

A.2. (SK) As part of the NRC Staff's health and safety review of the SERI ESP application, documented in the Grand Gulf Site SER, I reviewed the aspects of the Applicant's Site Safety Analysis Report that concerned the radioactive waste treatment system and the radiological impacts from routine operation to plant workers and members of the public. I was also part of the NRC Staff's environmental review of the SERI ESP application, documented in NUREG-1817, "Environmental Impact Statement for an Early Site Permit (ESP) at the Grand Gulf ESP Site: Final Report," April 2006 ("FEIS"). I reviewed the aspects of the Applicant's Environmental Report that concerned the radioactive waste treatment system and the radiological impacts from routine operation to plant workers, members of the public, and to the environment.

Q.3. In its November 6, 2006, Order, the Atomic Safety and Licensing Board ("Board") identified certain issues to be addressed in connection with the mandatory hearing. With regard to the monitorability of inadvertent radiological releases, the Board stated its opinion that the suitability of the Grand Gulf site for the eventual construction of an additional plant(s) hinges, in part, on SERI's ability (1) to detect discharges from plant systems, structures, and components that have a potential for the inadvertent release of radioactivity into the site soils or into the surface and ground water, and (2) to determine whether future detections of radiation are the result of historic impacts from the existing facility, or are the result of new contamination from the proposed plant(s). Please address this statement.

A.3. (GB) A number of NRC regulations and guidance documents address monitoring of radioactive material in effluents from nuclear power reactors.¹

¹ 10 CFR Part 20, Standards for Protection Against Radiation; 10 CFR 50.34a, Design objectives for equipment to control releases of radioactive material in effluents - nuclear power reactors; 10 CFR 50.36a, Technical specifications on effluents from nuclear power reactors; 10 CFR 50.72, Immediate notification requirements for operating nuclear power reactors; 10 CFR 50.73, Licensee event report system; 10 CFR Part 50, Appendix A, Design Criterion 60, Control of Releases of Radioactive Materials to the Environment; 10 CFR Part 50, Appendix A, Design Criterion 64, Monitoring Radioactivity
(continued...)

As stated in responses to the Board's Hearing Issue A, Questions 9 and 10, accidental releases of radionuclides from the ESP facility are precluded by Permit Condition 2. The Staff concluded that it is technically feasible to design engineered barriers and other hydraulic conditions to meet the requirements of Permit Condition 2. Accordingly, monitoring of inadvertent radiological releases is not required or warranted.

Q.4. In its November 6, 2006, Order, the Board identified certain issues to be addressed in connection with the mandatory hearing. With regard to the monitorability of inadvertent radiological releases, the Board asked that the Staff address site monitorability relating to surface water, ground water, and shallow soil impacts and sediments by presenting the existing knowledge base with detailed descriptions of the exploration program, aquifer testing, hydraulic modeling, and transport estimates used to characterize the site aquifer(s), and surface water courses. Please address these issues.

A.4. At the ESP stage, when the details of the reactor design, construction, and operating processes are not known, it is speculative and generally unproductive to investigate monitorability of the proposed ESP site. NRC's regulatory criteria and guidelines are in place to

¹(...continued)

Releases; 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; 40 FR 19439 (May 5, 1975; an immediately effective rule, using the terminology "as low as practicable"); Regulatory Guide 1.109, Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I (Rev. 1, 10/75); Regulatory Guide 1.21, Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants (Rev. 1, 6/74); Regulatory Guide 1.143, Design Guidance for Radioactive Waste Management Systems, Structures, and Components Installed in Light-Water-Cooled Nuclear Power Plants (Rev. 2, 11/01); Regulatory Guide 4.1, Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants (1/73); Regulatory Guide 4.2, Preparation of Environmental Reports for Nuclear Power Stations (Rev. 2, 7/76); Regulatory Guide 4.8, Environmental Technical Specifications for Nuclear Power Plants (12/75) and Branch Technical Position (Rev. 1, 11/79, specific to environmental monitoring program); Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Program (Normal Operation) - Effluent Streams and the Environment; NUREG-0472, Radiological Effluent Technical Specifications for PWRs (2/80); NUREG-0473, Radiological Effluent Technical Specifications for BWRs (7/79).

ensure that a future COL review will require a full description of radioactive effluent monitoring systems and associated technical specification limits.

With regard to radioactive releases in ground water, it should be noted that the ESP site has a deep soil deposit. Consequently, the monitoring wells may need to be deep. On the other hand, predominantly clay soil at the site provides an advantage of relative impermeability.

Q.5. In its November 6, 2006, Order, the Board identified certain issues to be addressed in connection with the mandatory hearing. With regard to the monitorability of inadvertent radiological releases, the Board asked that the Staff address site monitorability relating to surface water, ground water, and shallow soil impacts and sediments by describing and illustrating the extent of the existing radiological concentrations in the soil, sediment, surface water and ground water at the site, and the monitoring program used to quantify existing impacts. Please address these issues.

