ENCLOSURE 3

ERRATA AND ADDENDA TO PREVIOUS RAI RESPONSE

The following pages have been corrected as described below. The revised pages are enclosed with the changes indicated by margin sidebars. These pages supersede the respective pages in the original attachment to the letter from D. J. Chrzanowski (CECo) to T. E. Murley (NRC), "Response to NRC Request for Additional Information Regarding Commonwealth Edison Topical Report NFSR-0069", October 21, 1991. These corrections do not result in other changes to the original attachment to the above letter.

<u>Page</u>	<u>Description</u>
41	In Section 1.1.5.3 (Results), the third paragraph was revised to clarify the discussion provided and to correct the references to the appropriate Figures.
42	This page continues the corrections in the paragraph from page 41 as described above.
195	In Table 3.1.1-1 two additional items for comparison between the CECo and FSAR analyses have been added at the end of the table as described in the response to Question 19 of Enclosure 1.
196	In Table 3.1.1-2 the time of the Reactor Trip Signal for the CECo analysis was revised to 0.15 seconds instead of the incorrect original value of 0.75 seconds.
200	In Section 3.1.2.1 (Initial Conditions) the last sentence was changed in order to be consistent with the additions to Table 3.1.2-1 on page 201. Part of the sentence was changed from "identical to" to "either identical to or more conservative than". In Section 3.1.2.2 (Methodology) the reactor coolant pump underfrequency trip setpoint for the FSAR analysis was revised to 57.0 Hz from the incorrect original value of 56.8 Hz. Also, the CECo value was revised from 54 Hz to 54.0 Hz.
201	In Table 3.1.2-1 three additional items for comparison between the CECo and FSAR analyses have been added at the end of the table as described in the response to Question 19 of Enclosure 1.

Page	Description
202	In Table 3.1.2-2, the line originally reading Reactor Trip Signal was revised to correctly read Initiation of Control Rod Motion. Also, for clarification, a new line was added for Underfrequency Reactor Trip Setpoint Reached, with a value of 1.2 seconds for the CECo analysis and 0.6 for the FSAR analysis.
211	In Table 3.1.3-2, in the "Steam Generator Safety Valve Setpoints and Flows" section, the FSAR Full Open Setpoint was revised to correctly read 1133.0 instead of 1160.0 and the notation "(assumed)" below it was deleted.
212	In Table 3.1.3-3, the line for 112 seconds (CECo time) was revised to correctly read 1133 for the FSAR Result for the SG Safety Valves open instead of 1125.
217	In Table 3.2.1-1 the Scram Reactivity for the CECo analysis was revised to 1% Δk instead of the incorrect original value of 4% Δk.
219	In Table 3.2.1-2 the time that the 35% power level is reached for the FSAR analysis was changed to 7.76 seconds instead of Not Discussed which was incorrect. Further, for the time that the Scram is initiated for the FSAR analysis, the value was changed to 8.26 seconds instead of the original incorrect value of 7.76 seconds. The 8.26 value includes the 0.5 second trip delay reported in the FSAR.
220	In Table 3.2.2-1 the MTC values for the CECo analysis for MOL and EOL were revised to read 0.156 and 0.312, respectively, instead of the incorrect original values of 0.0 and 0.0. The units for the CECo values are delta rho/gm/cc. Finally, the data for the first three lines for the FSAR analysis were placed under a heading of BOL and a second column for MOL and EOL was added. All three lines for the new column read Not Discussed. The line for Scram Reactivity has been deleted from Table 3.2.2-1 on page 220. The line for Scram Reactivity for the same table on page 221 is correct and is left unchanged. The High Pressure Reactor Trip setpoint for the CECo analysis was changed to 2425 psia instead of the incorrect original value of 2385 psig. The High Pressure Reactor Trip setpoint for the FSAR analysis was changed to Not Credited instead of 2385 psig. The difference between the two analyses is addressed in the response to Question 19 of Enclosure 1.

