From: <eddie.grant@exeloncorp.com>
To: <jps1@nrc.gov>
Date: 4/5/05 1:28PM
Subject: DSER Partial Response

John Segala

Attached is your copy of the response to several DSER Open Items that is being mailed today.

Thanks,
Eddie R. Grant
Early Site Permit Project
610.765.5001 voice
610.765.5755 fax
850.598.9801 cell

CC: <thomas.mundy@exeloncorp.com>

Mail Envelope Properties (4252CA97.59B : 4 : 58779)

Subject: DSER Partial Response
Creation Date: 4/5/05 1:26PM
From: <eddie.grant@exeloncorp.com>

Created By: eddie.grant@exeloncorp.com

Recipients
nrc.gov
owf2_po.OWFN_DO
JPS1 (John Segala)

exeloncorp.com

thomas.mundy CC

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TEXT.htm	3810	
Blank Bkgrd.gif	145	
2005-04-04 Kray DSER Response.pdf		1300397
Mime.822	1787408	

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Security:	Standard

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April 4, 2005

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Early Site Permit (ESP) Application for the Clinton ESP Site
Docket No. 52-007

Subject: Partial Response to Draft Safety Evaluation Report (DSER) Items

Re: Letter, U.S. Nuclear Regulatory Commission (W. D. Beckner) to Exelon Generation Company, LLC, (M. Kray), dated February 10, 2005, Draft Safety Evaluation Report for the Exelon Early Site Permit Application

Enclosed, as requested in the referenced letter, are responses to open items identified in the subject DSER for the Exelon Generation Company, LLC (EGC) ESP. This letter provides several responses as discussed during the public meeting on March 31, 2005. EGC expects to provide the remaining responses no later than the April 26 date identified in the DSER transmittal letter.

Please contact Eddie Grant of my staff at 610-765-5001 if you have any questions regarding this submittal.

Sincerely yours,

Marilyn C Kray

Marilyn C. Kray
Vice President, Project Development

TPM/erg

cc: U.S. NRC Regional Office (w/ enclosures)
Mr. John P. Segala (w/ enclosures)

Enclosures

AFFIDAVIT OF MARILYN C. KRAY

State of Pennsylvania

County of Chester

The foregoing document was acknowledged before me, in and for the County and State aforesaid, by Marilyn C. Kray, who is Vice President, Project Development, of Exelon Generation Company, LLC. She has affirmed before me that she is duly authorized to execute and file the foregoing document on behalf of Exelon Generation Company, LLC, and that the statements in the document are true to the best of her knowledge and belief.

Acknowledged and affirmed before me this 4th day of April, 2005.

My commission expires Sept. 20, 2008.

Staci L. Sprouse
Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Staci L. Sprouse, Notary Public
Kennett Twp., Chester County
My Commission Expires Sept. 20, 2008
Member, Pennsylvania Association Of Notaries

NRC Letter Dated: 02/10/2005

This letter provides responses to the following DSER Open Items.

DSER Open Item 2.3-1

DSER Open Item 2.3-3

DSER Open Item 2.4-3

DSER Open Item 2.4-4

DSER Open Item 2.4-5

DSER Open Item 2.4-6

DSER Open Item 2.4-7

DSER Open Item 2.4-8

DSER Open Item 2.4-10

DSER Open Item 2.4-12

DSER Open Item 2.4-13

DSER Open Item 2.4-18

DSER Open Item 2.4-20

DSER Open Item 2.4-21

DSER Open Item 3.3-1

DSER Open Item 13.3-1

DSER Open Item 13.3-2

DSER Open Item 13.3-4

DSER Open Item 17.1-1

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.3-1

Identify the meteorological data to use in evaluating the performance of a mechanical draft cooling tower ultimate heat sink (UHS) with respect to maximum evaporation and minimum water cooling as discussed in Regulatory Guide 1.27.

EGC RAI ID: SOI1-2

EGC RESPONSE:

The NRC indicates, in DSER Section 2.3.1.3, that "the applicant did not adequately identify the meteorological data to use in evaluating the performance of a mechanical draft cooling tower UHS with respect to maximum evaporation and minimum water cooling, as discussed in RG 1.27. The controlling meteorological variables used to evaluate cooling tower performance are the wet-bulb temperature and the coincident dry-bulb temperature. The historical maximum 30-day average wet-bulb temperature and coincident dry-bulb temperature are widely used to represent meteorological conditions resulting in maximum evaporation and drift loss. Likewise, the historical maximum 1-day and 5-day average wet-bulb temperatures and the coincident dry-bulb temperatures are widely used to represent the worst combination of meteorological conditions resulting in minimal water cooling."

The meteorological data to be used in evaluating the performance of any required mechanical draft cooling tower ultimate heat sink (UHS) with respect to maximum evaporation and minimum water cooling (as discussed in Regulatory Guide (RG) 1.27) is identified below. The controlling parameters for maximum evaporation and minimum water-cooling for mechanical draft cooling towers used as a UHS are the wet-bulb temperature and coincident dry-bulb temperature.

RG 1.27 recommends that the meteorological conditions resulting in the maximum evaporation and drift loss of water from the UHS should be the worst 30-day average combination of the controlling parameters, namely the wet-bulb temperature and the coincident 30-day average dry-bulb temperature for the same period. Based on an evaluation of historical meteorological data for both Peoria and Springfield, Illinois, the site characteristic maximum 30-day running average wet-bulb temperature for the 30-yr period from 1961 to 1990 (see reference No. 1 below) is 74.7ºF (Springfield). The site characteristic coincident 30-day average dry-bulb temperature for the same period is 82ºF.

RG 1.27 recommends that the meteorological conditions resulting in minimal water cooling should be the worst combination of the controlling parameters. The worst combinations would be the maximum 1-day and 5-day average wet-bulb temperatures and the corresponding 1-day and 5-day average coincident dry-bulb temperatures for the same period. Based on an evaluation of historical meteorological data for both Peoria and Springfield, Illinois, the site characteristic maximum 1-day and 5-day running average wet-bulb temperatures for the 30-yr period from 1961 to 1990 are 81ºF and 79.7ºF, respectively (Springfield). The site characteristic coincident 1-day and 5-day running average dry-bulb temperatures for the same period are 87.6ºF and 86.2ºF, respectively.

The text of SSAR Section 2.3.1.2.4 "Ultimate Heat Sink Design Parameters" will be revised to include these parameters. In addition, Tables 1.4-1 and 1.4-9 will be revised to include these values as site characteristics.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

1. Revise SSAR Chapter 1, Table 1.4-1, to include the following new sections:

3.1.4	Maximum 30-day Average Wet Bulb Temperature	Note 1	74.7°F	SSAR
3.1.5	Coincident 30-day Average Dry Bulb Temperature	Note 1	82°F	SSAR
3.1.6	Maximum 1-day Average Wet Bulb Temperature	Note 1	81°F	SSAR
3.1.7	Coincident 1-day Average Dry Bulb Temperature	Note 1	87.6°F	SSAR
3.1.8	Maximum 5-day Average Wet Bulb Temperature	Note 1	79.7°F	SSAR
3.1.9	Coincident 5-day Average Dry Bulb Temperature	Note 1	86.2°F	SSAR

2. Revise SSAR Chapter 1, Table 1.4-9, to include the following new sections:

3.1.4	Maximum 30-day Average Wet Bulb Temperature	°F	The historical maximum 30-day running average wet bulb temperature observed in the site region, as recommended by RG 1.27 [add definition]	Minimum
3.1.5	Coincident 30-day Average Dry Bulb Temperature	°F	The 30-day average dry bulb temperature that coincides with the historical maximum 30-day average wet bulb temperature, as recommended by RG 1.27	Minimum
3.1.6	Maximum 1-day Average Wet Bulb Temperature	°F	The historical maximum 1-day average wet bulb temperature observed in the site region, as recommended by RG 1.27	Minimum
3.1.7	Coincident 1-day Average Dry Bulb Temperature	°F	The 1-day average dry bulb temperature that coincides with the historical maximum 1-day average wet bulb temperature, as recommended by RG 1.27	Minimum
3.1.8	Maximum 5-day Average Wet Bulb Temperature	°F	The historical maximum 5-day average wet bulb temperature observed in the site region, as recommended by RG 1.27	Minimum
3.1.9	Coincident 5-day Average Dry Bulb Temperature	°F	The 5-day average dry bulb temperature that coincides with the historical maximum 5-day average wet bulb temperature, as recommended by RG 1.27	Minimum

3. Revise SSAR, Chapter 2, Section 2.3.1.2.4, first paragraph (as revised by response to RAI 2.3.1-8), from:

Mechanical draft cooling towers will be used to provide the Ultimate Heat Sink for the EGC ESP Facility if the selected reactor type does not use passive cooling methods for the safety class cooling function. The cooling water system associated with any required Ultimate Heat Sink, as defined in Regulatory Guide 1.27, is referred to as the Essential Service Water (ESW) System in this document. The controlling meteorological parameter for a Essential Service Water mechanical draft cooling tower is the wet bulb temperature. The design wet bulb temperature based on the wet bulb temperature that is exceeded less than 1% of the time which is 77.2°F. The maximum wet bulb temperature recorded was 86°F and will produce a cold ESW water temperature of 95°F with a 9 degree approach in the cooling tower. This cold water temperature is equal to the 95°F value given in Table 1.4-1, Section 3.2.1. Wet bulb design temperatures are based on the maximum values for data from Springfield and Peoria, Ill weather data for the period 1961 to 1990. ESW cooling tower approaches greater than 10 degrees would be used for reactor plants designed for a cooling water inlet temperature greater than 95°F.

To read:

Mechanical draft cooling towers will be used to provide the Ultimate Heat Sink for the EGC ESP Facility if the selected reactor type does not use passive cooling methods for the safety class cooling function. The cooling water system associated with any required Ultimate Heat Sink, as defined in Regulatory Guide 1.27, is referred to as the Essential Service Water (ESW) System in this document. The controlling meteorological parameters for an Essential Service Water mechanical draft cooling tower are wet bulb temperature and the coincident dry bulb temperature.

As discussed in RG 1.27, the meteorological conditions resulting in the maximum evaporation and drift loss of water from the UHS are the worst 30-day average combination of the controlling parameters, namely the wet-bulb temperature and the coincident 30-day average dry-bulb temperature for the same period. Based on an evaluation of historical meteorological data for both Peoria and Springfield, Illinois, the site characteristic maximum 30-day running average wet-bulb temperature for the 30-yr period from 1961 to 1990 (NCDC, 1993) is 74.7ºF (Springfield). The site characteristic coincident 30-day average dry-bulb temperature for the same period is 82ºF.

As also discussed in RG 1.27, the meteorological conditions resulting in minimal water cooling are be the worst combination of the controlling parameters, namely the worst combinations of the maximum 1-day and 5-day average wet-bulb temperatures and the corresponding 1-day and 5-day average coincident dry-bulb temperatures for the same period. Based on an evaluation of historical meteorological data for both Peoria and Springfield, Illinois, the site characteristic maximum 1-day and 5-day running average wet-bulb temperatures for the 30-yr period from 1961 to 1990 are 81ºF and 79.7ºF, respectively (Springfield). The site characteristic coincident 1-day and 5-day running average dry-bulb temperatures for the same period are 87.6ºF and 86.2ºF, respectively.

