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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSIONOFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

EXELON GENERATION COMPANY, LLC

(Early Site Permit for the Clinton ESP Site)

Docket No. 52-007

ASLBP No. 04-821-01-ESP

October 17, 2006

PREFILED TESTIMONY OF EDDIE R. GRANT ON REQUIRED SAFETY FINDINGS**I. INTRODUCTION**

Q. Please state your name.

A. My name is Eddie R Grant.

Q. Who is your current employer and what is your current position?

A. I am self-employed and contract with nuclear facilities to provide licensing and regulatory services. Since June 2002, I have been under contract with Exelon Generation Company, LLC (EGC or Exelon) to provide licensing and regulatory services with respect to the Clinton Early Site Permit (ESP) Application. In this role, I have acted as a member of the Exelon licensing team.

Q. Please describe your professional qualifications.

A. I have almost thirty years of experience related to licensing and regulatory affairs for nuclear facilities. This experience includes development of applications for licenses, permits, and license amendments under 10 C.F.R. Parts 50 and 52, and interaction with the NRC staff during their review of the applications and requests. I have provided direct

licensing and regulatory assistance to numerous nuclear facilities in the United States and Canada, and have been actively involved in Part 52 activities for the past four years. A copy of my professional qualifications is attached.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of the Applicant, EGC.

Q. Please describe your involvement in the ESP Application.

A. I was responsible for supervising the preparation and revision of the safety portion of the Exelon Early Site Permit, and for resolving NRC requests for additional information and open items related to safety.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide a brief description of the Site Safety Analysis Report (SSAR) and Emergency Plan (EP), including a description of the applicable regulatory criteria. My testimony also describes how the Application and the NRC Staff's Safety Evaluation Report (SER), which documents the results of the Staff's review of the SSAR and EP, support (a) a negative finding as to 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 Finding 1); and (b) a positive finding as to whether, 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 Finding 2).

II. SITE SAFETY ANALYSIS REPORT

A. Purpose and Contents of the SSAR

Q. Briefly describe the SSAR.

A. The SSAR addresses the safety issues associated with the ESP Application in compliance with 10 C.F.R. Part 52, Subpart A (Early Site Permits). It includes a description of the site and an assessment of site characteristics affecting the design. The SSAR contains the following principal sections: (1) Chapter 1 – Introduction and Description of the Proposed Facility, including an overview of the site and possible reactor types, along with a plant parameter envelope (PPE) listing; (2) Chapter 2 – Site Characteristics, addressing geography and demography, nearby industrial transportation and military facilities, meteorology, hydrologic engineering, and geologic and seismic engineering; and (3) Chapter 3 – Site Safety Assessment, addressing effluents, thermal discharges, radiological consequences of accidents, and conformance with 10 C.F.R. Part 100.

Q. Describe the regulatory criteria applicable to the SSAR.

A. The principal regulatory bases for the SSAR include the following:

- 10 C.F.R. Part 50, “Domestic Licensing of Production and Utilization Facilities,” primarily applicable provisions in § 50.34.
- 10 C.F.R. Part 52, “Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants,” including § 52.17 which requires the applicant to submit information needed to evaluate the factors involving the characteristics of the site.
- Subpart B to 10 C.F.R. Part 100, “Reactor Site Criteria,” which requires the consideration of factors relating to the size and location of the proposed site.
- 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”

Q. Does the SSAR comply with these criteria?

A. Yes. The SSAR complies with the regulations and generally complies with the guidance listed above. However, as discussed later in this testimony, the SSAR does contain one

significant deviation from NRC Regulatory Guide 1.165 related to calculation of the safe shutdown earthquake.

B. NRC Review of the SSAR

Q. How did the EGC ESP organization support the NRC Staff's review of the Application?

A. In the course of the Staff's review, the EGC ESP organization responded to twelve separate safety and emergency planning-related requests for additional information (RAIs) that included approximately 110 subparts. Exelon held numerous public meetings with the Staff on safety topics, including meetings on seismic and quality assurance issues, and the NRC Staff conducted several site visits and inspections regarding field investigations, seismic issues, hydrology, security, site hazards, meteorology, emergency planning, and other issues.

Q. Briefly describe the results of the NRC review of the SSAR.

A. The results of the NRC Staff's review of the SSAR are documented in the SER. The SER delineates the scope of technical safety matters the Staff considered in evaluating the ESP application and the suitability of the proposed site. The NRC standards for review of an ESP application are outlined in 10 C.F.R. § 52.18. The NRC conducted its review of the Application in accordance with RS-002. The SER provides the required findings on the safety matters addressed in the Application, including seismology, geology, meteorology, hydrology, and hazards from man-made facilities and activities on or in the vicinity of the site. The SER also assesses the risks of potential accidents that could occur as a result of operation of a nuclear power facility at the site and whether the site would support adequate physical security measures for a nuclear power facility.

Q. How did the Staff keep track of open items during its review?

During its review, the Staff confirmed that all open and confirmatory items from the draft SER (DSER) had been resolved or completed. The Staff also identified 32 COL Action Items. COL Action Items identify issues that do not need to be resolved prior to the issuance of the ESP (*e.g.*, because they pertain to the design of the facility that will not be finalized until the COL proceeding), but that will need to be addressed at the COL stage. The Staff also recommended six Permit Conditions; issuance of the ESP is expected to be contingent on these limitations. The Permit Conditions, or limitations on the ESP, are based on the provisions of 10 C.F.R. § 52.24, "Issuance of Early Site Permit." The COL Action Items and Permit Conditions are listed in Appendix A of the SER. The conclusions of the Staff's evaluation and independent review of the SSAR are described in Section 19 of the SER.

- Q. Please provide your opinion regarding the review performed by the NRC Staff.
- A. The Staff used its detailed guidance, provided in RS-002, to structure its review; the Staff asked numerous RAIs, visited the site, and held meetings to elicit more detailed information from EGC; and the Staff documented and tracked to closure the open items from its review. In my opinion, the review performed by the NRC Staff was systematic, comprehensive, and probing.
- Q. Describe the review by the Advisory Committee on Reactor Safeguards (ACRS).
- A. The ACRS reviewed the ESP application and the NRC Staff's DSER and supplemental DSER. The ACRS ESP subcommittee met with the Applicant and the NRC Staff on September 7, 2005, and the full ACRS committee met to discuss the ESP DSER and supplemental DSER on September 8, 2005. The final SER documents the Staff's actions taken in response to the ACRS comments and recommendations. The ACRS ESP

subcommittee met again with the Applicant and the NRC Staff on March 8, 2006, and the full ACRS met to discuss the ESP FSER on March 9, 2006. In accordance with 10 C.F.R. § 52.23, the ACRS issued a letter on March 24, 2006 to the NRC Chairman (included as Appendix E of the final SER) concluding that: (1) the ESP application and final SER show that the proposed facility adjacent to the existing Clinton Power Station (CPS) is an acceptable site for nuclear power plants that meet the PPE proposed by the Applicant; and (2) the Staff has thoroughly reviewed a performance-based method proposed by the Applicant for determining the safe shutdown earthquake ground motion.

III. EMERGENCY PLAN

Q. What requirements apply to emergency planning in an ESP application?

A. As required by 10 C.F.R. § 52.17(b)(1) and (3), the ESP Application must: “identify physical characteristics unique to the proposed site . . . that could pose a significant impediment to the development of emergency plans,” and describe “contacts and arrangements with local, state, and federal government agencies with emergency planning responsibilities.” Under 10 C.F.R. § 52.17(b)(2), the Applicant may also provide complete and integrated emergency plans or may propose major features of emergency plans. Guidance for major features is provided in NUREG-0654/FEMA-REP-1, Rev. 1, Supplement 2, “Criteria for Emergency Planning in an Early Site Permit Application” (1996). In the event that an ESP applicant elects to describe major features, a COL applicant would need to provide complete and integrated emergency plans for a new facility or facilities at the COL stage, 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. EGC elected to propose the major features of emergency plans for the EGC ESP facility, as permitted by 10 C.F.R. § 52.17(b).

