ENCLOSURE 6

Attachments

Tennessee Valley Authority - Watts Bar Nuclear Plant - Unit 2, Docket No. 50-391

1. SUMMARY OF CONTINGENCY EVENTS AND THE CASES/SCENARIO RUN

2. WATTS BAR NUCLEAR PLANT (WBN) - TRANSMISSION SYSTEM STUDY (TSS) - GRID VOLTAGE STUDY OF WBN'S OFF-SITE POWER SYSTEM

3. CROSS-WALK ROAD MAP (Unit 2 FSAR Amendment 92 vs Unit 2 FSAR Amendment 100):
   - COMPARISON OF UNIT 2 FSAR CHAPTER 11 SECTIONS
   - COMPARISON OF UNIT 2 FSAR CHAPTER 11 TABLES

4. MISCELLANEOUS FSAR FIGURES

5. FIGURES FOR RESPONSE TO RAI 15.3.1 - 3.

6. FIGURES FOR RESPONSE TO RAI 15.3..2 - 1.I.

7. TABLE 3 AND FIGURES FOR RESPONSE TO RAI 15.3.1 - 1.a.

8. NUCLEAR SERVICE ADVISOR LETTER NSAL-00-013, "CVCS MODELING ASSUMPTION FOR LOSS OF OFFSITE POWER ANALYSES"

ATTACHMENT 1

SUMMARY OF CONTINGENCY EVENTS AND THE CASES/SCENARIO RUN

Attachment 1 (RESPONSE TO NRC RAI 8.2-3)

Summary of Contingency events and the Cases/Scenario run

The Planning TSS (E32 100920 614) analyzes offsite power based on 2 cases: a near year and 5 year look ahead. For these 2 cases, a transmission outage is taken, system adjustments are made, and then a LOCA is simulated. Voltages at 161kV terminals are monitored to observe whether the transmission grid can meet offsite power criteria. The pre-event list includes all transmission circuits, capacitor banks, and generators in the local WBN area.

The worst case Contingency events listed in Tables 2 thru' 5 of the Transmission System Study (TSS) Calculation EDX-000-999-2004-0002 (E32 100920 614) are explained below:

Table 2 - 161kV grid offsite power simulation using 2010 base case (only WBN U1 online)

- BASE-CASE-ATC is a baseline simulation with all transmission elements in service. A Voltage drop of 3.36kV at T=30 seconds is observed on WBH #1 line when LOCA loading is simulated.
- SQN TO WBH 161 – The WBH to SQN 161kV transmission line is removed from service. A Voltage drop of 4.41kV at T=30 seconds is observed on WBH #1 line when LOCA loading is simulated.
- 3 Terminal Line - The Kingston-Rockwood-Roane 161kV transmission line is removed from service. A Voltage drop of 4.37kV at T=30 seconds is observed on WBH #1 line when LOCA loading is simulated. Also, this contingency had the lowest accident voltage, 158.21kV, observed on WBH #1 line.
- SQN U2- Sequoyah Nuclear Unit 2 is removed from service. A Voltage drop of 4.35kV at T=30 seconds is observed on WBH #1 line when LOCA loading is simulated.

Table 3 - 161kV grid offsite power simulation using 2015 base case (both WBN U1 and U2 online)

- BASE-CASE-ATC is a baseline simulation with all transmission elements in service. A Voltage drop of 3.35kV at T=30 seconds is observed on WBH #1 line when LOCA loading is simulated.
- SQN TO WBH 161 – The WBH to SQN 161kV transmission line is removed from service. A Voltage drop of 4.46kV at T=30 seconds is observed on WBH #1 line when LOCA loading is simulated.
- 3 Terminal Line - The Kingston-Rockwood-Roane 161kV transmission line is removed from service. A Voltage drop of 4.44kV at T=30 seconds is observed on WBH #1 line when LOCA loading is simulated. Also, this contingency had the lowest accident voltage, 156.39kV, observed on WBH #1 line.
- WBH-10mi-Athens- The WBH to Athens 161kV transmission line is removed from service. A Voltage drop of 4.35kV at T=30 seconds is observed on WBH #1 line when LOCA loading is simulated.

Table 4 - 500kV grid offsite power simulation using 2015 base case (both WBN U1 and U2 online)

- No Pre-Event Table 6 – This is a baseline simulation with all transmission elements in service. A 0.03kV voltage drop and voltage of 23.76kV is observed when LOCA loading (see Table 6 in T25 100806 609) is applied.
- SQN U1 - Sequoyah Nuclear Unit 1 is removed from service. A voltage drop of .08kV and voltage of 23.82 is observed at U1 USST when LOCA loading (see Table 6 in T25 100806 609) is applied.
- Roane 500 - 161 kV Bank – The Roane 500kV – 161kV transformer is removed from service. A voltage drop of .04kV and voltage of 23.65 is observed at U1 USST when LOCA loading (see Table 6 in T25 100806 609) is applied.
- No Pre-Event Table 7 – This is a baseline simulation with all transmission elements in service. A 0.03kV voltage drop and voltage of 23.76kV is observed when LOCA loading (see Table 7 in T25 100806 609) is applied.

- SQN U1 - Sequoyah Nuclear Unit 1 is removed from service. A voltage drop of .08kV and voltage of 23.82 is observed at U2 USST when LOCA loading (see Table 7 in T25 100806 609) is applied.
- Roane 500 - 161 kV Bank – The Roane 500kV – 161kV transformer is removed from service. A voltage drop of .04kV and voltage of 23.65 is observed at U2 USST when LOCA loading (see Table 7 in T25 100806 609) is applied.

Table 5 - 500kV grid offsite power simulation using 2015 base case (Single Unit Operation)

- ATC - ATC – 0 Table 6 – This is a baseline simulation with all transmission elements in service. A 0.14kV voltage drop and voltage of 23.76kV is observed when LOCA loading (see Table 6 in T25 100806 609) is applied.
- SQN U1 - Sequoyah Nuclear Unit 1 is removed from service. A voltage drop of .19kV and voltage of 23.92 is observed at U1 USST when LOCA loading (see Table 6 in T25 100806 609) is applied.
- Roane 500 - 161 kV Bank – The Roane 500kV – 161kV transformer is removed from service. A voltage drop of .15kV and voltage of 23.54 is observed at U1 USST when LOCA loading (see Table 6 in T25 100806 609) is applied.
- ATC - ATC – 0 Table 7 – This is a baseline simulation with all transmission elements in service. A 0.13kV voltage drop and voltage of 23.77kV is observed when LOCA loading (see Table 7 in T25 100806 609) is applied.
- SQN U1 - Sequoyah Nuclear Unit 1 is removed from service. A voltage drop of .18kV and voltage of 24.01 is observed at U2 USST when LOCA loading (see Table 7 in T25 100806 609) is applied.
- Roane 500 - 161 kV Bank – The Roane 500kV – 161kV transformer is removed from service. A voltage drop of .15kV and voltage of 23.55 is observed at U2 USST when LOCA loading (see Table 7 in T25 100806 609) is applied.

The complete list of the 161kV and 500kV criteria results can be found in Appendices II and III of the Transmission System Study (TSS) Calculation EDX-000-999-2004-0002.

ATTACHMENT 2

WATTS BAR NUCLEAR PLANT (WBN) - TRANSMISSION SYSTEM STUDY (TSS) - GRID VOLTAGE STUDY OF WBN'S OFF-SITE POWER SYSTEM

Attachment 2 (RESPONSE TO NRC RAI 8.2-3)

TVA Calculation Coversheet

QA Record

Title WATTS BAR NUCLEAR PLANT (WBN) - TRANSMISSION SYSTEM STUDY (TSS) - GRID VOLTAGE STUDY OF WBN'S OFF-SITE POWER SYSTEM

Location Description: WBN *(Optional)*	**Total Pages:** *(including appendices & attachments)* 117

Calculation ID *(All parts required to form a unique ID)*:

Org Code	Location/ Plant Code	Branch Code	Alphanumeric Part = Discipline Code (1) + Type Code (1) + "X" + Unit Field (3) + Sys Code (3) + Year (4) + Sequence No. (4)
PSO	WBN	PLN	EDX-000-999-2004-0002

NOTE: When referencing the calculation ID, include all parts without spaces or dashes between them.

Unit(s), Spill gate(s), or Voltages (PSO): WBN, 500, 161	**Key Nouns (For CTS/CCRIS):** nuclear, offsite power supply, offsite pwr	
Applicable Design Document(s): 100, 102	**Rev**	**RIMS/EDMS Accession Number** *(Optional)*
	R0	E32 050202 601
	R1	E32 070216 600
UNID System(s):	R2	E32 100920 614
	R	

	R0	R1	R2	R
DCN, PCN, NA	NA	NA	NA	
Prepared: Sign / Print Name	WB Hopf	JWC Shultz / MW Gant	MW Gant	
Checked: Sign / Print Name	SL Palmer	WB Hopf	reviewer - WR Tillen; William S Hopf; WB Hopf	
	These calculations contain unverified assumption(s) that must be verified later? ☐ Yes ☒ No These calculations contain special requirements and/or limiting conditions? ☒ Yes ☐ No			
Approved: Sign / Print Name	JT Whitehead	BD Till	RE Field	
Approval Date	09/15/2004	02/16/2007	09/20/2010	
	These calculations contain a design output attachment? ☐ Yes ☒ No			
Revision Applicability	☒ Entire calc	☒ Entire calc ☐ Selected pgs	☒ Entire calc ☐ Selected pgs	☐ Entire calc ☐ Selected pgs
	Computer output Microfiche generated? ☐ Yes ☒ No Number:			

Purpose of the Calculation: Evaluate the ability of the grid to provide qualified offsite power to the Watts Bar NP

Abstract: This TSS determines if WBN's off-site power system adequately meets GDC-17 requirements.

☐ Electronically file and return calculation to Calculation Library.

☒ Electronically file and return calculation MW GANT Address: MR5G-C

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LIST OF ABBREVIATIONS

AD*	Common Station Service Transformers A & D
BC*	Common Station Service Transformers B & C

*(Combination of CSSTs with one offsite power circuit is out of service)

CSST	Common Station Service Transformer
USST	Unit Station Service Transformer
GSU	Generator Step-up Transformer
NERC	North American Electric Reliability Council
NPG	Nuclear Power Group
PSO	Power System Operations
PSS/E	Power System Simulator for Engineering
TPD	Transmission Planning Department
TSS	Transmission System Study
IGA	Inter Group Agreement
FAWG	Fault Analysis Working Group
WBN	Watts Bar Nuclear Plant
WBH	Watts Bar Hydro
SQN	Sequoyah Nuclear Plant
FLR	Full Load Rejection
LOCA	Loss of Coolant Accident
LOOP	Loss of Off-site Power
DBE	Design Basis Event
ATC	All Ties Closed (no pre-events)

E32 100920 614

September 20, 2010

EDMS, WT CA-K

WATTS BAR NUCLEAR PLANT (WBN) - PLANNING TRANSMISSION SYSTEM STUDY (TSS) - GRID OFF-SITE POWER, TRANSIENT STABILITY, GSU TAP SETTING REVIEW, AND FAULT CURRENT CALCULATION FOR 2010 AND 2015

I. Purpose

This TSS determines if WBN's off-site power system adequately meets GDC-17 requirements. This TSS also documents load-flow analysis of the off-site power supply considering all system pre-event outages in order to provide input to site calculations. The analysis is based on summer 2010 and a 5-year look ahead to summer 2015. This study follows the guidelines documented in IGA-6 R12.

II. Assumptions

- For conservatism, Watts Bar Hydro (WBH) units are turned off. This assumption bounds all hydro dispatches or low-water conditions.

- Crossville, Charleston, and Sequoyah, and WBH caps are included in the base cases and are available except for pre-event cases where the capacitor banks are out as noted.

- Area Grid Voltage: This study assumes a nominal WBN 500-kV bus voltage schedule of 525 kV—525 kV is a reasonable operating voltage for WBN.

- Voltage Acceptance Criteria: WBN 161-kV off-site power acceptance criteria and study methodologies are established by TVAN. Post-event voltage criteria are based on steady state voltage after breakers are cleared, but before transmission system compensatory measures are taken.

- The positive sequence thevenin equivalent impedances and three-phase fault levels were obtained from LL14.sav base case used for fault studies. This case was developed by the Transmission Planning Department (TPD) and contains saturated sub-transient impedances.

- The total clearing time used for 500-kV breakers is 5 cycles in transient stability studies.

- Dual unit LOCA loads were used for 2010 single unit analysis. This is because dual unit loading contains heavier CSST loading both pre-event and post-event. This adds an additional amount of conservatism to the 2010 results.

- FLR simulations were not performed since LOCA loads are larger and bound all other scenarios. Also, for conservatism, for 161kV offsite validation, LOCA simulations trip WBN U1 at t=0. Note that for 500kV grid criteria validation the accident unit is allowed to provide reactive support for 30 seconds.

- Loading tables 6 and 7 (found in T25 100806 609 Appendix 1) were used for validating offsite power adequacy on the 500kV grid. Although tables 6 & 7 were designed for dual unit operation, single unit operation, with table 6&7 loading was simulated for conservatism.

- Wacker Chemie loads are included in 500kV voltage criteria simulations. Currently Wacker plans to locate on the 500kv transmission network which will impact WBN's 500kV offsite power.

- For 500kV voltage criteria simulations, only T=0+ loading is analyzed. Because accident loads are transferred from the USSTs before T=30+ seconds, T=30+ voltages are not bound by the 500kV offsite voltage criteria.

III. Input Information/References

- Inter Group Agreement IGA-6, Revision 12 specifies the credible grid and plant contingencies to study.

- Appendix I contains a memorandum T25 100806 609 sent from Ronald E. Cox to Roger E Field Jr on August 6, 2010 (see Appendix I). T25 100806 609 contains:
  - WBN unit station service transformer (USST) and common station service transformer (CSST) loads during normal and LOCA scenarios
  - 161-kV voltage and voltage drop acceptance criteria
  - 500-kV voltage criteria
  - GSU tap settings
  - July 17, 2009 WBN PGI meeting minutes

- The WBN transformer taps for the CSSTs and USSTs were obtained from Configuration Control Drawing 1-15E500-3, R19, Transformer Taps & Voltage Limits Aux Power System (see Appendix I, p14).

- 2 copies of all files used in this TSS are stored on CDs which reside in the Quality Assurance (QA) cabinet at MR 5G-C and the QA cabinet at PCC 2A C.

IV. Computations/Analysis

A. Load Flow Analysis

Criteria

The following voltage requirements are specified in T25 100806 609 (Appendix I).

- 500kV grid voltage Criteria: WBN Generator bus may neither exceed 24.8kV nor fall below 23kV.
- 161 kV grid voltage Criteria: Grid voltage at WBN 161-kV switchyard may neither exceed 169 kV (during light load conditions) nor fall below 153 kV (during a design basis event).
  - 9 kV maximum voltage drop on the high side of the CSSTs for normal alignments.
    6 kV maximum voltage drop on the high side of the CSSTs for certain alternate load alignments.

In determining adequate off-site power for WBN, the TVA Transmission System must provide two off-site sources that maintain the WBH 161-kV bus voltage to be greater than 153 kV during a simulated design basis event (DBE). Since planned maintenance or forced outages would affect the off-site power supply to WBN, it is prudent to study the area with various lines out of service. This study considers all pre-event outages in TVA'a service area followed by a loss of cooling accident (LOCA), which is the most severe DBE. WBH 161-kV voltage is monitored at each time step, and any low voltage or delta voltage violations are noted in the results section of the report.

Base Case Development

TPD's master database for case building is called FAWG, which stands for Fault Analysis Working Group. FAWG retains TVA's most up to date network topology (including future projects) as well as load and generation forecasts. All TVA planning cases, including the cases used for this TSS, are created from FAWG. Base cases were modified to include greater detail of the WBN bus than is normally used in TPD studies.

According to the 2009 PGI minutes, the study years chosen were 2010 (prior to Unit 2 operation) and 2015 (after Unit 2 commercial operation). To add conservatism to the load growth forecast, the 5 year look ahead case was extended 1 year from 2015 to 2016. Both summer cases were built using the Mean Normal Coincident Summer forecast in FAWG.

The cases used for this TSS contain a transmission network which spans the entire eastern interconnect from Florida to Canada. While TVA's network is generated in FAWG, the remaining transmission network comes from the North American Electric Reliability Council (NERC) dynamic case build.

The system wide loading for the three cases used are shown in the following table.

Cases used	TVA System Load
Summer Peak 2010	34,327 MW load
Light Load 2014	20,015 MW load
Summer Peak 2015	38,814 MW load

Table 1 - TVA System Loading

An 8,000 MW North to South transfer was added to the summer peak 2010 case and a 6,360MW North to South transfer was added to the 2015 summer peak case. These transfers are based on the highest transfer levels the basecase can withstand and still avoid voltage problems around the TVA service area perimeter.

Simulation Details

While powerflow studies cannot be used to calculate transient voltages, they can quickly calculate steady state voltages and power flows. The effects of automatic and manual devices, such as switched capacitors, can be included. The PTI powerflow software that TPD uses can include or ignore these devices as needed. The transients associated with a DBE are investigated in the dynamic portion of the study which will be described later. As opposed to the dynamic studies, a powerflow uses constant MVA load and generator reactive limits. Normally, the constant MVA load models represent the self restoring property of transmission system loads due to distribution transformer tap changes and other phenomenon. Without these actions, the load would fluctuate as the system voltage changed, due to the portion of the load that is made of constant impedance and constant current devices. The time scale of the DBEs, as described previously, would not give enough time for the self restoring actions to fully occur. Constant MVA load is used for the transmission system loads since it is unknown what percentage would actually respond as constant MVA. In addition, the generator reactive limits in a powerflow are set at the steady state unit limit. The limits are normally based on a reactive capability curve (a.k.a. D curve). For an overexcited situation a unit will initially respond more than these reactive limits but after a period of time the unit excitation system will automatically bring its reactive production back to within its rating. The powerflow study assumes that the unit never goes beyond this limit.

It is recognized that area outages can have impacts on the adequacy of the off-site power system at WBN. The analysis considered the outages of each line and transformer within the TVA system. A DBE event was studied for each of these outages. In the study this is accomplished by first applying the outage, then allowing the transmission system to reach a new steady state through the action of both automatic and dispatcher actions before the DBE event. From this point on, these outages will be referred to as pre-event outages.

Pre-event line outages and transformers that do not result in the loss of radially connected generators are modeled by taking single lines out of service in the powerflow and then re-solving. Since there is sufficient time for automatic or manual adjustments to take place, Power System Simulator for Engineering (PSS/E), TPD's computer simulation software developed by PTI, was allowed to change the taps of the load tap changing transformers in order to restore voltages

to load busses. Similarly, switched capacitors were also allowed to either switch in or out as their voltage set-points dictated. Although most generators control their terminal voltage as opposed to the high side of the GSU, it was assumed that the operators/dispatchers would adjust the AVR set-points to return the high side voltage to the pre-determined voltage schedule. This is implemented by allowing the units in the powerflow to simply control the high side voltage. The generators are allowed to generate up to their maximum steady state reactive capability, as defined by the data in FAWG, as described earlier in this section.

For pre-event outages that result in the loss of radially connected generators (mostly GSU outages), an extra step is taken, in addition to that described in the previous paragraph since a powerflow solution, by its nature, must always have a balance between the power generated and the power consumed by loads and losses. Per NERC standards, TVA must always have enough generation available to quickly compensate for the loss of its largest unit. This is known as a Spinning Reserve. Because the case already has an extreme transfer, the generation lost by a pre-event is picked up by generators within TVA's service area.

The second step in the power flow simulation is to take the case with the pre-event outage, from now on called the pre-event case, and model the effects of a loss of coolant accident (LOCA), which is the most severe DBE at WBN. The time steps for reporting voltage for a LOCA scenario are: t=0-, t=0+, and t=30 seconds.

Since voltages are calculated for a very short time period after the DBE disturbs the system, a few corrections are made to improve simulation accuracy. The first correction considers the generator control system in the PSS/E program monitoring and holding the voltage schedule for the high side of the GSU. This model reflects what the system operators do through operator intervention to maintain the voltage schedule. However, in reality as generators respond to the DBE disturbance their reactive outputs will change. This change in output creates a different voltage drop across the GSU, which the system operators cannot correct in this short time. As a result, the GSU high-side voltage will not be held constant. To model this voltage drop correctly, a program (called VQchng.ipl) is run which changes the generator voltage control bus location to be the low side of the GSU. The pre-event low-side voltage is selected as the AVR voltage set-point for each generator terminal bus so that the voltage of the GSU high side bus is at its normal scheduled voltage prior to the DBE.

The second correction is to hold transmission system elements, such as capacitors and tap changers, fixed before, during, and following the DBE. While the actions of these devices typically result in higher system voltages, the allowed time for the voltage to recover is too short to depend on these slow controls to operate.

The last correction concerns the loss of the unit's power output to the system when the DBE occurs. Since a powerflow must always balance generation with load and losses, the active power must be picked up by other units. Since the time span of the study is relatively short, it is a valid assumption to assume that the TVA units will not pick up the loss, as assumed in the pre-event case. Therefore,

the additional power is imported from outside the TVA area, increasing the system transfer level. Also, this tends to be more conservative since plant voltages are usually lower when power is imported (increasing the existing transfer) than when the extra power is generated from within the TVA system.

Typically, a pre-event with Full Load Rejection (FLR) scenario is analyzed. FLR is a simulation in which the 500 kV breakers at WBN open and isolate the nuclear unit from the transmission system. Typically, the FLR simulation is selected by choosing the worst pre-event from the DBE runs which cause the largest delta V at t=30 sec. Because FLR loading tables were not provided by NPG, this simulation was not performed. However, in this TSS report all LOCA simulations bound any FLR simulations due to 1)WBN U1 is tripped at T=0 and 2)LOCA loading is higher than FLR loading. Note that for 500kV grid criteria validation the accident unit is allowed to provide reactive support for 30 seconds.

B. Dynamic Analysis

The purpose of the Dynamic Study, as described in IGA-6 R12, is to provide voltage recovery curves to enable determination by the plant as to whether the system voltage recovers in time to avoid operation of the in-plant under-voltage relays and diesel generator initiation.

Base Case Development

The 2014 light load case provides the most conservative results for angular stability when considering NERC category B events (single failure events, i.e., 3-phase normally cleared faults). The 2010 and 2015 peak cases are used to simulate the worst case DBE events, as found in the loadflow section. Single unit operation (WBN Unit 1) is simulated in the 2010 case, while dual unit operation is studied in the 2014 light load as well as 2015 peak case.

Simulation Details

Area pre-events were taken one at a time. Then a three phase fault lasting 5 cycles was placed on each line leaving WBN 500 kV bus. Voltage, angle, and frequency deviations were monitored. Tables summarizing the events are included in the results section. Also, the worst pre-event case was studied for voltage recovery following a DBE, for both light load and peak cases. These curves are provided in the results section.

C. Fault Study Analysis

Fault studies were performed to determine the system impedance at the WBN 500-kV and WBH 161-kV buses. The fault study was performed using a 2019 fault case. The results are provided in Table 7.

D. GSU Tap Setting

The 2009 PGI Meeting minutes charge TPD to recommend optimal tap positions based on a 23kv minimum voltage requirement. The Reactive range used for studying WBN Unit 1 is up to 100 MVars absorbing and no more than 400 MVars generating. This evaluation was to consider a wide range of system voltages from 485kV to 550kV. A study was performed and results are provided in Table 8 in the results section of the report.

V. Results

A. Load Flow Results

161kV Criteria Results

Tables 2 and 3 show results from the 2010 and 2015 study years respectively. There are no voltage or delta V criteria violations. The worst loading configuration was found to be Common Station Service Transformers (CSSTs) B and C out of service with all load transferred to CSSTs A and D. Thus all results are based on this worst case loading.

The first row in each table displays the pre-event voltage for the base case as well as the voltage drop experienced for a LOCA with no pre event. The remaining three rows are the pre-events which cause the largest voltage drop at the 161kV common station service terminals. The pre-event, which caused the largest delta V in both the 2010 and 2015 screenings, was SQN to WBN 161kV line out. An extensive list of 161kV criteria results is found in Appendix II.

Table 2 - 2010 Peak Worst Cases

Contingency Event	Pre-event		T0+				T30			
	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
BASE-CASE-ATC	163.99	164.20	161.92	162.34	2.07	1.86	160.63	161.29	3.36	2.91
SQN TO WBH 161	163.38	163.60	160.79	161.22	2.59	2.38	158.98	159.65	4.41	3.95
3 Terminal Line	161.90	162.12	159.34	159.77	2.56	2.34	157.53	158.21	4.37	3.90
SQN U2	163.73	163.94	160.67	161.10	3.06	2.85	159.38	160.05	4.35	3.90

Table 3 - 2015 Peak Worst Cases

Contingency Event	Pre-event		T0+				T30			
	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
BASE-CASE-S15	163.49	163.70	161.65	162.07	1.84	1.63	160.14	160.80	3.35	2.90
SQN TO WBH 161	162.04	162.26	159.69	160.12	2.35	2.14	157.58	158.26	4.46	3.99
3 Terminal Line	160.14	160.36	157.90	158.33	2.24	2.02	155.70	156.39	4.44	3.97
WBH-10mi-Athens	163.37	163.58	161.11	161.54	2.25	2.04	159.02	159.69	4.35	3.89

500kV Criteria Results

There were no voltage violations observed. Tables 4 and 5 show results from the 500kV simulations. All 500kV criteria simulations used the 2015 Summer case because this validation is only needed when Unit 2 becomes operational.

For Tables 4 and 5, the first column lists the contingency event. The pre event which caused the largest voltage drop at T=0 was the outage of SQN U1. The lowest voltage experienced on the generator buses happened during the pre-event outage of Roane 500-161kV Intertie bank. The second column represents the loading table used during the simulation. Loading Tables 6 and 7 correspond to the numbered loading tables provided by TVAN in T25 100806 609. Loading Table 6 represents Unit 1 in accident on USSTs and non-accident Unit 2 on CSSTs. Loading Table 7 represents Unit 2 in accident on USSTs and non-accident Unit 1 on CSSTs. The rest of the columns report the voltage of the WBN generator buses. The T=30 second voltages are left out of the table, since accident loads are transferred to the CSSTs by then. The worst Voltage and delta Voltage numbers are **shaded**.

Table 4 simulations have both WBN online. The lowest T=0 voltage experienced is 23.65kV, and occurs with WBN U1 in accident (loading table 6) and with Roane 500-161kV transformer out of service.

Table 5 simulations are conducted with one WBN unit out of service. In the first 3 rows of table 5, WBN U2 is offline. In last 3 rows of the table, WBN U1 is offline. The lowest T=0 voltage experienced is 23.54kV, and occurs with WBN U1 in accident (U2 is outaged) with Roane 500-161kV transformer out of service. An extensive list of 500kV criteria results is found in Appendix III.

Table 4 - Dual Unit Operation Worst Cases

Contingency Event	Loading	Pre-event		T0+			
		U1	U2	U1	U2	ΔU1	ΔU2
No Pre-Event	Table 6	23.79	23.84*	23.76	23.78*	0.03	0.07*
SQN U1	Table 6	23.90	23.96*	23.82	23.84*	**0.08**	0.12*
Roane 500 - 161 kV Bank	Table 6	23.69	23.74*	**23.65**	23.66*	0.04	0.08*
No Pre-Event	Table 7	23.84*	23.79	23.78*	23.76	0.07*	0.03
SQN U1	Table 7	23.96*	23.90	23.84*	23.82	0.12*	**0.08**
Roane 500 - 161 kV Bank	Table 7	23.74*	23.68	23.67*	**23.65**	0.08*	0.04

* Values with asterisk are not bound by 500kV criteria since accident loads are not on that unit.

Table 5 - Single Unit Operation Worst Cases

Contingency Event	Loading	Pre-event		T0+			
		U1	U2	U1	U2	ΔU1	ΔU2
ATC - ATC - 0	Table 6	23.90	23.57*	23.76	23.40*	0.14	0.17*
SQN U1	Table 6	24.11	23.57*	23.92	23.35*	**0.19**	0.22*
Roane 500 - 161 kV Bank	Table 6	23.69	23.57*	**23.54**	23.38*	0.15	0.19*
ATC - ATC - 0	Table 7	23.57*	23.90	23.40*	23.77	0.17*	0.13
SQN U1	Table 7	23.57*	24.19	23.35*	24.01	0.22*	**0.18**
Roane 500 - 161 kV Bank	Table 7	23.57*	23.69	23.38*	**23.55**	0.19*	0.15

* Values with asterisk are not bound by 500kV criteria since accident loads are not on that unit.

B. Dynamic Results

Table 6 shows the results for the light load NERC category B events. There are no unstable normally cleared scenarios. The largest angle deviation (shaded) occurred with WBN-Bull Run 500kV transmission line (TL) outaged pre-event and WBN-Roane TL faulted and cleared. Table 6 and Figure 1, 2, and 3 studies were all done using the 2014 Light Load case.

Table 6 - 2014 Light Load Angle Deviation

Pre-Event	Faulted & Cleared Line	Angular Deviation
WBN - Sequoyah #2	WBN - Sequoyah #1	40.8
	WBN - Roane	40.4
	WBN - Volunteer	40.0
	WBN - Bull Run	39.6
WBN - Sequoyah #1	WBN - Sequoyah #2	40.9
	WBN - Roane	40.7
	WBN - Volunteer	40.2
	WBN - Bull Run	39.8
WBN - Bull Run	**WBN - Roane**	**44.2**
	WBN - Volunteer	41.0
	WBN - Sequoyah #1	38.2
	WBN - Sequoyah #2	38.1
WBN - Roane	WBN - Bull Run	43.6
	WBN - Volunteer	41.4
	WBN - Sequoyah #1	38.6
	WBN - Sequoyah #2	38.4
WBN - Volunteer	WBN - Roane	41.6
	WBN - Bull Run	40.7
	WBN - Sequoyah #1	38.3
	WBN - Sequoyah #2	38.1

Figure 1 is the voltage recovery plot for WBN 500-kV and 22.5-kV Generator Terminal buses. Pre event is WBN-Bull Run TL with three-phase normally cleared fault on WBN–Roane 500-kV TL.

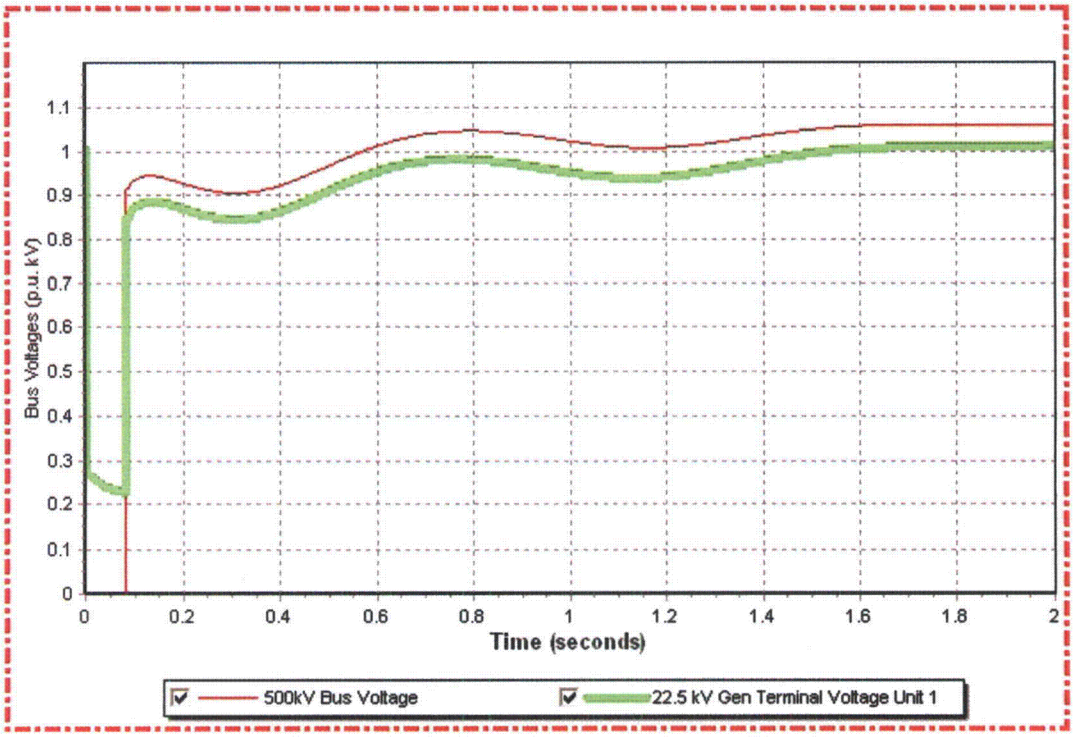

Figure 1 - Voltage Recovery from a Fault

Figure 2 is the rotor angle plot for WBN Units 1 and 2. Pre event is WBN-Bull Run TL with three-phase normally cleared fault on WBN–Roane 500-kV TL.

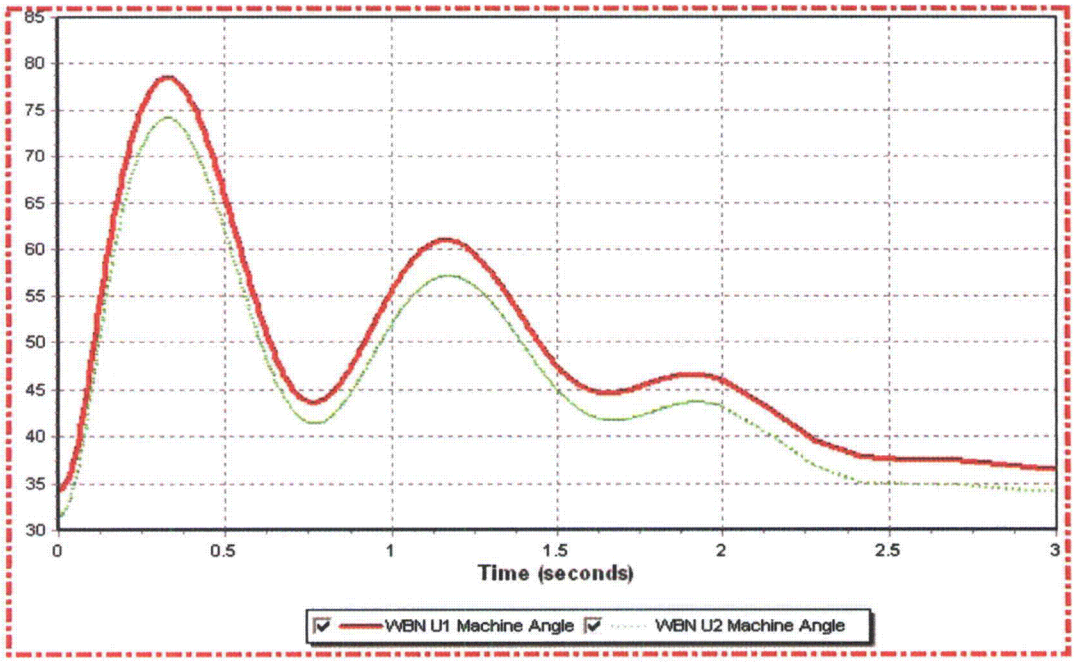

Figure 2 - Machine Angle Deviation

Figure 3 below is the WBN 500-kV bus frequency plot. Pre event is WBN-Bull Run Transmission Line with three-phase normally cleared fault on WBN–Roane 500-kV Transmission Line.

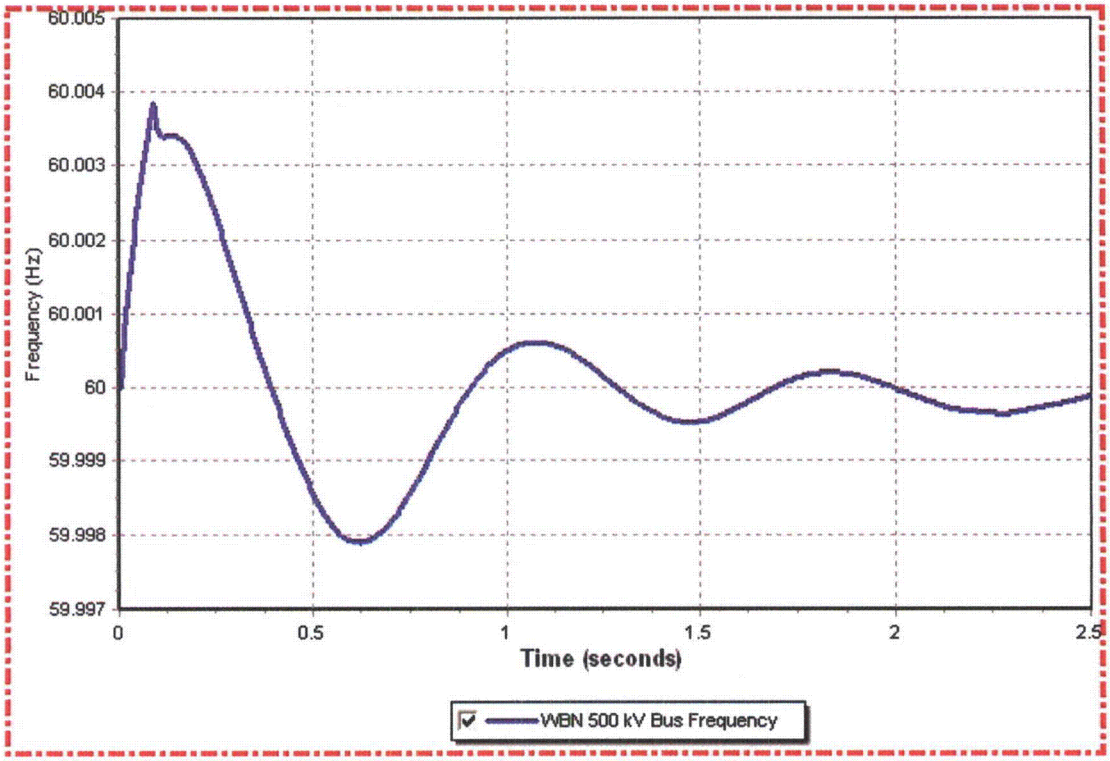

Figure 3 - 500kV Bus Frequency (Hz)

LOCA Voltage Recoveries

Figures 4 and 5 below show the voltage recovery for the worst cases as found in the loadflow section. They were run with the Summer 2010 and 2015 cases respectively. Voltage magnitude versus time, in seconds, is plotted in the graphs. The loadings selected are those used in the loadflow section. The time steps in the later part of the simulation have been reduced in order to hasten the analysis. The voltage was allowed to reach a steady state before the next load was applied.

The simulation starts with the worst case pre-event, WBN-SQN 161kV TL, out of service. At t=1 sec, LOCA loads are applied and WBN Unit 1 is tripped. The 30-second LOCA loads are applied at 15 seconds in the simulation. The solid red line is the 161-kV WBN CSST A&D bus voltage.

