

# AmerGen

An Exelon/British Energy Company

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## Clinton Power Station

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RS-01-247

October 31, 2001

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, DC 20555-0001

Clinton Power Station, Unit 1  
Facility Operating License No. NPF-62  
NRC Docket No. 50-461

Subject: Additional Reactor Systems Information Supporting the License Amendment  
Request to Permit Uprated Power Operation at Clinton Power Station

- References:
- (1) Letter from J. M. Heffley (AmerGen Energy Company, LLC) to U.S. NRC, "Request for License Amendment for Extended Power Uprate Operation," dated June 18, 2001
  - (2) Letter from J. B. Hopkins (U.S. NRC) to O. D. Kingsley (Exelon Generation Company, LLC), "Clinton Power Station, Unit 1 – Request For Additional Information (TAC No. MB2210)," dated October 3, 2001
  - (3) Letter from K. A. Ainger (Exelon Generation Company, LLC) to U.S. NRC, "Additional Information Supporting the License Amendment Request to Permit Uprated Power Operation at Clinton Power Station," dated October 17, 2001

In Reference 1, AmerGen Energy Company, LLC (i.e., AmerGen) submitted a request for changes to the Facility Operating License No. NPF-62 and Appendix A to the Facility Operating License, Technical Specifications (TS), for Clinton Power Station (CPS) to allow operation at an uprated power level. The proposed changes in Reference 1 would allow CPS to operate at a power level of 3473 megawatts thermal (MWt). This represents an increase of approximately 20 percent rated core thermal power over the current 100 percent power level of 2894 MWt. In Reference 2, the NRC requested additional information regarding the proposed changes in Reference 1. Reference 3 contained a response to a portion of this request. This letter contains the information for the remaining questions. Specifically, the attachment to this letter provides the requested information pertaining to NRC Questions 3.1 and 3.2 of Reference 2.

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Should you have any questions related to this information, please contact Mr. T. A. Byam at (630) 657-2804.

Respectfully,

A handwritten signature in black ink, appearing to read "PR Simpson". The signature is written in a cursive, flowing style.

P. R. Simpson  
Manager – Licensing  
Mid-West Regional Operating Group

Attachments:

Affidavit

Attachment: Additional Reactor Systems Information Supporting the License Amendment  
Request to Permit Upgraded Power Operation at Clinton Power Station

cc: Regional Administrator – NRC Region III  
NRC Senior Resident Inspector – Clinton Power Station  
Office of Nuclear Facility Safety – Illinois Department of Nuclear Safety

STATE OF ILLINOIS )  
COUNTY OF DUPAGE )  
IN THE MATTER OF )  
AMERGEN ENERGY COMPANY, LLC ) Docket Number  
CLINTON POWER STATION, UNIT 1 ) 50-461

SUBJECT: Additional Reactor Systems Information Supporting the License  
Amendment Request to Permit Up-rated Power Operation at Clinton  
Power Station

**AFFIDAVIT**

I affirm that the content of this transmittal is true and correct to the best of my  
knowledge, information and belief.

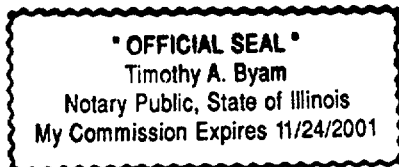
*P. R. Simpson*

P. R. Simpson  
Manager – Licensing  
Mid-West Regional Operating Group

Subscribed and sworn to before me, a Notary Public in and

for the State above named, this 31<sup>st</sup> day of

October, 2001.



*Timothy A. Byam*  
Notary Public

## ATTACHMENT

### **Additional Reactor Systems Information Supporting the License Amendment Request to Permit Up-rated Power Operation at Clinton Power Station**

#### Question

3.1 The submittal included proposed changes to the technical specification. However, the submittal did not provide any matrix or plan indicating which sections of the updated safety analysis report (USAR) will be superseded by current extended power uprate re-analysis. Provide a list or matrix that identifies which subsections of the USAR will be superseded and identify the corresponding sections of the current submittal. The actual updating of the USAR will be governed by the current regulations; however, the effected USAR subsections should be revised and documented.

#### Response

Table 3.1-1 contains a matrix that identifies the Clinton Power Station (CPS) USAR subsections affected by the extended power uprate (EPU) and the corresponding sections of Appendix E to Reference 1.

