposure control purposes," without having an explanation of what is meant by this term. However, in regard to the specific example given, the use of a stochastic DACs, and respective calculated internal dose projections, is acceptable in evaluating the use of respirators with regard to keeping the total effective dose equivalent (TEDE) ALARA, when this results in a more valid comparison with projected doses from external sources of exposure than would be afforded through the use of non-stochastic DACs.

Note: See related Question 459 (under the heading for 10 CFR 20.1902 in this set) concerning the meaning of the word "applicable" in the phrase "applicable ALIs" in 10 CFR 20.1502. (References: 10 CFR 20.1902, 20.1502, 20.1003).

10 CFR 20.2001 Waste Disposal - General

QUESTION 432: Questions 376 and 389, in the fifth set of questions and answers under the heading for 10 CFR 20.2001, concern the use of the "decay in storage" option of 10 CFR 20.2001(a)(2) at nuclear power plants and at materials facilities. However, it is not clear whether or not these questions and answers also apply to non-power reactor facilities. How can this option be used at non-power reactor facilities?

ANSWER: As indicated in the statement of considerations for new Part 20 (56 FR 23380, third column, and 23381, first column), and in the answers to questions 376 and to 389, technically, the "decay in storage" option has always been available to all licensees as an allowed waste disposal option. However, this option does not allow material to be released to an unrestricted area unless it meets the requirements of one of the other allowed forms of waste disposal in 10 CFR Part 20, or the requirements of §35.92, "Decay in Storage," of 10 CFR Part 35 (for medical licensees, only), or the specific license conditions given in any NRC or Agreement State license. (Reference: 10 CFR 20.2001).

10 CFR 20.2101 Records - General Provisions

QUESTION 428: 10 CFR 20.2102(a) requires the use of the units curie, rad, rem, including multiples and subdivisions, on records required by Part 20. May a licensee continue to use roentgen-based units (e.g., R, mR, R/h, mR/h) in exposure control, radiation survey, and instrument and dosimeter calibration records without conversion to rad or rem, provided that assessed doses for individuals are recorded in units of rad or rem?
Background: The purpose in asking this question is to establish whether or not the units of measurement specified in 10 CFR 20.2101(a) -- curie, rad, rem, and multiples and subdivisions -- must appear in all records required by Part 20 or only in those records that specifically deal with activity, absorbed dose, or dose equivalent. The intent is to be scientifically correct in recording exposure rate measurements made with radiation survey instruments and estimates of exposure obtained with direct-reading dosimeters and to avoid unnecessary changes to existing recordkeeping practices. Nuclear fuel cycle, radiography, medical, well-logging, and low-level waste licensees perform hundreds of thousands of radiation surveys each year with instruments that are calibrated for exposure rate and that read out in units of μR/h, mR/h, or R/h. Thousands of workers at nuclear power plants and licensed radiographers wear direct-reading dosimeters that are calibrated for exposure and that display mR or R. These radiation surveys and dosimeters are used to estimate exposure rates and exposures for the purpose of controlling individual doses, but they

are not normally used to assess dose equivalent. Therefore, it is not normally necessary to convert roentgen-based units to rad or rem in records of surveys and dosimeter readings. Rather than change the hundreds of forms, survey maps, logs and calibration sheets that are used at a facility to record exposure control data, radiation surveys, and calibrations, each licensee would prefer to continue recording radiation levels and exposures in roentgen-based units and to explain the relationship of these units to rem in a single program document, such as the facility's radiation protection plan. An example of such an explanation for a nuclear power plant is "exposures and exposure rates measured and recorded in roentgen-based units are numerically equal to or greater than deep-dose equivalent rates in rem-based units for the x-ray and gamma radiation energies normally present in locations other than inside or near open reactor plant components." The use of a single program statement would permit a licensee to record what was actually measured in the true units of measurement. This approach to recording exposures and exposure rates appears to be consistent with 10 CFR 20.2101(a), which implicitly prohibits the use of the SI units becquerel, gray, and sievert, but which does not prohibit the use of roentgen and other appropriate units when measuring and recording quantities other than activity, absorbed dose, and dose equivalent. It is also consistent with the use of roentgen-based units in 10 CFR Part 34 (§§ 34.21, 34.24, 34.33) and in 10 CFR Part 39 (§§ 39.33).

