September 14, 2000

Mr. Thomas M. Roe
260 Ave Vista Montana
No. 27 B
San Clemente, CA 92672

Dear Mr. Roe:

I am responding to your letters of July 24, 2000, to me and Karla Smith (Regional Counsel, NRC Region IV) regarding the meaning and interpretation of the terms "radiation protection program" and "ALARA" in 10 CFR §§ 20.1003 and 20.1101(b). You also asked about relevant agency or judicial decisions; the impact on these regulations of "new technologies" such as "remote radiation monitoring equipment"; whether all commercial nuclear power plants in Region IV (opearting or being decommissioned) are subject to 10 CFR Part 20; and licensee "response" to the regulations cited above.

I will address these issues below, but first note that the Commission's regulations authorize the General Counsel to issue formal, written interpretations of laws, regulations, and other sources of authority or guidance which are recognized as binding on the Commission. Following issuance, these interpretations are codified in 10 CFR Part 8 of the Commission's regulations. However, the General Counsel exercises this authority very sparingly and only in instances involving major policy or legal questions. Accordingly, the views in this letter do not constitute a formal interpretation.

As stated in 10 CFR § 20.1003, the term "ALARA" is an acronym for "as low as is reasonably achievable" and means "making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest." 10 CFR § 20.1003 (Attachment 1). The regulations do not define the term "radiation protection program" in 10 CFR § 20.1101(b). However, § 20.1101(a) states that the required radiation protection program must be "commensurate with the scope and extent of licensed activities and sufficient to ensure compliance with the provisions of this part . . . ." Section 20.1101(b) requires licensees "to use to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA)" (Attachment 2).

The excerpts from the attached Federal Register notices of proposed and final rulemaking provide additional information as to the regulatory history of the terms "radiation protection program" and "ALARA." "Standards for Protection Against Radiation," 56 Fed. Reg. 23360, 66-67 (May 21, 1991) (Attachment 3); 51 Fed. Reg. 1092, 1103, 1126 (January 9, 1986) (Attachment 4). In addition, the attached 1995 decision of the Third Circuit of the U.S. Court of Appeals cited below, contains a detailed history of the development of the "ALARA" concept. In re TMI, 67 F.3d 1103, 1107-12 (3d Cir. 1995) (Attachment 5).

In the above cited notice of final rulemaking, the Commission emphasized that "the 'ALARA' concept is intended to be an operating principle rather than an absolute minimization of exposures." 56 Fed. Reg. at 23366. The final rule established a requirement for all licensees

to have a "radiation protection program" that includes measures to keep doses and intakes ALARA. Id. As stated in that notice, "it is expressly intended that this level of program and efforts to document it are commensurate with the size of the licensed facility and the potential hazards from radiation exposure and the intake of radioactive materials." Id. at 23367.

Further insights as to the meaning of the terms "ALARA" and "radiation protection program" may be found in the attached documents: Regulatory Guide 8.8, Information Relevant to Ensuring That Occupational Radiation Exposures at Nuclear Power Stations Will Be As Low As Is Reasonably Achievable (Attachment 6); Regulatory Guide 8.10, Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as is Reasonably Achievable (Revision 1, 1975) (Attachment 7); Regulatory Guide 8.29, Instruction Concerning Risks from Occupational Radiation Exposure (Revision 1, 1996) (Attachment 8); Regulatory Guide 8.34, Monitoring Criteria and Methods to Calculate Occupational Radiation Doses (1992) (Attachment 9), and Regulatory Guide 8.37, ALARA Levels for Effluents from Materials Facilities (1993) (Attachment 10). Please note that as stated in regulatory guides, such guides are issued to describe and make available such information as methods acceptable to the NRC staff of implementing specific parts of the regulations and are not substitutes for regulations.

