



OFFICE OF THE  
GENERAL COUNSEL

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

September 29, 2006

Administrative Judge Paul B. Abramson, Chair  
Atomic Safety and Licensing Board Panel  
U.S. Nuclear Regulatory Commission  
Mail Stop: T-3F23  
Washington, D.C. 20555-0001

Administrative Judge David L. Hetrick  
8740 East Dexter Drive  
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Administrative Judge Anthony J. Baratta  
Atomic Safety and Licensing Board Panel  
U.S. Nuclear Regulatory Commission  
Mail Stop: T-3F23  
Washington, D.C. 20555-0001

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

Dear Administrative Judges:

Pursuant to the Board's Order of September 6, 2006, the Staff hereby submits its responses to the Board's inquiries concerning the Staff's Final Environmental Impact Statement in this proceeding.

Sincerely,

A handwritten signature in black ink that reads "Ann P. Hodgdon".

Ann P. Hodgdon  
Counsel for the NRC Staff

Enclosures: As stated

cc w/encls:

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ATTACHMENT A  
CLINTON ESP  
FEIS INQUIRIES

Q#	Page	Section	Inquiry
NA	NA	NA	<p><i>Question in text of Order:</i> In addition, the Board has observed that the FEIS deals much more thoroughly with issues related to the performance of reactor types other than the ABWR and the AP1000 in development of the PPE (<u>see, e.g.</u>, sections 5.10.1 and 5.10.2 of the FEIS) than does the FSER. The Staff is directed, in addition to responding to the queries set out in Attachment A, to explain why the assessment of the impacts of reactors other than the ABWR and the AP1000 is dealt with differently in the FSER and the FEIS and how those differences affected the logic of the Staff conclusions in each circumstance where it is assessed.</p> <p><u>Response</u></p> <p>With respect to the difference between the final safety evaluation report (FSER) and the final environmental impact statement (FEIS) with respect to certified and non-certified designs, the Staff reviewed how it addressed designs other than the ABWR and AP1000 in Section 5.10 of the FEIS and in Chapter 15 of the FSER. The Staff does not believe that the depth of its analyses for these designs is markedly different. In both the FEIS and the FSER, the analyses related to accidents focused on the ABWR and the AP1000 because of the level of information available for these designs. In the case of the FSER, the Staff had already evaluated accidents for these designs as part of the design certification reviews. So, in essence, most of the work had already been done. For the FEIS, the Staff was, for the first time, evaluating the environmental impacts of accidents for these designs at a site, so that analysis was new. For the other reactor designs in both the FEIS and the FSER, the Staff indicated that there was not as much information available, but the Staff judged the results for the ABWR and the AP1000 as likely to bound the results for the other designs. In both documents, the Staff indicated that, if a design other than the ABWR or AP1000 were chosen at the COL stage, the assumption that the results were bounded would have to be confirmed.</p>

		<p><u>Response continued:</u></p> <p>The Board indicated that its reference to Section 5.10 was just an example, but did not make clear in what other portions of the FEIS it found a marked difference between the FEIS and FSER in the depth of analyses for these other designs. However, the Staff can address, in general terms, some fundamental differences between the approaches used for the FEIS and the FSER. The sources of the differences are the statutory and regulatory requirements for each review. The Staff's safety review is performed under the Atomic Energy Act and in accordance with the regulations in 10 CFR Part 52. The environmental review is performed under the National Environmental Policy Act (NEPA) as implemented in NRC regulations at 10 CFR Part 51. Whereas the safety review is focused primarily on protecting the health and safety of the public, the environmental review considers a much broader range of impacts to the environment as a whole.</p> <p>Starting from NEPA and Part 51, for an environmental review the Staff evaluates the reasonably foreseeable impacts. In addition, the Staff has the latitude, if numerical data are not available, to qualitatively evaluate the impacts.<sup>1</sup> In contrast, the safety review generally focuses on the results of conservative analyses. As an example, in considering <math>\chi/Q</math> values the Staff used "typical" meteorological conditions in the FEIS (see page 5-63). "Typical" is defined as those conditions that give atmospheric dispersion factors that are exceeded [i.e., dispersion is lower] 50 percent of the time. In contrast, for the Chapter 15 analyses in the FSAR, the Staff used values for <math>\chi/Q</math> associated with "adverse" meteorological conditions (defined as those conditions that give atmospheric dispersion factors that are exceeded no more than 5 percent of the time).</p>
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<sup>1</sup> As stated in 10 CFR § 51.70(d), "The analysis for all draft environmental impact statements will, to the fullest extent practicable, quantify the various factors considered. To the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms."

			<p><u>Response continued:</u></p> <p>Another reason for differences in approach between the FEIS and the FSEIR is the matter of perspective. For example, both the FEIS and the FSEIR consider impacts related to hydrology. But in these two documents, the Staff is looking at hydrology for very different reasons. In the FEIS, the Staff is evaluating the impacts on the hydrology of the surrounding area of building and operating a nuclear plant (or plants). In the FSEIR, in contrast, the Staff is evaluating the potential impacts of local hydrology on the plant. Thus, in one case the Staff is looking from the inside out, and in the other case it is looking from the outside in. This difference in perspective leads to very different evaluations in relation to the same resource. Specifically, the analyses in the FSEIR address, for example, concerns related to the probable maximum flood, an issue unrelated to the environmental review. On the other hand, the analyses in the FEIS address concerns related to issues such as reductions in lake level, changes in flows, and the thermal plume.</p> <p>In summary, because of the differences in the basic goals of the analyses in the FEIS and the FSEIR, there are differences in the data used and the approaches applied by the Staff in the analyses. Based upon the reasoning described above, these differences are to be expected between the FEIS and FSEIR reviews.</p>
1	1-4	1.1.3	<p>The Staff states that it “relied on reasonable assumptions made by Exelon” and that those assumptions are “identified in each section and are documented in Appendixes J and K and this EIS.” The Staff then states “staff intends to confirm these assumptions at the CP or COL stage.” (See also Section 3.2.1 on p. 3-7). The Staff notes that it is required to “independently evaluate and be responsible for” information in the EIS.</p> <p>Appendix J is merely a list of parameters for the PPE and, since it was prepared by the applicant, and the applicant bears the full risk at the COL stage of its bounding nature. What is the nature of the “verification” to be conducted by Staff at the COL stage beyond assuring that the actual plant design falls within those bounds?</p> <p>Appendix K, on the other hand, has three parts: K-1 seems to be actual applicant commitments and/or statements to be verified; K-2 lists statements not directly considered by the Staff; and K-3 seems to also have matters that will need to be confirmed at the COL stage (although it is said to relate to activities of third parties). Explain what, if any, matters discussed in sections K-2 and K-3 are to be confirmed at the COL stage, and confirm the Board’s understanding that all items listed in K-1 are to be confirmed at the COL stage.</p>