The design wet bulb temperature based on the site characteristic wet bulb temperature that is exceeded less than 1% of the time which is 77.2°F. The maximum wet bulb temperature recorded was 86°F and will produce a cold ESW water temperature of 95°F with a 9 degree approach in the cooling tower. This cold water temperature is equal to the 95°F value given in Table 1.4-1, Section 3.2.1. Wet bulb design temperatures are based on the maximum values for data from Springfield and Peoria, Ill weather data for the period 1961 to 1990. ESW cooling tower approaches greater than 10 degrees would be used for reactor plants designed for a cooling water inlet temperature greater than 95°F.

4. Revise SSAR, Chapter 2, Section 2.3 references to add the following new reference:

National Climatic Data Center (NCDC). Solar and Meteorological Surface Observation Network (SAMSON), 1961 - 1990. Ashville, North Carolina. September 1993.

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.3-3

Use appropriately conservative meteorological data and appropriately conservative distances from postulated release points to calculate relative concentrations for accidental airborne releases of radioactive materials.

EGC RAI ID: SOI1-4

EGC RESPONSE:

The NRC indicates, in DSER Section 2.3.4.3, that "that the applicant needs to use appropriately conservative meteorological data and appropriately conservative distances from postulated release points to calculate relative concentrations for accidental airborne releases of radioactive materials."

The short term accident Chi/Q values have been recalculated using a conservative minimum distance of 805 meters to the EAB and 3 years of hourly meteorological data (January 2000 - December 2002) for distances of 805 meters and 4,018 meters. The 805 meters is the minimum distance to the proposed EAB from any point on the envelope of the ESP facility footprint and a full 3 years of hourly meteorological data will remove any potential bias in the results that may exist due to under-representation of autumn and the early winter months.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

1. Revise SSAR, Chapter 2, Section 2.3.4.3, from:

The release points and receptor locations in this analysis are defined as the EGC ESP Site EAB (1,025 m) and LPZ (4,018 m).

Short-term Chi/Q analyses were performed using the PAVAN model. The results of the PAVAN modeling ...

To read (insert new paragraph between existing paragraphs):

The release points and receptor locations in this analysis are defined as the EGC ESP Site EAB (1,025 m) and LPZ (4,018 m).

In addition to the above cases, an additional case was run for the 5% probability short-term diffusion values in response to the staff's request to use the minimum distance from the boundary of the EGC ESP Facility footprint to the EAB distance of 1,025 meters. This minimum distance is 805 meters. This case also uses three years of hourly meteorological data (January 2000 - December 2002) in lieu of the two years and eight months hourly meteorological data (January 2000 - August 2002) previously used. The other parameters are the same as described above. The results are summarized in Table 2.3-51.

Short-term Chi/Q analyses were performed using the PAVAN model. The results of the PAVAN modeling...

2. Revise SSAR, Chapter 2, Table 2.3-51, as shown in Attachment 2.3-3.

ATTACHMENTS:

Attachment 2.3-3 (Revised SSAR Table 2.3-51)

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-3

Provide an authoritative source that may include State or county planning officials that can either provide details of a development plan in Clinton Lake's watershed or verify the absence of such a plan.

EGC RAI ID: SOI1-8

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.1.3, that "for site suitability evaluation, the applicant needs to provide an authoritative source that may include State or county planning officials who can either provide details of a development plan in Clinton Lake's watershed or verify the absence of such a plan."

The DeWitt County Planning and Zoning office was contacted to obtain information on any development plans in the Clinton Lake watershed. The administrator of that office referred to a 1992 Comprehensive Land Use Plan that was out of date and out of print. The administrator also indicated that there are no current plans to update the land use plan. The administrator noted a 7 percent decline in population for the county from 1980 through 2000. A 1.2 percent increase in population was noted from 1990 through 2000. The administrator was not aware of any current large-scale development in the lake watershed. She noted one long-range development project in Farmer City which is in the Clinton Lake watershed. There is a current 40-acre residential development in Farmer City with a 20-year plan for additional development of up to 217 acres. The acting Administrator for Farmer City was also contacted. He confirmed the on-going 40-acre development and identified another planning concept for a 200-acre commercial/industrial development to the north of the city. No approvals have been requested or issued for this planning concept.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-4

Provide additional justification for why an increase in impervious area will not increase soil erosion.

EGC RAI ID: SOI1-9

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.1.3, that "the applicant needs to provide additional justification for why an increase in impervious area will not increase soil erosion."

Sediment delivery rates from agricultural land are extremely variable depending on the practices applied to control erosion. Sediment delivery tends to be high with fine grained soil (low infiltration) on sloped land and where soil is exposed to direct impact of precipitation. In such situations the volume and rate of runoff are both increased over native conditions. Sediment delivery from urban land is also variable. The sources of sediment are lower because of the land cover but urban drainage systems can be more efficient at delivering sediment to streams. As with agricultural practices, the sediment delivery rates from urban land depend significantly on the practices that are applied to control erosion.

Regarding sediment derived from stream bank erosion, there is a relationship between increased peak flow rates and volumes and increased stream bank erosion. Given that both agricultural and urban land use tend to increase runoff over native conditions, we would expect some increase from both land uses. Recent practices to control runoff and sediment from developing urban land significantly controls sediment delivery and buffers increases in the peak rate and volume of storm water runoff. Recent conversations with the Administrator of planning and zoning in DeWitt County indicate that storm water best management practices are incorporated in new urban development. Practices used include storm water detention, vegetated buffers (infiltration) and construction erosion control.

Given the above, it is difficult to establish a definitive argument for an increase in urban land use to significantly impact the soil erosion in either direction, i.e., increase or decrease. Our general opinion was presented in the SSAR. In either case, the impact is small.

Discussions with DeWitt County and Farmer City officials indicate that population levels are relatively flat in the short term and have declined over the long term. There are plans for some new urban development in the lake watershed, but the long term potential amounts to less than one-half of one percent of the watershed area. This low long term development potential combined with relatively small difference in sediment delivery rates between rural and urban land use diminishes the potential for predicting a significant change in the sediment delivery rate in either direction.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-5

Provide a revised probable maximum precipitation (PMP) estimate using the current criteria of HMR 51.

EGC RAI ID: SOI1-10

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.2.3, that "the applicant did not show that PMP values estimated using HMR 33 are conservative when compared to PMP values estimated using HMR 51. Therefore, the applicant needs to provide a revised PMP estimate using the current criteria of HMR 51."

A revised probable maximum precipitation (PMP) estimate is provided for the EGC ESP site consistent with the criteria provide in Hydrometeorological Report 51 (HMR 51).

The NRC staff indicated in DSER Section 2.4.2.3 that their independent estimates of the 24- and 48-hour PMP values using the criteria of HMR-51 for the Clinton Lake watershed were 4.9 and 6.3 percent higher than the applicant's PMP values of 22.6 and 25.2 inches. This corresponds to 23.7 and 26.8 inches, respectively. We agree with the staff's independent estimates of these PMP values using the HMR-51 criteria. It is noted that in our response to NRC RAI 2.4.2-1 (as well as the subsequently revised text in SSAR Section 2.4.2.2), we used the guidance provided in HMR-51 to estimate 24- and 48-hour PMP values for the Clinton Lake watershed of 23.5 and 26.3 inches respectively. While these values are slightly less than those estimated by the staff, we believe that our estimates differed as a result of differences in the interpolation of graphical information provided in the referenced HMR documents. It is also noted that the focus (and conclusion) of our response to RAI 2.4.2-1 was that the relatively small increase in PMP values using the HMR-51 versus the HMR-33 criteria would not have a significant impact on probable maximum flood (PMF) water levels in Clinton Lake. Furthermore, inasmuch as the proposed project site is considered to be a "dry site", PMF water levels in the lake were concluded to not be of concern. These conclusions have not changed. We do recognize; however, that the updated PMP values may be useful for assessing the impacts associated with site drainage during significant storm events.

The text of SSAR Section 2.4 "Hydrologic Engineering" will be revised to include the 24- and 48-hour PMP values using the more recent HMR criteria (i.e., 23.7 and 26.8 inches, respectively).

ASSOCIATED EGC ESP APPLICATION REVISIONS:

1. Revise SSAR, Chapter 2, Section 2.4.2.2, second paragraph, 2nd and 3rd sentences (as revised by response to RAI 2.4.2-1), from:

As noted in SSAR Section 2.4.3.1 use of more recent procedures to estimate PMP results in an increase of 1.1 inches for the 48-hr ESP PMP (total of 26.3 inches). Use of this value would result in an increase of the PMF water surface elevation of Clinton Lake to 708.9 ft above msl, which represents a negligible increase compared to the previous estimate of 708.8 ft msl.

To read:

As noted in SSAR Section 2.4.3.1, use of more recent procedures to estimate PMP results in an increase of 1.6 inches for the 48-hr ESP PMP (total of 26.8 inches). Use of this value would result in an increase of the PMF water surface elevation of Clinton Lake to approximately 708.9 ft above msl, which represents a negligible increase compared to the previous estimate of 708.8 ft msl.

2. Revise SSAR, Chapter 2, Section 2.4.3.1, third paragraph (as revised by response to RAI 2.4.2-1), from:

The 48-hr PMP of 25.2 inches developed above was based on methods described in Hydrometeorological Report No. 33. More recent procedures for developing PMP values are presented in Hydrometeorological Report No. 51 (USDOC, 1978), Hydrometeorological Report No. 52 (USWB, 1982) and Hydrometeorological Report No. 53 (USNRC, 1980). The use of these later procedures results in a calculated PMP of 26.3 inches, which is an increase of 1.1 inches, or 4 percent, compared to the 25.2 inches using the previous method. Subsequent analyses of the potential effects of the PMP on other ESP site characteristics (including probable maximum flood (PMF)) have indicated that this increase is essentially insignificant.

To read:

The 48-hr PMP of 25.2 in discussed above was based on methods described in Hydrometeorological Report No. 33. More recent procedures for developing PMP values are presented in Hydrometeorological Report No. 51 (USDOC, 1978), Hydrometeorological Report No. 52 (USDOC, 1982) and Hydrometeorological Report No. 53 (USNRC, 1980). The use of these later procedures results in a calculated PMP of 26.8 in., which is an increase of 1.6 in., or 6 percent, compared to the 25.2 in. using the previous method. Subsequent analyses of the potential effects of the PMP on other ESP site characteristics (including probable maximum flood (PMF) levels in Clinton Lake) have indicated that this increase is essentially insignificant.

3. Revise SSAR, Chapter 2, Section 2.4.7, first paragraph, last sentence, from:

Table 2.4-8 shows that the PMP for a duration of 48 hrs for the month of August (25.2 in.) is greater than that for the month of February (13.8 in.) by 11.4 in.

