

3. For the reasons explained in this decision, the record of the proceeding contains sufficient information, and the review of the application by the NRC Staff has been adequate, to support the findings with respect to the applicable standards in 10 C.F.R. Part 51, 52, and 100, and the Commission's Notice of Hearing.

4. Accordingly, the Director of Nuclear Reactor Regulation (NRR) is authorized to issue the ESP to Exelon.

A. Procedural Background

5. Exelon is responsible for the operation of ten nuclear stations with 17 nuclear reactors, representing approximately 17 percent of the U.S. nuclear industry's power capacity. Early Site Permit Application, Administrative Information (Rev. 4) (Admin.) at 3-1; "Prefiled Testimony of Thomas P. Mundy on Exelon Generation Company's ESP Application" (Mundy Testimony) at 3.

6. Exelon Generation Company, LLC is a wholly-owned subsidiary of Exelon Ventures Company, LLC which, in turn, is wholly owned by Exelon Corporation. Admin. at 3-1; Mundy Testimony at 3. The directors and principal officers of Exelon and its parents are U.S. citizens, and neither Exelon nor its parents are owned, controlled or dominated by an alien, a foreign corporation, or a foreign government. Admin. at 3-2; Mundy Testimony at 3.

7. On September 25, 2003, Exelon filed an application for an ESP, seeking approval of the existing Clinton nuclear power station site for the possible construction of one or more new nuclear reactors. The Notice of Hearing, published on December 12, 2003, offered interested persons the opportunity to petition for leave to intervene. 68 Fed. Reg. at 69,427.

8. Environmental Law and Policy Center, Blue Ridge Environmental Defense League, Nuclear Energy Information Service, Nuclear Information and Resource Service, and

Public Citizen were granted standing and one contention, related to the consideration of energy alternatives, was admitted. *See* LBP-04-17, 60 NRC 229 (2004). Exelon subsequently filed a motion for summary disposition of this contention, and the Board granted the motion. *See* LBP-05-19, 62 NRC 134 (2005), *aff'd*, CLI-05-29, 62 NRC 801 (2005); *appeal pending*, *Envtl. Law and Policy Ctr. v. NRC*, No. 06-1442 (7th Cir).

9. Following the Staff's review of the application and the publication of the final Safety Evaluation Report (SER) and final Environmental Impact Statement (EIS), and in preparation for the Mandatory Hearing, the Board provided questions to the Staff regarding its review of the safety and environmental portions of the application.¹ The Staff provided detailed responses to the Board's inquiries on a wide range of safety and environmental issues.²

10. The parties submitted prehearing briefs on September 14, 2006, and direct prefiled testimony on October 17, 2006. Both parties submitted testimony addressing the required safety and environmental findings.³

11. Prior to the hearing, the Board issued an Order identifying a number of specific questions for the parties to address, but indicated that we would not be limited to inquiries on these topics during the hearing. We requested that the parties:

¹ Order (Requesting Documents and Briefings on FSER) (July 20, 2006); Order (Reconsidering Inquiry 88, Following up on the Staff's Response to Inquiries, and Requiring Supplementation Regarding FSER Follow-Up Items not treated as COL Action Items) (August 17, 2006); Order (Requesting Staff Responses to Attachment A Regarding Clinton ESP FEIS) (Sept. 6, 2006).

² "NRC Staff Responses to Licensing Board's Order of July 20, 2006, Requiring Answers to Inquiries and the Provision of Documents," (July 31, 2006); "NRC Staff Brief in Response to Licensing Board's Order of August 2, 2006" (Aug. 18, 2006); "NRC Staff Responses to the Board's Follow-Up FSER Inquiries," (Sept. 14, 2006); "Staff Responses to Board's Inquiries Concerning the Staff's Final Environmental Impact Statement," (Sept. 29, 2006).

³ "NRC Staff's Prefiled Direct Testimony on Health and Safety Issues in the Clinton ESP Proceeding" (Staff Safety Testimony); "NRC Staff's Prefiled Direct Testimony on Environmental Issues in the Clinton ESP Proceeding" (Staff Environmental Testimony); "Prefiled Testimony of Eddie R. Grant on Required Safety Findings" (Grant Testimony); "Prefiled Testimony of Tamar Jergensen Cerafici on Required Environmental Findings" (Cerafici Testimony). Exelon also submitted prefiled testimony providing an overview of the Clinton ESP Application. (Mundy Testimony).

- 1) Describe, in an exhibit to be presented to the Board at commencement of the hearing and to be discussed preceding the close thereof, in a concise manner, the scope of activities that the Applicant would be enabled to undertake, and the tasks and information the Applicant would not be required to undertake or produce at a later date, as a result of the grant of the subject ESP (with all constraints imposed by Permit Conditions, COL Action Items⁴ and those items indicated in the record as deferred for later action).
- 2) Be prepared to pursue further EIS inquiry no. 35 concerning the different treatment of internally vs externally initiated events.
- 3) Be prepared to pursue further the statement "The NPHS has no safety function and is not required for shutdown or accident mitigation." NRC Staff's Brief in Response to the Licensing Board's Order of August 2, 2006 (Sept. 14, 2006) at 26.
- 4) Be prepared to pursue further the inconsistent treatment of the Plant Parameter Envelope in the SER and the EIS - particularly with respect to bounding of accident effects.
- 5) Be prepared to pursue further the long-term population estimates.
- 6) Be prepared to discuss further incorporation (or lack thereof) of lessons learned from Katrina.⁵

12. The Board held the mandatory evidentiary hearing in Decatur, Illinois on November 7 and 8, 2006. During the hearing, Exelon and Staff witnesses presented their prefiled written testimony, presented live testimony summarizing the prefiled testimony, and responded to specific questions posed by the Board. The presentation slides of the witnesses were entered into the record as Exhibits, as well as a Joint Exhibit sponsored by Exelon and the NRC Staff in response to the Board's request in its October 23 Order.

⁴ COL Action Items identify certain matters that shall be addressed in the site-specific portion of the final safety analysis report (FSAR) by a Combined License (COL) applicant referencing a Clinton ESP. These items constitute information requirements but are not the only acceptable set of information in the FSAR. An applicant may depart from or omit these items, provided that the departure or omission is identified and justified in the FSAR. After issuance of a COL, these items are not requirements for the licensee. Joint Exhibit 1 at 4.

⁵ Order (Additional Administrative Matters for Mandatory Hearing), slip op. at 6 (Oct. 23, 2006) (footnote omitted).

13. Following the hearing, the Board held a session to permit members of the public to make limited appearance statements regarding this proceeding. This session was held in Clinton, Illinois on the evening of November 8, 2006.

B. Legal Standards

14. The Notice of Hearing describes the legal determinations that the Board must make as part of the mandatory hearing. First, under the Atomic Energy Act of 1954, as amended (AEA), and as described in the Notice of Hearing, this Board is to determine, without conducting a *de novo* review of the license application:

(1) Whether the issuance of an ESP will be inimical to the common defense and security or to the health and safety of the public (Safety Issue 1); and (2) whether, taking into consideration the site criteria contained in 10 CFR Part 100, a reactor, or reactors having characteristics that fall within parameters for the site, can be constructed and operated without undue risk to the health and safety of the public (Safety Issue 2).

68 Fed. Reg. at 69,427; *see also* 10 C.F.R. 2.104(b)(2). Second, under the National Environmental Policy Act (NEPA), this Board must also make three environmental findings:

(1) determine whether the requirements of section 102(2)(A), (C), and (E) of NEPA and subpart A of 10 CFR Part 51 have been complied with in this proceeding; (2) independently consider the final balance among the conflicting factors contained in the record of the proceeding with a view to determining the appropriate action to be taken; and (3) determine, after considering reasonable alternatives, whether the ESP should be issued, denied, or appropriately conditioned to protect environmental values.