Q. How was the emergency planning information in the ESP Application developed?

A. The existing Clinton Power Station is currently implementing an Emergency Plan previously approved by the NRC (with subsequent modifications in accordance with the applicable regulations, *i.e.*, 10 C.F.R. § 50.54(q)). The emergency planning information in the ESP Application is based upon the implemented CPS Emergency Plan.

Q. What were the results of the NRC Staff's review of the emergency planning information?

A. The results of the NRC Staff review of the emergency planning information are documented in Section 13 of the SER. The Staff made the required findings on whether the Application 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. The Staff also determined that the emergency planning information provides an acceptable description of contacts and arrangements made with Federal, State, and Local governmental agencies with emergency response planning responsibilities. Finally, the Staff determined whether the emergency planning information provides sufficient information for the Staff to evaluate and conclude that the major features for emergency planning are adequately addressed and consistent with NRC guidance and regulatory requirements.

Q. What do the Application and SER say with respect to whether there are any significant impediments to the development of emergency plans?

A. The Application provides information demonstrating that no physical characteristics unique to the proposed ESP site could pose a significant impediment to the development

of emergency plans. The 1993 evacuation time estimate (ETE) for the CPS plume exposure pathway served as the basis for the ESP ETE. The SER concludes that the Applicant adequately evaluated evacuation times for potentially affected areas surrounding the ESP site and, using population growth rate projections and considering demography, topography, land characteristics and use, road networks, and jurisdictional boundaries, and the Application demonstrates that no physical characteristics unique to the ESP site could pose a significant impediment to the development of emergency plans. This information is also consistent with NRC guidance in RS-002 and meets the requirements of 10 C.F.R. § 52.17(b)(1) and 10 C.F.R. § 52.18.

Q. Does the Application describe contacts and arrangements with Federal, state, and local agencies?

A. Yes. Appendix A of the emergency planning information provides a description of contacts and arrangements made with Federal, State, and Local governmental agencies with emergency response planning responsibilities. The SER states that this information is consistent with NRC guidelines and meets the requirements of 10 C.F.R. § 52.17(b)(3).

Q. What information does the Application contain regarding major features for emergency plans for the proposed facility?

A. The Application describes major features for Assignment of Responsibility (Organization Control), Onsite Emergency Organizations, Emergency Response Support and Services, Emergency Classification System, Notification Methods and Procedures, Emergency Communications, Public Education and Information, Emergency Facilities and Equipment, Accident Assessment, Protective Response, Radiological Exposure Control, Medical and Public Health Support, Radiological Emergency Response Training, and

Responsibility for the Planning Effort: Development, Periodic Review, and Distribution of Emergency Plans. With one exception, the SER concludes that the major features are adequately addressed and consistent with NRC guidance and regulatory requirements.

Compliance with each major feature is described in the table below.

	MAJOR FEATURE	DESCRIPTION
A	Assignment of Responsibility (Organization Control)	Section 3.1 of the EP identifies the Federal, State, local, and private sector organizations that are intended to be part of the overall emergency response organization, including the functions and the responsibilities for major elements of response, and the legal bases for State and local authorities. The SER states that proposed Major Feature A is acceptable and consistent with the guidance in RS-002 and Supplement 2.
B	Onsite Emergency Organizations	Section 3.1 of the EP identifies the interfaces between and among the onsite functional areas of emergency activity, local services support, and State and local government response organizations. The EP also identified services to be provided by local agencies for handling emergencies. The SER states that proposed Major Feature B is acceptable and consistent with the guidance in RS-002 and Supplement 2.
C	Emergency Response Support and Services	Sections 3.1 and 3.4 of the EP describes provisions for requesting Federal assistance, identifies nuclear and other organizations that can provide assistance in an emergency, and describes contacts and arrangements made with the response organizations. The SER states that proposed Major Feature C is acceptable and consistent with the guidance in RS-002 and Supplement 2.
D	Emergency Classification System	Sections 4.1, 4.2, 4.3, and 4.4 of the EP identify the emergency classification scheme comprising four categories – unusual event, alert, site area emergency, and general emergency. The SER states that proposed Major Feature D is acceptable and consistent with the guidance in RS-002 and Supplement 2.
E	Notification Methods and	Section 5.1 of the EP describes the mutually agreeable

	Procedures	bases for notifying response organizations, consistent with NUREG-0654/FEMA-REP-1, and includes the method for alerting, notifying, and mobilizing personnel and the means for notifying and promptly instructing the public within the 10-mile emergency planning zone (EPZ). The SER states that proposed Major Feature E is acceptable and consistent with the guidance in RS-002 and Supplement 2.
F	Emergency Communications	Section 6.1 of the EP identifies communication provisions with State and local governments within the EPZs and describes provisions for alerting and activating emergency personnel. The SER states that proposed Major Feature F is acceptable and consistent with the guidance in RS-002 and Supplement 2.
G	Public Education and Information	Sections 7.1, 7.2, and 7.5 of the EP describe the program to provide information to the public and news media, on a periodic basis, that addresses public notification and emergency actions. The SER states that proposed Major Feature G is acceptable and consistent with the guidance in RS-002 and Supplement 2.
H	Emergency Facilities and Equipment	Sections 8.1.2, 8.1.3, and 8.2 of the EP describe the facilities and related equipment in support of emergency response, including the Emergency Operations Facility (EOF), the Operations Support Center (OSC) and Technical Support Center (TSC). The EP has minimal information related to the OSC and TSC, because design certifications typically contain the design information for an OSC and TSC. Therefore, the SER states that the Applicant did not provide sufficient information in support of Major Feature H and did not make findings regarding its acceptability. Complete and integrated emergency plans will, however, be required at the COL stage.
I	Accident Assessment	Sections 3.1, 9.1 and 9.2 (among others) describe methods, systems, and equipment for assessing and monitoring actual and potential offsite radiological consequences of a radiological emergency at the EGC ESP site, including associated contacts and arrangements. The SER states that proposed Major Feature I is acceptable and consistent with the guidance in RS-002 and Supplement 2.

J	Protective Response	Section 10.1 of the EP describes a range of protective actions for the plume exposure pathway EPZ for both public and emergency workers, including guidance for the choice of protective actions that are consistent with Federal guidance and protective actions for the ingestion pathway EPZ. The SER states that proposed Major Feature J is acceptable and consistent with the guidance in RS-002 and Supplement 2.
K	Radiological Exposure Control	Section 11.1 of the EP describes the means for controlling radiological exposures to emergency workers in an emergency. The SER states that proposed Major Feature K is acceptable and consistent with the guidance in RS-002 and Supplement 2.
L	Medical and Public Health Support	Section 12.1 of the EP describes the contacts and arrangements for medical services for contaminated, injured individuals, including local and backup hospital and medical services having the capability for evaluating radiation exposure and uptake. The SER states that proposed Major Feature L is acceptable and consistent with the guidance in RS-002 and Supplement 2.
O	Radiological Emergency Response Training	Section 15.1 of the EP describes a radiological emergency response training program (including initial and periodic training) for those who may be called on to assist in an emergency, including a training program for instructing and qualifying personnel who would implement the radiological emergency response plans. The SER states that proposed Major Feature O is acceptable and consistent with the guidance in RS-002 and Supplement 2.
P	Responsibility for the Planning Effort: Development, Periodic Review, and Distribution of Emergency Plans	Section 16.1 of the EP describes the responsibilities for plan development and review, as well as for distribution and update of emergency plans. The SER states that proposed Major Feature P is acceptable and consistent with the guidance in RS-002 and Supplement 2.

Q. Do you have an opinion as to whether the Applicant's emergency planning information satisfies the requirements of 10 C.F.R. § 52.17(b)?

- A. Yes. The Applicant's emergency planning information satisfies 10 C.F.R. § 52.17(b)(1) and (3), in that it demonstrates that there is no significant impediment to the development of emergency plans for the EGC ESP facility, and it contains a description of contacts and arrangements made with local, state, and federal governmental agencies with emergency planning responsibilities. Additionally, the Application provides sufficient information to satisfy 10 C.F.R. § 52.17(b)(2)(i) with respect to thirteen major features of the Emergency Plan.