		<p><u>Response</u></p> <p>Pursuant to 10 C.F.R. 51.70(b) and 51.90, the NRC is required to independently evaluate and be responsible for the reliability of all information used in the EIS, including an EIS prepared for a COL. In carrying out its responsibilities under 10 C.F.R. 51.70(b), the Staff may (1) inquire into the continued validity of information disclosed in an EIS for an ESP that is referenced in a COL application and (2) look for any new information that may affect the assumptions, analysis, or conclusions reached in the ESP EIS.</p> <p>The initial burden to assess newly identified information and those issues that were deferred to the COL, CP, or OL application (including unresolved issues) falls to the applicant. The applicant is required to provide information sufficient to resolve any significant environmental issue not considered in the ESP proceeding, either for the site or design, and the information contained in the application should be sufficient to aid the Commission in its development of an independent analysis (see 10 C.F.R. 51.45). Therefore, the environmental report must contain any significant new information for issues related to the impacts of construction and operation of the facility that were resolved in the ESP proceeding. The Staff, in the context of a COL application that references an ESP, defines "new" in the phrase "new and significant information" as any information that was not considered in preparing the environmental report included in the ESP application or the ESP EIS and that was not generally known or publicly available during the preparation of the ESP EIS.</p> <p>This new information may include (but is not limited to) specific design information that was not contained in the application, especially where the design interacts with the environment, or information that was in the ESP application, but has changed by the time of the COL application. Such new information may or may not be significant. See the NRC letter to NEI dated July 6, 2005, ADAMS ML051050031.</p>
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1	1-4	1.1.3	<p><u>Response continued:</u></p> <p>All matters discussed in sections K-1, K-2, and K-3 are to be confirmed at the COL stage. Matters discussed in K-1 that could be analyzed under the PPE concept were so analyzed in the EIS. Those matters will be reviewed at the COL stage to make sure the proposed parameters remain within the bounds of the PPE concept previously analyzed. Matters listed in K-2 are those matters that are identified in the ER but were not directly considered by the Staff in its evaluation; i.e., they are assumptions that the Staff was aware of during its review but that did not impact the Staff's conclusions. However, because these assumptions have the potential to affect the Staff's analysis should they change by the COL stage, the Staff will revisit these matters at that time. K-3 lists issues (related to transmission lines) that are not directly under the control or purview of Exelon. AmerenIP, not Exelon, owns the transmission lines. AmerenIP is regulated by the Federal Energy Regulatory Commission (FERC) and the State of Illinois (State), and AmerenIP will bear the ultimate responsibility for defining the nature and extent of system improvement. To trigger the interconnection procedure regulated by 18 C.F.R. Part 35, Exelon must submit a large generator interconnection request to AmerenIP. The AmerenIP Open Access Transmission Tariff (State) also governs the eventual routing and siting of new transmission lines serving the Exelon ESP site. Therefore, these issues must be reviewed at the COL stage.</p> <p>The Staff would conduct the verification of these matters at the COL stage in a manner similar to that employed during the review of the ESP application; i.e., the Staff would review information provided by the applicant in its ER and during the Staff's audit, and perform an independent review of these matters, including obtaining and reviewing information from local, State, Tribal, and Federal authorities.</p>
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2	2-15	2.3.1.2	<p>The Staff performed a comparison of atmospheric stability for the period between 1972 and 1977 and between 2000 and 2002. The Staff notes that there has been a shift in the distribution towards unstable conditions. The Staff then suggests that the shift may be due to the existence of the Clinton Lake. Did the Staff examine if there were any changes in regional stability that could explain the observations?</p> <p><u>Response</u></p> <p>The Staff did not examine regional stability change for several reasons. First, the apparent shift was deemed not to be of sufficient significance with respect to the question of acceptability of the Exelon ESP site; therefore, hourly meteorological data for other nuclear power plants in the area were not provided by the Applicant or requested by the Staff. Second, the statement that there has been a shift in stability was an observation about the two sets of site data presented by the Applicant, and the Staff's suggestion is a simple explanation for the change, because, at nuclear power plants, atmospheric stability is determined by the difference in temperature between 10 m and a level greater than 46 m above ground level. The cooling pond, which was not in operation in the 1970s, is a ground-level source of heat. Finally, although methods exist for estimating stability from hourly meteorological observations made by the National Weather Service (NWS), the NWS does not make hourly atmospheric stability determinations. While atmospheric stability estimated from NWS data is generally correlated with the stability determinations made at nuclear power plants, it would be difficult to use stabilities determined from NWS data to evaluate the apparent shift in stabilities seen in the Clinton data.</p>
3	2-18	2.3.3	<p>Fourth paragraph of section: Why is there no reference to the FSER for the atmospheric dispersion values?</p> <p><u>Response</u></p> <p>Atmospheric dispersion values in the FSER are for "adverse" meteorological conditions; they are taken from Table 2.3-51 of the SSAR. Because NEPA reviews have historically been based on reasonable expectations, the adverse values are not appropriate for the FEIS. Atmospheric dispersion values used in the FEIS are for "realistic" or "typical" meteorological conditions. NRC guidance to applicants and licensees has defined "adverse" meteorological conditions as those conditions that give atmospheric dispersion factors that are exceeded no more than 5% of the time. "Typical" meteorological conditions are those conditions that give atmospheric conditions that are exceeded 50% of the time (i.e. the are conditions that give median atmospheric dispersion factors). The atmospheric dispersion values for the FEIS are listed in both Table 2.3-52 of the SSAR and Table 2.7-52 of the ER.</p>

4	2-24	2.6.2.2	<p>Did Staff confirm Exelon's report that 65% of total public groundwater supplies are pumped from the Mahomet Bedrock Valley aquifer? If not, why is this matter not mentioned in Appendix K?</p> <p><u>Response</u></p> <p>No, the Staff did not confirm Exelon's value because Exelon has committed not to use any groundwater. (FEIS pg K-14). The only impacts to groundwater would be indirect and involve a) dewatering during construction and b) changes in lake elevation associated with consumptive water loss from the ESP plant's cooling system. The Staff concluded that the impacts of the dewatering would be localized and temporary given the location of the plant relative to Clinton Lake. The Staff concluded that the impact of the reduced elevation on the adjacent aquifers would be small and localized. Therefore, given that the ESP plant would have insignificant impacts on groundwater, the Staff concluded that a more detailed characterization of the groundwater resource was unnecessary. For these reasons, the percentage and source of groundwater are not mentioned in Appendix K.</p>
5	2-26	2.6.3.3	<p>The Staff states that Exelon proposed two new sampling locations regarding lake inflow and outflow temperature distributions. What is the Staff's view of the sufficiency of this proposal and the locations proposed? If this is an open ended proposal, why is it not mentioned in Appendix K?</p> <p><u>Response</u></p> <p>The agency's decisions in the 1978 Yellow Creek proceeding [LBP-78-7, 7 NRC 215 (1978), and ALAB-515, 8 NRC 702 (1978)] restrict the ability of NRC Staff to specify or require non-radiological monitoring of water resources covered by the Clean Water Act. Therefore, the NRC Staff does not have a position regarding the adequacy of the Applicant's proposed thermal monitoring program. The adequacy of thermal monitoring programs is determined by the Illinois Environmental Protection Agency.</p>

6	2-35	2.7.2.1	<p>Third paragraph of section: Tenmile Creek is “west of the city of Clinton and approximately 8 km (5 mi) west of the site.” But the city of Clinton is 6 mi west of the site. Is there a typographic error in part of this?</p> <p><u>Response</u></p> <p>The information on Tenmile Creek is taken directly from the ER, section 2.4.2.1. However, because the creek <i>is</i> west of the city, it would have been correct to state in the FEIS (on p. 2-35): “The first [environmentally sensitive area] includes a portion of Tenmile Creek just west of the City of Clinton and approximately 10 km (6 mi) west of the site.”</p>
7	2-42	2.8.1	<p>Staff mentions State of IL population projections are “not expected to be released until 2004 to 2006.” Were these projections released? If so, were they considered by Staff? If not, why is this not mentioned in Appendix K?</p> <p><u>Response</u></p> <p>In November 2005, the State of Illinois released new population projections through 2030 based on the 2000 Census. The Staff considered the updated county population projections and determined that the updated numbers would not change any of the Staff’s conclusions regarding socioeconomic impact levels. In addition, changes from the draft EIS to the final were made only in response to a specific question or comment on the draft EIS and no questions were received on this issue. This information does not appear in Appendix K because the Staff determined that the population information supplied by the Applicant did not bound the socioeconomic analysis; therefore, the Staff’s analysis relied on population information it obtained during its independent review.</p>

8	2-45	2.8.1.2	<p>Did Staff verify Exelon's population projection methods and results for tables 2-6 and 2-9? If not, why are these not part of what must be verified at the COL stage?</p> <p><u>Response</u></p> <p>See previous response above. As with all of the information upon which the ESP EIS is based, the applicant for a COL referencing the ESP must search for and reveal any new and significant information regarding the population projections. The Staff will evaluate the applicant's process for identifying new and significant information and will also independently confirm the results of that search for a sample of the issues. The impacts of new and significant information on the analysis results in the ESP EIS will be evaluated in the COL EIS. A similar approach is already being used by the Staff for the supplemental EISs prepared for license renewal of existing plants. See the NRC letter to NEI dated July 6, 2005, ADAMS ML051050031.</p>
9	2-52	2.8.2.1	<p>Middle of page: The term "Starker exchanges" should be defined for the reader.</p> <p><u>Response</u></p> <p>A Starker Exchange is a transaction in which the seller of real property (e.g., a farm) reinvests the proceeds in like-kind property and defers the capital gains taxes (Internal Revenue Code Section 1031).</p>

10	3-2	3.2	<p>Third paragraph of section: "The values used for the seven reactor designs are not necessarily the same values used in the safety evaluation." Why not? Please clarify.</p> <p><u>Response</u></p> <p>As the Staff has indicated in previous responses, there are some basic differences in the approach required for an environmental review (under the National Environmental Policy Act (NEPA) and 10 C.F.R. Part 51) as compared to a safety review (under the Atomic Energy Act and 10 C.F.R. Parts 50 and 52). Starting from NEPA and Part 51, for an environmental review the Staff evaluates the reasonably foreseeable impacts. In addition, the Staff has the latitude, if numerical data are not available, to qualitatively evaluate the impacts.<sup>2</sup> In contrast, the safety review generally focuses on the results of conservative analyses. As an example, in considering <math>\chi/Q</math> values the Staff used "typical" meteorological conditions in the FEIS (see page 5-63). "Typical" is defined as those conditions that give atmospheric dispersion factors that are exceeded (i.e., dispersion is greater) 50 percent of the time. In contrast, for the Chapter 15 analyses in the FSAR, the Staff used values for <math>\chi/Q</math> associated with "adverse" meteorological conditions (defined as those conditions that give atmospheric dispersion factors that are exceeded no more than 5 percent of the time).</p> <p>Another reason for differences in approach between the FEIS and the FSER is the matter of perspective. For example, both the FEIS and the FSER consider impacts related to hydrology. But in these two documents, the Staff is looking at hydrology for very different reasons. In the FEIS, the Staff is evaluating the impacts on the hydrology of the surrounding area of building and operating a nuclear plant (or plants). In the FSER, in contrast, the Staff is evaluating the potential impacts of local hydrology on the plant. Thus, in one case the Staff is looking from the inside out, and in the other case it is looking from the outside in. This difference in perspective leads to very different evaluations in relation to the same resource. Specifically, the analyses in the FSER address, for example, concerns related to the probable maximum flood, an issue unrelated to the environmental review. On the other hand, the analyses in the FEIS address concerns related to issues such as reductions in lake level, changes in flows, and the thermal plume.</p>
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<sup>2</sup> As stated in 10 CFR § 51.70(d), "The analysis for all draft environmental impact statements will, to the fullest extent practicable, quantify the various factors considered. To the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms."

