July 26, 2004

Ms. Marilyn Kray
Vice President, Project Development
Exelon Generation
200 Exelon Way, KSA3-N
Kennett Square, PA 19348

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 4 - EXELON EARLY SITE PERMIT APPLICATION FOR THE CLINTON ESP SITE (TAC NO. MC1122)

Dear Ms. Kray:

By letter dated September 25, 2003, Exelon Generation Company, LLC (Exelon) submitted its application for an early site permit (ESP) for the Clinton ESP site.

The Nuclear Regulatory Commission (NRC) staff is performing a detailed review of the Site Safety Analysis Report in your ESP application to ensure that the information is sufficiently complete to enable the NRC staff to reach a final conclusion on all safety questions associated with the site before the ESP is issued. The NRC staff has determined that additional information is necessary to continue the review. The topic covered in the request for additional information (RAI) contained in Enclosure 1 is meteorology. These RAIs were sent to you via electronic mail (e-mail) on June 11 and July 8, 2004.

Receipt of requested information within 75 days of the date of this letter will support the NRC's efficient and timely review of Exelon's ESP application. Please note that failure to provide a response in a timely fashion may result in a delay of completion of the staff's safety evaluation report. If you have any questions or comments concerning this matter, you may contact me at (301) 415-1180 or nvg@nrc.gov.

Sincerely,

/RA/

Nanette V. Gilles, Exelon ESP Project Manager
New Reactors Section
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket No. 52-007

Enclosure: As stated

cc: See next page

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Exelon Early Site Permit Application
Site Safety Analysis Report (SSAR) Section 2.3, Meteorology
Requests for Additional Information (RAI)

SSAR Section 2.3.1, Regional Climatology

RAI 2.3.1-1

SSAR Table 2.3-3 shows the number of tornadoes reported for DeWitt and the immediately adjacent surrounding counties for the period of record 1950 through 2002. Subsequent to the period of record reported in SSAR Table 2.3-3, there were 63 tornadoes reported in Central Illinois in 2003, 23 of which occurred in DeWitt and its surrounding counties. These 63 tornadoes rank 2003 second on the list for the most tornadoes in a year for central Illinois since 1950. Please update the tornado statistics provided in SSAR Section 2.3.1.2.2 and Tables 2.3-2 and 2.3-3 to include data from 2003.

RAI 2.3.1-2

Please provide a 3-second gust wind speed that represents a 100-year return period for the Clinton early site permit (ESP) site. This site characteristic value potentially represents a typical design parameter input for new reactor designs. Because the National Weather Service has phased out the measurement of fastest-mile wind speeds, Structural Engineering Institute/American Society of Civil Engineers (SEI/ASCE) 7-02 has redefined the basic wind as the peak (3-second) gust, a value which is now recorded and archived at most National Weather Service Stations.

RAI 2.3.1-3

SSAR Table 2.3-1 reports a peak gust wind speed of 69 miles per hour (mph) as well as a fastest-mile wind speed of 75 mph for both Peoria and Springfield. Given the response characteristics of the instrumentation used, the peak gust measurement is associated with an averaging time of approximately 3 seconds whereas the fastest-mile wind speed measurement of 75 mph is associated with an averaging time of approximately 48 seconds. Typically, extreme wind values are expected to increase as the averaging time decreases; for example, the fastest 3-second-average wind speed would be expected to be higher than the fastest 48-second-average wind speed which would be expected to be higher than the fastest 5-minute-average wind speed. Consequently, please explain the apparent abnormality in SSAR Table 2.3-1 where the reported peak gust wind speeds are lower than the reported fastest-mile wind speeds.

RAI 2.3.1-4

There are inconsistences reported in the SSAR for the maximum monthly and maximum 24-hour snowfall value for Springfield. Section 2.3.1.2.3 states that the maximum monthly snowfall in the Springfield area is 24.4 inches whereas Table 2.3-1 reports a monthly maximum snowfall value of 22.7 inches. Likewise, Section 2.3.1.2.3 reports a maximum recorded 24-hour snowfall of 15.0 inches whereas Table 2.3-1 reports a 24-hour snowfall value of 10.9 inches. In addition, the Illinois State Climatologist Office's web site, http://www.sws.uiuc.edu/atmos/statecli/summary/118179.htm, reports a third value for the 1-day maximum snowfall: 17.0 inches (December 12, 1972) for the period of record 1908 through

