AmerGen
AmerGen Energy Company, LLC
Three Mile Island Unit 1
Route 441 South, P.O. Box 480
Middletown, PA 17057

Telephone: 717-944-7621

An Exelon/British Energy Company

10 CFR 50.73

April 18, 2001
5928-01-20047

U.S. Nuclear Regulatory Commission
ATT: Document Control Desk
Washington, D.C. 20555

Dear Sir or Madam;

SUBJECT: LER 99-011, SUPPLEMENT NO. 1
INCOMPLETE CONTROL ROD INSERTION (IRI)

THREE MILE ISLAND NUCLEAR STATION, UNIT 1
OPERATING LICENSE NO. DPR-50
DOCKET NO. 50-289

REFERENCE: LER 99-011-00, DATED OCTOBER 21, 1999
LETTER NO. 1920-99-20549

The LER 99-011-00 documented the extensive inspections, evaluations, and analyses conducted to address the root cause of the event. This supplement is being submitted to meet the commitment set forth in the original LER to provide a supplemental report within 18 months evaluating additional vendor and industry information associated with IRI, which has been gathered since the original submittal.

This supplement provides further support of the original root cause investigations and actions taken to mitigate the contributing factors of the event. All additional data and analyses are consistent with corrective actions identified in the original LER. The Safety Evaluation performed at the time the event remains applicable in addressing the safety implications of operation in Cycle 13. None of the supplemental information contradicts that evaluation.

IE22

5928-01-20047

For additional information regarding this LER Supplement, please contact Mr. Gregory M. Gurican of the TMI Unit 1 Regulatory Assurance Department at (717) 948-8753.

Very truly yours,

George H. Gellrich
Plant Manager

GHG/gmg

ATTACHMENT: LER 99-011-01

cc: Mr. H. Miller, Administrator, Region I, NRC
Mr. D. Orr, NRC Senior Resident Inspector
Mr. T. Colburn, NRC Project Manager
File No. 99155

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(1-2001)

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Three Mile Island, Unit 1	05000289	1 of 8

TITLE (4)

VOLUNTARY LER: "Incomplete Control Rod Insertion During Trip Insertion Time Testing"

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
09	11	1999	99	- 011	-- 01	04	18	2001	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
			20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	0		20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)	X	OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Gregory M. Gurican, TMI Sr. II Regulatory Assurance Engineer	(717) 948-8753

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) **(16)**

On September 11, 1999 TMI Unit 1, then owned by GPU Inc. now owned and operated by AmerGen Energy Co. L.L.C. (AmerGen), conducted an elective post-shutdown Control Rod Trip Insertion test on the Control Rod Drive System in support of Maintenance Rule (a)(1) monitoring. Sixty of 61 control rods inserted to the Technical Specification 4.7.1.1 required 3/4 insertion position within the 1.66 second time requirement, while one rod did not. One control rod stopped at 26% withdrawn and it was declared inoperable. Technical Specification 3.5.2.2 allows for one inoperable control rod to remain completely out of the core. One additional control rod stopped at approximately 7% withdrawn; however, this control rod did meet the Technical Specification insertion position and time requirements. Additionally all remaining control rods inserted fully into the reactor core. There were no violations of Technical Specification requirements or Safety Analyses during this event and the original LER was submitted voluntarily to the NRC on October 21, 1999.

The direct cause of the incomplete control rod insertion was determined to be fuel assembly guide tube distortion, which resulted in excessive mechanical drag. Contributing factors were core location and shuffle history of the affected assemblies and hold down spring force. The Technical Specification required trip insertion time testing was performed prior to Cycle 13 startup, during which velocity profiles on selected rods were obtained, and no abnormal drag was found to be present. The two fuel assemblies where incomplete rod insertion occurred were discharged from the core. Additionally, TMI-1 redesigned the Cycle 13 core loading pattern and relaxed the pre-load forces in the hold down springs on specific fuel assemblies. Long term corrective actions were developed through the fuel vendor. It should be noted that there had been no prior instances at TMI of a control rod failing to fully insert when the Control Rod Drive Mechanism (CRDM) was de-energized.

There were no adverse safety consequences from this event, and the event did not affect the health and safety of the public.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Three Mile Island, Unit 1	05000289	99	-- 011 --	01	2 OF 8

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

I. Plant Operating Conditions Before The Event:

TMI-1 was in hot shut-down when Control Rod Trip Insertion Time testing was performed and the incomplete control rod insertion occurred. However, the condition being reported in this LER may have been present during the operating cycle (Cycle 12), while the unit was operating at power.

