

November 30, 2006

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )  
 )  
EXELON GENERATION COMPANY, LLC. ) Docket No. 52-007-ESP  
 )  
(Early Site Permit for Clinton ESP Site) )

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NRC STAFF's PROPOSED FINDINGS OF FACT AND  
CONCLUSIONS OF LAW IN THE MANDATORY HEARING

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INTRODUCTION

These findings and rulings address all issues with respect to this uncontested proceeding on the application filed by Exelon Generation Company, LLC. ("Exelon," "EGC," or "the Applicant") for an early site permit ("ESP"), under Title 10 of the *Code of Federal Regulations* (10 C.F.R.) Part 52, "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants." For the reasons stated below, the Board hereby makes the following findings of fact and conclusions of law.

PROCEDURAL BACKGROUND

On September 25, 2003, Exelon Generation Company, LLC (the Applicant) filed an ESP application with the U.S. Nuclear Regulatory Commission ("NRC"); this application includes the site safety analysis report ("SSAR"), which describes the safety assessment of the site, and the environmental report ("ER"), which describes the environmental assessment of the site. Supplements to the SSAR were filed on November 23, 2005, and January 10, March 3 and April 14, 2006. A public scoping meeting was held on December 18, 2003, to obtain public input on the scope of the environmental review. Environmental Impact Statement for an Early Site Permit (ESP) at the Exelon ESP Site ("FEIS") at 1-5. The U.S. Environmental Protection Agency issued a notice on March 11, 2005 (70 FR 12211) announcing the availability of the

Draft Environmental Impact Statement for an Early Site Permit at the Exelon ESP Site (“DEIS”), and a public meeting was held on April 19, 2005, to receive comments on the DEIS, which the staff of the NRC (“Staff”) considered in the development of the FEIS. FEIS at 1-5. The Staff published the FEIS (as NUREG-1815) in July 2006.

Upon receipt of the original application, the Staff reviewed the SSAR and produced a draft safety evaluation report (“DSER”), which it issued on February 10, 2005. At the time the DSER was issued, the Staff had not completed its review of seismology and geology; these issues were addressed in a supplemental DSER issued on August 26, 2005. Additionally, throughout the course of the review the Staff requested and received supplemental materials from the Applicant. The Applicant’s responses to these Staff Requests for Additional Information (“RAIs”) are addressed in the final Safety Evaluation Report (“SER”).

As part of its safety review, the Staff submitted the DSER to the Advisory Committee on Reactor Safeguards (“ACRS”) for review. SER at 18-1. The ACRS ESP subcommittee began a detailed review of the application and the DSER in February 2005, and the ACRS ESP subcommittee met with representatives from Exelon and the NRC Staff on September 7, 2005. SER at 18-1. The ACRS issued an interim letter report in September 2005, and also met with the Staff in March 2006 to discuss resolution of open items and the responses to ACRS comments on the major elements of the ESP review. SER at 18-1. In its final letter report dated March 24, 2006, the ACRS concurred with the Staff’s conclusions and concluded that the proposed site, subject to the permit conditions recommended by the Staff, can be used for nuclear power plants or modules having a total power generation rate of 2400 to 6800 MW thermal without undue risk to public health and safety. SER at 18-1. The final SER was published (as NUREG-1844) in May 2006.

## SITE CHARACTERISTICS

The EGC ESP site is located approximately 6 miles east of the city of Clinton in central Illinois, and is adjacent to an existing nuclear power reactor operated by AmerGen, a subsidiary of Exelon Generation Company. In its application, EGC seeks an ESP that would support a future application to construct and operate additional nuclear power reactors at the ESP site with a total nuclear generating capacity of up to 6800 megawatts (thermal).

## LEGAL STANDARDS AND REGULATORY GUIDANCE

The NRC standards of review for an ESP application are outlined in 10 C.F.R. § 52.18. The NRC Staff conducts its reviews of ESP applications in accordance with the guidance set forth in review standard RS-002, *Processing Applications for Early Site Permits*, which is based on the previously published NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants*, and NUREG-1555, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants* (hereafter “ESRP”).