10	3-2	3.2	<p><u>Response continued:</u></p> <p>In summary, because of the differences in the basic goals of the analyses in the FEIS and the FSER, there are differences in the data used and the approaches applied by the Staff in the analyses. Based upon the reasoning described above, these differences are to be expected between the FEIS and FSER reviews.</p>
11	3-4	3.2	<p>Table 3-1: Composing error in heading of table.</p> <p><u>Response</u></p> <p>The Board is correct. The column for the AP1000 reactor information is too narrow.</p>
12	3-6	3.2	<p>Footnote 1 states that the listings in Appendix K are not intended to be a complete list of the commitments described in the ER. Where is there a complete list of such commitments?</p> <p><u>Response</u></p> <p>There is no such list. As stated in Appendix K, the commitments that were considered in the Staff's evaluation of the environmental impacts related to the construction and operation of a new nuclear unit at the Exelon ESP site were listed in Table K-1. Other statements that may have been commitments, but that were <i>not</i> relevant to the review, were not included.</p>
13	3-9	3.2.2.1	<p>Second paragraph of section: The heat rejection of 4420 MW is for two AP-1000 reactors. The other plants in Table 3-1 would produce smaller heat loads. Please clarify how smaller heat loads would affect the discussion.</p> <p><u>Response</u></p> <p>Through the use of the PPE, the Applicant intended to bound the value of a parameter for all of the designs under consideration. Therefore, the impacts of a given parameter on a particular resource should be less for any of the designs other than the design from which the limiting value was drawn. This is true throughout the ER and the EIS.</p> <p>Regarding the value for heat rejection in particular, a smaller value would have a number of effects on the analyses in the EIS. For example, water withdrawals, water consumption (evaporation and drift), and blowdown would all be reduced for a plant with a significantly smaller heat rejection rate. However, the analyses in the EIS are meant to be bounding for the designs under consideration, and so no additional analyses for designs with smaller heat loads are necessary.</p>

14	4-20	4.4.3	<p>Final paragraph of section: "The conclusion of SMALL impacts by the NRC Staff is predicated on certain assumptions made by the Staff. These include . . . ." Why were all assumptions not listed?</p> <p><u>Response</u></p> <p>The assumptions listed constitute the primary assumptions made by the Staff that led to the determination of impacts. Other minor assumptions, such as the current FWS prescriptions for determining impacts to the Indiana bat and its habitat and the Applicant's responsibilities relative to those prescriptions, are spelled out in detail in the supporting text of this section, but are too lengthy to list in the last sentence of the last paragraph of this section. A similar situation exists for the conclusion of section 5.4.3 on page 5-26, for similar reasons.</p>
15	4-33	4.5.3.5	<p>The area around Clinton Lake is a popular summertime destination making rental property both expensive and scarce during that time. As a result, should the impact of construction on housing be listed as SMALL to LARGE depending on the time of year?</p> <p><u>Response</u></p> <p>The term MODERATE is sufficient to bound any potential housing impacts on the smaller counties of DeWitt, Piatt and Logan counties. The reasons are as follows. First, there are few rental properties around Clinton Lake proper. Most rental property is located in the City of Clinton, which is within six miles of the lake, and that rental property is not impacted by the seasonal use of the lake. Most housing around the lake is owner-occupied by year-round residents. These property owners do not have "lake front" property, in that Amergen owns the property from the lake's edge back 100 yards from the lake. The only access to the lake is via public access points at certain locations.</p> <p>Second, most construction workers are expected to come from within the 50-mile region and commute from their current residences to the ESP site. Given the temporary nature of the construction employment, it is unlikely that a large number of workers would seek to build permanent residences close to the ESP site. They would be more likely to rent housing. Third, there are several large cities located close to the ESP site (Decatur and Bloomfield-Normal are within approximately 20 miles of the ESP site) that have sufficient rental units (apartments and houses) to accommodate construction workers who might move to the region. If housing availability and rents in the smaller counties get too restrictive or high, respectively, then most workers would seek housing in the larger cities. Thus, given these facts, the probability of a large effect on the three counties is small, and the Staff considered the MODERATE impact level the most appropriate to bound potential impacts.</p>

16	5-2	5.1.1	<p>The Staff concludes the impacts of construction on land use would be SMALL yet states that additional mitigation would be warranted. Should the statement read "would not be warranted?"</p> <p><u>Response</u></p> <p>The Board is correct. The FEIS text should read "would not be warranted."</p>
17	5-4	5.2.2	<p>Last sentence of section: Give details of this calculation.</p> <p><u>Response</u></p> <p>Table S-3 states that NO<sub>x</sub> emissions from the fuel cycle for a 1000 MWe nuclear plant are equivalent to the emissions from a 45 MWe coal-fired plant. Hence the approximation that NO<sub>x</sub> from a nuclear plant is &lt;5% of the NO<sub>x</sub> from a coal-fired plant.</p> <p>"Carbon Dioxide Emissions from the Generation of Electric Power in the United States," (U.S. Department of Energy, U.S. Environmental Protection Agency, July 2000 [no document number]) lists the CO<sub>2</sub> emissions for coal generation as 2 lb/kwhr for a 2200 MWt coal-fired plant, and the Applicant's ER gives a 0.85 capacity factor for coal-fired plants. From these values, the CO<sub>2</sub> emissions for a coal-fired plant are estimated to be about 16.4 million metric tons per year.</p> <p>Assuming that CO<sub>2</sub> emissions are &lt;5% based on the NO<sub>x</sub> analogy, the CO<sub>2</sub> emissions for the fuel cycle are estimated to be &lt; 0.8 million metric tons.</p>
18	5-6	5.3.2	<p>Second paragraph of section (last sentence): Should the decrease in lake elevation correspond to a decrease in water releases? Please clarify.</p> <p><u>Response.</u></p> <p>Decreased lake elevations do result in lower total releases. The minimum release value for Clinton Lake is 5 cfs. At all other times the release exceeds 5 cfs. Lowered lake levels will cause the frequency and duration (persistence) of the times that the releases from Clinton Lake will be at 5 cfs, the minimum release, to increase. The sentence might have been clearer if the wording "at the minimum values." had instead read "at its minimum value." The Staff's basic intent was to state that the reduction in the lake levels would cause releases from the lake to be at the minimum value of 5 cfs more often and for longer durations.</p>

19	5-8	5.3.2	<p>The Staff states that during years where precipitation is below normal the impact of water use would be MODERATE and require coordination with IEPA. How will the Staff ensure this occurs?</p> <p><u>Response</u></p> <p>Pursuant to Section 401 of the Clean Water Act, the Staff has recommended that any ESP permit issued for the Exelon ESP site will have a permit condition that requires Exelon to obtain a certification from the State of Illinois prior to any construction or operation activities that could impact the waters of the State. The State of Illinois has jurisdiction to impose conditions on the use of water by Exelon that can limit water use in periods of below normal precipitation. This permit condition ensures that the Applicant will engage IEPA to fulfill its duties in managing the State's water resources.</p>
20	5-9	5.4.1	<p>Throughout the EIS the Staff notes that Exelon has not chosen a cooling tower design and did not provide sufficient information to evaluate various impacts, and instead, these impacts would be assessed at the CP or COL stage. How will the Staff ensure these are evaluated given the 20 year life of an ESP?</p> <p><u>Response</u></p> <p>If the Staff lacked sufficient information to resolve an issue, then it is not given finality under 10 C.F.R. 52.39, and an applicant for a COL referencing the ESP would have to address the issue as it will any issue (e.g., the benefits assessment) that was not resolved in the proceeding on the ESP. However, in many cases for which the Staff lacked specific design information, it was still able to assign an impact level for an issue based on available information and assumptions. As discussed previously, in this situation, an applicant for a COL referencing the ESP would have to search for any new and significant information related to those impacts. The Staff will evaluate the applicant's process for identifying new and significant information and will also independently confirm the results of that review. The impacts of new and significant information on the analysis results in the ESP EIS will be evaluated in the COL EIS. See the NRC letter to NEI dated July 6, 2005, ADAMS ML051050031.</p>