Page	Description
224	In Table 3.2.3-1 the RCS Startup Boron Concentration for the FSAR analysis was revised to 2000 ppm instead of the incorrect original value of 1900 ppm. The difference between this value and that for the CECo analysis is addressed in the response to Question 19 of Enclosure 1.
229	In Table 3.2.6-1 the SG SV Drift allowance for the CECo analysis was revised to correctly describe the modeling of the drift, accumulation, and uncertainty. The revised table states that 1% drift, 3% accumulation, and an additional 28 psi for uncertainty (added to each value in the main steam safety valve fill table) were used. The original incorrectly stated that 3.5% drift and 3% accumulation were used. (The 3.5% drift value was calculated as 1% drift with 2.5% for the uncertainty added to it. The 2.5% value came from the fact that 28 psi represented 2.5% of the lowest setpoint value.)
230	In the "Sequence of Events (Loss of External Electric Load)", the references to the reactor being in automatic and manual control were clarified to properly refer to automatic and manual pressure control.
233	In Table 3.2.8-1 the MTC for EOL for the FSAR analysis was revised to -3.5E-4 delta k/ deg F instead of the incorrect original value of -3.5 delta k/ deg F.
236	In Table 3.2.9-1 the line reading Scram Reactivity was revised to correctly read Shutdown Margin. Also, eight additional items for comparison between the CECo and FSAR analyses have been added at the end of the table as described in the response to Question 19 of Enclosure 1. Due to this revision, there are now two pages, numbered 236a and 236b.
237	For item 4 in Table 3.2.9-1 the line reading high containment pressure has been changed. For the CECo analysis, it now correctly reads Not Credited. For the FSAR analysis, it now correctly reads High-high containment pressure. The difference between the two analyses is addressed in the response to Question 19 of Enclosure 1. Due to this revision, there are now two pages, numbered 237a and 237b.

Page	Description
238	In Table 3.2.9-1 item 3 and the footnote were revised and three additional items added at the end of the table as described in the response to Question 19 of Enclosure 1. The difference between the CECo and FSAR analyses for the revised item 3 is also addressed in the response to Question 19 of Enclosure 1. Also, the "continued" in the title of the table was moved in order to be consistent with the previous pages of the table. Due to this revision, there are now two pages, numbered 238a and 238b.

ondary heat transfer and used in this sensitivity study were the LOL with automatic pressurizer pressure control at BOL and EOL. These cases are termed LOL1 and LOL3, respectively. These two LOL cases and the LONF event were evaluated with bubble rise velocities varying from 3.0 to 1.0 E6 feet per second and bubble rise gradients from 0.7 to 0.9. The Wilson Bubble rise model was also compared to this large range of constant bubble rise velocities. Since bubble rise velocities of less than 3.0 feet per seond tend to generate erroneous results due to the excessive mixture level swell, these cases were excluded from the sensitivity study results.

1.1.5.3 Results

The sensitivity study results are presented in Figures 1.1.5-1 through 1.1.5-4 for the LONF cases and Figures 1.1.5-5 through 1.1.5-12 for the LOL cases. Since the models utilized similar pressurizer relief and/or pressurizer safety valve models, there are no significant differences in the peak primary pressures. The steam generator heat removal capacity is evaluated based on the calculated RCS pressure increase during the transient. The parameters plotted are the pressurizer mixture level and the pressurizer mixture volume.

The sensitivity results shown in Figures 1.1.5-1, 1.1.5-2, 1.1.5-5. 1.1.5-6, 1.1.5-9, and 1.1.5-10 demonstrate that varying the steam generator bubble gradient did not significantly affect the pressurizer pressure or water volume for the LONF and the two LOL cases. Since it was determined not to be a sensitive parameter, the Zion model used the RETRAN recommended bubble gradient value of 0.8.