68 Fed. Reg. at 69,427; *see also* 10 C.F.R. 2.104(b)(3).

15. During the course of this proceeding, the Commission provided the following guidance to the licensing boards regarding the conduct of mandatory, uncontested hearings:

[W]e expect licensing boards conducting mandatory hearings on uncontested issues to take an independent “hard look” at NRC Staff safety and environmental findings, but not to replicate NRC Staff work. Giving appropriate deference to NRC Staff technical expertise, boards are to probe the logic and evidence supporting staff findings and decide whether those findings are sufficient to support license issuance.

Exelon Generation Co. (Early Site Permit for Clinton ESP Site), CLI-05-17, 62 NRC 5, 34 (2005). Thus, “boards should conduct a simple, sufficiency ‘review’ of uncontested issues, not a *de novo* review,” *id.* at 39, and “decide whether the *staff’s* review has been adequate to support [its] findings, *id.* at 36 (emphasis in original) (internal citation omitted). Regarding environmental issues, the Commission directed licensing boards to the U.S. Court of Appeals decision in *Calvert Cliffs’ Coordinating Comm., Inc. v. AEC*, 449 F.2d 1109 (D.C. Cir. 1971). The Board must consider reasonable alternatives to the proposed action and conduct an independent assessment, but “boards should not second-guess underlying technical or factual findings by the NRC Staff,” unless “the reviewing board found the Staff review to be incomplete or the Staff findings to be insufficiently explained in the record.” CLI-05-17, 62 NRC at 45.

16. Based upon these standards, the Board provides the following Findings of Fact and Conclusions of Law.

II. PURPOSE OF THE ESP AND ACTIVITIES AUTHORIZED UNDER THE ESP

17. As provided in 10 C.F.R. § 52.39, an ESP resolves siting and environmental issues that are reviewed and approved by the NRC. An ESP allows the holder to “bank” a site for up to 20 years for future reference in an application for a construction permit (CP) or COL. 10 C.F.R. § 52.27.

18. Accordingly, a COL applicant referencing the ESP will not be required to submit information regarding issues resolved during the ESP proceeding, except that the applicant must (1) address the terms and conditions of the ESP; (2) address matters that were addressed but not fully resolved in the ESP proceeding, or matters that could not be addressed because they relate

to design issues;⁶ (3) address significant environmental issues that were not addressed in the Environmental Report or EIS; (4) demonstrate that the design of the facility falls within the parameters specified in the ESP; (5) provide any significant new information related to environmental issues resolved in the ESP proceeding; and (6) provide complete and integrated emergency plans, which may incorporate by reference the emergency plan major features that are approved in the ESP. 10 C.F.R. § 52.39 and § 52.79; Joint Exhibit 1 at 3-4.

19. An ESP does not authorize the holder to conduct any construction activities at the site. However, an ESP with an approved Site Redress Plan does authorize the holder to perform the activities allowed by 10 C.F.R. § 50.10(e)(1)(2006), subject to prerequisites listed in the EIS and the conditions of the permit. 10 C.F.R. § 52.25; Joint Exhibit 1 at 1-2.

III. BACKGROUND

20. The proposed ESP facility will be located in rural DeWitt County, Illinois, on the site of the existing Clinton Power Station, which is owned by an Exelon subsidiary, AmerGen Energy Company, LLC (AmerGen). The site is located on man-made Clinton Lake, approximately six miles east of the town of Clinton, Illinois. The ESP facility would have a core thermal power rating of between 2,400 and 6,800 MWt, and would generate baseload power for sale on the wholesale market. Mundy Testimony at 3, 6.

21. The ESP application is composed of the following documents: Administrative Information, the Site Safety Analysis Report (SSAR), the Environmental Report (ER), information related to the Emergency Plan (EP), and the Site Redress Plan. The principal regulatory criterion for developing the ESP application, and for the Staff's review of the

⁶ Exelon has committed that the COL Applicant referencing the ESP will review the ESP application and the Staff's SER and EIS to ensure all open or unresolved items in the ESP proceeding are addressed in the COL Application. Joint Exhibit 1 at 4; Tr. at 562-63.

application, is 10 C.F.R. Part 52. Additional regulatory criteria and guidance used in the preparation and review of the ESP application are described in Sections IV and V, below.

22. The Staff has reviewed the application in accordance with applicable regulatory criteria and guidance. During the Staff's review, the Staff asked Exelon to respond to twelve separate safety and emergency planning-related requests for additional information (RAIs) that included approximately 110 subparts, and four RAIs with approximately fifty subparts related to environmental issues. Mundy Testimony at 13.

23. The SER and EIS document the resolution of open and confirmatory items from the draft SER and comments on the draft EIS. SER at 1-9; EIS Appendix E. The Staff's environmental review was also predicated on certain assumptions that will need to be verified at the CP or COL stage, including 32 COL Action Items and seven Permit Conditions. Required future actions are documented in Appendix K to the EIS and in Appendix A to the SER. The single environmental Permit Condition is documented in EIS § 4.3.1. The conclusions of the Staff's evaluation and independent review of the application, and its recommendation that the ESP be issued, are described in Chapter 19 of the SER and Chapter 10 of the EIS.

24. Neither Exelon nor the Staff identified any time-dependant site characteristics that would not fully support a 20 year ESP. Such site characteristics would normally involve issues such as demography, meteorology, and locations of nearby industrial hazards. None of the data provided in the Application contains conditions or limitations, beyond those normally expected in such an application, which would invalidate a 20 year ESP plus a 40 year operating license or COL. Mundy Testimony at 4.

25. As permitted by 10 C.F.R. Part 52, Exelon has not selected a specific reactor type for the site. To support its application, Exelon developed a plant parameter envelope (PPE) to

serve as a surrogate for design information. To develop the PPE, Exelon used available information from several reactor plant designs that are either currently commercially available or anticipated to be commercially available within the term of the ESP, including: the Advanced Boiling Water Reactor (ABWR), AP1000 Reactor, Pebble Bed Modular Reactor (PBMR), Gas Turbine Modular Helium Reactor (GTMHR), the Advanced CANDU Reactor (ACR), the International Reactor Innovative and Secure (IRIS) reactor, and the Economic Simplified Boiling Water Reactor (ESBWR). The PPE values serve as a set of design parameters that are expected to bound the design of a reactor or reactors that might be deployed at the site. The PPE values are listed in Table 1.4-1 of the SSAR. The PPE is sufficient to assess the future use of the site from both a nuclear safety and environmental perspective. Mundy Testimony at 6-8.

26. The PPE values are generally based on the certified designs and the best available information for not yet certified designs. SER at 1-6. Exelon's PPE values, which include some additional margin, are reasonable. *Id.*; Staff Safety Testimony at 4.

27. Although the same PPE applies to the all portions of the ESP application, the characteristics in the PPE may be used differently in the safety and environmental analyses. In its environmental review, the Staff evaluates the reasonably foreseeable impacts, while safety issues are subject to conservative analyses. Staff Safety Testimony at 4-6; Staff Environmental Testimony at 13-16. For example, the χ/Q values used in the Staff's environmental review used typical meteorological conditions. *See* EIS at 5-63. For safety analyses, however, the Applicant and Staff used values for χ/Q associated with adverse meteorological conditions for accident evaluations and values for χ/Q associated with typical meteorological conditions for annual effluent evaluations. *See* SSAR Chapter 15.

28. In accordance with 10 C.F.R. § 52.23, the Advisory Committee on Reactor Safeguards issued a letter on March 24, 2006, to the NRC Chairman (included as Appendix E of the SER) concluding that the ESP application and SER show that the proposed facility adjacent to the existing Clinton Power Station is an acceptable site for nuclear power plants that meet the PPE proposed by the Applicant.