To read:

Table 2.4-8 shows that the monthly PMP values obtained from the CPS USAR (CPS, 2002) for a duration of 48 hrs for the month of August (25.2 in.) is significantly greater than that for the month of February (13.8 in.) by 11.4 in.

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-6

Provide additional justification for why an increase in area with impervious surface will decrease the duration of low-flow events.

EGC RAI ID: SOI1-11

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.2.3, that "the applicant's assertion that an increase in area with impervious surface will decrease the duration of low-flow events is not adequate. Increases in impervious surface also result in a reduction in recharge and the resulting ground water-derived baseflow. While the applicant's assertion of increased flow is correct for the long-term average flow, an increase in impervious surface area could result in a decrease in baseflow during dry periods. Therefore, the applicant needs to provide additional justification for why an increase in area with impervious surface will decrease the duration of low-flow events."

Before addressing the impact of the area of impervious surface on the duration of low-flow events, it may be helpful to put the issue in perspective. The lake watershed is not significantly changing. Long term population trends are actually down, short term population trends are flat, and there is no information that supports significant future changes in land use or increases in the demand for water either upstream or downstream of the lake. As indicated in the response to DSER Open Item 2.4-4, the long term potential amounts to less than one-half of one percent of the watershed area. Given this information, the original question regarding the impact of development on flooding and low flows becomes somewhat hypothetical.

In our response to the question of flooding at the plant site, there is considerable variability in the rate and volume of runoff from both urban and agricultural land. In both cases these hydrologic characteristics can be controlled with stormwater management practices. New urban development in DeWitt County is required to include urban stormwater practices that control the rate and volume of runoff. Given the low rate of development in the lake watershed and the required stormwater control practices for new development it is reasonable to assume there will be no significant change in flooding.

In response to the question of low flows, the general conclusion drawn is that development will reduce the amount of infiltration and reduce the volume of water in the ground that is available during low flow periods. Therefore, the rate of flow during low flow periods will be reduced as will the duration of low flow for those stream reaches that will dry up. With required stormwater management practices for new urban development the change in the volume of infiltration is reduced. Given the low rate of development in the lake watershed and the required stormwater control practices for new development, it is reasonable to assume there will be no significant change in stream low flows.

Regarding low flows in Salt Creek downstream of Clinton Lake, the state requires a minimum discharge of 5 cfs through the dam. This minimum discharge is maintained during dry periods using the large storage capacity of the lake above the minimum lake elevation. With development and potential small shifts from infiltration volume to runoff, there is not expected to be a significant change in the total volume of water that is delivered to the lake, and therefore, no change in the lake's ability to deliver the minimum low flow to Salt Creek.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-7

Provide references to projections from State or local authorities responsible for development plans in the area of concern to substantiate any prediction of future development.

EGC RAI ID: SOI1-12

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.2.3, that "the applicant stated that the portion of Salt Creek downstream of Clinton Lake is not a candidate for an increase in demand. The applicant stated that Salt Creek is not a likely candidate for any diversion development because it historically has experienced extended periods of low flow. However, the staff concludes that the applicant did not provide adequate basis for this statement. Since an increase in additional storage capacity could mitigate these low-flow periods, the staff finds the applicant's response incomplete. The applicant should provide references to projections from State or local or authorities responsible for development plans in the area of concern to substantiate any prediction of future development."

Information on planned development for DeWitt County and Farmer City (obtained from State or local authorities responsible for development plans in the area of concern) is provided in the responses to DSER Open Items 2.4-3 and 2.4-6. As indicated in these responses, there is no known significant development planned for the lake watershed that would result in significant future withdrawals from Salt Creek upstream of the lake. The limited development that is occurring is expected to use a groundwater source for water supply.

With regard to future withdrawals from Salt Creek downstream of the dam, we affirm our previous statement that the creek would not be a good candidate for water withdrawal since flows released from the dam can be at the minimum flow rate of 5 cfs for extended periods of time. This minimum flow rate was established by the state as the minimum flow necessary to sustain a healthy aquatic life in the stream, and would generally not be considered as sufficient to support additional development.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-8

Address the differences between the applicant's and the staff's estimates of local intense precipitation at the ESP site for a 1-hour duration and for a 5-minute duration.

EGC RAI ID: SOI1-13

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.2.3, that the "applicant estimated local intense precipitation at the ESP site for a 1-hour duration of 13.5 in. and for a 5-minute duration of 4.3 in. Table 2.4-2 of this SER shows the staff's independent estimation of local intense precipitation, which is 2 percent higher than the applicant's estimate for a 1-hour duration and 41 percent higher than its estimate for a 5-minute duration. Because of these differences, the site characteristic of local intense precipitation at the ESP site remains open. Therefore, the applicant needs to address the differences between the applicant's and the staff's estimates of local intense precipitation at the ESP site for a 1-hour duration and for a 5-minute duration."

Revised estimates of local intense precipitation (1-mi^2) at the ESP site for the 1-hour and 5-minute durations are provided. Short-term intense precipitation at the site was characterized in the SSAR for the 1-hour and 5-minute averaging periods on the basis of information available from the CPS USAR (CPS, 2002). The information in the CPS USAR is based on HMR-33. The staff's independent evaluation using more up-to-date guidance (HMR-52), as presented in the DSER, indicates that the local intense precipitation for these periods may be higher. The values for the local intense precipitation presented in the SSAR compared with the values developed by the staff are as follows:

Duration	SSAR PMP	Staff PMP
1-hour	13.5 in	18.15 in
5-minute	4.3 in	6.08 in

EGC notes that the NRC estimate of the 1-hour PMP was higher than the SSAR 1-hour estimate, and after review of HMR-52, agrees with the staff's estimate of local intense precipitation for the 1-hour and 5-minute durations. As stated in the SSAR, the estimates provided therein were based on guidance provided in HMR-33, which has been superseded by HMR-52. Our analysis of the information in HMR-52 is consistent with the staff's estimates, and we therefore concur that the 1-hour and 5-minute duration PMP estimates should be 18.15 and 6.08 in., respectively.

The text of SSAR Section 2.4.2.3 "Effects of Local Intense Precipitation" will be revised to include the updated 1-hour and 5-minute PMP local intense values using the more recent HMR criteria (i.e., 18.15 and 6.08 in., respectively).

ASSOCIATED EGC ESP APPLICATION REVISIONS:

1. Revise SSAR, Chapter 1, Table 1.4-1, from:

1.2.1	Maximum Rainfall Rate	Note 1	13.5 in/hr (4.3 in/5 min)	SSAR

To read:

1.2.1	Maximum Rainfall Rate	Note 1	18.15 in/hr (6.08 in/5 min)	SSAR

2. Revise SSAR, Chapter 2, Section 2.4.2.3, 4th paragraph, from:

The maximum rainfall rate site characteristic for the EGC ESP Site is derived from Figure 2.4-6 (CPS, 2002). The values are established as 13.5 in/hr (4.3 in/5 min) where the five min to the 1 hr PMP ratio is 0.32 as found in National Weather Service Publication HMR No. 52 (USDOC, 1982).(The local PMP values will be used to evaluate the local site flooding based on site grading and drainage design at the COL stage.

To read:

The maximum rainfall rate site characteristic for the EGC ESP Facility as obtained from the CPS USAR and represented in Figure 2.4-6 of the SSAR (CPS, 2002) was established as 13.5 in/hr (4.3 in/5 min). More current information, as provided in HMR-52 (USDOC, 1982) indicates that the 1 hr PMP ratio is 18.15 in and the 5 minute PMP is 6.08 in. These local PMP values will be used to evaluate local site flooding based on site grading and drainage design at the COL stage for the ESP facility.

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-10

Provide a schematic diagram clearly showing the bounding dimensions and critical elevations of the ESP facility intake structure, including its conceptual plan and cross section, clearly indicating elevation of the basemat, elevation of the screen house opening, elevation of the normal plant heat sink makeup water intake pipe, elevation of the UHS makeup water intake pipe, and their relationship to the existing lake bed.

EGC RAI ID: SOI1-15

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.7.3, that "According to the CPS environmental report (ER) Figure 5.3-1, the ESP facility UHS intake would be located at an elevation of 668 ft MSL, which is below the lake bottom mentioned in the RAI response. The staff needs the bounding dimensions and critical elevations of the ESP facility intake structure, including its conceptual plan and cross section, clearly indicating elevation of the basemat, elevation of the screen house opening, elevation of the NHS makeup water intake pipe, elevation of the UHS makeup water intake pipe, and their relationship to the existing lake bed. The applicant needs to provide a schematic diagram clearly showing these items."

The EGC ESP ER Figure 5.3-1 is a cross section of Clinton Lake looking away from the CPS intake and the 668 ft elevation refers to the lake and not the plant intake structure. The design of the EGC ESP intake structure is dependent upon the reactor selected, and therefore, no schematic diagrams are available. Section 2.4.7 of the SSAR provides the approximate elevation of the screen house openings and is repeated below for your convenience: This information was also previously provided in response to RAI 2.4.7-3.

> "The new intake structure will be similar to the existing CPS intake structure except it will be smaller. The intake opening(s) to the ESP intake structure will extend vertically from elevation 690 ft, or higher, down to approximately elevation 669 ft."

The basemat of the EGC ESP Facility intake structure is expected to be located similar to that of the CPS Facility which is at 657 ft 6 in., but the design elevation will have to be set based on the submergence required for the UHS makeup water pumps. There is no intake pipe since vertical makeup pumps will be located in suction bays behind the screens. The lake bottom at the intake is at elevation 668 ft 6 in.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-12

Address the difference between the applicant's and the staff's estimates of the 30-day makeup water needed for the ESP facility UHS system.

EGC RAI ID: SOI1-17

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.8.3, that the "staff estimated that applying a 33-percent factor for blowdown, and an overall 20-percent margin, the 30-day makeup water needed for the ESP facility UHS system would be 73.6 x 1.33 x 1.2 = 117.4 ac-ft. The staff's estimate is considerably different from the applicant's estimate of 87 ac-ft. The applicant needs to justify its makeup water requirements for the proposed UHS."

The difference between the EGC and the NRC estimates of the 30-day makeup water needed for the ESP facility UHS system appears to be the result of double counting of the blowdown in the NRC estimate. The NRC estimate also includes a twenty percent margin on to the double counted blowdown value. These two factors are the major difference in the two estimates.

Applicant Estimate:

Evaporation rate requirement = 411 gpm (PPE 3.3.7)

Evaporation rate plus blowdown = 411 gpm x 1.33 (blowdown factor) = 548 gpm

Volume for 30-day shut-down period (without margin) = 73 ac-ft
= (548 gpm x 60 m/h x 24 h/d x 30 days) / 7.4805 gal/cf / 43560 sf/ac

Evaporation rate plus blowdown plus margin = 548 x 1.2 = 658 gpm
(makeup flow rate with margin)

Volume for 30-day shut-down period (with margin) = 87 ac-ft
= (658 g/m x 60 m/h x 24 h/d x 30 days) / 7.4805 gal/cf / 43560 sf/ac

Makeup water range for 30-day period with and without margin = 73 ac-ft to 87 ac-ft

NRC Estimate:

Makeup water requirement = 555 gpm (PPE 3.3.9) (this is actually the evaporation rate and blowdown using a 1.35 factor, 411 gpm x 1.35 = 555 gpm) or 73.6 ac-ft
= (555 gpm x 60 m/h x 24 h/d x 30 days) / 43560 sf/ac / 7.4805 g/cf

Makeup water plus blowdown = 97.9 ac-ft (this step double counts blowdown)
= 73.6 ac-ft x 1.33 (blowdown factor)

Makeup water plus blowdown plus margin = 117.4 ac-ft (adds margin to double counted blowdown) = 97.9 ac-ft x 1.20

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-13

Provide a commitment to specific ESP facility normal and ultimate heat sink systems for the staff to conclude this review.