Summer 2010 case. Pre-event is WBN-SQN 161kV TL. LOCA applied at t=1

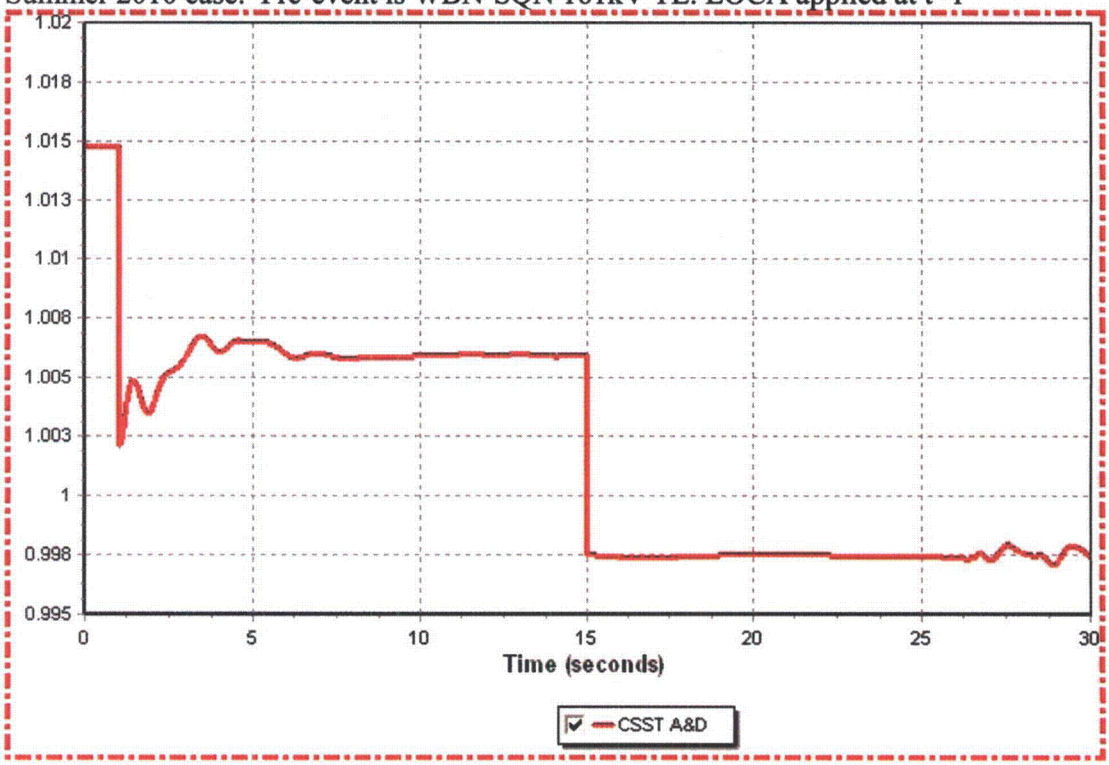

Figure 4 - 161kV CSST Bus Voltages (PU)

Summer 2015 case. Pre-event is WBN-SQN 161kV TL. LOCA applied at t=1

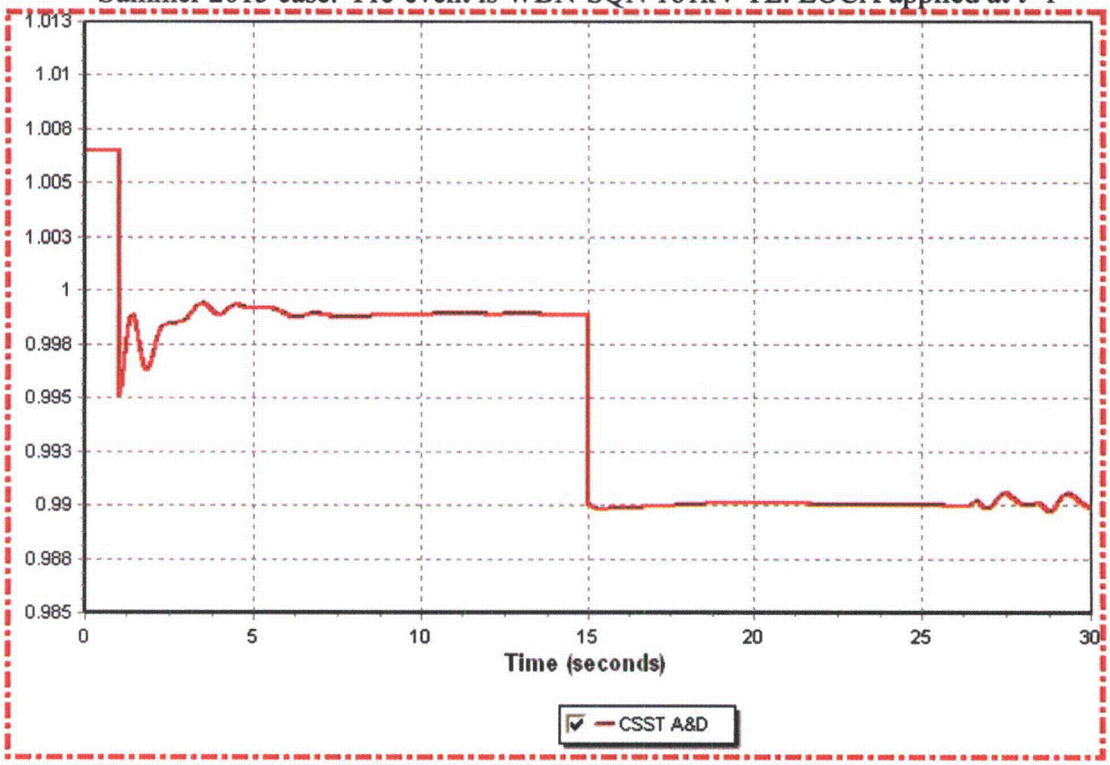

Figure 5 - 161kV CSST Bus Voltages (PU)

C. Fault Study Results

The following table contains the fault study results:

Table 7 - Fault Study Results

Bus	Configuration	3-Phase Fault Current (A)	Positive Sequence Impedance (p.u.) R	Positive Sequence Impedance (p.u.) X
WBN-500kV	With WBN Gens On	32299.3	0.00018	0.00375
	With WBN Gens Off	24798	0.00029	0.00488
WBH-161kV	With WBH Gens On	16089.8	0.00347	0.02314
	With WBH Gens Off	14360.4	0.00431	0.02586

These equivalent impedances are calculated on a 100-MVA base with and without the contribution of the Watts Bar Hydro/Nuclear generators. Copies of the fault output printouts are in Appendix III.

D. GSU Tap Setting Results

Table 8 shows the allowable MVar generation of WBN Unit 1 based on extreme system voltages ranging from 485kv - 550kv.

Table 8 - GSU Tap Setting Voltage Survey

tap settings	485kV system Voltage	490kV system Voltage	497kV system Voltage	525kV system Voltage	530kV system Voltage	535kV system Voltage	540kV system Voltage	545kV system Voltage	550kV system Voltage
tap 4 (500kV)	22.5kv	22.68kv	400 < Q < 400	no limits	no limits	no limits	-100 < Q < 346	-100 < Q < 228	-100 < Q < 110
tap 5 (487.5kV)	396 < Q < 400	284 < Q < 400	127 < Q < 400	-100 < Q < 382	-100 < Q < 261	-100 < Q < 141	-100 < Q < 20	-100 < Q < -100	NA- high V

The first column lists available tap positions for WBN U1 GSU. Because Taps 1-3 are unfeasible, only taps 4 and 5 are listed. The remaining columns represent different 500kv system voltages. Rows 2 and 3 list the available reactive output of Unit 1. The full range of Unit 1 is assumed to be from absorbing 100 MVars to generating 400 MVars.

For low system voltage (<500kV), WBN generator low side voltage is in danger of falling below 23kv. The most optimal tap at low voltages is position 5. At tap 5, as long as WBN U1 is outputting 400 MVars, the generator voltage is able to maintain the 23kV minimum requirement with system voltages as low as 485kV. However, at position 4, as long as WBN U1 is outputting 400 MVars, the generator voltage is able to maintain the 23kV minimum requirement with system voltages only as low as 497kV.

For high system voltage (>540kV), WBN generator voltage is in danger of rising above its 24.8kV maximum limit. The most optimal tap at high voltages is position 4. At tap 4, the system voltage can rise to 550kV and beyond without the generator voltage being in danger of going too high. However, at position 5, if the system voltage rises above 540kV WBN U1 must be able to absorb MVars to prevent generator voltage from rising above the 24.8kV maximum. For tap 5, if the system voltage rises above 545kV the generator voltage will rise above the maximum voltage limit.

Based on E31 960802 300, this GSU was originally set on tap 5 in the 1980's, but changed from position 5 to position 4 by 1996. Our studies show that tap 4 will cause a generator voltage violation if the grid falls below 497kV, whereas tap 5 will cause a generator voltage violation if the system voltage rises above 545kV. NPG should evaluate the benefits and risks involved at each tap to decide the optimal tap position.

VI. Conclusions

A. Load Flow Conclusions

The results show no significant issues for WBN Unit 2 coming online or for other future system changes. All cases (for both study years) meet the WBN voltage requirements for both normal and alternate alignments. Also, each contingency case meets the minimum voltage and delta voltage requirements. This satisfies all GDC-17 requirements for WBN Unit 1 and 2.

B. Dynamic Conclusions

WBN Units 1 and 2 are stable for all 3-phase fault scenarios with normal clearing. Graphs showing the frequency response during a transient event (3 phase normally cleared fault) are provided for the plant to verify that all relays are coordinated properly. Additionally, there are plots showing the voltage recovery during a DBE are provided for the plant to verify relay coordination.

C. Fault Study Conclusions

The maximum fault levels were calculated and tabulated to provide information for use by the nuclear site in their AC system calculations.

D. GSU Tap Setting Conclusions

The only feasible tap settings are positions 4- 500,000 and 5- 487,500. Although position 5 seems to be the best for low system voltage, consideration needs to be taken such as reasons why the original tap setting of 5 was moved to tap 4.

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MR 5G-C

MWG: WBH
Appendices
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Prepared by M.W. Gant (3714-C), S.T. Cain (6828-C), R.D. Bottoms(4437-C) and coordinated with Transmission System Operations.

Appendices

Appendix I

Fault Current Results

161-kV fault current with WBH Units Offline

```
PSS/E  SHORT  CIRCUIT  OUTPUT                    MON, MAY 17 2010  11:00      HOME  BUS  IS  :

FA19L - 2019, 1.05 PU V, X"D SAT FAULT CASE W/07 SERC EXT.                    87 [5WBHP       161.00]
2013 EQUIV - SPECIAL STUDIES SECTION - [JWCS/BAM - 01/09]

***  FAULTED  BUS  IS :      87 [5WBHP       161.00]  ***                      0  LEVELS  AWAY
```

```
AT BUS     87 [5WBHP       161.00] AREA  347  (KV L-G) V+: /  0.000/    0.00     (KV L-G) VA: /  0.000/    0.00    V0: / 35.055/ -178.62
                                                                                            V+: / 66.371/    0.32    V-: / 31.329/  179.13

THEV. R, X, X/R: POSITIVE  0.00431  0.02586    6.007        NEGATIVE  0.00441  0.02593    5.882        ZERO  0.00379  0.02918    7.698
```

X--------- FROM ----------X	AREA	CKT	I/Z	THREE PHASE FAULT /I+/	AN(I+)	/Z+/	AN(Z+)	APP X/R	ONE PHASE FAULT /IA/ /3I0/	AN(IA) AN(3I0)	/ZA/ /Z0/	AN(ZA) AN(Z0)	APP X/R APP X/R
427 [5SPRING CITY161.00]	347	1	AMP/OHM	1447.2	-79.83	5.93	78.40	4.870	1295.7	-79.91	10.32	74.32	3.563
									1115.8	-78.39	73.33	-97.53	7.567
1007 [5WB UTIL COR161.00]	347	1	AMP/OHM	0.0	0.00	0.00	0.00	0.000	189.4	-88.51	1.32	74.05	3.500
									568.2	-88.51	183.81	-90.00	9999.999
1041 [5DAYTON TAP 161.00]	347	1	AMP/OHM	1294.4	-79.43	13.91	79.05	5.167	1051.9	-79.37	20.49	77.02	4.338
									668.7	-76.36	112.58	-100.21	5.551
1047 [5WBNP SS #1 161.00]	347	1	AMP/OHM	0.0	0.00	0.00	0.00	0.000	864.1	-86.83	4.91	75.01	3.735
									2592.3	-86.83	35.80	-90.00	9999.999
1051 [5WBNP SS#2 161.00]	347	1	AMP/OHM	0.0	0.00	0.00	0.00	0.000	900.0	-87.29	3.27	73.87	3.457
									2699.9	-87.29	35.80	-90.00	9999.999
1123 [5TEN MILE TP161.00]	347	1	AMP/OHM	3838.0	-79.85	3.21	78.70	5.004	3067.5	-79.06	4.36	77.59	4.543
									1841.4	-73.20	48.18	-104.98	3.736
1130 [5ST CLAIR TP161.00]	347	1	AMP/OHM	3358.1	-80.49	8.97	78.33	4.843	2581.7	-79.61	12.58	77.85	4.645
									1307.1	-72.23	50.19	-105.39	3.632
1138 [5PIKEVLLE TP161.00]	347	1	AMP/OHM	1441.2	-76.46	25.10	75.16	3.774	1100.3	-76.15	35.79	74.40	3.581
									543.2	-71.06	103.88	-105.15	3.694
1277 [5GOODFLD TP 161.00]	347	1	AMP/OHM	2992.4	-84.32	8.16	83.80	9.206	2252.6	-83.30	11.36	82.84	7.955
									1025.8	-73.74	73.39	-104.61	3.835
4482 [1WBHP H1 13.800]	347	1	AMP/OHM	0.0	0.00	0.00	0.00	0.000	101.6	-88.45	0.00	0.00	0.000
									304.8	-88.45	0.00	0.00	0.000
4483 [1WBHP H2 13.800]	347	1	AMP/OHM	0.0	0.00	0.00	0.00	0.000	101.5	-88.45	0.00	0.00	0.000
									304.4	-88.45	0.00	0.00	0.000
4484 [1WBHP H3 13.800]	347	1	AMP/OHM	0.0	0.00	0.00	0.00	0.000	101.6	-88.45	0.00	0.00	0.000
									304.7	-88.45	0.00	0.00	0.000
4485 [1WBHP H4 13.800]	347	1	AMP/OHM	0.0	0.00	0.00	0.00	0.000	101.5	-88.45	0.00	0.00	0.000
									304.6	-88.45	0.00	0.00	0.000
4486 [1WBHP H5 13.800]	347	1	AMP/OHM	0.0	0.00	0.00	0.00	0.000	101.5	-88.45	0.00	0.00	0.000
									304.6	-88.45	0.00	0.00	0.000

TOTAL FAULT CURRENT (AMPS) 14360.4 -80.55 13786.3 -81.22

161-kV fault current with WBH Units Online

```
PSS/E  SHORT  CIRCUIT  OUTPUT                          MON, MAY 17 2010  10:54      HOME  BUS  IS  :

FA19L - 2019, 1.05 PU V, X"D SAT FAULT CASE W/07 SERC EXT.                          87 [5WBHP       161.00]
2013 EQUIV - SPECIAL STUDIES SECTION - [JWCS/BAM - 01/09]

        ***  FAULTED  BUS  IS :      87 [5WBHP       161.00]  ***                     0  LEVELS  AWAY

AT BUS     87 [5WBHP       161.00] AREA  347  (KV L-G) V+: /  0.000/    0.00     (KV L-G) VA: /  0.000/    0.00    V0: / 37.513/ -179.10
                                                                                           V+: / 67.771/    0.10    V-: / 30.266/  179.11

THEV. R, X, X/R: POSITIVE  0.00347  0.02314    6.669        NEGATIVE  0.00379  0.02344    6.177        ZERO  0.00379  0.02918    7.698

                                                   T H R E E   P H A S E   F A U L T                    O N E   P H A S E   F A U L T
X--------- FROM ----------X AREA CKT  I/Z      /I+/    AN(I+)    /Z+/    AN(Z+)  APP X/R      /IA/    AN(IA)    /ZA/    AN(ZA)  APP X/R
                                                                                            /3I0/   AN(3I0)    /Z0/    AN(Z0)  APP X/R
   427 [5SPRING CITY161.00]  347 1  AMP/OHM  1447.2   -79.83     5.93    78.40    4.870    1285.4   -79.86    10.67    73.91    3.467
                                                                                           1194.0   -78.87    73.33   -97.53    7.567
  1007 [5WB UTIL COR161.00]  347 1  AMP/OHM     0.0     0.00     0.00     0.00    0.000     202.7   -88.99     1.32    74.05    3.500
                                                                                            608.1   -88.99   183.81   -90.00 9999.999
  1041 [5DAYTON TAP 161.00]  347 1  AMP/OHM  1294.4   -79.43    13.91    79.05    5.167    1034.9   -79.25    21.06    76.70    4.230
                                                                                            715.6   -76.84   112.58  -100.21    5.551
  1047 [5WBNP SS #1 161.00]  347 1  AMP/OHM     0.0     0.00     0.00     0.00    0.000     924.7   -87.31     4.91    75.01    3.735
                                                                                           2774.1   -87.31    35.80   -90.00 9999.999
  1051 [5WBNP SS#2  161.00]  347 1  AMP/OHM     0.0     0.00     0.00     0.00    0.000     963.1   -87.77     3.27    73.87    3.457
                                                                                           2889.2   -87.77    35.80   -90.00 9999.999
  1123 [5TEN MILE TP161.00]  347 1  AMP/OHM  3838.0   -79.85     3.21    78.70    5.004    3014.2   -78.87     4.47    77.33    4.447
                                                                                           1970.6   -73.68    48.18  -104.98    3.736
  1130 [5ST CLAIR TP161.00]  347 1  AMP/OHM  3358.1   -80.49     8.97    78.33    4.843    2528.0   -79.39    12.92    77.61    4.550
                                                                                           1398.7   -72.70    50.19  -105.39    3.632
  1138 [5PIKEVLLE TP161.00]  347 1  AMP/OHM  1441.2   -76.46    25.10    75.16    3.774    1076.9   -75.96    36.78    74.14    3.519
                                                                                            581.3   -71.54   103.88  -105.15    3.694
  1277 [5GOODFLD TP 161.00]  347 1  AMP/OHM  2992.4   -84.32     8.16    83.80    9.206    2201.5   -83.04    11.67    82.55    7.647
                                                                                           1097.7   -74.21    73.39  -104.61    3.835
  4482 [1WBHP H1    13.800]  347 1  AMP/OHM   349.5   -89.09     0.34    88.70   44.145     311.4   -88.13     2.69    39.11    0.813
                                                                                            326.2   -88.93     0.00     0.00    0.000
  4483 [1WBHP H2    13.800]  347 1  AMP/OHM   349.1   -89.09     0.34    88.71   44.384     311.0   -88.13     2.69    39.15    0.814
                                                                                            325.8   -88.93     0.00     0.00    0.000
  4484 [1WBHP H3    13.800]  347 1  AMP/OHM   349.4   -89.09     0.34    88.70   44.190     311.3   -88.13     2.69    39.12    0.813
                                                                                            326.0   -88.93     0.00     0.00    0.000
  4485 [1WBHP H4    13.800]  347 1  AMP/OHM   349.4   -89.09     0.34    88.70   44.113     311.3   -88.13     2.69    39.12    0.813
                                                                                            326.0   -88.93     0.00     0.00    0.000
  4486 [1WBHP H5    13.800]  347 1  AMP/OHM   349.3   -89.09     0.34    88.70   44.173     311.2   -88.13     2.69    39.13    0.814
                                                                                            325.9   -88.93     0.00     0.00    0.000
                                TOTAL  FAULT  CURRENT  (AMPS)  16089.8   -81.47                      14752.9   -81.70
```

500-kV fault current with WBH Units Offline

```
PSS/E  SHORT  CIRCUIT  OUTPUT                          MON, MAY 17 2010  10:52        HOME  BUS  IS  :

FA19L - 2019, 1.05 PU V, X"D SAT FAULT CASE W/07 SERC EXT.                            85 [8WBNP #1    500.00]
2013 EQUIV - SPECIAL STUDIES SECTION - [JWCS/BAM - 01/09]

        ***  FAULTED  BUS  IS :      85 [8WBNP #1    500.00]  ***                       0  LEVELS  AWAY

AT BUS     85 [8WBNP #1    500.00] AREA  347  (KV L-G) V+: /  0.000/    0.00     (KV L-G) VA: /  0.000/    0.00    V0: / 76.646/  179.26
                                                                                          V+: /190.091/   -0.37    V-: /113.448/  179.89

THEV. R, X, X/R: POSITIVE  0.00029  0.00488   16.886        NEGATIVE  0.00035  0.00489   13.882        ZERO  0.00027  0.00330   12.045

                                          T H R E E   P H A S E   F A U L T                O N E   P H A S E   F A U L T
X--------- FROM ----------X AREA CKT  I/Z      /I+/    AN(I+)    /Z+/    AN(Z+)  APP X/R      /IA/    AN(IA)    /ZA/    AN(ZA)  APP X/R
                                                                                            /3I0/   AN(3I0)    /Z0/    AN(Z0)  APP X/R
    81 [8SEQUOYAH NP500.00]  347 2  AMP/OHM   6560.5   -86.64    21.80    86.05   14.500     5564.7   -84.74    29.59    83.37    8.606
                                                                                             2050.5   -75.64    27.62   -95.12   11.167
    86 [8WBNP #2    500.00]  347 1  AMP/OHM  13426.9   -86.62     0.00     0.00    0.000    14828.1   -85.89     0.00     0.00    0.000
                                                                                            14443.8   -85.65    15.92   -95.09   11.230
    90 [8ROANE TN   500.00]  347 1  AMP/OHM   4810.6   -86.54    21.30    85.96   14.167     4097.8   -84.77    28.80    83.16    8.337
                                                                                             1542.5   -76.64    68.52   -99.51    5.971
  4022 [1WBNP N2    24.000]  347 1  AMP/OHM      0.0     0.00     0.00     0.00    0.000     3261.3   -90.13     0.00     0.00    0.000
                                                                                             9784.0   -90.13     0.00     0.00    0.000
             TOTAL  FAULT  CURRENT  (AMPS)  24798.0   -86.61                                 27741.1   -85.99

PSS/E  SHORT  CIRCUIT  OUTPUT                          MON, MAY 17 2010  10:52        HOME  BUS  IS  :

FA19L - 2019, 1.05 PU V, X"D SAT FAULT CASE W/07 SERC EXT.                            86 [8WBNP #2    500.00]
2013 EQUIV - SPECIAL STUDIES SECTION - [JWCS/BAM - 01/09]

        ***  FAULTED  BUS  IS :      86 [8WBNP #2    500.00]  ***                       0  LEVELS  AWAY

AT BUS     86 [8WBNP #2    500.00] AREA  347  (KV L-G) V+: /  0.000/    0.00     (KV L-G) VA: /  0.000/    0.00    V0: / 76.646/  179.26
                                                                                          V+: /190.091/   -0.37    V-: /113.448/  179.89

THEV. R, X, X/R: POSITIVE  0.00029  0.00488   16.886        NEGATIVE  0.00035  0.00489   13.882        ZERO  0.00027  0.00330   12.045

                                          T H R E E   P H A S E   F A U L T                O N E   P H A S E   F A U L T
X--------- FROM ----------X AREA CKT  I/Z      /I+/    AN(I+)    /Z+/    AN(Z+)  APP X/R      /IA/    AN(IA)    /ZA/    AN(ZA)  APP X/R
                                                                                            /3I0/   AN(3I0)    /Z0/    AN(Z0)  APP X/R
    81 [8SEQUOYAH NP500.00]  347 1  AMP/OHM   7319.9   -86.92    19.54    86.33   15.600     6265.7   -84.90    26.28    83.53    8.821
                                                                                             2462.4   -75.66    23.00   -95.10   11.214
    85 [8WBNP #1    500.00]  347 1  AMP/OHM  11371.1   -86.60     0.00     0.00    0.000    12913.1   -86.11     0.00     0.00    0.000
                                                                                            13297.9   -86.37    17.29   -94.37   13.075
    93 [8BULL RUN FP500.00]  347 1  AMP/OHM   3506.1   -86.33    30.83    85.82   13.667     3071.8   -84.49    42.42    82.12    7.228
                                                                                             1380.0   -77.43    59.71   -93.11   18.403
    97 [8VOLUNTEER  500.00]  347 1  AMP/OHM   2601.1   -86.18    50.37    86.02   14.357     2240.7   -84.43    69.01    82.82    7.940
                                                                                              909.5   -76.82    66.73   -91.67   34.215
  4021 [1WBNP N1    24.000]  347 1  AMP/OHM      0.0     0.00     0.00     0.00    0.000     3261.3   -90.13     0.00     0.00    0.000
                                                                                             9784.0   -90.13     0.00     0.00    0.000
             TOTAL  FAULT  CURRENT  (AMPS)  24798.0   -86.61                                 27741.1   -85.99
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500-kV fault current with WBH Units Online

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PSS/E  SHORT  CIRCUIT  OUTPUT                          MON, MAY 17 2010  10:54        HOME  BUS  IS  :

FA19L - 2019, 1.05 PU V, X"D SAT FAULT CASE W/07 SERC EXT.                          85 [8WBNP #1    500.00]
2013 EQUIV - SPECIAL STUDIES SECTION - [JWCS/BAM - 01/09]

        ***  FAULTED  BUS  IS :      85 [8WBNP #1    500.00]  ***                     0  LEVELS  AWAY

AT BUS     85 [8WBNP #1    500.00] AREA  347  (KV L-G) V+: /  0.000/    0.00     (KV L-G) VA: /  0.000/    0.00    V0: / 92.735/  179.24
                                                                                          V+: /198.156/   -0.68    V-: /105.421/  179.39

THEV. R, X, X/R: POSITIVE  0.00018  0.00375   21.240        NEGATIVE  0.00030  0.00376   12.452        ZERO  0.00027  0.00330   12.045

                                          T H R E E   P H A S E   F A U L T                O N E   P H A S E   F A U L T
X--------- FROM ----------X AREA CKT  I/Z      /I+/    AN(I+)    /Z+/    AN(Z+)  APP X/R      /IA/    AN(IA)    /ZA/    AN(ZA)  APP X/R
                                                                                            /3I0/   AN(3I0)    /Z0/    AN(Z0)  APP X/R
    81 [8SEQUOYAH NP500.00]  347 2  AMP/OHM   6560.5   -86.64    21.80    86.05   14.500     5359.7   -84.35    31.59    82.77    7.880
                                                                                             2480.9   -75.66    27.62   -95.12   11.167
    86 [8WBNP #2    500.00]  347 1  AMP/OHM  17177.5   -87.27     0.00     0.00    0.000    17725.4   -85.91     0.00     0.00    0.000
                                                                                            17475.7   -85.68    15.92   -95.09   11.230
    90 [8ROANE TN   500.00]  347 1  AMP/OHM   4810.6   -86.54    21.30    85.96   14.167     3950.1   -84.41    30.71    82.55    7.642
                                                                                             1866.3   -76.66    68.52   -99.51    5.971
  4022 [1WBNP N2    24.000]  347 1  AMP/OHM   3754.6   -89.60     0.05    89.39   94.000     6540.0   -88.66     0.21    37.37    0.764
                                                                                            11837.8   -90.15     0.00     0.00    0.000
             TOTAL  FAULT  CURRENT  (AMPS)  32299.3   -87.30                               33564.4   -86.02
```

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PSS/E  SHORT  CIRCUIT  OUTPUT                          MON, MAY 17 2010  10:54        HOME  BUS  IS  :

FA19L - 2019, 1.05 PU V, X"D SAT FAULT CASE W/07 SERC EXT.                          86 [8WBNP #2    500.00]
2013 EQUIV - SPECIAL STUDIES SECTION - [JWCS/BAM - 01/09]

        ***  FAULTED  BUS  IS :      86 [8WBNP #2    500.00]  ***                     0  LEVELS  AWAY

AT BUS     86 [8WBNP #2    500.00] AREA  347  (KV L-G) V+: /  0.000/    0.00     (KV L-G) VA: /  0.000/    0.00    V0: / 92.735/  179.24
                                                                                          V+: /198.156/   -0.68    V-: /105.421/  179.39

THEV. R, X, X/R: POSITIVE  0.00018  0.00375   21.240        NEGATIVE  0.00030  0.00376   12.452        ZERO  0.00027  0.00330   12.045

                                          T H R E E   P H A S E   F A U L T                O N E   P H A S E   F A U L T
X--------- FROM ----------X AREA CKT  I/Z      /I+/    AN(I+)    /Z+/    AN(Z+)  APP X/R      /IA/    AN(IA)    /ZA/    AN(ZA)  APP X/R
                                                                                            /3I0/   AN(3I0)    /Z0/    AN(Z0)  APP X/R
    81 [8SEQUOYAH NP500.00]  347 1  AMP/OHM   7319.9   -86.92    19.54    86.33   15.600     6049.0   -84.48    27.99    82.90    8.031
                                                                                             2979.3   -75.68    23.00   -95.10   11.214
    85 [8WBNP #1    500.00]  347 1  AMP/OHM  15121.8   -87.34     0.00     0.00    0.000    15839.1   -86.14     0.00     0.00    0.000
                                                                                            16089.3   -86.39    17.29   -94.37   13.075
    93 [8BULL RUN FP500.00]  347 1  AMP/OHM   3506.1   -86.33    30.83    85.82   13.667     2982.2   -84.12    45.28    81.38    6.594
                                                                                             1669.7   -77.46    59.71   -93.11   18.403
    97 [8VOLUNTEER  500.00]  347 1  AMP/OHM   2601.1   -86.18    50.37    86.02   14.357     2166.2   -84.06    73.70    82.15    7.252
                                                                                             1100.4   -76.84    66.73   -91.67   34.215
  4021 [1WBNP N1    24.000]  347 1  AMP/OHM   3754.6   -89.60     0.05    89.39   94.000     6540.0   -88.66     0.21    37.37    0.764
                                                                                            11837.8   -90.15     0.00     0.00    0.000
             TOTAL  FAULT  CURRENT  (AMPS)  32299.3   -87.30                               33564.4   -86.02
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Appendix II
161kv Results

161kV Summer 2010 Results

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
CSSM A-D - WBH 2-2 - 1	160.46	167.36	157.47	166.34	2.99	166.34	154.88	166.47	5.58	0.89
GMID 3 - WBH 2-2 - 1	165.79	162.49	163.12	161.33	2.66	161.33	161.13	161.34	4.66	1.16
GMID 3 - WBH 1-3 - 1	165.79	162.49	163.12	161.33	2.66	161.33	161.13	161.34	4.66	1.16
5SEQUOYAH NP - 5GOODFLD TP - 1	163.38	163.60	160.79	161.22	2.59	161.22	158.98	159.65	4.41	3.95
5HARRIMAN TP - 5ROCKWOOD TN - 1	161.90	162.12	159.34	159.77	2.56	159.77	157.53	158.21	4.37	3.90
5ROCKWOOD TP - 5HARRIMAN TP - 1	161.97	162.18	159.41	159.84	2.56	159.84	157.60	158.28	4.37	3.90
5SEQUOYAH NP - 1SEQUOYAH N2 - 1	163.73	163.94	160.67	161.10	3.06	161.10	159.38	160.05	4.35	3.90
5GOODFLD TP - WBH 1-1 - 1	163.88	164.09	161.38	161.80	2.50	161.80	159.62	160.28	4.26	3.80
5ATHENS TN - 5TEN MILE TP - 1	164.14	164.35	161.69	162.11	2.45	162.11	159.89	160.55	4.25	3.79
5TEN MILE TP - WBH 1-1 - 1	165.04	165.25	162.62	163.04	2.42	163.04	160.88	161.54	4.16	3.71
5ROCKWOOD TN - 5BURKEMILLRD - 1	163.30	163.51	160.91	161.34	2.38	161.34	159.16	159.83	4.13	3.67
5BURKEMILLRD - 5ST CLAIR TP - 1	163.53	163.74	161.15	161.58	2.37	161.58	159.42	160.09	4.10	3.65
8SEQUOYAH NP - 1SEQUOYAH N1 - 1	163.86	164.07	161.05	161.47	2.81	161.47	159.76	160.42	4.10	3.64
5ST CLAIR TP - WBH 2-4 - 1	163.65	163.86	161.29	161.71	2.37	161.71	159.57	160.24	4.08	3.63
5WINCHESTER - 5PELHAM TN - 1	162.44	162.66	160.04	160.47	2.40	160.47	158.45	159.13	3.99	3.53
5COALMONT TN - 5PELHAM TN - 1	162.83	163.04	160.48	160.91	2.35	160.91	158.92	159.59	3.90	3.45
5BULL RUN FP - 1BULLRUN F1H - 1	164.03	164.24	161.44	161.86	2.59	161.86	160.14	160.80	3.89	3.44
5CHARLESTON - 5LAMONTVL RD - 1	163.54	163.75	161.15	161.58	2.38	161.58	159.70	160.37	3.84	3.38
5LAMONTVL RD - 5SANFORD TAP - 1	163.58	163.79	161.21	161.63	2.37	161.63	159.75	160.42	3.83	3.37
5ATHNS NIP T - 5SANFORD TAP - 1	163.58	163.79	161.21	161.64	2.37	161.64	159.76	160.43	3.82	3.36
5BULL RUN FP - 1BULLRUN F1L - 1	164.03	164.24	161.54	161.96	2.49	161.96	160.24	160.90	3.79	3.34
5ATHENS TN - 5ATHNS NIP T - 1	163.71	163.92	161.38	161.80	2.34	161.80	159.93	160.60	3.78	3.32
8WBNP #2 - 8VOLUNTEER - 1	163.96	164.18	161.50	161.92	2.47	161.92	160.20	160.86	3.77	3.32
5KINGST U5-6 - 1KINGSTON F5 - 1	163.82	164.03	161.37	161.80	2.44	161.80	160.06	160.73	3.75	3.30
5KINGST U5-6 - 1KINGSTON F6 - 1	163.82	164.03	161.38	161.80	2.44	161.80	160.07	160.73	3.75	3.30
5ROANE TN - 5ROCKWOOD TP - 1	164.06	164.27	161.76	162.18	2.30	162.18	160.33	161.00	3.73	3.27
5CENTER HILL - 5SMITHVLE TN - 1	163.19	163.41	160.86	161.28	2.34	161.28	159.48	160.14	3.72	3.26
5COALMONT TN - 5SMITHMTN TN - 1	163.70	163.92	161.48	161.91	2.22	161.91	159.99	160.66	3.71	3.26
8WID CRK FP - 8SEQUOYAH NP - 1	163.96	164.17	161.51	161.94	2.44	161.94	160.24	160.91	3.71	3.26
8CUMBERLAND - 8DAVIDSON TN - 1	163.86	164.07	161.48	161.91	2.37	161.91	160.18	160.85	3.67	3.22
5ROCKWOOD TP - 5KINGST U5-6 - 1	163.55	163.77	161.23	161.66	2.32	161.66	159.91	160.58	3.64	3.19
5DAYTON TAP - 5SKYLINE TN - 1	164.04	164.25	161.84	162.27	2.20	162.27	160.42	161.08	3.63	3.18
5SMITHMTN TN - 5SKYLINE TN - 1	164.11	164.33	161.92	162.34	2.20	162.34	160.49	161.15	3.63	3.18

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5MURFREESBRO - 5MURF INDPKT - 1	163.14	163.35	160.91	161.34	2.23	161.34	159.53	160.20	3.61	3.16
5WCOOKEVL TN - 5DOUBLE SPRG - 1	163.70	163.91	161.43	161.86	2.26	161.86	160.11	160.77	3.59	3.14
8BR FERRY NP - 1BR FERRY N1 - 1	163.90	164.11	161.60	162.03	2.29	162.03	160.31	160.97	3.59	3.14
8CUMBERLAND - 8MONTGOMERY - 1	163.91	164.12	161.62	162.05	2.29	162.05	160.33	160.99	3.59	3.14
8WILSON TN - 8ROANE TN - 1	163.95	164.16	161.65	162.08	2.30	162.08	160.37	161.03	3.59	3.13
8WBNP #2 - 8BULL RUN FP - 1	163.96	164.17	161.68	162.11	2.28	162.11	160.38	161.04	3.58	3.13
5WCOOKEVL TN - 5N LEBANON T - 1	163.72	163.93	161.47	161.89	2.25	161.89	160.14	160.81	3.57	3.12
8MARSHALL KY - 8CUMBERLAND - 1	163.95	164.17	161.68	162.11	2.27	162.11	160.39	161.05	3.56	3.11
5KINGST U7-9 - 5LOUDOUN TN - 1	163.81	164.02	161.57	161.99	2.25	161.99	160.25	160.91	3.56	3.11
5GALLATIN F2 - 5GALLATIN5-8 - 1	163.94	164.15	161.67	162.10	2.27	162.10	160.38	161.04	3.56	3.11
8BR FERRY NP - 1BR FERRY N2 - 1	163.91	164.12	161.64	162.07	2.27	162.07	160.35	161.01	3.56	3.11
5SMITHVLE TN - 5GREAT FALLS - 1	163.80	164.02	161.60	162.02	2.20	162.02	160.25	160.91	3.56	3.11
8DAVIDSON TN - 8MAURY TN - 1	163.84	164.05	161.58	162.00	2.26	162.00	160.28	160.94	3.56	3.11
8WBNP #1 - 8ROANE TN - 1	163.96	164.17	161.70	162.13	2.25	162.13	160.40	161.06	3.56	3.10
8BR FERRY NP - 1BR FERRY N3 - 1	163.91	164.12	161.65	162.08	2.26	162.08	160.36	161.02	3.55	3.10
CAPS - WBH 2-2 - 1	161.52	161.73	159.30	159.73	2.22	159.73	157.97	158.65	3.55	3.08
5GREAT FALLS - 5SPRING CITY - 1	163.79	164.00	161.65	162.08	2.14	162.08	160.26	160.92	3.54	3.08
8WID CRK FP - 8RACCOON MTN - 1	163.94	164.15	161.70	162.12	2.24	162.12	160.41	161.07	3.53	3.08
5GREAT FALLS - 5PIKEVLLE TP - 1	163.75	163.96	161.62	162.04	2.13	162.04	160.22	160.89	3.53	3.07
5ROANE TN - 5W OAK RIDGT - 1	163.84	164.05	161.62	162.04	2.22	162.04	160.31	160.98	3.53	3.07
8JVILLE FP - 8DAVIDSON TN - 1	163.92	164.13	161.71	162.13	2.21	162.13	160.41	161.07	3.51	3.06
5J SEVIER #1 - 1J SEVIER F4 - 1	163.98	164.19	161.76	162.19	2.21	162.19	160.47	161.13	3.51	3.06
5J SEVIER #1 - 1J SEVIER F3 - 1	163.98	164.19	161.76	162.19	2.21	162.19	160.47	161.13	3.51	3.06
5WCOOKEVL TN - 5S COOKEVLLE - 1	163.96	164.17	161.78	162.20	2.18	162.20	160.46	161.12	3.50	3.05
8RACCOON MTN - 5RACCOON MT2 - 1	163.94	164.16	161.73	162.16	2.21	162.16	160.44	161.11	3.50	3.05
8MAURY TN - 8BR FERRY NP - 1	163.85	164.06	161.65	162.07	2.20	162.07	160.35	161.01	3.50	3.05
5DAYTON TAP - WBH 2-4 - 1	165.09	165.30	162.93	163.35	2.16	163.35	161.60	162.25	3.50	3.05
5FT LOUDOUN - 2FT LOUDOUN - 1	163.99	164.21	161.80	162.22	2.20	162.22	160.50	161.16	3.49	3.04
5SPRING CITY - WBH 1-3 - 1	164.22	164.43	162.09	162.51	2.13	162.51	160.72	161.39	3.49	3.04
5PIKEVLLE TP - WBH 2-2 - 1	163.92	164.13	161.80	162.22	2.12	162.22	160.43	161.09	3.49	3.04
5KINGST U7-9 - 1KINGSTON F9 - 1	164.05	164.26	161.84	162.26	2.21	162.26	160.55	161.22	3.49	3.04
8DAVIDSON TN - 8PIN HOOK TN - 1	164.00	164.21	161.81	162.23	2.19	162.23	160.51	161.18	3.49	3.04
5RACCOON MT1 - 1RACCOON P4 - 1	163.93	164.14	161.74	162.16	2.19	162.16	160.44	161.10	3.49	3.04
8MONTGOMERY - 8WILSON TN - 1	163.96	164.17	161.77	162.19	2.19	162.19	160.47	161.14	3.48	3.03

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5KINGST U7-9 - 1KINGSTON F8 - 1	164.04	164.25	161.84	162.26	2.20	162.26	160.56	161.22	3.48	3.03
5KINGST U7-9 - 1KINGSTON F7 - 1	164.04	164.25	161.84	162.26	2.20	162.26	160.56	161.22	3.48	3.03
5RACCOON MT1 - 1RACCOON P3 - 1	163.93	164.14	161.75	162.17	2.19	162.17	160.45	161.11	3.48	3.03
5N TULLA T#2 - 5BOYNTON TAP - 1	163.82	164.03	161.70	162.12	2.12	162.12	160.34	161.01	3.48	3.03
5WARTRACE TN - 5N TULLA T#2 - 1	163.84	164.05	161.72	162.14	2.12	162.14	160.36	161.02	3.48	3.03
5J SEVIER #2 - 1J SEVIER F1 - 1	163.98	164.20	161.80	162.22	2.18	162.22	160.51	161.17	3.48	3.03
5J SEVIER #2 - 1J SEVIER F2 - 1	163.98	164.20	161.80	162.22	2.18	162.22	160.51	161.17	3.48	3.03
5CORDELL HP - 5GALLATIN F2 - 1	163.91	164.12	161.75	162.17	2.16	162.17	160.43	161.09	3.48	3.03
5MANCHESTER - 5BOYNTON TAP - 1	163.76	163.97	161.64	162.06	2.12	162.06	160.28	160.95	3.47	3.02
8SHELBY TN - 8SANSOUC - 1	163.96	164.17	161.78	162.21	2.18	162.21	160.49	161.15	3.47	3.02
5LOUDOUN TN - 5N SWEETWATR - 1	163.38	163.60	161.27	161.70	2.11	161.70	159.92	160.58	3.47	3.02
8MAURY TN - 8FRANKLIN TN - 1	163.89	164.10	161.71	162.13	2.18	162.13	160.42	161.09	3.47	3.02
5MANCHESTER - 5RED HILL TP - 1	163.62	163.83	161.50	161.92	2.12	161.92	160.16	160.82	3.46	3.01
8DAVIDSON TN - 5DAVIDSON #2 - 1	163.94	164.15	161.77	162.20	2.16	162.20	160.48	161.14	3.46	3.01
8SEQUOYAH NP - 8WBNP #1 - 2	163.91	164.12	161.74	162.17	2.17	162.17	160.45	161.11	3.46	3.01
5WOODBURY TN - 5MURF INDPKT - 1	163.74	163.95	161.63	162.05	2.11	162.05	160.28	160.94	3.46	3.01
5GALLATIN F2 - 1GALLATIN F3 - 1	163.95	164.16	161.79	162.21	2.16	162.21	160.49	161.15	3.46	3.01
5GALLATIN F2 - 1GALLATIN F4 - 1	163.95	164.16	161.79	162.21	2.16	162.21	160.49	161.15	3.46	3.01
5FT LOUDOUN - 5KIMB CL TNT - 1	163.94	164.15	161.80	162.22	2.14	162.22	160.48	161.14	3.46	3.01
5NORRIS HP - 1NORRIS H2 - 1	163.97	164.18	161.81	162.24	2.16	162.24	160.52	161.18	3.45	3.00
5NORRIS HP - 1NORRIS H1 - 1	163.97	164.18	161.81	162.24	2.16	162.24	160.52	161.18	3.45	3.00
5CORDELL HP - 5BAXTER TN - 1	164.05	164.26	161.91	162.34	2.14	162.34	160.60	161.27	3.45	3.00
5MONTGOMRY#2 - 5KIRKWOOD TP - 1	163.97	164.18	161.81	162.23	2.15	162.23	160.52	161.18	3.45	3.00
5SWEETWATER - 5N SWEETWATR - 1	163.65	163.87	161.56	161.98	2.10	161.98	160.21	160.87	3.45	2.99
5GALLATIN F1 - 5HARTSVLE TP - 1	163.96	164.17	161.81	162.23	2.16	162.23	160.52	161.18	3.45	3.00
5KINGST U1-4 - 5BEAR CRK TN - 1	163.93	164.14	161.78	162.20	2.15	162.20	160.48	161.14	3.44	2.99
8DAVIDSON TN - 5DAVIDSON #1 - 1	163.94	164.15	161.79	162.21	2.15	162.21	160.49	161.15	3.44	2.99
5GALLATIN F2 - 5N LEBANON T - 1	164.03	164.24	161.90	162.32	2.13	162.32	160.59	161.25	3.44	2.99
5BLAIR RD TP - 5W OAK RIDGT - 1	163.86	164.07	161.72	162.14	2.14	162.14	160.42	161.08	3.44	2.99
5BEAR CRK TN - 5MANIS RD TN - 1	163.93	164.14	161.79	162.21	2.14	162.21	160.49	161.15	3.44	2.99
5KINGST U1-4 - 5EATON XRD - 1	163.92	164.14	161.78	162.21	2.14	162.21	160.49	161.15	3.44	2.99
8VALLEYVIEW - 1COGCALED T1 - 1	163.97	164.18	161.82	162.24	2.15	162.24	160.53	161.19	3.44	2.99
8VALLEYVIEW - 1COGCALED T2 - 1	163.97	164.18	161.82	162.24	2.15	162.24	160.53	161.19	3.44	2.99
8VALLEYVIEW - 1COGCALED T3 - 1	163.97	164.18	161.82	162.24	2.15	162.24	160.53	161.19	3.44	2.99