2001. Please affirm the appropriate maximum monthly and maximum 24-hour snowfall values for Springfield.

RAI 2.3.1-5

SSAR Section 2.3.1.2.3 defines an appropriate 100-year return period snowpack for the Clinton ESP site as 22 psf, based on the ASCE Standard 7-98, "Minimum Design Loads for Buildings and Other Structures." However, ASCE 7-98 Figure 7-1 shows a ground snow load of 20 performance shaping factor (psf) for the Clinton ESP site which, by definition, has a 2 percent annual probability of being exceeded or a 50-year mean recurrence interval. According to ASCE 7-98 Section C7.3.3, the ratio of the 100-year to 50-year mean recurrence interval values is typically 1.22, which means that the 50-year return period snowpack value of 20 psf corresponds to a 100-year return period snowpack value of 24 psf. Consequently, please justify the 100-year return period snowpack value of 22 psf presented in the Clinton ESP SSAR.

RAI 2.3.1-6

The 79 psf value presented in SSAR Section 2.3.1.2.3 as the 48-hour winter Probable Maximum Precipitation (PMP) for the Clinton ESP site is based on the winter PMP data cited in the Clinton Power Station (CPS) updated safety analysis report (USAR) Section 2.3.1.2.3. The CPS USAR winter PMP value (15.2 inches of precipitable water) was derived from Hydrometeorological Report (HMR) No. 33 published in 1956 by the United States Weather Bureau. HMR No. 33 has been superseded and updated with the issuance of HMR No. 53 in 1980. Please update the 48-hour winter PMP presented in the SSAR with data from HMR No. 53.

RAI 2.3.1-7

Please provide the meteorological data to be used to evaluate the performance of a mechanical draft cooling tower ultimate heat sink with respect to: (1) maximum evaporation and drift loss; and (2) minimum water cooling. The period of record examined should be identified, and the bases and procedures used for selection of the critical meteorological data should be provided and justified. Section C.1 of Regulatory Guide (RG) 1.27, "Ultimate Heat Sink for Nuclear Power Plants," describes methods and approaches acceptable to the staff to ensure that a 30-day cooling supply is available and that design basis temperatures of safety-related equipment are not exceeded.

RAI 2.3.1-8

Please provide the ambient air temperature and humidity site characteristic values specified below. The bases for these values should also be provided. These site characteristic values represent typical design parameter information for a range of reactor designs.

a) Maximum ambient dry bulb temperatures (along with the concurrent wet bulb temperatures) that:
   i) will be exceeded no more than 2.0 percent of the time annually.
   ii) will be exceeded no more than 0.4 percent of the time annually.
   iii) represents a 100-year return period.

b) Minimum ambient dry bulb temperature that:
   i) will be exceeded no more than 1.0 percent of the time annually.
   Ii) will be exceeded no more than 0.4 percent of the time annually.
   iii) represents a 100-year return period.

c) Maximum ambient wet bulb temperature that:
   i) will be exceeded no more than 0.4 percent of the time annually.
   ii) represents a 100-year return period.

RAI 2.3.1-9

SSAR Section 2.3.1.2.2 states that the Clinton ESP site characteristic maximum tornado wind speed is 300 mph, based on SECY-93-087. The subject of the applicable section of SECY-93-087 is design-basis tornado for design of advanced light-water reactors (ALWRs). The staff does not agree that acceptance of a given design-basis tornado wind speed for design of ALWRs means that this speed is acceptable for all sites that might be the subject of an ESP. Site parameters are postulated for a design certification [10 CFR 52.47(a)(iii)] and are not required to bound every site on which an applicant might seek to construct a nuclear power plant of certified design.

SECY 93-087 states: “The staff expects that use of these criteria will not preclude siting the ALWR plant designs on most sites in the United States. However, should an actual site hazard exceed the design envelope in a certain area, the combined license (COL) applicant would have the option of performing a site specific analysis to verify that the design is still acceptable for that site.”