21	5-11	5.4.1.3	<p>Second paragraph of section: More water consumption would seem to correspond to a decrease in water releases (see Question regarding p. 5-6). Please clarify.</p> <p><u>Response</u></p> <p>The minimum water release (0.14 m<sup>3</sup>/sec [5 cfs]) is the minimum that is required to maintain the aquatic environment in Salt Creek below Clinton Lake. The minimum is released when surplus water is not available in Clinton Lake. This occurs at lake surface elevations below 210 m (690 ft). Greater water consumption by the ESP facility is estimated to increase the amount of time when surface elevations in Clinton Lake would be below 210 m (690 ft), which would in turn increase the amount of time when only minimum flows could be released to Salt Creek. Thus, more water consumption does correspond to an overall decrease in water released, by increasing the number of days when only the minimum could be released.</p>
22	5-13 5-46	5.4.1.5 5.8.4	<p>Explain how the statements regarding EMF in these two sections are consistent.</p> <p><u>Response</u></p> <p>The difference between the two analyses is consistent with the analyses in the review of impacts of transmission lines in NUREG-1437 (License renewal GEIS). In NUREG-1437 (Section 4.5.4.2.3), the Staff evaluated the literature on the potential impacts of EMF on human health and determined that there is evidence suggesting, but not proof of, a causal link between EMF and leukemia, lymphoma, and cancer of the central nervous system. The Staff noted that the evidence is inconsistent and that "the pieces still do not fit together very well." Because the scientific evidence is not conclusive, the Staff did not reach a conclusion related to the impact of EMF on human health.</p> <p>The Staff also evaluated the literature on potential effects of EMFs on flora and fauna (GEIS Section 4.5.6.3.4). However, the Staff concluded that, for flora and fauna, the impacts of prolonged exposure to EMFs were small and that mitigation measures could create additional environmental impacts and would be costly.</p> <p>Both conclusions are set out in Appendix B of 10 C.F.R. Part 51.</p> <p>The National Institute of Environmental Health Sciences is responsible for directing EMF biological research funded through the Department of Energy and claims to have sole responsibility for determining whether a hazard exists and, if so, the magnitude of that hazard. EMF research is also carried out by other organizations, see FEIS section 5.4.1.5. The Staff continues to monitor research on the impacts of EMF.</p>

23	5-22	5.4.2.2	<p>The Staff notes that an Environmental Protection Plan as well as requirements for the disclosure, investigation, and analysis of nonroutine environmental impacts of operation would be expected to be part of an OL for a new nuclear unit and could be included as part of a COL. How will the Staff ensure these are included as part of a COL considering the 20 year life of an ESP?</p> <p><u>Response</u></p> <p>An Environmental Protection Plan (EPP) is essentially a set of conditions placed on a license to ensure that the licensee carries out certain activities related to the protection of the environment. For the current operating plants, the EPP generally consisted of near-term (up to around 5 years) monitoring programs for specific resources and long-term programs to ensure that (1) proposed changes to the plant with the potential to significantly affect the environment are reviewed and approved by the NRC Staff and that (2) unexpected impacts to the environment are reported to the NRC Staff.</p> <p>The Staff plans to propose an EPP for any ESP that includes an approved site redress plan allowing the permit holder to carry out the activities listed in 10 C.F.R. 50.10(e)(1). (See 10 C.F.R. 52.25.) The Staff expects that an EPP for a COL would include additional conditions related to the operation of the facility.</p>
24	5-35	5.5.3.2	<p>The Staff appears to question the assumptions of Exelon regarding the impact on taxes associated with operation of a new nuclear unit and concludes there is no way of knowing if Exelon is correct. It would seem appropriate for the Staff to conduct a bounding analysis to determine if additional mitigation is warranted. Please comment on whether or not this is appropriate.</p> <p><u>Response</u></p> <p>A bounding analysis was undertaken and is represented by the LARGE impacts (beneficial) to DeWitt County, which is the most impacted by the location of the ESP site within its boundaries. The other counties do not contain the ESP site and thus would benefit only from the sale and use taxes and property taxes of the operation workforce already living in, or choosing to move to, the counties. The sales and use and property taxes collected and tied to the new nuclear unit, while large in absolute amount, would be small when compared to the total taxes collected by the counties. In any event, mitigation is warranted only for adverse impacts, not beneficial ones.</p>

25	5-39	5.5.3.5	<p>Exelon assumes that much of the workforce will come from the local area and as a result there will be minimal impact on housing. Did the Staff assess the Exelon assumption given the changing demographics in the local area? Also, if the assumption is not valid, it would seem that the impact would be LARGE rather than MODERATE as indicated by the Staff. Please provide additional explanation for the choice of MODERATE.</p> <p><u>Response</u></p> <p>The Staff did not question Exelon's assumptions, but did undertake an independent analysis to assess the impacts to housing if Exelon's assumptions proved incorrect. The potential MODERATE impact for the smaller counties of DeWitt, Logan and Piatt is based on several considerations. First, there is up to a 20-year period in which the ESP could be valid without being acted on. From a socioeconomic standpoint, many things could happen that would impact the housing market in the region during that time, and it is difficult to anticipate the nature of these events so far in the future. Second, at the CP/COL stage, the Staff would look for new and significant information related to potential housing impacts. Third, there is no shortage of housing in some of the larger counties surrounding the ESP site (e.g., Champaign-Urban, Bloomington-Normal, Decatur, etc.). Therefore, even if a number of the operation workforce decided to move to the smaller counties, the larger counties could help ease, on a temporary or permanent basis, any housing shortage while the market responded to the increased demand for housing in the smaller counties. Fourth, if Exelon's assumptions are correct and the operations workforce comes from within the region and commutes to the ESP site, then the impacts on the smaller counties would be SMALL. Given these considerations, the Staff considers the MODERATE impact level to be the most appropriate in bounding the potential housing impacts.</p>
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26	5-47	5.8.6	<p>The chronic health effect of continued exposure to EMF's is given as unknown. Since all electrical generating facilities, no matter what location, would potentially have such an effect, why is this discussed in a site-specific EIS rather than in a GEIS?</p> <p><u>Response</u></p> <p>The issue of chronic effects of exposure to EMFs was initially raised in the license renewal GEIS (NUREG-1437). Each of the supplements to that GEIS addresses the issue by acknowledging and stating that the issue is still unresolved. The treatment of chronic exposure to EMFs presented in this FEIS is consistent with the treatment in the supplements to the license renewal GEIS and in the EISs for the other ESP applications. The Staff continues to monitor developments in the area and the position of the National Institute of Environmental Health Sciences. Thus, it is appropriate to address in this FEIS.</p> <p>The Staff agrees with the Board that this issue would not lead to a differentiation between the proposal to build a new nuclear plant and any other alternative that generates and distributes a similar amount of power. However, the purpose of the analysis in Chapter 5 is to attempt to quantify the impacts associated with the proposed action.</p>
27	5-51	5.9.2.2	<p>First paragraph of section: Why are Tables 3.5-1 and 3.5-3 of the ER not reproduced here?</p> <p><u>Response:</u></p> <p>Since the ER is a publicly available document, the decision was made not to reproduce tables verbatim out of the ER.</p>