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
8FRANKLIN TN - 5FRANKLIN TN - 1	163.28	163.49	161.21	161.63	2.07	161.63	159.84	160.50	3.44	2.98
5LAFAYETT TN - 5HARTSVLE TP - 1	163.97	164.18	161.82	162.24	2.15	162.24	160.53	161.19	3.44	2.99
5KINGST U1-4 - 5ORNL TN - 1	163.93	164.14	161.79	162.21	2.14	162.21	160.50	161.16	3.43	2.98
8PHIPPS B NP - 8POCKETN - 1	163.99	164.21	161.85	162.27	2.15	162.27	160.56	161.22	3.43	2.98
5KINGST U1-4 - 1KINGSTON F1 - 1	164.04	164.25	161.89	162.32	2.15	162.32	160.61	161.27	3.43	2.98
5NORTH COWAN - 5BEAULEU ALT - 1	163.79	164.01	161.66	162.09	2.13	162.09	160.36	161.03	3.43	2.98
5DOUBLE SPRG - 5BAXTER TN - 1	164.21	164.42	162.08	162.50	2.13	162.50	160.77	161.43	3.43	2.98
5FT LOUDOUN - 5MANIS RD TN - 1	163.93	164.15	161.80	162.22	2.13	162.22	160.50	161.17	3.43	2.98
8VOLUNTEER - 8PHIPPS B NP - 1	163.99	164.20	161.83	162.26	2.15	162.26	160.56	161.22	3.43	2.98
5COLBERT FP - 1COLBERT F4 - 1	163.97	164.18	161.83	162.25	2.14	162.25	160.54	161.20	3.43	2.98
5COLBERT FP - 1COLBERT F1 - 1	163.97	164.18	161.83	162.25	2.14	162.25	160.54	161.20	3.43	2.98
5COLBERT FP - 1COLBERT F2 - 1	163.97	164.18	161.83	162.25	2.14	162.25	160.54	161.20	3.43	2.98
5COLBERT FP - 1COLBERT F3 - 1	163.97	164.18	161.83	162.25	2.14	162.25	160.54	161.20	3.43	2.98
5DAVIDSON #2 - 5DAVIDSON RD - 1	163.96	164.17	161.83	162.25	2.13	162.25	160.54	161.20	3.43	2.98
5ATHENS TN - 5SWEETWATER - 1	164.09	164.31	162.00	162.42	2.10	162.42	160.67	161.33	3.43	2.98
5HUNTSVL TN - 5JAMESTWN TN - 1	163.71	163.92	161.61	162.03	2.10	162.03	160.28	160.94	3.43	2.98
5KINGST U1-4 - 1KINGSTON F4 - 1	164.04	164.25	161.89	162.32	2.14	162.32	160.61	161.27	3.43	2.98
5WOODBURY TN - 5GREAT FALLS - 1	163.86	164.08	161.77	162.19	2.10	162.19	160.44	161.10	3.43	2.97
5MONTGOMRY#2 - 5BARKERSMILL - 1	163.98	164.19	161.84	162.26	2.14	162.26	160.55	161.21	3.42	2.97
5NISSAN DECH - 5NORTH COWAN - 1	163.82	164.03	161.70	162.12	2.13	162.12	160.40	161.06	3.42	2.97
5KINGST U1-4 - 1KINGSTON F3 - 1	164.04	164.25	161.90	162.32	2.14	162.32	160.61	161.27	3.42	2.97
5WID CRK FP1 - 5BEAULEU ALT - 1	163.83	164.04	161.70	162.12	2.13	162.12	160.40	161.07	3.42	2.97
5KINGST U1-4 - 1KINGSTON F2 - 1	164.04	164.25	161.90	162.32	2.14	162.32	160.61	161.28	3.42	2.97
5CENTER HILL - 1CENTHILL H2 - 1	164.00	164.21	161.88	162.30	2.12	162.30	160.57	161.24	3.42	2.97
5SEQUOYAH NP - 5HARRISNB TP - 1	163.79	164.00	161.68	162.10	2.11	162.10	160.37	161.03	3.42	2.97
5CENTER HILL - 1CENTHILL H1 - 1	164.00	164.21	161.88	162.30	2.12	162.30	160.57	161.24	3.42	2.97
5CENTER HILL - 1CENTHILL H3 - 1	164.00	164.21	161.88	162.30	2.12	162.30	160.57	161.24	3.42	2.97
5EDGOTEN TN - 5BARKERSMILL - 1	163.98	164.19	161.85	162.27	2.13	162.27	160.56	161.22	3.42	2.97
5GALLATIN F2 - 5WGALLATIN T - 1	163.97	164.18	161.84	162.26	2.13	162.26	160.55	161.21	3.42	2.97
5PIN HOOK TN - 8PIN HOOK TN - 1	163.78	163.99	161.67	162.09	2.11	162.09	160.36	161.03	3.42	2.97
5E CLEVELAND - 5HIWASSEE RI - 1	164.09	164.30	161.97	162.40	2.11	162.40	160.67	161.33	3.42	2.97
5WID CRK FP1 - 1WID CRK F3 - 1	163.96	164.18	161.83	162.26	2.13	162.26	160.55	161.21	3.42	2.97
5WID CRK FP1 - 1WID CRK F4 - 1	163.96	164.18	161.83	162.26	2.13	162.26	160.55	161.21	3.42	2.97
5CHARLESTON - 5HIWASSEE RI - 1	164.12	164.33	162.01	162.43	2.11	162.43	160.71	161.37	3.42	2.97

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
8JVILLE FP - 8CUMBERLAND - 1	163.96	164.17	161.83	162.26	2.13	162.26	160.54	161.21	3.42	2.97
5N NASHVILLE - 5GOODLETTSVL - 1	163.99	164.21	161.87	162.29	2.13	162.29	160.58	161.24	3.42	2.97
5E BOWLGREEN - 5ABERD KY TP - 1	163.98	164.19	161.85	162.27	2.13	162.27	160.56	161.22	3.42	2.97
5WID CRK FP2 - 1WID CRK F6 - 1	163.97	164.18	161.84	162.27	2.13	162.27	160.56	161.22	3.41	2.96
4NBRISTOL VA - 05WOLFH2 - 1	163.99	164.20	161.86	162.28	2.13	162.28	160.57	161.23	3.41	2.96
5E GALLATIN - 5HOEGANAES T - 1	163.99	164.20	161.86	162.28	2.13	162.28	160.57	161.23	3.41	2.96
5GALLATN PRI - 5HOEGANAES T - 1	163.99	164.20	161.86	162.28	2.13	162.28	160.57	161.23	3.41	2.96
8RUTHERFORD - 8MAURY TN - 1	163.91	164.12	161.80	162.22	2.11	162.22	160.50	161.16	3.41	2.96
5PARADISE FP - 5BOWLING GRN - 1	163.97	164.18	161.85	162.27	2.12	162.27	160.56	161.22	3.41	2.96
8MONTGOMERY - 8DAVIDSON TN - 1	163.95	164.16	161.83	162.25	2.12	162.25	160.54	161.20	3.41	2.96
5GALLATIN F2 - 5CAIRO BEND - 1	163.95	164.16	161.82	162.24	2.12	162.24	160.53	161.19	3.41	2.96
8GLEASON CT - 1GLEASON T3 - 1	163.97	164.18	161.85	162.27	2.12	162.27	160.56	161.22	3.41	2.96
8RUTHERFORD - 5RUTHERFORD - 1	163.79	164.00	161.68	162.11	2.11	162.11	160.38	161.04	3.41	2.96
5GALLATN PRI - 5GALLATIN F2 - 1	163.97	164.18	161.85	162.27	2.12	162.27	160.56	161.22	3.41	2.96
5RACCOON MT2 - 1RACCOON P1 - 1	163.97	164.18	161.84	162.27	2.13	162.27	160.56	161.22	3.41	2.96
5WID CRK FP1 - 1WID CRK F1 - 1	163.97	164.18	161.84	162.27	2.12	162.27	160.56	161.22	3.41	2.96
5WID CRK FP1 - 1WID CRK F2 - 1	163.97	164.18	161.84	162.27	2.12	162.27	160.56	161.22	3.41	2.96
5RACCOON MT2 - 1RACCOON P2 - 1	163.97	164.18	161.84	162.27	2.13	162.27	160.56	161.22	3.41	2.96
5PARADISE FP - 5ABERD KY TP - 1	163.97	164.18	161.85	162.27	2.12	162.27	160.56	161.22	3.41	2.96
5HARRISNB TP - 5HOPEWELL TN - 1	163.83	164.04	161.73	162.15	2.10	162.15	160.42	161.08	3.41	2.96
5HIWASSEE HP - 1HIWASSEE H2 - 1	163.98	164.20	161.86	162.28	2.12	162.28	160.57	161.23	3.41	2.96
6WID CRK FP - 6CRAWFISH CR - 1	163.97	164.18	161.85	162.27	2.12	162.27	160.56	161.22	3.41	2.96
8VALLEYVIEW - 1COGCALED S2 - 1	163.97	164.18	161.85	162.27	2.12	162.27	160.56	161.22	3.41	2.96
5WID CRK FP2 - 1WID CRK F5 - 1	163.97	164.18	161.85	162.27	2.12	162.27	160.56	161.22	3.41	2.96
5HIWASSEE HP - 1HIWASSEE H1 - 1	163.98	164.20	161.86	162.29	2.12	162.29	160.58	161.24	3.41	2.96
8SULLIVAN TN - 05NAGEL - 1	163.98	164.19	161.86	162.29	2.12	162.29	160.58	161.24	3.41	2.96
8LAG CRK CT - 1LAG CRK CT1 - 1	163.97	164.18	161.85	162.28	2.12	162.28	160.56	161.23	3.41	2.96
8LAG CRK CT - 1LAG CRK CT2 - 1	163.97	164.18	161.85	162.28	2.12	162.28	160.56	161.23	3.41	2.96
5REDHILLS MS - 1REDHILLS F1 - 1	163.97	164.18	161.85	162.27	2.12	162.27	160.56	161.22	3.41	2.96
5J SEVIER #1 - 5MOORESBG TP - 1	163.98	164.20	161.86	162.29	2.12	162.29	160.58	161.24	3.41	2.96
8VALLEYVIEW - 1COGCALED S1 - 1	163.97	164.18	161.85	162.28	2.12	162.28	160.57	161.23	3.41	2.96
5FT LOUDOUN - 5EATON XRD - 1	163.95	164.16	161.84	162.26	2.11	162.26	160.54	161.20	3.41	2.96
5W SPARTA TN - 5GREAT FALLS - 1	164.15	164.36	162.04	162.46	2.11	162.46	160.74	161.40	3.41	2.96
5BULL RUN FP - 5KARNS TN - 1	163.97	164.18	161.86	162.28	2.11	162.28	160.56	161.23	3.41	2.96

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5EDGOTEN TN - 5COMMERCE PK - 1	163.99	164.21	161.88	162.30	2.12	162.30	160.59	161.25	3.41	2.96
5HARRIMAN TN - 5BLAIR RD TP - 1	163.90	164.11	161.78	162.21	2.12	162.21	160.49	161.15	3.41	2.96
5WHEELER HP - 1WHEELRH9-11 - 1	163.97	164.19	161.86	162.28	2.12	162.28	160.57	161.23	3.41	2.96
5MORRISON TN - 5RED HILL TP - 1	163.86	164.07	161.78	162.20	2.08	162.20	160.46	161.12	3.41	2.96
5WINCHESTER - 5WINCH REACT - 1	163.94	164.15	161.82	162.25	2.11	162.25	160.53	161.19	3.41	2.95
5NISSAN DECH - 5WINCH REACT - 1	163.94	164.15	161.82	162.25	2.11	162.25	160.53	161.19	3.41	2.96
8VALLEYVIEW - 1COGCALED S3 - 1	163.97	164.18	161.86	162.28	2.12	162.28	160.57	161.23	3.41	2.96
8SHAWNEE FP - 8MARSHALL KY - 1	163.98	164.19	161.86	162.28	2.12	162.28	160.57	161.24	3.40	2.95
5STOCKCRK TN - 5CHANDLER TN - 1	163.96	164.17	161.84	162.26	2.12	162.26	160.55	161.21	3.40	2.95
8SEQUOYAH NP - 8WBNP #2 - 1	163.89	164.11	161.78	162.21	2.11	162.21	160.49	161.15	3.40	2.95
5WGALLATIN T - 5STATION CMP - 1	163.98	164.19	161.86	162.28	2.12	162.28	160.57	161.23	3.40	2.95
5WID CRK FP1 - 1WID CRK F7H - 1	163.96	164.17	161.84	162.27	2.12	162.27	160.55	161.22	3.40	2.95
5WID CRK FP1 - 1WID CRK F7L - 1	163.96	164.17	161.84	162.27	2.12	162.27	160.55	161.22	3.40	2.95
5DEKALB MS - 5KEMPER CT - 1	163.97	164.18	161.86	162.28	2.12	162.28	160.57	161.23	3.40	2.95
8PHIPPS B NP - 8SULLIVAN TN - 1	163.98	164.20	161.87	162.29	2.12	162.29	160.58	161.24	3.40	2.95
5MCMINNVILLE - 5E MCMINN TP - 1	163.90	164.11	161.80	162.22	2.10	162.22	160.50	161.16	3.40	2.95
5OCANA TN TP - 5STATION CMP - 1	163.98	164.19	161.86	162.28	2.11	162.28	160.57	161.24	3.40	2.95
8WID CRK FP - 5WID CRK FP2 - 1	163.98	164.19	161.86	162.29	2.11	162.29	160.58	161.24	3.40	2.95
6CRAWFISH CR - 6CLOUDLANDGA - 1	163.97	164.19	161.86	162.28	2.11	162.28	160.57	161.23	3.40	2.95
5PARADISE FP - 1PARADIS F2H - 1	163.97	164.19	161.86	162.28	2.11	162.28	160.57	161.23	3.40	2.95
5CAIRO BEND - 5EASTGATE TN - 1	163.96	164.17	161.84	162.27	2.11	162.27	160.56	161.22	3.40	2.95
5MORRISON TN - 5BRIDGSTONE - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.59	161.25	3.40	2.95
5WID CRK FP2 - 1WID CRK F8A - 1	163.97	164.18	161.86	162.28	2.11	162.28	160.57	161.23	3.40	2.95
5WID CRK FP2 - 1WID CRK F8B - 1	163.97	164.18	161.86	162.28	2.11	162.28	160.57	161.23	3.40	2.95
5PARADISE FP - 5LOSTCITY KY - 1	163.97	164.18	161.86	162.28	2.11	162.28	160.57	161.23	3.40	2.95
6KENSNGTN GA - 6CLOUDLANDGA - 1	163.97	164.19	161.86	162.29	2.11	162.29	160.58	161.24	3.40	2.95
5NIXON RD TN - 5STOCKCRK TN - 1	163.96	164.17	161.85	162.27	2.11	162.27	160.56	161.22	3.40	2.95
5COSBY TN - 5WALTERS - 1	163.99	164.20	161.87	162.30	2.12	162.30	160.59	161.25	3.40	2.95
5PARADISE FP - 1PARADIS F1H - 1	163.98	164.19	161.87	162.29	2.11	162.29	160.58	161.24	3.40	2.95
5PARADISE FP - 1PARADIS F2L - 1	163.98	164.19	161.87	162.29	2.11	162.29	160.58	161.24	3.40	2.95
8SHELBY TN - 8CORDOVA TN - 1	163.97	164.18	161.86	162.29	2.11	162.29	160.58	161.24	3.40	2.95
5MCMINNVILLE - 5BRIDGSTONE - 1	163.85	164.06	161.77	162.19	2.08	162.19	160.45	161.11	3.40	2.95
5S NASHVILLE - 5EASTGATE TN - 1	163.96	164.17	161.85	162.28	2.11	162.28	160.57	161.23	3.40	2.95
5BETHEL RD - 5GOODLETTSVL - 1	163.98	164.19	161.87	162.30	2.11	162.30	160.59	161.25	3.40	2.95

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
8E POINT AL - 8WID CRK FP - 1	163.97	164.18	161.86	162.28	2.11	162.28	160.57	161.23	3.40	2.95
2OLD HICKORY - 1OLDHICKH3-4 - 1	163.97	164.18	161.86	162.28	2.11	162.28	160.57	161.23	3.40	2.95
2OLD HICKORY - 1OLDHICKH1-2 - 1	163.97	164.18	161.86	162.28	2.11	162.28	160.57	161.23	3.40	2.95
8BR FERRY NP - 8LIMESTONE - 1	163.98	164.19	161.87	162.29	2.11	162.29	160.58	161.24	3.40	2.95
8JACKSON TN - 8JVILLE FP - 1	163.96	164.17	161.85	162.28	2.11	162.28	160.57	161.23	3.40	2.95
5SEQUOYAH NP - 5CHARLESTON - 2	163.88	164.09	161.79	162.21	2.09	162.21	160.48	161.14	3.40	2.95
5MORRISTOWN - 5MOORESBG TP - 1	163.99	164.20	161.88	162.30	2.11	162.30	160.59	161.25	3.40	2.95
5OAK RIDG TN - 5KINGST U1-4 - 1	163.93	164.14	161.82	162.25	2.10	162.25	160.53	161.19	3.40	2.95
5JVILLE FP#2 - 1JVILLE F7 - 1	163.98	164.19	161.87	162.29	2.11	162.29	160.58	161.24	3.40	2.95
5JVILLE FP#2 - 1JVILLE F8 - 1	163.98	164.19	161.87	162.29	2.11	162.29	160.58	161.24	3.40	2.95
5JVILLE FP#2 - 1JVILLE F9 - 1	163.98	164.19	161.87	162.29	2.11	162.29	160.58	161.24	3.40	2.95
5JVILLE FP#2 - 1JVILLE F10 - 1	163.98	164.19	161.87	162.29	2.11	162.29	160.58	161.24	3.40	2.95
5PARADISE FP - 1PARADIS F1L - 1	163.98	164.19	161.87	162.30	2.11	162.30	160.58	161.24	3.40	2.95
5SUMMER SHAD - 5LEBJCTT - 1	163.99	164.20	161.88	162.30	2.11	162.30	160.59	161.25	3.40	2.95
5FONTANA HP - 1FONTANA H1 - 1	164.00	164.21	161.89	162.32	2.11	162.32	160.61	161.27	3.40	2.95
5FONTANA HP - 1FONTANA H3 - 1	164.00	164.21	161.89	162.32	2.11	162.32	160.61	161.27	3.40	2.95
5FONTANA HP - 1FONTANA H2 - 1	164.00	164.21	161.90	162.32	2.11	162.32	160.61	161.27	3.39	2.94
2FT PATHENRY - 1FT PAT H1-2 - 1	163.98	164.19	161.88	162.30	2.11	162.30	160.59	161.25	3.39	2.94
5LAWRENCB TN - 5WALTER ANDR - 1	163.85	164.06	161.75	162.17	2.10	162.17	160.46	161.12	3.39	2.94
5CASKY KY - 5COMMERCE PK - 1	163.99	164.20	161.89	162.31	2.11	162.31	160.60	161.26	3.39	2.94
6ROCK SPG GA - 6KENSNGTN GA - 1	163.98	164.19	161.87	162.29	2.11	162.29	160.58	161.24	3.39	2.94
8PARADISE FP - 8MONTGOMERY - 1	163.99	164.20	161.88	162.30	2.11	162.30	160.59	161.26	3.39	2.94
5GALLATIN F1 - 1GALLATIN F1 - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5GALLATIN F1 - 1GALLATIN F2 - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5ALCOA SW TN - 5PROFIT SPGS - 1	163.96	164.17	161.86	162.28	2.11	162.28	160.57	161.23	3.39	2.94
5MAYFIELD KY - 5PARIS TN - 1	163.98	164.19	161.87	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5WILSON TN - 5GALLATIN F1 - 1	163.96	164.17	161.85	162.28	2.11	162.28	160.57	161.23	3.39	2.94
5WILSON HP - 5PHIL TAP - 1	163.98	164.19	161.87	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5KIRKWOOD TP - 5ROSSVIEW - 1	163.98	164.19	161.87	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5CORDELL HP - 1CORDELL H1 - 1	163.91	164.12	161.82	162.24	2.09	162.24	160.52	161.18	3.39	2.94
5CORDELL HP - 1CORDELL H2 - 1	163.91	164.12	161.82	162.24	2.09	162.24	160.52	161.18	3.39	2.94
5CORDELL HP - 1CORDELL H3 - 1	163.91	164.12	161.82	162.24	2.09	162.24	160.52	161.18	3.39	2.94
5GALLATIN F1 - 5LASCASSAS - 1	163.89	164.10	161.79	162.21	2.10	162.21	160.50	161.16	3.39	2.94
5CHARLESTON - 5HOPEWELL TN - 1	163.90	164.11	161.81	162.24	2.09	162.24	160.51	161.17	3.39	2.94

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
7SHAWNEE FP - 7E W FKFT - 1	163.98	164.19	161.87	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5PARADISE FP - 5CROSS PLAIN - 1	163.96	164.17	161.86	162.28	2.10	162.28	160.57	161.23	3.39	2.94
8SHELBY TN - 8LAG CRK CT - 1	163.96	164.17	161.86	162.28	2.10	162.28	160.57	161.23	3.39	2.94
5COOPERTOWNT - 5ROSSVIEW - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5BOWLING GRN - 5S BOWLGRN T - 1	163.97	164.19	161.87	162.30	2.10	162.30	160.59	161.25	3.39	2.94
8WEST POINT - 8BR FERRY NP - 1	163.99	164.20	161.89	162.31	2.10	162.31	160.60	161.27	3.39	2.94
5HENDRSNVL T - 5OCANA TN TP - 1	163.97	164.18	161.87	162.29	2.10	162.29	160.58	161.24	3.39	2.94
5MEM JUNCT - 5S BOWLGRN T - 1	163.97	164.19	161.87	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5CROSS PARK - 5KARNS TN - 1	163.97	164.19	161.87	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5JONES COVE - 5COSBY TN - 1	163.99	164.20	161.88	162.31	2.11	162.31	160.60	161.26	3.39	2.94
5WILSON TN - 5HERMITAG TN - 1	163.95	164.17	161.85	162.28	2.10	162.28	160.57	161.23	3.39	2.94
8BR FERRY NP - 8MADISON AL - 1	163.98	164.20	161.88	162.30	2.10	162.30	160.60	161.26	3.39	2.94
5BOONE HP - 1BOONE H3 - 1	163.98	164.20	161.88	162.31	2.10	162.31	160.60	161.26	3.39	2.94
5RUTHERFORD - 5CHRISTIANA - 1	163.85	164.06	161.76	162.18	2.09	162.18	160.46	161.13	3.39	2.94
5JVILLE FP#2 - 1JVILLE F5 - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5JVILLE FP#2 - 1JVILLE F6 - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.39	2.94
8TRINITY AL - 5TRINITY AL - 1	163.96	164.17	161.86	162.29	2.10	162.29	160.58	161.24	3.39	2.94
5NEJC TN - 5WJC TN - 1	163.98	164.20	161.88	162.31	2.10	162.31	160.60	161.26	3.39	2.94
5PARADISE FP - 5JASON KY - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.39	2.94
2SHOLSTON HP - 1SHOLSTON H1 - 1	163.99	164.20	161.88	162.31	2.10	162.31	160.60	161.26	3.39	2.94
8UNION MS - 8PLEASANT HL - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5NICKJACK HP - 1NICKJK H1-2 - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.39	2.94
5DAVIDSON #2 - 5GRASSLAND T - 1	163.95	164.16	161.85	162.27	2.10	162.27	160.56	161.22	3.39	2.94
8ROANE TN - 8BULL RUN FP - 1	163.97	164.18	161.87	162.30	2.10	162.30	160.58	161.24	3.39	2.94
5DOUGLAS HP - 1DOUGLAS H3 - 1	163.99	164.20	161.89	162.31	2.10	162.31	160.60	161.26	3.39	2.94
5DOUGLAS HP - 1DOUGLAS H4 - 1	163.99	164.20	161.89	162.31	2.10	162.31	160.60	161.26	3.39	2.94
5ELK RIDGE - 5CULLEOKA TP - 1	163.94	164.15	161.84	162.26	2.10	162.26	160.55	161.21	3.39	2.94
5MARSHALL KY - 5GOLO KY - 1	163.98	164.19	161.88	162.31	2.10	162.31	160.59	161.26	3.39	2.94
5WOLF CRK HP - 1WOLFCR H1-2 - 1	163.97	164.18	161.87	162.29	2.10	162.29	160.58	161.24	3.39	2.94
5ELKTON KY T - 5JASON KY - 1	163.98	164.19	161.88	162.31	2.10	162.31	160.60	161.26	3.39	2.94
8SULLIVAN TN - 5SULLIVAN #2 - 1	163.99	164.20	161.89	162.31	2.10	162.31	160.60	161.26	3.38	2.94
5SUMMER SHAD - 5GLASGOW TP - 1	163.99	164.21	161.90	162.32	2.10	162.32	160.61	161.27	3.38	2.93
8SULLIVAN TN - 5SULLIVAN #1 - 1	163.99	164.20	161.89	162.31	2.10	162.31	160.60	161.26	3.38	2.93
5CLARKSVILLE - 5DUNBAR CAVE - 1	163.99	164.20	161.89	162.31	2.10	162.31	160.60	161.26	3.38	2.93

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5MAYFIELD KY - 5GOLO KY - 1	163.98	164.19	161.88	162.31	2.10	162.31	160.60	161.26	3.38	2.93
2TIMSFORD HP - 2SALEM TP - 1	163.95	164.16	161.86	162.28	2.10	162.28	160.57	161.23	3.38	2.93
5NICKJACK HP - 1NICKJK H3-4 - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.25	3.38	2.93
2TIMSFORD HP - 1TIMSFORD H1 - 1	163.95	164.16	161.86	162.28	2.10	162.28	160.57	161.23	3.38	2.93
5BULL RUN FP - 5BULL SCR1BT - 1	163.98	164.19	161.88	162.30	2.10	162.30	160.59	161.26	3.38	2.93
5DAVIDSON #1 - 5W NASHVILLE - 1	163.98	164.19	161.89	162.31	2.10	162.31	160.60	161.26	3.38	2.93
5MT PLEAS TN - 5CULLEOKA TP - 1	163.96	164.18	161.87	162.29	2.09	162.29	160.58	161.24	3.38	2.93
5WHEELER HP - 1WHEELR H1-2 - 1	163.98	164.19	161.88	162.31	2.10	162.31	160.60	161.26	3.38	2.93
5MAURY TN - 5MONSANTO TN - 1	163.97	164.18	161.87	162.29	2.10	162.29	160.58	161.24	3.38	2.93
5E GALLATIN - 5FOUNTAINHD - 1	163.99	164.20	161.89	162.32	2.10	162.32	160.61	161.27	3.38	2.93
5DUNBAR CAVE - 5ELKTON KY T - 1	163.98	164.19	161.89	162.31	2.10	162.31	160.60	161.26	3.38	2.93
8CORDOVA TN - 8BROWNSVL CT - 1	163.97	164.18	161.87	162.30	2.09	162.30	160.59	161.25	3.38	2.93
5COOPERTOWNT - 5S SPRINGFLD - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5JVILLE FP#1 - 1JVILLE F1 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5JVILLE FP#1 - 1JVILLE F2 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5JVILLE FP#1 - 1JVILLE F3 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5JVILLE FP#1 - 1JVILLE F4 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5BARKLEY HP - 5HOPCO - 1	163.98	164.19	161.88	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5WHEELER HP - 1WHEELR H5-6 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5WHEELER HP - 1WHEELR H7-8 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5W NASHVILLE - 5DAVIDSON RD - 1	163.99	164.20	161.89	162.32	2.09	162.32	160.60	161.27	3.38	2.93
5LONSDALE TN - 5BULL SCR1BT - 1	163.98	164.19	161.88	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5DAVIDSON #1 - 5FOREST HILL - 1	163.96	164.18	161.87	162.29	2.09	162.29	160.58	161.24	3.38	2.93
5APALACHIA - 1APALACH H2 - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5PORTLAND TN - 5FOUNTAINHD - 1	163.99	164.20	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5APALACHIA - 1APALACH H1 - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5WHEELER HP - 1WHEELR H3-4 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5SEQUOYAH NP - 5NOOLTEWAH - 1	163.85	164.06	161.77	162.19	2.09	162.19	160.47	161.13	3.38	2.93
5RADNOR TN - 5GRASSLAND T - 1	163.96	164.17	161.87	162.29	2.09	162.29	160.58	161.24	3.38	2.93
5JVILLE FP#2 - 5DICKSON TN - 1	163.97	164.18	161.88	162.30	2.09	162.30	160.59	161.25	3.38	2.93
5LAKEVW TP#1 - 5SAUNDERSVLE - 1	163.98	164.19	161.88	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5JVILLE FP#2 - 5LOBELVLE TP - 1	163.94	164.15	161.85	162.27	2.09	162.27	160.56	161.22	3.38	2.93
5WILSON TN - 5LAKEVW TP#1 - 1	163.98	164.19	161.88	162.31	2.09	162.31	160.60	161.26	3.38	2.93
2WATAUGA HP - 1WATAUGA H1 - 1	163.99	164.20	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5ALCOA SOUTH - 5CALDERWOOD - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5CROSS PLAIN - 5BETHEL RD - 1	163.97	164.18	161.88	162.30	2.09	162.30	160.59	161.25	3.38	2.93
5BOONE HP - 1BOONE H1 - 1	163.99	164.20	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
2MELTON H HP - 1MELTON H H1 - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5ALCOA SOUTH - 5CHILHOWE HP - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5ARDMORE AL - 5PARKCITY TP - 1	163.92	164.13	161.83	162.25	2.09	162.25	160.54	161.20	3.38	2.93
5EBENEZER TN - 5CROSS PARK - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5J SEVIER #1 - 5PERSIA TN - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5WILSON HP - 1WILSON H5-6 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5CALDERWOOD - 1CALDERWD H1 - 1	164.00	164.21	161.91	162.33	2.09	162.33	160.62	161.28	3.38	2.93
5CALDERWOOD - 1CALDERWD H2 - 1	164.00	164.21	161.91	162.33	2.09	162.33	160.62	161.28	3.38	2.93
5CALDERWOOD - 1CALDERWD H3 - 1	164.00	164.21	161.91	162.33	2.09	162.33	160.62	161.28	3.38	2.93
5WARTRACE TN - 5CHRISTIANA - 1	163.91	164.12	161.82	162.24	2.09	162.24	160.53	161.19	3.38	2.93
5LOGAN ALUM - 5ADAIRVLL KY - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5LAFAYETT TN - 5S SCOTTSVLE - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5WILSON HP - 1WILSON H7-8 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
8MARSHALL KY - 5MARSHALL KY - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5WILSON HP - 1WILSON 9-10 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5WILSON HP - 1WILSON11-12 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5WILSON HP - 1WILSON15-16 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5RUTHERFORD - 5CASON LANE - 1	163.86	164.07	161.78	162.21	2.08	162.21	160.48	161.14	3.38	2.93
2MELTON H HP - 1MELTON H H2 - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5WILSON HP - 1WILSON17-18 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
1CHICK HP3-4 - 1CHICKAMG H4 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
1CHICK HP1-2 - 1CHICKAMG H2 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
8UNION MS - 5UNION MS - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
1CHICK HP3-4 - 1CHICKAMG H3 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5JVILLE FP#1 - 5DRY CREEK T - 1	163.97	164.18	161.88	162.30	2.09	162.30	160.59	161.25	3.38	2.93
5SHAWNEE G90 - 1SHAWNEE F9 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
1CHICK HP1-2 - 1CHICKAMG H1 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5SHAWNEE FP2 - 1SHAWNEE F4 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5SHAWNEE FP2 - 1SHAWNEE F6 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5SHAWNEE FP2 - 1SHAWNEE F1 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5WILSON HP - 1WILSON H20 - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.60	161.27	3.38	2.93

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5SHAWNEE G56 - 5C-31 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5SHAWNEE G56 - 1SHAWNEE F5 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5SHAWNEE G78 - 1SHAWNEE F7 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5SHAWNEE G78 - 1SHAWNEE F8 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5CLINTON KY - 5CLINTONKY T - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5SHAW REACT1 - 5CLINTONKY T - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5JONES COVE - 5WALNUT GR T - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5SHAWNEE G34 - 5C-33 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5SPRINGFIELD - 5S SPRINGFLD - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5S CLEVELAND - 5NOOLTEWAH - 1	163.87	164.08	161.78	162.21	2.08	162.21	160.49	161.15	3.38	2.93
5SHAWNEE FP1 - 5SHAW REACT1 - 1	163.98	164.19	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5SHAWNEE G12 - 5C-33 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5SHAWNEE G12 - 1SHAWNEE F2 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5SHAWNEE G34 - 1SHAWNEE F3 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.27	3.38	2.93
5WILSON HP - 1WILSON H19 - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5WILSON HP - 1WILSON H21 - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5N KNOX TN - 5W HILL KUB - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5LASCASSAS - 5COMPTON RD - 1	163.94	164.15	161.85	162.27	2.09	162.27	160.56	161.22	3.38	2.93
5GREAT FALLS - 5E MCMINN TP - 1	164.06	164.27	161.98	162.40	2.08	162.40	160.68	161.34	3.38	2.93
8CORDOVA TN - 8BENTON MS - 1	163.98	164.19	161.90	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5BARKLEY HP - 5PRINCETN TP - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
5SPRINGFIELD - 5ADAIRVLL KY - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.38	2.93
5PRINCETN TP - 5HOPSON KY - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.38	2.93
2PERCY PR HP - 1PERCY PR H1 - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.37	2.93
2PERCY PR HP - 2DONELSON TN - 1	163.98	164.19	161.89	162.31	2.09	162.31	160.60	161.26	3.37	2.93
2WATAUGA HP - 1WATAUGA H2 - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.93
2WINCHESTER - 2SALEM TP - 1	163.98	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5PIN HOOK TN - 5HURRICAN CR - 1	163.90	164.11	161.82	162.24	2.08	162.24	160.52	161.19	3.37	2.92
5ATHENS TN - 5FT LOUDOUN - 1	163.98	164.19	161.92	162.34	2.06	162.34	160.60	161.26	3.37	2.92
5COLBERT FP - 5MT HOPE AL - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5JVILLE FP#1 - 5MT PLEAS TN - 1	163.96	164.18	161.88	162.30	2.09	162.30	160.59	161.25	3.37	2.92
5SULLIVAN #1 - 5MILLIGAN - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5SHAWNEE G90 - 1SHAWNEE F10 - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.37	2.92
8PLEASANT HL - 8BENTON MS - 1	163.98	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5CUMBERLAND - 5ERIN TN - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5ALCOA SW TN - 5FONTANA HP - 1	163.98	164.19	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5WHEELER HP - 5ROGERSVL AL - 1	163.94	164.16	161.86	162.28	2.09	162.28	160.57	161.23	3.37	2.92
5SOLWAY TN - 5SOLWAY TN T - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5N NASHVILLE - 5HENDRSNVL T - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5MAURY TN - 5RALLY HILLT - 1	163.95	164.16	161.87	162.29	2.08	162.29	160.58	161.24	3.37	2.92
5DICKSON TN - 2DICKSON TN - 1	163.98	164.19	161.89	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5BOWLING GRN - 5LOSTCITY KY - 1	163.99	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5ALCOA SOUTH - 5CHEOAH HP - 1	163.98	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5DOVER TN - 5BARKLEY HP - 1	163.98	164.20	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5MOULTON AL - 5MT HOPE AL - 1	163.98	164.19	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5FONTANA HP - 5HWY 411 TN - 1	163.98	164.19	161.90	162.32	2.09	162.32	160.61	161.27	3.37	2.92
5ERIN TN - 5TRACE CRK T - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5LAWRENCB TN - 5LOBELVLE TP - 1	163.96	164.17	161.87	162.29	2.08	162.29	160.58	161.24	3.37	2.92
5JVILLE FP#2 - 5CENTERVILLE - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5COLBERT FP - 1COLBERT F5A - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5COLBERT FP - 1COLBERT F5B - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5WJC TN - 5JONESBRO TN - 1	163.99	164.20	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5DRY CREEK T - 5S WAVERLY T - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5ELK RIDGE - 5COLLINS CRT - 1	163.97	164.18	161.88	162.31	2.08	162.31	160.59	161.26	3.37	2.92
2MOSS TN TAP - 2DALE HOLLOW - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5WILSON HP - 1WILSON H3-4 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5CLINTON KY - 5PIERCE TAP - 1	163.98	164.20	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5ARDMORE AL - 5ROGERSVL AL - 1	163.95	164.16	161.87	162.29	2.08	162.29	160.58	161.24	3.37	2.92
5COLBERT FP - 5WAYNESB TAP - 1	163.94	164.15	161.85	162.28	2.08	162.28	160.57	161.23	3.37	2.92
5WILSON HP - 1WILSON H1-2 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5PERSIA TN - 5BULLS GAP - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5DICKSON TN - 5POMONA TAP - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5WHITE PINE - 5SR 160 TN - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
8JACKSON TN - 8BROWNSVL CT - 1	163.98	164.19	161.89	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5MT PLEAS TN - 5ONLY TN - 1	163.96	164.18	161.88	162.30	2.08	162.30	160.59	161.25	3.37	2.92
5TRINITY AL - 5NEEL AL - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5WHITE PINE - 5GREENVL TP1 - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5NORRIS HP - 5ANDERSONVL - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5MARTIN TN - 5PIERCE TAP - 1	163.99	164.20	161.90	162.32	2.08	162.32	160.61	161.28	3.37	2.92
5CADIZ KY TP - 5HOPSON KY - 1	163.98	164.19	161.89	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5PICKWICK HP - 1PICKWICK H1 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5WHEELER HP - 5NANCE AL - 1	163.97	164.19	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5FAYETTVL TN - 5PARKCITY TP - 1	163.96	164.18	161.88	162.31	2.08	162.31	160.59	161.26	3.37	2.92
8JVILLE FP - 8GLEASON CT - 1	163.98	164.19	161.89	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5BULL RUN FP - 5N KNOX TN - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5NEEL AL - 5IRONMAN AL - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5WID CRK FP2 - 5OGLETHORPE - 2	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5PICKWICK HP - 1PICKWICK H4 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5PICKWICK HP - 1PICKWICK H5 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5PICKWICK HP - 1PICKWICK H6 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5WID CRK FP2 - 5OGLETHORPE - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5PARADISE FP - 5N.HARD - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5PICKWICK HP - 1PICKWICK H2 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5GUNTERSV HP - 1GUNTERSV H4 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5PICKWICK HP - 1PICKWICK H3 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
2OCOEE #1 HP - 1OCOEE#1H1-3 - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5PARIS TN - 5BIG SANDY T - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5JVILLE FP#2 - 5ONLY TN - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5GUNTERSV HP - 1GUNTERSV H2 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5HERMITAG TN - 5DONELSON TN - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5MONTGOMRY#2 - 5UNION CARBT - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5MONTEREY TN - 5ALGOOD TP - 1	163.90	164.11	161.84	162.27	2.06	162.27	160.53	161.19	3.37	2.92
5GALLATIN F1 - 5LEBANON IPT - 1	163.99	164.20	161.91	162.34	2.08	162.34	160.62	161.28	3.37	2.92
5UNION CARBT - 5MIMMS INDPK - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
8SHAWNEE FP - 5SHAWNEE B12 - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5JVILLE FP#1 - 5TRACE CRK T - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5GUNTERSV HP - 1GUNTERSV H3 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5PORTLAND TN - 5MITCHVLE TP - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5WID CRK FP1 - 5BRYANT AL - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5CHEOAH HP - 1CHEOAH H5 - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5PULASKI TN - 5WALTER ANDR - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5HARTSELL TP - 5IRONMAN AL - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5LOWNDES MS - 5WVERN SS - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5GUNTERSV HP - 1GUNTERSV H1 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5HENDRSV NES - 5SAUNDERSVLE - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5NEW ST BETH - 5MIMMS INDPK - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
2OCOEE #2 HP - 2OCOEE #3 HP - 1	163.98	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5HIWASSEE HP - 5TELLICO TN - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5JVILLE FP#2 - 5BIG SANDY T - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5ALCOA SW TN - 5WELLSVLE TN - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5GUNTERSV HP - 5GRGIAMTN AL - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
2BLUERIDG HP - 1BLUERIDG H1 - 1	163.97	164.19	161.89	162.32	2.08	162.32	160.61	161.27	3.37	2.92
8FRANKLIN TN - 8SEQUOYAH NP - 1	163.69	163.90	161.64	162.06	2.05	162.06	160.32	160.98	3.37	2.92
5MONSANTO TN - 5S WAVERLY T - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5CHILHOWEE - 5WELLSVLE TN - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5CHILHOWEE - 5TELLICO TN - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5MORGANVL GA - 5BRYANT AL - 1	163.99	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5APALACHIA - 5BENTON TN - 1	163.96	164.17	161.88	162.30	2.08	162.30	160.59	161.25	3.37	2.92
5KINGST U5-6 - 5BUCK CRK TN - 1	163.74	163.95	161.67	162.09	2.08	162.09	160.37	161.04	3.37	2.92
5SR 160 TN - 5BULLS GAP - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5LOUDOUN TN - 5BUCK CRK TN - 1	163.75	163.96	161.67	162.10	2.08	162.10	160.38	161.04	3.37	2.92
5JVILLE FP#2 - 5HILLTOP TN - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5GUNTERS PRI - 5GRGIAMTN AL - 1	163.98	164.19	161.90	162.33	2.08	162.33	160.61	161.28	3.37	2.92
5BULL RUN FP - 5N KNOX TN - 2	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5JETPORT AL - 5LIMESTONE - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5WHITE PINE - 5NEWPORT TN - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5TIPTONVL TN - 5NEWMAD - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5BATESVILLE - 5E BATESVILE - 1	163.98	164.20	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5WILSON TN - 5CENTRALPIKE - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
5MURFREESBRO - 5CASON LANE - 1	163.87	164.08	161.80	162.22	2.07	162.22	160.50	161.17	3.37	2.92
5CHEROKEE HP - 5CHER OAKLND - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5BOWLING GRN - 5E BOWLGREEN - 1	163.99	164.20	161.91	162.34	2.08	162.34	160.62	161.29	3.37	2.92
5MARSHALL KY - 5BENTON KY - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5J SEVIER #1 - 5CHEROKEE HP - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5CLARKSVILLE - 5ROTARY PARK - 1	163.97	164.18	161.89	162.31	2.08	162.31	160.60	161.26	3.37	2.92
8MADISON AL - 5MADISON #1 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
8PHIPPS B NP - 5PHIPPS B NP - 1	163.99	164.21	161.92	162.34	2.08	162.34	160.63	161.29	3.37	2.92
2OCOEE #1 HP - 1OCOEE#1H4-5 - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
8MADISON AL - 8LIMESTONE - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5NANCE AL - 5SPNG CRK AL - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5MOCCASIN TN - 5CHICK HP - 2	163.98	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5JONESBRO TN - 5WALTERS JC - 1	163.98	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5WHEELER HP - 5ELGIN AL - 1	163.96	164.17	161.88	162.30	2.08	162.30	160.59	161.25	3.37	2.92
5LEBANON TN - 5LEBANON IPT - 1	163.99	164.21	161.92	162.34	2.08	162.34	160.63	161.29	3.37	2.92
5CHICK HP - 5HAWTHORNE - 1	163.98	164.19	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5SEQUOYAH NP - 5CONCORD TN - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5MOULTON AL - 5ADDISON TAP - 1	163.98	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5NEJC TN - 5SULLIVAN #2 - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5TRINITY AL - 5MALLARD TTP - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5JONESBRO TN - 5MILLIGAN - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5MALLARD TTP - 5TRICO AL TP - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5SPNG CRK AL - 5TRICO AL TP - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
5MONTGOMRY#2 - 5CLARKSVILLE - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5WATER VLY T - 5E BATESVILE - 1	163.98	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5ALCOA SW TN - 5HWY 411 TN - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5CHILHOWE HP - 1CHILHOWE H1 - 1	163.99	164.20	161.91	162.34	2.08	162.34	160.63	161.29	3.37	2.92
5CHILHOWE HP - 1CHILHOWE H2 - 1	163.99	164.20	161.91	162.34	2.08	162.34	160.63	161.29	3.37	2.92
5CHILHOWE HP - 1CHILHOWE H3 - 1	163.99	164.20	161.91	162.34	2.08	162.34	160.63	161.29	3.37	2.92
5S SEVIERVL - 5E SEVIERVLT - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5WATTROAD TN - 2WATTROAD TN - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
2BATTLFLD TN - 2RADNOR TN - 1	163.99	164.20	161.92	162.34	2.08	162.34	160.63	161.29	3.37	2.92
5WOLF CRK HP - 5WAYNE CO KY - 1	163.97	164.19	161.90	162.32	2.08	162.32	160.61	161.27	3.37	2.92
8WEAKLEY TN - 8LAG CRK CT - 1	163.98	164.19	161.90	162.33	2.08	162.33	160.62	161.28	3.37	2.92
5MONSANTO TN - 5HILLTOP TN - 1	163.98	164.19	161.90	162.32	2.08	162.32	160.61	161.28	3.37	2.92
5BOONE HP - 1BOONE H2 - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
6ROCK SPG GA - 6E DALTON - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
8WEAKLEY TN - 8GLEASON CT - 1	163.97	164.18	161.89	162.32	2.08	162.32	160.61	161.27	3.37	2.92
8PARADISE FP - 1PARADISF3AB - 1	164.01	164.22	161.93	162.35	2.08	162.35	160.64	161.30	3.37	2.92
5GATTMAN MS - 5COLBERT FP - 1	163.98	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92
2NOTTELY HP - 1NOTTELY H1 - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92

