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52.17

October 7, 2004

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

Subject: Response to Request for Additional Information (RAI) Letter No. 8 – Exelon Early Site Permit (ESP) Application for the Clinton ESP Site (TAC No. MC1122)

Re: Letter, U.S. Nuclear Regulatory Commission (N. V. Gilles) to Exelon Generation Company, LLC, (M. Kray), dated July 27, 2004, Request for Additional Information Letter No. 8 – Exelon Early Site Permit Application for the Clinton ESP Site (TAC No. MC1122)

Enclosed, as requested in the referenced letter, are responses to the requests for additional information (RAIs) associated with the geography, demography, and radiological consequences of accidents portions of the Exelon Generation Company, LLC (EGC) ESP application.

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

D073

cc: U.S. NRC Regional Office (w/ enclosures)
Ms. Nanette V. Gilles (w/ enclosures)

Enclosure: Response to RAI 1.4-1
Response to RAI 1.4-2
Response to RAI 2.1.1-1 and associated attachment
Response to RAI 2.1.2-1
Response to RAI 3.3-1
Response to RAI 3.3.1-1
Response to RAI 3.3.2-1
Response to RAI 3.3.4-1
Response to RAI 3.3.4-2 and associated attachment
Response to RAI 3.3.4-3

Attachments:
RAI 2.1.1-1 Attachment (New Figure 2.1-8)
RAI 3.3.4-2 Attachment (AP1000 Results Bases Tabulation)

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 7th day of October, 2004.

My commission expires 10-6-07.

Vivia V. Gallimore

Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Vivia V. Gallimore, Notary Public
Kennett Square Boro, Chester County
My Commission Expires Oct. 6, 2007
Member, Pennsylvania Association Of Notaries

NRC Letter Dated: 07/27/2004

NRC RAI No. 1.4-1

SSAR Section 1.4, Plant Parameters Envelope (PPE)

Please clarify how the "dose consequences" in PPE Table 1.4-1, Sections 9.3 and 10.1, relate to the site characteristics identified in the referenced SSAR sections.

EGC RAI ID: R11-1

EGC RESPONSE:

PPE Section 9.3, Dose Consequences, refers to:

(1) SSAR Section 3.1.1, Gaseous Effluents, for the specification of the site characteristic value. This section states that the gaseous radioactive effluent concentrations for the ESP site were determined based on a composite of the highest activity content of the individual isotopes anticipated to be released from the alternative reactor designs and the site characteristic average annual atmospheric dilution factor given in PPE Section 9.2. The bounding radioactive releases in conjunction with the site average annual X/Q value is used to demonstrate compliance with 10 CFR 20 Effluent Concentration Limits per Table 3.1-1.

(2) SSAR Section 3.1.1.2, Estimated Doses, utilizes site specific effluent pathways / parameters as specified in Table 3.1-2 (i.e. population and meteorological data) and Table 3.1-3 for the location of the nearest resident, garden, milk cow, and milk goat when estimating the ESP site specific airborne pathway doses. The referenced Section (as given in Table 3.1-4) demonstrates compliance with 10 CFR 20 and 10 CFR 50, Appendix I requirements.

(3) SSAR Section 3.3, Radiological Consequences of Accidents, utilizes site characteristic post accident atmospheric dispersion factors, given in PPE Section 9.1, in conjunction with reactor vendor postulated design basis accident radioactive releases as a function of time to assess compliance with 10 CFR 50.34(a)(1) and 10 CFR 100 dose limits.

PPE Section 10.1, Dose Consequences, refers to:

(1) SSAR Section 3.1.2, Liquid Effluents, for the specification of the site characteristic value. This section states that the liquid radioactive effluent concentrations for the ESP site were determined based on a composite of the highest activity content of the individual isotopes anticipated to be released from the alternative reactor designs and the minimum dilution flow of 2,400 gpm given in PPE Section 10.2.1. The bounding radioactive releases in conjunction with the minimum dilution flow is used to demonstrate compliance with 10 CFR 20 Effluent Concentration Limits per Table 3.1-5.

(2) SSAR Section 3.1.2.2, Estimated Doses, utilizes site-specific effluent pathways / parameters as specified in Table 3.1-6 (i.e., Clinton Lake annual discharge flow and volume data, fish consumption, etc.). Section 3.1.2.2 also demonstrates compliance with 10 CFR 20 and 10 CFR 50, Appendix I requirements as shown in Table 3.1-7.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

Revise SSAR, Chapter 1, Table 1.4-1, items 9.3.1 and 9.3.2, from:

9.3.1	Normal	Note 1	Refer to SSAR 3.1.1 and 3.1.1.2 and ER 5.4	SSAR, ER
9.3.2	Post-Accident	Note 1	Refer to SSAR 3.3 and ER 7.1	SSAR, ER

To read:

9.3.1	Normal	Note 1	10 CFR 20, 10 CFR 50 Appendix I, and 40 CFR 190 dose limits. Refer to SSAR 3.1.1 and 3.1.1.2 and ER 5.4	SSAR ER
9.3.2	Post-Accident	Note 1	10 CFR 50.34(a)(1) and 10 CF 100 dose limits. Refer to SSAR 3.3 and ER 7.1	SSAR ER

Revise SSAR, Chapter 1, Table 1.4-1, item 10.1.1, from:

10.1.1	Normal	Note 1	SSAR 3.1.2.2	SSAR

To read:

10.1.1	Normal	Note 1	10 CFR 20, 10 CFR 50 Appendix I, and 40 CFR 190 dose limits. Refer to SSAR 3.1.2 and 3.1.2.2 and ER 5.4	SSAR, ER

ATTACHMENTS:

None

NRC Letter Dated: 07/27/2004

NRC RAI No. 1.4-2

Should you delete "sec/m^3" from Section 9.3, "Dose Consequences," of Table 1.4-9 (it appears to be a typographical error)? Should you replace the word "gaseous" in Table 1.4-9 in the definition sections of items 9.3.1 add 9.3.2, and from the parameter sections of 9.5.1 and 9.5.2, with the words "airborne effluents" to more accurately represent the effluent release characteristics?