ANSWER: Yes, except that the "assessed doses for individuals" must be recorded and reported in terms of dose equivalent quantities in units of *rem* for demonstrating compliance with the limits of Part 20.

As indicated in the background to the question, 10 CFR 20.2101(a) prescribes the units to be used for the quantities *activity*, *absorbed dose*, and *dose equivalent* on records required by Part 20. 10 CFR 20.2101(a) also requires that each licensee clearly indicate the units of all quantities on records required by Part 20. The *roentgen* is a unit for the quantity *exposure*; it is not a unit for the quantities *absorbed dose* or *dose equivalent*. Thus the use of this quantity and unit are not inconsistent with the requirements of 10 CFR 20.2101(a). However, the quantity *exposure* and its unit *roentgen* are commonly used as surrogates for the quantity *absorbed dose* and the unit *rad* or the quantity *dose equivalent* and the unit *rem*. When this is the case for use of the quantity *exposure* and its unit *roentgen* on records required by Part 20, the quantitative relationship between exposure (*roentgen*) and absorbed dose (*rad*) or dose equivalent (*rem*) must be clearly documented and understood by individuals using these quantities and units in meeting the requirements of Part 20. The documentation of this relationship may be in the licensee's "radiation protection plan" or other radiation protection program document(s), including survey procedures; it is not necessary that this relationship (e.g., conversion factor) appear on each form, map, or log used in surveys and calibrations. It may be assumed that one roentgen equals one rem, or a more accurate conversion factor may be used. The relationship between exposure (*roentgen*) and absorbed dose (*rad*) or dose equivalent (*rem*) should also be included in the instruction (training) of individuals who make the measurements of exposure (in roentgen units), and records of those measurements, that are required by Part 20.

Note: The answer to Question 96(a) [in the third set of questions and answers under section 10 CFR 20.1003] has been revised to be consistent with the answer above. Questions 116 and 117 and answers [in the third set of questions and answers under section 10 CFR 20.2101] also discuss dose quantities and units to be used in records. (References: 10 CFR 20.2101, 20.1003; 10 CFR 34.21, 34.24, 34.33; 10 CFR 39.33).

10 CFR 20.2104 Determination of Prior Occupational Dose

QUESTION 420: This question refers to the answer to Question 55 in the first set of questions and answers under § 20.2104. (a) Despite the quoted reference, § 20.2104 only refers to occupational radiation dose (why radiation when the defined term is occupational dose?), which is defined in terms of "dose". (b) The definition of dose does not include eye, shallow, or extremity doses. What is the regulatory basis for including eye, shallow, and extremity doses within the scope of § 20.2104 where it is so explicitly not included? A simple discussion in the Statement of Considerations does not seem to be an adequate basis for rewriting a regulation. (c) Are the dose histories of these three organs (eye, skin, extremity) so high as to necessitate the paperwork to track these for new employees? I suspect that for the vast majority of workers, these are negligible compared to TEDE.

ANSWER:

(a) "Dose" and "radiation dose" are synonymous (see "Dose or radiation dose" in § 20.1003); therefore, "occupational dose" and "occupation radiation dose" are synonymous.

(b) Contrary to the statement in the question, "dose or radiation dose" is broadly defined in Part 20 as "a generic term that means absorbed dose, dose equivalent, effective dose equivalent, committed dose equivalent, committed effective dose equivalent, or total effective dose equivalent, as defined in other paragraphs of... [10 CFR 20.1003]". The "eye dose equivalent" and the "shallow dose equivalent" (the quantity used in the limits for the skin and for the extremities) are both "dose equivalent" quantities and, therefore, are "doses" as defined in Part 20. The occupational dose limits include limits for the eye, shallow, and extremity doses and the "occupational dose" in 10 CFR 20.2104(a)(1) includes the eye, shallow, and extremity doses. The recommendation in the Statement of Considerations (which is not an explicit requirement in the regulation) that, in establishing administrative controls, the licensee should reduce the values for limits other than the TEDE by one quarter of their annual limit for each unreported quarter provides a method, acceptable to the NRC staff, for licensees to demonstrate compliance with those limits when records of those doses are missing for a portion of the year.