A.5. (SK) In addressing surface and groundwater radiologic impacts, the Staff relied on information from the radiological environmental monitoring program (REMP) currently in place at the Grand Gulf Nuclear Station. The REMP monitors the offsite environment outside the plant site. The NRC's requirements contained in Appendix A to 10 CFR Part 50, Criterion 64 - "Monitoring radioactivity releases," and its regulatory guidance in Branch Technical Position, Revision 1 (ML010710060), focus on the offsite environmental monitoring of soil, sediment, surface water, and ground water. However, the REMP does not focus on environmental monitoring within the plant site. The NRC requires that the REMP monitor the general offsite environment for the presence of radioactive material from the operating nuclear reactor. NRC's guidance describes the specified environmental monitoring program, which provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposure of individuals resulting from the station operation. Thus, there is no NRC requirement to have data for

radiological ground water or soil conditions at the site. The Staff did not receive any data in the SERI application on radiological conditions at the site.

Q.6. In its November 6, 2006, Order, the Board identified certain issues to be addressed in connection with the mandatory hearing. With regard to the monitorability of inadvertent radiological releases, the Board asked that the Staff address site monitorability relating to surface water, ground water, and shallow soil impacts and sediments by summarizing meteorological, geologic, and hydrogeologic data that can be used to estimate migration pathways for future impacts from plant(s) at the site. Please address these issues.

A.6. (GB) The Staff has summarized the hydrologic characteristics of the ESP site in its response to the Board's Hearing Issue A, Question 3. As noted in the Staff's answer to Question 4 above, data available at the ESP stage do not allow a reliable estimate of migration pathways for future impacts from plant(s) at the site, since the reactor type, liquid radwaste inventory, location of radwaste facility, extent of site modification due to construction activities, and the extent of the use of engineered backfill are unknown. Permit Condition 2 precludes the inadvertent radiological releases to which this Board question refers and is sufficient to ensure that necessary and appropriate review will be undertaken at the time of the COL review.

Q.7. In its November 6, 2006, Order, the Board identified certain issues to be addressed in connection with the mandatory hearing. With regard to the monitorability of inadvertent radiological releases, the Board asked that the Staff address site monitorability relating to surface water, ground water, and shallow soil impacts and sediments by explaining how the impact from a hypothetical release from the new plant could be separated from the historic impacts, and, as a corollary, if a future radiological release was detected, how it would be possible to determine which plant was the source of the impact. Please address these issues.

A.7. (SK) Hypothetical inadvertent radiological releases from the proposed new plant could be separated from historic impacts through a program of radiological surveys and specialized monitoring. The surveys and monitoring would have to trace the pathway of the residual radioactivity back to the source of the discharge in order to establish which plant was the source of the impact. As a practical matter, the NRC has experience with licensees who have performed such detailed, extensive surveys and monitoring of inadvertent liquid discharges at operating nuclear power reactor sites. However, as discussed in the Staff's response to Question 5, there are no NRC requirements to have such a detailed onsite monitoring program in order to detect inadvertent discharges. This is in contrast to routine radiological effluent discharges into the unrestricted area (public area). There is a requirement in Appendix A to 10 CFR Part 50, Criterion 64 - "Monitoring radioactivity releases," to monitor effluent discharge paths, and there is detailed regulatory guidance on the appropriate location, type, and sensitivity of monitoring equipment to be used. In addition, there is a requirement in 10 CFR 50.36a to submit an annual report that specifies the quantity of each of the principal radionuclides released to unrestricted areas in liquid and gaseous effluents. However, the regulation does not require the data to be reactor specific. As a matter of practice, licensees do a best effort to apportion the radioactive effluents to each reactor unit.

The NRC would not eliminate this site from future consideration because of the lack of a proposed radiological survey and monitoring program to monitor the onsite environment from potential inadvertent releases of radioactive material, because existing NRC requirements and guidance do not require such a program.

Q.8. In its November 6, 2006, Order, the Board identified certain issues to be addressed in connection with the mandatory hearing. With regard to the monitorability of inadvertent radiological releases, the Board asked that the Staff address site monitorability relating to surface water, ground water, and shallow soil impacts and sediments by describing

the reasons why the potential un-monitorability of the site would or would not possibly eliminate this site from future consideration for a new plant.

A.8. (GB) The Staff imposed Permit Condition 2 to ensure that effective measures for precluding releases will be put in place during the COL phase. The Staff concluded, therefore, that further characterization of the composition of the radwaste effluent and that of the subsurface hydrological and chemical properties was not needed. As discussed in the Staff's response to the Board's Hearing Issue A, Question 9, the Staff concluded that it is technically feasible to design engineered barriers and other hydraulic conditions to meet the requirements of Permit Condition 2.