EGC RAI ID: R11-2

EGC RESPONSE:

The dimension "sec/m^3 " is a typographical error that will be removed from Section 9.3, "Dose Consequences," of SSAR, Chapter 1, Table 1.4-9.

The term "airborne effluents" more accurately represents the effluent release characteristic. Thus, the definition is revised to delete "gaseous" and substitute "airborne effluent" in Sections 9.3.1 and 9.3.2 of Table 1.4-9. The definitions given in Sections 9.5.1 and 9.5.2 of Table 1.4-9 already define the gaseous source term as airborne effluents.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

Revise SSAR, Chapter 1, Table 1.4-9, line items 9.3.1 and 9.3.2, from:

9.3 Dose Consequences	sec/m^3		
9.3.1 Normal	rem	The estimated design radiological dose consequences due to gaseous releases from normal operation of the plant.	Maximum
9.3.2 Post-Accident	rem	The estimated design radiological dose consequences due to gaseous releases from postulated accidents.	Maximum

To read:

9.3 Dose Consequences			
9.3.1 Normal	rem	The estimated design radiological dose consequences due to airborne effluent releases from normal operation of the plant.	Maximum
9.3.2 Post-Accident	rem	The estimated design radiological dose consequences due to airborne effluent releases from postulated accidents.	Maximum

ATTACHMENTS:

None

NRC Letter Dated: 07/27/2004

NRC RAI No. 2.1.1-1

SSAR Section 2.1.1, Site Location and Description

SSAR Figure 1.2-3 shows the proposed ESP exclusion area boundary (EAB) and low population zone (LPZ), and the distances to the EAB and LPZ by sector. Please provide an expanded and legible figure to clearly show the proposed EAB and LPZ as well as existing Clinton Power Station EAB. Please provide the direction distances to the EABs and LPZ by sector. Please state the distance from the proposed ESP site to the nearest EAB line for the proposed ESP site, including its direction and distance.

EGC RAI ID: R11-3

EGC RESPONSE:

SSAR, Chapter 2, Figure 2.1-8 (as attached to this RAI response) has been provided to more clearly show the proposed ESP exclusion area boundary (EAB) and low population zone (LPZ) as well as the existing Clinton Power Station EAB. The ESP EAB is based on maintaining a minimum distance of 0.5 miles (805 meters) from any point on the ESP Plot Plan for locating the Power Block Structures. This resulted in an exclusion area with a radius of 1025 meters for the EGC ESP site. The LPZ was maintained at a distance of 2.5 miles (4018 meters) since this area contains residents whose total population and density are such that there is reasonable probability of providing appropriate protective measures based on both the Clinton Station Emergency Plan (EP) and EGC ESP major features EP documentation.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

Revise SSAR, Chapter 2, Section 2.1.1.2, first two paragraphs, from:

Figure 1.2-3 shows the EGC ESP Site area including the plant footprint, the Exclusion Area Boundary (EAB), and Low Population Zone (LPZ), as defined in 10 CFR 100. Also shown are the distances by sector to the existing property line.

The exclusion area is entirely within the property boundary and is the area encompassed by a radius of 1,025 m (3,362 ft) from the center of the ESP Facility footprint. The low population zone is the area encompassed by a circle of 4,018 m (2.5 mi) radius.

To read:

Figure 2.1-8 shows the EGC ESP Site Exclusion Area Boundary (EAB), and Low Population Zone (LPZ), as defined in 10 CFR 100. The exclusion area is entirely within the property boundary (Figure 1.2-3) and is the area encompassed by a radius of 1,025 m (3,362 ft) from the center of the ESP Facility footprint area for locating power block structures. The low population zone is the area encompassed by a circle of 4,018 m (2.5 mi) radius.

Revise SSAR, Chapter 2, Section 2.1.1.3, from:

For the purpose of evaluating compliance with the 10 CFR 20, the boundary of the restricted area for the EGC ESP Site is defined as the EGC ESP Site EAB. This boundary distance is established as a site characteristic (see Table 1.4-1, Section 9.4.4). There are no residential quarters in the restricted area. The radiation dose limits given in 10 CFR 20.1301 and the concentration limits of radioactive material in effluents given in 10 CFR 20.1302 will be met at the restricted area boundary. Access to the restricted area will be controlled by positive means such as fencing and posting of no trespassing signs on land and buoys with posting in Clinton Lake. The distance from the outside boundary of the EGC ESP footprint to the existing property line by compass sectors is shown in Figure 1.2-3. The guidelines for keeping the radiation exposures as low as is reasonably achievable (ALARA), as given in 10 CFR 50, Appendix I (10 CFR 50), are applied at the site boundary taken herein to be the EGC ESP Site EAB distance of 1,025 m. The liquid effluents from the station are discharged into Clinton Lake, the outfall of which joins the Sangamon River approximately 56 mi downstream. The Sangamon River joins the Illinois River approximately 80 mi west of the site. The closest sizeable lake is Lake Decatur on the Sangamon River, located approximately 20 mi south of the site. There is no plausible way for liquid effluents to get to Lake Decatur since the outfall from Clinton Lake enters the Sangamon River downstream of Lake Decatur. The liquid effluents from the ESP Facility will be discharged into Clinton Lake through the existing CPS discharge flume shown on Figure 1.2-3.