IV. FINDINGS OF FACT ON SAFETY ISSUES

29. Regulatory Criteria and Guidance. The SSAR and the emergency planning information were prepared in accordance with the applicable regulatory criteria in 10 C.F.R. Part 50, Part 52, and Part 100. With one exception related to seismic issues discussed below, the application also was generally prepared in accordance with the guidance in Review Standard (RS) RS-002, "Processing Applications for Early Site Permits," which provides detailed guidance for the review of ESP applications, provides references to applicable review criteria, and is based upon NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants" (SRP). Grant Testimony at 3-4.

The Staff's review also conformed to the same regulatory criteria and guidance. Staff Safety Testimony at 3.

30. Geography and Demography. The approximately 14,180 acre ESP site and its environs include woodlands, pasture land, cultivated farmland, recreational areas, and the man-made Clinton Lake. No member of the public lives within the exclusion area. Exelon will maintain control of the exclusion area boundary (EAB) for the Exelon ESP facility, to the extent necessary to comply with applicable NRC guidance. See SER at A-2. The closest population center likely to exist over the lifetime of the proposed ESP site is Decatur, approximately 22 miles from the site, well in excess of the minimum population center distance of 3.3 miles as

calculated in accordance with the requirements of 10 C.F.R. § 100.21(b). *See* SSAR at 2.1-8; SER at 2-9. Subject to the Permit Conditions and COL Action Item described in the SER, Exelon has provided sufficient information to comply with 10 C.F.R. § 52.17 and the site criteria in 10 C.F.R. Part 100 regarding geography and demography. SER at 2-3, 2-10, 3-3 to -4; *see also* Grant Testimony at 12-14; Staff Safety Testimony at 8.

31. Exelon submitted data regarding current and predicted population in the area surrounding the ESP site, including the exclusion area, 2.5 mile low population zone (LPZ), and nearest population center. Exelon referenced an Illinois State University county-by-county study and population projections through 2020, based on 1990 U.S. Census Bureau data. Tr. at 591-93; *see also* SSAR at 2.1-5 to -6. Starting with this data, Exelon made linear projections through 2060. Exelon also verified the accuracy of Illinois State University's projections for 2000 by comparing them to actual data from the 2000 U.S. Census, and these projections were accurate to within an average of one-half of one percent for the combined population of the five counties immediately surrounding the site. Tr. at 593, 663-64. The Staff confirmed this analysis by comparing Exelon's projections for 2020 and 2030 to the U.S. Census Bureau's state-wide projections for the same years, and concluded that Exelon's population projections were reasonable. Tr. at 602-03; *see also* SER at 2-9.⁷

32. Nearby Industrial, Transportation and Military Facilities. The nature and extent of activities at nearby industrial, transportation and military facilities were evaluated by Exelon and the NRC Staff, including the potential for flammable vapor clouds, aircraft crashes, toxic chemicals, and railroad accidents. Subject to the COL Action Item described in the SER, the SSAR has adequately identified the hazards, and there are no ongoing or presently planned

⁷ As requested by the Board in its Order of November 17, 2006, Exelon will be providing a separate brief that will demonstrate that the population projections of Exelon and the NRC Staff are not significantly different from population projections by the Illinois Department of Commerce and Economic Opportunity.

activities that have the potential for precluding the use of this site for a nuclear power facility based on the PPE.⁸ SER at 2-14 to -15, 2-18; *see also* Grant Testimony at 15-16; Staff Safety Testimony at 11.

33. One gas pipeline traverses the current CPS exclusion area within one mile of the ESP site. SSAR at 2.2-2. This pipeline transports low volatility gasoline and diesel fuel. While it is configured for more volatile fuels, such as propane, the use of the pipeline appears unlikely to change. *Id.* Under an agreement between AmerGen and the pipeline owner, described in the CPS FSAR, in the unlikely event that the pipeline owner decides to transport propane in this pipeline, the pipeline would be relocated or appropriate mitigating measures would be implemented. *Id.*; Grant Testimony at 15.

34. The site is acceptable from the perspective of aircraft hazards. Grant Testimony at 15. DeWitt County has no passenger air service or public airports, but has seven private airstrips, three of which are within six miles of the ESP site, and there are two commercial airports approximately 22.5 miles from the site. SSAR at 2.2-3 and Figure 2.2-1. Exelon evaluated the total probability of an aircraft impact from federal airways as $1.81E-7$ per year, which is consistent with the guideline criteria of $10E-7$ per year under the SRP. SSAR at 2.2-4 and Table 2.2-4A. The Staff calculated the total probability of an aircraft impact from federal airways was $4.96E-8$ per year, also well below the guideline criteria. SER at 3-5.

35. Meteorology. The SSAR addresses the most severe regional weather phenomenon (hail, thunderstorms, tornadoes, winter precipitation, high and low temperature

⁸ When the control room location and design is identified at the COL stage, the applicant will need to perform a new analysis of the airborne hazards associated with a toxic chemical accident on the Gilman railroad line. This evaluation will be based on control room location, ventilation system design, and the analytic methodology for dispersion and transport of airborne hazardous materials. SER at 2-17 to -18.

conditions, and high air pollution potential) in establishing the regional and site meteorological characteristics. SER at 2-33 to -34. The design-basis tornado wind speed is 300 miles per hour. SER at 2-28. The SSAR considers the most severe regional weather phenomenon (hail, thunderstorms, tornadoes, winter precipitation, high and low temperature conditions, and high air pollution potential) in establishing the regional and site meteorological characteristics. Subject to the COL Action Items described in the SER, such characteristics meet the requirements in 10 C.F.R. § 100.20(c) and 10 C.F.R. § 100.21(d). SER at 2-28 to 2-39; *see also* Grant Testimony at 16-18; Staff Safety Testimony at 12.

36. The SER contains an independent evaluation of short-term diffusion estimates, and concludes that the short-term diffusion and atmospheric dispersion estimates provided in the SSAR are adequately conservative and appropriate for the assessment of consequences from radioactive releases for postulated design-basis accidents. SER at 2-47 to -49; Grant Testimony at 18.

37. Hydrologic Engineering. SSAR Section 2.4 considers the most severe flooding that has been historically reported for the site and surrounding area. SER at 2-80. All safety-related structures at the Exelon ESP facility would either be above the maximum Clinton Lake water surface elevation, or be designed to withstand the effects of inundation. SSAR at 2.4-4. There are no dams upstream or downstream of Clinton Dam which could affect safety-related facilities if lost, and the loss of Clinton Dam will not result in a loss of water from the submerged CPS ultimate heat sink (UHS) pond which may provide makeup water to the UHS for the ESP facility. *Id.* at 2.4-10. The estimated minimum lake water levels will be well above the minimum required CPS lake level. *Id.* at 2.4-22. Subject to the Permit Conditions and COL Action Items described in the SER, SSAR § 2.4 meets the requirements for hydrologic

descriptions with respect to 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c). Grant Testimony at 19-26; Staff Safety Testimony at 20-34.

38. Permit Condition 3 requires that the groundwater gradient point inwards towards the radwaste building, and Permit Condition 4 requires that a radwaste facility design include features to preclude any and all accidental releases of radio-nuclides to any potential liquid pathway. SER at A-3. Based upon an inquiry from the Board (Tr. 733-34), Exelon consulted with the NRC Staff, to determine whether an additional permit condition would be appropriate for liquid radwaste in other structures, systems, and components (“SSCs”). The Staff informed Exelon that the Staff does not support any further permit condition, stating that such a condition is unnecessary given the existing permit conditions and because the analyses for the other SSCs appropriately account for accidents.