EGC RAI ID: SOI1-18

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.8.3, that “the applicant needs to provide additional details on the ESP facility normal and ultimate heat sink systems and their cooling water requirements to allow determination of the maximum PPE heat rejection parameters. The applicant should provide a commitment to specific ESP facility normal and ultimate heat sink systems for the staff to conclude this review. The staff needs this information at the ESP stage to evaluate the adequacy of the UHS volume available for the ESP facility.”

The maximum PPE heat rejection requirements are provided in SSAR Table 1.4-1 and need not be determined by the Staff.

As indicated in SSAR Table 1.4-1, Sections 2.4 and 2.6, the EGC ESP Facility normal heat sink (NHS) will be either mechanical draft cooling or natural draft cooling tower(s). The NHS cooling tower may use dry cooling in combination with wet cooling, or only wet cooling depending on the reactor type selected. Wet/dry cooling would be used to reduce the amount of evaporation and maintain plant operation during drought periods as a commercial decision.

As indicated in SSAR Table 1.4-1, Section 3.3, the EGC ESP Facility ultimate heat sink (UHS), if one is required, will be mechanical draft cooling towers. Some of the reactor types under consideration use passive cooling or air blast cooling, and thus do not require a UHS. Because not all of the reactor types that could be installed at the EGC ESP facility require a UHS facility as part of the site support systems, the SSAR wording was chosen to recognize that a UHS will be provided only if required.

The adequacy of the UHS volume available for the ESP Facility cannot be determined until the design of the ESP Facility is determined. At the ESP stage, we can only determine the volume of water available in the CPS UHS that can be utilized for the safe shutdown of the ESP Facility.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-18

Provide the potential impact of future construction for the ESP facility on the piezometric gradient for the ESP site.

EGC RAI ID: SOI1-23

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.12.3, that "the staff concludes that any direct impacts to the ground water system during plant operation would be small and very localized. However, the applicant did not bound the possible indirect impact of an overall drop in the lake pool elevation caused by the additional consumptive use of water associated with the ESP facility. Such a drop in elevation might alter the piezometric surface in the vicinity of the plant. It is also unclear to the staff that construction down to the PPE embedment depth could be performed without dewatering systems that could possibly reverse the piezometric gradient for the existing CPS unit. The applicant needs to provide the potential impact of future construction for the ESP facility on the piezometric gradient for the ESP site."

If dewatering is utilized during construction, the potential impact on the piezometric gradient for the ESP site is expected to be a localized, short-term impact to ambient groundwater levels. The site hydrogeology, the water level information obtained during the CPS site investigations, and impacts during lake filling were used to anticipate the potential impacts during the operation (i.e., the possible indirect impact of an overall drop in the lake pool elevation) and construction of the ESP facility. Based on the measured water levels and gradients and the occurrence of the springs, the North Fork of Salt Creek and Salt Creek have been and, as part of Clinton Lake, continue to be, the discharge zone for shallow groundwater.

The estimated change in lake levels with the addition of the ESP Facility is discussed in EGC ESP ER Section 5.2.1.2.4 and summarized in ER Table 5.2-9. Based on the model developed to examine potential operational impact of the ESP Facility, the estimated reduction of the average annual lake level is 0.2 feet using wet/dry cooling or 0.7 feet using wet cooling. The estimated drop in the pool water level is within the observed seasonal variation for water levels measured in wells completed in the Wisconsinan deposits (averaging 5 ft; see SSAR Section 2.4.13.3). Therefore, the predicted drop in the lake pool elevation is not anticipated to result in significant change to the piezometric surface in the vicinity of the plant.

If dewatering is utilized during construction, the groundwater levels and gradients are expected to be impacted during the construction down to the PPE embedment depth (mainly in response to dewatering), but once completed the groundwater system will re-equilibrate and the flow pattern will be re-established toward the Lake. The generally low permeability of the shallow glacial material will also tend to minimize impacts from sudden changes in the site condition. Because no permanent dewatering system for the facility will be installed the impacts are not anticipated to be a long-term condition.

The design of the excavation and dewatering activities will need to consider the amount of water to be removed based on the embedment depth and the lateral extent of the depression in the groundwater surface that will temporarily be caused by dewatering. The impacts from construction dewatering on the groundwater system will be evaluated during the pre-construction monitoring for the EGC ESP Facility. The pre-construction monitoring program (identified as Pre-Application in the SSAR and ER) will include:

- Installation of additional shallow water table piezometers and deep piezometers (screened in discontinuous sand layer) spaced at suitable lateral intervals away from the EGC ESP Facility, between the EGC ESP Facility and the CPS Facility. In addition, piezometers located near Clinton Lake to help define the lateral continuity of sand layers will be used during the pumping test.
- Monitoring of water levels in the piezometers on a monthly basis to verify the hydrostatic loading on the power plant foundation, flow directions, and to estimate the amount of water that may need to be controlled during the excavation activities.
- Installation of a 12-in. test well and performance of a long-term pumping test to help evaluate the potential impacts that may be caused from the dewatering activities and the amount of water that may need to be controlled during the excavation activities.

The specific number, depths, and locations of the piezometers and the test well will be determined as the engineering design of the facility is better defined. The data collected will be used to define the baseline conditions and groundwater-related design elevations. In addition, the information will be used to identify additional locations that should be monitored during the construction of the EGC ESP Facility (see Environmental Report Section 6.3.2.3 for additional details). (Note: The “pre-construction” terminology used here better fits the project phase during which the monitoring would likely be initiated than does the “pre-application” terminology used in the ER and SSAR.)

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-20

Specify the maximum elevation at which any liquid radioactive waste releases can occur in the proposed ESP facility.

EGC RAI ID: SOI1-25

EGC RESPONSE:

The NRC indicates, in DSER Section 2.4.13.3, that "In RAI 2.4.12-1, the staff requested additional information regarding the likelihood for liquid effluents to reach a surface water body. The applicant provided data on the historical water surface elevations in the two upper till strata (i.e., the Wisconsinan and Illinoian). The lowest value recorded was 710.8 ft MSL in the Illinoian. The applicant reported the site grade as 735 ft MSL and the maximum embedment depth from the PPE. However, the applicant should also specify the maximum elevation at which any liquid radioactive waste releases can occur in the proposed ESP facility."

The maximum elevation at which any radioactive liquid releases can occur within the proposed ESP facility will be dependent on the design chosen for the ESP Facility. Further, the actual associated minimum groundwater level will also be dependent on the design chosen and the final location of the structures. At the COL stage, it will be the COL applicant's action to address how the design prevents potential releases above the groundwater level.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 2.4-21

Provide a thorough description of the local hydrologic setting, both that which exists currently and that which is expected after the disruption associated with the ESP construction activities, to ensure that an inward gradient will be maintained.

EGC RAI ID: SOI1-26

EGC RESPONSE:

This item is identified in DSER Section 2.4.13.3.

A thorough description of the local hydrologic setting that exists currently is provided in SSAR Section 2.4.13.3 and in SSAR, Appendix A, Section 5.

The local hydrologic setting after the disruption associated with the ESP construction activities is expected to be similar. The construction of the EGC ESP Facility may cause localized short-term impacts to ambient groundwater levels. The generally low permeability of the shallow glacial materials, however, will help to minimize the impacts during construction.

Because the final groundwater levels will be dependent on the design chosen and on the location of the ESP Facility within the identified footprint, the groundwater system will be monitored during the COL pre-construction and construction phases, as well as during the pre-operational and operations phases (as discussed in SSAR 2.4.13.4 and the response to DSER Open Item 2.4-18).

The objectives and description of the monitoring programs for groundwater include:

- **Pre-construction Monitoring Program** will collect data to support the assessment of site acceptability and to identify the groundwater system impacts that could result from construction and operation of the EGC ESP Facility. The monitoring program will include installation of additional shallow water table and deep piezometers and measuring water levels in the piezometers on a monthly basis to verify the hydrostatic loading on the power plant foundation and flow directions. The specific number, depths, and locations of the piezometers and the test well will be determined as the engineering design of the facility is better defined. (Note: The “pre-construction” terminology used here better fits the project phase during which the monitoring would likely be initiated than does the “pre-application” terminology used in the ER and SSAR.)
- **Construction Hydrologic Monitoring Program** will monitor and provide for control of anticipated impacts from site preparation and construction and to detect any unexpected impacts arising from the construction activities. Water levels from the piezometers installed for the pre-construction monitoring program will be measured at least daily during the active construction period in order to monitor lateral depression in the groundwater surface caused by dewatering.
- **Pre-operational Monitoring Program** will provide the database for evaluating hydrologic changes arising from the operation of the EGC ESP Facility. The monitoring will consist of collecting water levels on a monthly basis from piezometers that remain after the construction.

- **Operational Hydrologic Monitoring Program** will be implemented in order to establish the impacts to the groundwater system from the operation of the EGC ESP Facility and detect any unexpected impacts from plant operation. The monitoring will consist of extending pre-operational monitoring for an additional five-year period or until conditions appear to have stabilized based on the trend analysis of groundwater and surface water conditions.

These monitoring programs are also discussed in Environmental Report Sections 6.3.1.3, 6.3.2.3, 6.3.3.3, and 6.3.4.3, respectively.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 3.3-1

Use appropriate meteorological data and appropriate distances from postulated release points to the EAB and the LPZ to estimate the site specific χ/Q values used in the radiological consequence evaluations.

EGC RAI ID: SOI1-27

EGC RESPONSE:

The NRC indicates, in DSER Section 3.3.3.4, that "the staff concludes that neither appropriate meteorological data nor appropriate distances from postulated release points to the EAB and the LPZ outer boundary have been used by the applicant for estimating the site specific X/Q values used in the radiological consequence evaluations. Therefore, the radiological consequence evaluation for the proposed ESP site is unresolved.

The short-term accident Chi/Q values have been recalculated using a minimum distance of 805 meters to the EAB and three years of hourly meteorological data (January 2000 - December 2002) for distances of 805 meters and 4018 meters. In addition, the revisions made to the Chi/Q values by Westinghouse to support the final AP1000 design certification were incorporated. These Chi/Q values have been used to update the accident radiological evaluation and related information in SSAR Table 1.4-1, Chapter 2 (Section 2.3.4.3 and Table 2.3-51 as shown in the response to DSER Open Item 2.3-3), and SSAR Section 3.3.4 and associated Tables 3.3-2, 3.3-2A, 3.3-2B, 3.3-5, 3.3-6, 3.3-8, 3.3-9, 3.3-11, 3.3-13, 3.3-16, 3.3-17, 3.3-19, 3.3-21, 3.3-22, 3.3-23, 3.3-25, 3.3-26, 3.3-27, 3.3-29, 3.3-31, and 3.3-33.