To read:

For the purpose of evaluating compliance with the 10 CFR 20, the boundary of the restricted area for the EGC ESP Site is defined as the EGC ESP Site EAB. This boundary distance is established as a site characteristic (see Table 1.4-1, Section 9.4.4). There are no residential quarters in the restricted area. The radiation dose limits given in 10 CFR 20.1301 and the concentration limits of radioactive material in effluents given in 10 CFR 20.1302 will be met at the restricted area boundary. Access to the restricted area will be controlled by positive means such as fencing and posting of no trespassing signs on land and buoys with posting in Clinton Lake.

The guidelines for keeping the radiation exposures as low as is reasonably achievable (ALARA), as given in 10 CFR 50, Appendix I (10 CFR 50), are applied at the site boundary taken herein to be the EGC ESP Site EAB distance of 1,025 m. The liquid effluents from the station are discharged into Clinton Lake, the outfall of which joins the Sangamon River approximately 56 mi downstream. The Sangamon River joins the Illinois River approximately 80 mi west of the site. The closest sizeable lake is Lake Decatur on the Sangamon River, located approximately 20 mi south of the site. There is no plausible way for liquid effluents to get to Lake Decatur since the outfall from Clinton Lake enters the Sangamon River downstream of Lake Decatur. The liquid effluents from the ESP Facility will be discharged into Clinton Lake through the existing CPS discharge flume shown on Figures 1.2-3 and 1.2-4.

Revise SSAR, Chapter 2, Section 2.1.2.1, 2nd paragraph, from (change Figure number as noted):

The exclusion area for the EGC ESP Site meets the requirements of 10 CFR 100 as demonstrated in Section 3.3. The boundary line of the EGC ESP Site exclusion area is shown in Figure 1.2-3. The EGC ESP Site overlaps the CPS Facility exclusion area; however, the two are not concentric.

To read:

The exclusion area for the EGC ESP Site meets the requirements of 10 CFR 100 as demonstrated in Section 3.3. The boundary line of the EGC ESP Site exclusion area is shown in Figure 2.1-8. The EGC ESP Site overlaps the CPS Facility exclusion area; however, the two are not concentric.

Revise SSAR, Chapter 2, Section 2.1, to add new Figure 2.1-8 as provided in the attachment to this RAI response.

ATTACHMENTS:

RAI 2.1.1-1 Attachment (New Figure 2.1-8)

NRC Letter Dated: 07/27/2004

NRC RAI No. 2.1.2-1

SSAR Section 2.1.2, Exclusion Area Authority and Control

You stated in Section 2.1.2.1 that Exelon Generation Company (EGC) will ensure that it has or will be granted the necessary authority, rights, and control of the EGC ESP Site, including the exclusion area, prior to commencing actions allowed pursuant to any ESP granted from your application.

Please provide the following information regarding your approach to obtaining such a grant:

1. A list of regulatory agencies and other private parties from which you would need a grant;
2. Information as to whether the ESP site incorporates the entire EAB as shown in the SSAR; and
3. The duration of the grant that you would seek.

EGC RAI ID: R11-4

EGC RESPONSE:

As discussed in SSAR, Chapter 2, Sections 2.1.1.2 and 2.1.2.1, the exclusion area for the EGC ESP facility is entirely within the EGC ESP Site. The real estate within the EGC ESP exclusion area is owned by AmerGen (with the exception of a right-of-way for a township road). AmerGen is wholly owned by EGC and its subsidiaries.

EGC does not need a grant from any regulatory agencies to control activities within the EGC ESP exclusion area boundary. As discussed in SSAR Sections 2.1.2.1 and 2.1.2.2, EGC together with the DeWitt County Sheriff's Department will control access to the exclusion area from the township road. As discussed in Section 3.2.3 and Appendix A of the Emergency Plan for the EGC ESP, an agreement exists between AmerGen and the Sheriff's Department to control traffic.

The public may be given recreational access to Lake Clinton. However, as discussed in SSAR Section 2.1.1.3, public access to those portions of the Lake within the restricted area boundary and exclusion area boundary will be controlled by positive means, such as buoys with postings on Lake Clinton.

As explained in Section 3.4.6 of the Administrative Information of the EGC ESP application, EGC plans to enter into an agreement with AmerGen prior to construction that will grant EGC an exclusive and irrevocable option to purchase, enter a long-term lease for, and/or procure other legal right in the land required for the EGC ESP Facility. Additionally, EGC will enter into an Exclusion Area Agreement with AmerGen. This Agreement will provide EGC with authority to determine the activities within the EGC ESP exclusion area, including the exclusion of personnel and property, to the extent necessary to comply with applicable NRC guidance. EGC anticipates that this Agreement and the lease will extend for 99 years.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 07/27/2004

NRC RAI No. 3.3-1

SSAR Section 3.3, Radiological Consequences of Accidents

In Section 3.3 of the SSAR, you stated:

> "The radioactivity released to the environs for [design-basis accidents] DBAs is provided by the reactor supplier based upon their standard safety analysis reports or as specified in their PPE listing as being representative of the bounding DBA environmental release."

Please clarify what you are referring to as the reactor supplier's "PPE listing."