The documented basis for the tornado-related conclusions in SECY-93-087 is NUREG/CR-4661, which shows 10^{-7}/yr tornado wind speeds above 300 mph in some parts of the United States. A letter dated March 25, 1988, from the NRC to the ALWR Utility Steering Committee, Subject: ALWR Design Basis Tornado, provided the staff's interim position on design basis tornado wind speed on a site-specific basis. This letter also cited design-basis tornado wind speeds higher than 300 mph in some parts of the United States, including the Clinton ESP site.

ESP applicants are not required to use either RG 1.76 or the staff’s interim position on design basis tornado wind speed, although they may do so since both are staff-accepted approaches. ESP applicants may use any design-basis tornado wind speeds that are appropriately justified. However, the staff does not believe that citing SECY-93-087 (or any document related to design certification) is adequate justification for use of 300 mph. In particular, Figure 30 of NUREG/CR-4461 shows a 10^{-7} probability of occurrence of wind speed of 327 mph for the Clinton ESP site. Please provide a safety justification for choosing 300 mph as the site characteristic maximum tornado wind speed for the Clinton ESP site.

RAI 2.3.1-10

The site characteristic snow load being proposed is based, in part, on a maximum-recorded monthly snowfall in the Clinton ESP site area of 24.7 inches at Peoria, IL in January 1979. However, a higher maximum-recorded monthly snowfall, 30.5 inches, was recorded at Decatur, IL in March 1906 (Reference: Illinois State Climatologist Office website

http://www.sws.uiuc.edu/atmos/statecli/Summary/112193.htm). Please revise the proposed site characteristic snow load using the higher maximum-recorded monthly snowfall recorded at Decatur.

SSAR Section 2.3.2, Local Meteorology

RAI 2.3.2-1

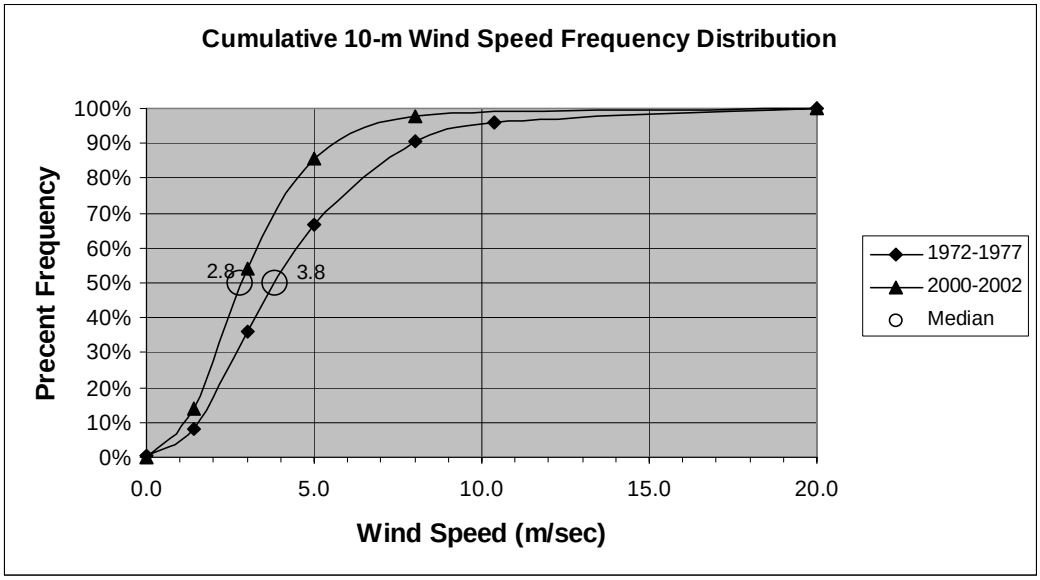
SSAR Sections 2.3.2.1.2 and 2.3.2.1.3 present temperature and humidity information from the onsite meteorological monitoring system for the period of record 1972-1977 and state that these data are believed to be representative of the site area. These data were collected prior to the installation of Clinton Lake and operation of the Clinton Power Station once-through cooling system. Please provide justification that these data remain representative of the Clinton ESP site, given that the site is now adjacent to a heated lake. Have any onsite data been analyzed since Clinton Power Station began operation to support this assumption?