II. Status of Structures, Components, or Systems That Were Inoperable At The Start Of The Event And That Contributed To The Event:

None.

III. Event Description:

On September 11, 1999 TMI-1 conducted a post-shutdown Control Rod Trip Insertion test on the Control Rod Drive System for Maintenance Rule (a)(1) monitoring. All control rods except one (Group 5, Rod 2) inserted to the Technical Specification 4.7.1.1 required 3/4 insertion position within the 1.66 second time requirement. Technical Specification 3.5.2.2 allows for one inoperable control rod to remain completely out of the core. Since Rod 5-2 stopped at 26% withdrawn it was declared inoperable. One additional control rod (Group 2, Rod 2) stopped at approximately 7% withdrawn; however, Rod 2-2 did meet the Technical Specification insertion position and time requirements. Additionally all remaining control rods inserted fully into the reactor core. The reactor was maintained in hot shutdown condition at all times during Control Rod Trip Insertion testing. TMI-1 is operated with sufficient negative reactivity to assure that the >1% $\Delta K/K$ Shut Down (reactivity) Margin is met with the highest worth control rod in a fully withdrawn position. There were no violations of Technical Specification requirements or Safety Analyses during this event and the LER was submitted voluntarily to the NRC.

During Trip Insertion Time testing of Control Rod Groups 1 through 4, Group 2 Rod 2 did not fully insert but indicated a control rod position of approximately 7 percent withdrawn. Rod 2-2 met the required trip insertion time of 1.66 seconds. Rod 2-2 was latched and driven into the fully inserted position. During Rod Trip Insertion time testing of Control Rod Groups 5 through 7, the Group 5 Rod 2 [*AA/RCT] did not fully insert but indicated 26 percent withdrawn. Rod 5-2 was latched and driven into the fully inserted position. All rods except 2-2 and 5-2 traveled to the fully inserted position. All control rods, except 5-2, met the trip insertion time requirement with the longest measured insertion time being 1.458 seconds. Control Rod 5-2 was declared to be inoperable because it did not meet the Technical Specification 4.7.1.1 requirement to drop from fully withdrawn to the ¾ inserted position within 1.66 seconds. Because Technical Specification 3.5.2.2 allows for one inoperable control rod, this event was determined not to be reportable.

As a follow-up to the incomplete insertion, a recorder was connected to the position indication signal for Rod 2-2, Rod 5-2 and Rod 5-3. The Trip Insertion Time test was repeated for those three rods. Rod 5-3 was included in the test for comparison to the two rods that had incomplete insertion. Rod 2-2 and Rod 5-2 each stopped at approximately the same position as they had stopped at during the initial test. The rods were latched and driven to the inserted position. Review of the strip chart recorder output of position indication signal versus time indicated that mechanical drag was the cause for the incomplete rod insertion.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Three Mile Island, Unit 1	05000289	99	– 011 –	01	3 OF 8

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

After cooldown a partial manual withdrawal of the control rod assemblies using a weight scale was performed to determine whether the mechanical binding was in the Control Rod Assembly (CRA) and Fuel Assembly interface or in the drive train. The weight readings indicated mechanical drag while the CRA was coupled. After uncoupling, the Control Rod Drive Leadscrew moved without any indication of drag. From this it can be concluded that the cause of the problem was not related to the CRDMs.

Supplemental Event Description:

The TMI Incomplete Rod Insertion (IRI) event was described fully in the original LER. This supplement provides no additional information on the event description, per se. Additional relevant events, which occurred after the LER submittal of October 21, 1999 are discussed below. These events were associated with B&W plants which contain the same fuel type (Mk-B10 hold down leaf springs) and similar cycle design (24-month) as TMI. [Note: B&W plants operating 18-month cycles have no indications of IRI or excessive fuel assembly guide tube distortion].

1. Crystal River (10/1999) – During shutdown for their refueling outage, Crystal River (CR) experienced similar symptoms of IRI with one control rod, which delayed its full insertion at 8% withdrawn, then slowly fully inserted. This control rod and a second control rod had drop times more than 0.1 seconds slower than beginning-of-cycle (BOC) drop times, plus increased drag loading measurements, indicating guide tube distortion. CR had completed a 24-month cycle with a long continuous run, though not as long, nor as high of a cycle exposure as TMI. The CR results were consistent with the TMI IRI root cause evaluation in that CR experienced IRI and fuel assembly guide tube distortion similar to TMI. The hold down springs were reset and same quadrant shuffles were avoided for their reload, similar to TMI corrective actions.