28	5-54 & 55	5.9.3.1	<p>Tables 5-3 and 5-4 are not in complete agreement with each other. Please clarify.</p> <p><u>Response</u></p> <p>The values in Table 5-3 and Table 5-4 were taken from the Applicant's ER to allow direct comparison to 10 CFR Part 50, Appendix I dose objectives and 40 CFR Part 190 dose standards, respectively. Table 5-3 in the FEIS (which compared doses to Appendix I dose objectives) was a composite of the liquid effluent doses in Table 5.4-7 of the ER and gaseous effluent doses in Table 5.4-9 of the ER. Table 5-4 in the FEIS (which compared doses to 40 CFR 190 dose standards) was the sum of the liquid effluent doses in Table 5.4-8 of the ER and the gaseous effluent doses in Table 5.4-10 of the ER.</p> <p>The estimated doses in these tables are not in complete agreement because they were presented for different purposes (i.e., Table 5-3 doses were presented for comparison to 10 CFR Part 50, Appendix I dose objectives and Table 5-4 doses were presented for comparison to 40 CFR Part 190 dose standards, but were not presented for direct comparison to each other) and thus included doses to different organs. Therefore, these differences are to be expected.</p> <p>Further, Table 5-3 did not include the thyroid dose from liquid effluents (reported as 0.0003 mSv/yr (0.03 mrem/yr) in Table 5.4-8 of the ER) because dose to the teen liver was bounding when compared to the Appendix I dose objective to any organ of 0.1 mSv/yr (10 mrem/yr). Adding the 0.0003 mSv/yr to the thyroid dose from gaseous effluents (0.944 mSv/yr) in Table 5-3, one gets the 0.0947 mSv/yr in Table 5-4.</p> <p>Table 5-3 did not include the dose to the bone from gaseous effluents (reported as 0.0371 mSv/yr (3.71 mrem/yr) in Table 5.4-10 of the ER) because dose to the thyroid was bounding when compared to the Appendix I dose objective to any organ of 0.15 mSv/yr (15 mrem/yr). 40 CFR Part 190 has a dose standard for both the thyroid and any other organ.</p> <p>The whole body dose equivalent value of 0.0321 mSv/yr reported in Table 5-4 is the sum of the total body dose from liquid pathway (0.0095 mSv/yr from Table 5-3) and from the gaseous pathway (0.0226 mSv/yr (2.26 mrem/yr) from Table 5.4-10 of the ER). The total body dose in Table 5-3 for the gaseous effluents does not equal 0.0226 mSv/yr because it only represents the total body dose from noble gases. Adding the total body dose contributions from inhalation, ground deposition, and external radiation will result in the 0.0226 mSv/yr (2.26 mrem/yr).</p>
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29	5-59	5.9.5.3	<p>The Staff states that it performed an independent assessment of the dose to biota. Please explain how this was done.</p> <p><u>Response</u></p> <p>The Staff described its independent assessment of dose to the biota in Appendix H (see Section H.3, p. H-11 – H-13). As stated in Appendix H, the Staff used the LADTAP II code, GASPAR II code, and input parameters supplied by Exelon in its ER to calculate doses to the biota. As part of its independent review, the Staff requested Exelon's input values for these codes, and reviewed them for reasonableness. It then ran the codes using Exelon's input and default values from Regulatory Guide 1.109 (when input values were not provided) to verify the results of Exelon's dose assessment.</p>
30	5-62	5.10	<p>Second to last paragraph of section: Why are the quoted cancer induction rates not referenced?</p> <p><u>Response</u></p> <p>The purpose of the discussion is to present a general introduction. Cancer induction rates are not presented in this section. The section only discusses latency. The statement in the FEIS is based on the Staff's general understanding of the effects of low radiation doses. The references provided below discuss the current state of knowledge related to the effects of low doses which generally support the Staff statement in the FEIS.</p> <p>International Commission on Radiological Protection (ICRP). 1991. "1990 Recommendations of the International Commission on Radiological Protection. ICRP Publication No. 60." Annals of the ICRP 21(1-3).</p> <p>Land CE, ES Gilbert, and JM Smith. 2003. Report of the NCI-CDC Working Group to Revise the 1985 NIH Radioepidemiological Tables. NIH Publication No. 03-5387, <a href="http://dceg.cancer.gov/radia/NIH_No_03-5387.pdf">http://dceg.cancer.gov/radia/NIH_No_03-5387.pdf</a>, National Cancer Institute, Washington, DC.</p> <p>Rall JE, GW Beebe, DG Hoel, S Jablon, CE Land, OF Nygaard, AC Upton, RS Yalow, and VH Zeve. 1985. Report of the National Institutes of Health Ad Hoc Working Group to Develop Radioepidemiological Tables. NIH 85-2748, U.S. Government Printing Office, Washington, DC.</p> <p>United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). 2001. Sources and Effects of Ionizing Radiation: UNSCEAR 2000 Report to the General Assembly, with Scientific Annexes. Vol. II: Effects. United Nations, New York.</p>

31	5-62	5.10.1	<p>First paragraph of section: Did the Staff verify the applicant's evaluation of DBA's?</p> <p><u>Response</u></p> <p>The Staff reviewed the Applicant's selection of DBAs for the AP1000 and ABWR reactor designs. The Staff considers the DBAs selected by the Applicant to be appropriate for these designs. The Staff has reviewed these DBAs in detail in the design certification process.</p> <p>The Staff reviewed the Applicant's dose calculation methods and confirmed that they give appropriate site-specific doses. The Staff also verified a sample of the Applicant's numerical values, and determined that the results of the remainder of the calculations were reasonable.</p>
32	5-63	5.10.1	<p>The Staff states that should Exelon choose to build and operate a reactor other than an ABWR or AP1000 Exelon would need to verify that the radiological consequences are bounded by those evaluated in the EIS. How is this documented by the Staff as part of the ESP approval? A similar statement appears later on (page 5-66) about gas cooled reactors in relation to chi/Q values, how does the Staff plan to track these needs?</p> <p>Finally, a similar situation exists in the SER yet statements such as those on pages 5-63, 5-66, 5-76, and 5-77 are not contained in the SER. Please explain why these are in the EIS and not in the SER.</p> <p><u>Response</u></p> <p>The FSER and FEIS serve different purposes and are responsive to different portions of the NRC's regulations. Evaluation of DBAs in the FSER is related to the NRC's health and safety missions under the Atomic Energy Act. The FEIS is prepared to fulfill the requirements of NRC regulations in 10 C.F.R. Part 51 that implement the National Environmental Policy Act (NEPA).</p> <p>The ER is the applicant's document, while 10 C.F.R. Part 51 places full responsibility for the EIS on the Staff. Further, in accordance with 10 C.F.R. 52.39, there are significant limitations regarding consideration of issues that are resolved in the proceeding for an early site permit.</p>

			<p><u>Response (continued):</u></p> <p>Therefore, the Staff has inserted the statements in question into the text of the FEIS as reminders of actions it needs to take in the review of any application for construction and operation of a new reactor, should an application that references an early site permit for the Exelon ESP site be submitted. In addition, the Staff has prepared Appendix K to further track the rationale for its conclusions. As discussed previously, an applicant for a COL referencing the ESP would have to determine whether there was any new and significant information related to environmental impacts. The Staff will evaluate the applicant's process for identifying new and significant information and will also independently confirm the results of that search for a sample of the issues. The impacts of new and significant information on the analysis results in the ESP EIS will be evaluated in the COL EIS. See the NRC letter to NEI dated July 6, 2005, ADAMS ML051050031.</p> <p>On page 15-5 of the ESP FSER, the Staff does indicate that it will verify the acceptability of its bounding analysis with respect to reactor design DBAs other than those for the AP1000 and ABWR designs at the COL or CP stage. Furthermore, the Staff does not evaluate the consequences of severe accidents in the ESP FSER as is done in the FEIS.</p>
33	5-64	5.10.1	<p>Explain the differences between Table 5-7 of this report and Table 2.3.4-1, page 2-46, of the FSER.</p> <p><u>Response</u></p> <p>Evaluation of DBAs in the FSER is related to the NRC's health and safety missions. As a result, the evaluation is done using "adverse" meteorological conditions. The FEIS is prepared to fulfill the requirements of NRC regulations in 10 C.F.R. Part 51 that are based on the National Environmental Policy Act (NEPA). NEPA reviews have historically been based on reasonable expectations. As a result, the evaluation of DBAs for the FEIS are based on "typical" or "representative" meteorological conditions. NRC guidance to applicants and licensees has defined "adverse" meteorological conditions as those conditions that give atmospheric dispersion factors that are exceeded no more than 5% of the time. "Typical" meteorological conditions are those conditions that give atmospheric conditions that are exceeded 50% of the time (i.e. they are conditions that give median atmospheric dispersion factors). See also the response to Question #3, above.</p>

34	5-67	5.10.1	<p>The following sentence appears to be inconsistent with the preceding discussions:</p> <p>“Should an applicant for a CP or Col reference an LWR design, the applicant would need to demonstrate that chi/Q values . . . .”</p> <p>Please explain if this is inconsistent and why.</p> <p><u>Response</u></p> <p>The atmospheric dispersion factor for a reactor design is generally a calculated value based on 1) atmospheric releases (source terms) derived from the evaluation of the accident and release path, and 2) dose limits found in regulations and guidance. These values are the maximum atmospheric dispersion factors for which the design will meet the Commission’s regulations. A large dispersion factor means that a site does not need much dispersion to be an acceptable site for the design, and a small dispersion factor means that a site needs to have good dispersion to be an acceptable site for the design.</p> <p>Atmospheric dispersion factors calculated for a specific site, such as the Exelon ESP site, are based on atmospheric conditions and the distance to site boundaries. A large atmospheric dispersion factor (e.g., <math>1.0 \times 10^{-3}</math> s/m<sup>3</sup> for the exclusion area boundary) indicates that the site does not have very good dispersion, while a small atmospheric dispersion factor (e.g., <math>1.0 \times 10^{-4}</math> s/m<sup>3</sup> for the exclusion area boundary) indicates that the site has good dispersion. Applicants can reduce the magnitude of these dispersion factors by increasing distance to the site boundaries.</p> <p>Thus, the statement questioned above is consistent. By showing that the design X/Q is greater than the Site X/Q, the COL or CP applicant would be demonstrating that the dispersion at the site is such that the consequences of DBAs evaluated for the design fall within regulatory limits.</p>
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35	5-69	5.10.2	<p>Middle of page: Why does Table 5-13 include only risks from internally initiated events?</p> <p><u>Response</u></p> <p>In NUREG-1150, both internal and external initiating events were analyzed only for the Surry and Peach Bottom plants; external events were not analyzed for the Grand Gulf, Sequoyah, or Zion plants. The analyses for the Surry and Peach Bottom plants examined a wide range of external initiating events. Most of the events examined were assessed to be insignificant contributors by means of bounding analyses. However, seismic events and fires were found to be potentially major contributors for Surry and Peach Bottom.</p> <p>Subsequent severe accident analyses related to license renewal have focused on internal initiating events. The same approach has been followed for the early site permit environmental reviews.</p> <p>The risks calculated for ABWR and AP1000 reactor designs at the Exelon ESP site are well within the Commission's safety goals. If external events had been considered and had they doubled or tripled the risk, the risk would still be well within the safety goals.</p>
36	5-80	5.12	<p>First paragraph of section: "The impact column [of Table 5-15] designates beneficial impacts as SMALL." But the beneficial items on page 5-82 are either "SMALL to MODERATE" or "SMALL to LARGE." Please clarify.</p> <p><u>Response:</u></p> <p>The text is incorrect. Inadvertently, the text was not modified to reflect updates to the table.</p>