2010 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5DOVER TN - 5INDIAN MND - 1	163.99	164.20	161.91	162.33	2.08	162.33	160.62	161.28	3.37	2.92

***All significant pre-events are shown above. The pre-events not shown in the above had results indicating no adverse impact on WBN offsite power.**

161kV Summer 2015 Results

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5SEQUOYAH NP - 5GOODFLD TP - 1	162.04	162.26	159.69	160.12	2.35	160.12	157.58	158.26	4.46	3.99
5HARRIMAN TP - 5ROCKWOOD TN - 1	160.14	160.36	157.90	158.33	2.24	158.33	155.70	156.39	4.44	3.97
5ROCKWOOD TP - 5HARRIMAN TP - 1	160.21	160.42	157.97	158.41	2.23	158.41	155.77	156.46	4.43	3.96
5ATHENS TN - 5TEN MILE TP - 1	163.37	163.58	161.11	161.54	2.25	161.54	159.02	159.69	4.35	3.89
5GOODFLD TP - WBH 1-1 - 1	163.25	163.46	160.94	161.36	2.31	161.36	158.91	159.58	4.33	3.88
5TEN MILE TP - WBH 1-1 - 1	164.57	164.78	162.35	162.77	2.22	162.77	160.35	161.01	4.23	3.77
8WBNP #1 - 1WBNP N2 - 1	163.71	163.92	161.15	161.58	2.55	161.58	159.65	160.31	4.06	3.61
5SEQUOYAH NP - 5GOODFLD TP - 1	162.10	162.31	160.09	160.52	2.01	160.52	158.06	158.73	4.04	3.58
5ROCKWOOD TN - 5BURKEMILLRD - 1	162.84	163.05	160.80	161.22	2.04	161.22	158.84	159.51	4.00	3.54
5BURKEMILLRD - 5ST CLAIR TP - 1	163.12	163.33	161.07	161.49	2.05	161.49	159.13	159.80	3.99	3.53
5ST CLAIR TP - WBH 2-4 - 1	163.27	163.49	161.22	161.64	2.06	161.64	159.30	159.96	3.98	3.52
5WINCHESTER - 5PELHAM TN - 1	162.58	162.79	160.47	160.90	2.11	160.90	158.61	159.29	3.97	3.51
5HARRIMAN TP - 5ROCKWOOD TN - 1	159.93	160.15	158.09	158.52	1.84	158.52	155.99	156.68	3.94	3.47
5SEQUOYAH NP - 1SEQUOYAH N2 - 1	163.35	163.56	160.99	161.41	2.36	161.41	159.42	160.08	3.93	3.48
5COALMONT TN - 5PELHAM TN - 1	162.61	162.83	160.53	160.96	2.09	160.96	158.70	159.38	3.91	3.45
5CHARLESTON - 5LAMONTVL RD - 1	162.14	162.35	160.00	160.42	2.15	160.42	158.27	158.95	3.87	3.41
5LAMONTVL RD - 5SANFORD TAP - 1	162.19	162.41	160.05	160.48	2.14	160.48	158.33	159.00	3.86	3.40
5ATHNS NIP T - 5SANFORD TAP - 1	162.22	162.43	160.08	160.51	2.14	160.51	158.36	159.04	3.86	3.40
5ATHENS TN - 5ATHNS NIP T - 1	162.39	162.60	160.26	160.69	2.13	160.69	158.55	159.22	3.84	3.38
5COALMONT TN - 5SMITHMTN TN - 1	163.35	163.56	161.32	161.74	2.03	161.74	159.58	160.25	3.77	3.32
8SEQUOYAH NP - 1SEQUOYAH N1 - 1	163.55	163.77	161.33	161.76	2.22	161.76	159.83	160.50	3.72	3.27
5DAYTON TAP - 5SKYLINE TN - 1	163.13	163.34	161.14	161.56	1.99	161.56	159.46	160.13	3.67	3.21
5SMITHMTN TN - 5SKYLINE TN - 1	163.21	163.42	161.22	161.64	1.99	161.64	159.54	160.20	3.67	3.21
8MARSHALL KY - 8CUMBERLAND - 1	163.43	163.64	161.29	161.72	2.13	161.72	159.78	160.45	3.65	3.19
5MURFREESBRO - 5MURF INDPKT - 1	162.64	162.85	160.64	161.06	2.00	161.06	159.00	159.67	3.64	3.18
5GALLATIN F2 - 5GALLATIN5-8 - 1	163.21	163.42	161.11	161.53	2.10	161.53	159.57	160.24	3.64	3.18
5ROANE TN - 5ROCKWOOD TP - 1	163.31	163.53	161.35	161.77	1.97	161.77	159.69	160.36	3.62	3.17
5GALLATIN F2 - 1GALLATIN F3 - 1	163.29	163.50	161.22	161.65	2.07	161.65	159.69	160.35	3.60	3.14
5GALLATIN F2 - 1GALLATIN F4 - 1	163.29	163.50	161.22	161.65	2.07	161.65	159.69	160.35	3.60	3.14

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5CENTER HILL - 5SMITHVLE TN - 1	162.73	162.95	160.76	161.19	1.97	161.19	159.14	159.81	3.59	3.13
5BULL RUN FP - 1BULLRUN F1H - 1	163.59	163.80	161.53	161.95	2.06	161.95	160.02	160.68	3.57	3.12
5GREAT FALLS - 5WHEELERMTN - 1	163.39	163.60	161.47	161.89	1.92	161.89	159.84	160.50	3.56	3.10
8CUMBERLAND - 8MONTGOMERY - 1	163.29	163.50	161.26	161.68	2.03	161.68	159.74	160.40	3.55	3.10
8CUMBERLAND - 8DAVIDSON TN - 1	163.31	163.52	161.28	161.70	2.03	161.70	159.76	160.42	3.55	3.10
5BULL RUN FP - 1BULLRUN F1L - 1	163.60	163.81	161.57	161.99	2.03	161.99	160.06	160.72	3.54	3.09
5GREAT FALLS - 5PIKEVLLE TP - 1	163.25	163.47	161.34	161.77	1.91	161.77	159.71	160.38	3.54	3.09
5SPRING CITY - 5WHEELERMTN - 1	163.49	163.70	161.57	162.00	1.92	162.00	159.95	160.62	3.54	3.08
5SMITHVLE TN - 5GREAT FALLS - 1	163.09	163.30	161.15	161.57	1.94	161.57	159.56	160.22	3.54	3.08
5N TULLA T#2 - 5BOYNTON TAP - 1	163.00	163.21	161.08	161.51	1.91	161.51	159.46	160.13	3.53	3.08
5WARTRACE TN - 5N TULLA T#2 - 1	163.01	163.23	161.10	161.53	1.91	161.53	159.49	160.16	3.53	3.07
8VOLUNTEER - 8PHIPPS B NP - 1	163.55	163.76	161.52	161.95	2.02	161.95	160.03	160.69	3.52	3.07
5MANCHESTER - 5RED HILL TP - 1	162.96	163.17	161.06	161.48	1.90	161.48	159.45	160.12	3.51	3.05
5PIKEVLLE TP - WBH 2-2 - 1	163.47	163.68	161.57	162.00	1.90	162.00	159.98	160.64	3.50	3.04
5CORDELL HP - 5BAXTER TN - 1	163.54	163.76	161.60	162.03	1.94	162.03	160.05	160.71	3.49	3.04
5DAYTON TAP - WBH 2-4 - 1	164.17	164.38	162.23	162.65	1.93	162.65	160.67	161.34	3.49	3.04
5MANCHESTER - 5BOYNTON TAP - 1	163.27	163.48	161.37	161.79	1.90	161.79	159.78	160.45	3.48	3.03
5SPRING CITY - WBH 1-3 - 1	163.96	164.17	162.06	162.48	1.90	162.48	160.47	161.14	3.48	3.03
8WBNP #1 - 8VOLUNTEER - 1	163.43	163.64	161.46	161.89	1.96	161.89	159.95	160.61	3.48	3.03
5GALLATIN F2 - 5N LEBANON T - 1	163.43	163.64	161.50	161.92	1.93	161.92	159.95	160.61	3.48	3.03
5N NASHVILLE - 5GOODLETTSVL - 1	163.50	163.71	161.54	161.96	1.96	161.96	160.03	160.69	3.47	3.02
8JVILLE FP - 8DAVIDSON TN - 1	163.32	163.53	161.36	161.79	1.96	161.79	159.85	160.51	3.47	3.02
8CUMBERLAND - 1CUMBRL F1HL - 1	163.41	163.62	161.46	161.88	1.96	161.88	159.94	160.61	3.47	3.02
5KINGST U5-6 - 1KINGSTON F5 - 1	163.18	163.39	161.22	161.65	1.95	161.65	159.70	160.37	3.47	3.02
5KINGST U5-6 - 1KINGSTON F6 - 1	163.18	163.39	161.23	161.65	1.95	161.65	159.71	160.37	3.47	3.02
5WCOOKEVL TN - 5DOUBLE SPRG - 1	163.12	163.33	161.20	161.62	1.92	161.62	159.65	160.32	3.47	3.02
5DOUBLE SPRG - 5BAXTER TN - 1	163.49	163.70	161.57	161.99	1.92	161.99	160.02	160.68	3.47	3.02
8CUMBERLAND - 1CUMBRL F2HL - 1	163.42	163.63	161.46	161.89	1.95	161.89	159.95	160.61	3.47	3.02
5WCOOKEVL TN - 5N LEBANON T - 1	163.10	163.31	161.18	161.61	1.92	161.61	159.63	160.30	3.47	3.01
8MAURY TN - 8BR FERRY NP - 1	163.18	163.39	161.24	161.66	1.94	161.66	159.71	160.38	3.47	3.01
5BARKERSMILL - 5MONTGOMRY#1 - 1	163.50	163.71	161.55	161.97	1.96	161.97	160.04	160.70	3.47	3.01

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5CENTER HILL - 1CENTHILL H1 - 1	163.36	163.58	161.44	161.86	1.92	161.86	159.90	160.57	3.46	3.01
5CENTER HILL - 1CENTHILL H2 - 1	163.36	163.58	161.44	161.86	1.93	161.86	159.90	160.57	3.46	3.01
5CENTER HILL - 1CENTHILL H3 - 1	163.36	163.58	161.44	161.86	1.92	161.86	159.90	160.57	3.46	3.01
5CORDELL HP - 5GALLATIN F2 - 1	163.34	163.56	161.43	161.85	1.92	161.85	159.88	160.55	3.46	3.01
8BR FERRY NP - 1BR FERRY N1 - 1	163.49	163.70	161.54	161.96	1.95	161.96	160.03	160.70	3.46	3.01
5WCOOKEVL TN - 5S COOKEVLLE - 1	162.48	162.69	160.59	161.01	1.89	161.01	159.02	159.69	3.46	3.00
8WID CRK FP - 8RACCOON MTN - 1	163.53	163.75	161.58	162.01	1.95	162.01	160.08	160.74	3.46	3.01
8SHELBY TN - 8SANSOUC - 1	163.43	163.64	161.48	161.91	1.95	161.91	159.97	160.64	3.46	3.00
5LOUDOUN TN - 5N SWEETWATR - 1	162.75	162.97	160.89	161.31	1.87	161.31	159.30	159.97	3.46	3.00
5WOODBURY TN - 5MURF INDPKT - 1	163.18	163.40	161.30	161.72	1.89	161.72	159.73	160.40	3.45	3.00
5MONTGOMRY#2 - 5KIRKWOOD TP - 1	163.44	163.65	161.50	161.93	1.94	161.93	159.99	160.65	3.45	3.00
5J SEVIER #1 - 1J SEVIER F3 - 1	163.49	163.70	161.55	161.97	1.94	161.97	160.03	160.70	3.45	3.00
5J SEVIER #1 - 1J SEVIER F4 - 1	163.49	163.70	161.55	161.97	1.94	161.97	160.03	160.70	3.45	3.00
5PARADISE FP - 1PARADIS F2H - 1	163.46	163.67	161.52	161.95	1.94	161.95	160.01	160.67	3.45	3.00
8RACCOON MTN - 5RACCOON MT2 - 1	163.54	163.75	161.60	162.02	1.94	162.02	160.09	160.76	3.45	3.00
5KINGST U7-9 - 1KINGSTON F8 - 1	163.62	163.83	161.68	162.11	1.94	162.11	160.17	160.83	3.45	3.00
5KINGST U7-9 - 1KINGSTON F9 - 1	163.62	163.83	161.69	162.11	1.94	162.11	160.18	160.84	3.45	3.00
5PARADISE FP - 1PARADIS F1H - 1	163.46	163.67	161.53	161.95	1.93	161.95	160.01	160.68	3.45	2.99
5PARADISE FP - 1PARADIS F2L - 1	163.46	163.67	161.53	161.95	1.93	161.95	160.02	160.68	3.45	2.99
5KINGST U7-9 - 1KINGSTON F7 - 1	163.62	163.83	161.68	162.11	1.93	162.11	160.17	160.84	3.45	2.99
5GALLATIN F1 - 1GALLATIN F1 - 1	163.44	163.65	161.51	161.93	1.93	161.93	160.00	160.66	3.45	2.99
5GALLATIN F1 - 1GALLATIN F2 - 1	163.44	163.65	161.51	161.93	1.93	161.93	160.00	160.66	3.45	2.99
8WID CRK FP - 8SEQUOYAH NP - 1	163.46	163.67	161.53	161.95	1.93	161.95	160.02	160.68	3.44	2.99
5PARADISE FP - 1PARADIS F1L - 1	163.46	163.68	161.53	161.96	1.93	161.96	160.02	160.68	3.44	2.99
5KINGST U7-9 - 5KINGSTON TP - 1	162.87	163.08	160.97	161.39	1.90	161.39	159.42	160.09	3.44	2.99
8DAVIDSON TN - 5DAVIDSON #2 - 1	163.30	163.51	161.38	161.80	1.92	161.80	159.86	160.52	3.44	2.99
8BR FERRY NP - 1BR FERRY N2 - 1	163.50	163.71	161.57	161.99	1.93	161.99	160.06	160.72	3.44	2.99
5J SEVIER #2 - 5GREENVL TP1 - 1	163.47	163.68	161.54	161.97	1.93	161.97	160.03	160.70	3.44	2.99
8BR FERRY NP - 1BR FERRY N3 - 1	163.50	163.71	161.57	161.99	1.93	161.99	160.06	160.72	3.44	2.99
5LOUDOUN TN - 5KINGSTON TP - 1	162.94	163.16	161.05	161.47	1.90	161.47	159.51	160.17	3.44	2.98
8DAVIDSON TN - 8PIN HOOK TN - 1	163.43	163.64	161.51	161.93	1.92	161.93	159.99	160.66	3.44	2.99

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
8WBNP #1 - 8BULL RUN FP - 1	163.44	163.65	161.52	161.94	1.92	161.94	160.00	160.67	3.44	2.99
5WOODBURY TN - 5GREAT FALLS - 1	163.38	163.59	161.50	161.93	1.88	161.93	159.94	160.61	3.44	2.98
5RACCOON MT1 - 1RACCOON P4 - 1	163.48	163.69	161.55	161.98	1.92	161.98	160.04	160.70	3.44	2.98
5RACCOON MT1 - 1RACCOON P3 - 1	163.48	163.69	161.56	161.98	1.92	161.98	160.05	160.71	3.43	2.98
5E CLEVELAND - 5HIWASSEE RI - 1	163.17	163.38	161.28	161.70	1.89	161.70	159.74	160.40	3.43	2.98
8RUTHERFORD - 8MAURY TN - 1	163.34	163.55	161.44	161.86	1.91	161.86	159.91	160.57	3.43	2.98
5SWEETWATER - 5N SWEETWATR - 1	163.10	163.31	161.25	161.67	1.86	161.67	159.67	160.34	3.43	2.98
8MONTGOMERY - 8WILSON TN - 1	163.42	163.63	161.50	161.93	1.92	161.93	159.99	160.65	3.43	2.98
5CHARLESTON - 5HIWASSEE RI - 1	163.22	163.43	161.33	161.75	1.89	161.75	159.79	160.46	3.43	2.98
5MAYFIELD KY - 5PARIS TN - 1	163.39	163.61	161.48	161.90	1.92	161.90	159.96	160.63	3.43	2.98
5MORRISON TN - 5RED HILL TP - 1	163.42	163.63	161.55	161.97	1.87	161.97	160.00	160.66	3.43	2.97
8FRANKLIN TN - 5FRANKLIN TN - 1	162.47	162.69	160.64	161.07	1.83	161.07	159.05	159.72	3.43	2.97
5S COOKEVLLE - 5ALGOOD TP - 1	162.73	162.95	160.86	161.29	1.87	161.29	159.31	159.98	3.43	2.97
8RUTHERFORD - 5RUTHERFORD - 1	163.28	163.50	161.39	161.81	1.90	161.81	159.86	160.53	3.42	2.97
8WBNP #1 - 8ROANE TN - 1	163.42	163.63	161.52	161.94	1.91	161.94	160.00	160.66	3.42	2.97
5FT LOUDOUN - 2FT LOUDOUN - 1	163.49	163.70	161.58	162.00	1.91	162.00	160.07	160.73	3.42	2.97
8SULLIVAN TN - 05BROADF - 1	163.72	163.93	161.79	162.21	1.93	162.21	160.30	160.96	3.42	2.97
8SHAWNEE FP - 8MARSHALL KY - 1	163.44	163.66	161.54	161.96	1.91	161.96	160.03	160.69	3.42	2.97
5MORRISON TN - 5BRIDGSTONE - 1	163.53	163.74	161.65	162.08	1.87	162.08	160.11	160.77	3.42	2.97
5HIWASSEE HP - 1HIWASSEE H2 - 1	163.45	163.66	161.55	161.97	1.90	161.97	160.03	160.70	3.42	2.96
8PARADISE FP - 8MONTGOMERY - 1	163.44	163.65	161.54	161.96	1.90	161.96	160.02	160.69	3.42	2.96
8DAVIDSON TN - 8MAURY TN - 1	163.42	163.63	161.51	161.94	1.90	161.94	160.00	160.67	3.42	2.96
5HIWASSEE HP - 1HIWASSEE H1 - 1	163.45	163.66	161.55	161.97	1.90	161.97	160.03	160.70	3.42	2.96
5KINGST U1-4 - 1KINGSTON F1 - 1	163.58	163.79	161.67	162.09	1.91	162.09	160.16	160.82	3.42	2.96
8DAVIDSON TN - 5DAVIDSON #1 - 1	163.35	163.56	161.45	161.87	1.90	161.87	159.93	160.60	3.41	2.96
5ROANE TN - 5W OAK RIDGT - 1	163.34	163.55	161.44	161.87	1.90	161.87	159.93	160.59	3.41	2.96
5SUMMER SHAD - 5E GLASGOW T - 1	163.49	163.70	161.59	162.01	1.90	162.01	160.07	160.74	3.41	2.96
5KINGST U1-4 - 1KINGSTON F4 - 1	163.57	163.78	161.67	162.09	1.90	162.09	160.16	160.82	3.41	2.96
5GALLATIN F2 - 5WGALLATIN T - 1	163.48	163.70	161.58	162.01	1.90	162.01	160.07	160.74	3.41	2.96
5KINGST U1-4 - 1KINGSTON F3 - 1	163.57	163.78	161.67	162.09	1.90	162.09	160.16	160.82	3.41	2.96
5KINGST U1-4 - 5BEAR CRK TN - 1	163.37	163.58	161.48	161.91	1.89	161.91	159.97	160.63	3.41	2.95

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5GALLATIN F1 - 5HARTSVLE TP - 1	163.48	163.69	161.58	162.01	1.90	162.01	160.07	160.73	3.41	2.96
5SEQUOYAH NP - 5HARRISNB TP - 1	163.30	163.51	161.42	161.85	1.87	161.85	159.89	160.56	3.41	2.95
5NORTH COWAN - 5BEAULEU ALT - 1	163.33	163.55	161.45	161.88	1.88	161.88	159.93	160.59	3.41	2.95
5KINGST U1-4 - 1KINGSTON F2 - 1	163.57	163.78	161.67	162.10	1.90	162.10	160.16	160.83	3.41	2.95
5BRADLEY TN - 5SUGARGROV T - 1	163.19	163.40	161.31	161.73	1.88	161.73	159.78	160.45	3.41	2.95
5NORRIS HP - 1NORRIS H2 - 1	163.48	163.69	161.58	162.01	1.89	162.01	160.07	160.74	3.41	2.95
5BEAR CRK TN - 5MANIS RD TN - 1	163.38	163.59	161.49	161.92	1.89	161.92	159.98	160.64	3.41	2.95
5NORRIS HP - 1NORRIS H1 - 1	163.48	163.69	161.59	162.01	1.89	162.01	160.07	160.74	3.41	2.95
5WID CRK FP1 - 5BEAULEU ALT - 1	163.37	163.58	161.49	161.91	1.88	161.91	159.97	160.63	3.40	2.95
5OCANA TN TP - 5STATION CMP - 1	163.48	163.70	161.59	162.01	1.89	162.01	160.08	160.75	3.40	2.95
5WGALLATIN T - 5STATION CMP - 1	163.49	163.70	161.59	162.02	1.89	162.02	160.08	160.75	3.40	2.95
5NISSAN DECH - 5NORTH COWAN - 1	163.37	163.58	161.49	161.92	1.88	161.92	159.97	160.63	3.40	2.95
5KINGST U1-4 - 5EATON XRD - 1	163.38	163.59	161.49	161.92	1.89	161.92	159.97	160.64	3.40	2.95
5COSBY TN - 5WALTERS - 1	163.49	163.70	161.60	162.02	1.89	162.02	160.09	160.75	3.40	2.95
5E CLEVELAND - 5SUGARGROV T - 1	163.22	163.43	161.34	161.77	1.88	161.77	159.82	160.49	3.40	2.95
5KINGST U1-4 - 5ORNL TN - 1	163.41	163.62	161.52	161.94	1.89	161.94	160.01	160.67	3.40	2.95
5EDGOTEN TN - 5BARKERSMILL - 1	163.50	163.71	161.61	162.03	1.89	162.03	160.10	160.76	3.40	2.95
5FT LOUDOUN - 5MANIS RD TN - 1	163.40	163.61	161.51	161.94	1.88	161.94	160.00	160.66	3.40	2.95
5HARRISNB TP - 5HOPEWELL TN - 1	163.37	163.58	161.50	161.92	1.87	161.92	159.96	160.63	3.40	2.95
5MCMINNVILLE - 5BRIDGSTONE - 1	163.77	163.98	161.90	162.33	1.87	162.33	160.37	161.03	3.40	2.95
8VALLEYVIEW - 1COGCALED T1 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.06	160.73	3.40	2.95
8VALLEYVIEW - 1COGCALED T2 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.06	160.73	3.40	2.95
8VALLEYVIEW - 1COGCALED T3 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.06	160.73	3.40	2.95
5COLBERT FP - 1COLBERT F4 - 1	163.46	163.67	161.57	162.00	1.89	162.00	160.06	160.72	3.40	2.95
5COLBERT FP - 1COLBERT F1 - 1	163.46	163.67	161.57	162.00	1.89	162.00	160.06	160.72	3.40	2.95
5COLBERT FP - 1COLBERT F3 - 1	163.46	163.67	161.57	162.00	1.89	162.00	160.06	160.72	3.40	2.95
5COLBERT FP - 1COLBERT F2 - 1	163.46	163.67	161.57	162.00	1.89	162.00	160.06	160.72	3.40	2.95
5MARSHALL KY - 5GOLO KY - 1	163.44	163.65	161.55	161.98	1.89	161.98	160.04	160.71	3.40	2.95
5MEC CC - 1MEC CT1 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.07	160.73	3.40	2.95
5MEC CC - 1MEC CT2 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.07	160.73	3.40	2.95
5MEC CC - 1MEC CT3 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.07	160.73	3.40	2.95

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5WID CRK FP1 - 1WID CRK F7H - 1	163.39	163.60	161.51	161.94	1.88	161.94	159.99	160.66	3.40	2.95
5SOLUTIA AL - 1DEC CT1 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.07	160.73	3.40	2.95
5SOLUTIA AL - 1DEC CT2 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.07	160.73	3.40	2.95
5SOLUTIA AL - 1DEC CT3 - 1	163.46	163.68	161.58	162.00	1.89	162.00	160.07	160.73	3.40	2.95
5WID CRK FP1 - 1WID CRK F7L - 1	163.40	163.61	161.52	161.94	1.88	161.94	160.00	160.66	3.40	2.95
5LAFAYETT TN - 5HARTSVLE TP - 1	163.48	163.69	161.59	162.02	1.89	162.02	160.08	160.75	3.40	2.95
5MCMINNVILLE - 5E MCMINN TP - 1	163.58	163.79	161.71	162.13	1.87	162.13	160.18	160.85	3.40	2.94
5SEQUOYAH NP - 5CHARLESTON - 2	163.44	163.65	161.57	161.99	1.87	161.99	160.04	160.70	3.40	2.94
5JVILLE FP#1 - 5JVILLE CT#3 - 1	163.40	163.61	161.51	161.94	1.88	161.94	160.00	160.66	3.40	2.94
5BLAIR RD TP - 5W OAK RIDGT - 1	163.39	163.60	161.51	161.93	1.88	161.93	159.99	160.66	3.40	2.94
5MAYFIELD KY - 5GOLO KY - 1	163.44	163.66	161.56	161.98	1.88	161.98	160.05	160.71	3.40	2.94
5PIN HOOK TN - 8PIN HOOK TN - 1	163.50	163.71	161.62	162.05	1.88	162.05	160.10	160.77	3.40	2.94
5PARADISE FP - 5BOWLING GRN - 1	163.46	163.67	161.58	162.00	1.88	162.00	160.07	160.73	3.39	2.94
5PARADISE FP - 5N.HARD - 1	163.43	163.64	161.55	161.97	1.88	161.97	160.03	160.70	3.39	2.94
5GALLATN PRI - 5GALLATIN F2 - 1	163.50	163.71	161.61	162.04	1.88	162.04	160.10	160.77	3.39	2.94
5E BOWLGREEN - 5ABERD KY TP - 1	163.47	163.69	161.59	162.01	1.88	162.01	160.08	160.74	3.39	2.94
5GALLATIN F2 - 5CAIRO BEND - 1	163.45	163.66	161.57	161.99	1.88	161.99	160.06	160.72	3.39	2.94
5JONES COVE - 5COSBY TN - 1	163.49	163.70	161.61	162.03	1.88	162.03	160.10	160.76	3.39	2.94
5KIRKWOOD TP - 5ROSSVIEW - 1	163.46	163.67	161.58	162.00	1.88	162.00	160.06	160.73	3.39	2.94
5CHARLESTON - 5HOPEWELL TN - 1	163.48	163.69	161.61	162.04	1.87	162.04	160.08	160.75	3.39	2.94
5BULL RUN FP - 5KARNS TN - 1	163.46	163.67	161.58	162.00	1.88	162.00	160.07	160.73	3.39	2.94
5RACCOON MT2 - 1RACCOON P1 - 1	163.52	163.73	161.64	162.06	1.88	162.06	160.13	160.79	3.39	2.94
5RACCOON MT2 - 1RACCOON P2 - 1	163.52	163.73	161.64	162.06	1.88	162.06	160.13	160.79	3.39	2.94
5WINCHESTER - 5WINCH REACT - 1	163.40	163.62	161.53	161.96	1.87	161.96	160.01	160.68	3.39	2.94
5NISSAN DECH - 5WINCH REACT - 1	163.40	163.62	161.53	161.96	1.87	161.96	160.01	160.68	3.39	2.94
5FT LOUDOUN - 5EATON XRD - 1	163.43	163.64	161.55	161.97	1.88	161.97	160.03	160.70	3.39	2.94
8PARADISE FP - 1PARADISF3AB - 1	163.47	163.68	161.59	162.01	1.88	162.01	160.08	160.74	3.39	2.94
5WID CRK FP2 - 1WID CRK F8A - 1	163.50	163.71	161.62	162.04	1.88	162.04	160.10	160.77	3.39	2.94
5WID CRK FP2 - 1WID CRK F8B - 1	163.50	163.71	161.62	162.04	1.88	162.04	160.10	160.77	3.39	2.94
5PARADISE FP - 5LOSTCITY KY - 1	163.45	163.66	161.57	162.00	1.88	162.00	160.06	160.72	3.39	2.94
8UNION MS - 8PLEASANT HL - 1	163.49	163.71	161.61	162.04	1.88	162.04	160.10	160.77	3.39	2.94

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5HOPKINSV KY - 5CASKY KY - 1	163.45	163.67	161.57	162.00	1.88	162.00	160.06	160.73	3.39	2.94
5SWEETWATER - 5NIOTA TN - 1	163.66	163.87	161.82	162.25	1.84	162.25	160.27	160.94	3.39	2.94
5COOPERTOWNT - 5ROSSVIEW - 1	163.46	163.67	161.58	162.01	1.88	162.01	160.07	160.73	3.39	2.94
5WHEELER HP - 1WHEELRH9-11 - 1	163.47	163.68	161.59	162.01	1.88	162.01	160.08	160.74	3.39	2.94
5HENDRSNVL T - 5OCANA TN TP - 1	163.49	163.70	161.61	162.03	1.88	162.03	160.10	160.77	3.39	2.94
8VALLEYVIEW - 1COGCALED S2 - 1	163.47	163.68	161.59	162.01	1.88	162.01	160.08	160.74	3.39	2.94
5BETHEL RD - 5GOODLETTSVL - 1	163.47	163.68	161.59	162.02	1.88	162.02	160.08	160.75	3.39	2.94
5FRANKLIN TN - 5ESTILL SPGS - 1	163.09	163.30	161.25	161.67	1.84	161.67	159.70	160.36	3.39	2.93
5DICKSON TN - 2DICKSON TN - 1	163.49	163.70	161.60	162.02	1.89	162.02	160.10	160.77	3.39	2.94
5WILSON TN - 5GALLATIN F1 - 1	163.46	163.67	161.58	162.00	1.88	162.00	160.07	160.73	3.39	2.94
8WID CRK FP - 5WID CRK FP2 - 1	163.46	163.67	161.58	162.01	1.87	162.01	160.07	160.73	3.39	2.94
5PARADISE FP - 5ABERD KY TP - 1	163.46	163.67	161.59	162.01	1.88	162.01	160.08	160.74	3.39	2.94
2OLD HICKORY - 1OLDHICKH1-2 - 1	163.44	163.65	161.57	161.99	1.88	161.99	160.05	160.72	3.39	2.94
2OLD HICKORY - 1OLDHICKH3-4 - 1	163.44	163.65	161.57	161.99	1.88	161.99	160.05	160.72	3.39	2.93
8SHELBY TN - 8CORDOVA TN - 1	163.48	163.69	161.60	162.02	1.88	162.02	160.09	160.75	3.39	2.94
8VALLEYVIEW - 1COGCALED S1 - 1	163.47	163.68	161.59	162.02	1.88	162.02	160.08	160.74	3.39	2.94
CAPS - WBH 2-2 - 1	160.62	160.84	158.78	159.21	1.85	159.21	157.23	157.92	3.39	2.92
5MAURY TN - 5SPRING HILL - 1	163.24	163.46	161.38	161.80	1.87	161.80	159.86	160.52	3.39	2.93
8LAG CRK CT - 1LAG CRK CT1 - 1	163.46	163.67	161.59	162.01	1.87	162.01	160.07	160.74	3.39	2.93
8LAG CRK CT - 1LAG CRK CT2 - 1	163.46	163.67	161.59	162.01	1.87	162.01	160.07	160.74	3.39	2.93
5GREAT FALLS - 5E MCMINN TP - 1	163.79	164.01	161.92	162.35	1.87	162.35	160.41	161.07	3.39	2.94
8VALLEYVIEW - 1COGCALED S3 - 1	163.47	163.68	161.59	162.02	1.87	162.02	160.08	160.75	3.39	2.93
5GLASGOW TP - 5E GLASGOW T - 1	163.49	163.70	161.61	162.04	1.87	162.04	160.10	160.76	3.39	2.93
5OAK RIDG TN - 5KINGST U1-4 - 1	163.42	163.63	161.55	161.97	1.87	161.97	160.04	160.70	3.39	2.93
4NBRISTOL VA - 05WOLFH2 - 1	163.49	163.70	161.61	162.04	1.87	162.04	160.10	160.77	3.38	2.93
5ALCOA SW TN - 5PROFIT SPGS - 1	163.46	163.67	161.58	162.01	1.87	162.01	160.07	160.74	3.38	2.93
5CAIRO BEND - 5EASTGATE TN - 1	163.47	163.68	161.59	162.02	1.87	162.02	160.08	160.75	3.38	2.93
5CROSS PARK - 5KARNS TN - 1	163.47	163.68	161.60	162.02	1.87	162.02	160.09	160.75	3.38	2.93
5ROCKWOOD TP - 5KINGST U5-6 - 1	162.93	163.14	161.07	161.50	1.86	161.50	159.55	160.21	3.38	2.93
5KEDRON RD - 5SPRING HILL - 1	163.27	163.48	161.40	161.83	1.86	161.83	159.88	160.55	3.38	2.93
5LAFAYETT TN - 5S SCOTTSVLE - 1	163.49	163.70	161.62	162.04	1.87	162.04	160.11	160.77	3.38	2.93

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5ARDMORE AL - 5PARKCITY TP - 1	163.33	163.54	161.47	161.89	1.86	161.89	159.95	160.61	3.38	2.93
7SHAWNEE FP - 7E W FKFT - 1	163.46	163.67	161.59	162.01	1.87	162.01	160.08	160.74	3.38	2.93
8PLEASANT HL - 8BENTON MS - 1	163.49	163.70	161.62	162.04	1.87	162.04	160.11	160.77	3.38	2.93
5DAVIDSON #2 - 5DAVIDSON RD - 1	163.47	163.69	161.60	162.03	1.87	162.03	160.09	160.76	3.38	2.93
5JONES COVE - 5WALNUT GR T - 1	163.50	163.71	161.62	162.05	1.87	162.05	160.11	160.78	3.38	2.93
5J SEVIER #1 - 5PERSIA TN - 1	163.45	163.66	161.58	162.00	1.87	162.00	160.06	160.73	3.38	2.93
5ALCOA SOUTH - 5CALDERWOOD - 1	163.46	163.67	161.59	162.01	1.87	162.01	160.08	160.74	3.38	2.93
5J SEVIER #2 - 5PHIPPS B NP - 2	163.48	163.69	161.61	162.04	1.87	162.04	160.10	160.76	3.38	2.93
5J SEVIER #2 - 5PHIPPS B NP - 4	163.48	163.69	161.61	162.04	1.87	162.04	160.10	160.76	3.38	2.93
5S NASHVILLE - 5EASTGATE TN - 1	163.47	163.68	161.60	162.03	1.87	162.03	160.09	160.75	3.38	2.93
5COLBERT FP - 5WAYNESB TAP - 1	163.36	163.57	161.49	161.92	1.86	161.92	159.98	160.64	3.38	2.93
5PARIS TN - 5BIG SANDY T - 1	163.47	163.68	161.60	162.02	1.87	162.02	160.09	160.75	3.38	2.93
5JSEVIER C12 - 1J SEVIER C1 - 1	163.51	163.72	161.64	162.06	1.87	162.06	160.13	160.79	3.38	2.93
5JSEVIER C12 - 1J SEVIER C2 - 1	163.51	163.72	161.64	162.06	1.87	162.06	160.13	160.79	3.38	2.93
5RALLY HILL - 5KEDRON RD - 1	163.29	163.51	161.44	161.86	1.86	161.86	159.92	160.58	3.38	2.93
5WILSON TN - 5HERMITAG TN - 1	163.42	163.63	161.56	161.98	1.86	161.98	160.04	160.71	3.38	2.93
5LAKEVW TP#1 - 5SAUNDERSVLE - 1	163.47	163.68	161.60	162.03	1.87	162.03	160.09	160.75	3.38	2.93
5PARADISE FP - 5CROSS PLAIN - 1	163.42	163.63	161.55	161.98	1.86	161.98	160.04	160.70	3.38	2.93
5NICKJACK HP - 1NICKJK H1-2 - 1	163.47	163.68	161.61	162.03	1.87	162.03	160.09	160.76	3.38	2.93
5DAVIDSON #1 - 5W NASHVILLE - 1	163.46	163.68	161.60	162.02	1.87	162.02	160.09	160.75	3.38	2.93
5JVILLE FP#2 - 5BIG SANDY T - 1	163.47	163.68	161.60	162.02	1.87	162.02	160.09	160.75	3.38	2.93
8MONTGOMERY - 8DAVIDSON TN - 1	163.44	163.65	161.58	162.00	1.86	162.00	160.06	160.73	3.38	2.93
8BR FERRY NP - 8LIMESTONE - 1	163.50	163.71	161.63	162.05	1.87	162.05	160.12	160.78	3.38	2.93
5WILSON TN - 5LAKEVW TP#1 - 1	163.47	163.68	161.60	162.03	1.87	162.03	160.09	160.76	3.38	2.93
5HARRIMAN TN - 5BLAIR RD TP - 1	163.45	163.66	161.58	162.00	1.86	162.00	160.07	160.73	3.38	2.93
5COOPERTOWNT - 5S SPRINGFLD - 1	163.47	163.68	161.60	162.02	1.87	162.02	160.09	160.75	3.38	2.93
8UNION MS - 5UNION MS - 1	163.48	163.69	161.61	162.04	1.87	162.04	160.10	160.76	3.38	2.93
2TIMSFORD HP - 2SALEM TP - 1	163.43	163.64	161.57	161.99	1.86	161.99	160.05	160.72	3.38	2.92
2TIMSFORD HP - 1TIMSFORD H1 - 1	163.43	163.64	161.57	161.99	1.86	161.99	160.05	160.72	3.38	2.92
5BULL RUN FP - 5BULL SCR1BT - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.10	160.77	3.38	2.92
5FONTANA HP - 1FONTANA H1 - 1	163.51	163.72	161.64	162.07	1.87	162.07	160.13	160.80	3.38	2.92