There is some judicial and NRC case law regarding the ALARA principle. The litigation before the courts mainly has focused on whether ALARA should be used as the standard of care applied in civil suits for damages. See TMI, 67 F.3d at 1109-13 (relying on federal regulations then in place to resolve issues surrounding the application of ALARA in civil litigation). Also see Carey v. Kerr-McGee Chem. Corp., 60 F.Supp.2d 800 (N.D. Ill. 1999) (Attachment 11); McCafferty v. Centerior Serv. Co., 983 F.Supp. 715 (N.D. Ohio, 1997) (Attachment 12). NRC case law concerning ALARA has mainly involved requirements in 10 CFR §§ 50.34a and 50.36a and 10 CFR Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet The Criterion 'As Low As Is Reasonably Achievable for Radioactive Material in Light-Water Cooled Nuclear Power Reactor Effluents." See, e.g., In the Matter of Lillian McNally, 24 NRC 671, 677 (1986) (Attachment 13); In the Matter of Entergy Gulf States, Inc., 49 NRC 381, 386-87 (1999) (Attachment 14). Another decision rejected a claim that the "$1,000 per man-rem value from 10 CFR Part 50, Appendix I, can be used to determine whether a licensee has met the ALARA occupational exposure requirement of 10 CFR Part 20." Northern States Power Company (Prairie Island Nuclear Generating Plant, Units 1 and 2), 6 NRC 473 (1977) (Attachment 15).

You also inquired about what impact technologies developed within the last decade would have on these regulations. Our technical staff has provided the following information in response to this inquiry: Nuclear power plant licensees have incorporated numerous technological advances into their radiation protection programs in efforts to reduce occupational doses. Two important parameters which affect the magnitude of occupational doses are the intensity of the radiation field and the length of time the individual remains in the radiation field. One of the functions of a good radiation protection program is to minimize each of these parameters in order to maintain occupational doses ALARA. There have been significant technological advances made in the last decade in radiation field control. Cobalt-60 is the major contributor to post-shutdown radiation fields and, is thus, the major cause of occupational radiation exposure at Boiling Water Reactor (BWR) and Pressurized Water Reactor (PWR) nuclear power plants. Recent advancements to reduce the amount of cobalt available for irradiation in BWRs and PWRs have included the development of low cobalt materials for use in components contacting reactor coolant and the use of sub-micron filters to remove cobalt from the reactor coolant. Strict reactor coolant chemistry controls and advanced decontamination techniques are used to reduce radiation fields by minimizing the amount of activated corrosion products in the reactor coolant and on components. There have also been several advances in the last decade to shorten the length of time a worker needs to remain in a radiation field. The use of video

libraries and virtual plant tours allow plant personnel to better pre-plan activities in radiation fields, thereby shortening the actual time spent in such fields. Use of remote surveillance such as video cameras has replaced the need for worker surveys in some high radiation areas. In addition, much work on highly radioactive components is now being performed using automated maintenance techniques. The use of these new technologies, in conjunction with the wide use of the ALARA philosophy at U.S. nuclear power plants, has been the primary reason why the collective occupational doses at U.S. nuclear power plants have dropped so dramatically in the past decade. Note however, that on an individual plant basis, the spectrum of measures and level of effort may vary depending on what is determined to be the "to the extent practical" component of ALARA.

As an example of a licensee's "response" to the ALARA regulations in 10 CFR Part 20, I have attached an article on "Reducing radiation exposure during North Anna outages," Nuclear News, July 2000 (Attachment 16). To the extent that your question about licensee "response" to the ALARA regulations means licensee compliance with the regulations, I would recommend that you utilize the NRC's Electronic Public Reading Room available at http://www.nrc.gov/NRC/ADAMS/index.html. In the reading room you will find the ADAMS documents database which will provide you with information on licensee compliance.

In response to your question regarding commercial nuclear power plants in Region IV, according to our technical staff in Region IV, all of the operating power reactors in Region IV are subject to 10 CFR Part 20. As to decommissioned nuclear power plants, the Ft. St. Vrain reactor was decommissioned in 1997, based on specifically approved residual contamination criteria that preceded 10 CFR Part 20, Appendix E, "Radiological Criteria for License Termination." There are other nuclear power plants in RIV that are in various phases of decommissioning such as the Trojan and Rancho Seco plants.

I would also recommend the Commission's website as an excellent source for information, such as the attached Appendix C ("Occupational Radiation Safety Significance Determination Process") to the NRC Inspection Manual - Manual Chapter - MC 0609 (Attachment 17). Not only will you find recent information, but we also have been included most of the documents available at our Reading Room on the website. You may access the website by going to http://www.nrc.gov/.

I hope this information as well as the attached documents are helpful to you.

Sincerely,

/S/

Stuart A. Treby
Assistant General Counsel
for Rulemaking and Fuel Cycle
Office of the General Counsel

Attachments: As stated

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