39. Geology, Seismology, and Geotechnical Engineering. Exelon performed geological and seismological investigations to assess the site geologic conditions. Subject to the Permit Condition and COL Action Items described in the SER, Exelon provided a thorough characterization of the geological and seismological characteristics of the site, and this information provides an adequate basis to conclude that no capable tectonic sources exist in the site areas that have the potential to cause near-term surface fault displacement. The proposed ESP site is acceptable from a geological and seismological standpoint and meets the requirements of 10 C.F.R. § 100.23. SER at 2-200, 2-276; *see also* Grant Testimony at 27-30; Staff Safety Testimony at 35-49.

40. The SSAR addresses the inherent uncertainties in the determination of the Safe Shutdown Earthquake (SSE) response spectrum through the use of a probabilistic seismic

hazards analysis (PSHA). The SSAR follows the guidance of Regulatory Guide 1.165 “Identification and Characterizations of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion,” with one exception. SER at 2-273. Instead of using a reference hazard probability of median 1E-5/year to determine the SSE, the SSAR uses a performance-based approach based on a national consensus standard, American Society of Civil Engineers (ASCE)/Structural Engineering Institute (SEI) Standard ASCE/SEI 43-05. After thorough review, the Staff concluded that the performance-based approach is an advancement over the reference probability approach recommended in Regulatory Guide 1.165. *Id.* The SSE developed using the performance-based approach adequately represents the regional and local seismic hazards and accurately includes the effects of the local ESP site subsurface properties. The proposed ESP site is acceptable from a geological and seismological standpoint and meets the requirements of 10 C.F.R. § 100.23. *Id.*; *see also* Grant Testimony at 27-29; Staff Safety Testimony at 37.⁹

41. Radiological Effluents. Subject to the COL Action Item described in the SER, the SSAR provides adequate information to provide reasonable assurance that the Applicant would control, monitor, and maintain radioactive gaseous and liquid effluents and solid waste from the ESP facility within the regulatory limits in 10 C.F.R. Part 20 and maintain them at ALARA levels in accordance with the effluent design objectives set forth in Appendix I to 10 C.F.R. Part 50. SER at 11-3; *see also* Grant Testimony at 31-32; Staff Safety Testimony at 51-52.

42. Thermal Discharges. The normal heat sink (NHS) provides cooling water for condensing turbine exhaust steam and cooling turbine auxiliaries in a light water reactor, helium cooling in a gas-cooled reactor plant, and cooling for other non-safety components during normal

⁹ During the hearing, the Board inquired about the use of a beta of 0.4, which describes the variability in the fragility of SSCs. Dr. Robert Kennedy explained that the 0.4 value was selected in order to be conservative and achieve the goals established in ASCE/SEI 43-05. Tr. at 631-34.

operation. The normal heat sink is likely to be able to perform its function consistent with the maximum thermal discharge assumed in the PPE, and the consequences of the normal heat sink operation on the ultimate heat sink (UHS) are acceptable and should not lead to frequent plant shutdown or frequent use of the UHS. SER at 2-175. Some of the possible reactor technology designs considered for the PPE will require safety-related cooling water systems.¹⁰ For these designs, the UHS will provide safety-related cooling water to various reactor plant cooling water systems and components that are used for accident mitigation and safe shutdown. Based upon this information, the SSAR meets the requirements of 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c). SER at 2-175; *see also* Grant Testimony at 32-33; Staff Safety Testimony at 34.

43. Radiological Consequences of Accidents. Based on the site-specific χ/Q values and PPE source term values, the SSAR evaluates a representative set of design bases accidents selected to demonstrate site suitability. The proposed distances to the EAB and the LPZ outer boundary of the proposed ESP site, in conjunction with the fission product release rates to the environment provided by the PPE values, are adequate to provide reasonable assurance that the radiological consequences of the design bases accidents will be within the dose consequence evaluation factors set forth in 10 C.F.R. § 50.34(a)(1) for the ESP site. SER at 15-9. The proposed ESP site is suitable for power reactors with source term characteristics bounded by those of the ABWR and AP1000 without undue risk to the health and safety of the public. Therefore, the SSAR complies with the requirements of 10 C.F.R. § 52.17 and 10 C.F.R. Part 100. *Id.* at 15-10; *see also* Grant testimony at 33-35; Staff Safety Testimony at 59-63.

44. The Applicant identified the bounding accident dose consequences for the reactor designs used in the development of the PPE. As described in Table 3.3-2 of the SSAR, while

¹⁰ The NHS is not considered to be a safety-related system (as defined in 10 C.F.R. § 50.2) because the Applicant has taken no credit for the cooling function of the NHS in its analysis of radiological consequences of accidents. Tr. at 639-40.

many of the source terms for this analysis were derived from ABWR and AP1000 data, other designs were also referenced. Tr. at 647-48. The Applicant's dose consequence analysis, as confirmed by the Staff, is generally expected to bound the design basis accidents for the reactors considered in the development of the PPE. *Id.* at 645-56, 664-65; *see also* SSAR at 3.3-1.

45. Security. The SSAR provides information on the site characteristics pertaining to development of security plans for reactors that might be constructed and operated on the site. The Staff examined pedestrian, vehicle, and water approaches, including existing culverts, nearby railroad lines, nearby hazardous materials facilities, nearby pipelines, and other transportation routes and terrain features. SER at 13-82. Subject to the COL Action Item described in the SER, (1) the Exelon ESP facility owner-controlled area is sufficiently large to provide adequate distances between vital areas and the probable location of a security boundary; (2) the owner controlled area is also large enough to meet the 360-foot distance criterion from vital equipment to the protected area fence, as specified in Regulatory Guide 4.7, Rev. 2, "General Site Suitability Criteria for Nuclear Power Stations;" (3) Exelon has a security program in place for the existing unit and there are no identified impediments to the eventual development of an adequate security plan for the ESP facility; and (4) there is sufficient distance available to satisfy the criteria of 10 C.F.R. § 73.55 and the revised design basis threat. *See id.* at 13-80; *see also* Grant Testimony at 35; Staff Safety Testimony at 57-59.

46. Emergency Plan (EP). The EP provided in the Application was structured to meet the regulatory criteria in 10 C.F.R. § 52.17(b), 10 C.F.R. § 100.21(g), NUREG-0654/FEMA-REP-1, Rev. 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (1980), and NUREG-0654/FEMA-REP-1, Rev. 1, Supplement 2, "Criteria for Emergency Planning in an Early Site

Permit Application” (1996). The Staff relied on this regulatory criteria and guidance in its review of the EP. Grant Testimony at 6-8; Staff Safety Testimony at 53.

47. As required under 10 C.F.R. § 52.17(b)(1), the EP provides sufficient information to demonstrate that no physical characteristics unique to the proposed ESP site could pose a significant impediment to the development of emergency plans. SER at 13-14. As required under 10 C.F.R. § 52.17(b)(3), the EP also provides an acceptable description of contacts and arrangements made with Federal, State, and Local government agencies with emergency response planning responsibilities. *Id.* at 13-17.

48. As permitted by 10 C.F.R. § 52.17(b)(2), the Application described fourteen major features of the EP. During the Staff’s review of a COL applicant’s emergency plan, the applicant will receive full credit for thirteen of those major features that were reviewed and approved by the NRC Staff. These major features for emergency planning are adequately addressed and consistent with NRC guidance and regulatory requirements. *See* SER at 13-17 to -79. A COL applicant will be required to submit a complete and integrated emergency plan,¹¹ which the NRC Staff will review to ensure compliance with the requirements in 10 C.F.R. § 50.47 and 10 C.F.R. Part 50, Appendix E.