As requested by NRC during our public meeting of March 31, 2005, the PAVAN input is also attached.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

1. Revise SSAR, Chapter 1, Table 1.4-1, Section 9.1, from:

9.1.1	0-2 hr @ EAB (sec/m^3)	Note 1	1.85E-04(5%) 3.56E-05 (50%)	SSAR ER
9.1.2	0-8 hr @ LPZ (sec/m^3)	Note 1	2.49E-05 (5%) 3.40E-06 (50%)	SSAR ER
9.1.3	8-24 hr @ LPZ (sec/m^3)	Note 1	1.68E-05 (5%) 2.85E-06 (50%)	SSAR ER
9.1.4	1-4 day @ LPZ (sec/m^3)	Note 1	7.18E-06 (5%) 1.85E-06 (50%)	SSAR ER
9.1.5	4-30 day @ LPZ (sec/m^3)	Note 1	2.11E-06 (5%) 1.00E-06 (50%)	SSAR ER

To read:

9.1.1	0-2 hr @ EAB (sec/m^3)	Notes 1,3	2.52E-04 (5%) 3.56E-05 (50%)	SSAR ER
9.1.2	0-8 hr @ LPZ (sec/m^3)	Notes 1,3	3.00E-05 (5%) 3.40E-06 (50%)	SSAR ER

9.1.3	8-24 hr @ LPZ (sec/m^3)	Notes 1,3	2.02E-05 (5%) 2.85E-06 (50%)	SSAR ER
9.1.4	1-4 day @ LPZ (sec/m^3)	Notes 1,3	8.53E-06 (5%) 1.85E-06 (50%)	SSAR ER
9.1.5	4-30 day @ LPZ (sec/m^3)	Notes 1,3	2.48E-06 (5%) 1.00E-06 (50%)	SSAR ER

2 Revise SSAR, Chapter 1, Table 1.4-1, to add new Note 3 which reads:

3. Re-evaluated site accident 5% Chi/Qs using 36 months of data for the period 1-1-2000 to 12-31-2002. Also shown are the 50% Chi/Qs used in the ER accident assessments.

3. Revise SSAR, Chapter 3, Section 3.3.4, last sentence of second paragraph (as previously added in response to RAI 3.3.1-1), from:

The AP1000 representative site X/Q value used in the evaluations are given in Table 3.3-2a.

To read:

The AP1000 representative site X/Q value used in the evaluations are given in Tables 3.3-2A and 3.3-2B.

4. Revise SSAR, Chapter 3, Section 3.3.4, to delete the last paragraph as previously added in response to RAI 3.3.1-1.

5. Revise SSAR, Chapter 3, Tables 3.3-2, 3.3-2A, 3.3-2B, 3.3-5, 3.3-6, 3.3-8, 3.3-9, 3.3-11, 3.3-13, 3.3-16, 3.3-17, 3.3-19, 3.3-21, 3.3-22, 3.3-23, 3.3-25, 3.3-26, 3.3-27, 3.3-29, 3.3-31, and 3.3-33, as shown in Attachment 3.3-1.

ATTACHMENTS:

Attachment 3.3-1A (Revised SSAR Tables)

Attachment 3.3-1B (PAVAN Input)

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 13.3-1

Provide a response to RAIs 13.3-20(a-j).

EGC RAI ID: SOI1-28

EGC RESPONSE:

The NRC indicates, in DSER Section 13.3.1.3, that “the applicant has not yet responded to RAIs 13.3-20(a–j).”

A response to RAIs 13.3-20(a-j) was submitted to NRC on January 24, 2005.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 13.3-2

Provide copies of documentation of contacts and arrangements with local government agencies having emergency planning responsibilities within the plume exposure EPZ (potentially DeWitt, Macon, McLean, and Piatt Counties; the municipalities of Clinton, Wapella, and Weldon; and the Village of DeWitt) that address the expanded responsibilities associated with an additional reactor(s) at the Clinton site.

EGC RAI ID: SOI1-29

EGC RESPONSE:

The NRC indicates, in DSER Section 13.3.2.3, that "the applicant's description of contacts and arrangements made with Federal, State, and local agencies does not clearly address the presence of an additional reactor(s) at the site and any resulting impact on government agency emergency planning responsibilities, including the agencies' acknowledgment of the proposed expanded responsibilities. Further, the additional information provided by the applicant does not adequately address RAI 13.3-4. Specifically, the applicant's documentation of contacts and arrangements with local government agencies having emergency planning responsibilities within the plume exposure EPZ (potentially DeWitt, Macon, McLean, and Piatt Counties; the municipalities of Clinton, Wapella, and Weldon; and the Village of DeWitt) does not address the expanded responsibilities associated with an additional reactor(s) at the Clinton site.

As indicated in the original response to NRC RAI No. 13.3-4 (submitted October 5, 2004), documentation of contacts and arrangements with local governmental agencies with emergency planning responsibilities within the plume exposure EPZ is provided through IEMA and the State of Illinois Statute § 20 ILCS 3305.

Specifically, section 3305/2 establishes the IEMA and authorizes "emergency management programs with the political subdivision of the State." Section 3305/4 defines political subdivisions as "any county, city, village, or incorporated town or township…"

Section 3305/5(f) indicates that the IEMA shall (among other things):

(1) coordinate the overall emergency management program of the State…

(4) Promulgate rules and requirements for political subdivision emergency operations plans that are not inconsistent with and are at least as stringent as applicable federal laws and regulations.

(5) Review and approve, in accordance with Illinois Emergency Management Agency rules, emergency operations plans for those political subdivisions required to have an emergency services and disaster agency pursuant to this Act.

(5.5) Promulgate rules and requirements for the political subdivision emergency management exercises, including, but not limited to, exercises of the emergency operations plans.

(5.10) Review, evaluate, and approve, in accordance with Illinois Emergency Management Agency rules, political subdivision emergency management exercises for those political subdivisions required to have an emergency services and disaster agency pursuant to this Act.

(6) Determine requirements of the State and its political subdivisions for food, clothing, and other necessities in event of a disaster."

These statutes show that IEMA coordinates and provides all necessary contacts and arrangements with the political subdivisions of the State, including the local governmental agencies with emergency planning responsibilities within the plume exposure EPZ.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 13.3-4

Address the estimated time required for confirmation of evacuation and provide a response to RAIs 13.3-20(k–v).

EGC RAI ID: SOI1-31

EGC RESPONSE:

The NRC indicates, in DSER Section 13.3.3.11.3, that “the staff needs additional information related to the 1993 ETE as requested in RAIs 13.3-20(k-v). Also, the applicant has not adequately addressed the estimated time required for confirmation of evacuation (RAI 13.3-16).”

A response to RAIs 13.3-20(k-v) was submitted to NRC on January 24, 2005.

The time required for confirmation of evacuation has been estimated based on visual confirmation by ground vehicles, a method specific in NUREG-0654. The evacuation confirmation times were calculated as the time required for emergency vehicles to conduct a “windshield survey” of the evacuated sub-areas, road by road, at an average travel speed of 15 mph. The miles of roadway in each sub-area were determined from U.S. Census TIGER (Topologically Integrated Geographic Encoding and Referencing system) files.

Estimated Confirmation Times for EGC ESP EPZ

PAR Evacuation Zone	Sub-areas	Miles of Roads	Drive Time (minutes)
2-mile	1	200	30
5-mile	1	200	30
10-mile (021-048)	1, 5, 6	343	55
10-mile (021-048)	1, 6	273	45
10-mile (021-048)	1, 6, 7	383	60
10-mile (021-048)	1, 7	311	50
10-mile (021-048)	1, 7, 8	377	60
10-mile (021-048)	1, 2, 8	352	55
10-mile (021-048)	1, 2	286	45
10-mile (021-048)	1, 2, 3	365	60
10-mile (021-048)	1, 3	279	45
10-mile (021-048)	1, 3, 4	363	60
10-mile (021-048)	1, 4	284	45
10-mile (021-048)	1, 4, 5	355	55
10-mile (021-048)	1, 5	271	45
Full EPZ	1 though 8	769	125

Based on discussions with the State of Illinois Emergency Management Agency, it was assumed that confirmation of evacuation would be performed using 25 vehicles. (More than 100 traffic and access control points have been designated for the EPZ and sub-areas. As the evacuation nears completion, some of the resources dedicated to traffic management will be available to perform other duties, such as evacuation confirmation.) The table above summarizes the miles of roadway in each Protective Action Recommendation (PAR) evacuation zone, plus estimated times for evacuation confirmation (rounded to the nearest five minutes).

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 02/10/2005

NRC DSER Open Item 17.1-1

Address 10 CFR Part 21 for ESP activities.

EGC RAI ID: SOI1-34

EGC RESPONSE:

The NRC indicates, in DSER Section 17.7.3.7, that "The staff does not agree with Exelon's position that none of its ESP activities could affect safety-related SSCs. A June 22, 2004, letter to the Nuclear Energy Institute (NEI) (ADAMS Accession No. ML040430041) and meeting summaries for two public meetings with NEI on generic ESP issues (September 9, 2004, ADAMS Accession No. ML042360430; November 10, 2004, ADAMS Accession No. ML043290195) document the NRC position regarding the applicability of 10 CFR Part 21 to ESP applicants and holders. The staff considers Exelon's failure to address the applicability of 10 CFR Part 21 to its ESP activities as Open Item 17.1-1."

This Open Item is specifically identified in the DSER section addressing the review of the EGC ESP conformance to acceptable QA measures associated with "Control of Purchased Material, Equipment, and Services." In particular, the "services" (which 10 CFR Part 21 refers to as "analysis ... or consulting services" in defining a "basic component") that EGC has contracted from CH2M HILL are being required to fall under Part 21. The NRC cites a June 22, 2004 position paper to NEI for detail, in which is stated (emphasis added):

> *Accordingly, safety-related design and analysis or consulting services must be procured and controlled, <u>or dedicated</u>, in a manner sufficient to allow the ESP holder and its contractors, as applicable, to comply with the above-described reporting requirements of 10 CFR 50.55(e) and Part 21. If this is not done, the ESP holder will not be in compliance with 50. 55(e) upon issuance of the ESP, nor will its suppliers of such services be in compliance with Part 21 at that time.*

Since many of the contracted services have already been completed, and they were not "procured and controlled" under Part 21, EGC intends to "dedicate" these completed "services," and assume the Part 21 reporting responsibilities.

The NRC Staff has concluded that the EGC QA program, including the corrective action program portion, has meet the guidance of RS-002 in providing reasonable assurance that any ESP activity "analyses or services" that could be used in the design and/or construction of SSCs important to safety will support satisfactory performance of such SSCs once they are in service. To further provide this assurance, each company contracted to perform "analyses or service" that may be associated with SSCs important to safety, is being requested to verify that no significant safety defects were discovered during performance of work for the ESP Application project, or since completion and delivery of that work. With this, these analyses and consulting services shall be deemed "dedicated" by virtue of the controls established and adhered to by the EGC ESP Project Quality Assurance program and summary verification that any defects have been identified.