2. Davis Besse (4/2000) – During shutdown for their refueling outage, Davis Besse (DB) experienced no IRI, although one rod exhibited slow insertion over it's last 1% of travel and two rods had velocity profiles indicating guide tube distortion. DB had a mid-cycle cold shutdown which provided a degree of spring reset, reducing the hold down spring load on fuel assemblies over the second half of the operating cycle. The magnitude of this reset was evaluated by Framatome ANP (formerly FCF) to be slightly less than that provided by the manual resets performed for CR and TMI during their refueling outages. The DB results were consistent with the TMI IRI root cause evaluation, in that spring reset reduces the potential for IRI.

3. Crystal River (9/2000) – Approximately 290 EFPD into their current cycle, CR performed a shutdown for maintenance and observed their control rods for slow drop and IRI behavior. None was observed. This experience at CR provides another data point in time that does not contradict previous conclusions drawn for TMI.

4. BWOG Analytical Models – Framatome ANP has developed a CRA drop time model which predicts control rod drag based on control rod drop time profiles as input. The model has benchmarked well against B&W plant data. If control rod velocity profiles are available, this model can give quantitative results regarding the drag work observed in a rodded fuel assembly. This information can be trended to monitor the effectiveness of corrective actions.
Framatome ANP has also developed a 2D model for the Mark-B fuel design to evaluate creep deformation over time. This model is useful in performing relative comparisons of fuel assembly lateral deflection for varying axial loads. The model indicates that the plastic setting of springs (as performed during 13R at TMI-1) is slightly more beneficial than the effect of the mid-cycle

cold shutdown experienced at Davis Besse. The model shows a significant reduction in lateral deflection for a Mark-B assembly with a redesigned leaf spring.

Framatome ANP has also developed a 3D finite element model for the Mark-B fuel design which can be used to study the effects of hold down loading, design changes to individual fuel assembly components, and external loading.

5. Crystal River (11/2000) – The B&WOG has sponsored inspections on high burnup assemblies in the CR spent fuel pool to provide additional data on bow, drag, and spring force, including comparisons of helical vs. leaf springs fuel assemblies. None of the results from these inspections at CR contradict previous conclusions for TMI as indicated in preliminary evaluations. No excessive drag was observed in helical spring fuel assemblies.

IV. Identification of Root Cause:

TMI assembled a root cause evaluation team that included engineering and subject matter experts from other utilities, the fuel vendor, the reactor equipment vendor, and EPRI. The team determined that the probable cause of the incomplete rod insertion was fuel assembly guide tube distortion, which resulted in excessive mechanical drag. This cause was confirmed during subsequent fuel assembly inspections and tests.

Fuel assembly bowing has been observed in previous cycles at TMI-1 as well as other PWRs, and appears to be loosely correlated to fuel burnup. Some fuel assemblies in higher burnup locations do not exhibit a pronounced bow and observable bow was seen on fuel assemblies after the first cycle burn. The bowing in this case was more prominent in a specific area of the core. Visual bow data taken of the fuel assemblies during off loading showed that there was more prominent bowing in the quadrant where the incomplete control rod insertion occurred. It was hypothesized that the fuel assembly hold down force may be combining with fuel assembly axial growth during exposure and lateral stresses induced by coolant flow patterns and interaction with adjacent assemblies resulting in guide tube distortion.

The increased control rod drag is primarily associated with multi-node, "W" and "S," shape fuel bowing. The more severe "W" bows correlate with the drag test data and fuel assembly guide tube plug gage tests.

The two fuel assemblies that had incomplete rod insertion remained in the same core quadrant over two consecutive fuel cycles (as did several other fuel assemblies). In reviewing the videotapes of fuel assembly 7UG at the end of Cycle 11 a "W" shaped bow was observed; fuel assembly 7UG hosted Control Rod 5-2 during Cycle 12. The "W" shaped bow on fuel assembly 7UG appeared more pronounced at the end of Cycle 12. This apparent core location dependency was taken into account in the redesign of the core for Cycle 13.

The two CRAs were in Mark-B10 fuel assemblies. The Mark-B10 fuel assembly design has a higher hold down force compared to the previous fuel assembly design used at TMI. The hold down springs on a number of fuel assemblies have been relaxed within the recommendations of the fuel vendor in order to limit excess hold down force as a possible causal factor in fuel assembly guide tube bowing.

The root cause team concluded that there might be several causative factors acting together that results in fuel assembly bowing. Further analysis and follow-up data gathering will be needed to be able to identify the specific cause(s) of fuel assembly guide tube distortion.