49. While the Applicant and Staff did not directly address specific lessons learned following Hurricane Katrina as they relate to emergency planning at the Clinton site, there is no requirement to do so under the major features option chosen by the Applicant, and any relevant issues would be addressed during the review of the complete and integrated emergency plan at the COL stage. Further, significant differences exist between potential emergencies at the Clinton ESP site and the type of disaster represented by Hurricane Katrina, where the evacuation

¹¹ As permitted by 10 C.F.R. § 52.79(d)(1), the COL emergency plan may incorporate by reference the EP major features approved for this ESP.

and communications infrastructure were directly affected by the disaster¹² and could not be relied upon. For example, Exelon has an emergency operations and communications system with multiple redundancies and satellite communications capability to reduce the potential for the type of communications infrastructure breakdown that took place following Hurricane Katrina. *See* Tr. at 611-14. Additionally, in the area around the ESP site, there are provisions to provide state backup support for local emergency responders. *See id.* at 612-14.

50. Compliance with NRC Regulations. Exelon presented testimony which systematically demonstrated that the Application satisfies each of the applicable requirements in the Commission's regulations. The primary regulation governing the content of the SSAR is 10 C.F.R. § 52.17(a)(1). The SSAR complies with each of the requirements in that section. *See* Grant Testimony at 36-37. The SSAR also conforms to the non-seismic site criteria of 10 C.F.R. § 100.21, which address the "factors to be considered" in 10 C.F.R. § 100.20. Therefore, by conforming to § 100.21, the SSAR also conforms to § 100.20. Finally, the SSAR conforms to the geologic and seismic siting criteria in 10 C.F.R. § 100.23. *See id.* at 36-38.

51. The issuance of an ESP will not be inimical to the common defense and security or to the health and safety of the public. The site is within the jurisdiction of the United States. The ESP does not authorize any safety-related construction activities to be conducted on the site. All of the Applicant's and its parent company's directors and principal officers are citizens of the United States, and the Applicant is not owned, dominated or controlled by any alien, foreign corporation, or a foreign government. As described in paragraph 50 above, the SSAR complies

¹² Emergency plans do not need to consider severe natural phenomena (*e.g.*, seismic events) in conjunction with a nuclear accident, absent unique circumstances that would raise the normally low probability of such a simultaneous occurrence. *See Pacific Gas & Electric* (Diablo Canyon Nuclear Plant, Units 1 and 2), CLI-84-12, 20 NRC 249, 252 (1984), *aff'd sub nom. Deukmejian v. NRC*, 751 F.2d 1287 (D.C. Cir. 1984), *aff'd en banc sub nom. San Luis Obispo Mothers for Peace v. NRC*, 789 F.2d 26, 38 (D.C. Cir. 1986), *cert. denied*, 479 U.S. 923 (1986).

with the applicable requirements in 10 C.F.R. § 52.17(a) and 10 C.F.R. Part 100 (including the applicable criteria on radiological doses to the public). As described in paragraph 45, above, there is sufficient standoff distance between vital areas and the probable location of a security boundary. As described in paragraphs 46-49 above, the Emergency Plan information complies with the requirements in 10 C.F.R. § 52.17(b). The Staff's evaluation and independent review of the SSAR and Emergency Planning portions of the ESP application concluded that, taking into consideration the site criteria contained in 10 C.F.R. Part 100, a reactor(s) with the proposed characteristics can be constructed and operated without undue risk to the public.

52. Taking into consideration the site criteria contained in 10 C.F.R. Part 100, a reactor, or reactors having characteristics that fall within parameters for the site, can be constructed and operated without undue risk to the health and safety of the public. As discussed in paragraph 50 above, the Exelon ESP site characteristics comply with the requirements of 10 C.F.R. § 52.17 and 10 C.F.R. Part 100. Further, taking into consideration the site criteria contained in 10 C.F.R. Part 100, reactors having characteristics that fall within the parameters for the site, and which meet the terms and conditions proposed by the Staff in the SER, can be constructed and operated without undue risk to the health and safety of the public.

53. For the foregoing reasons, the safety review conducted by the NRC Staff has been adequate; the SSAR and SER contain sufficient information to support the Safety Findings and issuance of the ESP; the Clinton ESP site is a suitable location for a nuclear station of the general size and type bounded by the PPE; and the ESP should be issued subject to the terms and conditions specified in the SER and in this decision.

V. FINDINGS OF FACT ON ENVIRONMENTAL ISSUES

54. Regulatory Criteria. Exelon's ER and Site Redress Plan were prepared in accordance with the applicable regulatory criteria in 10 C.F.R. Part 51, 10 C.F.R. Part 52, and NUREG-1555, "Standard Review Plans for Environmental Reviews of Nuclear Power Plants." Cerafici Testimony at 5-6.

55. Staff Review Process. Upon acceptance of the application for docketing, the NRC Staff began the environmental review process described in 10 C.F.R. Part 51 by publishing in the *Federal Register* a Notice of Intent to prepare an EIS and conduct scoping. 68 Fed. Reg. 66,130 (Nov. 25, 2003). The Staff held a public scoping meeting in Clinton, Illinois on December 18, 2003, and visited the site in March 2004. EIS at 10-2. The Staff then evaluated the potential environmental impacts of constructing and operating a new nuclear unit at the Exelon ESP site. *Id.* During the course of preparing the EIS, the Staff reviewed the ER, consulted with Federal, State, Tribal, and local agencies, and followed the guidance set forth in RS-002 to conduct an independent review of the issues. In addition, the NRC considered the public comments related to the environmental review received during the scoping process. These comments are in Appendix D of the EIS. Cerafici Testimony at 7-8; *see also* Staff Environmental Testimony at 1-3.

56. Impact Significance Levels. Based upon 10 C.F.R. Part 51, Appendix B, and the practice the Staff uses in NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (1996) and supplemental license renewal EISs, Exelon and the Staff evaluated environmental issues using the three-level standard of significance – SMALL, MODERATE, or LARGE. EIS at 10-3. The footnote to Table B-1 of 10 C.F.R. Part 51, Subpart A, Appendix B, provides the following definitions of the three significance levels: SMALL –

Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource; MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource; LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource. Cerafici Testimony at 8.

57. Affected Environment. Chapters 2 of the ER and the EIS describe the site and affected environment, including the site location, land use, demography, meteorology and air quality, geology, radiological environment, water, ecology, socioeconomics, historic and cultural resources, and environmental justice. *Id.* at 10-13; Staff Environmental Testimony at 9-12.

58. Land use within the vicinity and region is primarily agricultural, with the exceptions of some recreational areas in the vicinity and the regional population centers of Decatur, Springfield, Bloomington-Normal, and Champaign-Urbana. *See* ER at 2.2-1, 2.2-4. The site meteorological monitoring program provides an acceptable basis for atmospheric dispersion estimates under 10 C.F.R. Part 50, Appendix I. *See* EIS at 2-13 to -19. Before a new nuclear unit could begin to operate, Exelon would need to obtain a National Pollutant Discharge Elimination System permit from the Illinois Environmental Protection Agency (IEPA). *Id.* at 2-24 to -25. The Staff prepared a biological assessment for threatened and endangered species identified by the U.S. Fish and Wildlife Service, and concluded that no critical habitats are located on site, and no threatened or endangered plant or aquatic species are known to occur in the vicinity of the site or on anticipated transmission rights-of-way. *See id.* at 2-31 to -39. Findings on population and demography are discussed in paragraphs 30-31, above. The Staff consulted on the proposed action with the Illinois State Historic Preservation Agency (IHPA)

and affected Native American tribes. *Id.* at 2-69. No cultural resources were found on site, but the IHPA may require cultural resource studies prior to construction. *Id.* at 2-70.