IV. SAFETY ISSUES

- Q. Briefly describe the safety issues that must be addressed under 10 C.F.R. § 52.17 and Part 100, and the Staff's review standard, RS-002.

- A. The SSAR must address geography and demography; nearby industrial, transportation, and military facilities; meteorology; hydrologic engineering; geology, seismology, and geotechnical engineering; radiological effluents; thermal discharges; radiological consequences of accidents; and security, as these issues pertain to siting.

A. Geography and Demography

- Q. Please summarize the information in the SSAR and SER regarding site location and description.
- A. SSAR § 2.1.1 provides information regarding site location and boundary that could affect the design of systems, structures, and components important to safety of a nuclear facility that might be constructed on the proposed EGC ESP site. SSAR Figures 1.2-1 to -4 show the site property boundary and the areas of proposed new facility construction. The approximately 14,180 acre property site and its environs include woodlands, pasture land, cultivated farmland, recreational areas, and the man-made Clinton Lake. The SER

reviews the site location and description information and concludes that it is sufficient to evaluate compliance with siting evaluation factors in 10 C.F.R. Part 100 and 10 C.F.R. § 52.17, subject to a COL Action Item.

- Q. Please summarize the information in the SSAR and SER regarding exclusion area authority and control.
- A. SSAR § 2.1.2 provides information regarding the exclusion area for the EGC ESP site and the authority and control over ingress to and egress from the exclusion area. The boundary lines for the exclusion area for both the currently operating unit and the new facility (as defined in 10 C.F.R. Part 100) are shown on SSAR Figure 2.1-8. AmerGen, a subsidiary of Exelon Corporation, owns the real estate on which the EGC ESP facility will sit, including the exclusion area, with the exception of a right of way for a township road that traverses the exclusion area to provide access to privately held property outside the exclusion area. AmerGen has the authority to control activities within the exclusion area. In an emergency, EGC and local law enforcement will control access to the exclusion area via this township road. To meet the exclusion area control requirements of 10 C.F.R. § 100.21(a) and 10 C.F.R. § 100.3, the applicant need not demonstrate total control of the property before issuance of the ESP. Should EGC decide to apply for a CP or COL, EGC anticipates entering into an agreement whereby AmerGen would grant EGC an exclusive and irrevocable option, exercisable prior to the start of construction, to purchase, enter a long-term lease for, and/or procure other legal right in the land required by the EGC ESP facility. In addition to the rights EGC acquires in the land for the EGC ESP facility, the EGC will enter an Exclusion Area Agreement with AmerGen. The AmerGen Management Committee has authorized AmerGen's officers to negotiate an

Exclusion Area Agreement with EGC. The aggregate result will provide EGC with full control of the exclusion area for the EGC ESP facility, to the extent necessary to comply with applicable NRC guidance. The SER identifies Permit Conditions and a COL Action Item to ensure this occurs at the COL stage.

- Q. Please summarize the information in the SSAR and SER regarding population distribution.
- A. SSAR § 2.1.3 provides information 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 based on U.S. Census Bureau data from 2000 and projections through 2060, based on Illinois State University studies. No member of the public lives within the exclusion area. The community of Clinton, with a population of over 7,000, is approximately 6 miles west of the ESP site. The closest population center (a community with 25,000 or more inhabitants) likely to exist over the lifetime of the proposed ESP site is Decatur, approximately 22 miles south-southwest of the ESP site, with a 2000 population of 81,860. This distance is 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). The SER concludes that the SSAR provides an acceptable description of current and projected population densities in and around the site and properly specified the LPZ and population center distance, and that the supplied data meets the requirements of 10 C.F.R. § 52.17 and 10 C.F.R. Part 100.

B. Nearby Industrial, Transportation, and Military Facilities

- Q. Please summarize the information in the SSAR and SER regarding potential man-made hazards at the proposed site.

- A. SSAR § 2.1 and 2.2 provide information regarding potential man-made hazards in the site vicinity. Nearby highway, rail, and pipeline locations are shown in SSAR Figure 2.2-1. The only rail line within five miles of the site is the Gilman Line of the Canadian National Railroad, which passes approximately one mile from the proposed EGC facility. The closest military installation is 23 miles from the ESP site and there are no missile sites within 50 miles of the ESP site. SSAR Figure 2.2-1 shows the location of oil and gas pipelines within the vicinity of the ESP site. One pipeline traverses the current CPS exclusion area within one mile of the ESP site. 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. In the unlikely event that the pipeline owner wants to transport propane in this pipeline, the pipeline would be relocated or appropriate mitigating measures would be implemented. The area around the ESP site is not heavily industrialized, and CPS is the largest industrial facility in the vicinity. 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. The SER reviews the information included in the SSAR, as well as information obtained from other sources, to evaluate the potential for man-made hazards in the vicinity of the ESP site, and concludes that the SSAR has adequately identified the hazards, subject to a COL Action Item. Further, the SER reviews the information on aircraft hazards in SSAR § 2.2.2.5 and contains an independent analysis to determine that aircraft hazards pose no undue risk to the health and safety of the public, and concludes that the site is acceptable from the perspective of aircraft hazards.

Q. Please summarize the information in the SSAR and SER regarding evaluation of potential accidents.

A. SSAR § 2.2.3 provides information regarding potential accidents related to the presence of hazardous materials or activities in the vicinity of the ESP site. This information includes evaluation of flammable vapor clouds, aircraft crashes, toxic chemicals, and railroad accident fires. The SER concludes that the site location is acceptable with regard to potential accidents that could affect a nuclear power facility based on the PPE and that the site location meets the requirements of 10 C.F.R. § 52.17(a)(1)(vii), 10 C.F.R. § 100.20(b), and 10 C.F.R. § 100.21(e). 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.

C. Meteorology

Q. Please summarize the information in the SSAR and SER regarding regional climatology.

A. SSAR § 2.3.1 provides information concerning regional climatology and meteorology, including the averages and extremes of climatic conditions that could affect the design and siting of a nuclear power plant(s) that falls within the PPE values and that might be constructed on the site. SSAR § 2.3.1.2.2 provides information regarding tornado characteristics consistent with NRC guidance and interim Staff position on design-basis tornado characteristics for a tornado with a maximum wind speed of 300 miles per hour. As described in the SER, the Staff directed Pacific Northwest National Laboratories to perform an independent review, and the SER concludes that the proposed design-basis

tornado site characteristics are acceptable. The SER also states that 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 and it concludes that such characteristics meet the requirements in 10 C.F.R. § 100.20(c) and 10 C.F.R. § 100.21(d).

Q. Please summarize the information in the SSAR and SER regarding local meteorology.

A. SSAR § 2.3.2 provides information concerning local meteorological, air quality and topographical characteristics of importance to the safe design and operation of a nuclear power plant(s) falling within its PPE that might be constructed on the proposed site. The SER also states that the SSAR identifies the most severe local weather phenomenon at the site and surrounding area. After the COL Action Item is taken into account, the SER concludes that the SSAR's identification and consideration of the meteorological, air quality, and topographical characteristics of the site and surrounding area meet the requirements of 10 C.F.R. § 100.20(c) and 10 C.F.R. § 100.21(d).

Q. Please summarize the information in the SSAR and SER regarding the onsite meteorological measurements program.

A. SSAR § 2.3.3 provides information regarding the onsite meteorological measurements program and the data used to characterize atmospheric dispersion conditions for the site. In response to the Staff's request for additional information, the Applicant provided to the Staff the onsite meteorological database used to generate the short and long-term diffusion estimates in SSAR §§ 2.3.4 and 2.3.5. The SER concludes that the supplied information provides data adequate to represent onsite meteorological conditions, as required by 10 C.F.R. § 100.20.