37	6-1	6.0	<p>The Staff states that Exelon would have to perform a new evaluation of uranium fuel cycle impacts if a different design is proposed at the construction permit or COL stage, if a reactor other than a LWR is chosen. Is this condition tabulated elsewhere to ensure easy reference given the 20 year life of an ESP?</p> <p><u>Response</u></p> <p>The findings in Chapter 6, including the need for additional impact analyses at the CP or COL stage, are not provided in a summary table. However, the Staff believes that the statement in this chapter, as well as the demonstrations required at the COL stage (as described below), are sufficient to ensure that the issue will be properly addressed.</p> <p>The issue is unresolved for non-LWR designs. In accordance with 10 C.F.R. 52.39(a)(2) "...the Commission shall treat as resolved those matters resolved in the proceeding on the application for issuance or renewal of an early site permit..." At the COL stage, in accordance with 10 C.F.R. 52.79(a)(1), an applicant is required to submit information sufficient to demonstrate that the design of the facility falls within the parameters specified in the early site permit, and to resolve any other significant environmental issues not considered in any previous proceeding on the site or design.</p> <p>Therefore, for unresolved issues, the applicant is required to submit the information and the Staff will evaluate it in the EIS issued for the COL.</p>
38	6-11	6.1.1.5	<p>Please explain the origin of the technetium-99 during the gaseous diffusion enrichment.</p> <p><u>Response</u></p> <p>Gaseous diffusion enrichment plants at Paducah, Oak Ridge, and Portsmouth had uranium hexafluoride feed plants which converted uranium oxide to uranium hexafluoride for subsequent introduction into the gaseous diffusion enrichment cascade. Recycled uranium was used as feed for these feed plants at specific time periods in the 1950s, 1960s, and 1970s. The Paducah facility received approximately 100,000 tons (90,000 metric tons) of recycled uranium containing an estimated 661 kilograms of technetium-99. (reference – <a href="http://www.ne.doe.gov/home/9-29-99.html">http://www.ne.doe.gov/home/9-29-99.html</a>)</p>

39	6-16	6.1.2	<p>Did Staff confirm the information set out in table 6-3? Since GT-MHR and PBMR type reactors provide higher thermal efficiencies than LWRs, does the Staff's approach over-estimate the impacts?</p> <p><u>Response</u></p> <p>The Staff derived information in Table 6-3 of the FEIS from data in Table 5.7-1 of Exelon's ER. Table 5.7-1 included the higher thermal efficiencies of the gas-cooled reactor designs compared to LWRs. Exelon normalized impacts from gas-cooled reactors to 1000 MW(e) reference LWR. Therefore, the Staff's approach does not overestimate impacts.</p>
40	6-18, 6-19	6.1.2.1, 6.1.2.2	<p>Please show how the estimates for the amount of UO<sub>2</sub>, UF<sub>6</sub> and SWU needed were derived if gas-cooled reactor technologies are employed.</p> <p><u>Response</u></p> <p>The estimates of the UO<sub>2</sub>, UF<sub>6</sub>, and SWU needed for the gas-cooled reactors (as presented in Table 6-3 of the FEIS and discussed in Sections 6.1.2.1-6.1.2.3) were obtained from Table 5.7-1 of the Exelon ER. In Appendix E of the FEIS (p. E-139), the Staff stated that it "... used a scaling approach to derive the values in Table 6-3 of the EIS. The number of four-module GT-MHR units (with a net power rating of 1003 MW(e)) that could be placed on the ESP site and remain within the PPE net power rating for the site of 2200 MW(e) is two. The number of eight-module PBMR units (with a net power rating of 1254 MW(e)) that could be placed on the ESP site and remain within the PPE net power rating for the site of 2200 MW(e) is one. These scaling factors were multiplied times the appropriate values in Table 5.7-1 of the ER to estimate fuel cycle impacts from the gas-cooled reactor designs. For example, the enriched UO<sub>2</sub> MT estimate for fuel fabrication plant operations in Table 6-3 of the EIS would equal 12.2 MT for the GT-MHR and 9.5 MT for the PBMR." The 12.2 MT of enriched UO<sub>2</sub> for the GT-MHR was derived by multiplying 6.11 MT in Table 5.7-1 of the ER by the scaling factor of two.</p>

41	6-20	6.1.2.7	<p>Did Staff confirm Exelon's statements that gas-cooled technologies would generate less waste and produce less heavy metal radioactive waste than the reference LWR? If not, explain how Staff is "responsible" for this portion of the conclusions. Is this part of what the Staff refers to as "unresolved" in 6.1.2.8?</p> <p><u>Response</u></p> <p>The Staff did not confirm Exelon's statement that gas-cooled technologies would generate less waste and produce less heavy metal radioactive waste during decontamination and decommissioning activities. The ER did not present quantitative data to support this conclusion; therefore, the Staff concluded that this was an unresolved issue that would need to be reviewed at the CP or COL stage should Exelon propose to put a gas-cooled reactor on the ESP site.</p> <p>The issue is unresolved for non-LWR designs. In accordance with 10 C.F.R. 52.39(a)(2) "...the Commission shall treat as resolved those matters resolved in the proceeding on the application for issuance or renewal of an early site permit..." At the COL stage, in accordance with 10 C.F.R. 52.79(a)(1), an applicant is required to submit information sufficient to demonstrate that the design of the facility falls within the parameters specified in the early site permit, and to resolve any other significant environmental issues not considered in any previous proceeding on the site or design.</p> <p>Therefore, for unresolved issues, the applicant is required to submit the information and the Staff will evaluate it in the EIS issued for the COL.</p>
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42	6-21	6.1.2.7	<p>The Staff concludes that the impacts from low-level radioactive waste generated by decommissioning would likely be small but would need to be evaluated at the CP or COL stage. Was it possible to glean any information from the decommissioning of the Ft. St. Vrain reactor? If so what conclusion can be drawn in light of this experience?</p> <p><u>Response</u></p> <p>Low level waste generation was considered in the NUREG-0586 Supplement 1, <i>Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities</i>, which was published in 2002. This GEIS took into consideration experience from waste generation of all plants being decommissioned or having completed decommissioning at that time. The GEIS included Fort St. Vrain information in its evaluation, but that information was insufficient to support conclusions on the impacts of any advanced gas-cooled designs. Although not specifically stated in this section of the FEIS, the GEIS was the reference the Staff used for formulating expectations relating to decommissioning issues. However, as the Board noted, the Staff considers the issue one to be addressed at the COL stage.</p>
43	6-24	6.2	<p>In the second bullet, sixth line, should the word “Cash” be “cask?”</p> <p><u>Response</u></p> <p>Yes, the word should be “cask.”</p>
44	6-35	6.2.2.1	<p>Last paragraph of section: “Dose estimates to the MEI from the transportation of unirradiated fuel, spent fuel, and waste under normal conditions are presented in Section 6.2.1.1.” But Section 6.2.1.1 is for unirradiated fuel only. Please clarify.</p> <p><u>Response</u></p> <p>The analysis of MEI doses in Section 6.2.1.1 is generic and applies to transportation of unirradiated fuel, spent fuel, and radioactive waste. As stated on page 6-27 of the FEIS, the analysis is conservative with respect to unirradiated fuel and radioactive waste because the radiation dose rates emitted from shipments of unirradiated fuel and radioactive waste are typically much lower than the dose rate from a spent fuel shipment. Because the dose rate assumed in the MEI analysis was set to the regulatory limit, the analysis is bounding for all three types of materials and more so for unirradiated fuel and radioactive waste. The Staff made an administrative decision to locate the analysis in the first of these three sections (6.2.1, 6.2.2, and 6.2.3).</p>