The LONF bubble gradient sensitivity study cases in Figures 1.1.5-1 and 1.1.5-2 demonstrate that the maximum calculated pressurizer water volume varies from the Reference 1 topical results by only 0.3 cubic feet. This is considered insignificant compared to the total 500 cubic feet increase calculated for the LONF transient. The bubble rise velocity did generate some variations in the LONF pressure increase rate and in the LONF Pressurizer water volume as shown in Figures 1.1.5-3 and 1.1.5-4. This is due to changing heat transfer coefficients in the steam generator as the bubble rise velocities create more or less secondary water volume voiding. Consequently, the Zion model used a bubble rise velocity of 38 feet per second, which provides a conservative LONF pressurizer water volume response.

The Wilson Bubble rise model uses a bubble rise velocity that varies according to the mass flow, density, and voiding of the control volume. Therefore, it is reasonable for the Wilson results to be bounded by the range of 3.0 to 1.0E6 ft/sec. Figures 1.1.5-7, 1.1.5-8, 1.1.5-11, and 1.1.5-12 demonstrate there are no significant effects on the LOL transient results due to varying the bubble rise velocity. Therefore, the Wilson bubble rise model utilized in the Reference 1 LOL analyses is appropriately conservative.

Table 3.1.1-1

CEC0 and Zion FSAR Locked Rotor Initial Condition Comparison

INITIAL CONDITION	INITIAL VALUE CECo	INITIAL VALUE FSAR
Power (MWt)	3315.0	3315.0
Vessel Flow (GPM)	350000.0	350000.0
Inlet Temperature (°F)	534.2	534.2
Pressure (PSIA)	2220.0	2220.0
	2280.0*	2280.0*
Low Reactor Coolant Flow Trip Setpoint	87% of nominal	87% of nominal
Pressurizer Safety Valve Setpoint (psia)	2500.0	2500.0

* Pressure used for overpressurization case

Table 3.1.1-2

CECo and Zion FSAR Locked Rotor Sequence of Events Comparison

EVENT SEQUENCE (all times in sec)	CECo	FSAR
Start of Event	0.0	0.0
Reactor Trip Signal	0.15	0.05
Rod Reactivity Insertion Begins	1.15	1.05
Time of MDNBR	1.75	1.9
Time of Peak Pressure	3.7	3.8

3.1.2 Loss of Flow

3.1.2.1 Initial Conditions

The initial conditions for reactor power, core inlet temperature, pressurizer pressure, and reactor vessel flow are shown in Table 3.1.2-1 for both the CECo RETRAN analysis and the FSAR analysis. As the table indicates, the initial conditions used by CECo were either identical to or more conservative than those used by Westinghouse for the FSAR analysis.

3.1.2.2 Methodology

The transient assumptions used by CECo in the loss of flow analysis were the same or more conservative than those used by Westinghouse. Both analyses assumed a reactor trip on a reactor coolant pump underfrequency signal. However, the Westinghouse FSAR analysis used a value of 57.0 Hz, while the CECo analysis used a more conservative value of 54.0 Hz. No control systems are credited for mitigation, and there is no single active failure which adversely impacts the transient.

3.1.2.3 Results

The sequence of events for the loss of flow analyses are shown for both the Westinghouse FSAR analysis and the CECo Reference 1 analysis in Table 3.1.2-2. The RETRAN analysis is run with a 1.0 second null transient at the beginning of the case. The event times have been offset by this amount. The table shows that the event sequences are very similar, as would be expected, with the exception of the time of the reactor trip signal and the rod reactivity insertion time. This is due to the more conservative underfrequency trip setpoint which resulted in a 0.6 second additional delay.

The comparison of the core flow, core power, and heat flux results are shown in Figures 3.1.2-1, 3.1.2-2, and 3.1.2-3, respectively. Figure 3.1.2-1 shows almost identical agreement of the flow coastdowns. Figures 3.1.2-2 and 3.1.2-3 show the RETRAN core power and heat flux results are conservative compared to the FSAR results. This is due to the more conservative underfrequency trip setpoint discussed previously.