## OVERVIEW OF KEY CONCLUSIONS TO BE REACHED BY THE BOARD

In this ESP proceeding, the Commission’s “Notice of Hearing and Opportunity to Petition for Leave to Intervene[;] Early Site Permit for the Clinton ESP Site” of December 12, 2003 (“Hearing Notice”), identified five key issues, two related to the Staff’s safety review and three to the Staff’s environmental review, to be assessed by this Board:

### **Safety Findings:**

(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; and, (2) whether, taking into consideration the site criteria contained in 10 C.F.R. Part 100, a reactor, or reactors, having characteristics that fall within the parameters for the site, can be

constructed and operated without undue risk to the health and safety of the public.

**Environmental Findings:**

(1) Determine whether the requirements of Section 102(2) (A), ©, and (E) of NEPA and Subpart A of 10 C.F.R. 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 69427 (Dec. 12, 2003).

Therefore, in accordance with the applicable agency regulations and the Commission's notice of hearing in this proceeding, the Board, after reviewing the material portions of the record, makes the following findings.

FACTUAL FINDINGS AND LEGAL CONCLUSIONS

A. Safety Related Findings

With respect to safety-related matters, the Commission's Hearing Notice directed the Board to determine "whether the application and record of the proceeding contain sufficient information, and the review of the application by the Commission's staff has been adequate to support [the safety findings] proposed to be made by the Director, Office of Nuclear Reactor Regulation[.]"<sup>1</sup> 68 Fed. Reg. at 69427. In examining the principal Exelon and Staff review

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<sup>1</sup> Thus, the Board has an obligation to determine whether the application and the record of the proceeding support the Staff's findings; but, as part of that determination, it examines whether the Staff findings – made evident in the Staff's formal review documents – demonstrate the adequacy of the Staff's review. As the Commission advised, the Board approached this task by conducting an examination of the factual and logical foundation for the Staff's conclusions regarding the sufficiency of the application.

documents in the record, the Board was directed to determine whether the record would enable it to conclude that the Staff had a reasonable basis for its stated conclusions on safety matters. The Board assumed that such a reasonable basis was present if the facts underlying a Staff determination were clear and the Staff's decision logically flowed from those facts and from appropriate regulatory guidance. The Board did not, however, undertake any independent review of, or attempt to verify, technical results presented in the Exelon application or in the Staff's review documents.

Consequently, the Board must make two findings related to safety: (1) whether the issuance of an early site permit will be inimical to the common defense and security or to the health and safety of the public; and (2) whether, taking into consideration the site criteria contained in 10 C.F.R. Part 100, a reactor, or reactors, having characteristics that fall within the parameters for the site, can be constructed and operated without undue risk to the health and safety of the public. *Id.*

The SER presents the conclusions of the Staff's review of relevant portions of the ESP application and supplemental information provided by the Applicant. The Staff reviewed three health and safety sections of the Applicant's ESP application: (1) the description of the site and nearby areas that could affect or be affected by a nuclear power plant located on the site; (2) the safety assessment of the site on which the facility would be located, including an analysis and evaluation of the major structures, systems, and components of the facility that bear significantly on the acceptability of the site; and (3) the proposed major features of an emergency plan. Specifically, the Staff evaluated the Applicant's analysis and conclusions regarding: the geography and demography of the site; nearby industrial, transportation and military facilities; site meteorology; site hydrology; site geology, seismology, and geotechnical engineering; aircraft hazards; radiological effluent release dose consequences from normal operations; emergency planning and industrial security; accident

analyses; and ESP quality assurance measures. The Staff's safety review was conducted in accordance with the NRC's guidance for the review of ESP applications. In all cases but one, seismology, the application complied with the guidance used by the Staff to evaluate ESP applications. Portions of the application dealing with seismology were not covered by the Staff's guidance because the Applicant elected to use a new method to calculate the Safe Shutdown Earthquake. The relevant testimony of Dr. Clifford Munson, the Staff's primary seismologist for the EGC ESP review, follows:

To determine the safe shutdown earthquake ground motion or SSE the applicant used ASCE standard 43-05 Entitled Seismic Design Criteria For Structures, Systems, and Components in Nuclear Facilities.

In order to thoroughly review this new approach the staff formed an advisory task group of senior geophysicists and civil engineers from the NRC offices of NRR, research, and NMSS, and took an additional six months of review time.

The task group evaluated the model and assumptions underlying the approach including a detailed derivation of the factors used to develop the SSE. The staff also focused on the adequacy of the performance goal and performed an independent confirmation of the SSE.

The staff visited the Clinton ESP site to observe the geotechnical field investigations. Once we received the ESP application, the staff reviewed the properties of the subsurface soil and rock and verified the adequacy of the field investigations and laboratory testing. The staff also confirmed the similarity between the subsurface material underlying the Clinton Power Station and ESP site.