To provide continued Part 21 compliance for the “open” contracts, contract revisions are being initiated to identify that the provisions of 10 CFR Part 21 apply, which will meet the requirements of 10 CFR 21.31. These “open” contracts are the EGC contract with CH2M HILL, and the CH2M HILL contracts with Geomatrix and Parson’s.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

ATTACHMENTS

Attachment 2.3-3 (Revised SSAR Table 2.3-51)

Revised to include new first column and new final column.

Attachment 3.3-1A (Revised SSAR Tables)

Revised SSAR Tables (revision description):
Table 3.3-2 (revised EAB Dose and LPZ Dose values);
Table 3.3-2A (revised ESP X/Q Values and X/Q Ratios);
Table 3.3-2B (new Table);
Table 3.3-5 (revised EAB Dose and LPZ Dose values);
Table 3.3-6 (revised EAB Dose and LPZ Dose values);
Table 3.3-8 (revised EAB Dose and LPZ Dose values),
Table 3.3-9 (revised EAB Dose and LPZ Dose values),
Table 3.3-11 (revised EAB Dose and LPZ Dose values),
Table 3.3-13 (revised EAB Dose and LPZ Dose values),
Table 3.3-16 (revised EAB Dose and LPZ Dose values),
Table 3.3-17 (revised EAB Dose and LPZ Dose values),
Table 3.3-19 (revised EAB Dose and LPZ Dose values),
Table 3.3-20 (no changes),
Table 3.3-21 (revised EAB Dose and LPZ Dose values),
Table 3.3-22 (revised header and all release values),
Table 3.3-23 (revised EAB Dose and LPZ Dose values),
Table 3.3-25 (revised EAB Dose and LPZ Dose values),
Table 3.3-26 (revised header only on other than first page),
Table 3.3-27 (revised EAB Dose and LPZ Dose values),
Table 3.3-29 (revised EAB Dose and LPZ Dose values),
Table 3.3-31 (revised EAB Dose and LPZ Dose values),
and Table 3.3-33 (revised EAB Dose and LPZ Dose values).

Attachment 3.3-1B (PAVAN Input)

TABLE 2.3-51
Summary and Comparison of Short-Term Chi/Q Calculations (5% Probability Level)

Averaging Period	Maximum Sector Values (sec/m^3)								
	PAVAN Results [a]	CPS USAR Results [b]	PAVAN Results [c]	PAVAN Results [c]	PAVAN Results [c]	CPS USAR Results [b]	PAVAN Results [c]	PAVAN Results [c]	PAVAN Results [a]
	EAB 805 m	EAB 975 m		EAB 1025 m		LPZ 4018 m	LPZ 4018 m	LPZ 4018 m	LPZ 4018 m
	No Building Wake	Building Wake	No Building Wake	Building Wake	No Building Wake	Building Wake	Building Wake	No Building Wake	No Building Wake
0 - 2 Hr	2.52E-04	1.78E-04	1.98E-04	1.85E-04	1.85E-04	4.15E-05	5.47E-05	5.47E-05	6.65E-05
0 - 8 Hr	1.41E-04	6.00E-05	9.78E-05	9.09E-05	9.89E-05	1.25E-05	2.36E-05	2.49E-05	3.00E-05
8 – 24 Hr	1.05E-04	4.03E-05	6.87E-05	6.37E-05	7.23E-05	8.20E-06	1.55E-05	1.68E-05	2.02E-05
1 - 4 Days	5.58E-05	1.71E-05	3.20E-05	2.95E-05	3.66E-05	3.30E-06	6.24E-06	7.18E-06	8.53E-06
4 – 30 Days	2.25E-05	0.81E-05	1.06E-05	0.98E-05	1.38E-05	1.55E-06	1.68E-06	2.11E-06	2.48E-06

[a] PAVAN results based on 3 years of meteorological data (January 2000 – December 2002).
[b] CPS, 2002
[c] PAVAN results based on 2 years 8 months of meteorological data (January 2000 – August 2002).

TABLE 3.3-2
Design Basis Accident Off-Site Dose Consequences

Accident	Reactor Type	EAB Dose TEDE Rem	LPZ Dose TEDE Rem	Guideline TEDE Rem
Main Steam Line Break				
Accident-initiated Iodine Spike	AP1000	3.4E-01	3.3E-01	2.5
Pre-existing Iodine Spike		2.9E-01	9.0E-02	25
Max Equilibrium Iodine Activity	ABWR	2.4E-02	2.9E-03	2.5
Pre-existing Iodine Spike		4.8E-01	5.8E-02	25
Reactor Coolant Pump Locked Rotor	AP1000	1.1E+00	1.3E-01	2.5
Control Rod Ejection Accident	AP1000	1.3E+00	3.7E-01	6.3
Control Rod Drop Accident	ABWR	N/A	N/A	6.3
Steam Generator Tube Rupture				
Accident-initiated Iodine Spike	AP1000	6.3E-01	5.5E-02	2.5
Pre-existing Iodine Spike		1.3E+00	7.6E-02	25
Small Line Break	AP1000	5.5E-01	6.7E-02	2.5
	ABWR	2.1E-02	5.1E-03	2.5
Loss of Coolant Accident	AP1000	1.2E+01	3.1E+00	25
	ABWR	1.7E+00	2.6E+00	25
	ESBWR	2.2E+00	2.4E+00	25
	ACR-700	2.7E+00	2.2E+00	25
Fuel Handling Accident	AP1000	1.0E+00	1.3E-01	6.3
	ABWR	5.7E-01	8.6E-02	6.3

Note:
1. TEDE guidelines from Regulatory Guide 1.183. Small line break guideline based on NUREG-0800, Chapter 15.6.2.
2. N/A - Not applicable due to design of ABWR, see Section 3.3.4.5.

TABLE 3.3-2A
Ratio of EGC ESP Site Short Term χ/Q Values to AP1000 Design Certification (DC) χ/Q Values

Post Accident Time Period (hr)	EGC ESP Site χ/Q Values (sec/m^3)	AP1000 DC χ/Q Values (sec/m^3)	χ/Q Ratio (ESP Site / AP1000 DC)
EAB[1] 0 – 2	2.52E-04	6.00E-04	4.20E-01
LPZ 0 – 8	3.00E-05	1.35E-04	2.22E-01
LPZ 8 – 24	2.02E-05	1.00E-04	2.02E-01
LPZ 24 – 96	8.53E-06	5.40E-05	1.58E-01
LPZ 96 – 720	2.48E-06	2.20E-05	1.13E-01

Note 1. 2-hour period with greatest EAB dose consequences.

TABLE 3.3-2B
Ratio of EGC ESP Site Short Term χ/Q Values to AP1000 LOCA Design Certification (DC) χ/Q Values

Post Accident Time Period (hr)	EGC ESP Site χ/Q Values (sec/m^3)	AP1000 DC χ/Q LOCA Values (sec/m^3)	χ/Q Ratio (ESP Site / AP1000 DC)
EAB[1] 0 – 2	2.52E-04	5.10E-04	4.94E-01
LPZ 0 – 8	3.00E-05	2.20E-04	1.36E-01
LPZ 8 – 24	2.02E-05	1.60E-04	1.26E-01
LPZ 24 – 96	8.53E-06	1.00E-04	8.53E-02
LPZ 96 – 720	2.48E-06	8.00E-05	3.10E-2

Note 1. 2-hour period with greatest EAB dose consequences.

TABLE 3.3-5
AP1000 Main Steam Line Break
Accident-Initiated Iodine Spike Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	3.36E-01	-
0 to 8 hr	-	1.42E-01
8 to 24 hr	-	8.48E-02
24 to 96 hr	-	9.95E-02
96 to 720 hr	-	0
Total	3.36E-01	3.27E-01

TABLE 3.3-6
AP1000 Main Steam Line Break
Pre-Existing Iodine Spike Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	2.94E-01	-
0 to 8 hr	-	5.33E-02
8 to 24 hr	-	1.62E-02
24 to 96 hr	-	2.05E-02
96 to 720 hr	-	0
Total	2.94E-01	9.00E-02

TABLE 3.3-8
ABWR Main Steam Line Break Outside Containment
Maximum Equilibrium Value for Full Power Operation Off-Site Dose Consequences

Dose Type	**EAB Dose Rem**	**LPZ Dose Rem**
Thyroid	4.70E-01	5.59E-02
Whole Body	1.03E-02	1.23E-03
TEDE	2.43E-02	2.89E-03

TABLE 3.3-9
ABWR Main Steam Line Break Outside Containment
Pre-existing Iodine Spike Off-Site Dose Consequences

Dose Type	**EAB Dose Rem**	**LPZ Dose Rem**
Thyroid	9.40E+00	1.12E+00
Whole Body	2.05E-01	2.44E-02
TEDE	4.85E-01	5.77E-02

TABLE 3.3-11
AP1000 Locked Rotor Accident, 0 to 1.5 Hour Duration
Pre-existing Iodine Spike Off-Site Dose Consequences

Time	**EAB Dose TEDE Rem**	**LPZ Dose TEDE Rem**
0 to 2 hr	1.05E+00	-
0 to 8 hr	-	1.33E-01
8 to 24 hr	-	0
24 to 96 hr	-	0
96 to 720 hr	-	0
Total	1.05E+00	1.33E-01

TABLE 3.3-13
AP1000 Control Rod Ejection Accident
Pre-existing Iodine Spike Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	1.26E+00	-
0 to 8 hr	-	3.11E-01
8 to 24 hr	-	5.25E-02
24 to 96 hr	-	7.27E-03
96 to 720 hr	-	1.35E-03
Total	1.26E+00	3.72E-01

TABLE 3.3-16
AP1000 Steam Generator Tube Rupture
Accident-Initiated Iodine Spike Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	6.30E-01	-
0 to 8 hr	-	4.00E-02
8 to 24 hr	-	1.45E-02
24 to 96 hr	-	0
96 to 720 hr	-	0
Total	6.30E-01	5.45E-02

TABLE 3.3-17
AP1000 Steam Generator Tube Rupture
Pre-existing Iodine Spike Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	1.26E+00	-
0 to 8 hr		7.11E-02
8 to 24 hr		5.25E-03
24 to 96 hr		0
96 to 720 hr		0
Total	1.26E+00	7.64E-02

TABLE 3.3-19
AP1000 Small Line Break Accident, 0 to 0.5 Hour Duration
Accident-Initiated Iodine Spike Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	5.46E-01	-
0 to 8 hr	-	6.67E-02
8 to 24 hr	-	0
24 to 96 hr	-	0
96 to 720 hr	-	0
Total	5.46E-01	6.67E-02

TABLE 3.3-20
ABWR Small Line Break Outside Containment
Activity Released to Environment