Table 3.1.2-1

CECo and Zion FSAR Loss of Flow Initial Condition Comparison

	INITIAL VALUE	
INITIAL CONDITION	CECo	FSAR
Power (MWt)	3315.0	3315.0
Vessel Flow (GPM)	350000.0	350000.0
Inlet Temperature (°F)	534.2	534.2
Pressure (PSIA)	2220.0	2220.0
Control Rod Drop Delay Time (from LOOP to initiation of rod motion) (seconds)	1.8	1.2
Credit for Underfrequency Trip	Yes	Yes
Credit for Undervoltage Trip	No	Yes
Underfrequency Reactor Trip Setpoint	54.0 HZ	57.0 HZ

Table 3.1.2-2

CECo and Zion FSAR Loss of Flow Sequence of Events Comparison

EVENT SEQUENCE (all times in sec)	CECo	FSAR
Start of Event	0.0	0.0
Underfrequency Reactor Trip Setpoint Reached	1.2	0.6
Initiation of Control Rod Motion	1.8	1.2
Rod Reactivity Insertion Begins	2.2	1.2
Time of MDNBR	2.8	2.8

Table 3.1.3-2

CECo and FSAR LONF Assumptions Comparison

DESCRIPTION	CECo	FSAR
Symmetric Flows, Pressures, Temperatures and Levels in all Loops	YES	YES
Pressurizer Heaters and Sprays are off	YES	YES
Loss of Offsite Power occurs at reactor trip	YES	YES
Reactor Trips on Low-Low Steam Generator Level	YES	YES
Reactor Coolant Pumps Trip and Coast down after Reactor trip	YES	YES
Low-Low Steam Generator Level Setpoint (lbm per SG)	61,000	61,000
Low-Low Steam Generator Level Trip Delay (seconds)	2.0	2.0
Core Decay Heat (% ANS 5.1 1971)	120	120
AFW Flow Delay (seconds After Trip)	60.0	60.0
Auxiliary Feedwater provided (# of Motor Driven Pumps)	1	1
AFW Flow Rate actually delivered to 4 Steam Generators (GPM)	261.2	308.0
AFW Flow Purge Volume of Feedwater Piping per SG (cubic ft)	72.4	72.4
AFW Temperature/Enthalpy (degrees F)/(btu/lbm)	120/90	120/90
Credit for Steam Generator Relief Valves	NO	NO
Credit for Pressurizer Relief Valves	NO	NO

Steam Generator Safety Valve Setpoints and Flows:

Valve #	CECo Lift Setpoint (psia)	CECo Full Open Setpoint (psia)	CECo Capacity (lbm/hr)	FSAR Lift Setpoint (psia)	FSAR Full Open Setpoint (psia)	FSAR Capacity (lbm/hr)
1	1103.3	1135.6	584,105	1129.6	1133.0	3,705,500
2	1116.5	1149.1	584,105	-	-	(assumed)
3	1129.6	1162.7	845,763	-	-	-
4	1141.7	1175.1	845,763	-	-	-
5	1153.8	1187.6	845,763	-	-	-

Pressurizer Safety Valve Setpoints and Flows:

Valve #	CECo Lift Setpoint (psia)	CECo Full Open Setpoint (psia)	CECo Capacity (lbm/hr)	FSAR Lift Setpoint (psia)	FSAR Full Open Setpoint (psia)	FSAR Capacity (lbm/hr)
1	2474.7	2548.9	1,260,000	2500.0	2580.0 (assumed)	1,260,000 (assumed)