EGC RAI ID: R11-5

EGC RESPONSE:

The reactor supplier PPE listing is the post accident radioactive airborne effluent releases that are referred to in SSAR, Chapter 1, Section 9.5.2 and Table 1.4-1, and given in Section 3.3 Tables for the design basis accidents considered. The specific DBA activity releases were provided in the reactor vendors certification package or if no certification package has been docketed or the information was not included in the certification package, this information was provided as part of a reactor vendor PPE submittal to the ESP applicants. The Section 3.3 Tables that contain this data are:

3.3-1	Limiting Gas Cooled Reactor Design Basis Event Curies Released to Environment by Interval
3.3-3	AP1000 Main Steam Line Break Curies Released to Environment by Interval - Accident-Initiated Iodine Spike
3.3-4	AP1000 Main Steam Line Break Curies Released to Environment by Interval-Pre-existing Iodine Spike
3.3-7	ABWR Main Steam Line Break Outside Containment Curies Released to Environment
3.3-10	AP1000 Locked Rotor Accident Curies Released to Environment-Pre-existing Iodine Spike
3.3-12	AP1000 Control Rod Ejection Accident Curies Released to Environment by Interval-Pre-existing Iodine Spike
3.3-14	AP1000 Steam Generator Tube Rupture Accident Curies Released to Environment by Interval-Accident Initiated Iodine Spike
3.3-15	AP 1000 Steam Generator Tube Rupture Accident Curies Released to Environment by Interval-Pre-existing Iodine Spike
3.3-18	AP1000 Small Line Break Accident Curies Released to Environment Accident Initiated Iodine Spike
3.3-20	ABWR Small Line Break Outside Containment Activity Released to Environment
3.3-22	AP1000 Design Basis Loss of Coolant Accident Curies Released to Environment by Interval

3.3-24	ABWR LOCA Curies Released to Environment by Interval
3.3.26	ESBWR Design Basis Loss of Coolant Accident Curies Released to Environment by Interval
3.3-28	ACR-700 Design Basis Large Loss of Coolant Accident Curies Released to Environment by Interval
3.3-30	AP1000 Fuel Handling Accident Curies Released to Environment
3.3-32	ABWR Fuel Handling Accident Curies Released to Environment by Interval

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 07/27/2004

NRC RAI No. 3.3.1-1

SSAR Section 3.3.1, Selection of Postulated Accidents

In Section 3.3.1 of the SSAR, you stated that you used the AP1000 design in selecting DBAs for demonstrating site suitability. Westinghouse has revised its χ/Qs in the AP1000 design control document since submittal of the Clinton ESP application. Please use the updated χ/Qs in the Westinghouse AP1000 Design Control Document and revise the site-specific doses and fission product releases for all DBAs in SSAR Section 3.3 accordingly, or please note that the AP1000 values used in the emergency response (ER) have been revised but the applicant has elected not to use the updated values in the accident analyses.

EGC RAI ID: R11-6

EGC RESPONSE:

The EGC ESP Application uses the χ/Qs from Revision 2 of the Westinghouse AP1000 Design Control Document. This was the most recent completed revision of the document at the time the Application was submitted.

Since the submittal of the Exelon ESP Application, the AP1000 design certification review process has been completed and resulted in Westinghouse changing the standard χ/Q values used in their design basis accident analyses. EGC has elected not to update the Application to reflect the more recent values because the specific impact of the AP1000 Design Certification change in χ/Q values has been assessed and found to have a minor effect on the design basis accident EAB and LPZ doses presented in the EGC ESP Application. Based upon the changes made by Westinghouse the EAB and LPZ doses will increase or decrease in proportion to the change in the ESP site to design certification χ/Q ratios as noted in the following Table.

Ratios of 5% Accident Site χ/Q Values to AP1000 Design Certification (DC) χ/Q Values						
	χ/Q (sec/m^3)	χ/Q (sec/m^3)	χ/Q (sec/m^3)	χ/Q Ratio (Site/DC)		Ratio
Time Period (hr)	EGC ESP Site	AP1000 (PPE values)	New AP1000*	Old AP1000	New AP1000	New to Old
EAB 0 - 2	1.85E-04	6.00E-04	5.8E-04	3.08E-01	3.19E-01	1.036
LPZ						
0 - 8	2.49E-05	1.35E-04	2.7E-04	1.84E-01	9.22E-02	0.501
8 -24	1.68E-05	1.00E-04	2.0E-04	1.68E-01	8.40E-02	0.500
24 -96	7.18E-06	5.40E-05	1.0E-04	1.33E-01	7.18E-02	0.534
96 - 720	2.11E-06	2.20E-05	8.0E-05	9.59E-02	2.64E-02	0.275

* DSER Open Item Response 15.3-1 R4 page 17 dated 4/21/04

Based on the above, the EAB doses for the AP1000 design basis accidents would increase by 3.6 % and the LPZ doses would decrease by about 50% on average depending upon the specific accident. Adequate margin exists in the ESP site calculated DBA doses to accommodate this change and maintain compliance with the applicable 10 CFR 50.34 regulatory criteria.

The fission product releases presented in EGC ESP Application are unaffected by the changes in χ/Q values.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

Revise SSAR, Chapter 3, Section 3.3.4, from:

This section identifies the postulated accidents, the resultant activity release paths, the important accident parameters and assumptions, and the credited mitigation features used in the EGC ESP Site dose consequence assessments. An overall summary of the results of the evaluated accident doses appears in Table 3.3-2. This table also compares the site safety analysis doses to the recommended limits based on Regulatory Guide 1.183 and NUREG-0800. Table 3.3-2 shows that the evaluated dose consequences meet the accident-specific acceptance criteria invoked in Section 3.3.2.