**Table 3.1-1  
CPS USAR Changes Due to EPU**

<b>USAR Section</b>	<b>Subject</b>	<b>Changes</b>	<b>PUSAR Section</b>
1.1	Introduction	New power level related, heat balance, etc.	1.2.1 1.3.1
1.2	General plant description	New power level related, heat balance, etc.	1.2.1 1.3.1
3.6	Protection against dynamic effects and rupture of piping	Mass and energy release data from steam line break in steam tunnel	10.1.1.1
3.9.2	Mechanical systems and components, analyses	Vibration monitoring update and computer programs update	3.5.5 Table 1-3
3.9.5	Reactor pressure vessel (RPV) internals	Updated conclusion and results of structural integrity assessment	3.3.4
3.11.9	Environmental zone map	Update some environmental zone envelopes	10.3
4.1.4.5	Neutron fluence	RPV neutron flux/fluence update	3.3.1
4.4.3.3	Power/flow operating map	Revised power/flow operating map	2.3.1
5.2.2.2	Reactor coolant system	Revised operating conditions and safety/relief valve setpoints	3.2
5.3.1.6	RPV material surveillance	Updated RPV lead factors	3.3.1
5.4.4	Main steam line flow restrictors	Revised main steam line break values	3.6
5.4.5	Main steam isolation valve (MSIV)	Changes to MSIV performance	3.7
6.2.1	Containment systems	Containment response and related analyses and numerous updates of texts, tables and figures	4.1.1

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### Additional Reactor Systems Information Supporting the License Amendment Request to Permit Up-rated Power Operation at Clinton Power Station

USAR Section	Subject	Changes	PUSAR Section
6.2.5	Containment systems/ hydrogen generation	Updated containment hydrogen generation values	4.7
6.3.3	Emergency core cooling system (ECCS) performance	ECCS-loss of coolant accident evaluation per 10 CFR 50.46	4.3
9.1.3	Spent fuel pool cooling and cleanup system	Updated spent fuel pool temperature analyses and results	6.3.1
9.2.5	Ultimate heat sink	Updated heat removal rates by residual heat removal system heat exchangers at accident related conditions	6.4.5
9.3.5	Standby liquid control	Increased minimum boron concentration	6.5
10.1	Power conversion summary	EPU related information	7.0
10.2	Turbine generator	Updated turbine generator performance information	7.1
10.4	Steam power conversion	EPU related changes	7.0
11.2	Liquid radioactive waste	Changes due to EPU	8.1
12.2	Radiation protection	Radiation source updates	8.4, 8.5
15	Transients and accidents	Incorporating EPU and consideration of larger operating map	4.1.1, 9.1
Appendix 15A	Failure modes and effects analyses	Including EPU and adjust bypass percentage	N/A
Appendix 15B	Single loop operation	Acknowledging EPU	4.1.1, 9.1
Appendix 15C	Maximum extended operating domain (MEOD) and feedwater heaters out-of-service	Acknowledging EPU but referencing analyses and results in Appendix 15D	4.1.1, 9.1
Appendix 15D	EPU Analyses	Revised current Appendix 15D to document analyses and results of transients in MEOD	4.1.1, 9.1
Proposed Appendix 15E	MELLLA+	Proposed appendix reserved for MELLLA+ analyses	N/A
Proposed Appendix 15F	Reload analyses	Relocation of reload analyses from current Appendix 15D and revisions acknowledging EPU and necessary changes for the subsequent reload	4.1.1, 9.1

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#### Question

3.2 Ref. Attachment E – Table 1-3 lists all the nuclear steam system supplier Computer codes used for EPU. Respond to the following requests which pertain to the codes used in the power uprate.

- (a) Review the approving safety evaluation report (SER) for each code and state whether your application of the code complies with any limitations, restrictions or conditions specified in the approving SER. Demonstrate that your applications of the computer codes in the re-analysis conforms with all assumptions and restrictions given by the corresponding approving SER.
- (b) In addition, review the SERs for the EPU generic reports and indicate if you complied with all restrictions stated in the approving SER.

#### Response

The control of Engineering Computer Programs (ECPs) with respect to approving SERs is addressed by the General Electric (GE) Engineering Operation Procedures (EPs). The GE EPs require control of ECPs and Technical Design Procedures (TDPs). The EPs further require the TDPs to consider new or revised licensing bases, including revisions to generic licensing documents, new or revised regulations, new NRC orders, generic letters and bulletins, and new GE commitments to the NRC. The TDPs include the application basis for incorporation of ECPs in the design process. In addition to the TDP, each ECP is utilized within the limitations of the ECP application basis included in both the ECP abstract and user manual. This application basis exists as an independent set of requirements for use of the technology encoded in the ECP.

An SER, when issued for an ECP, is viewed as either a new licensing basis or a revision to an existing licensing basis depending upon whether the ECP is a new methodology or a revision of an existing methodology, respectively. As outlined above, this is taken into consideration through the TDP.