In conclusion, the staff found that the applicant provided a thorough characterization of the regional and local geology and seismology. We found that the applicant appropriately characterized the seismic sources for the SSE. The staff concluded that ASCE standard 43-05 provides an acceptable alternative to Regulatory Guide 1.165 for determining the SSE. The ESP site is acceptable from a geological and seismological standpoint, and the applicable regulations have been met.

During the course of its safety review the Staff identified 32 COL action items,<sup>2</sup> which are compiled in SER Appendix A. The Staff used COL Action Items to ensure that particular significant design and construction issues will be tracked and considered during the COL or CP stage.<sup>3</sup> The Staff determined that COL action items do not affect its regulatory findings at the ESP stage and are more appropriately addressed at the COL stage. SER at 1-9. The Staff also identified six permit conditions, listed in SER Appendix A, which it proposed to control various safety matters; the Staff recommended that the Commission include these permit conditions in any ESP issued for the EGC ESP. SER at 1-9, 1-10. These permit conditions, as authorized by 10 C.F.R. § 52.24, would require: (1) that an agreement granting EGC an exclusive and irrevocable option to purchase, enter a long-term lease, and/or other legal right in the land required to satisfy the requirements of 10 C.F.R. Part 100 for the ESP facility, be obtained and executed before submission of a COL application for a nuclear power plant referencing the ESP; (2) that the ESP holder obtain the right to implement the site redress plan before initiating any activities authorized by 10 C.F.R. § 52.25; (3) that the hydraulic gradient will always point inwards, into the radwaste holding and storage facility, from ambient groundwater during construction and operation of the ESP facility, including the time during which recovery of groundwater occurs to near its pre-dewatering elevation; (4) that the radwaste facility design for a future reactor include features to preclude any and all accidental releases of radio-nuclides into any potential liquid pathway; (5) that a groundwater monitoring program be instituted at the ESP site to continuously monitor and verify that the central

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<sup>2</sup> A COL action item is a tool, devised by the Staff, used to highlight significant issues that the Staff identified during the ESP or design certification review. These items should be considered by the Staff during the review of a COL application.

<sup>3</sup> COL action items do not establish requirements; rather, they identify an acceptable set of information to be included in the site-specific portion of the safety analysis report submitted by a COL or CP applicant referencing an EGC ESP. SER at 1-9.



assumption for the preclusion of radioactive release to groundwater is not violated and that this monitoring system must be kept in place and in operation for the life and decommissioning of the ESP facility; (6) that the ESP holder must remove or replace or improve the soils above 60 ft below the ground surface to reduce any liquefaction potential. SER at A-2, A-3.

Based on the Staff's review, as indicated in the SER and the record of this proceeding, the Board concludes that the Staff's determinations are clear and logically flow from the facts and the appropriate regulatory guidance; the Staff, therefore, had a reasonable basis for its stated conclusions on safety matters.

The Board, as directed by the Commission, therefore makes the following findings: (1) the issuance of an ESP will not be inimical to the common defense and security or to the health and safety of the public; and, (2) a reactor, or reactors, having characteristics that fall within the parameters for the site, can be constructed and operated without undue risk to the health and safety of the public.

B. Environmental Findings

With respect to environmental matters, i.e., matters stemming from the agency's NEPA obligations, the Hearing Notice required the Board to determine "whether the review conducted by the Commission pursuant to NEPA has been adequate." *Id.*; see also 10 C.F.R. § 2.104(b)(2)(ii). The Staff's FEIS addresses (1) the results of the NRC Staff's analyses, which consider and weigh the environmental effects of the proposed action (issuance of the ESP) and of constructing and operating one or more new nuclear units at the ESP site, (2) mitigation measures for reducing or avoiding adverse effects, (3) the environmental impacts of alternatives to the proposed action, and (4) the NRC Staff's recommendation regarding the proposed action based on its environmental review. FEIS at xxviii.