To read (adds 2nd paragraph):

This section identifies the postulated accidents, the resultant activity release paths, the important accident parameters and assumptions, and the credited mitigation features used in the EGC ESP Site dose consequence assessments. An overall summary of the results of the evaluated accident doses appears in Table 3.3-2. This table also compares the site safety analysis doses to the recommended limits based on Regulatory Guide 1.183 and NUREG-0800. Table 3.3-2 shows that the evaluated dose consequences meet the accident-specific acceptance criteria invoked in Section 3.3.2.

The analysis approach for evaluating the AP1000 design basis accidents discussed in the following subsections is based upon the EAB and LPZ doses provided by Westinghouse and given in Chapter 15 of the AP1000 Design Control Document, Tier 2, Revision 2 and the ratio of the ESP Site X/Q value to the AP1000 representative site X/Q value for each post accident time period. The AP1000 representative site X/Q value used in the evaluations are given in Table 3.3-2a.

Based upon the revisions made to the X/Q values by Westinghouse to support the final AP1000 design certification, the EAB doses presented in Tables 3.3-2, 3.3-5, 3.3-6, 3.3-11, 3.3-13, 3.3-16, 3.3-17, 3.3-19, 3.3-23 and 3.3-31 will increase by 3.6% and the LPZ doses will remain bounding.

Revise SSAR, Chapter 3, Section 3.3, to add new Table 3.3-2a:

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	1.85E-04	6.00E-04	3.08E-01
LPZ 0 – 8	2.49E-05	1.35E-04	1.84E-01
LPZ 8 – 24	1.68E-05	1.00E-04	1.68E-01
LPZ 24 – 96	7.18E-06	5.40E-05	1.33E-01
LPZ 96 – 720	2.11E-06	2.20E-05	9.59E-02

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

ATTACHMENTS:

None

NRC Letter Dated: 07/27/2004

NRC RAI No. 3.3.2-1

SSAR Section 3.3.2, Evaluation of Radiological Consequences

Are the "0 to 2 hours" radioactivity release time intervals shown in Section 3.3.2 for any two-hour period with the greatest EAB doses? If so, please add a note to indicate this fact.

EGC RAI ID: R11-7

EGC RESPONSE:

The 0- to 2-hour EAB time period provides the χ/Q value for the 2-hour period with the greatest EAB doses if applicable to the analysis. For example the 0- to 2-hour period is the period used in the LOCA analyses for the ABWR and ACR-700, whereas the χ/Q for this period is applied to releases in the 1- to 3-hour time period for the AP1000 and the 1.4- to 3.4-hour time period for the ESBWR.

As requested, a notation will be added to the Application indicating this fact.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

Revise SSAR, Chapter 3, Section 3.3.2, third paragraph, from:

The accident dose evaluations are performed using Chi/Qs and activity releases for the following intervals:

To read:

The accident dose evaluations are performed using Chi/Qs and activity releases for the following intervals. The 0- to 2-hour Chi/Q value is used for the 2-hour release duration with the greatest dose consequence at the EAB.

ATTACHMENTS:

None

NRC Letter Dated: 07/27/2004

NRC RAI No. 3.3.4-1

SSAR Section 3.3.4, Postulated Accidents

Several tables in Section 3.3 show time-dependent activities released to the environs as the PPE values. Please provide the references and the methodology used to determine the time-dependent activity release values in these tables. Also, please ensure the values in these tables appropriately reflect the AP1000 design χ/Qs as discussed in RAI 3.3.1-1

EGC RAI ID: R11-8

EGC RESPONSE:

The approach used for calculating time-dependent activity releases are as generally described in Chapter 3, Section 3.3.3 of the SSAR. For the ABWR and AP1000 designs the specific methodology used to determine the time dependent activity release values are presented in their respective design certification documents as referenced in Section 3.3.

For the non-certified reactors, the vendors have not provided the specific details of the methodology but have provided time dependent activity releases which were presented in their respective tables in Section 3.3. These values are considered by the reactor vendors to be the best estimate of the limiting design basis post accident radioactive releases.

The final time-dependent activity release values for the EGC ESP facility will be design specific and thus are not yet available. The methodology and design specific activity release values will be identified at either the completion of the Design Certification stage or at the Combined License stage. However at this ESP stage, the Application provides a spectrum of design values for use in evaluating offsite radiological consequences and the capability of the site to comply with 10 CFR 100 and 10 CFR 50.34 post accident dose requirements.

The activity releases given in Section 3.3 are not affected by the χ/Q values or the changes discussed in RAI 3.3.1-1.

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

None

NRC Letter Dated: 07/27/2004

NRC RAI No. 3.3.4-2

SSAR Table 3.3-2 summarizes the resulting doses at the ESP site for postulated DBAs using the AP1000, the advanced boiling water reactor (ABWR), and the ACR-700 as surrogate reactor designs. Please update the table for each DBA to include (1) AP1000, ABWR, and ACR-700 χ/Q values and doses used for the EAB and LPZ, and (2) the ratios of site-specific χ/Qs to design certification χ/Qs used.

EGC RAI ID: R11-9

EGC RESPONSE:

SSAR Table 3.3-2 summarizes the resulting EAB and LPZ doses at the ESP Site for the spectrum of postulated design basis accidents (DBA) that had offsite dose consequences as considered in the AP1000 and ABWR certification documents. In addition, projected EGC ESP Facility offsite doses were provided for the ESBWR and the ACR-700 for the limiting DBA (Loss of Coolant Accident). The ESBWR and ACR-700 offsite doses were projected based on estimated radioactive releases to the environment provided by the vendors and EGC ESP Site X/Q values since no certification documents have been submitted for these design concepts.