(c) A licensee is required to determine a particular occupational dose received by a new employee earlier in the current year only if the licensee makes the prospective determination that individual monitoring will be required, pursuant to 10 CFR 20.1502, for the prospective occupational dose. If the licensee determines that individual monitoring for eye or shallow or extremity dose are not required for a particular individual (because, at the licensee's facility, those doses are not likely to exceed 10 percent of the limits for those doses), the licensee is not required to determine the prior eye or shallow or extremity doses. (References: 10 CFR 20.2104, 20.1003).

10 CFR Part 20 Appendix A - Protection Factors for Respirators

QUESTION 452: **The following questions refer to the selection and use of a half-mask face piece, as described in Appendix A, "Protection Factors for Respirators":**

a. Footnote "g" of Appendix A states that "this type of respirator is not satisfactory for use where it might be possible (e.g., if an accident or emergency were to occur) for ambient airborne concentrations to reach instantaneous values greater than 10 times the pertinent values in table 1, column 3 of Appendix B...," i.e., the derived air concentrations (DACs) for inhalation. Is this provision intended to apply to the work activity in progress for which the respirator is being used, or is it more broadly applicable to the type of facility or licensed activity? For example, is the statement intended to exclude the use of a half-mask face piece respirator at a nuclear power plant? We believe that the use of half-mask face piece respirators should be permitted with the same limitations as are applied to other respirator types because the use of a half-mask face piece may offer advantages over, for example, a full face piece respirator in some applications by keeping the overall total effective dose equivalent ALARA. This would appear to be in keeping with the intent of § 20.1703, *Use of Individual Respiratory Protection Equipment*, which states that "...the licensee may select respiratory protection equipment with a lower protection factor only if such a selection would result in keeping the total effective dose equivalent ALARA."

b. Footnote "g" requires that "...the mask is to be tested for fit prior to use each time it is donned..." for the use of half-mask face pieces. Is a negative pressure test an acceptable method to adequately test the respirator prior to use? Such a qualitative test method would seem to be acceptable because it appears that there would be no practical method to accomplish a quantitative test in the field prior to each use.

ANSWER:

(a) This provision is intended to apply to situations in which the ambient airborne concentrations are likely "...to reach instantaneous values greater than 10 times the pertinent values in table 1, column 3 of appendix B..." The statement is not intended to exclude the use of a half-mask face piece at a nuclear power plant or other licensee facility.

(b) Yes. See NUREG-0041, Section 8.5.2.3, for four acceptable testing methods for field testing of respirator operation (isoamyl acetate, irritant smoke, negative pressure test, and positive pressure test). (Reference: 10 CFR 20, Appendix A).

10 CFR Part 20 Appendix B

QUESTION 425: It appears that some of the oral ingestion ALIs in Appendix B of 10 CFR 20 are sometimes associated with the wrong chemical forms; is this the case?

ANSWER: No. See the answer to Question 71 (in the second set of questions and answers under the heading for 10 CFR Part 20, Appendix B), which indicates that the "Class" column of 10 CFR Appendix B applies to inhalation only; it does not refer to ingestion. In other words, neither the D, W, and Y classes nor the chemical forms (compounds) in the "Class" column refer to the ingestion ALIs. (Reference: 10 CFR 20 Appendix B).

QUESTION 426: Are the noble gas ("submersion") DACs based on a dose of 5 rem per year or 50 rem per year? Is the submersion dose calculated at a depth of 1000 mg/cm^2 or 7 mg/cm^2?