Following the requirements set forth in 10 C.F.R. Part 51 and the guidance in RS-002, the NRC environmental staff (and its technical contractors from the Pacific Northwest National

Laboratory) visited the proposed EGC ESP site and alternative sites in March 2004 to gather information and to become familiar with the sites and their environs. FEIS at 1-5. During these site visits, the Staff and its contractor personnel met with the Applicant's staff, public officials, and the public. FEIS at 1-5. To help guide its assessment of the environmental impacts of a proposed action or alternative actions, the NRC established a standard for quantifying environmental impacts using the Council on Environmental Quality ("CEQ") guidance (40 C.F.R. § 1508.27). FEIS at 1-6. Using this approach, the NRC established three significance levels -- SMALL, MODERATE, or LARGE<sup>4</sup> which the Staff applied to its findings throughout the FEIS. FEIS at 1-6.

In conducting its review, the Staff evaluated environmental impacts based on the bounding parameter values Exelon submitted as part of its application; these values constitute the PPE for the EGC ESP site. A list of these values is reproduced in Appendix J to the FEIS. In any COL or CP application referencing an EGC ESP, the Staff would review the actual design selected to determine whether the design fits within these bounding parameter values.

The Staff's FEIS focused on the environmental effects of construction and operation of reactors with characteristics that fall within the plant parameter envelope ("PPE") developed by Exelon and included an evaluation of alternative sites to determine whether there is an obviously superior alternative to the proposed EGC ESP site. FEIS at 1-3. An ESP environmental report is not required to include an assessment of the benefits (for example, the need for power) (10 C.F.R. § 52.17) or a discussion of energy alternatives; these may be

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<sup>4</sup> The NRC Staff's definitions of these significance levels are as follows:  
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.

deferred to the CP or COL application. FEIS at 1-3. However, the Exelon environmental report did address energy alternatives; therefore, the FEIS included an assessment of energy alternatives, but did not evaluate the need for power. FEIS at 1-3.

#### Overall Environmental Review Findings

In reaching its ultimate findings and recommendations concerning the ESP application, the Staff provided its conclusions on a number of determinations required by NEPA. These determinations included analysis of any unavoidable adverse environmental impacts, any irreversible and irretrievable commitments of resources, the relationship between short-term uses and long-term productivity of the human environment, and the cumulative impacts of the proposed action.

With respect to unavoidable adverse environmental impacts (NEPA section 102(2)(C)(ii)), the Staff concluded that there will be no unavoidable adverse environmental impacts associated with the granting of the ESP, with the exception of impacts associated with limited site-preparation and preliminary construction activities (defined in 10 C.F.R. § 50.10(e)(1); *see also* FEIS at 10-4) and identified in the site redress plan (as provided by 10 C.F.R. § 52.17© and 10 C.F.R. § 52.25). FEIS at 10-4. The Staff further found reasonable assurance that redress carried out under the Applicant's plan will achieve an environmentally stable and aesthetically acceptable site suitable for whatever non-nuclear use may conform with local zoning laws; therefore, it concluded that the potential site preparation and preliminary construction activities described in Exelon's site redress plan would not result in any significant adverse impacts that could not be redressed. FEIS at 10-5.

The Staff found that although impacts associated with the site preparation and preliminary construction activities are bounded by the construction activities, there are unavoidable adverse environmental impacts associated with the construction and operation of a new nuclear unit at the proposed EGC ESP site. FEIS at 10-4. Therefore, although final

assessment of adverse environmental impacts from construction and operation at the EGC ESP site would be performed at the CP or COL stage for issues that were not resolved in the ESP review,<sup>5</sup> the Staff summarized the impacts described in Chapters 4 and 5 of its ESP FEIS analysis. FEIS at 10-5 to 10-7.

With respect to construction activities, such unavoidable impacts were primarily related to land use (involving ground disturbance for permanent facilities and removal of some forested habitat), but also included some potential socioeconomic impacts resulting from increased traffic congestion. FEIS at 10-5 to 10-6. The Staff reiterated from its earlier analysis the ways in which most impacts such as actions to reduce equipment emissions and fugitive dust would be mitigated. FEIS at 10-5 to 10-6, Tbl. 10-1.

Likewise, with respect to operations, the Staff reiterated that unavoidable impacts would be small, and it summarized mitigation activities, such as State regulation of water use and water quality to mitigate cooling system impacts, and the use of tax revenues and local land management plans to mitigate increased growth and use of public services. FEIS at 10-6, 10-7, Tbl. 10-2.