45	6-41	6.2.3	<p>Last paragraph of section: Same question as posed by preceding question.</p> <p><u>Response</u></p> <p>The analysis of MEI doses in Section 6.2.1.1 is generic and applies to transportation of unirradiated fuel, spent fuel, and radioactive waste. As stated on page 6-27 of the FEIS, the analysis is conservative with respect to unirradiated fuel and radioactive waste because the radiation dose rates emitted from shipments of unirradiated fuel and radioactive waste are typically much lower than the dose rate from a spent fuel shipment. Because the dose rate assumed in the MEI analysis was set to the regulatory limit, the analysis is bounding for all three types of materials and more so for unirradiated fuel and radioactive waste. The Staff made an administrative decision to locate the analysis in the first of these three sections (6.2.1, 6.2.2, and 6.2.3).</p>
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46	6-37	6.2.2.2	<p>The Staff states that the impact of crud and activation products on spent fuel shipment would have to be evaluated at the CP or COL stage. Where is this need tabulated?</p> <p><u>Response</u></p> <p>The findings in Chapter 6 include the need for additional impact analyses at the CP or COL stage. The need for these analyses is not provided in a summary table. The Staff believes that the statement in this chapter, as well as the demonstrations required at the COL stage (as described below), are sufficient to ensure that the issue will be properly addressed.</p> <p>The issue is unresolved for non-LWR designs. In accordance with 10 C.F.R. 52.39(a)(2) "...the Commission shall treat as resolved those matters resolved in the proceeding on the application for issuance or renewal of an early site permit..." At the COL stage, in accordance with 10 C.F.R. 52.79(a)(1), an applicant is required to submit information sufficient to demonstrate that the design of the facility falls within the parameters specified in the early site permit, and to resolve any other significant environmental issues not considered in any previous proceeding on the site or design.</p> <p>With regard to LWRs, there were no data on crud and activation products in the INEEL document except for the ABWR and ESBWR. In the FEIS, the Staff stated in Appendix G that "... the impacts of crud and activation products on spent fuel transportation accident risk will need to be examined at the CP or COL stage." This statement applies to advanced LWRs (no inventory data for IRIS or ACR-700 at all and no crud data for AP-1000) as well as the advanced gas-cooled reactors (for reasons, including lack of crud/activation product inventories, cask designs, fuel performance, etc.).</p> <p>Therefore, for these unresolved issues, an applicant for a COL would need to submit the missing information and the Staff would evaluate it in an EIS issued for the COL application.</p>
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47	6-38, 6-39, 6-43	6.2.2.2, 6.2.2.3, 6.3	<p>These sections state that for non-LWRs there are a number of unresolved issues related to fuel performance, shipping casks, and accident risks, and that these issues would have to be evaluated at CP or COL stage if such designs were referenced. Where is this need tabulated?</p> <p><u>Response</u></p> <p>The findings in Chapter 6 include the need for additional impact analyses at the CP or COL stage. The need for these analyses is not provided in a summary table. The Staff believes that the statement in this chapter, as well as the demonstrations required at the COL stage (as described below), are sufficient to ensure that the issue will be properly addressed.</p> <p>The issue is unresolved for non-LWR designs. In accordance with 10 C.F.R. 52.39(a)(2) "...the Commission shall treat as resolved those matters resolved in the proceeding on the application for issuance or renewal of an early site permit..." At the COL stage, in accordance with 10 C.F.R. 52.79(a)(1), an applicant is required to submit information sufficient to demonstrate that the design of the facility falls within the parameters specified in the early site permit, and to resolve any other significant environmental issues not considered in any previous proceeding on the site or design.</p> <p>Therefore, for unresolved issues, the applicant is required to submit the information and the Staff will evaluate it in the EIS issued for the COL.</p>
48	7-2	7.2	<p>The Staff states the impact on air quality of construction would be SMALL. How did the Staff make this determination? Similar statements appear throughout the cumulative impact section. The Staff should explain the rationale for their assessment as it is not obvious to the reader. Note, in some cases, a simple cite to an earlier section would be sufficient.</p> <p><u>Response</u></p> <p>Chapter 7 discusses cumulative impacts. The Exelon ESP site is isolated from other industrial facilities and is in a region of good air quality. Chapters 4 and 5 provide the Staff's rationale for its determination that the impacts on air quality of construction and operation of a new reactor at the Exelon ESP site are small. Consequently, because the impacts of construction and operation are small when considered alone and the site is in an area of good air quality, isolated from other industrial facilities, the Staff concluded that the cumulative air quality impacts likewise would be small.</p> <p>This rationale for concluding air quality impacts are small generally applies to the alternative sites, unless otherwise noted.</p>

49	7-6	7.5	<p>The Staff states that entrainment data are not available for the CPS for recreational fish. Page 5-17 seems to imply otherwise. Please explain.</p> <p><u>Response</u></p> <p>As stated at the top of page 5-17, there are no entrainment data available for the CPS. The data provided on page 5-17 relate to impingement studies, not to entrainment studies. These are treated as two separate issues. Definitions of impingement and entrainment are provided in Section 5.4.2.1 at the bottom of page 5-14.</p>
50	7-7	7.5	<p>This section states that the impact of the intake structure could be MODERATE if best available technology is not used. Can the use of best available technology be a condition of the ESP?</p> <p><u>Response</u></p> <p>No. The Clean Water Act (CWA) requires the use of the best technology available. The NRC is prohibited from imposing on licensees requirements that fall within the purview of the CWA. [See the decisions in the Yellow Creek proceeding: LBP-78-7, 7 NRC 215 (1978) and ALAB-515, 8 NRC 702 (1978)].</p>
51	7-12	7.10	<p>Staff states that certain information was not available to resolve issues. Where are these issues documented? [they are not mentioned in Appendix K] If they are not listed anywhere, provide a list.</p> <p><u>Response</u></p> <p>The information needed to evaluate an issue was generally described in the text of the FEIS. Likewise, information that was not available but necessary was discussed in the appropriate earlier sections of the FEIS. The issues the Staff considered unresolved in the chapter 7 analysis were the same as those considered unresolved in the earlier chapters of the FEIS. Therefore, the Staff did not consider an additional table summarizing the unavailable information in Chapter 7 to be necessary at the time the FEIS was finalized.</p>