RAI 2.3.2-2

SSAR Section 2.3.2.1.3.4 states that the average yearly precipitation for the Clinton ESP site is 25.47 inches, based on onsite data reported for the 1972-1977 period of record. The SSAR remarks that these data are believed to be representative of the site area and have been previously shown to be consistent with regional observations from Peoria and Springfield, Illinois when compared to long-term periods of record at those locations. However, SSAR Table 2.3-1 reports annual average precipitation totals of 34.89 inches and 33.78 inches for Peoria and Springfield, respectively. Likewise, the 1971-2000 normal annual precipitation reported for the Clinton cooperative weather station (located approximately 7 miles from the Clinton ESP site) is 39.86 inches. Please explain why the 1972-1977 onsite precipitation totals are only approximately 75 percent of the long-term precipitation totals reported for Peoria and Springfield.

RAI 2.3.2-3

The onsite 10-m wind speed frequency distributions presented in SSAR Table 2.3-8 show a general shift towards lower wind speeds in the more recent data. In particular, a plot of cumulative wind speed frequency distribution shows a median (50 percent) wind speed value of 2.8 m/sec for the 2000-2002 period of record as compared to a median wind speed value of 3.8 m/sec for the 1972-1977 period of record. Please explain what might have caused these differences in reported wind speed frequency distributions between these two periods of record.



RAI 2.3.2-4

The onsite (60m-10m delta-temperature) stability class frequency distributions presented in SSAR Table 2.3-37 show a high occurrence of unstable (stability class A, B, and C) conditions for 2000-2002 period of record as compared to 1972-1977 period of record (25.7 percent of the time versus 13.3 percent of the time, respectively). Please explain what might have caused these differences in reported stability class frequency distributions between these two periods of record.

RAI 2.3.2-5

Please identify the air quality characteristics of the site that would be design and operating bases for a nuclear plant or plants that might be constructed on the ESP site.

RAI 2.3.2-6

An hourly wet bulb temperature should never exceed the coincident dry bulb temperature. Consequently, please explain why nearly all of the CPS wet bulb temperature values presented in SSAR Table 2.3-13 exceed the corresponding (dry bulb) temperature values presented in SSAR Table 2.3-9.

SSAR Section 2.3.3, On-site Meteorological Measurements Program

RAI 2.3.3-2

SSAR Section 2.3.3 states that the onsite meteorological monitoring system is compliant with applicable requirements of Revision 0 (February 1972) to RG 1.23, “Onsite Meteorological Programs,” except for exceptions identified in the CPS USAR. However, USAR Section 1.8 states that the CPS meteorological monitoring system meets the requirements of American Nuclear Society (ANS) 2.5-1984 with several exceptions. Please clarify the Clinton ESP

meteorological monitoring program commitments to regulatory guidance documents and identify any exceptions to these documents.

RAI 2.3.3-3

SSAR Section 2.3.3 states that the existing Clinton Power Station onsite meteorological monitoring program will also be used as an operational system once the Clinton ESP facility becomes operational. The options being considered for the Clinton ESP facility normal heat sink include either 60-foot tall mechanical draft cooling towers or 550-foot tall natural draft cooling towers. Please describe the potential location of these cooling towers vis-a-vis the existing meteorological tower and the potential influence of these cooling towers on meteorological measurements.

RAI 2.3.3-4

Please explain why only 32 months of recent onsite data (January 2000-August 2002) have been used to generate the climatic data summaries and atmospheric dispersion analyses presented in the SSAR. Potential bias in these data exists due to the under representation of autumn and early winter months.

SSAR Section 2.3.4, Short-Term Diffusion Estimates

RAI 2.3.4-1

Please explain in more detail how the 50 percent exclusion area boundary (EAB) and low-population zone (LPZ) atmospheric dispersion factors (χ/Q values) were determined. In particular, please explain the apparent discrepancy in the SSAR where Section 2.3.4.3 states that these values represent direction independent (i.e., overall site) values whereas Table 2.3-52 states that these are maximum sector values.

RAI 2.3.4-2

Because potential release points could be located anywhere within the plant envelope area being proposed for the Clinton ESP site, please recalculate the EAB and LPZ χ/Q values using the shortest distances between the ESP plant envelope boundaries and the 1,025-m EAB radius and 4,018-m LPZ radius for each downwind sector. Also provide a copy of the resulting PAVAN input and output files used to generate the accident CHI/Q values that are being proposed as site characteristic values.

Distribution for Request For Additional Information Letter No. 4 dated July 26, 2004

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