The bases for the AP1000 results presented in SSAR Table 3.3-2 is presented in the tabulation attached to this RAI response. This table includes the AP1000 EAB and LPZ doses along with the corresponding ratio of ESP Site X/Q to Vendor specified X/Qs as a function of post accident time periods. As noted in the Application, the doses provided for the ABWR design basis accidents were not based on X/Q ratios of certified post accident offsite dose values but were calculated based upon the DBA activity releases as function of the post accident time period, the EGC ESP Site X/Q and Federal Guidance Reports 11 and 12 dose conversion factors. The ABWR doses are presented in terms of TEDE equivalent in lieu of thyroid and whole body doses (refer to the response to RAI 3.3.4-3 for the equivalent thyroid and whole body doses). Certification doses and X/Q ratios are not available for the ACR-700 or the ESBWR and therefore have not been included.

The following table provides the basis for the ratios presented in the tabulation attached to this RAI response.

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	1.85E-04	6.00E-04	3.08E-01
LPZ 0 – 8	2.49E-05	1.35E-04	1.84E-01
LPZ 8 – 24	1.68E-05	1.00E-04	1.68E-01
LPZ 24 – 96	7.18E-06	5.40E-05	1.33E-01
LPZ 96 – 720	2.11E-06	2.20E-05	9.59E-02

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

ASSOCIATED EGC ESP APPLICATION REVISIONS:

None

ATTACHMENTS:

RAI 3.3.4-2 Attachment (AP1000 Results Bases Tabulation)

NRC Letter Dated: 07/27/2004

NRC RAI No. 3.3.4-3

Several tables, including Table 3.3-2 in Section 3.3, present doses for ABWR DBAs in total effective dose equivalent (TEDE) units. Please provide the doses in thyroid and whole body doses in addition to the doses in TEDE units, because the General Electric ABWR design is certified with the thyroid and whole body doses.

EGC RAI ID: R11-10

EGC RESPONSE:

The following Tables in Section 3.3 that present doses for the ABWR design basis accidents are provided below with the calculated thyroid, whole body, and TEDE doses. The ABWR DBA doses were calculated using the certified time-dependent activity releases provided in GE's ABWR SAR and the ESP Facility short-term accident X/Qs. Thyroid doses were determined using ICRP 30. Whole body doses were determined using Regulatory Guide 1.109 dose conversion factors. The dose conversion bases is similar to that identified in the ABWR SSAR. TEDE doses were calculated using the dose conversion factors contained in Federal Guidance Reports 11 and 12.

Table 3.3-8 ABWR Main Steam Line Break Outside Containment Maximum Equilibrium Value for Full Power Operation

Dose Type	EAB (rem)	LPZ (rem)
Thyroid	3.45E-01	4.64E-02
Whole Body	7.57E-03	1.02E-03
TEDE	1.78E-02	2.40E-03

Table 3.3-9 ABWR Main Steam Line Break Outside Containment - Pre-existing Iodine Spike

Dose Type	EAB (rem)	LPZ (rem)
Thyroid	6.90E+00	9.29E-01
Whole Body	1.50E-01	2.062-02
TEDE	3.56E-01	4.79E-02

Table 3.3-21 ABWR Small Line Break Outside Primary Containment

Dose Type	EAB (rem)	LPZ (rem)
Thyroid	3.17E-01	8.78E-02
Whole Body	5.95E-03	1.58E-03
TEDE	1.54E-02	4.21E-03

Table 3.3-25 ABWR Design Basis Loss of Coolant Accident

Dose Type	EAB (rem)	LPZ (rem)
Thyroid	2.58E+01	5.90E+01
Whole Body	5.32E-01	6.57E-01
TEDE	1.22E+00	2.22E+00

Table 3.3-33 ABWR Fuel Handling Accident

Dose Type	EAB (rem)	LPZ (rem)
Thyroid	1.03E+01	1.40E+00
Whole Body	1.46E-01	4.07E-02
TEDE	4.18E-01	7.16E-02

ASSOCIATED EGC ESP APPLICATION REVISIONS:

Revise SSAR, Chapter 3, Section 3.3, Table 3.3-8 (to present thyroid and whole body doses in addition to the TEDE) from:

TABLE 3.3-8

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

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	1.78E-02	-
0 to 8 hr	-	2.40E-03
8 to 24 hr	-	0
24 to 96 hr	-	0
96 to 720 hr	-	0
Total	1.78E-02	2.40E-03

To read:

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	3.45E-01	4.64E-02
Whole Body	7.57E-03	1.02E-03
TEDE	1.78E-02	2.40E-03

Revise SSAR, Chapter 3, Section 3.3, Table 3.3-9 (to present thyroid and whole body doses in addition to the TEDE) from:

TABLE 3.3-9

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

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	3.56E-01	-
0 to 8 hr	-	4.79E-02
8 to 24 hr	-	0
24 to 96 hr	-	0
96 to 720 hr	-	0
Total	3.56E-01	4.79E-02

To read:

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	6.90E+00	9.29E-01
Whole Body	1.50E-01	2.062-02
TEDE	3.56E-01	4.79E-02

Revise SSAR, Chapter 3, Section 3.3, Table 3.3-21 (to present thyroid and whole body doses in addition to the TEDE) from:

TABLE 3.3-21

ABWR Small Line Break Outside Containment Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	1.54E-02	-
0 to 8 hr	-	4.21E-03
8 to 24 hr	-	0
24 to 96 hr	-	0
96 to 720 hr	-	0
Total	1.54E-02	4.21E-03

To read:

TABLE 3.3-21

ABWR Small Line Break Outside Containment Off-Site Dose Consequences

Dose Type	EAB Dose Rem	LPZ Dose Rem
Thyroid	3.17E-01	8.78E-02
Whole Body	5.95E-03	1.58E-03
TEDE	1.54E-02	4.21E-03