Q. Please summarize the information in the SSAR and SER regarding short-term diffusion estimates.

A. SSAR § 2.3.4 provides information regarding short-term diffusion estimates for postulated accidental airborne releases of radioactive effluents to the exclusion area boundary (EAB) and LPZ (atmospheric dispersion factors or χ/Q values). The SER contains an independent evaluation 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 in accordance with 10 C.F.R. § 100.21, subject to a COL Action Item.

Q. Please summarize the information in the SSAR and SER regarding long-term diffusion estimates.

A. SSAR § 2.3.5 provides information regarding diffusion estimates for long-term (routine releases) of effluents to the atmosphere, including bounding values for routine release points. The SSAR provides atmospheric diffusion estimates for routine airborne releases of radioactive effluents to the site boundary, EAB, LPZ, and special receptors of interest. As described in the SER, the Staff conducted an independent evaluation and obtained similar results. When the COL Action Item is taken into account, the SER concludes that characterization of long-term atmospheric transport and diffusion conditions in the SSAR complies with the requirements of 10 C.F.R. § 100.21(c)(1) and is appropriate for demonstrating compliance with the numerical guides for dose contained in Appendix I to 10 C.F.R. Part 50.

D. Hydrologic Engineering

Q. Please summarize the information in the SSAR and SER regarding hydrologic description.

A. SSAR § 2.4.1 provides information regarding hydrology of the ESP site, including descriptions of rivers, streams, lakes, water-control structures, and users of these waters. The proposed EGC ESP facility would use Clinton Lake as the source of cooling water, using closed-cycle cooling with wet, dry, or wet/dry hybrid cooling towers as the plant's normal heat sink. The ultimate heat sink (UHS), if required, would consist of mechanical draft cooling tower(s) with no water storage. The submerged UHS pond for CPS would supply the makeup water to the UHS for the EGC ESP facility for a period of 30 days. When the COL Action Items are taken into account, the SER concludes that SSAR § 2.4.1 conforms to RS-002 § 2.4.1, and that the SSAR meets the requirements for general hydrologic descriptions with respect to 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

Q. Please summarize the information in the SSAR and SER regarding floods.

A. SSAR § 2.4.2 provides information regarding potential for flooding at the Clinton Lake and ESP site. Flood history data indicates that Clinton Lake is significantly attenuating flood flows in Salt Creek. (Clinton Lake was formed by a dam across Salt Creek.) All safety-related structures at the EGC ESP facility would either be above the maximum combined effects Clinton Lake water surface elevation, or be designed to withstand the effects of inundation. The SER states that the SSAR appropriately considers the most severe flooding that has been historically reported for the site and surrounding area, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data has been accumulated. When the COL Action Items are taken into

account, the SER concludes that SSAR § 2.4.2 conforms to Section 2.4.2 of RS-002, and that the SSAR meets the requirements concerning floods with respect to 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

Q. Please summarize the information in the SSAR and SER regarding probable maximum flood on streams and rivers.

A. SSAR § 2.4.3 provides information regarding the probable maximum flood (PMF) on streams and rivers that are reasonably possible in the region. The PMF analyses were performed in accordance with NRC Regulatory Guide 1.59. The Staff performed an independent analysis to verify the Applicant's PMF analysis. The SER states that the SSAR considers the most severe natural phenomena that have been historically reported for the site and surrounding area in establishing the stream and river design flood, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data has been accumulated. The SER concludes that SSAR § 2.4.3 conforms to Section 2.4.3 of RS-002, and that the SSAR meets the requirements concerning PMF on streams and rivers with respect to 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

Q. Please summarize the information in the SSAR and SER regarding potential dam failures.

A. SSAR § 2.4.4 provides information regarding potential dam failures at the site. There are no dams upstream or downstream of Clinton Dam the loss of which could affect the ESP site safety-related facilities or the cooling water supply, and the loss of Clinton Dam will not result in a loss of water from the submerged UHS pond. The Staff independently verified the information in the SSAR. The SER states that the SSAR considers the most severe natural phenomenon that have been historically reported for the site and surrounding area in establishing the design basis dam failure, with sufficient margin for

the limited accuracy, quantity, and period of time in which the historical data has been accumulated. The SER concludes that the SSAR conforms to Section 2.4.4 of RS-002, Attachment 2, and that it meets the requirements of 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c) with respect to potential dam failures.

Q. Please summarize the information in the SSAR and SER regarding probable maximum surge and seiche flooding.

A. SSAR § 2.4.5 provides information regarding surge and seiche flooding at the site, conservatively estimating that the maximum storm surge at the site is 0.3 feet. The Staff concluded that the ESP site is not subject to storm surge. Further, the Staff performed an independent evaluation to estimate seiche effects, concluding that forced resonance and seismically induced seiche were unlikely on Clinton Lake. The SER also states that the seismically induced flooding analysis reflects the most severe seismic event historically reported for the site and surrounding areas (with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data has been accumulated). The SER concludes that SSAR § 2.4.5 conforms to Section 2.4.5 of RS-002, Attachment 2, and that the SSAR meets the requirements concerning probable maximum surge and seiche flooding with respect to 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c). The SER also concludes that the SSAR conforms to General Design Criteria (GDC) 2 in Appendix A to 10 C.F.R. Part 50, insofar as the flooding analysis defines design bases for seismically induced surge and seiche.

Q. Please summarize the information in the SSAR and SER regarding probable maximum tsunami flooding.

A. SSAR § 2.4.6 provides information regarding the probable maximum tsunami flooding, including the effects of a lake tsunami caused by a hillslope failure, concluding that landslide-induced tsunamis do not pose a threat to the site. The Staff conducted an independent review, concluding that the effects of even the largest ocean or Great Lakes tsunami would not affect the Clinton ESP Site in central Illinois, and that hillslope failure-induced tsunamis did not pose a risk to the ESP site. The SER also states that the SSAR considers the most severe natural phenomenon that have been historically reported for the site and surrounding area in establishing the design bases for tsunamis, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data has been accumulated. The SER concludes that the SSAR meets the requirements to identify and evaluate tsunami flooding under 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c), and that the SSAR conforms to that portion of GDC 2 related to tsunamis.

Q. Please summarize the information in the SSAR and SER regarding ice effects.

A. SSAR § 2.4.7 provides information regarding the identification and evaluation of ice effects on Clinton Lake on the EGC ESP facility. The SSAR evaluates the effects of ice jams, estimates the average thickness of an ice sheet that could form on Clinton Lake, and evaluates the effects of such an ice sheet. The Staff performed an independent estimation of maximum ice thickness and proposed a maximum ice thickness of 27 inches as a site characteristic. When the COL Action Items are taken into account, the SER concludes that the SSAR considers the most severe natural phenomenon that have been historically reported for the site and surrounding area in establishing the design basis information pertaining to ice effects, with sufficient margin for the limited

accuracy, quantity, and period of time in which the historical data has been accumulated. Similarly, taking the COL Action Items into account, the SER concludes that the SSAR conforms to RS-002, Attachment 2, Section 2.4.7, and that the SSAR meets the requirements to identify and evaluate ice effects with respect to 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

Q. Please summarize the information in the SSAR and SER regarding cooling water canals and reservoirs.

A. SSAR § 2.4.8 provides information identifying and evaluating cooling water canals and reservoirs at the site. The EGC ESP facility would use Clinton Lake as the source of cooling water and raw water, and no changes will be made to the Clinton Dam. A new intake structure will be added to supply water to the EGC ESP facility. The SSAR evaluates lake capacity in drought conditions, the effects of the estimated PMF, and the impact of the new facility on the submerged UHS pond, its submerged dam, baffle dike, and the existing discharge flume. As described in the SER, the Staff visually inspected the site on May 11, 2004 and determined that the SSAR accurately describes the intakes, discharge canals, outfalls, and reservoirs near the ESP site. When the COL Action Items are taken into account, the SER concludes that the SSAR considers the most severe natural phenomenon that have been historically reported for the site and surrounding area in establishing the design basis information pertaining to cooling water canals and reservoirs, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data has been accumulated. Similarly accounting for the COL Action Items, the SER concludes that the SSAR conforms to “Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants,” (SRP) § 2.4.8, and that

the SSAR meets the requirements for cooling water canals and reservoirs at the site under 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c)(3).