Isotope	Curies Released 0 to 2 hr	Curies Released 0 to 8 hr
I-131	1.84E+00	3.81E+00
I-132	1.61E+01	3.22E+01
I-133	1.24E+01	2.55E+01
I-134	2.68E+01	5.14E+01
I-135	1.78E+01	3.62E+01
Total	7.50E+01	1.49E+02

TABLE 3.3-21
ABWR Small Line Break Outside Containment Off-Site Dose Consequences

Dose Type	EAB Dose Rem	LPZ Dose Rem
Thyroid	4.32E-01	1.06E-01
Whole Body	8.10E-03	1.90E-03
TEDE	2.10E-02	5.07E-03

TABLE 3.3-22
AP1000 Design Basis Loss of Coolant Accident Curies Released to Environment by Interval

Isotope	1.4 to 3.4 hr	0 to 8 hr	8 to 24 hr	24 to 96 hr	96 to 720 hr
Halogen Group					
I-130	5.65E+01	1.12E+02	5.37E+00	7.10E-01	1.27E-02
I-131	1.69E+03	3.49E+03	2.66E+02	2.39E+02	7.19E+02
I-132	1.24E+03	2.14E+03	1.64E+01	1.46E-02	0
I-133	3.24E+03	6.54E+03	3.83E+02	1.04E+02	1.04E+01
I-134	6.63E+02	1.14E+03	2.96E-01	6.79E-08	0
I-135	2.56E+03	4.89E+03	1.58E+02	6.09E+00	3.16E-03
Noble Gas Group					
Kr-85m	1.42E+03	3.77E+03	1.87E+03	8.56E+01	1.22E-03
Kr-85	8.32E+01	3.49E+03	7.06E+02	1.59E+03	1.36E+04
Kr-87	1.10E+03	2.14E+03	4.97E+01	4.05E-03	0
Kr-88	3.12E+03	6.54E+03	1.70E+03	1.75E+01	4.09E-07
Xe-131m	8.27E+01	1.14E+03	6.79E+02	1.37E+03	5.57E+03
Xe-133m	4.44E+02	1.54E+03	3.15E+03	4.11E+03	2.58E+03
Xe-133	1.47E+04	5.19E+04	1.16E+05	2.06E+05	4.07E+05
Xe-135m	1.07E+01	3.59E+01	2.14E-07	0	0
Xe-135	3.16E+03	9.64E+03	1.01E+04	2.11E+03	8.68E+00
Xe-138	3.14E+01	1.20E+02	1.58E-07	0	0
Alkali Metal Group					
Rb-86	3.05E+00	6.32E+00	2.99E-01	9.83E-02	5.13E-01
Cs-134	2.59E+02	5.38E+02	2.57E+01	9.11E+00	7.74E+01
Cs-136	7.34E+01	1.52E+02	7.16E+00	2.28E+00	9.88E+00
Cs-137	1.51E+02	3.13E+02	1.50E+01	5.32E+00	4.57E+01
Cs-138	1.51E+02	3.30E+02	2.18E-03	0	0
Tellurium Group					
Sr-89	9.25E+01	1.85E+02	9.24E+00	3.19E+00	2.26E+01
Sr-90	7.96E+00	1.59E+01	7.99E-01	2.84E-01	2.44E+00
Sr-91	9.70E+01	1.81E+02	5.46E+00	1.35E-01	7.06E-04
Sr-92	6.85E+01	1.13E+02	1.01E+00	5.15E-04	0

TABLE 3.3-22 (CONTINUED)
AP1000 Design Basis Loss of Coolant Accident Curies Released to Environment by Interval

Isotope	1.4 to 3.4 hr	0 to 8 hr	8 to 24 hr	24 to 96 hr	96 to 720 hr
Tellurium Group (continued)					
Sb-127	2.42E+01	4.80E+01	2.29E+00	5.67E-01	7.82E-01
Sb-129	5.12E+01	8.94E+01	1.51E+00	4.95E-03	4.90E-08
Te-127m	3.16E+00	6.30E+00	3.16E-01	1.11E-01	8.71E-01
Te-127	2.05E+01	3.83E+01	1.15E+00	2.75E-02	1.33E-04
Te-129m	1.07E+01	2.15E+01	1.07E+00	3.65E-01	2.36E+00
Te-129	1.89E+01	2.83E+01	2.69E-02	3.54E-08	0
Te-131m	3.17E+01	6.20E+01	2.64E+00	3.35E-01	7.81E-02
Te-132	3.23E+02	6.40E+02	3.02E+01	7.04E+00	7.83E+00
Ba-139	5.45E+01	8.30E+01	1.49E-01	9.91E-07	0
Ba-140	1.63E+02	3.25E+02	1.61E+01	5.11E+00	2.17E+01
Noble Metals Group					
Mo-99	2.15E+01	4.25E+01	1.98E+00	4.29E-01	3.78E-01
Tc-99m	1.48E+01	2.66E+01	6.05E-01	5.27E-03	1.33E-06
Ru-103	1.73E+01	3.46E+01	1.73E+00	5.93E-01	3.99E+00
Ru-105	8.20E+00	1.44E+01	2.48E-01	8.86E-04	1.17E-08
Ru-106	5.71E+00	1.14E+01	5.73E-01	2.03E-01	1.70E+00
Rh-105	1.03E+01	2.02E+01	8.81E-01	1.29E-01	4.14E-02
Lanthanide Group					
Y-90	8.09E-02	1.60E-01	7.44E-03	1.59E-03	1.35E-03
Y-91	1.19E+00	2.37E+00	1.19E-01	4.12E-02	3.00E-01
Y-92	7.91E-01	1.35E+00	1.80E-02	2.86E-05	0
Y-93	1.22E+00	2.28E+00	7.08E-02	1.98E-03	1.42E-05
Nb-95	1.60E+00	3.19E+00	1.59E-01	5.44E-02	3.55E-01
Zr-95	1.59E+00	3.18E+00	1.59E-01	5.52E-02	4.08E-01
Zr-97	1.43E+00	2.74E+00	1.03E-01	6.73E-03	3.71E-04

TABLE 3.3-22 (CONTINUED)
AP1000 Design Basis Loss of Coolant Accident Curies Released to Environment by Interval

Isotope	1.4 to 3.4 hr	0 to 8 hr	8 to 24 hr	24 to 96 hr	96 to 720 hr
Lanthanide Group (continued)					
La-140	1.68E+00	3.29E+00	1.46E-01	2.36E-02	9.62E-03
La-141	1.03E+00	1.79E+00	2.71E-02	6.41E-05	2.01E-10
La-142	5.40E-01	8.31E-01	2.09E-03	3.39E-08	0
Nd-147	6.17E-01	1.23E+00	6.06E-02	1.90E-02	7.29E-02
Pr-143	1.39E+00	2.78E+00	1.37E-01	4.40E-02	1.94E-01
Am-241	1.20E-04	2.39E-04	1.20E-05	4.27E-06	3.68E-05
Cm-242	2.83E-02	5.65E-02	2.83E-03	9.98E-04	8.08E-03
Cm-244	3.47E-03	6.93E-03	3.48E-04	1.24E-04	1.06E-03
Cerium Group					
Ce-141	3.90E+00	7.78E+00	3.88E-01	1.32E-01	8.45E-01
Ce-143	3.47E+00	6.78E+00	2.93E-01	4.05E-02	1.14E-02
Ce-144	2.95E+00	5.89E+00	2.96E-01	1.05E-01	8.68E-01
Pu-238	9.18E-03	1.83E-02	9.21E-04	3.27E-04	2.82E-03
Pu-239	8.08E-04	1.61E-03	8.10E-05	2.88E-05	2.48E-04
Pu-240	1.18E-03	2.37E-03	1.19E-04	4.22E-05	3.63E-04
Pu-241	2.66E-01	5.31E-01	2.67E-02	9.48E-03	8.14E-02
Np-239	4.49E+01	8.87E+01	4.08E+00	8.15E-01	5.70E-01

Note:
The EAB dose is greatest during the two-hr period between 1.4 and 3.4 hours after start of this accident

TABLE 3.3-23
AP1000 Design Basis Loss of Coolant Accident Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
1.4 to 3.4 hr	1.23E+01	-
0 to 8 hr	-	2.96E+00
8 to 24 hr	-	9.71E-02
24 to 96 hr	-	3.17E-02
96 to 720 hr	-	2.70E-02
Total	1.23E+01	3.12E+00

Notes:
1. The EAB dose is greatest during the two-hr period between 1.4 and 3.4 hours after start of this accident.
2. LOCA based on Regulatory Guide 1.183.

TABLE 3.3-25
ABWR Design Basis Loss of Coolant Accident Off-Site Dose Consequences

Dose Type	EAB Dose Rem	LPZ Dose Rem
Thyroid	3.51E+01	6.98E+01
Whole Body	7.25E-01	7.83E-01
TEDE	1.66E+00	2.63E+00

Note: LOCA based on Regulatory Guide 1.3 and TID-14844.

TABLE 3.3-26
ESBWR Design Basis Loss of Coolant Accident Curies Released to Environment by Interval

Isotope	0 to 1.4 hr	1.4 to 3.4 hr	0 to 8 hr	8 to 24 hr	24 to 96 hr	96 to 720 hr
Halogen Group						
I-131	9.28E+01	2.85E+02	8.72E+02	1.60E+03	5.09E+03	6.64E+03
I-132	1.21E+02	3.11E+02	7.18E+02	4.42E+02	1.02E+03	4.80E+02
I-133	1.89E+02	5.56E+02	1.62E+03	2.09E+03	2.36E+03	1.50E+02
I-134	1.01E+02	1.09E+02	2.31E+02	0	0	0
I-135	1.66E+02	4.42E+02	1.16E+03	6.90E+02	1.40E+02	0
Noble Gas Group						
Kr-85m	1.09E+02	7.25E+02	2.90E+03	3.83E+03	6.40E+02	0
Kr-85	3.56E+00	2.96E+01	1.75E+02	1.24E+03	1.23E+04	1.99E+05
Kr-87	1.30E+02	5.02E+02	1.09E+03	7.00E+01	0	0
Kr-88	2.43E+02	1.42E+03	4.72E+03	2.82E+03	1.10E+02	0
Xe-133	7.68E+02	6.36E+03	3.70E+04	2.46E+05	1.89E+06	6.68E+06
Xe-135	2.02E+02	1.66E+03	8.14E+03	2.44E+04	1.90E+04	1.00E+02
Alkali Metal Group						
Rb-86	4.50E-02	1.30E-01	4.03E-01	7.37E-01	2.40E+00	2.91E+00
Cs-134	1.36E+01	3.95E+01	1.22E+02	2.28E+02	7.90E+02	1.26E+03
Cs-136	3.64E+00	1.06E+01	3.25E+01	5.90E+01	1.87E+02	2.04E+02
Cs-137	8.14E+00	2.37E+01	7.32E+01	1.37E+02	4.72E+02	7.58E+02
Tellurium Group						
Sr-89	4.70E+00	2.15E+01	6.27E+01	1.19E+02	4.03E+02	5.85E+02
Sr-90	3.33E-01	1.53E+00	4.45E+00	8.55E+00	2.94E+01	4.75E+01
Sr-91	5.62E+00	2.36E+01	6.07E+01	5.03E+01	2.00E+01	0
Sr-92	4.78E+00	1.60E+01	3.30E+01	4.90E+00	1.00E-01	0
Sb-127	9.76E-01	4.43E+00	1.28E+01	2.23E+01	5.73E+01	3.06E+01
Sb-129	2.85E+00	1.08E+01	2.44E+01	8.60E+00	6.00E-01	0
Te-127	9.51E-01	4.36E+00	1.26E+01	2.33E+01	6.51E+01	4.80E+01
Te-127m	1.28E-01	5.89E-01	1.72E+00	3.29E+00	1.14E+01	1.78E+01
Te-129	3.11E+00	1.30E+01	3.19E+01	2.69E+01	6.22E+01	8.50E+01