Revise SSAR, Chapter 3, Section 3.3, Table 3.3-25 (to present thyroid and whole body doses in addition to the TEDE) from:

TABLE 3.3-25

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

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	1.22E+00	-
0 to 8 hr	-	2.76E-01
8 to 24 hr	-	1.89E-01
24 to 96 hr	-	6.39E-01
96 to 720 hr	-	1.12E+00
Total	1.22E+00	2.22E+00

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

To read:

TABLE 3.3-25

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

Dose Type	EAB Dose Rem	LPZ Dose Rem
Thyroid	2.58E+01	5.90E+01
Whole Body	5.32E-01	6.57E-01
TEDE	1.22E+00	2.22E+00

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

Revise SSAR, Chapter 3, Section 3.3, Table 3.3-25 (to present thyroid and whole body doses in addition to the TEDE) from:

TABLE 3.3-33

ABWR Fuel Handling Accident Off-Site Dose Consequences

Time	EAB Dose TEDE Rem	LPZ Dose TEDE Rem
0 to 2 hr	4.18E-01	-
0 to 8 hr	-	7.16E-02
8 to 24 hr	-	-
24 to 96 hr	-	-
96 to 720 hr	-	-
Total	4.18E-01	7.16E-02

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

To read:

TABLE 3.3-33

ABWR Fuel Handling Accident Off-Site Dose Consequences

Dose Type	EAB Dose Rem	LPZ Dose Rem
Thyroid	1.03E+01	1.40E+00
Whole Body	1.46E-01	4.07E-02
TEDE	4.18E-01	7.16E-02

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

ATTACHMENTS:

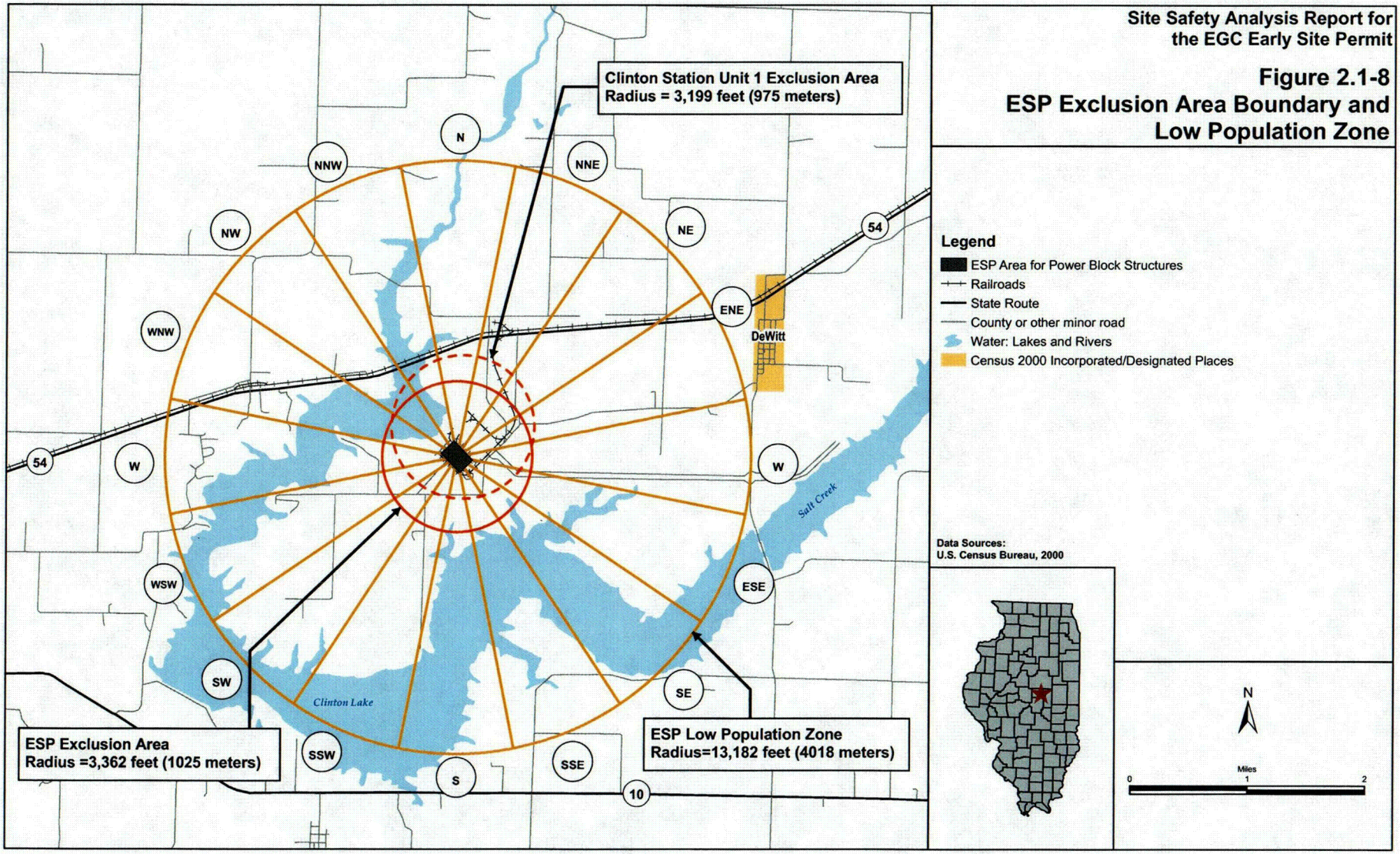
None

RAI ATTACHMENT

RAI 2.1.1-1 Attachment (New Figure 2.1-8)