Q. Please summarize the information in the SSAR and SER regarding channel diversions.

A. SSAR § 2.4.9 provides information regarding channel diversion and notes that there is no historical evidence of channel diversion in Salt Creek or the North Fork of Salt Creek upstream of Clinton Dam. Based on topographic characteristics and geologic features of the drainage basin, landslides that might lead to blockage of stream flow into Clinton Lake are not possible. The Staff's independent review and research confirmed that there is no historical evidence of major channel diversion in the area. The SER states that even if channel migration were to stop all flow into Clinton Lake, it would not adversely affect the safety of the EGC ESP facility. The SER further states that the SSAR considers the most severe natural phenomenon that have been historically reported for the site and surrounding area in establishing the design basis information related to channel diversions, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data has been accumulated. The SER concludes that SSAR § 2.4.9 conforms to Section 2.4.9 of RS-002, and that the SSAR meets the requirements to identify and evaluate channel diversion at the site under 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

Q. Please summarize the information in the SSAR and SER regarding flooding protection requirements.

A. SSAR § 2.4.10 provides information regarding flooding protection of the site. The approximate grade level for the EGC ESP facility of 735 ft. above sea level is approximately 19 ft. above the maximum wave run-up level and 25 ft. above the PMF

still water level. The safety-related facilities in the station area would not be affected by the PMF conditions in the lake. The only EGC ESP facility structure that may be affected by the PMF is the intake structure, which, if required, will be designed with appropriate flood protection. The Staff independently estimated the maximum water surface elevation at the site for the design basis, and accepted the Applicant's calculations. The SER further found that the SSAR considers the most severe natural phenomenon that have been historically reported for the site and surrounding area in establishing the design basis information for flood protection, with sufficient margin for the limited accuracy, quantity, and period of time in which the historical data has been accumulated. The SER concludes that the SSAR conforms to SRP Section 2.4.10 as applicable to the ESP site, and that the SSAR meets the flooding protection requirements at the site under 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c), when COL Action Item 2.4-3 is taken into account.

- Q. Please summarize the information in the SSAR and SER regarding low water considerations.
- A. SSAR § 2.4.11 provides information regarding low-water considerations (*e.g.*, low flow in Salt Creek, seiches, wind-induced set-down, intake blockages from sediment or ice). The SSAR estimates the minimum lake water levels at 685 and 681.4 feet above mean sea level during 50 and 100-year droughts, respectively. Both minimum lake levels are well above the minimum CPS lake level of 677 feet above sea level. The SER states that the SSAR considers the most severe natural phenomenon that have been historically reported for the site and surrounding area in establishing the design basis information for low-water conditions, with sufficient margin for the limited accuracy, quantity, and

period of time in which the historical data has been accumulated. When the COL Action Item is taken into account, the SER concludes that the SSAR conforms to Section 2.4.11 of RS-002 and meets the requirements for low water conditions under 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

Q. Please summarize the information in the SSAR and SER regarding accidental releases of liquid effluents to ground and surface waters.

A. SSAR §§ 2.4.12 and 2.4.13.3 provide information pertaining to the identification and evaluation of accidental releases of liquid effluents in ground water and surface water at the site. When the COL Action Item and Permit Conditions are taken into account, the SER concludes that the SSAR conforms to Section 2.4.13 of RS-002, Attachment 2, and meets the requirements to identify and evaluate accidental releases of liquid effluents to ground and surface water at the site under 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

Q. Please summarize the information in the SSAR and SER regarding ground water.

A. SSAR § 2.4.13 provides information regarding ground water for the site and notes that ground water would not be used for either normal or safety-related plant operations. The SER states that the SSAR's description of regional hydrogeologic conditions and onsite and offsite groundwater use is accurate. When the COL Action Items and Permit Condition are taken into account, the SER concludes that the SSAR conforms to Section 2.4.12 of RS-002, Attachment 2, and meets the requirements to identify and evaluate ground water characteristics at the site under 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

E. Geology, Seismology, and Geotechnical Engineering

Q. Please summarize the information in the SSAR and SER regarding site and regional geology.

A. SSAR § 2.5.1 provides information regarding regional and site geology, including potential hazard conditions caused by human activities (*e.g.*, mining activities or ground water depression), as input for the characterization of the geological and seismological characteristics of the site. The Staff, assisted by the U.S. Geological Survey, evaluated the SSAR's information, focusing on tectonic and seismic information, nontectonic deformation information, and conditions caused by human activities. The SER states that the SSAR provides a thorough characterization of the geological and seismological characteristics of the site, as required by 10 C.F.R. § 100.23. These results provide 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 SER also states that the SSAR identifies and appropriately characterizes the seismic sources significant to determining the safe shutdown earthquake (SSE) for the ESP site, and therefore satisfies 10 C.F.R. § 100.23(c) and General Design Criterion 2. Additionally, the SER concludes that the proposed ESP site is acceptable from a geological and seismological standpoint and meets the requirements of 10 C.F.R. § 100.23.

Q. Please summarize the information in the SSAR and SER regarding vibratory ground motions.

A. SSAR § 2.5.2 provides a description of the geological, seismological, and engineering characteristics of the ESP site and of the region surrounding the site, as required by 10 C.F.R. § 100.23. It also contains evaluations that address the inherent uncertainties in the

determination of the SSE response spectrum through the use of a probabilistic seismic hazards analysis (PSHA). The SSAR adequately addresses uncertainties inherent in the characterization of seismic hazards through a PSHA, and that the PSHA follows the guidance of Regulatory Guide 1.165 "Identification and Characterizations of Seismic Sources and Determination of Safe Shutdown Earthquake Ground Motion." The determination of the SSE response spectrum deviates from Regulatory Guide 1.165 guidance in one area. Regulatory Guide 1.165 states that a reference hazard probability of median $1\text{E-}5/\text{year}$ should be used to determine the SSE. This reference probability was established based upon an evaluation of the probability of exceeding the SSE design spectra for 29 existing nuclear power plants in Central and Eastern United States (CEUS), that have seismic designs that use the Regulatory Guide 1.60 standard design response spectrum based upon assessments of geological and seismological data available in the 1980's. More recent data indicates that the reference probability will continue to be subject to change as the seismic hazard for CEUS sites change with the collection of new data, making the reference probability an unstable metric for future application to determine SSE response spectra. Therefore, rather than develop a new reference probability based on this more recent data or conservatively use the reference probability in Regulatory Guide 1.165, EGC decided to use a national consensus standard, American Society of Civil Engineers (ASCE) / Structural Engineering Institute (SEI) Standard ASCE/SEI 43-05. ASCE/SEI 43-05 Standard establishes uniform performance goal-based procedures for the determination of the SSE response spectrum for a site based on combining PSHA with seismic design criteria and procedures. The most stringent performance goal of ASCE/SEI 43-05 Standard is to keep SSCs essentially within elastic

limits at a mean annual target performance frequency of 1E-5. For a plant using the methodology in ASCE/SEI 43-05 Standard, the seismic core damage frequency would be less than the mean seismic core damage frequency of existing nuclear plants. ASCE/SEI 43-05 provides for a consistent level of seismic risk performance for all plants using the methodology, whereas Regulatory Guide 1.165 provides for a shifting level of performance as new data impacting the seismic hazard becomes available for the reference plants. 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. The SER states that the SSE, which was 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. Accordingly, the SER concludes that the proposed ESP site is acceptable from a geological and seismological standpoint and meets the requirements of 10 C.F.R. § 100.23.

Q. Please summarize the information in the SSAR and SER regarding surface faulting.

A. SSAR § 2.5.3 provides information regarding the potential for surface faulting and the potential for surface tectonic deformation at the ESP site. The Staff evaluated the investigations performed by the Applicant, including a site visit with the assistance of U.S. Geological Survey advisors. The SER concludes that the Applicant performed its surface faulting investigations for the site in accordance with 10 C.F.R. § 100.23 and Regulatory Guide 1.165 and that the SSAR provides an adequate basis to establish that no capable tectonic sources exist in the site vicinity that would cause surface deformation

in the site area. The SER also concludes that the site is suitable from the perspective of tectonic surface deformation and meets the requirements of 10 C.F.R. § 100.23.