ANSWER: There is no one particular dose or one particular depth. The method for calculating submersion doses is explained in *Federal Guidance Report No. 11* on pages 10, 18, 181, and 182. When air concentration is limited by submersion dose, the DAC for a particular radionuclide is the maximum concentration of that radionuclide in air that, for a 2,000-hour exposure, will result in a dose that is equal to or less than each of the applicable limits (5 rem effective dose equivalent, 15-rem eye dose equivalent, 50-rem dose equivalent to other organs and tissues, shallow dose equivalent of 50 rem to the skin). That is, the DAC for a particular radionuclide depends on which of the applicable dose limits is the most restrictive with respect to the concentration of that particular radionuclide. The dosimetric model used to calculate the DACs considers shielding of organs by overlying tissues and the degradation of the photon spectrum through scatter and attenuation by air. The dose from beta particles is evaluated at a depth of 7 mg/cm^2 for skin, and at a depth of 3 mm for the lens of the eye. The worker is assumed to be immersed in pure parent radionuclide, and no radiation from airborne progeny is considered. In most cases, the concentration limit for submersion is based on external irradiation of the body; it does not take into account either

absorbed gas within the body or the inhalation of radioactive decay products. An exception to the preceding statement is Ar-37, for which direct exposure of the lungs by inhaled activity limits (stochastically) the concentration in air. The skin dose is limiting for Ar-39, Kr-85, and Xe-131m; the eye dose is limiting for Kr-83m. {Note: There are typographical errors in the discussion of submersion doses on page 10 of *Federal Guidance Report No. 11*. In the fifth sentence of the paragraph beginning "Some airborne radionuclides...", the word "effective" should be added before the words "dose equivalent rate". In equation (8b), the subscript "E" should be the subscript "T".] (Reference: 10 CFR 20 Appendix B).

QUESTION 453: Note 2 of Appendix B provides criteria for determining the appropriate derived air concentration (DAC) for a mixture of radionuclides where "the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides are not present in the mixture." In § 20.1204, *Determination of Internal Exposure*, provisions are made to disregard the concentration of any radionuclide that is less than 10% of its DAC so long as the sum of the percentages for all of the radionuclides disregarded in the mixture does not exceed 30%. Can this approach of disregarding certain radionuclides be applied to the determination of the appropriate DAC, as outlined in note 2 to Appendix B; in other words, can radionuclides that are not present in the mixture in concentrations greater than or equal to 10% of its DAC be disregarded so long as the sum of the percentages for all of the radionuclides disregarded in the mixture does not exceed 30%? This question is intended to affirm a practical approach to truncating the analysis of radionuclide mixtures by disregarding radionuclides that are not present or may only be present in insignificant concentrations relative to other radionuclides in a mixture.

ANSWER: No. This would be a misapplication of the provisions of 10 CFR 20.1204(g), which applies to the determination of internal exposure under specified circumstances, not to the choice of the appropriate DAC for a mixture. See the following related questions and answers: Question #121 and answer (in the third set of questions and answers under the heading for 10 CFR 20.1204) which clarifies the meaning of "total activity" in 10 CFR 20.1204(g) and provides an example of the proper use of this provision of Part 20; Question #403 and answer (in the fifth set of questions and answers under the heading for 10 CFR 20.2106), which concerns the relevance of 10 CFR 20.1202(b)(3) and 20.1204(g) to a cutoff levels for radionuclides contributing to the CEDE; and Question #146 and answer (in the fourth set of questions and answers under the heading for 10 CFR 20 Appendix B), which indicates that the definition of the term "not present" in old Part 20 does not apply to the new Part 20. (References: 10 CFR 20 Appendix B, 10 CFR 20.1202, 20.1204).

10 CFR Part 19 Notices, Instructions and Reports to Workers

QUESTION 421: This question refers to the answer to Question 37 in the first set of questions and answers under "Conforming Changes: 10 CFR Part 19." I sincerely hope that the NRC will encourage licensees to simply file a memo to the effect that these reports were done. Otherwise, the volume of paper will be ridiculous.

ANSWER: A filed memorandum to the effect that each worker has been advised of his or her dose in accordance with 10 CFR 19.13(a) is an acceptable way of documenting compliance with that requirement. Another acceptable way of documenting compliance is to file copies of the reports provided to employees (as indicated in the answer to Question 37). (Reference: 10 CFR 19.13).