Table 3.1.3-3

CECo and FSAR LONF Sequence of Events Comparison

CECo Time sec	FSAR Time sec	EVENT	Condition	CECo Result	FSAR Result
0	0	Steady State Full Power	(% Power)	102	102
1	10	Feedwater Flow Stops	PZR Pres (psia)	2280	2280
32	50	Pressurizer Safety Valve opens	PZR pres (psia)	2475	2500
55	58	Low-Low SG Level Trip	Water Mass lbm	61000	61000
57	60	Reactor Trips, RCPs Trip, Loss of Offsite Power occurs, AFW Start Signal Sent			
56	75	PZR Liq Volume 1st Peak	(cubic feet)	1481	1328
62	75	PZR Safety Valves close	(< psia)	2475	2500
112	75	SG Safety Valves open	SG Pres (psia)	1118	1133
117	118	AFW Pumps started, Flow at 409 btu/lbm enters SG	SG water Mass (lbm)	55263	50500
596	#	PZR Safety Valve reopens	(psia)	2475	#
614	540	AFW Flow at 90 btu/lbm enters Steam Generator	SG water mass (lbm)	40703	37500
1857	N/A	AFW flow increased to 400 GPM, Operator Action mitigates filling of the pressurizer	Elapsed Time from Reactor trip (min)	30	N/A
#	2500	PZR Safety Valve reopens	(psia)	#	2500
2400	5440	Hot Leg temperature at maximum	(degrees F)	608	603
2720	5440	Cold Leg temp at maximum	(degrees F)	585	582
2720	5440	PZR Max Water volume	(cubic feet)	1690	1556
2960	#	PZR Safety Valve closes	(< psia)	2475	#
3080	5500	Min SG Level, then it rises ending the transient. Decay Heat = AFW Cooling capacity	SG level (ft) SG water mass (lbm per SG)	4.8 27356	* *
#	6000	PZR Safety Valve closes	PZR Pres less than (psia)	#	2500
10000	7000	Plant stable	SG Water level (ft above tubesheet)	14.1	*

* Data not supplied in FSAR analysis

\# The FSAR and the CECo analysis had a different sequence of events

3.2 RETRAN-FSAR Transient Comparisons

3.2.1 Uncontrolled RCCA Withdrawal at Subcritical

Table 3.2.1-1

Initial Conditions: Uncontrolled RCCA Withdrawal at Subcritical

Parameter	CECo	*FSAR
DTC	-0.65 pcm/deg F	NOT DISCUSSED
MTC	0 delta k/deg F (value must remain negative per Tech. Specs.; a 0 value is bounding)	1.0E-4 delta k/deg F
Prompt n lifetime (l*)	30 microseconds	NOT DISCUSSED
Beta	0.0075	NOT DISCUSSED
System Pres.	2220 psia (2250-30), (conservative steady state error)	2220 psia
Coolant Temp.	551 deg F (547+4) (conservative steady state error)	551 deg F
Coolant Flow	135E6 lb/hr (Thermal Design Flow)	135E6 lb/hr
Reactivity Insertion Rate	8.0E-4 delta k/s	8.0E-4 delta k/s
Source or Intermediate Range Trips	Not Credited	Not Credited
Power Range Trip Setpoint	35% Power	35% Power
Scram Reactivity	1% delta k	NOT DISCUSSED

* - Values taken from Section 14.1.1 of the FSAR.

Table 3.2.1-2

Sequence of Events: Uncontrolled RCCA Withdrawal at Subcritical

Event	CECo	*FSAR
Reactor at hot zero power	0.0	0.0
Reactivity insertion begins	0.0	0.0
35% power level reached	10.75	7.76
Scram initiated	11.25	8.26

* - Values taken from Section 14.1.1 of the FSAR.

3.2.2 Uncontrolled RCCA Withdrawal at Power

Table 3.2.2-1

Initial Conditions: Uncontrolled RCCA Withdrawal at Power

Parameter	CECo			*FSAR	
	BOL	MOL	EOL	BOL	MOL and EOL
DTC	-0.7	-1.6	-2.5 (pcm/deg. F)	Not Discussed	Not Discussed
Beta	0.007	0.005815	0.00463	Not Discussed	Not Discussed
MTC	0.0	0.156	0.312 (delta rho/gm/cc)	0.0 delta k/deg F	Not Discussed
Pressurizer Pressure	2220 psia (2250-30) (Conservative steady state error.)			2220 psia	
Coolant Flow	135E6 lb/hr (Thermal Design Flow)			135E6 lb/hr	
Reactivity Insertion Rate Range	1E-6 to 1E-3 delta k/s			1E-6 to 1E-3 delta k/s	
Power Range Trip	118% nominal full power			118% nominal full power	
Reactor Trip	Delta-T exceeds OTDT setpoint plus uncert.			Delta-T exceeds OTDT setpoint plus uncert.	
	Delta-T exceeds OPDT setpoint plus uncert.			Delta-T exceeds OPDT setpoint plus uncert.	
High Pressure Reactor Trip	2425 psig (< 2485 for pressurizer safety valves)			Not Credited	

* - Values taken from Section 14.1.2 of the FSAR.