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5FONTANA HP - 1FONTANA H3 - 1	163.51	163.72	161.64	162.07	1.87	162.07	160.13	160.80	3.38	2.92
5SUMMER SHAD - 5LAFAYETT TN - 1	163.47	163.68	161.60	162.03	1.86	162.03	160.09	160.75	3.38	2.92
5GALLATIN F1 - 5ANGELTOWN - 1	163.48	163.69	161.61	162.04	1.87	162.04	160.10	160.77	3.38	2.92
5ALCOA SOUTH - 5CHEOAH HP - 1	163.47	163.69	161.61	162.03	1.86	162.03	160.10	160.76	3.38	2.92
5ATHENS TN - 5NIOTA TN - 1	163.84	164.05	162.00	162.43	1.83	162.43	160.46	161.12	3.38	2.93
5LEBANON TN - 5LASCASSAS - 1	163.34	163.55	161.48	161.91	1.86	161.91	159.97	160.63	3.38	2.92
5FONTANA HP - 1FONTANA H2 - 1	163.51	163.72	161.65	162.07	1.87	162.07	160.13	160.80	3.38	2.92
8WILSON TN - 5WILSON TN - 1	163.32	163.53	161.46	161.89	1.85	161.89	159.94	160.61	3.38	2.92
5ALCOA SW TN - 5FONTANA HP - 1	163.47	163.69	161.61	162.03	1.86	162.03	160.10	160.76	3.38	2.92
5JSEVIER C34 - 1J SEVIER C3 - 1	163.50	163.71	161.64	162.06	1.87	162.06	160.12	160.79	3.38	2.92
5N KNOX TN - 5W HILL KUB - 1	163.49	163.70	161.62	162.05	1.86	162.05	160.11	160.77	3.38	2.92
5LONSDALE TN - 5BULL SCR1BT - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.38	2.92
5MONTEREY TN - 5ALGOOD TP - 1	163.24	163.46	161.41	161.83	1.84	161.83	159.87	160.53	3.38	2.92
5FONTANA HP - 5HWY 411 TN - 1	163.47	163.69	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
8JVILLE FP - 8CUMBERLAND - 1	163.46	163.67	161.59	162.02	1.86	162.02	160.08	160.75	3.37	2.92
5NICKJACK HP - 1NICKJK H3-4 - 1	163.47	163.69	161.61	162.04	1.86	162.04	160.10	160.76	3.37	2.92
5PERSIA TN - 5BULLS GAP - 1	163.45	163.66	161.59	162.01	1.86	162.01	160.08	160.74	3.37	2.92
8VOLUNTEER - 5VOLUNTEER#2 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.09	160.76	3.37	2.92
8PHIPPS B NP - 5PHIPPS B NP - 1	163.48	163.69	161.61	162.04	1.86	162.04	160.10	160.76	3.37	2.92
5WHEELER HP - 1WHEELR H1-2 - 1	163.47	163.69	161.61	162.04	1.86	162.04	160.10	160.76	3.37	2.92
5WHEELER HP - 1WHEELR H7-8 - 1	163.47	163.69	161.61	162.04	1.86	162.04	160.10	160.76	3.37	2.92
5BARKLEY HP - 5HOPCO - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5FAYETTVL TN - 5PARKCITY TP - 1	163.40	163.61	161.54	161.97	1.86	161.97	160.03	160.69	3.37	2.92
5WHEELER HP - 1WHEELR H5-6 - 1	163.47	163.69	161.61	162.04	1.86	162.04	160.10	160.76	3.37	2.92
5DOUGLAS HP - 1DOUGLAS H3 - 1	163.49	163.70	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5DOUGLAS HP - 1DOUGLAS H4 - 1	163.49	163.70	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
2SHOLSTON HP - 1SHOLSTON H1 - 1	163.49	163.70	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5RUTHERFORD - 5CASON LANE - 1	163.20	163.41	161.35	161.77	1.85	161.77	159.83	160.49	3.37	2.92
5E GALLATIN - 5HOEGANAES T - 1	163.50	163.72	161.64	162.06	1.86	162.06	160.13	160.80	3.37	2.92
5GALLATN PRI - 5HOEGANAES T - 1	163.50	163.72	161.64	162.06	1.86	162.06	160.13	160.80	3.37	2.92
5DEKALB MS - 5KEMPER CT - 1	163.50	163.71	161.64	162.06	1.86	162.06	160.13	160.79	3.37	2.92

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5HIWASSEE HP - 5TELLICO TN - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.09	160.76	3.37	2.92
5WHEELER HP - 1WHEELR H3-4 - 1	163.48	163.69	161.61	162.04	1.86	162.04	160.10	160.77	3.37	2.92
5NEJC TN - 5WJC TN - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5APALACHIA - 1APALACH H2 - 1	163.49	163.70	161.63	162.06	1.86	162.06	160.12	160.78	3.37	2.92
5E GALLATIN - 5FOUNTAINHD - 1	163.49	163.71	161.63	162.06	1.86	162.06	160.12	160.79	3.37	2.92
8BR FERRY NP - 8MADISON AL - 1	163.50	163.71	161.64	162.06	1.86	162.06	160.13	160.79	3.37	2.92
5APALACHIA - 1APALACH H1 - 1	163.49	163.71	161.63	162.06	1.86	162.06	160.12	160.79	3.37	2.92
5W NASHVILLE - 5DAVIDSON RD - 1	163.47	163.69	161.61	162.04	1.86	162.04	160.10	160.77	3.37	2.92
5DAVIDSON #2 - 5GRASSLAND T - 1	163.41	163.62	161.55	161.97	1.86	161.97	160.04	160.70	3.37	2.92
5SUMMER SHAD - 5LEBJCTT - 1	163.49	163.70	161.63	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5WILSON HP - 1WILSON H5-6 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.10	160.77	3.37	2.92
5LAWRENCB TN - 5WALTER ANDR - 1	163.35	163.56	161.50	161.92	1.86	161.92	159.98	160.64	3.37	2.92
5ALCOA SOUTH - 5CHILHOWE HP - 1	163.46	163.67	161.60	162.03	1.86	162.03	160.09	160.75	3.37	2.92
2MELTON H HP - 1MELTON H H1 - 1	163.49	163.70	161.63	162.05	1.86	162.05	160.12	160.78	3.37	2.92
5PARADISE FP - 5HOPKINSV KY - 1	163.49	163.70	161.63	162.05	1.86	162.05	160.12	160.78	3.37	2.92
5DAVIDSON #1 - 5FOREST HILL - 1	163.42	163.63	161.56	161.99	1.86	161.99	160.05	160.71	3.37	2.92
2FT PATHENRY - 1FT PAT H1-2 - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5PHIPPS B NP - 5JSEV C34 TP - 3	163.62	163.83	161.75	162.17	1.87	162.17	160.25	160.91	3.37	2.92
5EDGOTEN TN - 5COMMERCE PK - 1	163.49	163.70	161.63	162.06	1.86	162.06	160.12	160.79	3.37	2.92
5CROSS PLAIN - 5WHITEHOUSET - 1	163.44	163.65	161.58	162.00	1.86	162.00	160.07	160.73	3.37	2.92
2WATAUGA HP - 2ELIZABETHTN - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5BOWLING GRN - 5S BOWLGRN T - 1	163.45	163.66	161.59	162.02	1.86	162.02	160.08	160.74	3.37	2.92
5DOVER TN - 5BARKLEY HP - 1	163.47	163.69	161.61	162.04	1.86	162.04	160.10	160.77	3.37	2.92
5CORDELL HP - 1CORDELL H1 - 1	163.36	163.57	161.51	161.93	1.85	161.93	159.99	160.66	3.37	2.92
5CORDELL HP - 1CORDELL H2 - 1	163.36	163.57	161.51	161.93	1.85	161.93	159.99	160.66	3.37	2.92
5CORDELL HP - 1CORDELL H3 - 1	163.36	163.57	161.51	161.93	1.85	161.93	159.99	160.66	3.37	2.92
2MELTON H HP - 1MELTON H H2 - 1	163.49	163.70	161.63	162.06	1.86	162.06	160.12	160.78	3.37	2.92
5MEM JUNCT - 5S BOWLGRN T - 1	163.45	163.66	161.59	162.02	1.86	162.02	160.08	160.74	3.37	2.92
5SEQUOYAH NP - 5NOOLTEWAH - 1	163.28	163.49	161.43	161.85	1.85	161.85	159.91	160.57	3.37	2.92
5RALLY HILL - 5UNIONVLE TN - 1	163.38	163.59	161.52	161.95	1.85	161.95	160.01	160.67	3.37	2.92
5JSEV C34 TP - 5JSEVIER C34 - 3	163.62	163.83	161.75	162.17	1.87	162.17	160.25	160.91	3.37	2.92

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
5REDHILLS MS - 1REDHILLS F1 - 1	163.51	163.72	161.65	162.07	1.86	162.07	160.14	160.80	3.37	2.92
8SHELBY TN - 8LAG CRK CT - 1	163.50	163.71	161.64	162.06	1.86	162.06	160.13	160.79	3.37	2.92
5CHILHOWEE - 5TELLICO TN - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5CHILHOWEE - 5WELLSVLE TN - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5PIN HOOK TN - 5HURRICAN CR - 1	163.35	163.56	161.49	161.92	1.85	161.92	159.98	160.64	3.37	2.92
5MURFREESBRO - 5CASON LANE - 1	163.24	163.45	161.39	161.82	1.85	161.82	159.87	160.54	3.37	2.92
5SHAWNEE FP2 - 1SHAWNEE F4 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5SHAWNEE FP2 - 1SHAWNEE F6 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5SHAWNEE FP2 - 1SHAWNEE F1 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5MONTGOMRY#1 - 5UNION CARBT - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.77	3.37	2.92
5UNION CARBT - 5MIMMS INDPK - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.77	3.37	2.92
2WINCHESTER - 2SALEM TP - 1	163.47	163.68	161.61	162.04	1.86	162.04	160.10	160.76	3.37	2.92
5BETHEL RD - 5WHITEHOUSET - 1	163.45	163.66	161.59	162.01	1.86	162.01	160.08	160.74	3.37	2.92
5ALCOA SW TN - 5WELLSVLE TN - 1	163.46	163.67	161.61	162.03	1.86	162.03	160.09	160.76	3.37	2.92
8SULLIVAN TN - 5SULLIVAN #1 - 1	163.48	163.70	161.63	162.05	1.86	162.05	160.11	160.78	3.37	2.92
2WATAUGA HP - 1WATAUGA H1 - 1	163.49	163.70	161.63	162.05	1.86	162.05	160.12	160.78	3.37	2.92
5EBENEZER TN - 5CROSS PARK - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5NORRIS HP - 5ANDERSONVL - 1	163.50	163.72	161.65	162.07	1.86	162.07	160.14	160.80	3.37	2.92
5ATHENS TN - 5FT LOUDOUN - 1	163.51	163.72	161.68	162.11	1.83	162.11	160.14	160.81	3.37	2.92
5WILSON HP - 1WILSON H7-8 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5SR 160 TN - 5BULLS GAP - 1	163.45	163.67	161.60	162.02	1.85	162.02	160.09	160.75	3.37	2.92
5WILSON HP - 1WILSON 9-10 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5SHAWNEE G90 - 1SHAWNEE F9 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5WILSON HP - 1WILSON11-12 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5WILSON HP - 1WILSON15-16 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
1CHICK HP3-4 - 1CHICKAMG H4 - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5LORETTO TN - 5WAYNESB TAP - 1	163.42	163.63	161.56	161.99	1.85	161.99	160.05	160.71	3.37	2.92
5SHAWNEE G56 - 5C-31 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5SHAWNEE G56 - 1SHAWNEE F5 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
8JACKSON TN - 8BROWNSVL CT - 1	163.47	163.68	161.61	162.04	1.86	162.04	160.10	160.76	3.37	2.92
5WILSON HP - 1WILSON17-18 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
1CHICK HP3-4 - 1CHICKAMG H3 - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
1CHICK HP1-2 - 1CHICKAMG H1 - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
1CHICK HP1-2 - 1CHICKAMG H2 - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5SHAWNEE G12 - 5C-33 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5SHAWNEE G12 - 1SHAWNEE F2 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5SHAWNEE G34 - 5C-33 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5SHAWNEE G34 - 1SHAWNEE F3 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5PARADISE FP - 5FRUIT HL KY - 1	163.49	163.70	161.63	162.05	1.86	162.05	160.12	160.78	3.37	2.92
5S CLEVELAND - 5NOOLTEWAH - 1	163.30	163.51	161.45	161.87	1.85	161.87	159.93	160.59	3.37	2.92
5SHAWNEE G78 - 1SHAWNEE F7 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5SHAWNEE G78 - 1SHAWNEE F8 - 1	163.47	163.68	161.61	162.03	1.86	162.03	160.10	160.76	3.37	2.92
5N NASHVILLE - 5HENDRSNVL T - 1	163.50	163.71	161.64	162.06	1.86	162.06	160.13	160.79	3.37	2.92
5WHEELER HP - 5ELGIN AL - 1	163.41	163.62	161.55	161.98	1.85	161.98	160.04	160.70	3.37	2.92
5WILSON HP - 1WILSON H19 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5WILSON HP - 1WILSON H20 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5WILSON HP - 1WILSON H21 - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5DOUGLAS HP - 5NORTHVIEW - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5BOONE HP - 1BOONE H3 - 1	163.48	163.70	161.63	162.05	1.86	162.05	160.12	160.78	3.37	2.92
5CLINTON KY - 5CLINTONKY T - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5RUTHERFORD - 5CHRISTIANA - 1	163.37	163.59	161.52	161.95	1.85	161.95	160.01	160.67	3.37	2.92
5PARADISE FP - 5JASON KY - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5SOLWAY TN - 5SOLWAY TN T - 1	163.45	163.66	161.59	162.01	1.85	162.01	160.08	160.74	3.37	2.92
5NEW ST BETH - 5MIMMS INDPK - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92
5WILSON HP - 1WILSON H1-2 - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.77	3.37	2.92
5WILSON HP - 1WILSON H3-4 - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.77	3.37	2.92
5RADNOR TN - 5GRASSLAND T - 1	163.43	163.64	161.58	162.00	1.85	162.00	160.06	160.73	3.37	2.92
5CALDERWOOD - 1CALDERWD H1 - 1	163.50	163.72	161.65	162.07	1.86	162.07	160.14	160.80	3.37	2.92
5CALDERWOOD - 1CALDERWD H2 - 1	163.50	163.72	161.65	162.07	1.86	162.07	160.14	160.80	3.37	2.92
5CALDERWOOD - 1CALDERWD H3 - 1	163.50	163.72	161.65	162.07	1.86	162.07	160.14	160.80	3.37	2.92
5TIPTONVL TN - 5NEWMAD - 1	163.48	163.69	161.62	162.04	1.86	162.04	160.11	160.77	3.37	2.92
5SHAW REACT1 - 5CLINTONKY T - 1	163.48	163.69	161.62	162.05	1.86	162.05	160.11	160.78	3.37	2.92

2015 Results	Pre-event		T0+				T30			
Contingency Event	AD	BC	AD	BC	ΔAD	ΔBC	AD	BC	ΔAD	ΔBC
2PERCY PR HP - 1PERCY PR H1 - 1	163.46	163.67	161.61	162.03	1.85	162.03	160.10	160.76	3.37	2.92
2PERCY PR HP - 2DONELSON TN - 1	163.46	163.67	161.61	162.03	1.85	162.03	160.10	160.76	3.37	2.92
5CHANDLER TN - 5PROFIT SPGS - 1	163.46	163.67	161.61	162.03	1.86	162.03	160.09	160.76	3.37	2.92
5JVILLE FP#1 - 5DRY CREEK T - 1	163.45	163.66	161.59	162.02	1.85	162.02	160.08	160.75	3.37	2.91
5SHAWNEE G90 - 1SHAWNEE F10 - 1	163.47	163.68	161.61	162.04	1.85	162.04	160.10	160.77	3.37	2.91
5SPRINGFIELD - 5S SPRINGFLD - 1	163.47	163.68	161.62	162.04	1.86	162.04	160.10	160.77	3.37	2.91
5MARSHALL KY - 5BENTON KY - 1	163.47	163.68	161.61	162.04	1.85	162.04	160.10	160.76	3.37	2.91
8MAURY TN - 5MAURY TN - 1	163.34	163.55	161.49	161.91	1.85	161.91	159.97	160.64	3.37	2.91
5MEC CC - 1MEC STG - 1	163.50	163.71	161.64	162.06	1.86	162.06	160.13	160.79	3.37	2.91
5CROCKETT TN - 5LORETTO TN - 1	163.43	163.64	161.58	162.00	1.85	162.00	160.06	160.73	3.37	2.91
5SOLUTIA AL - 1DEC STG - 1	163.50	163.71	161.64	162.06	1.86	162.06	160.13	160.79	3.37	2.91
2WATAUGA HP - 1WATAUGA H2 - 1	163.49	163.70	161.63	162.06	1.86	162.06	160.12	160.79	3.37	2.91
8MARSHALL KY - 5MARSHALL KY - 1	163.48	163.69	161.63	162.05	1.85	162.05	160.12	160.78	3.37	2.91
8SULLIVAN TN - 05NAGEL - 1	163.49	163.70	161.63	162.05	1.85	162.05	160.12	160.78	3.37	2.91
5DOUGLAS HP - 5CHEROKEE HP - 1	163.47	163.69	161.62	162.04	1.85	162.04	160.11	160.77	3.37	2.91
8JACKSON TN - 8JVILLE FP - 1	163.49	163.71	161.64	162.06	1.86	162.06	160.13	160.79	3.37	2.91
5ALCOA SW TN - 5HWY 411 TN - 1	163.49	163.70	161.63	162.06	1.85	162.06	160.12	160.79	3.37	2.91
5MT PLEAS TN - 5CULLEOKA TP - 1	163.48	163.70	161.63	162.06	1.85	162.06	160.12	160.78	3.37	2.91
5DOUGLAS HP - 5E SEVIERVLT - 1	163.48	163.69	161.63	162.05	1.85	162.05	160.12	160.78	3.37	2.91
5ELK RIDGE - 5CULLEOKA TP - 1	163.46	163.67	161.61	162.03	1.85	162.03	160.09	160.76	3.37	2.91
5WILSON HP - 5PHIL TAP - 1	163.49	163.70	161.64	162.06	1.85	162.06	160.12	160.79	3.37	2.91
8SHAWNEE FP - 7SHAWNEE FP - 1	163.47	163.68	161.62	162.04	1.85	162.04	160.11	160.77	3.37	2.91
5SHAWNEE FP1 - 5SHAW REACT1 - 1	163.48	163.69	161.63	162.05	1.85	162.05	160.11	160.78	3.37	2.91
8WEAKLEY TN - 8LAG CRK CT - 1	163.46	163.68	161.61	162.04	1.85	162.04	160.10	160.76	3.37	2.91
5GUNTERSV HP - 5GRGIAMTN AL - 1	163.47	163.68	161.62	162.04	1.85	162.04	160.11	160.77	3.37	2.91

***All significant pre-events are shown above. The pre-events not shown in the above had results indicating no adverse impact on WBN offsite power.**

Appendix III
500kV Results

500 kV Results- U1 & U2 Online- Loading Table 6 - Accident on U1

500kV Summer 2015 Case

Results are sorted by largest U1 voltage drop at T=0+ from pre-event voltage

Please note that T=30 voltages do not fall under 500kV offsite voltage criteria.

Largest Delta and lowest T=0+ voltage are shaded.

Both Units Online - LOCA on U1	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
SQN U1	Table 6	23.90	23.96	23.82	23.84	0.08	0.12	23.21	23.59	0.70	0.36
8MARSHALL KY - 8CUMBERLAND - 1	Table 6	23.81	23.86	23.74	23.75	0.07	0.11	23.28	23.57	0.53	0.29
5SEQUOYAH NP - 1SEQUOYAH N2 - 1	Table 6	23.88	23.93	23.81	23.83	0.07	0.10	23.20	23.57	0.68	0.36
8RACCOON MTN - 5RACCOON MT2 - 1	Table 6	23.79	23.84	23.74	23.76	0.05	0.09	23.32	23.59	0.47	0.25
8WID CRK FP - 8RACCOON MTN - 1	Table 6	23.80	23.85	23.75	23.77	0.05	0.09	23.31	23.59	0.49	0.26
5KINGST U7-9 - 1KINGSTON F9 - 1	Table 6	23.80	23.86	23.76	23.77	0.05	0.08	23.31	23.59	0.50	0.26
5KINGST U7-9 - 1KINGSTON F8 - 1	Table 6	23.80	23.86	23.76	23.77	0.05	0.08	23.31	23.59	0.50	0.26
8SHELBY TN - 8SANSOUC - 1	Table 6	23.81	23.86	23.76	23.78	0.05	0.08	23.31	23.60	0.50	0.26
5KINGST U7-9 - 1KINGSTON F7 - 1	Table 6	23.80	23.86	23.76	23.77	0.05	0.08	23.31	23.59	0.50	0.26
5BULL RUN FP - 1BULLRUN F1H - 1	Table 6	23.93	23.98	23.88	23.90	0.05	0.08	23.23	23.64	0.70	0.34
5BULL RUN FP - 1BULLRUN F1L - 1	Table 6	23.90	23.96	23.86	23.87	0.05	0.08	23.25	23.63	0.66	0.32
8CUMBERLAND - 8MONTGOMERY - 1	Table 6	23.85	23.90	23.80	23.82	0.05	0.08	23.28	23.61	0.57	0.29
8CUMBERLAND - 8DAVIDSON TN - 1	Table 6	23.85	23.91	23.81	23.83	0.05	0.08	23.27	23.61	0.58	0.30
5BRADLEY TN - 5SUGARGROV T - 1	Table 6	23.76	23.81	23.71	23.73	0.04	0.08	23.35	23.59	0.40	0.22
5KINGST U5-6 - 1KINGSTON F5 - 1	Table 6	23.82	23.87	23.78	23.79	0.04	0.08	23.30	23.60	0.52	0.27
5KINGST U5-6 - 1KINGSTON F6 - 1	Table 6	23.82	23.87	23.77	23.79	0.04	0.08	23.30	23.60	0.52	0.27
5E CLEVELAND - 5SUGARGROV T - 1	Table 6	23.76	23.81	23.71	23.73	0.04	0.08	23.35	23.59	0.40	0.22
5GALLATIN F2 - 5GALLATIN5-8 - 1	Table 6	23.82	23.87	23.77	23.79	0.04	0.08	23.30	23.60	0.52	0.27
8BRADLEY TN - 5BRADLEY TN - 1	Table 6	23.70	23.76	23.66	23.68	0.04	0.08	23.39	23.57	0.32	0.19
8SHAWNEE FP - 8MARSHALL KY - 1	Table 6	23.81	23.86	23.76	23.78	0.04	0.08	23.31	23.60	0.49	0.26
5COSBY TN - 5WALTERS - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.08	23.32	23.59	0.47	0.25
Wacker 500 - 8SEQUOYAH NP - 1	Table 6	23.82	23.88	23.78	23.80	0.04	0.08	23.27	23.58	0.55	0.30
8BR FERRY NP - 1BR FERRY N1 - 1	Table 6	23.80	23.86	23.76	23.78	0.04	0.08	23.31	23.60	0.49	0.26
5KINGST U1-4 - 1KINGSTON F1 - 1	Table 6	23.79	23.85	23.75	23.77	0.04	0.08	23.32	23.60	0.47	0.25
5N NASHVILLE - 5GOODLETTSVL - 1	Table 6	23.79	23.84	23.74	23.76	0.04	0.08	23.32	23.59	0.46	0.25
5GALLATIN F2 - 1GALLATIN F3 - 1	Table 6	23.80	23.85	23.76	23.77	0.04	0.08	23.31	23.59	0.49	0.26
5GALLATIN F2 - 1GALLATIN F4 - 1	Table 6	23.80	23.85	23.76	23.77	0.04	0.08	23.31	23.59	0.49	0.26
5JONES COVE - 5COSBY TN - 1	Table 6	23.79	23.84	23.75	23.76	0.04	0.08	23.32	23.59	0.46	0.25

Both Units Online - LOCA on U1	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
5J SEVIER #1 - 1J SEVIER F4 - 1	Table 6	23.84	23.89	23.79	23.81	0.04	0.08	23.30	23.61	0.54	0.27
5J SEVIER #1 - 1J SEVIER F3 - 1	Table 6	23.84	23.89	23.79	23.81	0.04	0.08	23.30	23.61	0.54	0.27
5KINGST U1-4 - 1KINGSTON F4 - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.08	23.32	23.60	0.47	0.25
5KINGST U1-4 - 1KINGSTON F3 - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.08	23.32	23.60	0.47	0.25
8BR FERRY NP - 1BR FERRY N2 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.08	23.32	23.60	0.48	0.25
8BR FERRY NP - 1BR FERRY N3 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.08	23.32	23.60	0.48	0.25
5RACCOON MT2 - 1RACCOON P2 - 1	Table 6	23.78	23.84	23.74	23.76	0.04	0.08	23.33	23.60	0.45	0.24
5RACCOON MT2 - 1RACCOON P1 - 1	Table 6	23.78	23.84	23.74	23.76	0.04	0.08	23.33	23.60	0.45	0.24
5KINGST U1-4 - 1KINGSTON F2 - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.08	23.32	23.60	0.47	0.25
8DAVIDSON TN - 8MAURY TN - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.08	23.32	23.60	0.48	0.25
5BARKERSMILL - 5MONTGOMRY#1 - 1	Table 6	23.79	23.84	23.74	23.76	0.04	0.08	23.33	23.59	0.46	0.24
8CUMBERLAND - 1CUMBRL F1HL - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.08	23.32	23.60	0.48	0.25
8CUMBERLAND - 1CUMBRL F2HL - 1	Table 6	23.80	23.85	23.76	23.77	0.04	0.08	23.32	23.60	0.48	0.25
5J SEVIER #2 - 5GREENVL TP1 - 1	Table 6	23.84	23.89	23.80	23.81	0.04	0.07	23.29	23.61	0.54	0.28
5JONES COVE - 5WALNUT GR T - 1	Table 6	23.78	23.83	23.74	23.76	0.04	0.07	23.33	23.59	0.45	0.24
5PARADISE FP - 5N.HARD - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
8JVILLE FP - 8DAVIDSON TN - 1	Table 6	23.83	23.88	23.79	23.81	0.04	0.07	23.30	23.61	0.53	0.27
Roane 500 - 161 kV Bank	Table 6	23.69	23.74	**23.65**	23.66	0.04	0.08	23.39	23.56	0.30	0.18
8SULLIVAN TN - 05BROADF - 1	Table 6	23.71	23.76	23.67	23.69	0.04	0.08	23.38	23.57	0.33	0.19
5BLUFF CITY - 2BLUFF CITY - 1	Table 6	23.80	23.86	23.77	23.78	0.04	0.07	23.77	23.78	0.04	0.07
5ALCOA SW TN - 5PROFIT SPGS - 1	Table 6	23.82	23.88	23.78	23.80	0.04	0.07	23.30	23.61	0.52	0.27
5MEC CC - 1MEC CT1 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.47	0.25
5MEC CC - 1MEC CT2 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.47	0.25
5MEC CC - 1MEC CT3 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.47	0.25
5SOLUTIA AL - 1DEC CT1 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.47	0.25
5SOLUTIA AL - 1DEC CT2 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.47	0.25
5SOLUTIA AL - 1DEC CT3 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.47	0.25
5MONTGOMRY#2 - 5KIRKWOOD TP - 1	Table 6	23.79	23.85	23.75	23.77	0.04	0.07	23.32	23.60	0.47	0.25
5RACCOON MT1 - 1RACCOON P3 - 1	Table 6	23.81	23.86	23.77	23.78	0.04	0.07	23.32	23.60	0.49	0.25

Both Units Online - LOCA on U1	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
5MAYFIELD KY - 5PARIS TN - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.48	0.25
5COLBERT FP - 1COLBERT F4 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
5COLBERT FP - 1COLBERT F2 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
7SHAWNEE FP - 7E W FKFT - 1	Table 6	23.79	23.85	23.76	23.77	0.04	0.07	23.33	23.60	0.47	0.24
5COLBERT FP - 1COLBERT F1 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
5COLBERT FP - 1COLBERT F3 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
5CHANDLER TN - 5PROFIT SPGS - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.31	23.61	0.50	0.26
5RACCOON MT1 - 1RACCOON P4 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.31	23.60	0.49	0.26
5NIXON RD TN - 5STOCKCRK TN - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5STOCKCRK TN - 5CHANDLER TN - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.48	0.25
8PARADISE FP - 8MONTGOMERY - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5APISON PIKE - 5BRADLEY TN - 1	Table 6	23.77	23.82	23.73	23.75	0.04	0.07	23.35	23.60	0.42	0.22
5HIWASSEE HP - 1HIWASSEE H2 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
5HIWASSEE HP - 1HIWASSEE H1 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
5CATOOSA GA - 5WINDSTONE - 1	Table 6	23.77	23.82	23.73	23.75	0.04	0.07	23.35	23.60	0.42	0.22
5BRADLEY TN - 5WINDSTONE - 1	Table 6	23.77	23.82	23.73	23.75	0.04	0.07	23.35	23.60	0.42	0.22
5PARADISE FP - 1PARADIS F2H - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
4NBRISTOL VA - 05WOLFH2 - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.32	23.60	0.47	0.25
5CONCORD TN - 5CATOOSA GA - 1	Table 6	23.77	23.82	23.73	23.75	0.04	0.07	23.35	23.60	0.42	0.22
8VALLEYVIEW - 1COGCALED T1 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
8VALLEYVIEW - 1COGCALED T2 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
8VALLEYVIEW - 1COGCALED T3 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
5PARADISE FP - 1PARADIS F1H - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5PARADISE FP - 1PARADIS F2L - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
8MONTGOMERY - 8WILSON TN - 1	Table 6	23.82	23.88	23.79	23.80	0.04	0.07	23.31	23.61	0.52	0.26
5SUMMER SHAD - 5E GLASGOW T - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5PARADISE FP - 1PARADIS F1L - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
8MAURY TN - 8FRANKLIN TN - 1	Table 6	23.78	23.84	23.75	23.76	0.04	0.07	23.33	23.60	0.45	0.24
8LAG CRK CT - 1LAG CRK CT1 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25

Both Units Online - LOCA on U1	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
8LAG CRK CT - 1LAG CRK CT2 - 1	Table 6	23.81	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.49	0.25
5JSEVIER C12 - 1J SEVIER C1 - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5JSEVIER C12 - 1J SEVIER C2 - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5WHEELER HP - 1WHEELRH9-11 - 1	Table 6	23.79	23.85	23.76	23.78	0.04	0.07	23.33	23.60	0.47	0.24
8UNION MS - 8PLEASANT HL - 1	Table 6	23.79	23.85	23.76	23.77	0.04	0.07	23.33	23.60	0.46	0.24
8LOWNDES MS - 8VALLEYVIEW - 1	Table 6	23.78	23.83	23.74	23.76	0.04	0.07	23.35	23.60	0.43	0.22
8PARADISE FP - 1PARADISF3AB - 1	Table 6	23.78	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.45	0.24
5GALLATIN F1 - 1GALLATIN F1 - 1	Table 6	23.79	23.84	23.76	23.77	0.04	0.07	23.33	23.60	0.47	0.24
5GALLATIN F1 - 1GALLATIN F2 - 1	Table 6	23.79	23.84	23.76	23.77	0.04	0.07	23.33	23.60	0.47	0.24
5SUMMER SHAD - 5LEBJCTT - 1	Table 6	23.79	23.84	23.76	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5BARKLEY HP - 5HOPCO - 1	Table 6	23.79	23.85	23.76	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5OAK RIDG TN - 5KINGST U1-4 - 1	Table 6	23.80	23.86	23.77	23.79	0.04	0.07	23.32	23.61	0.48	0.25
5APISON PIKE - 5WOOLTEWAH - 1	Table 6	23.77	23.83	23.74	23.76	0.04	0.07	23.35	23.60	0.43	0.22
5GALLATIN F1 - 5HARTSVLE TP - 1	Table 6	23.79	23.84	23.75	23.77	0.04	0.07	23.33	23.60	0.46	0.24
5DOUGLAS HP - 5WALNUT GR T - 1	Table 6	23.78	23.83	23.74	23.76	0.04	0.07	23.34	23.59	0.44	0.23
8DAVIDSON TN - 8PIN HOOK TN - 1	Table 6	23.84	23.89	23.80	23.82	0.04	0.07	23.30	23.62	0.54	0.27
5MAYFIELD KY - 5GOLO KY - 1	Table 6	23.80	23.85	23.76	23.78	0.04	0.07	23.33	23.60	0.47	0.24
5SUMMER SHAD - 5LAFAYETT TN - 1	Table 6	23.79	23.84	23.76	23.77	0.04	0.07	23.33	23.60	0.46	0.24

***Results are truncated due to pre-events no longer causing significant impact to 500kV offsite power.**

500 kV Results- U1 & U2 Online- Loading Table 7 - Accident on U2

500kV Summer 2015 Case

Results are sorted by largest U2 voltage drop at T=0+ from pre-event voltage

Please note that T=30 voltages do not fall under 500kV offsite voltage criteria.

Largest Delta and lowest T=0+ voltage are shaded.

Both Units Online - LOCA on U2	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
SQN U1	Table 7	23.96	23.90	23.84	23.82	0.12	0.08	23.60	23.21	0.36	0.70
8MARSHALL KY - 8CUMBERLAND - 1	Table 7	23.87	23.81	23.76	23.74	0.11	0.07	23.57	23.28	0.29	0.53
5SEQUOYAH NP - 1SEQUOYAH N2 - 1	Table 7	23.94	23.88	23.83	23.81	0.10	0.06	23.57	23.20	0.36	0.67
8RACCOON MTN - 5RACCOON MT2 - 1	Table 7	23.85	23.79	23.76	23.74	0.09	0.05	23.59	23.32	0.25	0.47
8WID CRK FP - 8RACCOON MTN - 1	Table 7	23.86	23.80	23.77	23.75	0.09	0.05	23.60	23.31	0.26	0.49
5KINGST U7-9 - 1KINGSTON F9 - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.60	23.31	0.26	0.50
8SHELBY TN - 8SANSOUC - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.60	23.31	0.26	0.50
5BULL RUN FP - 1BULLRUN F1H - 1	Table 7	23.98	23.93	23.90	23.88	0.08	0.04	23.65	23.23	0.34	0.69
5KINGST U7-9 - 1KINGSTON F8 - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.60	23.31	0.26	0.49
5KINGST U7-9 - 1KINGSTON F7 - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.60	23.31	0.26	0.49
5BULL RUN FP - 1BULLRUN F1L - 1	Table 7	23.96	23.90	23.88	23.86	0.08	0.04	23.64	23.25	0.32	0.65
8CUMBERLAND - 8MONTGOMERY - 1	Table 7	23.91	23.85	23.83	23.81	0.08	0.04	23.61	23.28	0.29	0.57
8CUMBERLAND - 8DAVIDSON TN - 1	Table 7	23.91	23.85	23.83	23.81	0.08	0.04	23.61	23.27	0.30	0.58
5KINGST U5-6 - 1KINGSTON F5 - 1	Table 7	23.88	23.82	23.80	23.78	0.08	0.04	23.61	23.30	0.27	0.51
5KINGST U5-6 - 1KINGSTON F6 - 1	Table 7	23.88	23.82	23.80	23.78	0.08	0.04	23.61	23.30	0.27	0.51
5BRADLEY TN - 5SUGARGROV T - 1	Table 7	23.81	23.75	23.73	23.71	0.08	0.04	23.60	23.35	0.22	0.40
5GALLATIN F2 - 5GALLATIN5-8 - 1	Table 7	23.87	23.81	23.79	23.77	0.08	0.04	23.60	23.30	0.27	0.51
5E CLEVELAND - 5SUGARGROV T - 1	Table 7	23.81	23.75	23.73	23.71	0.08	0.04	23.60	23.35	0.22	0.40
8BRADLEY TN - 5BRADLEY TN - 1	Table 7	23.76	23.70	23.68	23.66	0.08	0.04	23.57	23.39	0.18	0.31
8SHAWNEE FP - 8MARSHALL KY - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.61	23.31	0.26	0.49
5COSBY TN - 5WALTERS - 1	Table 7	23.85	23.79	23.77	23.75	0.08	0.04	23.60	23.32	0.25	0.47
8BR FERRY NP - 1BR FERRY N1 - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.60	23.31	0.26	0.49
Wacker 500 - 8SEQUOYAH NP - 1	Table 7	23.88	23.82	23.80	23.78	0.08	0.04	23.58	23.27	0.30	0.55
5KINGST U1-4 - 1KINGSTON F1 - 1	Table 7	23.85	23.79	23.77	23.75	0.08	0.04	23.60	23.32	0.25	0.47
5N NASHVILLE - 5GOODLETTSVL - 1	Table 7	23.84	23.78	23.77	23.75	0.08	0.04	23.60	23.32	0.25	0.46
5GALLATIN F2 - 1GALLATIN F3 - 1	Table 7	23.85	23.80	23.78	23.76	0.08	0.04	23.60	23.31	0.26	0.48
5GALLATIN F2 - 1GALLATIN F4 - 1	Table 7	23.85	23.80	23.78	23.76	0.08	0.04	23.60	23.31	0.26	0.48
5JONES COVE - 5COSBY TN - 1	Table 7	23.84	23.78	23.77	23.75	0.08	0.04	23.60	23.32	0.25	0.46

Both Units Online - LOCA on U2	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
5J SEVIER #1 - 1J SEVIER F4 - 1	Table 7	23.89	23.83	23.82	23.80	0.08	0.04	23.62	23.30	0.27	0.54
5J SEVIER #1 - 1J SEVIER F3 - 1	Table 7	23.89	23.83	23.82	23.80	0.08	0.04	23.62	23.30	0.27	0.54
5KINGST U1-4 - 1KINGSTON F4 - 1	Table 7	23.85	23.79	23.77	23.75	0.08	0.04	23.60	23.32	0.25	0.47
5KINGST U1-4 - 1KINGSTON F3 - 1	Table 7	23.85	23.79	23.77	23.75	0.08	0.04	23.60	23.32	0.25	0.46
8BR FERRY NP - 1BR FERRY N2 - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.60	23.32	0.25	0.48
8BR FERRY NP - 1BR FERRY N3 - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.60	23.32	0.25	0.48
8DAVIDSON TN - 8MAURY TN - 1	Table 7	23.86	23.80	23.78	23.76	0.08	0.04	23.61	23.32	0.25	0.48
5KINGST U1-4 - 1KINGSTON F2 - 1	Table 7	23.85	23.79	23.77	23.75	0.08	0.04	23.60	23.32	0.25	0.46
5RACCOON MT2 - 1RACCOON P2 - 1	Table 7	23.84	23.78	23.76	23.74	0.08	0.04	23.60	23.33	0.24	0.45
5RACCOON MT2 - 1RACCOON P1 - 1	Table 7	23.84	23.78	23.76	23.74	0.08	0.04	23.60	23.33	0.24	0.45
8CUMBERLAND - 1CUMBRL F1HL - 1	Table 7	23.85	23.79	23.78	23.76	0.08	0.04	23.60	23.32	0.25	0.48
8CUMBERLAND - 1CUMBRL F2HL - 1	Table 7	23.85	23.79	23.78	23.76	0.08	0.04	23.60	23.32	0.25	0.48
5BARKERSMILL - 5MONTGOMRY#1 - 1	Table 7	23.84	23.78	23.77	23.75	0.08	0.04	23.60	23.33	0.24	0.45
8SULLIVAN TN - 05BROADF - 1	Table 7	23.77	23.71	23.69	23.67	0.08	0.04	23.58	23.38	0.19	0.33
5J SEVIER #2 - 5GREENVL TP1 - 1	Table 7	23.89	23.83	23.82	23.80	0.07	0.04	23.62	23.30	0.27	0.54
8JVILLE FP - 8DAVIDSON TN - 1	Table 7	23.89	23.83	23.81	23.79	0.07	0.04	23.61	23.30	0.27	0.53
5JONES COVE - 5WALNUT GR T - 1	Table 7	23.84	23.78	23.76	23.74	0.07	0.04	23.60	23.33	0.24	0.45
5PARADISE FP - 5N.HARD - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.04	23.61	23.32	0.25	0.49
Roane 500 - 161 kV Bank	Table 7	23.74	23.68	23.67	**23.65**	0.08	0.04	23.56	23.39	0.18	0.29
5ALCOA SW TN - 5PROFIT SPGS - 1	Table 7	23.88	23.82	23.81	23.79	0.07	0.03	23.61	23.30	0.27	0.52
5MONTGOMRY#2 - 5KIRKWOOD TP - 1	Table 7	23.85	23.79	23.78	23.75	0.07	0.03	23.60	23.32	0.25	0.47
5MEC CC - 1MEC CT1 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.32	0.25	0.47
5MEC CC - 1MEC CT2 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.32	0.25	0.47
5MEC CC - 1MEC CT3 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.32	0.25	0.47
5SOLUTIA AL - 1DEC CT1 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.32	0.25	0.47
5SOLUTIA AL - 1DEC CT2 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.32	0.25	0.47
5SOLUTIA AL - 1DEC CT3 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.32	0.25	0.47
5RACCOON MT1 - 1RACCOON P3 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
5MAYFIELD KY - 5PARIS TN - 1	Table 7	23.86	23.80	23.78	23.76	0.07	0.03	23.61	23.32	0.25	0.48