Q. Please summarize the information in the SSAR and SER regarding stability of subsurface materials and foundations.

A. SSAR § 2.5.4 provides information regarding the overall subsurface profile and the engineering properties of the soil and rock underlying the ESP site. The SER reviews and agrees with the site characteristics and the values for those characteristics, subject to COL Action Items and a Permit Condition.

Q. Please summarize the information in the SSAR and SER regarding stability of slopes.

A. SSAR § 2.5.5 states that slope stability analyses were not carried out for the Application – either for the CPS UHS or any other slopes that could be associated with future development – because the design of the EGC ESP facility has not yet been developed. As provided in a COL Action Item, a COL or CP applicant will conduct a more detailed dynamic analysis of the stability of the existing slope and any new slopes using the SSE ground motion.

Q. Please summarize the information in the SSAR and SER regarding embankments and dams.

A. SSAR § 2.5.6 describes the assessment of the Clinton Lake main dam and the CPS UHS as it relates to the potential for seismically induced floods and water waves. The SER's conclusions regarding dam failures, seiche flooding, and slope stability are discussed above.

F. Radiological Effluents

Q. Please summarize the information in the SSAR and SER regarding gaseous effluents.

A. SSAR § 3.1.1 provides information regarding the control, collection, processing, storage, and disposal of potentially radioactive gases during plant operation including startup, normal operations, shutdown, refueling, and anticipated operational occurrences. The normal gaseous effluents are released from the plant to the environment via waste processing systems designed to minimize the releases to and impact on the environment. The release of radioactive gaseous effluents from the facility is controlled and monitored based upon the regulatory limits specified in 10 C.F.R. Part 20 and 10 C.F.R. Part 50, Appendix I.

Q. Please summarize the information in the SSAR and SER regarding liquid effluents.

A. SSAR § 3.1.2 provides information regarding the control, collection, processing, storage, and disposal of potentially radioactive liquids during plant operation including startup, normal operations, shutdown, refueling, and anticipated operational occurrences. The system will typically be operated in a manner that minimizes release of radioactivity to the environment. The SSAR includes a bounding assessment to demonstrate the capability of complying with the 10 C.F.R. Part 20 and 10 C.F.R. Part 50, Appendix I regulatory requirements at the EGC ESP site.

Q. Please summarize the information in the SSAR and SER regarding solid waste.

A. SSAR § 3.1.3 provides information regarding the control, collection, handling, processing, packaging, and temporary storage prior to off-site shipment of wet and dry solid radioactive waste materials generated during normal plant operations. Shipments of solid radioactive waste material will be made periodically between the EGC ESP Site and the permanent waste disposal facility. The waste will be packaged and shipped in accordance with applicable regulations in 10 C.F.R. Part 71 and 49 C.F.R. Part 173.

Q. What are the NRC's conclusions regarding gaseous and liquid effluents and solid waste?

A. The SER states that 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, 10 C.F.R. Part 71, and 49 C.F.R. Part 173, and maintain them at as low as reasonably achievable (ALARA) levels in accordance with the effluent design objectives set forth in Appendix I to 10 C.F.R. Part 50, subject to a COL Action Item.

G. Thermal Discharges

Q. Please summarize the information in the SSAR and SER regarding normal plant heat sink.

A. SSAR § 3.2.1 provides information on the normal heat sink (NHS) which 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 operation. Makeup water for the NHS cooling towers would be withdrawn from Clinton Lake. The SER states that the normal heat sink is likely to be able to perform its function consistent with the maximum thermal discharge assumed in the PPE and that the consequences of the normal heat sink operation on the UHS are acceptable and should not lead to frequent plant shutdown or frequent use of the UHS.

Q. Please summarize the information in the SSAR and SER regarding the ultimate heat sink.

A. SSAR § 3.2.2 provides information on the UHS. Some of the possible reactor technology designs considered for the PPE will require safety-related cooling water systems. 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. The UHS function for the EGC ESP facility may be provided by the safety-related cooling towers that will provide the heat rejection from the safety-related cooling water systems. The safety class supply of makeup water for the cooling tower basins is provided from Clinton Lake. The SER concludes that the SSAR meets the requirements of 10 C.F.R. § 52.17(a) and 10 C.F.R. § 100.20(c).

H. Radiological Consequences of Accidents

- Q. What are the regulatory requirements regarding radiological consequences of accidents at the proposed site?
- A. 10 C.F.R. § 52.17(a) and § 50.34(a) require the SSAR to evaluate a postulated fission product release from the core into the containment, assuming that the facility is operated at the ultimate power level contemplated, and determine that: (1) an individual located at any point on the EAB for any two hour period following the accident would not receive a radiation dose in excess of 25 rem total effective dose equivalent; and (2) an individual located at any point on the outer boundary of the LPZ, who is exposed to the radioactive cloud resulting from the accident during the entire period of its passage would not receive a radiation dose in excess of 25 rem total effective dose equivalent.
- Q. Please summarize the information in the SSAR and SER regarding the selection of postulated accidents.
- A. SSAR § 3.3.1 provides information on a bounding and representative set (in terms of frequency and consequences) of postulated accidents that cover a spectrum of design basis accidents (DBAs) and reactor types. Consistent with regulatory objectives for determining site suitability, the selection includes low probability accidents postulated to

result in significant releases of radioactivity to the environs. In addition, accidents of higher frequency but with lower potential for significant releases are considered to permit quantitative assessment of the spectrum of potential risks at the EGC ESP Site. The SER concludes that the SSAR includes DBAs that are consistent with those analyzed in NUREG-0800 and provides an acceptable DBA selection for evaluating the compliance of the proposed ESP site with the dose consequence evaluation factors specified in 10 C.F.R. § 50.34(a)(1).

Q. Please summarize the information in the SSAR and SER regarding source terms.

A. Since a plant design has not yet been selected for the EGC ESP facility, actual source terms do not exist for the performance of accident dose analyses. However, as described in SSAR § 3.3, EGC performed bounding accident dose analyses for the ESP, using PPE source terms derived from the ABWR and AP1000. The SER states that the PPE values described in the SSAR for source terms included as inputs to the radiological consequence analyses are reasonable and acceptable.

Q. Please summarize the information in the SSAR and SER regarding postulated accidents and accident dose consequences.

A. SSAR §§ 3.3.2 and 3.3.4 provide information regarding postulated accidents and accident dose consequences, including radiological consequence analyses using 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. The SER concludes that the SSAR demonstrates that 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, and the SSAR complies with the requirements of 10 C.F.R. § 52.17 and 10 C.F.R. Part 100.

I. Security

- Q. Please summarize the information in the SSAR and SER regarding security.
- A. SSAR § 3.4.1.6 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. The SER concludes that: (1) the EGC 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) EGC has a security program in place for the existing unit and that there are no identified impediments to the eventual development of an adequate security plan for the EGC 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, subject to a COL Action Item.