GE has reviewed the codes identified in Table 1-3 of the CPS PUSAR and determined that the application of each of the codes complies with the restrictions, limitations and conditions specified in the approving SER or the SERs associated with the extended power uprate generic reports, as applicable. Many SERs have no restrictions, limitations and conditions applicable to the listed codes.

The results of the review are summarized in the attached table, which is a modified version of Table 1-3 from the CPS PUSAR with two additional columns to address parts (a) and (b) of the RAI. The column with the heading "Code SER Compliance" summarizes the compliance of the application of the listed code with the SER approving the code. The last column with the heading "Generic EPU SER Compliance" summarizes the compliance of the application of the listed code with the SERs associated with extended power uprate generic reports.

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### **Additional Reactor Systems Information Supporting the License Amendment Request to Permit Up-rated Power Operation at Clinton Power Station**

Additionally, the 'Y' indicator for the application of the LAMB code for reactor internal pressure differences has been modified to reference a footnote. The LAMB code is approved for use in ECCS-LOCA applications, but no approving SER exists for the use of the LAMB code for the evaluation of reactor internal pressure differences.

The legend key for the columns is as follows:

- Comply - Code complies with any applicable restrictions, limitations, or conditions contained in the associated SER.
- None - The applicable SER does not provide restrictions, limitations, or conditions associated with this application of the code.
- NA - No approving SER exists for the application of the code, applies only to the column with the heading "Code SER Compliance."

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### Additional Reactor Systems Information Supporting the License Amendment Request to Permit Up-rated Power Operation at Clinton Power Station

**Modified Table 1-3 SER Compliance of NSSS Computer Codes Used For the EPU**

Task	Computer Code	Version or Revision	NRC Approved	Comments	Code SER Compliance	Generic EPU SER Compliance
Nominal Reactor Heat Balance	ISCOR	09	Y	NEDE-24011; (1)	None	Comply
Reactor Core and Fuel Performance	TGBLA	04	Y	NEDE-30130P-A	None	Comply
	PANAC	10	Y	NEDE-30130P-A		
	ISCOR	09	Y	NEDE-30130P-A		
RPV Internals Structural Integrity Evaluation	SEISM03V	Add 1, Rev 1	NA	NEDC-23865 (2)	NA	None
Flow Induced Vibration Evaluation of Piping and Components	SAPG407	07	NA	NEDO-10909 (2)	NA	None



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### Additional Reactor Systems Information Supporting the License Amendment Request to Permit Up-rated Power Operation at Clinton Power Station

**Modified Table 1-3 SER Compliance of NSSS Computer Codes Used For the EPU**

Task	Computer Code	Version or Revision	NRC Approved	Comments	Code SER Compliance	Generic EPU SER Compliance
Reactor Internal Pressure Differences	ISCOR	09	(1)	NEDC-32082P, Aug. 1992 MFN-212-78, May 12, 1978	NA	None
	LAMB	07	(13)	NEDE-23008, April 1978 NEDE-20566P-A, Sept. 1986		
	TRACG	02	(3)	NEDC-32176P, Feb. 1993 NEDC-32177P, Rev. 1, June 1993 NEDC-32192, Dec. 1993 NRC SER TAC No. M90270, Sept. 30, 1994		
Transient Analysis	PANACEA	10	Y	NEDE-24011P-A, Amendment 13	Comply	Comply
Transient Analysis	ISCOR	09	Y	(1), NEDE-24011P-A	None	Comply
Transient Analysis	CNRC	05	Y	NEDO-24154P-A, 1986	Comply	Comply
Transient Analysis	ODYN	09	Y	NEDO-24154P-A	Comply	Comply

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**Modified Table 1-3 SER Compliance of NSSS Computer Codes Used For the EPU**

Task	Computer Code	Version or Revision	NRC Approved	Comments	Code SER Compliance	Generic EPU SER Compliance
Transient Analysis	TASC	03	Y	(4), (5) GENE-666-03-0393, March 1993	None	Comply
Transient Analysis	SAFER	04	Y	(6)	Comply	Comply
Anticipated Transient Without Scram	ODYN	09	Y	(11) NEDE-24154P-A	Comply	Comply
Anticipated Transient Without Scram	STEMP	04	Y	(7) NEDE-32868P, Dec. 1998	None	None
Anticipated Transient Without Scram	TASC	03	Y	(4) (5) NEDE-32868P, Dec. 1998	None	None
Anticipated Transient Without Scram	ISCOR	09	Y	(1) (4) NEDE-32868P, Dec. 1998	None	None
Containment System Response	SHEX	04	Y	(8)	Comply	Comply
	M3CPT	05	Y	NEDO-10320, Apr. 1971		
	LAMB	08	Y	NEDE-20566P-A, Sept. 1986		
Fire Protection	GESTR	08	Y	NEDE-23785-1PA, Rev. 1	Comply	Comply
	SAFER	04	Y	(6) (9) (10)		
	SHEX	04	Y	(8)		