Direct Cause(s):

The Direct Cause of incomplete control rod insertions was determined to be fuel assembly guide tube distortion. Distortion (or bowing) increases the frictional drag on the control rod. Observations of fuel assembly bow correlate with the Control Rod Trip Insertion time measurements, drag test results and plug gage tests of fuel assembly guide tubes. Additional data gathering and analysis is required before the underlying or root cause(s) of guide tube distortion can be determined conclusively.

Contributing Factors:

1. Observations indicate that core location may be a causal factor in development of fuel assembly bow. Fuel assemblies located in the regions of the core where the occurrence of bow was more prevalent and which were also shuffled within the same quadrant appeared to experience greater bow.

2. High fuel assembly hold down spring forces may have contributed to the occurrence of fuel assembly bow.

Effects of Supplemental Information on Root Cause Evaluation:

As described above, all supplemental information obtained since the original LER submittal has been consistent with the original root cause evaluation and analyses of the contributing factors to IRI. IRI did not occur at Davis Besse where the hold down spring force was decreased by mid-cycle shutdown and where same-quadrant shuffles were less frequent and less localized than during TMI Cycle 12. Framatome ANP's 2D fuel assembly model predicts slightly greater benefit from the manual reset of springs. Therefore, there is no indication that an IRI event would occur at TMI during a shutdown at any time during Cycle 13.

V. Previous Events & Extent of Condition:

There have been no previous occurrences of incomplete rod insertion at TMI-1. TMI-1 previously experienced an unrelated problem meeting rod insertion times as a result of corrosion product interference with the CRDM ball-check valve operation. (Reference LER 97-008) That problem was corrected prior to Cycle 12, and the recommended cycle chemistry conditions have been maintained in accordance with EPRI guidelines.

In regard to the extent of condition, at the end of Cycle 12, fuel assembly bowing resulted in one control rod being declared inoperable pursuant to Technical Specification requirements. The affected control rod was able to be driven to the full-in position and all other control rods met their Technical Specification required Trip Insertion times.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Three Mile Island, Unit 1	05000289	99	– 011 –	01	6 OF 8

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

In addition to the inoperable Control Rod 5-2, Control Rod 2-2 experienced incomplete insertion, and nine (9) other control rods had an apparent increase in trip time of > 0.1 seconds, with the maximum insertion time being 1.458 seconds. Fuel inspections and drag data indicate that the nine control rods with increased trip times were also affected by fuel assembly guide tube bow. The increased drag was primarily in the bottom half of travel. Eight of the nine (9) fuel assemblies in locations where an apparent increase in measured control rod insertion time of greater than 0.1 seconds occurred were not reloaded into the Cycle 13 core. The one remaining fuel assembly was loaded into a Cycle 13 core location that does not contain a control rod assembly.

VI. Assessment of Safety Consequences & Implications of the Event:

During Control Rod Trip Insertion testing the reactor was maintained in hot shutdown condition. TMI-1 is designed with sufficient negative reactivity to assure >1% ΔK/K Shut Down Margin is met with the highest worth Control Rod in the fully withdrawn position. The safety significance of this event was minimal since both Control Rods inserted to a position where most of their respective rod worth would be effective.

Control Rod 5-2 was declared inoperable because it did not reach the 25% position. Subsequent retest with an analog recorder attached indicates that Control Rod 5-2 achieved the 2/3 insertion in approximately 1.44 seconds. The safety analysis assumption is 1.4 seconds to 2/3 insertion. A shutdown margin calculation was performed with Control Rod 5-2 inoperable (i.e., assumed to be fully withdrawn from the core). Presuming that Control Rod 5-2 was inoperable prior to shutdown, the plant continued to be in compliance with the Technical Specifications.

Control Rod 2-2 performed the required safety function of travel to 2/3 inserted as assumed in Safety Analysis and also met the Technical Specification criteria for time to travel from full withdrawn to the 1/4th withdrawn position (25 percent zone switch). Control Rod 2-2 was considered operable and within the Technical Specification requirements.

If the incomplete rod insertion had occurred when the reactor was operating at full power, the safety function would have been met. Even if no credit were taken for the inoperable rod, the safety analysis assumptions would have been met. Additionally, the Technical Specification 3.5.2. Limiting Condition for Operations requires that "an evaluation shall be initiated immediately to verify the existence of 1% (delta k/k) hot shutdown margin," once a control rod is declared inoperable. This evaluation while required only for power operation was conducted following the incomplete rod insertion which occurred during the Control Rod Trip Time testing.