V. CONFORMANCE WITH NRC REGULATIONS

Q. What is the primary regulation governing the content of the SSAR?

A. The primary regulation governing the content of the SSAR is 10 C.F.R. § 52.17(a)(1).

Q. In your opinion, does the SSAR comply with 10 C.F.R. § 52.17(a)(1)?

A. Yes. As shown in the following table, the SSAR complies with each of the requirements in that section.

Section 52.17(a)(1) Provision	SSAR Section
Information required by § 50.33 (a) through (d); <i>i.e.</i> , name of applicant; address of applicant; a description of the business or occupation of applicant; the state of incorporation and the principal location where it does business; the names, addresses and citizenship of its directors and of its principal officers; and whether it is owned, controlled, or dominated by an alien, a foreign corporation, or foreign government	Administrative Information § 3
Information required by § 50.34 (a)(12) and (b)(10); <i>i.e.</i> , information complying with the earthquake engineering criteria in Appendix S to Part 50	2.5
Information required by § 50.33 (g) and (j), and § 50.34 (b)(6)(v) related to emergency planning information and control of restricted data in the application	<ul style="list-style-type: none"> • Emergency Plan information • The application does not contain restricted data
An analysis and evaluation of the major structures, systems, and components of the facility that bear significantly on the acceptability of the site under the radiological consequence evaluation factors identified in § 50.34(a)(1)	3.3
Site characteristics that comply with Part 100	See discussion below
The number, type, and thermal power level of the facilities for which the site may be used	1.2.3, 1.3, 1.4
The boundaries of the site	1.2.1, 2.1.1
The proposed general location of each facility on the site	1.2, 2.1.1

The anticipated maximum levels of radiological and thermal effluents each facility will produce	3.1, 3.2
The type of cooling systems, intakes, and outflows that may be associated with each facility	3.2
The seismic, meteorological, hydrologic, and geologic characteristics of the proposed site	2.3, 2.4, 2.5
The location and description of any nearby industrial, military, or transportation facilities and routes	2.2
The existing and projected future population profile of the area surrounding the site	2.1.3

Q. In your opinion, does the SSAR comply with the non-seismic site criteria in 10 C.F.R. § 100.21?

A. Yes. SSAR § 3.4 provides information demonstrating conformance with the requirements of 10 C.F.R. § 100.21, as follows:

Non-Seismic Site Criteria	SSAR Section
Exclusion Area and Low Population Zone	3.4.1.1
Population Center Distance	3.4.1.2
Site Atmospheric Dispersion Characteristics and Dispersion Parameters	3.4.1.3
Site Characteristics – Meteorology, Geology, Seismology, and Hydrology	3.4.1.4
Potential Off-Site Hazards	3.4.1.5
Site Characteristics – Security Plans	3.4.1.6
Site Characteristics – Emergency Plans	3.4.1.7
Population Density	3.4.1.8

The criteria in 10 C.F.R. § 100.21 address the “factors to be considered” in 10 C.F.R. § 100.20. Therefore, by demonstrating conformance to § 100.21, the table provided above also demonstrates conformance to § 100.20.

Q. In your opinion, does the SSAR comply with the geologic and seismic site criteria in 10 C.F.R. § 100.23?

A. Yes. As shown in the following table, the SSAR contains information demonstrating conformance to the geologic and seismic siting criteria in Section 100.23.

Summary of Applicable Provisions in 10 C.F.R. § 100.23	SSAR Section
(c) The geological, seismological, and engineering characteristics of a site and its environs must be investigated in sufficient scope and detail to permit an adequate evaluation of the proposed site, to provide sufficient information to support evaluations performed to arrive at estimates of the SSE, and to permit adequate engineering solutions to actual or potential geologic and seismic effects at the proposed site. Data on the vibratory ground motion, tectonic surface deformation, nontectonic deformation, earthquake recurrence rates, fault geometry and slip rates, site foundation material, and seismically induced floods and water waves must be obtained by reviewing pertinent literature and carrying out field investigations.	2.5.1 2.5.2
(d)(1) The SSE for the site is characterized by both horizontal and vertical free-field ground motion response spectra at the free ground surface. The SSE for the site is determined considering the results of the investigations required by paragraph (c) of this section. Uncertainties must be addressed through an appropriate analysis, such as a probabilistic seismic hazard analysis or suitable sensitivity analyses.	2.5.2.6
(d)(2) Sufficient geological, seismological, and geophysical data must be provided to clearly establish whether there is a potential for surface deformation.	2.5.3
(d)(3) The size of seismically induced floods and water waves that could affect a site from either locally or distantly generated seismic activity must be determined.	2.5.6.2

(d)(4) Siting factors for other design conditions that must be evaluated include soil and rock stability, liquefaction potential, natural and artificial slope stability, cooling water supply, and remote safety-related structure siting. Each applicant shall evaluate all siting factors and potential causes of failure, such as, the physical properties of the materials underlying the site, ground disruption, and the effects of vibratory ground motion that may affect the design and operation of the proposed nuclear power plant(s).	2.5.4 2.5.5 2.5.6.1
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VI. REQUIRED SAFETY FINDINGS

- Q. Do you have an opinion on whether the issuance of an ESP would not be inimical to the common defense and security or to the health and safety of the public?
- A. Yes. 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. Additionally, the SSAR complies 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), and the EP information complies with the requirements in 10 C.F.R. § 52.17(b). 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. For these reasons the issuance of the ESP for the Clinton site will also not be inimical to the common defense and security.
- Q. Do you have an opinion on whether, 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?

- A. Yes. The EGC ESP site characteristics comply with the requirements of 10 C.F.R. § 52.17 and 10 C.F.R. Part 100. 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.

Q. Do you have any concluding remarks?

- A. Yes. For the reasons I have discussed, 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.

Q. Does this conclude your testimony?

- A. Yes.

STATEMENT OF PROFESSIONAL QUALIFICATIONS OF EDDIE R. GRANT

Education

University of Oklahoma, B.S. Nuclear Engineering (1978)

Current Position

Self-employed as Contractor, Licensing and Regulatory Services

- Dec 2005 – current, NuStart Energy, LLC – Part 52 COL Activities
 - Providing licensing expertise and coordination of preparation and reviews of an application for a Part 52 Combined License (COL) for the Bellefonte project.
 - Representing NuStart on NEI COL Task Force and NEI Seismic Issues Task Force.
- Jun 2002 – current, Exelon Generation Company – Part 52 Activities
 - Providing licensing expertise and coordination of preparation and reviews of an application for a Part 52 Early Site Permit.
 - Representing Exelon on NEI Early Site Permit Task Force, NEI Combined Operating License Task Force, NEI Seismic Issues Task Force and an NEI (proposed Part 53) New Regulatory Framework Task Force.
- Jan 2003, Louisiana Energy Services - Uranium Enrichment Facility
 - Providing licensing expertise during final review of an application for a license for a uranium enrichment facility originally proposed for a location in Hartsville, TN.
- Jan 2002 – Feb 2002, Entergy Nuclear Northeast - J. A. FitzPatrick
 - Providing support of engineering activities with focus on coordinating reviews of proposed Improved Technical Specifications for final submittal and certification, including closure of remaining open issues and supporting closure of final review comments.
- May 2000 – Dec 2001, Nebraska Public Power District - Cooper Nuclear Station
 - Providing general support of Nuclear Licensing and Safety Manager activities with focus on mentoring of permanent Licensing Staff personnel.
 - Providing staff augmentation and performing general licensing activities as assigned, including drafting and reviewing License Amendment Requests, Licensee Event Reports, responses to Inspection Report findings, and other correspondence, reviewing procedure revisions, and conducting a general assessment of Nuclear Licensing and Safety activities and processes.
- Sept 1999 - April 2000, ComEd - LaSalle County Station
 - Site Lead utility position in team developing the conversion of dual unit LaSalle County Station Technical Specifications to the BWR/6 Improved Standard Technical Specifications (NUREG-1434), including adoption of 24-month cycle surveillance requirements.