Both Units Online - LOCA on U2	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
5COLBERT FP - 1COLBERT F4 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
5COLBERT FP - 1COLBERT F2 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
7SHAWNEE FP - 7E W FKFT - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.33	0.24	0.46
5COLBERT FP - 1COLBERT F1 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
5COLBERT FP - 1COLBERT F3 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
5CHANDLER TN - 5PROFIT SPGS - 1	Table 7	23.87	23.81	23.79	23.77	0.07	0.03	23.61	23.31	0.26	0.49
5RACCOON MT1 - 1RACCOON P4 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.31	0.26	0.49
8PARADISE FP - 8MONTGOMERY - 1	Table 7	23.85	23.79	23.77	23.75	0.07	0.03	23.60	23.33	0.24	0.46
5NIXON RD TN - 5STOCKCRK TN - 1	Table 7	23.85	23.79	23.77	23.75	0.07	0.03	23.60	23.33	0.24	0.46
5STOCKCRK TN - 5CHANDLER TN - 1	Table 7	23.86	23.80	23.78	23.76	0.07	0.03	23.61	23.32	0.25	0.48
5HIWASSEE HP - 1HIWASSEE H2 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
5BLUFF CITY - 2BLUFF CITY - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.79	23.77	0.07	0.03
5HIWASSEE HP - 1HIWASSEE H1 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
5APISON PIKE - 5BRADLEY TN - 1	Table 7	23.83	23.77	23.75	23.73	0.07	0.03	23.61	23.35	0.22	0.41
5PARADISE FP - 1PARADIS F2H - 1	Table 7	23.84	23.79	23.77	23.75	0.07	0.03	23.60	23.33	0.24	0.46
5CATOOSA GA - 5WINDSTONE - 1	Table 7	23.83	23.77	23.75	23.73	0.07	0.03	23.61	23.35	0.22	0.42
5BRADLEY TN - 5WINDSTONE - 1	Table 7	23.83	23.77	23.75	23.73	0.07	0.03	23.61	23.35	0.22	0.42
4NBRISTOL VA - 05WOLFH2 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.33	0.24	0.47
8MONTGOMERY - 8WILSON TN - 1	Table 7	23.88	23.82	23.81	23.79	0.07	0.03	23.62	23.31	0.26	0.51
8VALLEYVIEW - 1COGCALED T1 - 1	Table 7	23.86	23.81	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
8VALLEYVIEW - 1COGCALED T2 - 1	Table 7	23.86	23.81	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
8VALLEYVIEW - 1COGCALED T3 - 1	Table 7	23.86	23.81	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.49
5PARADISE FP - 1PARADIS F2L - 1	Table 7	23.84	23.78	23.77	23.75	0.07	0.03	23.60	23.33	0.24	0.46
5PARADISE FP - 1PARADIS F1H - 1	Table 7	23.84	23.78	23.77	23.75	0.07	0.03	23.60	23.33	0.24	0.46
5SUMMER SHAD - 5E GLASGOW T - 1	Table 7	23.84	23.78	23.77	23.75	0.07	0.03	23.60	23.33	0.24	0.45
5CONCORD TN - 5CATOOSA GA - 1	Table 7	23.83	23.77	23.76	23.74	0.07	0.03	23.61	23.35	0.22	0.42
5PARADISE FP - 1PARADIS F1L - 1	Table 7	23.84	23.78	23.77	23.75	0.07	0.03	23.60	23.33	0.24	0.45
8LAG CRK CT - 1LAG CRK CT1 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.48
8LAG CRK CT - 1LAG CRK CT2 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.48

Both Units Online - LOCA on U2	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
8MAURY TN - 8FRANKLIN TN - 1	Table 7	23.84	23.78	23.77	23.75	0.07	0.03	23.60	23.34	0.24	0.45
5JSEVIER C12 - 1J SEVIER C1 - 1	Table 7	23.84	23.78	23.77	23.75	0.07	0.03	23.61	23.33	0.24	0.45
5JSEVIER C12 - 1J SEVIER C2 - 1	Table 7	23.84	23.78	23.77	23.75	0.07	0.03	23.61	23.33	0.24	0.45
5WHEELER HP - 1WHEELRH9-11 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.33	0.24	0.46
8UNION MS - 8PLEASANT HL - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.33	0.24	0.46
5GALLATIN F1 - 1GALLATIN F1 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.60	23.33	0.24	0.46
5GALLATIN F1 - 1GALLATIN F2 - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.60	23.33	0.24	0.46
8PARADISE FP - 1PARADISF3AB - 1	Table 7	23.84	23.78	23.77	23.75	0.07	0.03	23.60	23.33	0.24	0.45
8LOWNDES MS - 8VALLEYVIEW - 1	Table 7	23.83	23.77	23.76	23.74	0.07	0.03	23.61	23.35	0.22	0.42
5SUMMER SHAD - 5LEBJCTT - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.33	0.24	0.46
5GALLATIN F1 - 5HARTSVLE TP - 1	Table 7	23.85	23.79	23.78	23.75	0.07	0.03	23.61	23.33	0.24	0.46
5BARKLEY HP - 5HOPCO - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.33	0.24	0.46
5OAK RIDG TN - 5KINGST U1-4 - 1	Table 7	23.86	23.80	23.79	23.77	0.07	0.03	23.61	23.32	0.25	0.48
5DOUGLAS HP - 5WALNUT GR T - 1	Table 7	23.83	23.77	23.76	23.74	0.07	0.03	23.60	23.34	0.23	0.44
8DAVIDSON TN - 8PIN HOOK TN - 1	Table 7	23.89	23.84	23.82	23.80	0.07	0.03	23.62	23.30	0.27	0.54
5APISON PIKE - 5WOOLTEWAH - 1	Table 7	23.83	23.77	23.76	23.74	0.07	0.03	23.61	23.35	0.22	0.42
5MAYFIELD KY - 5GOLO KY - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.33	0.24	0.47
5SUMMER SHAD - 5LAFAYETT TN - 1	Table 7	23.85	23.79	23.78	23.76	0.07	0.03	23.61	23.33	0.24	0.46

***Results are truncated due to pre-events no longer causing significant impact to 500kV offsite power.**

500 kV Results- U1 Online- Loading Table 6 - Accident on U1

500kV Summer 2015 Case

Results are sorted by largest U1 voltage drop at T=0+ from pre-event voltage

Please note that T=30 voltages do not fall under 500kV offsite voltage criteria.

Largest Delta and lowest T=0+ voltage are shaded.

U1 Online - LOCA on U1	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
SQN U1	Table 6	24.11	23.57	23.92	23.35	0.19	0.22	22.93	22.93	1.18	0.64
8SEQUOYAH NP - 1SEQUOYAH N1 - 1	Table 6	24.19	23.57	24.00	23.35	0.19	0.22	22.92	22.92	1.27	0.65
Wacker 500 - 8SEQUOYAH NP - 1	Table 6	23.96	23.57	23.78	23.35	0.18	0.22	23.04	23.04	0.93	0.53
8MARSHALL KY - 8CUMBERLAND - 1	Table 6	23.95	23.57	23.77	23.35	0.18	0.22	23.09	23.09	0.86	0.48
8SEQUOYAH NP - 8WBNP #1 - 1	Table 6	23.96	23.57	23.78	23.36	0.18	0.21	23.03	23.03	0.93	0.55
8WID CRK FP - 8SEQUOYAH NP - 1	Table 6	24.02	23.57	23.85	23.37	0.17	0.20	23.03	23.03	0.99	0.54
5KINGST U7-9 - 1KINGSTON F9 - 1	Table 6	23.92	23.57	23.77	23.38	0.16	0.19	23.13	23.13	0.79	0.44
8CUMBERLAND - 8DAVIDSON TN - 1	Table 6	24.03	23.57	23.88	23.38	0.16	0.19	23.06	23.06	0.98	0.51
5GALLATIN F2 - 5GALLATIN5-8 - 1	Table 6	23.94	23.57	23.78	23.38	0.16	0.19	23.11	23.11	0.83	0.46
8CUMBERLAND - 8MONTGOMERY - 1	Table 6	24.02	23.57	23.86	23.38	0.16	0.19	23.07	23.07	0.95	0.50
5KINGST U7-9 - 1KINGSTON F8 - 1	Table 6	23.92	23.57	23.76	23.38	0.16	0.19	23.14	23.14	0.78	0.43
8WID CRK FP - 8RACCOON MTN - 1	Table 6	23.91	23.57	23.76	23.38	0.16	0.19	23.15	23.15	0.77	0.42
5KINGST U7-9 - 1KINGSTON F7 - 1	Table 6	23.92	23.57	23.76	23.38	0.16	0.19	23.14	23.14	0.78	0.43
8RACCOON MTN - 5RACCOON MT2 - 1	Table 6	23.89	23.57	23.74	23.38	0.16	0.19	23.16	23.16	0.73	0.41
8SHELBY TN - 8SANSOUC - 1	Table 6	23.92	23.57	23.77	23.38	0.15	0.19	23.14	23.14	0.78	0.43
Roane 500 - 161 kV Bank	Table 6	23.69	23.57	23.54	23.38	0.15	0.19	23.28	23.28	0.41	0.29
5GALLATIN F2 - 1GALLATIN F3 - 1	Table 6	23.92	23.57	23.77	23.38	0.15	0.19	23.13	23.13	0.79	0.44
5GALLATIN F2 - 1GALLATIN F4 - 1	Table 6	23.92	23.57	23.77	23.38	0.15	0.19	23.13	23.13	0.79	0.44
5BULL RUN FP - 1BULLRUN F1H - 1	Table 6	24.20	23.57	24.05	23.38	0.15	0.19	22.96	22.96	1.25	0.61
5COSBY TN - 5WALTERS - 1	Table 6	23.90	23.57	23.75	23.38	0.15	0.19	23.15	23.15	0.75	0.42
5BULL RUN FP - 1BULLRUN F1L - 1	Table 6	24.15	23.57	24.00	23.38	0.15	0.19	22.99	22.99	1.16	0.58
5KINGST U5-6 - 1KINGSTON F5 - 1	Table 6	23.97	23.57	23.82	23.38	0.15	0.19	23.11	23.11	0.86	0.46
5KINGST U5-6 - 1KINGSTON F6 - 1	Table 6	23.97	23.57	23.82	23.38	0.15	0.19	23.11	23.11	0.86	0.46
8BR FERRY NP - 1BR FERRY N1 - 1	Table 6	23.92	23.57	23.77	23.38	0.15	0.19	23.14	23.14	0.78	0.43
8JVILLE FP - 8DAVIDSON TN - 1	Table 6	23.97	23.57	23.82	23.38	0.15	0.19	23.11	23.11	0.86	0.46
8CUMBERLAND - 1CUMBRL F1HL - 1	Table 6	23.92	23.57	23.77	23.38	0.15	0.19	23.14	23.14	0.79	0.43
8SHAWNEE FP - 8MARSHALL KY - 1	Table 6	23.92	23.57	23.77	23.38	0.15	0.19	23.15	23.15	0.77	0.42
8CUMBERLAND - 1CUMBRL F2HL - 1	Table 6	23.92	23.57	23.77	23.38	0.15	0.19	23.14	23.14	0.79	0.43

U1 Online - LOCA on U1	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
5J SEVIER #2 - 5GREENVL TP1 - 1	Table 6	24.02	23.57	23.87	23.38	0.15	0.19	23.08	23.08	0.94	0.49
5KINGST U1-4 - 1KINGSTON F1 - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.19	23.15	23.15	0.76	0.42
8BR FERRY NP - 1BR FERRY N2 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.19	23.15	23.15	0.77	0.42
8BR FERRY NP - 1BR FERRY N3 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.19	23.15	23.15	0.77	0.42
5JONES COVE - 5COSBY TN - 1	Table 6	23.90	23.57	23.75	23.39	0.15	0.19	23.16	23.16	0.74	0.41
5N NASHVILLE - 5GOODLETTSVL - 1	Table 6	23.90	23.57	23.75	23.39	0.15	0.18	23.16	23.16	0.73	0.41
5KINGST U1-4 - 1KINGSTON F4 - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.18	23.15	23.15	0.76	0.42
5KINGST U1-4 - 1KINGSTON F3 - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.18	23.15	23.15	0.76	0.42
5J SEVIER #1 - 1J SEVIER F4 - 1	Table 6	24.00	23.57	23.85	23.39	0.15	0.18	23.09	23.09	0.91	0.48
5J SEVIER #1 - 1J SEVIER F3 - 1	Table 6	24.00	23.57	23.85	23.39	0.15	0.18	23.09	23.09	0.91	0.48
5KINGST U1-4 - 1KINGSTON F2 - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.18	23.15	23.15	0.76	0.42
8LOWNDES MS - 1CALDONIA T1 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.14	23.14	0.78	0.43
5ALCOA SW TN - 5PROFIT SPGS - 1	Table 6	23.96	23.57	23.82	23.39	0.15	0.18	23.12	23.12	0.85	0.45
8WILSON TN - 8ROANE TN - 1	Table 6	23.95	23.57	23.81	23.39	0.15	0.18	23.11	23.11	0.85	0.47
5MAYFIELD KY - 5PARIS TN - 1	Table 6	23.92	23.57	23.78	23.39	0.15	0.18	23.14	23.14	0.78	0.43
5MONTGOMRY#2 - 5KIRKWOOD TP - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.18	23.16	23.16	0.75	0.42
5BARKERSMILL - 5MONTGOMRY#1 - 1	Table 6	23.89	23.57	23.75	23.39	0.15	0.18	23.17	23.17	0.73	0.41
5GALLATIN F1 - 1GALLATIN F1 - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.18	23.15	23.15	0.76	0.42
5GALLATIN F1 - 1GALLATIN F2 - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.18	23.15	23.15	0.76	0.42
5RACCOON MT1 - 1RACCOON P4 - 1	Table 6	23.94	23.57	23.79	23.39	0.15	0.18	23.13	23.13	0.80	0.44
5RACCOON MT1 - 1RACCOON P3 - 1	Table 6	23.94	23.57	23.79	23.39	0.15	0.18	23.14	23.14	0.80	0.43
8DAVIDSON TN - 8MAURY TN - 1	Table 6	23.93	23.57	23.78	23.39	0.15	0.18	23.15	23.15	0.78	0.43
5CHANDLER TN - 5PROFIT SPGS - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5COLBERT FP - 1COLBERT F4 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5COLBERT FP - 1COLBERT F2 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5COLBERT FP - 1COLBERT F1 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5COLBERT FP - 1COLBERT F3 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5MEC CC - 1MEC CT1 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5MEC CC - 1MEC CT2 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42

U1 Online - LOCA on U1	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
5MEC CC - 1MEC CT3 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5SOLUTIA AL - 1DEC CT1 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5SOLUTIA AL - 1DEC CT2 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5SOLUTIA AL - 1DEC CT3 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
8VALLEYVIEW - 1COGCALED T2 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
8VALLEYVIEW - 1COGCALED T3 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
8VALLEYVIEW - 1COGCALED T1 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
8MONTGOMERY - 8WILSON TN - 1	Table 6	23.95	23.57	23.81	23.39	0.15	0.18	23.13	23.13	0.83	0.45
8PARADISE FP - 8MONTGOMERY - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.18	23.16	23.16	0.75	0.42
5PARADISE FP - 5N.HARD - 1	Table 6	23.92	23.57	23.78	23.39	0.15	0.18	23.15	23.15	0.77	0.42
8MAURY TN - 8FRANKLIN TN - 1	Table 6	23.89	23.57	23.75	23.39	0.15	0.18	23.17	23.17	0.73	0.40
5J SEVIER #2 - 1J SEVIER F1 - 1	Table 6	23.99	23.57	23.85	23.39	0.15	0.18	23.10	23.10	0.89	0.47
5HIWASSEE HP - 1HIWASSEE H2 - 1	Table 6	23.92	23.57	23.77	23.39	0.15	0.18	23.15	23.15	0.77	0.42
5STOCKCRK TN - 5CHANDLER TN - 1	Table 6	23.90	23.57	23.75	23.39	0.15	0.18	23.16	23.16	0.74	0.41
8WEST POINT - 8CHOCTAW CC - 1	Table 6	23.91	23.57	23.76	23.39	0.15	0.18	23.16	23.16	0.75	0.41
5JONES COVE - 5WALNUT GR T - 1	Table 6	23.89	23.57	23.74	23.39	0.15	0.18	23.17	23.17	0.72	0.40
7SHAWNEE FP - 7E W FKFT - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.76	0.41
8PHIPPS B NP - 5PHIPPS B NP - 1	Table 6	23.96	23.57	23.82	23.39	0.14	0.18	23.12	23.12	0.84	0.45
8FRENCH CAMP - 1RELIANT T1 - 1	Table 6	23.92	23.57	23.77	23.39	0.14	0.18	23.15	23.15	0.76	0.42
8FRENCH CAMP - 1RELIANT T2 - 1	Table 6	23.92	23.57	23.77	23.39	0.14	0.18	23.15	23.15	0.76	0.42
8FRENCH CAMP - 1RELIANT T3 - 1	Table 6	23.92	23.57	23.77	23.39	0.14	0.18	23.15	23.15	0.76	0.42
5HIWASSEE HP - 1HIWASSEE H1 - 1	Table 6	23.92	23.57	23.77	23.39	0.14	0.18	23.15	23.15	0.77	0.42
5RACCOON MT2 - 1RACCOON P1 - 1	Table 6	23.89	23.57	23.75	23.39	0.14	0.18	23.17	23.17	0.72	0.40
5RACCOON MT2 - 1RACCOON P2 - 1	Table 6	23.89	23.57	23.75	23.39	0.14	0.18	23.17	23.17	0.72	0.40
4NBRISTOL VA - 05WOLFH2 - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.75	0.41
8DAVIDSON TN - 5DAVIDSON #2 - 1	Table 6	23.95	23.57	23.80	23.39	0.14	0.18	23.13	23.13	0.82	0.44
8MAURY TN - 8BR FERRY NP - 1	Table 6	24.00	23.57	23.86	23.39	0.14	0.18	23.09	23.09	0.91	0.48
5NIXON RD TN - 5STOCKCRK TN - 1	Table 6	23.90	23.57	23.75	23.39	0.14	0.18	23.16	23.16	0.73	0.41
8DAVIDSON TN - 8PIN HOOK TN - 1	Table 6	24.00	23.57	23.86	23.39	0.14	0.18	23.09	23.09	0.91	0.48

U1 Online - LOCA on U1	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
8LAG CRK CT - 1LAG CRK CT1 - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.76	0.42
8LAG CRK CT - 1LAG CRK CT2 - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.76	0.42
5GALLATIN F1 - 5HARTSVLE TP - 1	Table 6	23.90	23.57	23.76	23.39	0.14	0.18	23.16	23.16	0.74	0.41
5SUMMER SHAD - 5E GLASGOW T - 1	Table 6	23.90	23.57	23.75	23.39	0.14	0.18	23.17	23.17	0.73	0.40
5WHEELER HP - 1WHEELRH9-11 - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.75	0.41
5PARADISE FP - 1PARADIS F2H - 1	Table 6	23.90	23.57	23.76	23.39	0.14	0.18	23.16	23.16	0.74	0.41
5MARSHALL KY - 5GOLO KY - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.76	0.41
8PARADISE FP - 1PARADISF3AB - 1	Table 6	23.90	23.57	23.75	23.39	0.14	0.18	23.17	23.17	0.73	0.40
8UNION MS - 8PLEASANT HL - 1	Table 6	23.90	23.57	23.76	23.39	0.14	0.18	23.16	23.16	0.74	0.41
5MAYFIELD KY - 5GOLO KY - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.75	0.41
5PARADISE FP - 1PARADIS F1H - 1	Table 6	23.90	23.57	23.76	23.39	0.14	0.18	23.16	23.16	0.74	0.41
5PARADISE FP - 1PARADIS F2L - 1	Table 6	23.90	23.57	23.76	23.39	0.14	0.18	23.16	23.16	0.74	0.41
8VALLEYVIEW - 1COGCALED S2 - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.76	0.41
5LAFAYETT TN - 5HARTSVLE TP - 1	Table 6	23.90	23.57	23.76	23.39	0.14	0.18	23.16	23.16	0.74	0.41
5OAK RIDG TN - 5KINGST U1-4 - 1	Table 6	23.93	23.57	23.79	23.39	0.14	0.18	23.14	23.14	0.78	0.43
5SUMMER SHAD - 5LEBJCTT - 1	Table 6	23.91	23.57	23.76	23.39	0.14	0.18	23.16	23.16	0.74	0.41
8VALLEYVIEW - 1COGCALED S1 - 1	Table 6	23.91	23.57	23.77	23.39	0.14	0.18	23.16	23.16	0.75	0.41
5PARADISE FP - 1PARADIS F1L - 1	Table 6	23.90	23.57	23.76	23.39	0.14	0.18	23.16	23.16	0.74	0.41

***Results are truncated due to pre-events no longer causing significant impact to 500kV offsite power.**

500 kV Results- U2 Online- Loading Table 7 - Accident on U2

500kV Summer 2015 Case

Results are sorted by largest U2 voltage drop at T=0+ from pre-event voltage

Please note that T=30 voltages do not fall under 500kV offsite voltage criteria.

Largest Delta and lowest T=0+ voltage are shaded.

U2 Online - LOCA on U2	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
SQN U1	Table 7	23.57	24.19	23.35	24.01	0.22	**0.18**	22.92	22.92	0.65	1.27
5SEQUOYAH NP - 1SEQUOYAH N2 - 1	Table 7	23.57	24.11	23.35	23.93	0.22	0.18	22.93	22.93	0.64	1.18
8MARSHALL KY - 8CUMBERLAND - 1	Table 7	23.57	23.95	23.35	23.78	0.22	0.18	23.09	23.09	0.48	0.86
Wacker 500 - 8SEQUOYAH NP - 1	Table 7	23.57	23.97	23.35	23.79	0.22	0.18	23.03	23.03	0.54	0.93
8SEQUOYAH NP - 8WBNP #1 - 1	Table 7	23.57	23.96	23.36	23.79	0.21	0.17	23.02	23.02	0.55	0.94
8WID CRK FP - 8SEQUOYAH NP - 1	Table 7	23.57	24.02	23.37	23.86	0.20	0.16	23.03	23.03	0.54	0.99
5KINGST U7-9 - 1KINGSTON F9 - 1	Table 7	23.57	23.92	23.38	23.77	0.19	0.15	23.13	23.13	0.44	0.79
8CUMBERLAND - 8DAVIDSON TN - 1	Table 7	23.57	24.04	23.38	23.88	0.19	0.15	23.05	23.05	0.52	0.98
5GALLATIN F2 - 5GALLATIN5-8 - 1	Table 7	23.57	23.94	23.38	23.79	0.19	0.15	23.11	23.11	0.46	0.83
8CUMBERLAND - 8MONTGOMERY - 1	Table 7	23.57	24.02	23.38	23.87	0.19	0.15	23.06	23.06	0.51	0.96
5KINGST U7-9 - 1KINGSTON F8 - 1	Table 7	23.57	23.92	23.38	23.77	0.19	0.15	23.13	23.13	0.44	0.79
8WID CRK FP - 8RACCOON MTN - 1	Table 7	23.57	23.91	23.38	23.76	0.19	0.15	23.14	23.14	0.43	0.77
5KINGST U7-9 - 1KINGSTON F7 - 1	Table 7	23.57	23.92	23.38	23.77	0.19	0.15	23.13	23.13	0.44	0.79
8RACCOON MTN - 5RACCOON MT2 - 1	Table 7	23.57	23.90	23.38	23.74	0.19	0.15	23.16	23.16	0.41	0.74
8SHELBY TN - 8SANSOUC - 1	Table 7	23.57	23.92	23.38	23.77	0.19	0.15	23.14	23.14	0.43	0.79
5BULL RUN FP - 1BULLRUN F1H - 1	Table 7	23.57	24.20	23.38	24.05	0.19	0.15	22.95	22.95	0.62	1.25
5GALLATIN F2 - 1GALLATIN F3 - 1	Table 7	23.57	23.93	23.38	23.78	0.19	0.15	23.13	23.13	0.44	0.80
5GALLATIN F2 - 1GALLATIN F4 - 1	Table 7	23.57	23.93	23.38	23.78	0.19	0.15	23.13	23.13	0.44	0.80
Roane 500 - 161 kV Bank	Table 7	23.57	23.69	23.38	**23.55**	0.19	0.15	23.28	23.28	0.29	0.41
5BULL RUN FP - 1BULLRUN F1L - 1	Table 7	23.57	24.15	23.38	24.00	0.19	0.15	22.99	22.99	0.58	1.16
5COSBY TN - 5WALTERS - 1	Table 7	23.57	23.90	23.38	23.75	0.19	0.15	23.15	23.15	0.42	0.76
5KINGST U5-6 - 1KINGSTON F5 - 1	Table 7	23.57	23.97	23.38	23.82	0.19	0.15	23.11	23.11	0.46	0.86
5KINGST U5-6 - 1KINGSTON F6 - 1	Table 7	23.57	23.97	23.38	23.82	0.19	0.15	23.11	23.11	0.46	0.86
8BR FERRY NP - 1BR FERRY N1 - 1	Table 7	23.57	23.92	23.38	23.78	0.19	0.15	23.14	23.14	0.43	0.79
8JVILLE FP - 8DAVIDSON TN - 1	Table 7	23.57	23.97	23.38	23.82	0.19	0.15	23.11	23.11	0.46	0.86
8CUMBERLAND - 1CUMBRL F1HL - 1	Table 7	23.57	23.93	23.38	23.78	0.19	0.15	23.13	23.13	0.44	0.79
8SHAWNEE FP - 8MARSHALL KY - 1	Table 7	23.57	23.92	23.38	23.77	0.19	0.15	23.15	23.15	0.43	0.77
8CUMBERLAND - 1CUMBRL F2HL - 1	Table 7	23.57	23.92	23.38	23.78	0.19	0.15	23.13	23.13	0.44	0.79

U2 Online - LOCA on U2	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
5J SEVIER #2 - 5GREENVL TP1 - 1	Table 7	23.57	24.02	23.38	23.87	0.19	0.15	23.08	23.08	0.49	0.94
5KINGST U1-4 - 1KINGSTON F1 - 1	Table 7	23.57	23.91	23.39	23.77	0.19	0.15	23.15	23.15	0.42	0.77
8BR FERRY NP - 1BR FERRY N2 - 1	Table 7	23.57	23.92	23.39	23.77	0.19	0.15	23.14	23.14	0.43	0.78
8BR FERRY NP - 1BR FERRY N3 - 1	Table 7	23.57	23.92	23.39	23.77	0.19	0.15	23.14	23.14	0.43	0.77
5JONES COVE - 5COSBY TN - 1	Table 7	23.57	23.90	23.39	23.75	0.18	0.14	23.15	23.15	0.42	0.74
5KINGST U1-4 - 1KINGSTON F4 - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.77
5N NASHVILLE - 5GOODLETTSVL - 1	Table 7	23.57	23.90	23.39	23.75	0.18	0.14	23.16	23.16	0.41	0.74
5DICKSON TN - 2DICKSON TN - 1	Table 7	23.57	23.90	23.39	23.76	0.18	0.14	23.17	23.17	0.41	0.74
5KINGST U1-4 - 1KINGSTON F3 - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.77
5J SEVIER #1 - 1J SEVIER F4 - 1	Table 7	23.57	24.00	23.39	23.86	0.18	0.14	23.09	23.09	0.48	0.91
5J SEVIER #1 - 1J SEVIER F3 - 1	Table 7	23.57	24.00	23.39	23.86	0.18	0.14	23.09	23.09	0.48	0.91
5KINGST U1-4 - 1KINGSTON F2 - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.77
8LOWNDES MS - 1CALDONIA T1 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.14	23.14	0.43	0.78
5ALCOA SW TN - 5PROFIT SPGS - 1	Table 7	23.57	23.96	23.39	23.82	0.18	0.14	23.11	23.11	0.46	0.85
5MAYFIELD KY - 5PARIS TN - 1	Table 7	23.57	23.93	23.39	23.78	0.18	0.14	23.14	23.14	0.43	0.78
5RACCOON MT1 - 1RACCOON P4 - 1	Table 7	23.57	23.94	23.39	23.80	0.18	0.14	23.13	23.13	0.44	0.81
5RACCOON MT1 - 1RACCOON P3 - 1	Table 7	23.57	23.94	23.39	23.80	0.18	0.14	23.13	23.13	0.44	0.81
5GALLATIN F1 - 1GALLATIN F1 - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76
5GALLATIN F1 - 1GALLATIN F2 - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76
5MONTGOMRY#2 - 5KIRKWOOD TP - 1	Table 7	23.57	23.91	23.39	23.76	0.18	0.14	23.15	23.15	0.42	0.75
5BARKERSMILL - 5MONTGOMRY#1 - 1	Table 7	23.57	23.89	23.39	23.75	0.18	0.14	23.16	23.16	0.41	0.73
8WILSON TN - 8ROANE TN - 1	Table 7	23.57	23.96	23.39	23.81	0.18	0.14	23.10	23.10	0.47	0.85
8DAVIDSON TN - 8MAURY TN - 1	Table 7	23.57	23.93	23.39	23.79	0.18	0.14	23.14	23.14	0.43	0.79
5COLBERT FP - 1COLBERT F4 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
5CHANDLER TN - 5PROFIT SPGS - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.14	23.14	0.43	0.78
5COLBERT FP - 1COLBERT F2 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
5COLBERT FP - 1COLBERT F3 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
5COLBERT FP - 1COLBERT F1 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
5MEC CC - 1MEC CT1 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77

U2 Online - LOCA on U2	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
5MEC CC - 1MEC CT2 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
5MEC CC - 1MEC CT3 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
5SOLUTIA AL - 1DEC CT1 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
5SOLUTIA AL - 1DEC CT2 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
5SOLUTIA AL - 1DEC CT3 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
8VALLEYVIEW - 1COGCALED T2 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.43	0.78
8VALLEYVIEW - 1COGCALED T3 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.43	0.78
8VALLEYVIEW - 1COGCALED T1 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.43	0.78
8MONTGOMERY - 8WILSON TN - 1	Table 7	23.57	23.95	23.39	23.81	0.18	0.14	23.12	23.12	0.45	0.83
5PARADISE FP - 5N.HARD - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.78
8PARADISE FP - 8MONTGOMERY - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76
8MAURY TN - 8FRANKLIN TN - 1	Table 7	23.57	23.90	23.39	23.76	0.18	0.14	23.16	23.16	0.41	0.73
5J SEVIER #2 - 1J SEVIER F1 - 1	Table 7	23.57	23.99	23.39	23.85	0.18	0.14	23.10	23.10	0.47	0.89
5HIWASSEE HP - 1HIWASSEE H2 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.43	0.78
8WEST POINT - 8CHOCTAW CC - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.16	23.16	0.42	0.75
8PHIPPS B NP - 5PHIPPS B NP - 1	Table 7	23.57	23.96	23.39	23.82	0.18	0.14	23.12	23.12	0.45	0.85
7SHAWNEE FP - 7E W FKFT - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76
5JONES COVE - 5WALNUT GR T - 1	Table 7	23.57	23.89	23.39	23.75	0.18	0.14	23.16	23.16	0.41	0.73
5STOCKCRK TN - 5CHANDLER TN - 1	Table 7	23.57	23.90	23.39	23.76	0.18	0.14	23.16	23.16	0.41	0.74
5HIWASSEE HP - 1HIWASSEE H1 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
8FRENCH CAMP - 1RELIANT T3 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
4NBRISTOL VA - 05WOLFH2 - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76
5RACCOON MT2 - 1RACCOON P1 - 1	Table 7	23.57	23.89	23.39	23.75	0.18	0.14	23.17	23.17	0.40	0.72
5RACCOON MT2 - 1RACCOON P2 - 1	Table 7	23.57	23.89	23.39	23.75	0.18	0.14	23.17	23.17	0.40	0.72
8FRENCH CAMP - 1RELIANT T1 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
8FRENCH CAMP - 1RELIANT T2 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.77
8MAURY TN - 8BR FERRY NP - 1	Table 7	23.57	24.00	23.39	23.86	0.18	0.14	23.09	23.09	0.48	0.91
8DAVIDSON TN - 5DAVIDSON #2 - 1	Table 7	23.57	23.95	23.39	23.81	0.18	0.14	23.13	23.13	0.44	0.82
8DAVIDSON TN - 8PIN HOOK TN - 1	Table 7	23.57	24.01	23.39	23.87	0.18	0.14	23.09	23.09	0.48	0.91

U2 Online - LOCA on U2	Loading	Pre-event		T0+				T30			
Contingency Event		U1	U2	U1	U2	ΔU1	ΔU2	U1	U2	ΔU1	ΔU2
8LAG CRK CT - 1LAG CRK CT1 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.76
8LAG CRK CT - 1LAG CRK CT2 - 1	Table 7	23.57	23.92	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.76
5NIXON RD TN - 5STOCKCRK TN - 1	Table 7	23.57	23.90	23.39	23.76	0.18	0.14	23.16	23.16	0.41	0.74
5GALLATIN F1 - 5HARTSVLE TP - 1	Table 7	23.57	23.90	23.39	23.76	0.18	0.14	23.16	23.16	0.41	0.75
5WHEELER HP - 1WHEELRH9-11 - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76
5MARSHALL KY - 5GOLO KY - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76
5SUMMER SHAD - 5E GLASGOW T - 1	Table 7	23.57	23.90	23.39	23.76	0.18	0.14	23.16	23.16	0.41	0.73
5PARADISE FP - 1PARADIS F2H - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.16	23.16	0.41	0.75
8UNION MS - 8PLEASANT HL - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.16	23.16	0.41	0.75
5MAYFIELD KY - 5GOLO KY - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76
8PARADISE FP - 1PARADISF3AB - 1	Table 7	23.57	23.90	23.39	23.76	0.18	0.14	23.16	23.16	0.41	0.73
8VALLEYVIEW - 1COGCALED S2 - 1	Table 7	23.57	23.91	23.39	23.78	0.18	0.14	23.15	23.15	0.42	0.76
5LAFAYETT TN - 5HARTSVLE TP - 1	Table 7	23.57	23.90	23.39	23.77	0.18	0.14	23.16	23.16	0.41	0.74
5PARADISE FP - 1PARADIS F1H - 1	Table 7	23.57	23.90	23.39	23.77	0.18	0.14	23.16	23.16	0.41	0.74
5PARADISE FP - 1PARADIS F2L - 1	Table 7	23.57	23.90	23.39	23.77	0.18	0.14	23.16	23.16	0.41	0.74
5SUMMER SHAD - 5LEBJCTT - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.16	23.16	0.41	0.75
5OAK RIDG TN - 5KINGST U1-4 - 1	Table 7	23.57	23.93	23.39	23.79	0.18	0.14	23.14	23.14	0.43	0.79
8VALLEYVIEW - 1COGCALED S1 - 1	Table 7	23.57	23.91	23.39	23.77	0.18	0.14	23.15	23.15	0.42	0.76

***Results are truncated due to pre-events no longer causing significant impact to 500kV offsite power.**

ATTACHMENT 3

CROSS-WALK ROAD MAP
(Unit 2 FSAR Amendment 92 Versus Unit 2 FSAR Amendment 100):

- **COMPARISON OF UNIT 2 FSAR CHAPTER 11 SECTIONS**
- **COMPARISON OF UNIT 2 FSAR CHAPTER 11 TABLES**

COMPARISON OF UNIT 2 FSAR CHAPTER 11 SECTIONS

Amendment 91		Amendment 100	
SECTION #	**SECTION TITLE**	**SECTION #**	**SECTION TITLE**
11.0	Radioactive Waste Management	Same	Same
11.1	Source Terms	Same	Same
11.1.1	Historical Design Model for Radioactivities in Systems and Components	Same	Same
11.2	LIQUID WASTE SYSTEMS	Same	Same
11.2.1	DESIGN OBJECTIVES	Same	Same
11.2.2	SYSTEMS DESCRIPTIONS	Same	Same
11.3	GASEOUS WASTE SYSTEMS	Same	Same
11.3.1	Design Bases	Same	Same
11.3.2	System Descriptions	Same	Same
11.4	Process and Effluent Radiological Monitoring and Sampling System	Same	Same

COMPARISON OF UNIT 2 FSAR CHAPTER 11 SECTIONS

Amendment 91		Amendment 100	
SECTION #	SECTION TITLE	SECTION #	SECTION TITLE
11.4.1	Design Objectives	Same	Same
11.4.2	Continuous Monitors	Same	Same
11.5	Solid Waste Management System	Same	Same
11.5-1	Design Objectives	Same	Same
11.5-2	System Inputs	Same	Same
11.6	Offsite Radiological Monitoring Program	Same	Same
11.6-1	Expected Background	Same	Same
11.6-2	Critical Pathways to Man	Same	Same
	Tritium Control	11A	TRITIUM CONTROL
11A.1	System Sources	11A	SYSTEM SOURCES
11.A.1-1	The Fission Source	11A.1	The Fission Source
11A.1.2	Control Rod Sources	11A.2	Control Rod Source
11A.1.3	Boric Acid Source	11A.3	Boric Acid Source
11A.1.4	Burnable Shim Rod Source	11A.4	Burnable Shim Rod Source

COMPARISON OF UNIT 2 FSAR CHAPTER 11 SECTIONS

Amendment 91		Amendment 100	
SECTION #	**SECTION TITLE**	**SECTION #**	**SECTION TITLE**
11A.2	Tritium Release	11A.2	Tritium Releases
11A.3	Design Bases	11A.3	Design Bases
11A.4	Design Evaluation	11A.4	Design Evaluation

COMPARISON OF UNIT 2 FSAR CHAPTER 11 TABLES

Amendment 91		Amendment 100	
TABLE #	**TABLE TITLE**	**TABLE #**	**TABLE TITLE**
11.1-1	Parameters Used In The Calculation Of Reactor Coolant Fission And Corrosion Product Historical Design Activities	11.1-1	Same
11.1-2	Reactor Coolant Equilibrium Fission And Corrosion Product Historical Design Activities	11.1-2	Same
11.1-3	Equilibrium Volume Control Tank Historical Design Activities (Based on Parameters Given in Table 11.1-1)	11.1-3	Same
11.1-4	Pressurizer Historical Design Activities	11.1-4	Same
11.1-5	Historical Design Inventory In The Gaseous Waste Processing System Single Unit	11.1-5	Same
11.1-6	Parameters Used To Describe The Reactor Coolant System Realistic Basis	11.1-6	Same
11.1-7	Specific Activities In Principal Fluid Streams Realistic Basis (μCi/gm)	11.1-7	Same
11.2-1	Liquid Waste Processing System Calculation Basis	11.2-1	Same

COMPARISON OF UNIT 2 FSAR CHAPTER 11 TABLES

Amendment 91		Amendment 100	
TABLE #	**TABLE TITLE**	**TABLE #**	**TABLE TITLE**
11.2-2	Deleted by Amendment 89		
11.2-3	Component Design Parameters	11.2-2	Component Design Parameters
11.2-4	Deleted by Amendment 77		
11.2-5	Liquid Waste Processing System Instrumentation Design Parameters		
11.2-6	Radioactive Liquid Releases From Westinghouse Designed PWR Plants	11.2-3	Radioactive Liquid Releases From Westinghouse Designed PWR Plants Historical Information
11.2-7	Total Annual Discharge Liquid Waste Processing System	11.2-4	Total Annual Discharge Liquid Waste Processing System Prior To Treatment
		11.2-5	Total Annual Discharge Liquid Waste Processing System Annual Discharge (Ci) After Processing Total Releases Per Unit (TPC Unit 1 Only)
11.2-7a	Design (For 1% Failed Fuel) Liquid Releases ∑Concentration/(Effluent Concentration Limit) No Processing Of Condensate Resin Regeneration Waste By Mobile Demineralizers	11.2.5a	Design (For 1% Failed Fuel) Liquid Releases Concentration/(Effluent Concentration Limit) Baseline Data With No Processing

COMPARISON OF UNIT 2 FSAR CHAPTER 11 TABLES

Amendment 91		Amendment 100	
TABLE #	**TABLE TITLE**	**TABLE #**	**TABLE TITLE**
11.2-7b	Design (For 1% Failed Fuel) Liquid Releases ∑Concentration/(Effluent Concentration Limit) Condensate Resin Regeneration Waste Produced By Mobile Demineralizers	11.2.5b	Design (For 1% Failed Fuel) Liquid Releases Concentration/(Effluent Concentration Limit) Waste Processed By Mobile Demineralizers
11.2-8	Deleted		
11.2-9	Deleted		
11.2-10	Tennessee River Reaches Within 50 Miles Radius Downstream Of WBN	11.2-6	Tennessee River Reaches Within 50 Mile Radius Downstream Of WBN
11.2-11	Watts Bar Nuclear Plant Doses From Liquid Effluents For Year 2040	11.2-7	Watts Bar Nuclear Plant Doses From Liquid Effluents For Year 2040
11.3-1	Gaseous Waste Processing System Component Data	11.3-1	Gaseous Waste Processing System Component Data
11.3-2	Gaseous Waste Processing System Instrumentation Design Parameters		
11.3-3	Airborne Radioactive Noble Gas Releases For 1973 From Westinghouse Designed Operating Reactors	11.3-2	*Historical Data* Airborne Radioactive Noble Gas Releases For 1973 From Westinghouse Designed Operating Reactors
11.3-4	Bases Used In Calculating Expected System Activities and Releases From The GWPS	11.3-3	Bases Used In Calculating Expected System Activities and Releases From The GWPS
11.3-5	Process Parameters and Expected Activities in Gaseous Waste System (Concentrations in µci/gm)	11.3-4	Process Parameters and Expected Activities in Gaseous Waste System (Concentrations in µCi/gm)