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**Modified Table 1-3 SER Compliance of NSSS Computer Codes Used For the EPU**

<b>Task</b>	<b>Computer Code</b>	<b>Version or Revision</b>	<b>NRC Approved</b>	<b>Comments</b>	<b>Code SER Compliance</b>	<b>Generic EPU SER Compliance</b>
Reactor Recirculation System	BILBO	04V	NA	(2), NEDE-23504, February 1977	NA	None
ECCS-LOCA	LAMB	08	Y	NEDO-20566A	None	Comply
ECCS-LOCA	GESTR	08	Y	NEDE-23785-1P-A, Rev. 1	None	Comply
ECCS-LOCA	SAFER	04	Y	(6) (9) (10)	Comply	Comply
ECCS-LOCA	ISCOR	09	Y	NEDE-30130P-A, NEDE-24011P-A-14-US, (1) (4)	None	Comply
ECCS-LOCA	TASC	03	Currently under NRC review.	(10)	NA	Comply
Fission Product Inventory	ORIGEN2	2.1	N	Isotope Generation and Depletion Code (12)	NA	None
High Energy Line Break	COMPARE Mod 1	0A	Y	COMPARE Mod 1, LA-7199-MS, March, 1978	NA No SER; approved for use by NUREG 800, 6.2.1.2	None

NA – Not Applicable

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### **Additional Reactor Systems Information Supporting the License Amendment Request to Permit Up-rated Power Operation at Clinton Power Station**

#### NOTES FOR MODIFIED TABLE 1-3:

- (1) The steady-state thermal-hydraulic correlations used in ISCOR are discussed in Section 4 of GESTAR-II, NEDE-24011P-A, which is NRC approved.
- (2) Not a safety analysis code that requires NRC approval. The code application is reviewed and approved by GENE for "Level-2" application and is part of GENE's standard design process. Also, the application of this code has been used in previous power uprate submittals.
- (3) NRC has reviewed and accepted the TRACG application for the flow-induced loads on the core shroud as stated in NRC SER TAC No. M90270.
- (4) The NRC reviewed the code for this application in the stated reference(s).
- (5) The TASC code is an improved version of the SCAT code, reviewed and approved by the NRC, with advanced fuel features (partial length rods and new critical power correlation) capability.
- (6) SAFER02&03 have been reviewed and approved by the NRC per NEDE-23785-1P-A, Revision 1, October 1984, and "SAFER Model for Evaluation of Loss-of-Coolant Accidents for Jet Pump and Non-Jet Pump Plants," NEDE-30996P-A, General Electric Company, October 1987. Changes since NRC approval are documented in MFN (Master File Number)-040-88, MFN-023-90, MFN-025-91, and MFN-090-93.
- (7) The STEMP code uses fundamental laws of mass and energy conservation principals in evaluating the suppression pool heatup. NRC reviewed the code for this application in the reference stated.
- (8) The application of the methodology in the SHEX code to the containment response is approved by NRC in the letter to G. L. Sozzi (GE) from A. Thadani (NRC), "Use of the SHEX Computer Program and ANSI/ANS 5.1-1979 Decay Heat Source Term for Containment Long-Term Pressure and Temperature Analysis," July 13, 1993.
- (9) Letter, J.F. Klapproth (GE) to USNRC, "Transmittal of GE Proprietary Report NEDC-32950P 'Compilation of Improvements to GENE's SAFER ECCS-LOCA Evaluation Model'," dated January 2000 by letter dated January 27, 2000.
- (10) Letter, S.A. Richards (NRC) to J.F. Klapproth, "General Electric Nuclear Energy (GENE) Topical Reports GENE (NEDC)-32950P and GENE (NEDC)-32084P Acceptability Review," May 24, 2000.
- (11) Version 09 of ODYN is only applicable to plants that use Flow Control Valves (FCV) for recirculation flow control.
- (12) Oak Ridge National Laboratory, Radiation Safety Information Computational Center, Code CCC-371A, August 1991.
- (13) The LAMB code is approved for use in ECCS-LOCA applications, but no approving SER exists for the use of the LAMB code for the evaluation of reactor internal pressure differences.

## **ATTACHMENT A**

### **Additional Reactor Systems Information Supporting the License Amendment Request to Permit Upgraded Power Operation at Clinton Power Station**

#### **REFERENCE**

1. Letter from J. M. Heffley (AmerGen Energy Company, LLC) to U.S. NRC, "Request for License Amendment for Extended Power Upgrade Operation," dated June 18, 2001