59. Site Layout and PPE. Chapters 3 of the ER and the EIS provide information regarding the site layout and PPE, including information on the cooling system and power transmission system. Cerafici Testimony at 14-15; Staff Environmental Testimony at 13-16.

60. As discussed in paragraph 26 above, given the absence of a specific plant design, the Applicant developed a set of bounding PPE values for the ESP application. *See* EIS at 3-2 to -12. At the CP or COL stage, the Applicant will need to verify that the actual parameters for the selected reactor are bounded by the PPE. *See* 10 C.F.R. § 52.79(a)(1). If the actual design characteristics are not bounded by the PPE, Exelon and the Staff will need to evaluate whether the environmental impacts of construction and operation remain bounded by the impacts analyzed in the ESP application, and if not Exelon may need to request a variance from the ESP in accordance with 10 C.F.R. § 52.39(b). Mundy Testimony at 8.

61. The ESP facility will include a cooling tower system for normal cooling, and a second mechanical draft cooling tower system as the UHS, as appropriate. Cerafici Testimony at 14. Cooling tower blowdown and other discharges would be discharged through a flume near the CPS discharge. EIS at 3-9 to -10. Radioactive and nonradioactive plant effluents will be discharged in such a manner as to comply with applicable Federal and State requirements. *See id.* at 3-10 to -12.

62. The existing power transmission system has excess capacity to handle some, but not all of the output of a new facility bounded by the PPE. Thus, widening of existing rights-of-way may be required. *See id.* at 3-12 to -13. This may result in some additional environmental impacts. Cerafici Testimony at 15.

63. In its evaluation of site geology, the Staff concluded that fill material will need to be imported onsite during construction because there is glacial material beneath the site that is geotechnically unsuitable for use as a fill material. EIS at 2-19. Some of the excavated soil may be used for backfill, but the majority of the soil will be deposited in spoil and excavation areas that will be identified during the design. These spoil areas will be maintained during construction in order to minimize water and wind erosion, such as grading, revegetation and barriers. ER at 4.2-5; Tr. 801-3.

64. Construction Impacts. Chapters 4 of the ER and the EIS evaluate the environmental impacts of construction at the proposed site, including impacts on land use, air quality, water-related, ecological, socioeconomic, historic and cultural resources, environmental justice, and nonradiological and radiological health impacts. This analysis included mitigation measures to reduce adverse impacts. Cerafici Testimony at 15-20; Staff Environmental Testimony at 16-25.

65. Most adverse construction impacts are expected to be SMALL, with two exceptions: (1) if new transmission line rights-of-way are required, habitat and terrestrial ecosystem impacts could range from SMALL to LARGE, EIS at 4-12 to -16, Cerafici Testimony at 17; (2) potential MODERATE impacts on roads and housing in DeWitt county, but these impacts could be mitigated and are balanced by expected significant beneficial tax and economic impacts, *see* EIS at 4-20 to -36, 4-45, Cerafici Testimony at 18.

66. While the ESP facility site is not particularly susceptible to erosion, some erosion during construction is possible, along with resulting sedimentation in Clinton Lake. Compliance with regulations, permits, and good construction practices will minimize sedimentation and erosion (including erosion of fill and excavation material), and the resulting impacts on water

quality, aquatic species and habitat, and aesthetics are expected to be SMALL. *See* EIS at 4-16 to -17, 4-24; Tr. at 800-02; ER at 2.3-7.

67. The Staff imposed one Permit Condition to ensure construction related impacts are SMALL, localized, and temporary: prior to conducting any activity pursuant to the ESP, Exelon must submit a copy of its CWA 401 certification issued by the IEPA, or its determination that no 401 certification is required. EIS at 4-8.

68. The Staff evaluated the impacts of construction on transportation and housing in the vicinity as SMALL to MODERATE, based in part on the Applicant's interviews and historical information collected regarding the construction of the original CPS. This review revealed no significant adverse impacts on transportation and housing during CPS construction. Because the expected peak ESP facility construction workforce is expected to be roughly one-third of the peak CPS construction workforce of approximately 9000, the Applicant and Staff concluded that the impacts in these areas were unlikely to be LARGE. Further, based on the existing number of construction workers in the region, it is unlikely that an influx of workers into the region would lead to significant adverse impacts. Tr. at 799-800; ER at 4.4-2 to -5; *see also* EIS at 4-33.¹³

69. Station Operation Impacts. Chapters 5 of the ER and the EIS evaluate station operation impacts at the proposed site, including impacts on land use, air quality, water-related, ecological, socioeconomic, historic and cultural resources, environmental justice, and nonradiological and radiological health impacts, including an analysis of postulated accidents based on the PPE. This analysis included mitigation measures to reduce adverse impacts. Cerafici Testimony at 20-26; Staff Environmental Testimony at 25-40.

¹³ As requested by the Board in its Order of November 17, 2006, Exelon will be providing a separate brief that will demonstrate that the analyses of Exelon and the NRC Staff have accounted for an influx of workers (including skilled workers) into the region to support construction.

70. Most adverse operational impacts are expected to be SMALL, with five exceptions: (1) new cooling towers would reduce the volume of water in Clinton Lake, and could lead to MODERATE water use impacts in below-average precipitation conditions – Exelon would need to coordinate with the IEPA in such cases to implement mitigation measures; (2) depending on the intake structure design and permit requirements that would be set by the IEPA, cooling water intake system impacts could be MODERATE if the best available technology is not utilized; (3) the impact to available aquatic habitat could be MODERATE in low-water years; (4) potential MODERATE aesthetic and recreational impacts due to lowered lake water level during severe drought; and (5) potential MODERATE housing impacts in DeWitt County, but these impacts could be mitigated and also are balanced by expected significant beneficial tax and economic impacts. EIS at 5-8, 5-23 to -24, 5-27 to -42, Cerafici Testimony at 21-23, 26.

71. The Applicant's analysis of the radiological health impacts of operation included a severe accident analysis that focused on internally initiated events, for which quantifiable data is readily available. The limited available detailed studies of externally initiated events show that the core damage frequency from externally initiated events is comparable in magnitude to that from internally initiated events. Based on NUREG-1437, Exelon conservatively represented the core damage frequency of externally initiated events by multiplying the frequency of internally initiated events by a factor of two or three. Tr. at 776-78.

72. Fuel Cycle, Transportation, and Decommissioning. The EIS evaluates fuel cycle impacts as given in Table S-3 of 10 C.F.R. § 51.51(b), and concludes that the impacts for light-water reactors (LWRs) would be SMALL, and mitigation would not be warranted. EIS at 6-15; Cerafici Testimony at 26-27. The analysis in the EIS accounts for the environmental effects of transportation of unirradiated fuel, spent fuel, and wastes under normal operating and accident

conditions as contained in Table S-4 to 10 C.F.R. Part 51, as adjusted to account for the difference in reactor output compared to the reference reactor, and concludes that the environmental impacts of transportation of fuel and radioactive wastes to and from advanced light-water reactor designs would be SMALL. EIS at 6-42; Cerafici Testimony at 27.

73. Fuel cycle and transportation impacts for the proposed gas-cooled reactors would also be expected to be SMALL, because the analysis of the impacts of LWRs is expected to bound that of gas-cooled reactors. However, if the CP or COL applicant references a gas-cooled reactor design, additional reviews would be required at the CP or COL stage to confirm that LWRs are bounding. *See* EIS at 6-21, 6-42; Cerafici Testimony at 26-27.

74. At the ESP stage, an applicant need not provide information regarding the impacts of decommissioning. The Staff, however, reviewed NUREG-0586, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1, Regarding the Decommissioning of Nuclear Power Reactors" (2002), and expects that the impacts of decommissioning will be SMALL. This issue will be resolved in the COL application proceeding. EIS at 6-43; Cerafici Testimony at 27-28; Staff Environmental Testimony at 47-48.