COMPARISON OF UNIT 2 FSAR CHAPTER 11 TABLES

Amendment 91		Amendment 100	
TABLE #	**TABLE TITLE**	**TABLE #**	**TABLE TITLE**
11.3-6	Expected Annual Releases From The GWPS – Per Reactor Unit	11.3-5	Expected Annual Gaseous Releases From The GWPS – Per Reactor Unit
11.3-7	Deleted by Amendment 77		
11.3-8	Radioactive Gaseous Effluent Parameters	11.3-6	Radioactive Gaseous Effluent Parameters
11.3-9	Radioactive Releases (Curies/Year/Reactor)	11.3-7	Annual Radioactive Releases With Purge Air Filters (Curies/Year/Reactor)
11.3-9a	Design (For 1% Failed Fuel) Gas Releases ∑Concentration/(Effluent Concentration Limit)	11.3-7a	Design (For 1% Failed Fuel) Expected Gas Release Concentration/(Effluent Concentration Limit) with Containment Purge
		11.3-7b	Design (For 1% Failed Fuel) Expected Gas Release Concentration/(Effluent Concentration Limit) With Continuous Filtered Containment Vent
		11.3-7c	Total Releases (≈1/8 failed fuel in Ci/yr), with Continuous Filtered Containment Vent
11.3-10	Data On Points Of Interest Near Watts Bar Nuclear Plant	11.3-8	Data On Points Of Interest Near Watts Bar Nuclear Plant
11.3-11	Deleted by Amendment 77		
11.3-12	Projected 2040 Population Distribution Within 50 Miles Of Watts Bar Nuclear Plant Population Within Each Sector Element	11.3-9	Projected 2040 Population Distribution Within 50 Miles Of Watts Bar Nuclear Plant Population Within Each Sector Element Distance From Site (Miles)

COMPARISON OF UNIT 2 FSAR CHAPTER 11 TABLES

Amendment 91		Amendment 100	
TABLE #	**TABLE TITLE**	**TABLE #**	**TABLE TITLE**
11.3-13	Watts Bar Nuclear Plant – Individual Doses From Gaseous Effluents (For 2 Units)	11.3-10	Watts Bar Nuclear Plant- Individual Doses From Gaseous Effluents (For 1 Unit without TPC)
11.3-14	Summary Of Population Doses	11.3-11	Summary Of Population Doses
11.4-1	Process And Effluent Radiation Monitors – Liquid Media	11.4-1	Process And Effluent Radiation Monitors - Liquid Media
11.4-2	Process and Effluent Radiation Monitors	11.4-2	Process And Effluent Radiation Monitors
11.4-3	Locations For Gaseous Process And Effluent Radiation Monitor Indicators, Recorders, and Annunciators	11.4-3	Locations For Gaseous Process And Effluent Radiation Monitor Indicators, Recorders, And Annunciators
11.4-4	Deleted By Amendment 49	11.4-4	Deleted By Amendment 49
11.4-5	Process Monitors Check Source Description	11.4-5	Process Monitors Check Source Description
11.5-1	Maximum Anticipated Annual Solid Radwaste To Be Processed	11.5-1	Maximum Anticipated Annual Solid Radwaste To Be Processed
11.5-2	Estimated Major Nuclide Composition	11.5-2	Estimated Major Nuclide Composition
11A-1	Tritium sources In A Typical WNES 4 Loop Reactor Operating At A Power Level of 3582 MW(th) Curies/12 Full –Power Months At A 0.8 Load Factor	11A-1	Tritium Sources In A Typical WNES 4 Loop Reactor Operating At A Power Level Of 3582 MW(th) Curies/12 Full-Power Months At A 0.8 Load Factor
11A-2	Tritium Release For 1972 From Westinghouse Designed Operating Reactors	11A-2	Tritium Release For 1972 From Westinghouse Designed Operating Reactors

ATTACHMENT 4

MISCELLANEOUS FSAR FIGURES

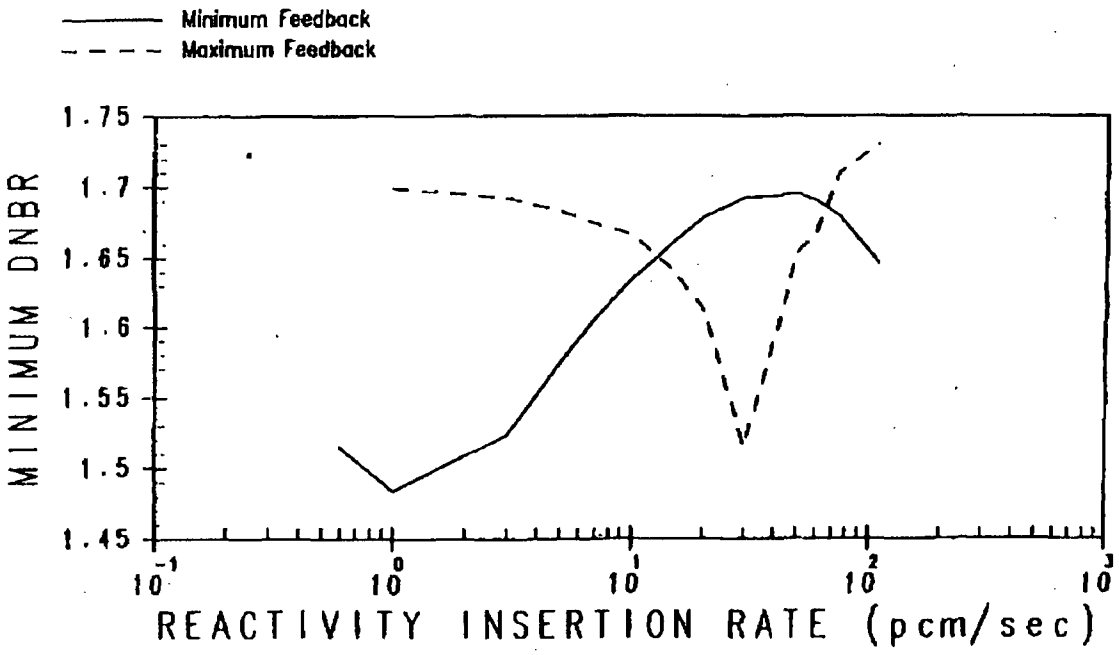


Figure 15.2-8 Uncontrolled Rod Withdrawal From 100% Power, Effect Of Reactivity Insertion Rate On Minimum DNBR

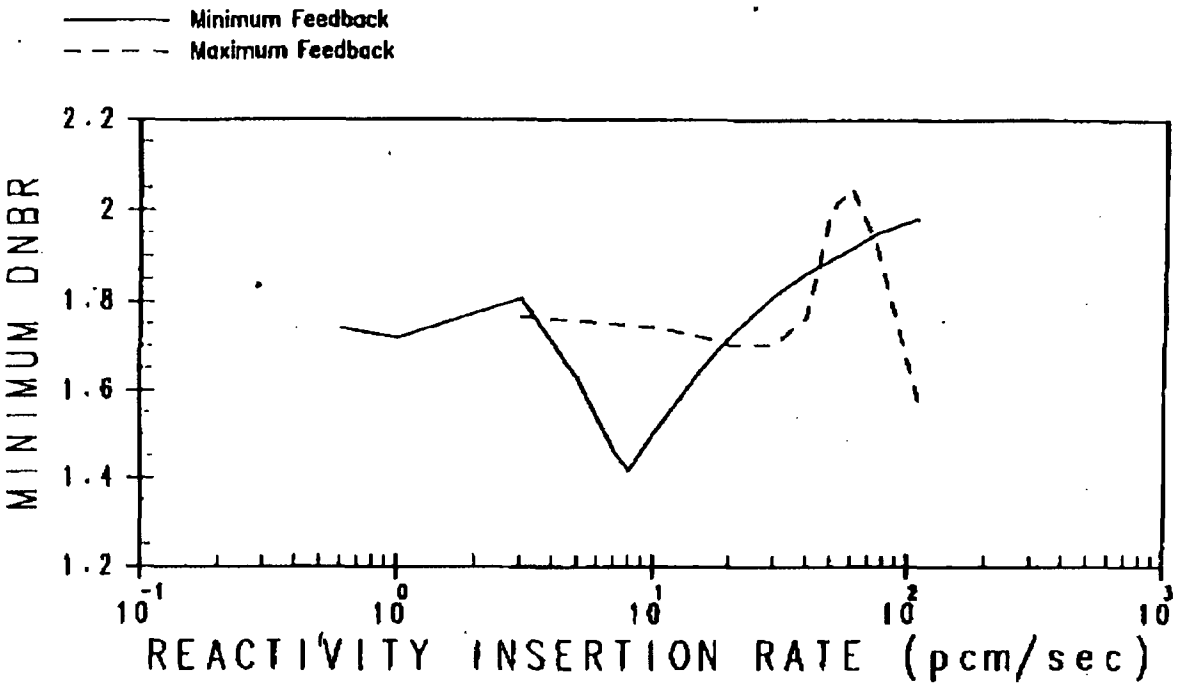


Figure 15.2-9 Uncontrolled Rod Withdrawal From 60% Power, Effect Of Reactivity Insertion Rate On Minimum DNBR

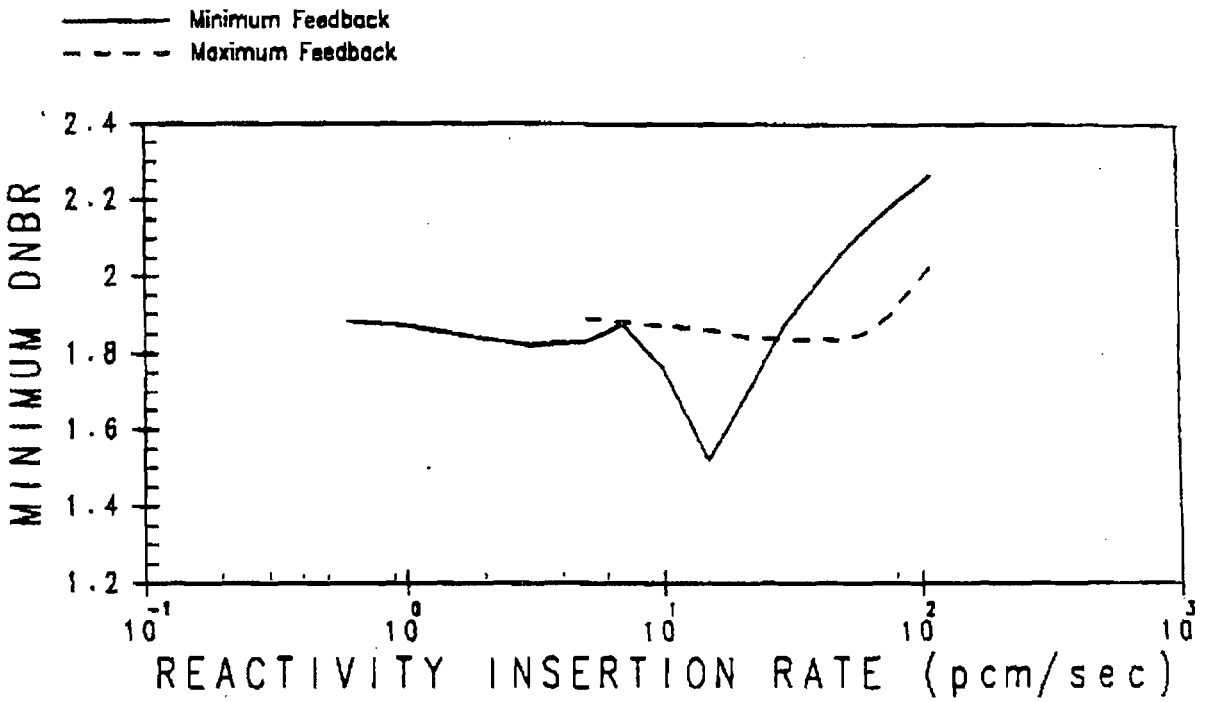


Figure 15.2-10 Uncontrolled Rod Withdrawal From 10% Power, Effect Of Reactivity Insertion Rate On Minimum DNBR

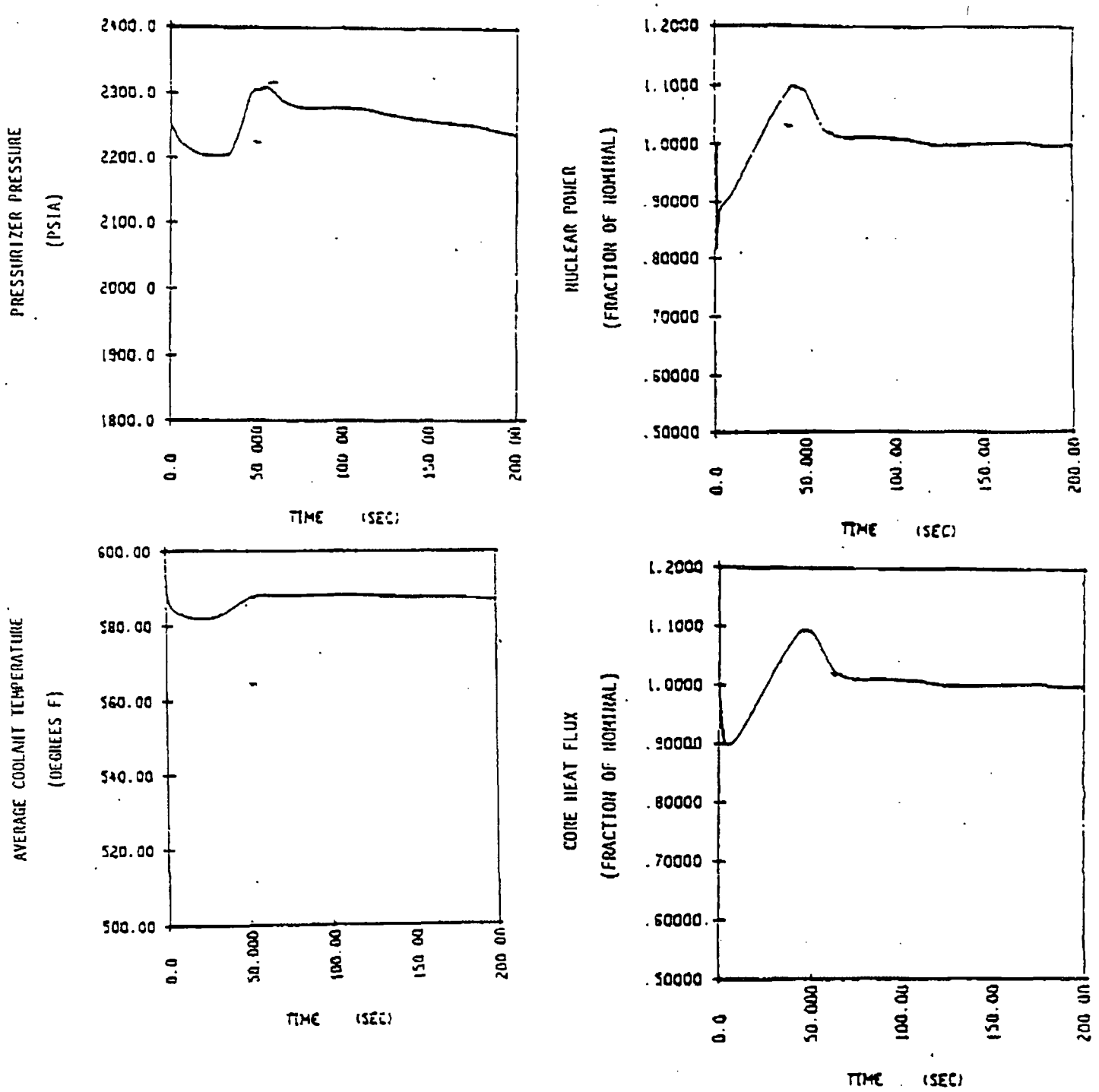


Figure 15.2-11 Pressurizer Pressure Transient, Nuclear Power, Core Average Temperature, and Core Heat Flux Transient for Dropped RCCA Assembly

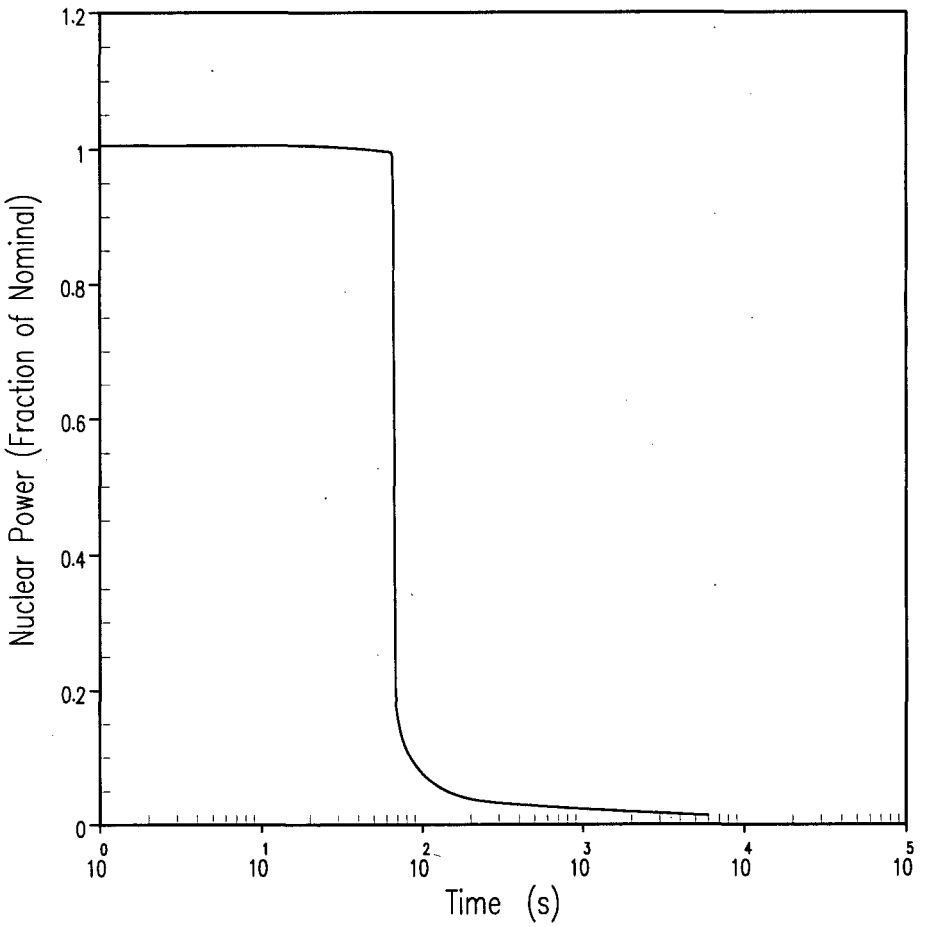


Figure 15.2-27a Loss Of Normal Feedwater Nuclear Power Versus Time

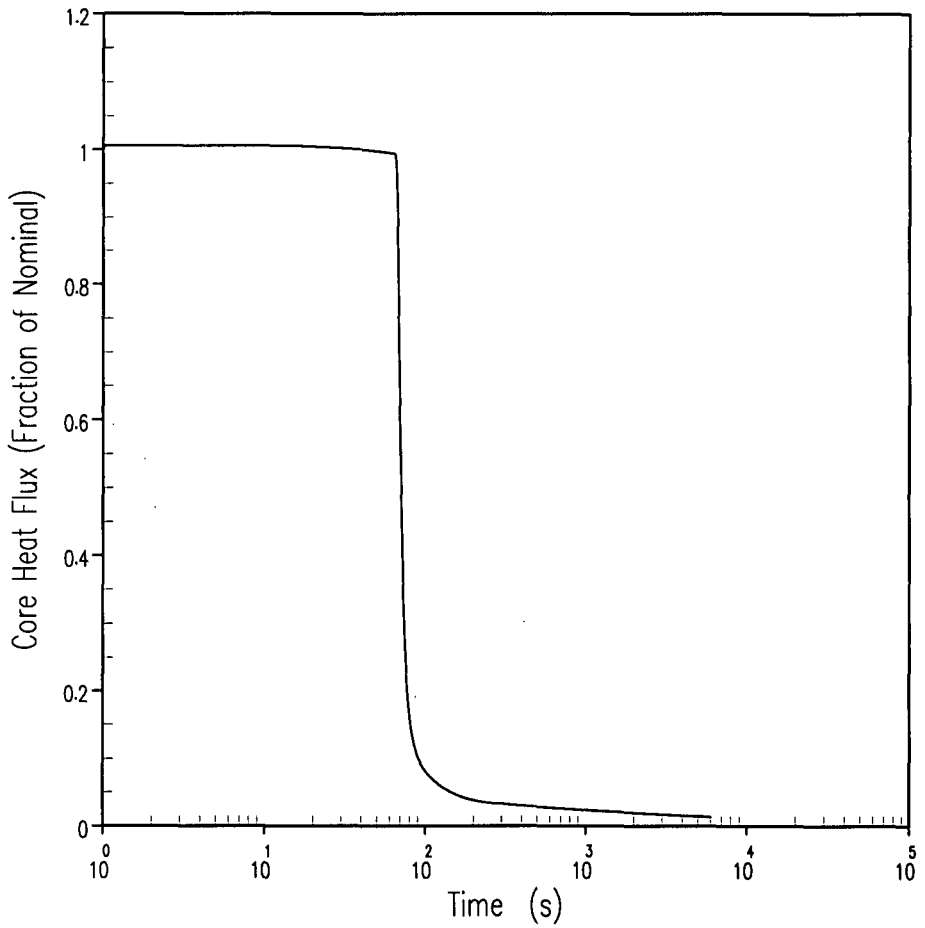


Figure 15.2-27b Loss of Normal Feedwater Core Heat Flux Versus Time

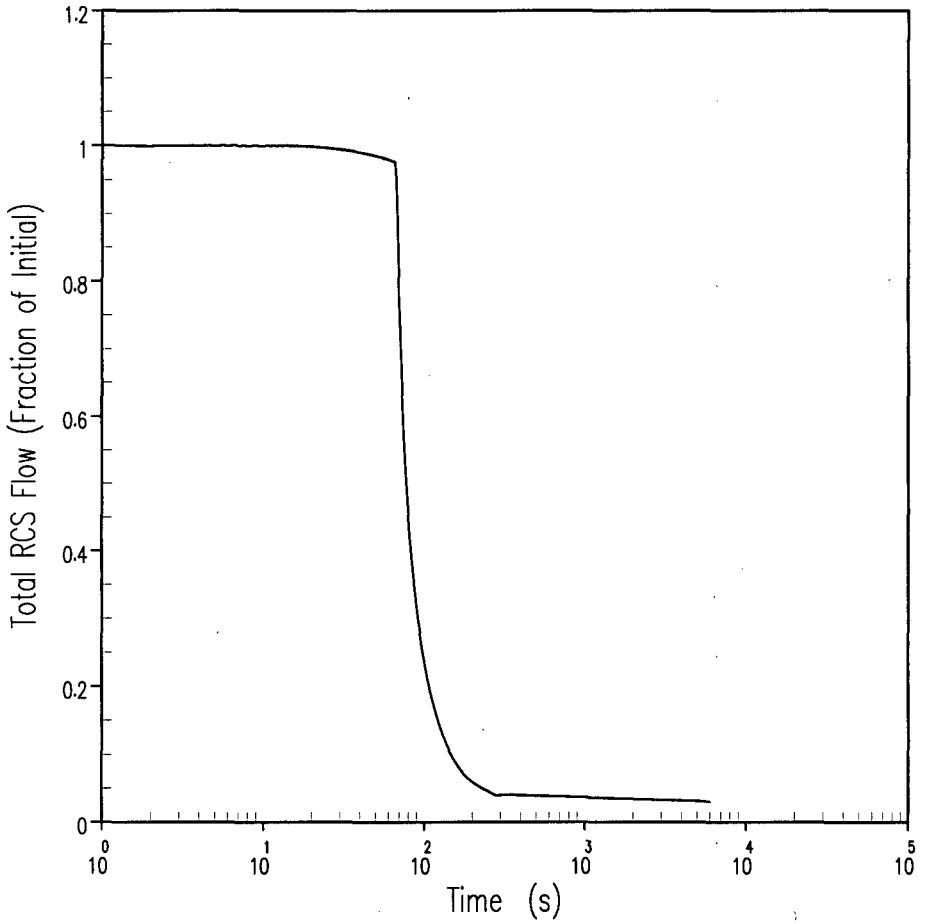


Figure 15.2-27c Loss of Normal Feedwater Total RCS Flow Versus Time

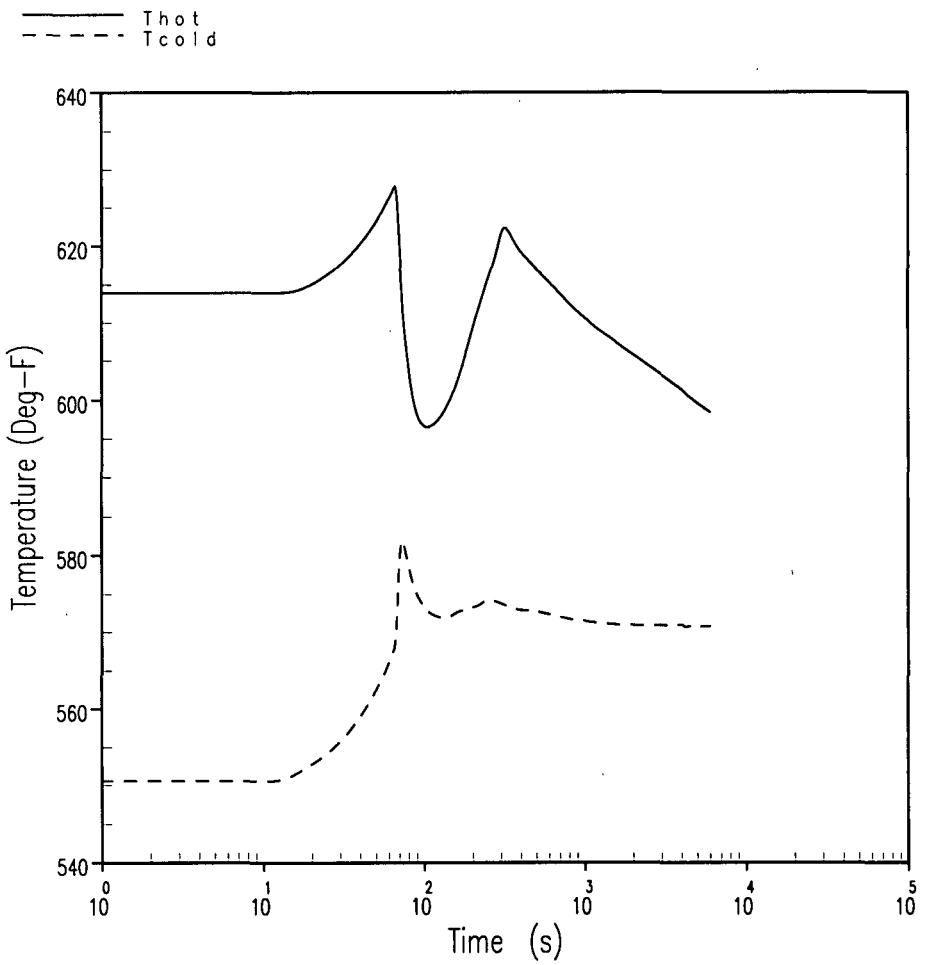


Figure 15.2-27d Loss of Normal Feedwater Reactor Coolant System Temperature Transient Versus Time

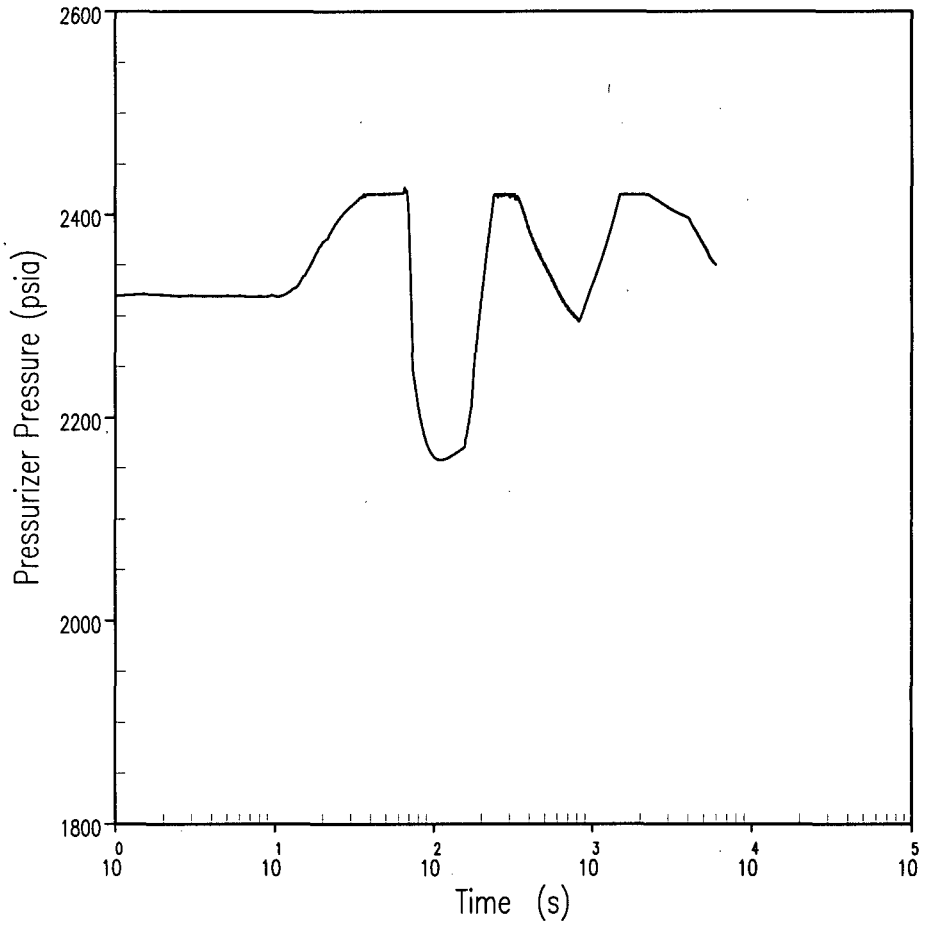


Figure 15.2-27f Loss of Normal Feedwater Pressurizer Pressure Versus Time

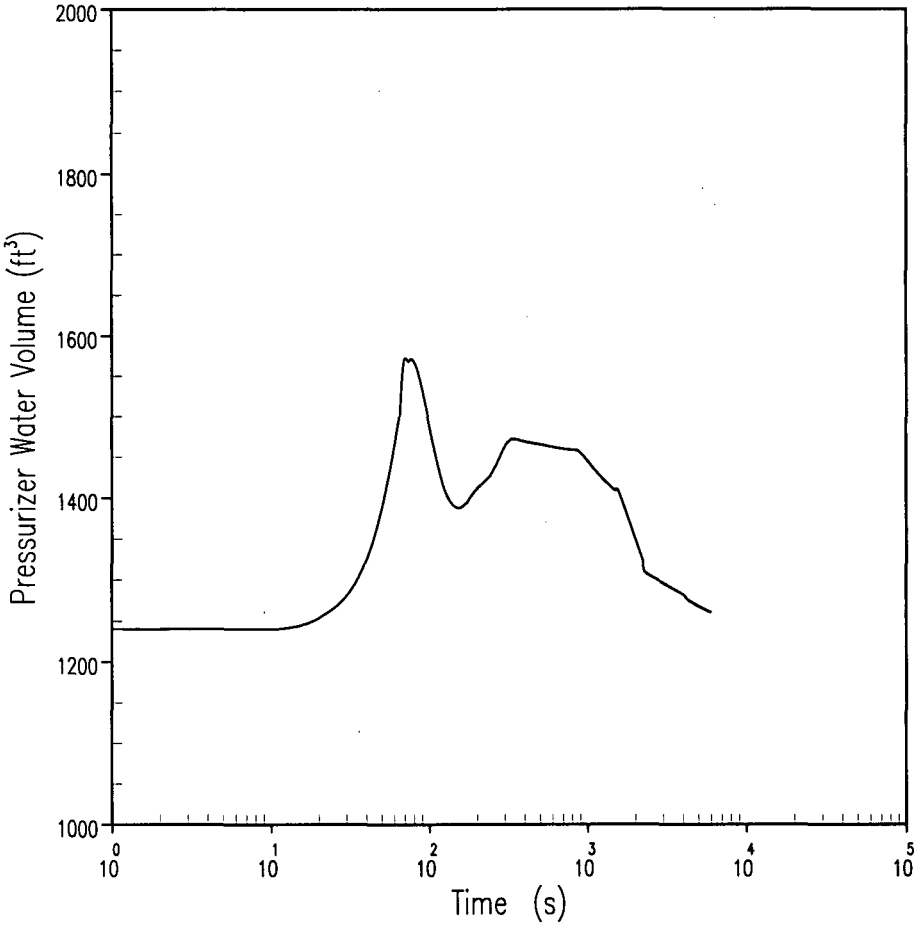


Figure 15.2-27g Loss of Normal Feedwater Pressurizer Water Volume Versus Time

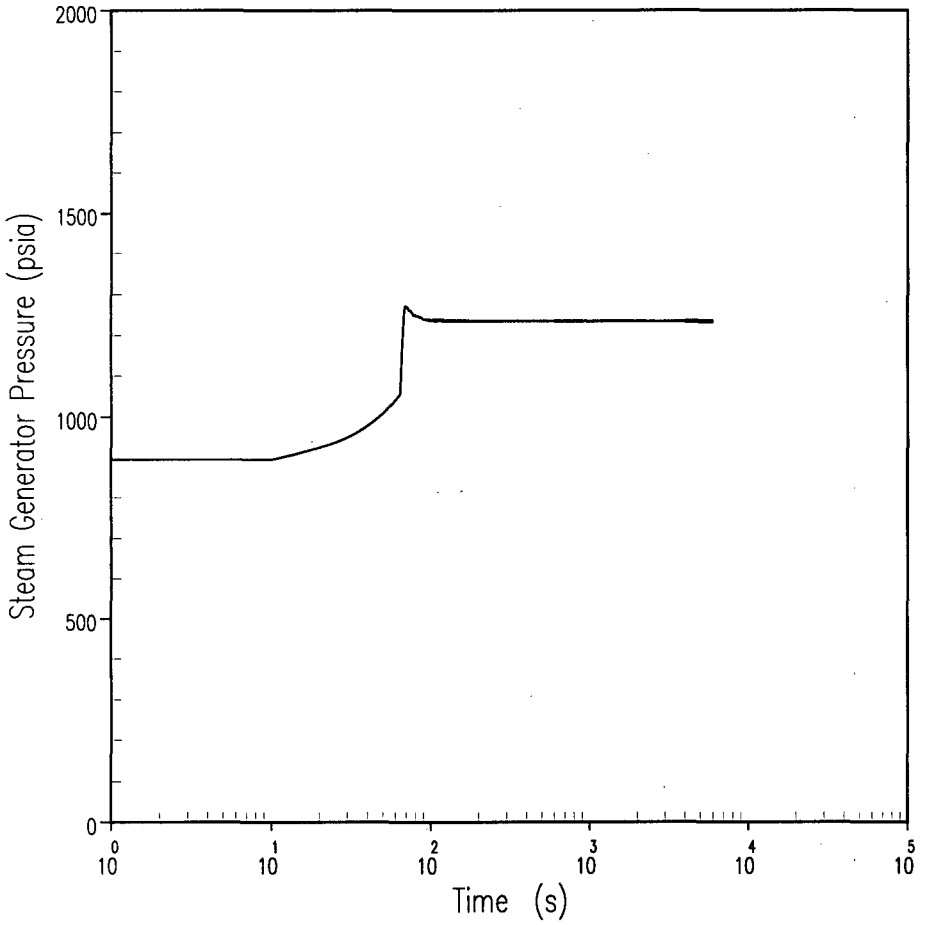


Figure 15.2-27h Loss of Normal Feedwater Steam Generator Pressure Versus Time

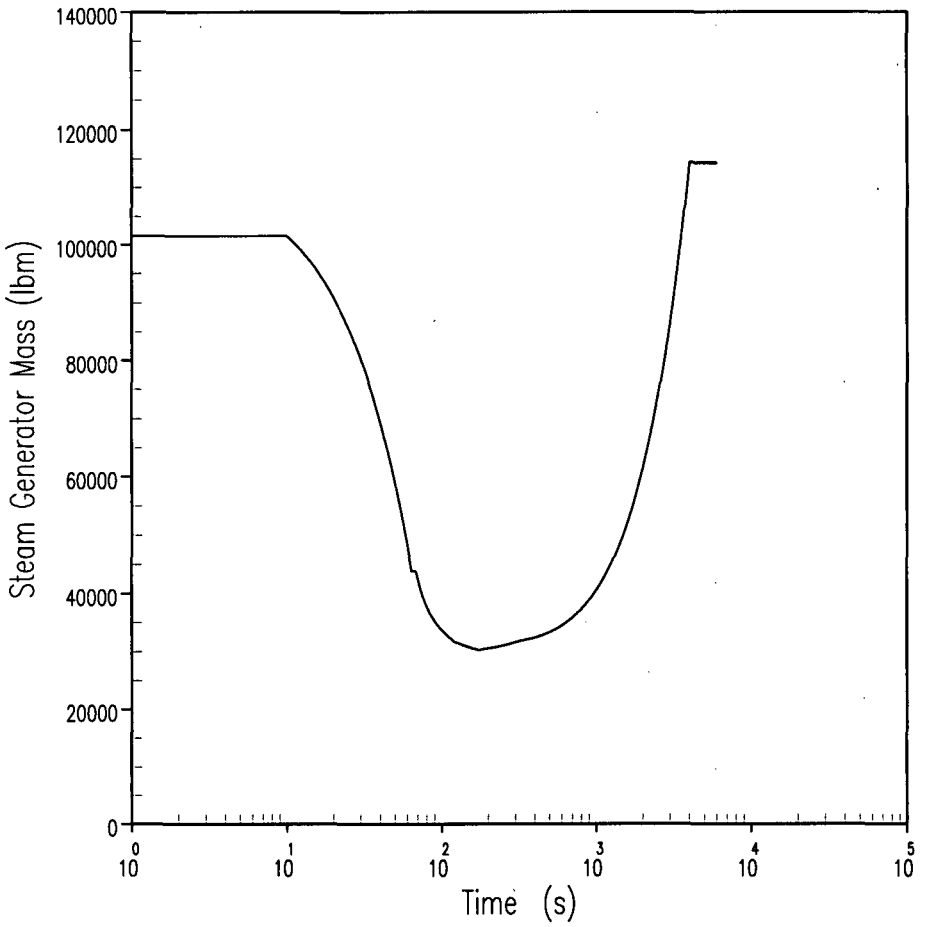


Figure 15.2-27i Loss of Normal Feedwater Steam Generator Mass Versus Time

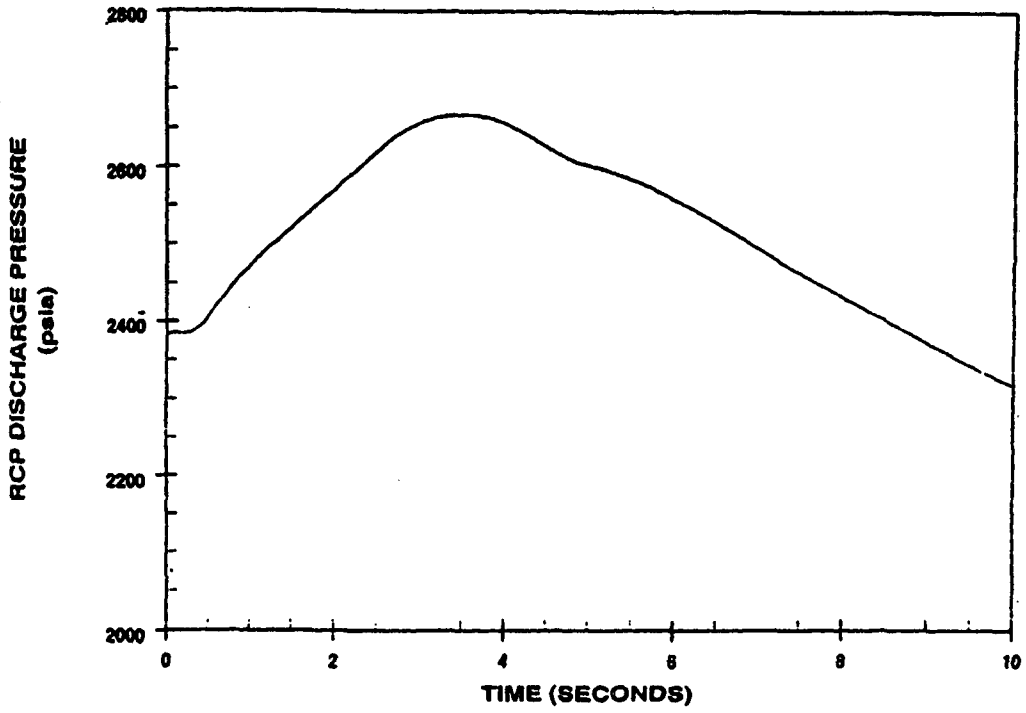


Figure 15.4-15 RCS Pressure Transient; Four Pumps in Operation, One Locked Rotor

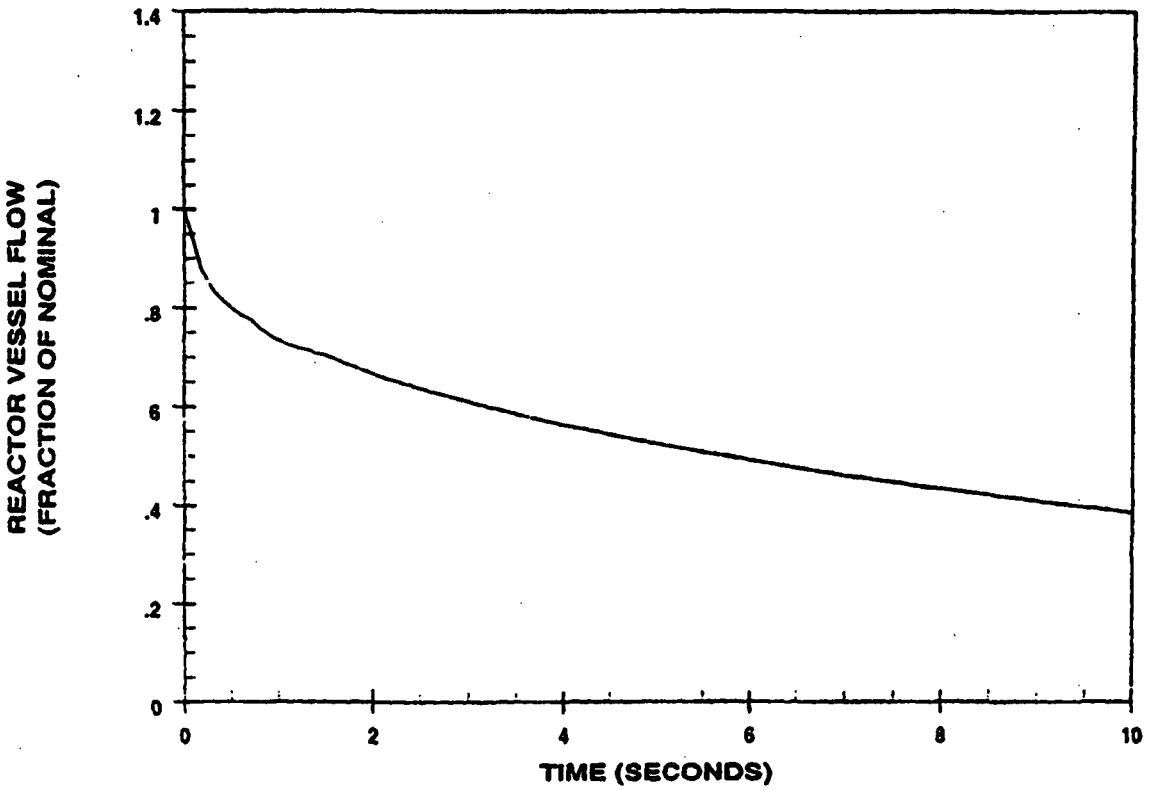


Figure 15.4-17 Reactor Vessel Flow Transient; Four Pumps in Operation, One Locked Rotor