Table 3.2.3-1

Initial Conditions: CVCS Malfunction (cont.)

DILUTION DURING STARTUP

Parameter	CECo	*FSAR
RCS Startup Boron Conc.	1900 ppm	2000 ppm
Core Monitoring	Source Range Detectors	Source Range Detectors
Rx Protection	SR High Flux and all Rx trips active.	SR High Flux and all Rx trips active.
RCS Mixing	Four RCPs	Four RCPs
Maximum Dilution	420 gpm (2 charging pumps at 210 gpm each)	208 gpm
RCS Volume	10,068 cubic ft (active volume excluding the pressurizer)	10,068 cubic ft (active volume excluding the pressurizer)
Critical Cb	1200 ppm	1200 ppm
Time to Critical	91 min.** (sufficient time to terminate dilution)	140 min. (sufficient time to terminate dilution)

* - Values taken from Section 14.1.4 of the FSAR.
** - Actual calculated time > 91 min. but kept consistent with the current FSAR Startup case to provide added conservatism.

3.2.6 Loss of External Electric Load

Table 3.2.6-1
Initial Conditions: Loss of External Electric Load

Parameter		CECo	*FSAR
Beta		0.007	Not Discussed
DTC		-1.0 pcm/deg F	Not Discussed
MTC	BOL EOL	0 pcm/deg F 0.312 delta rho/gm/cc	0 pcm/deg F -3.5E-4 delta k/deg F
System Pres.		2220 psia (2250 - 30) (Conservative steady state error).	2220 psia
System Power		102% (3315 MWth)	102% (3315 MWth)
Coolant Temp.		566.2 deg F (562.2+4) (Conservative steady state error).	566.2 deg F
Coolant Flow		135E6 lb/hr (Thermal Design Flow)	135E6 lb/hr (Thermal Design Flow)
Scram Reactivity		4% delta k	Not Discussed
Decay Heat		120% ANS	Not Discussed
PZR PORV and Spray		Automatic - Active Manual - Inactive	Automatic - Active Manual - Inactive
SG SV Drift Allowance		1% Drift 3% Accumulation 28 psi for Uncertainty **	Not Discussed Not Discussed Not Discussed
Pressurizer Safety Valve Setpoint		2735 psig	Not Discussed
Steam Dump System		Inactive	Inactive

* - Values taken from Section 14.1.7 of the FSAR.
** - Added to each value in the main steam safety valve fill table.

Sequence of Events (Loss of External Electric Load)

The transient response for a total loss of load from 102% full power operation is analyzed for four cases, two cases for the beginning of core life (automatic pressure control and manual pressure control) and two cases for the end of core life (again, automatic pressure control and manual pressure control). The sequence of events for the two most limiting cases, discussed below, is summarized in Table 3.2.6-2.

The FSAR's most limiting MDNBR case is the automatic pressure control BOL case where the MDNBR reached 1.74 at 11.0 seconds after the loss of load occurs. The MDNBR for all four cases of the CECo analysis is 2.13 which occurs at the beginning of the transient. However, it should be noted that for all four cases of both analyses the DNBR remains fairly constant for the first 10 to 12 seconds of the transient, and therefore the time at which the MDNBR occurs is relatively insignificant. The variation in magnitudes is primarily due to the different DNB calculation methods and the computer modeling techniques utilized. The MDNBR values, for both analyses, are significantly greater than the current safety limit which precludes fuel damage with a Loss of Load Event.