QUESTION 422: This question refers to Question 95 in the third set of questions and answers under 10 CFR Part 19 and Question 81 in the second set of questions and answers under 10 CFR 20.1502. Clearly there is a significant population of occupationally exposed persons in unrestricted areas of whom the licensee has no knowledge. Even among their own employees, the licensed operation may be a small segment of the whole organization where license management treats the rest of the organization as general public. So presumably, the general principle of educating occupationally exposed persons has a dose threshold, e.g., something like the public dose limit; is this correct?

ANSWER: No. There is no such threshold. However, the questioner, in the second sentence of the question, appears to assume, incorrectly, that any dose received by an individual while working, is an occupational dose. [See the discussion of this point in the answer to Question 26 (a) in the fourth set of questions and answers under the heading, "Occupational Dose vs. Public Dose."] A licensee may have an organization in which most of the workers are members of the public; these workers do not need and are not required to receive the kind of training (instructions) outlined in 10 CFR 19.12. Workers who do receive an occupational dose (and therefore are not members of the public) should receive such training, whether required by 10 CFR 19.12 or not. For workers who must receive such training, there is no "dose threshold"; however, the extent of the instruction of these workers should be commensurate with the potential radiological health protection problems for these workers. (Reference: 10 CFR 19.12).

QUESTION 454: What is the specific scope of the reports required to be provided to workers in accordance with the various provisions of 10 CFR Part 19.13? The provisions in question are as follows:

a. Part 19, § 19.13(b) requires that licensees provide reports to workers annually of dose as shown in records maintained by the licensee. Is the monitoring period covered by this section limited to the preceding year only? This would appear to be the case based on the comments made by the NRC staff in the statements of consideration (56 FR 23386, column 2) which states, "a copy of the annual report to NRC could also be given to the individual worker to satisfy the revised reporting requirement in § 19.13..." The annual report referred to is the report submitted in accordance with Part 20, § 20.2206, which is limited to the monitoring period of the preceding year.

b. If the licensee provides workers with an NRC Form 5 (or equivalent), does the scope of this information fulfill the requirements of Part 19, § 19.13(a) to provide certain information to workers? The purpose in asking this question is to confirm that, although § 19.13(a) was not revised as a conforming amendment to the revised Part 20, the comments made by the NRC (as described in item "a", above) also apply, i.e., "a copy of the annual report to NRC could also be given to the individual worker to satisfy the revised reporting requirement in § 19.13." If the NRC Form 5 (or equivalent) is not sufficient to comply with § 19.13 (a), what additional information is required to be provided to the worker?

c. Does this provision [i.e., § 19.13(b)] apply to all workers who were monitored during the preceding year by the licensee, or only to workers who continue to be monitored by the licensee at the end of the year?

d. If the workers were given a complete and final dose report at the time of termination of employment during the preceding year, is an additional, duplicative report still required to be issued in accordance with § 19.13(b)?

e. In providing annual dose reports to workers in accordance with § 19.13(b), are reports of dose to the worker's embryo/fetus, maintained in accordance with 10 CFR 20.2106, also required to be provided to the worker with the report?

f. In providing dose reports to a worker in accordance with § 19.13(e), at the request of the worker at the time of termination of employment, are reports of dose to the worker's embryo/fetus, maintained in accordance with 10 CFR 20.2106, also required to be provided to the worker with the report?

ANSWER:

(a) Yes; the monitoring period covered by 10 CFR 19.13(b) is limited to the previous year. See related Questions 392-395, inclusive, (in the fifth set of questions and answers in the section headed 10 CFR 20.2206) concerning reports required by 10 CFR 20.2206 and Questions 37 (in the first set of questions and answers in the section headed 10 CFR Part 19) and Questions 377 and 378 (in the fifth set of questions and answers in the section headed 10 CFR 19.13) concerning the requirements of 10 CFR 19.13(b).

(b) Yes, the scope of the information on NRC Form 5 (or equivalent) fulfills the information requirements of 10 CFR 19.13 (a) [and 10 CFR 19.13(b). However, in accordance with 10 CFR 19.13(a), the transmittal of the information by the licensee to the individual must contain the following statement (which is not on Form 5): This report is furnished to you under the provisions of the Nuclear Regulatory Commission regulation 10 CFR Part 19. You should preserve this report for further reference.