- Feb 1998 - Sept 1999, Ontario Hydro/OPG - Regulatory Affairs Department
 - Participant in team establishing initial corporate regulatory oversight group during restructuring and recovery efforts for the nuclear program of twenty CANDU reactors. Activities included preparing policies, standards, programs, and procedures for interface with the Canadian regulatory agency, while supporting the sites and corporate offices day-to-day regulatory needs (including a Darlington Generating Station license renewal application), and mentoring permanent staff in licensing and nuclear safety oversight activities.
- Jan 1998 - Feb 1998, ComEd - Quad Cities Nuclear Plant
 - Participant in team preparing submittals and responses to fire protection issues to allow restart of both Quad Cities units.
- Oct 1997 - Jan 1998, Consumers Power Co. - Palisades Nuclear Plant
 - Participant in team finalizing submittal of conversion of Palisades custom Technical Specifications to the Westinghouse Improved Standard Technical Specifications (NUREG-1431).
- Aug 1995 - Oct 1997, Arkansas Power and Light Co. - Arkansas Nuclear One
 - Lead participant in team preparing the conversion of ANO-1 custom Technical Specifications to the Babcock and Wilcox Improved Standard Technical Specifications (NUREG-1430). The team also prepared to convert ANO-2 standard Technical Specifications to the Combustion Engineering Improved Standard Technical Specifications (NUREG-1432).
- Feb 1994 - Aug 1995, Commonwealth Edison Co. - Zion Station
 - Prepared lead-plant conversion of Zion current Technical Specifications to the Westinghouse Improved Standard Technical Specifications (NUREG-1431).
 - Coordinated development, reviews, comment disposition, and NRC negotiations in a Near Term Operating License (NTOL)-like project conversion.
- Oct 1993 - Jan 1994, Gulf States Utilities Co. - River Bend Station (RBS)
 - Established program for review and identification of Cost Beneficial Licensing Actions (CBLAs) at RBS. Identified and began internal development of several high priority CBLAs.
 - Prepared internal Nuclear Licensing policies for review and approval by Nuclear Licensing management.
- Jan 1993 - Oct 1993, BWR6 Improved Technical Specification Conversion Project
 - Prepared lead-plant conversion of Grand Gulf Nuclear Station (GGNS) current Technical Specifications to the BWR6 Improved Standard Technical Specifications (NUREG-1434). Contributed to development and comment disposition for all four BWR6 plant conversions. All four of these have been implemented (GGNS, RBS, Clinton and Perry).

- Jan 1992 - Jan 1993, Commonwealth Edison Co. - Dresden Station
 - Prepared and coordinated internal reviews for complete conversion of Dresden (two units) and Quad Cities (two units) custom Technical Specifications to the BWR4 Standard Technical Specification format and content, as applicable. These were approved by NRC and have been implemented at both stations. Prepared and coordinated reviews for Operating License Amendment Requests, Regulation Exemptions, and Waivers of Compliance. Provided 2-day training course on Waivers of Compliance from the regulatory perspective. Reviewed proposed revisions of the technical specifications and provided interpretations where such revisions were unnecessary.
- May 1990 - Dec 1991, Baltimore Gas and Electric Co. - Calvert Cliffs
 - Prepared and coordinated reviews for Operating License Amendment Requests, Regulation Exemptions, and Quality Assurance Program revisions.
 - Reviewed proposed revisions of the technical specifications and provided interpretations where such revisions were unnecessary.
 - Provided initial input and review support for thorough revision of procedures for revision of the operating license, including the technical specifications.
- Feb 1990 - May 1990, Arkansas Power and Light Co. - Arkansas Nuclear One
 - Review and preparation of proposed revisions for various licensing procedures, including license amendments, interpretations, exemption requests, Part 21 evaluations, justifications for continued operation (licensing bases compliance), unreviewed safety questions, unreviewed environmental questions, and environmental impact reviews.
 - Conducted comparison of technical specifications, surveillance requirements with initiating procedures and performance procedures.
- Feb 1988 - Feb 1990, Philadelphia Electric Co. - Limerick Generating Station
 - Responsible for coordination of activities associated with resolution of issues related to obtaining an operating license from the Nuclear Regulatory Commission for Limerick Unit 2. Major aspects of the position include direct interface with the NRC's Office of Nuclear Reactor Regulation to resolve open Safety Evaluation Report issues, coordinate ACRS activities, and support the Nuclear QA Department's resolution of NRC Regional issues.
 - Upon issuance of the Limerick Unit 2 Operating License, responsibilities were supplemented to include operating plant support activities, such as Licensee Event Report preparation and review, License Amendment preparation and review, and review of operating events for regulatory compliance.

Affiliations

- American Nuclear Society (ANS), 1978-present, National Life Member
- ANS, Bylaws and Rules Committee Member, 1986-2000
- ANS, Bylaws and Rules Committee Chair, 1989-1991

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of

EXELON GENERATION COMPANY, LLC

(Early Site Permit for the Clinton ESP Site)

Docket No. 52-007

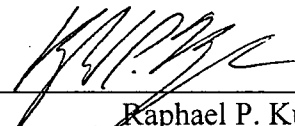
ASLBP No. 04-821-01-ESP

October 17, 2006

CERTIFICATE OF SERVICE

I hereby certify that copies of the attached letter dated October 17, 2006, from Steven P. Frantz to the Licensing Board Members and Exelon Generation Company, LLC's (1) "Prefiled Testimony of Thomas P. Mundy on Exelon Generation Company's ESP Application," (2) "Prefiled Testimony of Eddie R. Grant on Required Safety Findings," and (3) "Prefiled Testimony of Tamar Jergensen Cerafici on Required Environmental Findings" in the above captioned proceeding have been served as shown below by deposit in the United States mail, first class, this 17th day of October, 2006. Additional service has also been made this same day by electronic mail as shown below.

Office of the Secretary* U.S. Nuclear Regulatory Commission Attn: Rulemakings and Adjudication Staff Washington, DC 20555-0001 email: hearingdocket@nrc.gov	Office of Commission Appellate Adjudication U.S. Nuclear Regulatory Commission Washington, DC 20555-0001
Dr. Paul B. Abramson Atomic Safety and Licensing Board Panel U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 email: pba@nrc.gov	Dr. Anthony J. Baratta Atomic Safety and Licensing Board Panel U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 email: ajb5@nrc.gov
Dr. David L. Hetrick 8740 E. Dexter Drive Tucson, AZ 85715 email: dlmwh@dakotacom.net	Ann P. Hodgdon Robert M. Weisman Office of the General Counsel U.S. Nuclear Regulatory Commission Washington, DC 20555-0001 email: aph@nrc.gov, rmw@nrc.gov



Raphael P. Kuyler

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Steven P. Frantz
Partner
202.739.5460
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October 17, 2006

Dr. Paul B. Abramson, Chairman
Dr. Anthony J. Baratta
Dr. David L. Hetrick
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Re: Exelon Generation Company, LLC (Early Site Permit for Clinton ESP Site), Docket No. 52-007-ESP: Submittal of Prefiled Direct Testimony

Dear Licensing Board Members:

In accordance with the Atomic Safety and Licensing Board's ("Board's") August 2, 2006 Order in the above proceeding, Exelon hereby provides the enclosed prefiled direct testimony. It consists of three separate documents: (1) "Prefiled Testimony of Thomas P. Mundy on Exelon Generation Company's ESP Application," (2) "Prefiled Testimony of Eddie R. Grant on Required Safety Findings," and (3) "Prefiled Testimony of Tamar Jergensen Cerafici on Required Environmental Findings."

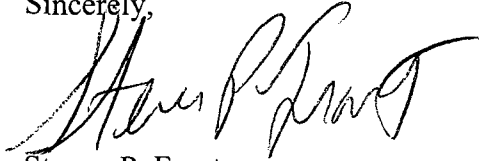
Also in accordance with the Board's request during the October 3, 2006 prehearing teleconference, Exelon hereby provides the following list of exhibits that it intends to introduce as evidence at the November 7-9, 2006 mandatory hearing in Decatur, Illinois:

1. Exelon Generation Company, LLC, Early Site Permit Application, Revision 4, April 14, 2006;
2. The following slide presentations to be given by Exelon's witnesses at the hearing:
 - Overview of Clinton Early Site Permit Application (Thomas P. Mundy)
 - Safety Assessment of Clinton Early Site Permit (Eddie R. Grant)

Atomic Safety and Licensing Board
October 17, 2006
Page 2

- Environmental Analyses for Clinton Early Site Permit (Tamar J. Cerafici)

Sincerely,

A handwritten signature in black ink, appearing to read "Steven P. Frantz". The signature is fluid and cursive, with a large initial "S" and "F".

Steven P. Frantz
Counsel for Exelon Generation Company, LLC

Enclosures

cc: Service List