The FSAR's most limiting peak pressurizer pressure case is the manual pressure control BOL case where the pressure reached a maximum value of 2532 psia with the high pressurizer pressure setpoint (2425 psia) reached at 6.1 seconds. The CECo analysis has the same limiting case with a peak pressurizer pressure of 2532 psia, but the high pressurizer pressure setpoint (2425 psia) is reached at approximately 9 seconds. The peak RCS pressure is approximately 50 psi above the peak pressurizer pressure, which is significantly below the primary system pressurization limit of 2735 psig. Therefore, system overpressurization does not occur.

The pressurizer pressure and neutron flux curves also exhibit similar trends and magnitudes. No other information about the sequence of events could be identified in the FSAR for this transient.

3.2.8 Excessive Load Increase Incident

Table 3.2.8-1

Initial Conditions: Excessive Load Increase

Parameter	CECo	*FSAR
Beta	0.007	Not Discussed
DTC	-1.0 pcm/deg F	Not Discussed
MTC BOL EOL	0 pcm/deg F 0.312 delta rho/gm/cc	0 pcm/deg F -3.5E-4 delta k/deg F
Pressurizer Pressure	2220 psia (2250-30) (Conservative steady state error)	2220 psia
System Power	102% (3315 MWth)	102% (3315 MWth)
RCS Tavg	566.2 deg F (562.2+4) (S.S. error in most conservative direction)	566.2 deg F
RCS Flow	135E6 lb/hr (Thermal Design Flow)	135E6 lb/hr (Thermal Design Flow)
Scram Reactivity	4% delta k	4% delta k
Protection for an Excessive Load Increase	Overpower delta T Reactor Trip Overtemp. delta T Reactor Trip Power Range High Neutron Flux Rx Trip	Overpower delta T Reactor Trip Overtemp. delta T Reactor Trip Power Range High Neutron Flux Rx Trip
4 Cases Analyzed for 10% Step Load Increase from Rated Load	1. Reactor in Manual at BOL 2. Reactor in Manual at EOL 3. Reactor in Automatic at BOL 4. Reactor in Automatic at EOL	1. Reactor in Manual at BOL 2. Reactor in Manual at EOL 3. Reactor in Automatic at BOL 4. Reactor in Automatic at EOL

* - Values taken from Section 14.1.10 of the FSAR.

3.2.9 Small and Large Steam Line Breaks.

Table 3.2.9-1

Initial Conditions: Small and Large Steam Line Breaks

Parameter	CECo	*FSAR
Time in Life	EOL	EOL
Beta	0.0046	Not Discussed
DTC	-1.0 pcm/deg F	Not Discussed
MTC	0.312 delta rho/gm/cc	Not Discussed
Pressurizer Pressure	2250 psia	2250 psia
System Power	0% (subcritical)	0% (subcritical)
RCS Temp.	547 deg F	Not Discussed
RCS Flow	135E6 lb/hr (Thermal Design Flow)	135E6 lb/hr (Thermal Design Flow)
Shutdown Margin	1.6% delta k	Not Discussed
Low Steam Line Pressure Signal	445 psig	Not Discussed
High Delta Steamline Pressure	160 psig	Not Discussed
High Steam Line Flow (0% Power)	8.4E5 lb/hr	Not Discussed
Low RCS Tavg Trip	536 deg F	Not Discussed
Main Steam Isolation Value Closing Time	5 seconds	5 seconds

Table 3.2.9-1 (continued)

Initial Conditions: Small and Large Steam Line Breaks

Parameter	CECo	*FSAR
ECCS System Modeling		
Number of Charging Pumps Credited	1	1
Number of SI Pumps Credited	1	0
Accumulators	No	Yes
RHR System	No	No
Initial Boron Concentration in the RWST Line	Not Credited	Not Credited
Time to Full SI Flow with Offsite Power	25 seconds	10 seconds
Time to Full SI Flow without Offsite Power	37 seconds	22 seconds

* - Values taken from Section 14.2.5 of the FSAR.