(c) 10 CFR 19.13(b) applies to all workers who were required to be monitored during the preceding year, not just those who continue to be monitored at the end of the year.

(d) No, an additional duplicative report need not be issued, provided that it was made clear to the worker that the report he or she was given at time of termination of employment was a "complete and final report" from the licensee for that worker for that year.

(e) No, not unless requested by the worker. See the answer to Question 378 (in the fifth set of questions and answers in the section headed 10 CFR 19.13).

(f) Yes, if the worker has requested this information. (References: 10 CFR 19.13, 20.2106).

Reactor Technical Specifications

QUESTION 433: Question 397 (in the fifth set of questions and answers under the heading for "Reactor Technical Specifications") concerns a reporting requirement in "reactor technical specifications." Does this question, and the answer provided, apply to non-power reactors?

ANSWER: No. Question 397 and its answer refer to reporting requirements contained in technical specifications for power reactors, but not in technical specifications for non-power reactors. Question 397 also refers to Regulatory Guide 1.16, "Reporting of Operating Information - Appendix A Technical Specifications," which applies only to nuclear power plants. (Reference: Reactor Technical Specifications).

QUESTION 455: Part 50 license standard technical specifications define "Dose Equivalent I-131" as "*...that concentration of I-131 (microCurie/gram) which alone would produce the same thyroid dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present...*" and "*the thyroid dose conversion factors used for this calculation shall be those listed in NRC Regulatory Guide 1.109.*" **(a) After implementation of the revised 10 CFR Part 20, should licensees continue to use the Reg Guide 1.109 thyroid dose conversion factors or should they use the thyroid dose conversion factors in EPA Federal Guidance Report No. 11? (b) Will this be addressed in NRC's** forthcoming generic letter on changes to technical specifications related to the revised Part 20?

ANSWER: (a) Licensees must continue to use the thyroid dose conversion factors (DCFs) that are referenced in their technical specifications (TS). A TS amendment would be needed to allow the use of other technically acceptable values. It should be noted that in the absence of such regulatory requirements, the NRC has allowed licensees to use sources of intake-to-dose conversion factors other than Regulatory Guide 1.109. (b) The use of Federal Guidance Report No. 11 thyroid DCFs is not planned to be included in the generic letter on changes to power reactor technical specifications to incorporate the revised Part 20 but will be addressed in a forthcoming health physics position document (which will be made publicly available). (Reference: Reactor Technical Specifications).

10 CFR Part 50 - Final Safety Analysis Report (FSAR)

QUESTION 456: FSARs for Part 50 power reactor licensees typically contain multiple references to current 10 CFR Part 20 concepts and terminology, primarily with regard to describing aspects of the radiation protection program. Updating of these references would be editorial in nature, without any health and safety benefit, but would nevertheless divert resources from potentially more significant matters. Additionally, these changes would be submitted to the NRC as part of the FSAR Update process, involving NRC staff review, an additional expenditure of resources. **May licensees forego such editorial changes to the FSAR, that have no health and safety significance?** Note that programmatic changes required to implement the revised Part 20 will still be accomplished through new or revised procedures and training. Additional clarification of the NRC staff's expectations would be useful for Part 50 licensees to more appropriately efficiently allocate resources to their revised Part 20 implementation efforts.

ANSWER: Yes; power reactor licensees do **not** need to provide updates that are purely editorial and have no health and safety significance. 10 CFR 50.71(e) requires each power reactor licensee to update the licensee's FSAR and to submit the changes to the NRC. The only FSAR changes (resulting from the revised Part 20) that need to be made are (a) significant changes in commitments identified in the FSAR regarding the radiation protection program, (b) changes in the facility described in the FSAR, and (c) changes that involve an unreviewed safety question or technical specification change pursuant to 10 CFR 50.59. The NRC staff does not expect that implementation of new Part 20 will result in significant changes to power reactor facilities or in unreviewed safety questions at these facilities. Changes in reactor technical specifications are not required by the new Part 20; however, the staff does expect that some power reactor licensees will voluntarily request changes in technical specifications as a result of new Part 20, such as changes in ESF-related process monitor alarm set points (which may have been based on the old Part 20). (Reference: 10 CFR Part 50, FSAR).