Site Safety Analysis Report for
the EGC Early Site Permit

Figure 2.1-8
ESP Exclusion Area Boundary and Low Population Zone



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RAI ATTACHMENT

RAI 3.3.4-2 Attachment (AP1000 Results Bases Tabulation)

RAI 3.3.4-2 Attachment

TABULATION OF THE BASES FOR THE AP1000 DESIGN BASIS ACCIDENT OFFSITE DOSES AT THE EGC ESP SITE

Design Basis Accident	ESP EAB Dose TEDE (rem)	Vendor EAB Dose TEDE (rem)	ESP/Vendor EAB X/Q Ratio	ESP LPZ Dose TEDE (rem)	Vendor LPZ Dose TEDE (rem)	ESP/Vendor LPZ X/Q Ratio
AP1000 Reactor Main Steam Line Break						
Accident-initiated Iodine Spike						
0 -2 hrs	2.47E-01	8.00E-01	3.08E-01			
0 - 8 hrs				1.18E-01	6.4E-01	1.84E-01
8 - 24 hrs				7.06E-02	4.2E-01	1.68E-01
24 -96 hrs				8.38E-02	6.3E-01	1.33E-01
Total	**2.47E-01**	**8.00E-01**		**2.72E-01**	**1.69E+00**	
Preexisting Iodine Spike						
0 -2 hrs	2.16E-01	7.00E-01	3.08E-01			
0 - 8 hrs				4.43E-02	2.40E-01	1.84E-01
8 - 24 hrs				1.34E-02	8.00E-02	1.68E-01
24 -96 hrs				1.73E-02	1.30E-01	1.33E-01
Total	**2.16E-01**	**7.00E-01**		**7.50E-02**	**4.50E-01**	
Reactor Coolant Pump Locked Rotor						
0 -2 hrs	7.71E-01	2.50E+00	3.08E-01			
0 - 8 hrs				1.11E-01	6.00E-01	1.84E-01
Total	**7.71E-01**	**2.50E+00**		**1.11E-01**	**6.00E-01**	

RAI 3.3.4-2 Attachment

TABULATION OF THE BASES FOR THE AP1000 DESIGN BASIS ACCIDENT OFFSITE DOSES AT THE EGC ESP SITE

Design Basis Accident	ESP EAB Dose TEDE (rem)	Vendor EAB Dose TEDE (rem)	ESP/Vendor EAB X/Q Ratio	ESP LPZ Dose TEDE (rem)	Vendor LPZ Dose TEDE (rem)	ESP/Vendor LPZ X/Q Ratio
Control Rod Ejection Accident						
0 -2 hrs	9.25E-01	3.00E+00	3.08E-01			
0 - 8 hrs				2.58E-01	1.4E+00	1.84E-01
8 - 24 hrs				4.37E-02	2.6E-01	1.68E-01
24 -96 hrs				6.12E-03	4.6E-02	1.33E-01
96 - 720 hrs				1.15E-03	1.2E-02	9.59E-02
Total	**9.25E-01**	**3.00E+00**		**3.09E-01**	**1.72E+00**	
Steam Generator Tube Rupture						
Accident-initiated Iodine Spike						
0 -2 hrs	4.63E-01	1.50E+00	3.08E-01	-	-	-
0 – 8 hrs				3.32E-02	1.80E-01	1.84E-01
8 – 24 hrs				1.21E-02	7.2E-02	1.68E-01
Total	**4.63E-01**	**1.50E+00**		**4.53E-02**	**2.52E-01**	
Preexisting Iodine Spike						
0 –2 hrs	9.25E-01	3.00E+00	3.08E-01	-	-	
0 - 8 hrs				5.90E-02	3.20E-01	1.84E-01
8 - 24 hrs.				4.37E-03	2.60E-02	1.68E-01
Total	**9.25E-01**	**3.00E+00**		**6.34E-02**	**3.46E-01**	

RAI 3.3.4-2 Attachment

TABULATION OF THE BASES FOR THE AP1000 DESIGN BASIS ACCIDENT OFFSITE DOSES AT THE EGC ESP SITE

Design Basis Accident	ESP EAB Dose TEDE (rem)	Vendor EAB Dose TEDE (rem)	ESP/Vendor EAB X/Q Ratio	ESP LPZ Dose TEDE (rem)	Vendor LPZ Dose TEDE (rem)	ESP/Vendor LPZ X/Q Ratio
Small Line Break						
0 -2 hrs	4.01E-01	1.30E+00	3.08E-01			
0 - 8 hrs				5.53E-02	3.00E-01	1.84E-01
Total	**4.01E-01**	**1.30E+00**		**5.53E-02**	**3.00E-01**	
Fuel Handling Accident						
0 -2 hrs	7.40E-01	2.40E+00	3.08E-01			
0 - 8 hrs				1.11E-01	6.00E-01	1.84E-01
Total	**7.40E-01**	**2.40E+00**		**1.11E-01**	**6.00E-01**	
Loss of Coolant Accident						
1 - 3 hrs	7.65E+00	2.48E+01	3.08E-01			
0 - 8 hrs				1.70E+00	9.20E+00	1.84E-01
8 - 24 hrs				5.54E-02	3.30E-01	1.68E-01
24 -96 hrs				4.12E-02	3.10E-01	1.33E-01
96 - 720 hrs				2.78E-02	2.90E-01	9.59E-02
Total	**7.65E+00**	**2.48E+01**		**1.82E+00**	**1.01E+01**	