Table 3.2.9-1 (continued)

Initial Conditions: Small and Large Steam Line Breaks

Parameter	CECo	*FSAR
Systems that provide the necessary protection against steam pipe rupture.		
1. Safety Injection System Actuation from any of the following:	2 of 4 coincident low pressurizer pressure	Not Discussed
	2 of 3 differential pressure signals between a steam line and the remaining steam lines.	2 of 3 differential pressure signals between a steam line and the remaining steam lines
	High steam line flow in 2 out of 4 main steam lines (1 of 2 per line), in coincidence w/ either low low RCS Tavg (2 of 4 loops) or low main steam line pres. (2 of 4 lines)	High steam line flow in 2 out of 4 main steam lines (1 of 2 per line), in coincidence w/ either low low RCS Tavg (2 of 4 loops) or low main steam line pres. (2 of 4 lines)
	2 of 4 high containment pressure signals	2 of 4 high containment pressure signals
2. Reactor trip from:	High flux	High flux
	Overpower delta T	Overpower delta T
	Trip on SI Signal	Trip on SI Signal
3. Redundant isolation of Main Feed-water Lines	Sustained High FW flow would cause additional cooldown	Sustained High FW flow would cause additional cooldown
	A safety injection signal will rapidly close all FW control valves, trip main FW pumps, & close FW header stop valves	A safety injection signal will rapidly close all FW control valves, trip main FW pumps, & close FW header stop valves

Table 3.2.9-1 (continued)

Initial Conditions: Small and Large Steam Line Breaks

Parameter	CECo	*FSAR
4. Trip of the Fast Acting Main Steam Line Stop Valves on:	High steam flow in any 2 steam lines in coincidence with either low-low RCS Tavg or low steam line pressure in any two lines	High steam flow in any 2 steam lines in coincidence with either low-low RCS Tavg or low steam line pressure in any two lines
	Not credited	High-high containment pressure

* - Values taken from Section 14.2.5 of the FSAR.

Table 3.2.9-1 (continued)

Initial Conditions: Small and Large Steam Line Breaks

Input Assumptions* (conditions at time of steam break accident)

1. The design end of life shutdown margin at no-load, equilibrium xenon conditions and with the most reactive rod stuck in its fully withdrawn position. Operation of the control rod banks during core burnup is restricted in such a way that addition of positive reactivity in a steam break accident will not lead to a more adverse condition than the case analyzed.

2. The negative moderator coefficient corresponding to the end of life rodded core with the most reactive rod in the fully withdrawn position.

3. Minimum capability for injection of high concentration boric acid solution corresponding to the most restrictive single active failure in the Safety Injection System. In the FSAR analysis, this corresponds to the flow delivered by one charging pump delivering its full flow to the cold leg header. In the CECo analysis, this corresponds to one charging pump and one SI pump.

4. A conservative value of the steam generator heat transfer coefficient. (No corresponding assumption found in FSAR.)

5. Hot channel factors corresponding to the worst stuck rod at end of core life.

6. Complete severance of a pipe inside the containment at the outlet of the steam generator (upstream of the flow restriction) with the plant initially at no-load conditions and all reactor coolant pumps running.

7. In computing the steam flow during a steam line break, Moody choked flow was assumed.

8. Perfect moisture separation in the steam generator is assumed. The assumption leads to conservative results since, in fact, considerable water would be discharged. Water carryover would reduce the magnitude of the temperature decrease in the core and the pressure increase in the containment.

9. The properties of the hot sector of the core and the properties for the remainder of the core are combined for use in calculating reactivity feedback. The FSAR also uses a uniform power distribution for calculating reactivity feedback from the Doppler power coefficient. The CECo analysis does not use a Doppler power coefficient.

Table 3.2.9-1

Initial Conditions: Small and Large Steam Line Breaks (cont.)

10. The core inlet temperature distribution is non-uniform with the coldest conditions assumed to occur at the location of the stuck rod.

11. The FSAR assumes that the intact steam generators blow down until the MSIV's close or until 10 seconds after the break, whichever occurs first. The CECo analysis assumes that the blowdown from the intact steam generators ends only upon closure of the MSIVs.

* - Input assumptions are for both analyses, except where noted, with the FSAR information taken from Section 14.2.5 of the FSAR.