Regulatory Guide 8.7, Rev. 1, Instructions for Recording and Reporting Occupational Exposure Data

QUESTION 451: **May the codes "ND" (not detectable), "NR" (not required), and "NC" (not calculated) be used more generally in the radiation dose data blocks on the NRC Forms 4 and 5 than is implied by the instructions on the forms?** The purpose in asking this question is to clarify the guidance for filling out the forms provided in the regulatory position and in the instructions on the reverse side of the NRC Forms 4 and 5. The Form 5 instructions appear to limit the use of the "NR" and "NC" codes to the committed effective dose equivalent (CEDE) and the committed dose equivalent (CDE), "ND" is not referenced in the Form 5 instructions, and the NRC Form 4 instructions do not appear to refer to any of these codes. We believe that the references to the codes in the guidance and instructions on the forms are as examples for emphasis, and that the intent of the guidance is that "NR" and "ND" are appropriate for use, as applicable, in any of the dose blocks, and are not specifically limited for use by the manner in which referenced or described in the guidance. However, we do note that "NC" may only be applicable to the CDE (e.g., if the CEDE were less than 1 rem).

ANSWER: Yes. As indicated in the second paragraph of regulatory position 1.1 of the guide, "NR" should be entered in the blocks on Forms 4 and 5 to indicate the areas for which monitoring was not required and "ND" should be entered on these forms to indicate "where monitoring was provided but not measurable [detectable]". As indicated in regulatory position 2.2 of the guide, the use of "NC" is appropriate only for items 16 and 18 on NRC Forms 4 and 5 for cases in which the CEDE does not exceed 1 rem and there are no overexposures in any dose category within the monitoring year. (References: Reg. Guide 8.7, Rev. 1; 10 CFR 20.2104, 20.2106).

Other Questions

QUESTION 457: Some licensees have established administrative dose control levels or guidelines, below regulatory dose limits, as a tool to support supervisory and management involvement in dose minimization. Procedures commonly describe certain review actions to be taken at successive dose levels, with a higher level of management involvement at higher dose levels. **If an administrative dose control level or guideline is exceeded without all of the described actions being taken, but no regulatory limit is exceeded, is the fact of exceeding the control level or guideline a violation of NRC regulations?**

ANSWER: Exceeding an administrative dose control level or guideline that is below the limits of 10 CFR Part 20 is not a violation of 10 CFR Part 20. This is generally true with respect to other parts of the NRC regulations, although it is subject to exceptions; for example, for medical licensees, 10 CFR 35.25(a)(2) specifies requirements for a "supervised individual" including following "the written radiation safety and quality management procedures established by the licensee". Such procedures might include administrative dose control levels or guidelines and failure to follow such procedures could

be a violation of 10 CFR 35.25(a)(2). Furthermore, exceeding an administrative dose control level or guideline could be a violation of procedural requirements in the plant technical specifications at a nuclear power plant or a violation of specific license conditions in a material license. (Reference: Other).

Enclosure 2

The answer to Question 96 (in the third set of questions and answers under section 10 CFR 20.1003) has been revised to be consistent with the answer to Question 428 (under section 10 CFR 20.2101 in the seventh set of questions and answers.) Question 96, and the revised answer, are as follows:

QUESTION 96: (a) The roentgen (R) is not defined or used in the new Part 20; however, many survey instruments and computer records show dose rates in terms of "mR/h" or "R/h." Will these survey instrument face pieces and computer forms have to be changed when new Part 20 is implemented? (b) Most radiation instrumentation is currently calibrated in units of roentgens rather than rads. A roentgen of x- or gamma-radiation in the energy range of 0.1 - 3 MeV produces 0.96 rad in tissue. Will these instruments need to be recalibrated to account for this difference.

ANSWER: (a) No. The survey instruments will not need to be changed. See Question 428 (in the seventh set of questions and answers under section 10 CFR 20.2101) for additional information concerning the use of the unit "roentgen" and its subunits. (b) No. It may be assumed that one roentgen equals one rem or a more accurate conversion factor may be used.
(References: 10 CFR 20.1003, 20.2101).