TABLE 3.3-26 (CONTINUED)
ESBWR Design Basis Loss of Coolant Accident Curies Released to Environment by Interval

Isotope	0 to 1.4 hr	1.4 to 3.4 hr	0 to 8 hr	8 to 24 hr	24 to 96 hr	96 to 720 hr
Tellurium Group (continued)						
Te-129m	8.43E-01	3.87E+00	1.13E+01	2.13E+01	7.14E+01	9.80E+01
Te-131m	1.58E+00	7.02E+00	1.97E+01	2.86E+01	4.23E+01	5.30E+00
Te-132	1.57E+01	7.10E+01	2.04E+02	3.51E+02	8.55E+02	4.00E+02
Ba-139	4.82E+00	1.21E+01	2.15E+01	5.00E-01	0	0
Ba-140	8.33E+00	3.81E+01	1.11E+02	2.06E+02	6.49E+02	7.04E+02
Noble Metals Group						
Co-58	3.24E-03	1.49E-02	4.33E-02	8.27E-02	2.80E-01	4.18E-01
Co-60	3.88E-03	1.78E-02	5.19E-02	9.91E-02	3.43E-01	5.56E-01
Mo-99	1.02E+00	4.61E+00	1.32E+01	2.22E+01	5.11E+01	1.95E+01
Tc-99m	8.91E-01	4.09E+00	1.19E+01	2.14E+01	5.21E+01	2.06E+01
Ru-103	7.81E-01	3.58E+00	1.04E+01	1.98E+01	6.64E+01	9.34E+01
Ru-105	4.37E-01	1.65E+00	3.78E+00	1.37E+00	1.10E-01	0
Ru-106	2.12E-01	9.78E-01	2.84E+00	5.42E+00	1.87E+01	2.97E+01
Rh-105	3.91E-01	1.79E+00	5.17E+00	8.43E+00	1.44E+01	2.40E+00
Lanthanide Group						
Y-90	4.85E-03	3.54E-02	1.90E-01	1.35E+00	1.33E+01	4.16E+01
Y-91	5.78E-02	2.69E-01	8.07E-01	1.72E+00	6.26E+00	9.31E+00
Y-92	4.03E-01	3.88E+00	1.58E+01	1.50E+01	1.10E+00	0
Y-93	6.74E-02	2.84E-01	7.36E-01	6.44E-01	2.80E-01	0
Zr-95	7.55E-02	3.47E-01	1.01E+00	1.92E+00	6.51E+00	9.66E+00
Zr-97	7.42E-02	3.24E-01	8.77E-01	1.04E+00	9.00E-01	2.00E-02
Nb-95	7.14E-02	3.28E-01	9.56E-01	1.83E+00	6.33E+00	1.02E+01
La-140	1.37E-01	1.14E+00	6.70E+00	4.90E+01	4.12E+02	7.42E+02
La-141	6.45E-02	2.38E-01	5.32E-01	1.59E-01	9.00E-03	0
La-142	4.57E-02	1.21E-01	2.21E-01	7.00E-03	0	0
Pr-143	7.23E-02	3.33E-01	9.75E-01	1.92E+00	6.67E+00	7.94E+00
Nd-147	3.22E-02	1.47E-01	4.27E-01	7.93E-01	2.46E+00	2.52E+00
Am-241	3.72E-06	1.71E-05	4.98E-05	9.62E-05	3.37E-04	5.87E-04

TABLE 3.3-26 (CONTINUED)
ESBWR Design Basis Loss of Coolant Accident Curies Released to Environment by Interval

Isotope	**0 to 1.4 hr**	**1.4to 3.4 hr**	**0 to 8 hr**	**8 to 24 hr**	**24 to 96 hr**	**96 to 720 hr**
Lanthanide Group (continued)						
Cm-242	9.81E-04	4.50E-03	1.31E-02	2.51E-02	8.58E-02	1.34E-01
Cm-244	5.29E-05	2.43E-04	7.08E-04	1.35E-03	4.69E-03	7.55E-03
Cerium Group						
Ce-141	1.89E-01	8.71E-01	2.53E+00	4.79E+00	1.60E+01	2.18E+01
Ce-143	1.80E-01	8.05E-01	2.26E+00	3.37E+00	5.37E+00	8.00E-01
Ce-144	1.23E-01	5.64E-01	1.64E+00	3.14E+00	1.08E+01	1.71E+01
Pu-238	1.67E-04	7.68E-04	2.24E-03	4.28E-03	1.48E-02	2.39E-02
Pu-239	4.24E-05	1.95E-04	5.68E-04	1.09E-03	3.78E-03	6.16E-03
Pu-240	5.31E-05	2.44E-04	7.10E-04	1.36E-03	4.70E-03	7.53E-03
Pu-241	9.14E-03	4.20E-02	1.22E-01	2.34E-01	8.14E-01	1.30E+00
Np-239	2.37E+00	1.07E+01	3.06E+01	5.05E+01	1.09E+02	3.50E+01

TABLE 3.3-27
ESBWR Design Basis Loss of Coolant Accident Off-Site Dose Consequences

Time	**EAB Dose TEDE Rem**	**LPZ Dose TEDE Rem**
1.4 to 3.4 hr	2.19E+00	-
0 to 8 hr	-	7.88E-01
8 to 24 hr	-	5.01E-01
24 to 96 hr	-	7.75E-01
96 to 720 hr	-	3.49E-01
Total	2.19E+00	2.41E+00

Notes:
1. The EAB dose is greatest during the two-hr period between 1.4 and 3.4 hours after start of this accident.
2. LOCA based on Regulatory Guide 1.183.

TABLE 3.3-29
ACR-700 Large Loss of Coolant Accident Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	2.67E+00	-
0 to 8 hr	-	6.91E-01
8 to 24 hr	-	1.81E-01
24 to 96 hr		1.26E+00
96 to 720 hr		9.78E-02
Total	2.67E+00	2.23E+00

TABLE 3.3-31
AP1000 Fuel Handling Accident Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	1.01E+00	-
0 to 8 hr	-	1.33E-01
8 to 24 hr	-	0
24 to 96 hr	-	0
96 to 720 hr	-	0
Total	1.01E+00	1.33E-01

TABLE 3.3-33
ABWR Fuel Handling Accident Off-Site Dose Consequences

Dose Type	**EAB Dose Rem**	**LPZ Dose Rem**
Thyroid	1.40E+01	1.69E+00
Whole Body	1.99E-01	4.91E-02
TEDE	5.69E-01	8.63E-02

Note: LPZ dose includes contribution from activity remaining in reactor building. See Section 3.3.4.13.

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Exelon ESP Site     1/1/00-12/31/02      GROUND-LEVEL RELEASE
Sensor Height 10.0 METERS 10 - 60 METERS
Data Source Clinton Power Station Met Data System
 No SITE-SPECIFIC TERRAIN ADJUSTMENT FACTORS
    6    0
2069. 76.1 10.0 10.0
    0    0    0    0    0    0    0
    3    1    3    7    5   16   16   22    7    5    7    7    3    2    3    1
   17    7   64   63   75   91   95  103  138   91  104   41   41   46   41   25
   42   39   94   32   26   12   47   32  138  132  126   70   89   82   91   43
   18   12   23    5    3    0    9   25   69   64   62   41   79   84   51   22
    1    0    1    0    0    0    1    2    8    4    2    5   18   20   10    5
    0    0    0    0    0    0    0    1    0    0    0    2    3    0    0    0
    4    0    5    8    8   15   16    9   17   10   10    7    3    5    2    0
   23   23   48   30   23   18   42   38   56   54   51   32   38   39   41   21
   40   33   30   19   10    1   13   34   50   63   87   61   52   57   58   29
   13    7   13    2    3    1    4   18   29   41   22   32   30   24   16    7
    1    1    1    0    0    0    0    2    8    3    3    4    8    7    5    3
    0    0    0    0    0    0    0    0    1    0    0    1    4    0    0    0
    2    3    8    6    6   10   11   11    9    6   12    7    2    8   10    3
   32   21   51   35   23   22   36   33   38   28   40   28   31   39   43   41
   40   39   28   17    6    8   19   32   64   48   57   45   49   53   45   29
   16   20   21    0    1    0    8   11   23   20   18   27   35   53   30   12
    0    9    5    0    0    0    0    1    8    4    2   16    5   13    7    1
    0    0    0    0    0    0    0    0    0    0    0    1    1    1    0    0
   22   27   37   40   57   72   38   44   23   35   42   23   34   31   26   23
  161  165  228  188  154  181  214  234  175  187  166  106  171  159  188  148
  224  218  227  102   50   69  141  269  367  361  179  169  313  321  288  187
   59   73   70    5    1    2   27   68  181  204   59   91  212  205  125   52
    2    9    8    0    0    0    0    4   44   27    9   24   44   35   11    4
    0    1    0    0    0    0    0    0    0    0    1    1    6    2    3    0
   20   39   74   73   95  111   94   74   67   72   58   60   43   33   32   23
   78   96  197  143  135  151  212  363  417  320  201  177  151  162  134  105
   39   42   28   18   10   12   64  169  341  343  154  103  124   91   38   54
    0    5    1    0    0    0    5   17  106   71   33   24   40   10   10   13
    0    0    0    0    0    0    0    4   18    6    1    1    1    2    2    0
    0    3    3    0    0    0    0    0    0    0    0    0    0    0    0    0
   22   51   96   65   68   67   55   54   55   65   45   54   47   43   34   17
   39   82  133   70   33   19   86   93   99  112   98   87   73   52   77   27
    1    8    8   16   11    1    3   10   23   22   17   32    8   12   12    6
    1    0    0    1    0    0    0    0    0    0    4   13    2    0    1    4
    0    0    0    0    0    0    0    0    0    0    0    3    0    0    0    0
    4    1    3    0    0    0    0    0    1    0    0    0    0    0    0    0
   20   78  137   54   46   36   28   25   22   26   32   40   40   51   42   16
    9   62   93   17   15    3   19   15   20   18   31   28   14   23   55    7
    0    1    1    5    4    0    0    0    0    0    4    3    0    0    5    2
    1    0    0    2    4    0    0    0    0    0    4    4    0    0    0    0
    0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0
    3    0    0    0    0    0    0    0    0    0    0    0    0    0    0    0
 101. 3.0  7.0  12.0 18.0 24.0 30.0
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