75. Cumulative Impacts. Chapter 7 of the EIS evaluates cumulative impacts. The potential cumulative impacts of constructing and operating one or more nuclear power units at the ESP site include impacts on land use, air quality, water use and quality, terrestrial and aquatic ecosystems, socioeconomics, historic and cultural resources, environmental justice, nonradiological health, radiological impacts of normal operation, fuel cycle, transportation, and decommissioning. Most impacts are expected to be SMALL, with the following exceptions where there is the potential for MODERATE impacts: (1) cumulative water use and quality impacts in dry years; (2) water intake structure impacts, if best available technology is not used;

(3) aquatic environment impacts following dry years; (4) cumulative impacts of thermal discharge; (5) physical impacts to roads due to heavy truck traffic; and (6) aesthetic and recreational impacts in severe drought. In these cases, mitigation measures may be warranted. EIS at 7-11 to -12; *see also* Cerafici Testimony at 28; Staff Environmental Testimony at 48-53.

76. Alternatives. The ER and EIS evaluate the environmental impacts of alternatives, including the no-action alternative, energy alternatives, design alternatives, and alternative sites. While the no-action alternative would avoid all of the environmental impacts associated with the ESP, it would accomplish none of the benefits intended by the ESP process, such as early resolution of siting issues prior to large investments resources and early resolution of environmental issues. EIS at 8-2; Cerafici Testimony at 29; Staff Environmental Testimony at 54. Should the ESP be denied, all of Exelon's remaining options to satisfy its objectives would have associated environmental impacts. EIS at 9-9 to -10; Cerafici Testimony at 29-30. Regarding energy alternatives, during the contested portion of this proceeding this Board determined that conservation is not a reasonable alternative to baseload generation, and that combinations of wind/solar power with fossil fueled generators are not environmentally preferable to a new nuclear plant.¹⁴ Similarly, none of the economically viable alternatives is environmentally preferable to a new nuclear unit at the ESP site. EIS at 8-24; Cerafici Testimony at 30; Staff Environmental Testimony at 54-65. With the exception of the analysis of wet cooling towers (both mechanical and natural draft) in the EIS, system design alternatives will need to be reviewed further at the COL stage. *See* EIS at 8-25, -26; Cerafici Testimony at 30; Staff Environmental Testimony at 65-66.

¹⁴ *See* CLI-05-29, 62 NRC at 808; LBP-04-17, 60 NRC at 245-46. Energy efficiency measures also pertain to the "need for power," which is deferred to the COL stage.

77. Exelon selected the state of Illinois as the Region of Interest for the identification of alternative sites in part because of the uniform regulatory structure for power transmission within the state and the availability of transmission capabilities in the state, ER at 9.3-2, and this region is sufficiently large to permit the analysis of a reasonable range of alternative sites. Staff Environmental Testimony at 67. Within the Region of Interest, Exelon and the Staff evaluated generic greenfield and brownfield sites. Cerafici Testimony at 30; Staff Environmental Testimony at 68-69. Greenfield or former industrial sites were considered not environmentally preferable to the proposed site, because the impact on any non-nuclear site would be greater than that on any site with an existing facility. Cerafici Testimony at 30. Additionally, Exelon and the Staff evaluated in more detail co-locating a new nuclear plant at each of the six existing nuclear power plant sites in Illinois. None of the six alternative sites analyzed by Exelon and the Staff were obviously superior to the Clinton site, either because they lacked sufficient land for a new plant or are not environmentally preferable to the proposed ESP facility.¹⁵ EIS at 9-9; Cerafici Testimony at 31-32; Staff Environmental Testimony at 90.

78. Other Factors. NEPA also requires the consideration of a number of other factors, including unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and the relationship between short-term uses and long-term productivity of the human environment. The construction and operation of a new nuclear power facility would result in some unavoidable impacts, including disturbed land, decrease in lake level during dry periods, increased use of local services, and radiation dose from construction and operation. Cerafici Testimony at 32. Most of these impacts would be SMALL, but the impact of the cooling system on water in low water years would be MODERATE, but could be mitigated by the State of

¹⁵ The “obviously superior” standard is specified in 10 C.F.R. § 52.17(a)(2) and § 52.18; and *Public Serv. Co. of N.H.* (Seabrook Station, Units 1 and 2), CLI-77-8, 5 NRC 503 (1977).

Illinois through its authority to regulate water use and quality. *See* EIS Tables 10-1 and 10-2; *id.* at 10-4 to -6. The estimated use of construction materials that will take place during the CP or COL stage, and the uranium ore commitment is expected to be of small consequence in comparison to the availability of such resources. Cerafici Testimony at 32. While activities authorized by the ESP are unlikely to adversely affect the long-term productivity of the environment, a full assessment of the impact of construction and operation of the proposed facility on long-term productivity will be performed at the CP or COL stage. EIS at 10-9, 10-11.

79. Site Redress Plan. Exelon's Site Redress Plan is sufficient to return the Exelon ESP site to an environmentally stable and aesthetically acceptable condition suitable for non-nuclear uses. Cerafici Testimony at 4. The pre-construction activities allowed pursuant to 10 C.F.R. § 50.10(e)(1)(2006) and as described by Exelon are bounded by the environmental impacts for construction of the entire facility as analyzed in preceding sections of the EIS, and the potential site-preparation activities described in the Site Redress Plan would not result in any significant adverse environmental impacts that could not be redressed. EIS at 4-48.

80. Compliance With Section 102(2)(A) of NEPA. NEPA Section 102(2)(A) requires federal agencies to "utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment." 42 U.S.C. § 4332(2)(A). The NRC Staff utilized a systematic, interdisciplinary approach integrating their use of the natural and social sciences in their decision-making regarding environmental impacts as required under NEPA. The ER strictly followed the format in NUREG-1555 (NRC's Environmental Standard Review Plan), and the NRC's EIS closely parallels NUREG-1555, thereby ensuring both a systematic and interdisciplinary approach. Cerafici Testimony at 33.

81. Compliance with NEPA Section 102(2)(C). Section 102(2)(C) of NEPA requires a Federal agency to address in its environmental impact statement: (1) the environmental impact of the proposed action; (2) any adverse impacts which cannot be avoided should the proposal be implemented; (3) alternatives to the proposed action; (4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and (5) any irreversible and irretrievable commitment of resources which would be involved in the proposed action should it be implemented. *See* 42 U.S.C. § 4332(2)(C). The EIS addresses each of these five requirements. *See* Cerafici Testimony at 34. Section 102(2)(C) also requires that an agency "consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved." 42 U.S.C. § 4332(2)(C). The Staff has complied with this requirement. *See* EIS Appendix B; Cerafici Testimony at 35.

82. Compliance with NEPA Section 102(2)(E). Section 102(2)(E) of NEPA requires a Federal agency to "study, develop, and describe appropriate alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(2)(E). The EIS considers the no action alternative, energy alternatives, plant design alternatives, and alternative sites, *see* EIS Chapters 8 and 9, and satisfies the requirements under NEPA with respect to consideration of alternatives. Cerafici Testimony at 35.

83. Compliance with Subpart A to Part 51. Subpart A to Part 51 contains a number of procedural and substantive requirements related to an EIS for a construction permit (and by implication, for an ESP).¹⁶ The Applicant's witness presented testimony which systematically

¹⁶ 10 C.F.R. § 51.71(d) and (e) require in general that draft EISs include an analysis of the benefits of the proposed action, and a cost-benefit analysis. This general requirement is superseded by the more specific

addressed each of these requirements and demonstrated how they have been satisfied. *See* Cerafici Testimony at 36-37.¹⁷

84. Summary. For the foregoing reasons, the NEPA review conducted by the NRC Staff has been adequate; the ER and EIS contain sufficient information to support the Environmental Findings and issuance of the ESP; the Clinton ESP site is a suitable location for a nuclear station of the general size and type bounded by the PPE; and the ESP should be issued subject to the terms and conditions specified in the EIS and in this decision.