52	8-3	8.2	<p>The Staff states that the State of Illinois is an appropriate region of interest in keeping with current deregulation policies. Please provide a cite for these policies.</p> <p><u>Response</u></p> <p>The Staff was stating Exelon's basis for identifying the State of Illinois as the region of interest (ROI). In Section 9.2 of the ER, Exelon states that the "delineation of this region of interest is in keeping with current deregulation policies and the proposed location of the facility within the State of Illinois."</p> <p>Exelon's proposal involves siting a merchant plant that would sell generated power in a deregulated marketplace. States have had the authority to regulate power generation utilities within their boundaries. They may or may not choose to change from a traditional regulated structure to a less-regulated structure. As a result, the regulatory structure varies from state to state.</p> <p>Although the Staff considers that the phrase "deregulation policies" may not reflect precise terminology, the State of Illinois has embarked on deregulation of power generation. It is a large state, which offers a selection of viable alternative power generation sites under a common regulatory structure for the NEPA evaluation of alternatives to be meaningful.</p> <p>As stated in ESRP 9.3 (page 9.3-2), "[t]he basis for an ROI [region of interest] is the state in which the proposed site is located or relevant service area to the proposed site." Section 9.3 of the ESRP also states that there may</p> <p style="padding-left: 40px;">... be special cases in which the proposed site was not selected on the basis of a systematic site-selection process. Examples include plants proposed to be constructed on the site of an existing nuclear power plant previously found acceptable on the basis of a NEPA review and/or demonstrated to be environmentally satisfactory on the basis of operating experience....</p> <p>Further, Section 9.3 of the ESRP states that "[a]s a corollary, all nuclear power plant sites within the identified region of interest having an operating nuclear power plant or a construction permit issued by the NRC should be compared with the applicant's proposed site."</p> <p>The Applicant has 6 nuclear power plant sites within the State of Illinois that were reviewed as potential alternative sites. The Exelon ESP site is located centrally in the State. The Staff, therefore, considers the State of Illinois to be an appropriate region of interest.</p>
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			<p>Throughout this section, there are assessments made that appear inconsistent with those of the similar section discussing a nuclear plant. For example, why would construction impact on land use be MODERATE where as for a nuclear plant it is SMALL? Similar inconsistencies appear in other sections and are summarized in the table on page 8-12. Please explain.</p> <p><u>Response</u></p> <p>In many instances, including the example cited above, the difference between a small impact and a moderate impact is one of degree. A new nuclear plant would involve long-term commitment of about 39 ha (96 ac) (page 4-3); a coal-fired plant at the site would involve long-term commitment of about 120 ha (300 ac). Much of land associated with a coal-fired plant would be used for storage of coal, limestone, and ash. In addition, construction of either a nuclear plant or a coal-fired plant is likely to involve use of a rail-line to the site. However, operation of a coal-fired plant would entail regular use of the rail-line to deliver coal and limestone for the entire period of operation, while the rail-line would receive little, if any, use during the period of operation of the nuclear plant. Hence, the Staff considers land use impacts to be moderate for the coal-fired plant and small for the nuclear plant.</p> <p>For similar reasons, with respect to the other specific issue areas associated with coal-fired generation (and identified in Table 8-1), the Staff based its impact level determinations on the facts noted in Section 8.2.2.1 of the FEIS and does not believe these determinations are inconsistent with the comparable analyses presented for the impacts of a new nuclear unit.</p>
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54	8-17	8.2.3.1	<p>The Staff states that current energy storage technologies are too expensive for wind power to serve as a large baseload generator but does not provide a basis for this statement. Please provide either the reason or a cite to the literature. Similar statements appear on the following pages concerning geothermal sites and the size of large wood-waste power plants. Again, please provide citations.</p> <p><u>Response</u></p> <p>The Staff determined that stored energy is not an economic means for mitigating the intermittence of wind (and solar) power. Pumped hydroelectric storage is a common method of storing large quantities of energy. A paper, "Pumped Storage Situational Analysis," presented at the Wind Water Prospects Meeting on November 15, 2004, by L. Baccari, Aspen Power Systems, which reviews the status of pumped storage, gives the efficiency of pumped storage as 75% to 85%. Assuming an efficiency of 80%, the cost of energy generated by pumped storage is 25% higher than the cost of the power used to pump water to the upper reservoir plus the added costs associated with the capital equipment and maintenance of the pumping and hydro generation facilities. Similar reasoning applies to compressed air energy storage and other large-scale methods of energy storage. The cost of the stored energy is the sum of the costs of original generation, energy storage, and conversion of stored energy.</p> <p>Geothermal plants were not considered to be a viable alternative because there is no known geothermal resource in Illinois. The Geo-Heat Center at Oregon Institute of Technology compiles information on geothermal resource areas direct use projects in the United States.<sup>3</sup></p> <p>The Department of Energy Office of Biomass Program lists the typical range for biomass (including wood waste) power boilers as typically in the 20 to 50 MW range<sup>4</sup> and plant efficiencies as in the low 20% range. However, typical plant size was not a significant factor in the Staff's rejection of the wood waste alternative. As discussed in the EIS, the significant environmental impacts of plants of this type include ecological impacts of large-scale timber cutting (e.g., soil erosion and loss of wildlife habitat), and potential air pollution from emissions.</p>
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<sup>3</sup> This information is available at <http://geoheat.oit.edu/dusys.htm>.

<sup>4</sup> See [http://www1.eere.energy.gov/biomass/electrical\\_power.html](http://www1.eere.energy.gov/biomass/electrical_power.html).

55	8-19	8.2.3.4	<p>Last paragraph of section: First line should read "4.0 to 4.5 kWhr/m<sup>2</sup>." Also, why is the solar power more for flat-plate collectors than for concentrating systems?</p> <p><u>Response</u></p> <p>The Board is correct; the first line should have read "4.0 to 4.5 kWhr/m<sup>2</sup>." The solar power resource for flat-plate collectors is higher than for concentrating collectors because flat-plate collectors use both direct and diffuse solar radiation. Concentrating collectors only use direct solar radiation.</p>
56	8-21	8.2.3.8	<p>Third paragraph of section: Change "\$4500 per kWh" to "\$4500 per kW" and "\$800 to \$1500 per kWh" to "\$800 to \$1500 per kW."</p> <p><u>Response</u></p> <p>The board has correctly identified an error in units for cost of installed capacity for fuel cells in the third paragraph of section 8.2.3.8. The units should be \$ per kW, as suggested by the Board.</p>
57	8-21	8.2.3.8	<p>Given that the ESP is valid for 20 years, the Staff conclusion that fuel cells are not economically competitive seems inconsistent with the DOE initiative to lower costs to the \$400 per kWh goal expressed in 2004. Please explain this apparent inconsistency.</p> <p><u>Response</u></p> <p>The Staff does not consider its conclusion that fuel cells are not economically competitive to be inconsistent with the DOE goal. Environmental reviews are conducted based on existing conditions. The DOE goal is, in itself, an indication that fuel cells are not economically viable at this time. Recent DOE programmatic actions indicate that fuel cell technology is not currently viable. Projects were initiated by the Department of Energy in FY2005 "...to <i>develop</i> and <i>demonstrate</i> the fuel cell technology required for central power station applications..." [emphasis added] (DOE at <a href="http://fossil.energy.gov/programs/powersystems/fuelcells">http://fossil.energy.gov/programs/powersystems/fuelcells</a>)</p>

58	8-22	8.2.3.10	<p>First paragraph of section: "There are many possible combinations of alternatives." However, only one combination is analyzed in this section. Why is this considered sufficient for the environmental analysis?</p> <p><u>Response</u></p> <p>The Staff selected the combination of alternatives presented in the EIS assuming that to meet base load needs, a significant portion of the generation would have to be either coal-fired or gas-fired generation. Gas-fired generation was included in the combination on the basis of comparative environmental impacts of gas-fired generation and coal-fired generation. A combination of alternatives including gas-fired generation was more likely to compare favorably with nuclear power than one with coal-fired generation.</p> <p>The combination of alternatives selected by the Staff as reasonable included 75% gas-fired generation (three of the four 550-MWe units considered in FEIS Section 8.2.2.1). The remaining 25% was made up of various energy sources and demand-side management. The mixture chosen for the 25% is only of limited interest because, in evaluating the impacts of the combination, the Staff assigned <i>no</i> adverse impacts to the mix generating the 25% not generated by gas; all of the impacts of the combination were attributed to gas-fired generation. For environmental review purposes, the combination of alternatives considered represents many possible combinations, as long as the combination includes 75% gas-fired generation. Therefore, the Staff considered the analysis of this combination to be sufficiently bounding for addressing any reasonable combination of alternatives that would satisfy baseload needs.</p>
59	8-22	8.2.3.10	<p>The discussion does not adequately explain table 8-3. The Staff should review the discussion to see if it can be amplified.</p> <p><u>Response</u></p> <p>The Staff agrees with the Board's comment. Table 8-3 is a summary of the potential environmental impacts of the combination of alternatives, just as Table 8-1 summarizes the potential impacts of coal-fired generation, and Table 8-2 summarizes the potential impacts of gas-fired generation. The response to the previous question should provide additional insight into Table 8-3.</p>

60	8-24	8.2.4	<p>Table 8-4 seems inconsistent with some of the analysis for a new nuclear unit, as noted in an earlier comment regarding p. 8-9. Please explain.</p> <p><u>Response</u></p> <p>Table 8-4 summarizes the Staff's evaluation of information on the significance levels of environmental impacts of nuclear power, coal-fired power, gas-fired power, and a combination of power generation alternatives including gas-fired power. The significance levels for nuclear power are based on the significance levels shown in Table 9-1, which compares construction impacts at the Exelon ESP site and alternative sites, and Table 9-2, which compares the impacts of operation at the same sites. The significance levels for the coal-fired alternative, gas-fired alternative, and combination of alternatives are taken directly from Tables 8-1, 8-2, and 8-3, respectively. See also the response to Question #53, above.</p> <p>The general significance levels assigned to nuclear power in Table 8.4 are bounding values representing a composite of the impacts at the Exelon ESP site and the alternative sites. The Staff inadvertently did not update the text of Section 8.2.4 of the FEIS to reflect this approach. Also, the table incorrectly identified the bounding impacts of water use as SMALL instead of SMALL to MODERATE for nuclear power. This correction does not affect the outcome of the Staff's comparative analysis of alternative energy sources because the impacts from the other generation sources are SMALL to LARGE for water use.</p>
61	8-74	8.5.4.5	<p>The text in the first full paragraph of the page: "increase the congest the highway . . ." is garbled.</p> <p><u>Response</u></p> <p>The Board's comment is correct. The sentence should read as follows: "Up to an additional 580 cars on the road for operating employees of a new nuclear unit plus the 980 operating QCGS employees and 1100 temporary refueling workforce (assuming a single occupant per car) would not materially increase congestion on the highway, except at shift changes."</p>

62	8-102	8.64	<p>Middle of the page: Zion is not the only alternate site where existing plants would be replaced. Does the Staff's conclusion adequately reflect this?</p> <p><u>Response</u></p> <p>The sentence in question was intended to be confined to the issue of traffic. Zion is the only alternative site that does not currently have any operating nuclear plants. The work force for existing operations at Zion is small and does not have a significant impact on local traffic. The other alternative sites have operating units and work forces of several hundred people.</p>
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