VII. Corrective Actions:

The extent of the condition has been addressed by inspection, testing, redesign of the core, and resetting the hold down springs. Fuel assembly bow data and drag data have been obtained on fuel assemblies with control rods that are being returned to the reactor for operation in Cycle 13. The trip insertion time testing that is required by Technical Specifications provides assurance that the control rods met their required function at the beginning of cycle. The Cycle 13 core has been redesigned with consideration given to the bowing already present in the once burned fuel and the impact of potential

causal factors associated with their location assignments. Reducing the bow during this cycle will reduce the potential for drag in future cycles when the fuel assembly may host control rods.

Immediate & Short Term Actions:

1. Data collection was performed, as follows: (Completed)
   a. Fuel Assembly bow data on fuel assemblies being returned to the reactor.
   b. Insertion drag data for each control rod assembly while inserting it into its host fuel assembly for Cycle 13.
   c. In-core drag data for 33 selected control rods after hold down force was applied following the reloading of the fuel assemblies into the reactor and installing the reactor head,
   d. Control Rod Trip Insertion Time testing in accordance with Technical Specifications
   e. Velocity data for selected control rods during Control Rod Trip Insertion Time testing.

2. The core design for Cycle 13 was changed to account for location dependency of the fuel assemblies. (Complete)

3. The hold down spring force on once burned fuel assemblies operating under control rods has been reset in order to lessen the potential for additional fuel assembly bowing during Cycle 13. The springs on 53 once burned fuel assemblies that will host control rod assemblies were set. The other 8 fuel assemblies hosting control rod assemblies are new fuel assemblies in core locations which did not experience a significant amount of discernable fuel assembly bowing during Cycle 12. (Complete.)

4. Springs on 46 of 48 new fuel assemblies hosting Burnable Poison Rod Assemblies (BPRAs) were reset. The two remaining fuel assemblies are in locations that did not experience much bow in Cycle 12. (Complete.)

Effects of Supplemental Information on Short Term Corrective Actions:

Corrective actions taken in 13R have reduced the compressive forces and eliminated the cumulative multi-cycle effect of same-quadrant lateral loads that contribute to fuel assembly guide tube distortion. These actions will improve control rod insertion at TMI if/when required for shutdown. Since the IRI event in 13R was determined to have no impact on safety or shutdown margin considerations, continued operation for Cycle 13 in the improved condition also has no safety impact. Hence, no shutdown during Cycle 13 is required to perform control rod trip insertion time testing. TMI will obtain rod insertion times should any shutdown occur up to and including the 14R outage (9/2001). This action continues to be tracked by the TMI Corrective Action Program [CAP-CA T1999-0722-8]. Control rod drag testing and assembly bow data will be obtained during 14R to enable comparison to 13R data, to help quantify the effects of the 13R corrective actions, and to further benchmark the analytical models.

Long Term Corrective Actions:

1. Continue efforts to collect data from other B&W plants and analyze the specific causal factors of guide tube distortion. Additional long term corrective actions as a result of this investigation by the Licensee and the fuel vendor shall be reported in a Supplement to this LER on or before October 31, 2000.

2. During Cycle 13 TMI will obtain control rod insertion times only during shutdown events, should a shutdown occur, and only if the insertion times were not obtained within a prior four month time period. The plant process computer collects trip insertion times. Upon an automatic trip, Group 7 trip insertion times may not be from the fully withdrawn position, but this action demonstrates the ability to fully insert.

Effects of Supplemental Information on Long Term Corrective Actions:

As discussed in the LER, TMI reloaded fuel in the current cycle with reset spring loading and redesigned the core shuffle pattern to avoid same-quadrant loading of fuel assemblies in consecutive cycles. The Mark-B12 fuel design that has been ordered for upcoming Cycle 14 includes two design changes that will significantly reduce compressive forces on the fuel assemblies. The hold down spring has been redesigned to lower the spring force and the Mark-B12 design utilizes the Framatome ANP's low growth M5™ advanced cladding material for fuel rod cladding and guide tubes. The 2D fuel assembly model described earlier shows a significant reduction in lateral deflection for a Mark-B assembly with a redesigned leaf spring and using Framatome ANP's low growth M5™ advanced cladding material. Core shuffle patterns will continue to avoid same-quadrant loading in consecutive cycles. These actions further mitigate the factors that caused IRI at TMI-1 in Cycle 12.

* The Energy Industry Identification System (EIIS), System Identification (SI) and Component Function Identification (CFI) Codes are included in brackets, [SI/CFI] where applicable, as required by 10 CFR 50.73 (b)(2)(ii)(F).