VI. CONCLUSIONS OF LAW

Based upon a review of the entire record in this proceeding and the foregoing discussion and findings of fact, the Board concludes as follows:

Issues Pursuant to the Atomic Energy Act of 1954, as Amended

- a. The issuance of an ESP will not be inimical to the common defense and security or to the health and safety of the public. (Safety Issue 1)
- b. Taking into consideration the site criteria contained in 10 C.F.R. Part 100, a reactor, or reactors having characteristics that fall within parameters for the site, can be constructed and operated without undue risk to the health and safety of the public. (Safety Issue 2)

Issues Pursuant to National Environmental Policy Act of 1969 (NEPA)

- a. The requirements of NEPA sections 102(2)(A), (C), and (E) and 10 C.F.R. Part 51, Subpart A have been complied with in this proceeding. (Environmental Issue 1)

requirement in 10 CFR § 52.18, which permits analysis of the benefits to be deferred from the ESP stage to the COL stage.

¹⁷ The NRC Staff agrees, with some clarifications. Letter dated November 15, 2006, from NRC Staff to Licensing Board.

- b. The Board has independently considered the final balance among the factors contained in the record of the proceeding, and has determined that the ESP site is suitable from an environmental standpoint for the Exelon ESP facility, and the ESP should be issued as proposed in the EIS in order to preserve the option of using the site for eventual construction and operation of the Exelon ESP facility. The need for power from the Exelon ESP facility will be determined at the COL stage, and a final cost-benefit balance will performed at that time.
- (Environmental Issue 2)
- c. All reasonable alternatives have been considered,¹⁸ the ESP does not need any additional conditions to protect environmental values, and the ESP should be issued as recommended in the EIS. (Environmental Issue 3)

VII. ORDER

WHEREFORE, IT IS ORDERED, in accordance with the Atomic Energy Act of 1954, as amended, and the rules and regulations of the Commission, that the Director of Nuclear Reactor Regulation is authorized to issue to Exelon Generation Company, LLC, an early site permit for the Clinton ESP site for a duration of twenty (20) years, consistent with the terms of this Initial Decision.

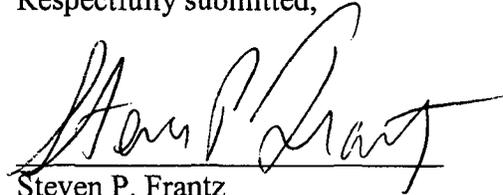
IT IS FURTHER ORDERED, in accordance with 10 C.F.R. § 2.340(f)(2), that the effectiveness of this initial decision is stayed pending a Commission decision on whether a stay is warranted.

IT IS FURTHER ORDERED, in accordance with 10 C.F.R. § 2.340(f) and § 2.1210, that this initial decision shall constitute the final decision of the Commission upon issuance of a

¹⁸ Design alternatives will be considered at the COL stage.

decision by the Commission not to stay the effectiveness this initial decision. Pursuant to 10 C.F.R. § 2.340(c), the Director of Nuclear Reactor Regulation shall issue the early site permit to Exelon Generation Company, LLC, within ten (10) days from the date of effectiveness of this initial decision.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Steven P. Frantz", written over a horizontal line.

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ATTACHMENT A

PROPOSED HEARING TRANSCRIPT CORRECTIONS

1. Transcription Errors

Page 544, l. 10-11: “~~and the~~ in response”

Page 544, l. 24: “Was Is Revision”

Page 546, l. 3: “would be ~~unable~~ able”

Page 550, l. 8: “bounding ~~designed~~ design parameters”

Page 559, l. 23: “of ~~manufacturer~~ manufactured components of the facility and”

Page 560, l. 20: “And finally construction of other ~~en~~”

Page 564, l. 4: “including severe accident mitigation, ~~design~~”

Page 576, l. 21: “Has Exelon looked at what ~~energy~~ Entergy did”

Page 587, l. 22: “standards of NUREG-0654 ~~sub~~ sup. 2 and in particular”

Page 590, l. 8: “Section ~~213~~ 2.1.3 of the SER provides other”

Page 590, l. 10: “~~little~~ low population zone”

Page 607, l. 24: “meteorology. Section ~~231~~ 2.3.1 provides information”

Page 611, l. 10-11: “in the ~~corporate~~ corporation”

Page 611, l. 20-23: Our systems ~~during our break would exercise the shear we integrated to~~ for the ~~break injection pathway~~ would be exercised during the full participation exercise to demonstrate them during the exercise”

Page 618, l. 24: “Subsection ~~2.42~~ 2.4.2 provides information”

Page 621, l. 9: “information regarding the ~~probably~~ probable maximum”

Page 626, l. 17: “The PSHA, the ~~Probablisite~~ Probabilistic Seismic”

Page 627, l. 15: “standard establishes a ~~uniformed~~ uniform”

Page 630, l. 24: “THE WITNESS: Robert ~~B.~~ P. Kennedy.”

Page 631, l. 2: “ROBERT ~~B.~~ P. KENNEDY”

Page 632, l. 15: “unconservative but not ~~give~~ in risk space by more”

Page 637, l. 15: “Subsections ~~3.11~~ 3.1.1 and ~~3.12~~ 3.1.2 provide information”

Page 638, l. 2: “Section ~~3.13~~ 3.1.3 provides information on”

Page 639, l. 6: “assumed in the ~~PDE~~ PPE, and the SER states that the”

Page 645, l. 12: “back to ~~50-34~~ 50.34, and these require evaluation of”

Page 656, l. 16: “~~3.4.16~~ 3.4.1.6 provides some information on the site”

Page 659, l. 14-15: “~~NR~~ owner controlled boundary”

Page 661, l. 8-9: “design-basis ~~access~~ accidents”

Page 665, l. 7: “rotor for ~~PWA~~ PWR control ~~route~~ rod ejection, control”

Page 665, l. 8: “~~route dropbacks to the~~ rod drop accidents, steam generator, tube”

Page 738, l. 9: “BY MR. ~~FRANTZ~~ BESSETTE”

Page 773, l. 6: “an ~~expert~~ expert on severe accidents who is available at”

Page 786, l. 9: “As a result, we looked at six other

2. Substantive Correction

Page 618, l. 14-18: “The ESP Facility ultimate heat sink pump ~~for the Clinton Power Station~~ would supply the makeup water ~~then~~ for ~~this~~ the ESP water cooled ultimate heat sink for that 30 day time frame that is identified in the guidance documents.”

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

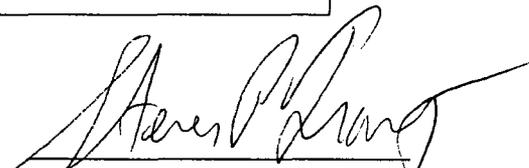
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

| | | |
|--|---|-------------------------|
| In the Matter of |) | Docket No. 52-007 |
| EXELON GENERATION COMPANY, LLC |) | ASLBP No. 04-821-01-ESP |
| (Early Site Permit for the Clinton ESP Site) |) | November 28, 2006 |

CERTIFICATE OF SERVICE

I hereby certify that copies of Exelon Generation Company, LLC's Proposed Findings of Fact and Conclusions of Law in the above captioned proceeding have been served as shown below by deposit in the United States mail, first class, this 28th day of November, 2006. Additional service has also been made this same day by electronic mail as shown below.

| | |
|---|---|
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