

DOCKET NO: 70-1201  
LICENSE NO: SNM-1168  
LICENSEE: Framatome ANP, Inc.  
Lynchburg, VA

SUBJECT: SAFETY EVALUATION REPORT: AMENDMENT 9 - REQUEST TO USE  
INTERNATIONAL COMMISSION ON RADIOLOGICAL PROTECTION  
PUBLICATION 68 VALUES IN LIEU OF THE VALUES IN 10 CFR 20,  
APPENDIX B (TAC L31907)

### BACKGROUND

By letter dated September 1, 2005, Framatome ANP, Inc., Lynchburg (FANP) requested an amendment to its Materials License SNM-1168, to allow the use of Derived Air Concentration (DAC) and Annual Limit on Intake (ALI) values calculated, using the new internal dosimetry models specified in the International Commission on Radiological Protection Publication 68 (ICRP-68). The Nuclear Regulatory Commission (NRC) staff is treating this matter as an exemption request from the requirements of 10 CFR Part 20.

### DISCUSSION

FANP will modify its license application to include ICRP-68 model by adding the following paragraph to Section 1.5, "Special Exemptions and Special Authorizations,"

f) Authorization to Use ICRP-68

DAC and ALI values based on the dose coefficients from ICRP Publication No. 68 for 5  $\mu\text{m}$  AMAD values can be used in lieu of the values in 10 CFR 20, Appendix B in accordance with internal procedures.

The basic limits on radiation exposures, as well as the minimum radiation protection practices required of any NRC licensee, are specified in 10 CFR Part 20, "Standards for Protection Against Radiation." Part 20 underwent a major revision in the 1980's, and the revised regulation was published as a proposed rule in December 1985. The final rule was published in the *Federal Register* on May 21, 1991 (56 FR 23391), and became mandatory for all licensees in January 1994.

One of the major changes incorporated in the revised Part 20 was the manner in which internal exposure to radioactive materials is regulated. Before the revision, the NRC regulated internal exposures by limiting the amounts of radioactive materials that may be taken into the body over

specified time periods. The revised Part 20 eliminated regulation based on intakes and regulated instead, on the basis of the dose that resulted from those intakes. The internal dose from intake of radioactive material is referred to in Part 20 as the committed effective dose equivalent (CEDE). The regulation of dose instead of intake was prompted by recommendations provided by national and international bodies, and also by the desire to end the traditional treatment of internal and external doses as two separate entities. The dose based rule removes the requirement to use a specific set of parameters to calculate the dose. Part 20 allows adjustments to the model parameters if specific information is available, such as adjustments for the particle size of airborne radioactive material, rather than using a default particle size. However, Part 20 also specifies increased radiation protection based on DAC and ALI values as tabulated in Appendix B, rather than in terms of dose. Thus requirements such as posting of airborne radioactivity areas, monitoring for intakes of radioactive materials, establishment of bioassay programs, and use of respirators are explicitly tied to the measurable quantities of contamination, rather than to a dose. This approach was taken to avoid imposing an undue calculation burden on the licensee.

The models used in Part 20 to regulate internal dose are those described in ICRP Publications 26 and 30, adopted by ICRP in 1977 and 1978, respectively. Much of the basic structure of these models were developed in 1966, with few modifications before their formal adoption by ICRP in 1978. In the same year that the Commission approved the final Part 20 rule, ICRP published a major revision of its radiation protection recommendations (ICRP 60). Within the several years following this revision, ICRP published a series of reports in which it described the components of an extensively updated and revised internal dosimetry model. These reports include ICRP Publications 60 (1990), 66 (1993), 67 (1993), 68 (1994), 71 (1995), 72 (1995), and 78 (1997). The NRC licensees are not permitted to use the revised and updated internal dosimetry models unless an exemption to 10 CFR 20.1201(d) is granted.

The dose per unit intake calculated, using the new models, does not differ by more than a factor of about two from the values in 10 CFR Part 20, Appendix B, for most radionuclides. However, the differences are substantial for some isotopes, particularly thorium, uranium, and some of the transuranic radionuclides. For example, the revised ICRP lung model for the inhalation of insoluble thorium-232 ( $^{232}\text{Th}$ ) produces a dose per unit intake 15 times lower than the dose based on 10 CFR Part 20, Appendix B. Because protective measures are based on the hazard and the hazard is proportional to dose, 10 CFR Part 20 requires significantly more protective measures when using  $^{232}\text{Th}$  than would be warranted based on the revised models.

Using the updated ICRP-68 standard would enable FANP Lynchburg to reduce the size of its internal exposure program, while providing a level of protection proportional to the actual hazard. For this reason FANP has requested to use DAC and ALI values based on the dose coefficients listed in ICRP-68. The NRC staff concluded that FANP Lynchburg has historically maintained worker doses as low as reasonably achievable (ALARA) and is qualified to utilize the ICRP 68 in a manner equivalent to 10 CFR 20.1201(d), (i.e. doses at a level lower than the NRC's regulatory limit of 5 rem, in its Radiation Safety Program). Therefore, FANP Lynchburg's request for an exemption under 10 CFR 20.2301 is acceptable, because it gives its workers equivalent radiological protection as required by 10 CFR Part 20. Thus, the exemption is authorized by law and will not result in an undue hazard to life or property.

## ENVIRONMENTAL REVIEW

The applicant has committed to adequate environmental protection measures, including environmental and effluent monitoring and effluent controls to maintain public doses ALARA as part of the radiation protection program. The NRC staff concludes that the applicant's conformance to its application and license conditions provides adequate assurance of the protection of the health and safety of the public and workers, is adequate to protect the environment, and complies with the regulatory requirements imposed by the Commission in 10 CFR Parts 20, 51, and 70.

The basis for this conclusion is documented in an Environmental Assessment (EA) which was prepared in support of the enclosed amendment (ADAMS - ML060120454). On January 20, 2006, a Federal Register Notice was published (71 FR 3342-3344) which contained the EA and a Finding of No Significant Impact.

## CONCLUSION

It is generally agreed among the national and international scientific community that newer models provide a more up-to-date basis for calculating exposure to radioactive materials and compliance with the dose limits. Further, the licensee's use of these newer models is in compliance with the requirements in 10 CFR 20.2301. Also, the NRC supports these types of dose estimates, and has authorized the staff to grant exemptions on a case-by-case basis (SRM-SECY-99-0077, ML042750086). Therefore, the staff recommends approving the licensee's request to use the new models.

The Region 2 inspection staff has no objection to this proposed action.

## PRINCIPAL CONTRIBUTORS:

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