With respect to irreversible and irretrievable commitments of resources (NEPA section 102(2)(C)(v)), the Staff found that the only such commitments would be resources used by Exelon for site-preparation activities, and that such resources not used during the ESP stage would be used at the CP or COL stage or could be used for other activities even if Exelon does not eventually seek a CP or a COL for the ESP location. FEIS at 10-8. The Staff noted, however, that irretrievable commitments of resources during construction generally would be similar to those of any major construction project and would depend on the specific design. The Staff also determined that the materials required for construction and uranium required for

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<sup>5</sup> See FEIS at tables in chapters 4, 5, 9, and 10.

operation would be of small consequence with respect to the availability of such resources. FEIS at 10-8.

With respect to the relationship between short-term uses and long-term productivity of the human environment (NEPA section 102(2)(c)(iv)), the Staff found that the only short-term use of the environment that could occur if the proposed action is implemented would be site preparation activities authorized in an ESP, and any such activities are unlikely to adversely affect the long-term productivity of the environment. FEIS at 10-8. The assessment of the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity would be performed at the CP or COL stage. FEIS at 10-8, 10-9.

With respect to cumulative impacts, the Staff repeated its conclusions from FEIS Chapter 7 that potential cumulative impacts were determined to be small. FEIS at 10-9. The Staff noted that some impact issues had the potential for MODERATE adverse impacts, most of which would occur under temporary circumstances or as the result of a larger-than-expected concentration of construction workers settling near the Clinton ESP site. FEIS at 10-9.

In light of its findings and conclusions, the Staff's recommendation to the Commission related to the environmental impacts of the proposed action was that the ESP should be issued.<sup>6</sup> FEIS at 10-9 to 10-11.

Based on the Staff's review, as indicated in the EIS and the record of this proceeding, the Board concludes that the Staff's determinations are clear and logically flow from the facts and the appropriate regulatory guidance; the Staff, therefore, had a reasonable basis for its stated conclusions on environmental matters. The Board, therefore, finds that (1) the

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<sup>6</sup> As noted in the discussion of FEIS chapter 4, *infra*, the Staff recommended that the permit be issued with a permit condition related to compliance with the Federal Water Pollution Control Act ("FWPCA"), Section 401, certification process managed by the Illinois Environmental Protection Agency ("IEPA"). FEIS at 4-8, 10-9.

requirements of sections 102(2)(A), ©, and (E) of NEPA and Subpart A of 10 C.F.R. Part 51 have been complied with; (2) it has independently considered the final balance among the factors contained in the record of the proceeding with a view to determining the appropriate action to be taken; and (3) after evaluating the Staff's analysis of alternative sites, alternative energy sources, and the no action alternative, the Board agrees that none of the alternative sites identified is obviously superior to the proposed EGC ESP site. Therefore, the Board finds that the ESP should be issued, and protection of the environment does not require denial or any further conditioning of the permit.

#### SUMMARY FINDINGS OF FACT AND CONCLUSIONS OF LAW

The Board has, in attempting to fulfill its mandatory hearing obligations discussed above, reviewed the material portions of the record in this proceeding. Based upon that review, the Board has reached the following determinations:

With respect to safety issues, the Board has determined that the application and the record of the proceeding contain sufficient information, and that the review of the application by the Staff has been adequate, to support findings in accordance with the Commission's December 2003 notice of hearing, that (1) the issuance of an early site permit will not be inimical to the common defense and security or to the health and safety of the public; and (2) taking into consideration the site criteria contained in 10 C.F.R. Part 100, a reactor, or reactors, having the characteristics that fall within the parameters for the site, can be constructed and operated without undue risk to the health and safety of the public.

With respect to environmental issues, the Board has determined that the review conducted by the Staff pursuant to 10 C.F.R. part 51 has been adequate, in accordance with the Commission's December 2003, hearing notice, *see also* 10 C.F.R. § 2.104(b)(2)(ii). In addition, the Board finds that (1) the requirements of sections 102(2)(A), ©, and (E) of NEPA have been satisfied; (2) having conducted its own independent balancing of the conflicting

environmental and other factors (including an analysis to determine that there are no obviously superior sites), that the overall balance supports issuance of the license; and (3) protection of the environment does not require denial or any further conditioning of the license. The Board thus concludes that these factors support issuance of the requested early site permit.

For the foregoing reasons, it is [on this date], ORDERED, that, in accordance with 10 C.F.R. § 2.340, this decision shall become immediately effective. Further, in accordance with 10 C.F.R. § 2.713, this decision shall constitute the final decision of the Commission forty (40) days from the date of issuance, unless a petition for review is filed in accordance with 10 C.F.R. § 2.341, or unless the Commission directs otherwise.