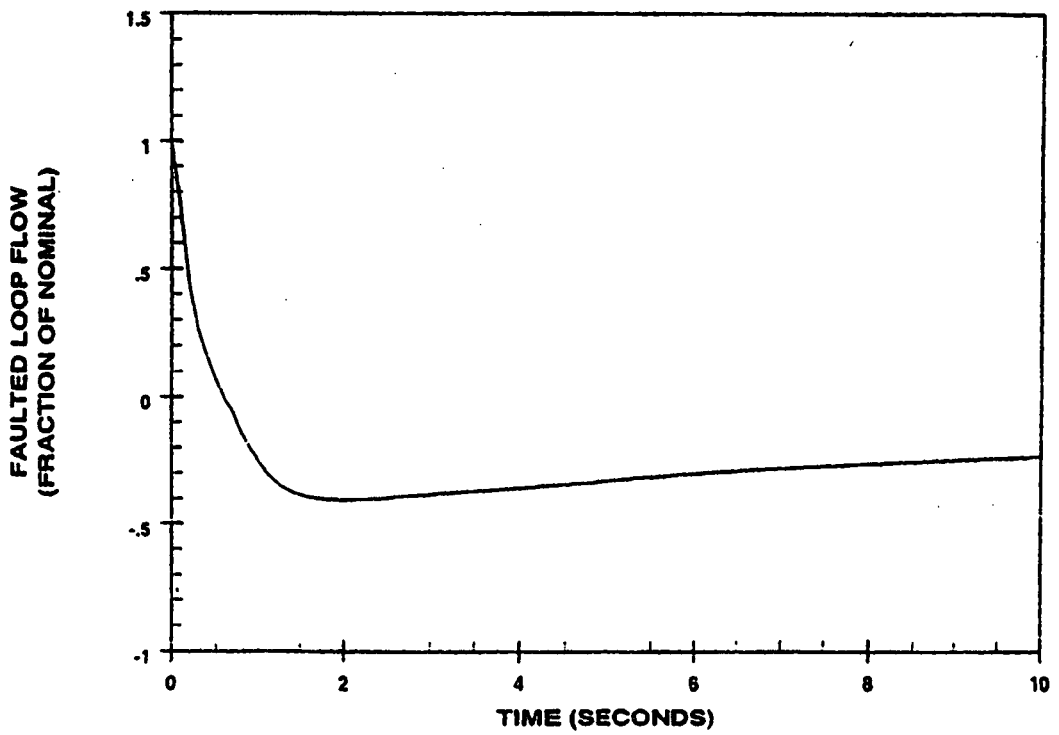


Figure 15.4-18 Loop Flow Transient; Four Pumps in Operation, One Locked Rotor

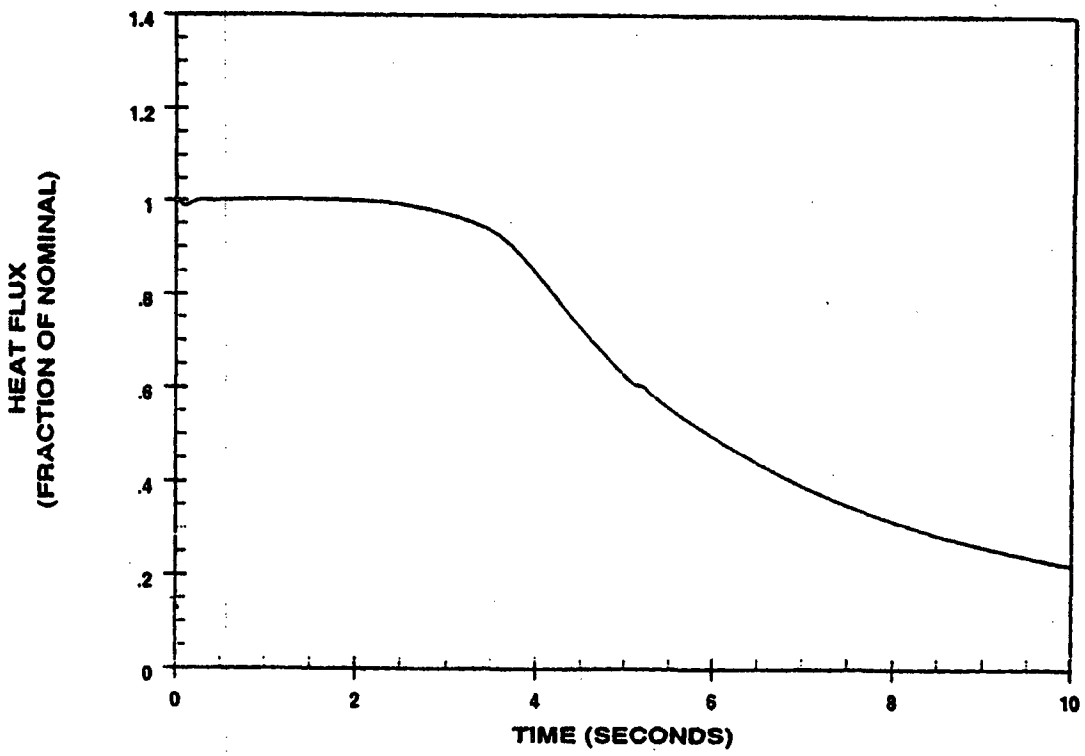


Figure 15.4-19 Core Heat Flux Transient; Four Pumps in Operation, One Locked Rotor

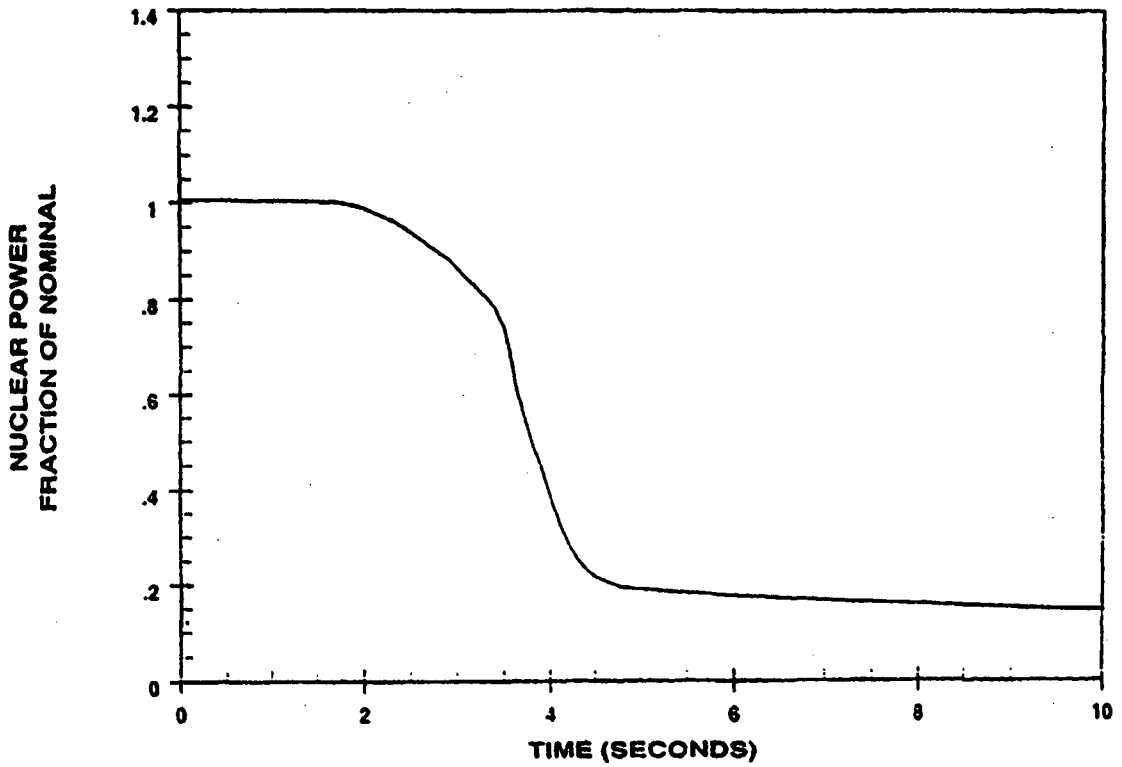


Figure 15.4-20 Nuclear Power Transient; Four Pumps in Operation, One Locked Rotor

ATTACHMENT 5

FIGURES FOR RESPONSE TO RAI 15.3.1 - 3.

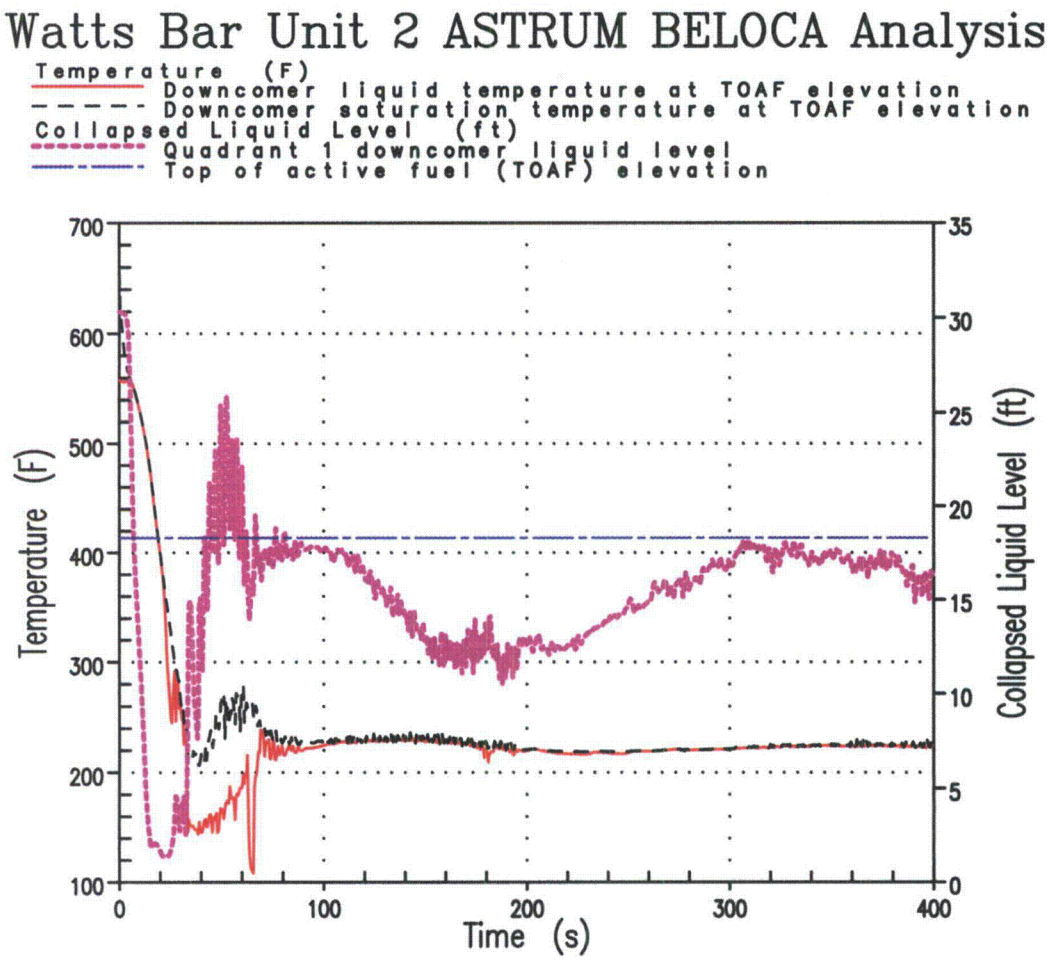


Figure 1 Watts Bar Unit 2 limiting case, calculated downcomer temperatures and collapsed liquid level during LB LOCA transient.

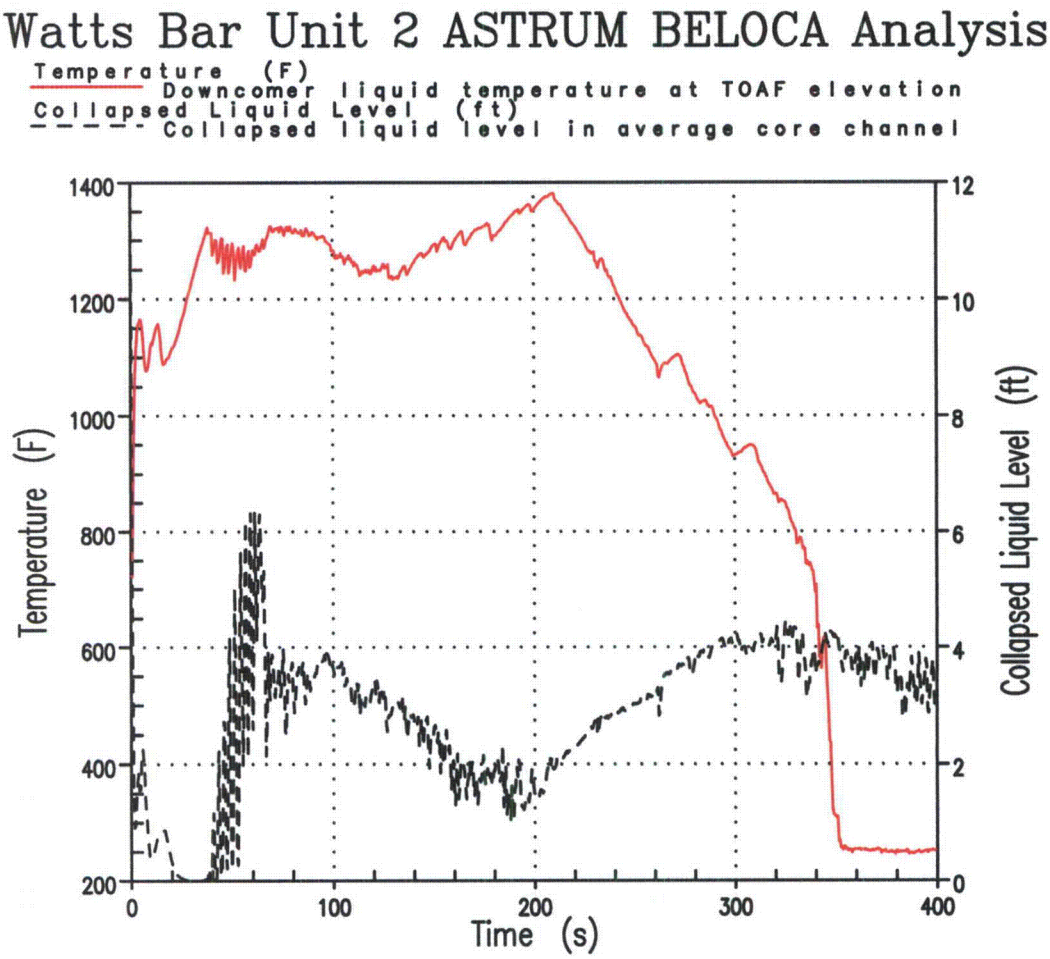


Figure 2 Watts Bar Unit 2 limiting case, calculated peak clad temperature vs. core collapsed liquid level

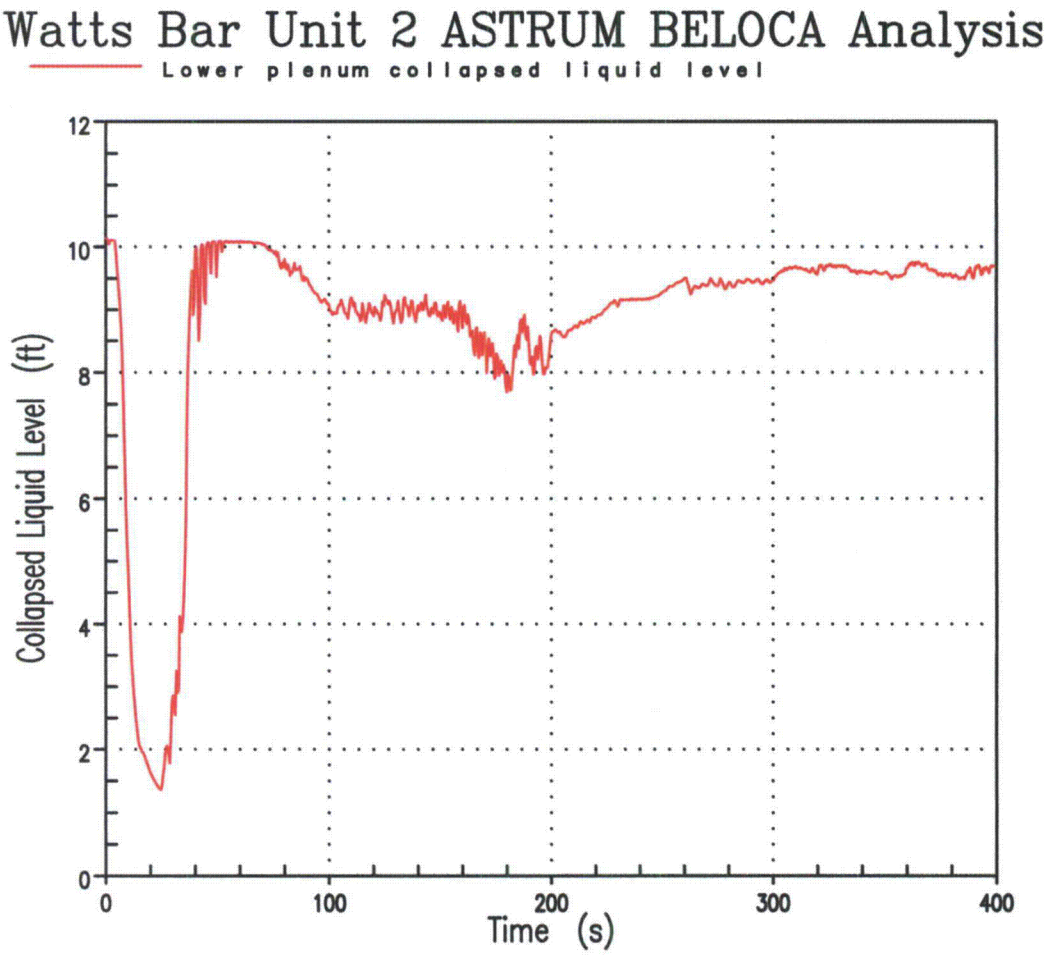
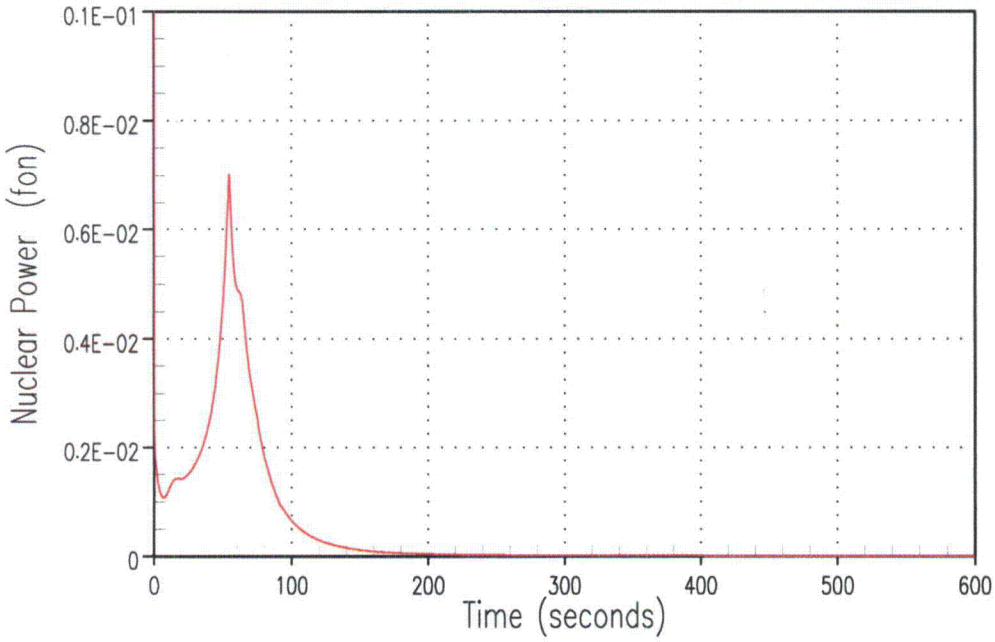


Figure 3 Watts Bar Unit 2 limiting case, calculated lower plenum level.

ATTACHMENT 6

FIGURES FOR RESPONSE TO RAI 15.3..2 - 1.I.



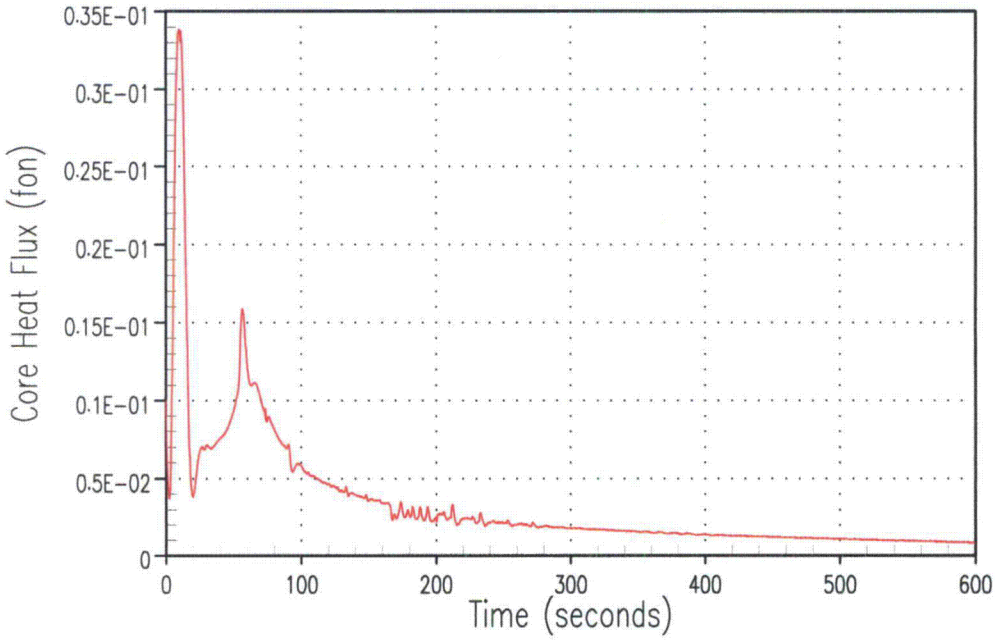
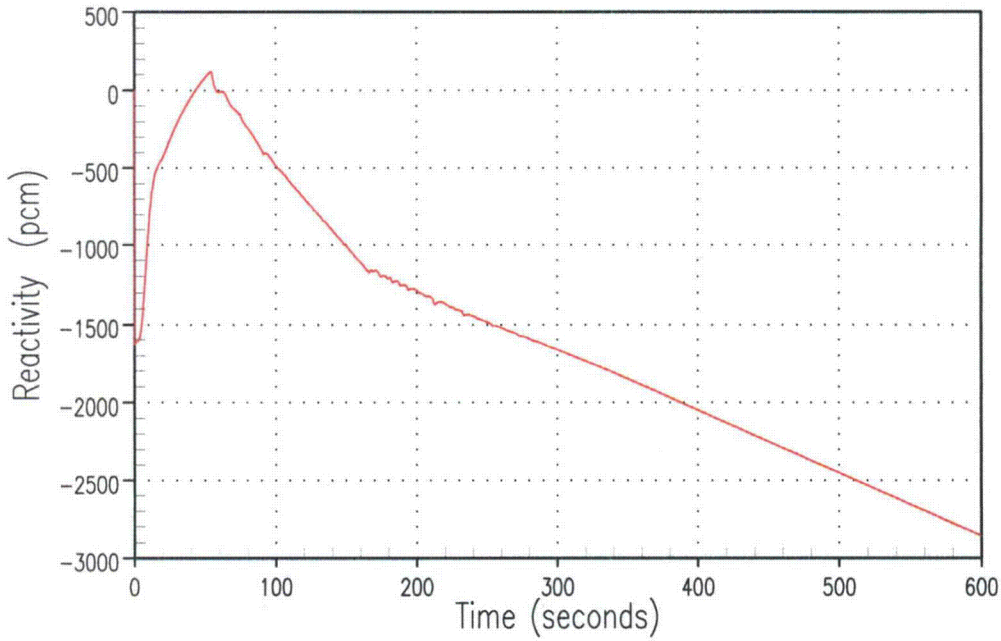


Figure 1 – Watts Bar Unit 2 Hot Zero Power Steamline Break Nuclear Power and Core Heat Flux Transients (Case A - with Offsite Power Available)



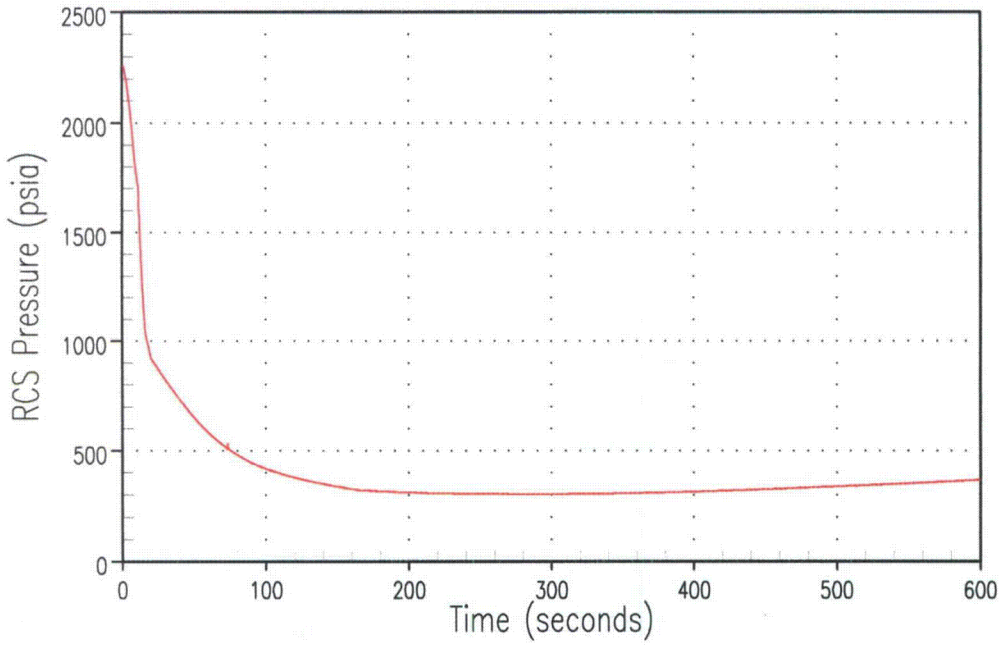


Figure 2 – Watts Bar Unit 2 Hot Zero Power Steamline Break
Core Reactivity and RCS Pressure Transients
(Case A - with Offsite Power Available)

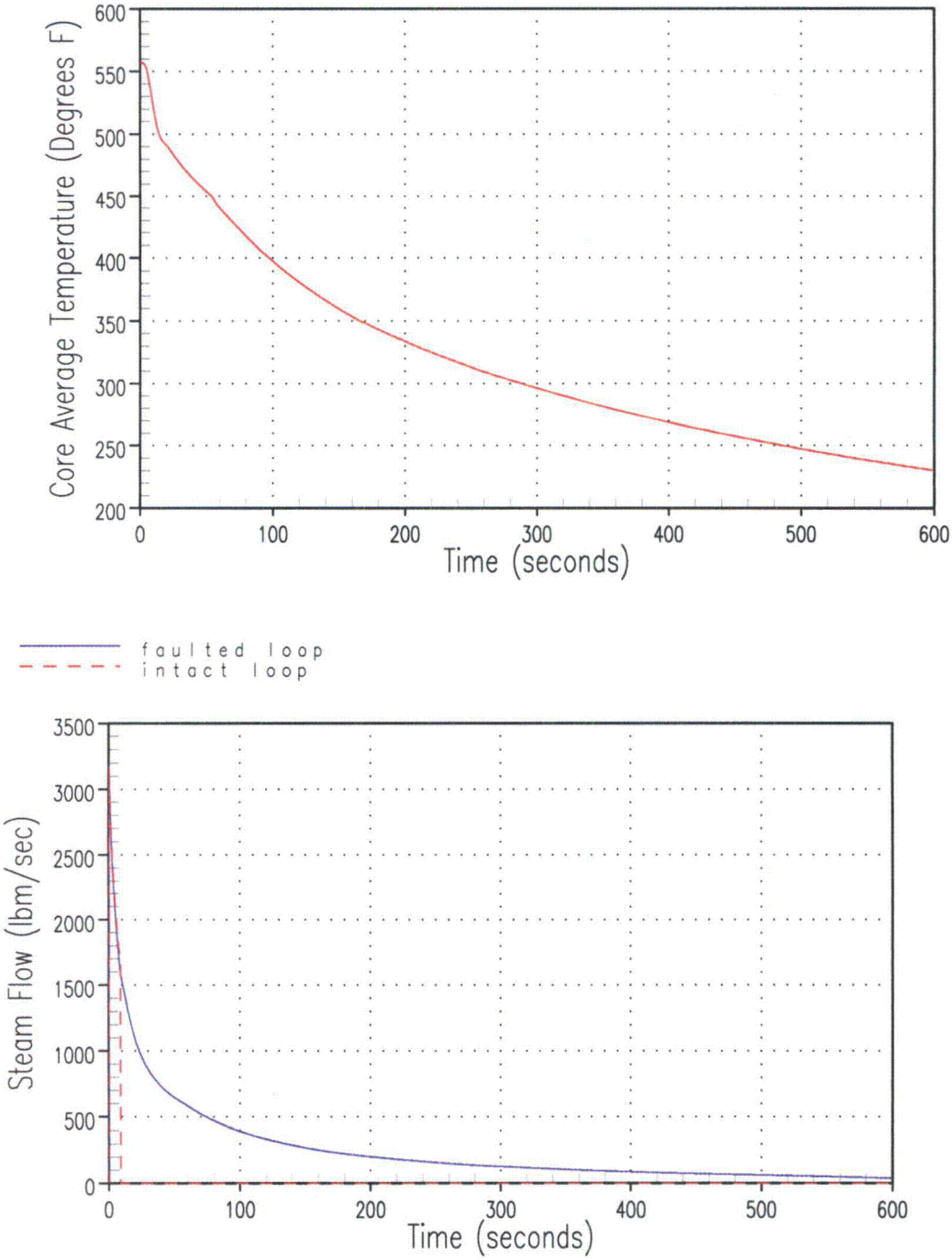
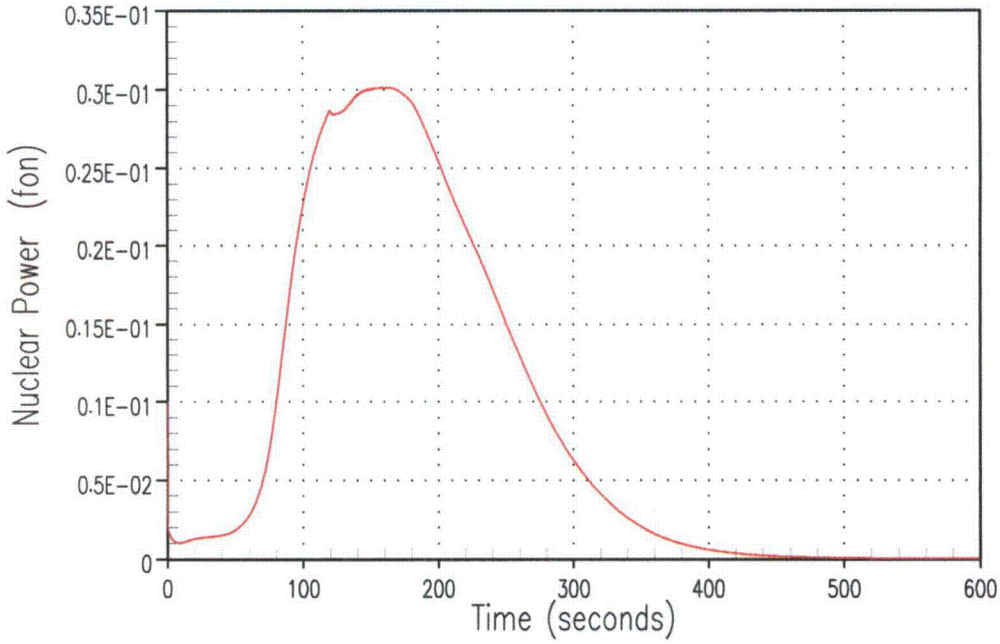


Figure 3 – Watts Bar Unit 2 Hot Zero Power Steamline Break Core Average Temperature and Steam Flow Transients (Case A - with Offsite Power Available)



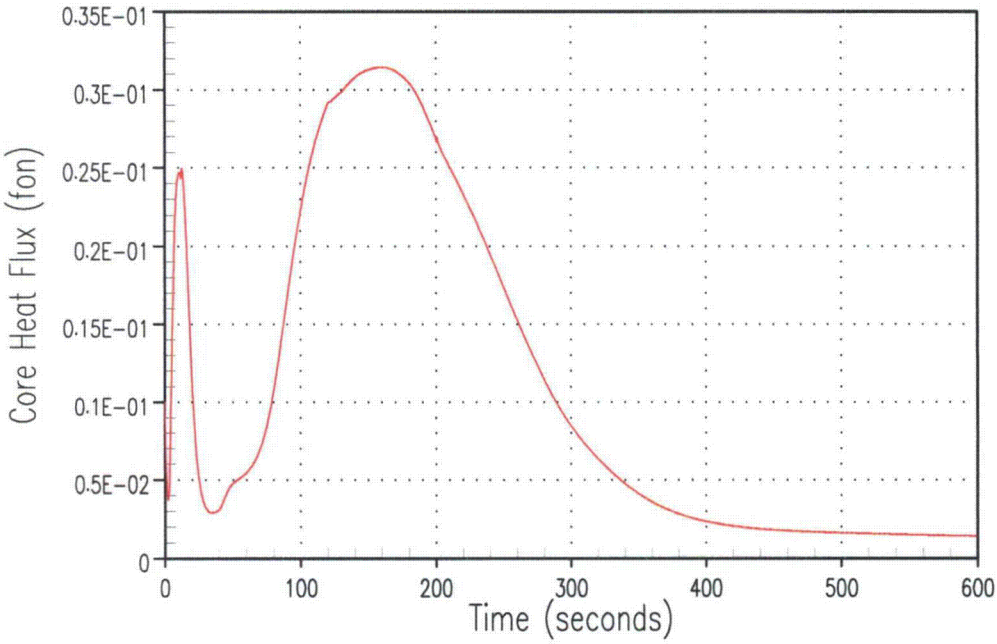
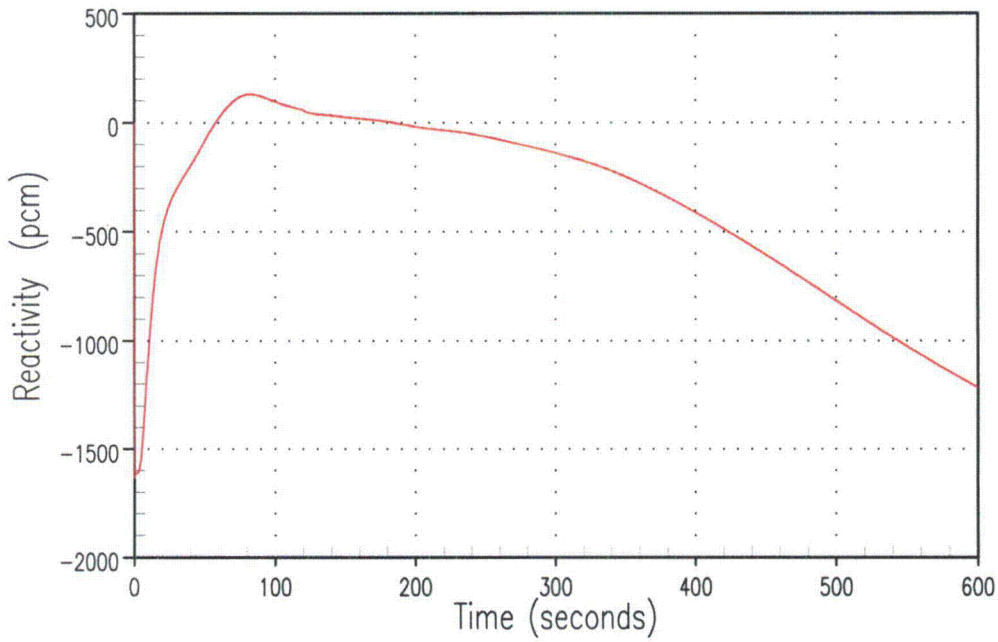


Figure 4 – Watts Bar Unit 2 Hot Zero Power Steamline Break Nuclear Power and Core Heat Flux Transients (Case B - Offsite Power Not Available)



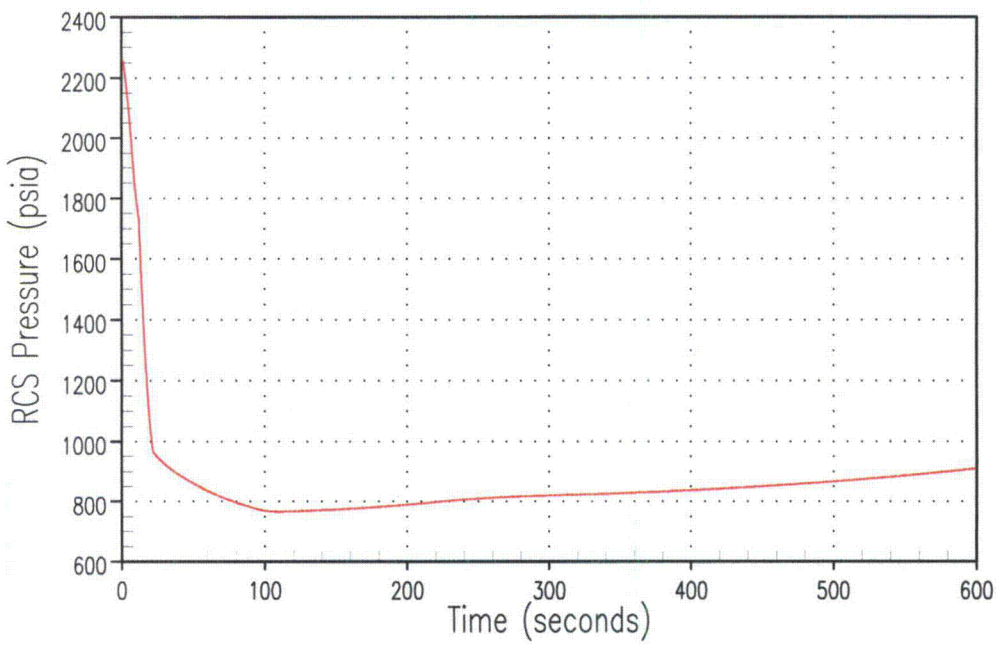


Figure 5 – Watts Bar Unit 2 Hot Zero Power Steamline Break Core Reactivity and RCS Pressure Transients (Case B - Offsite Power Not Available)

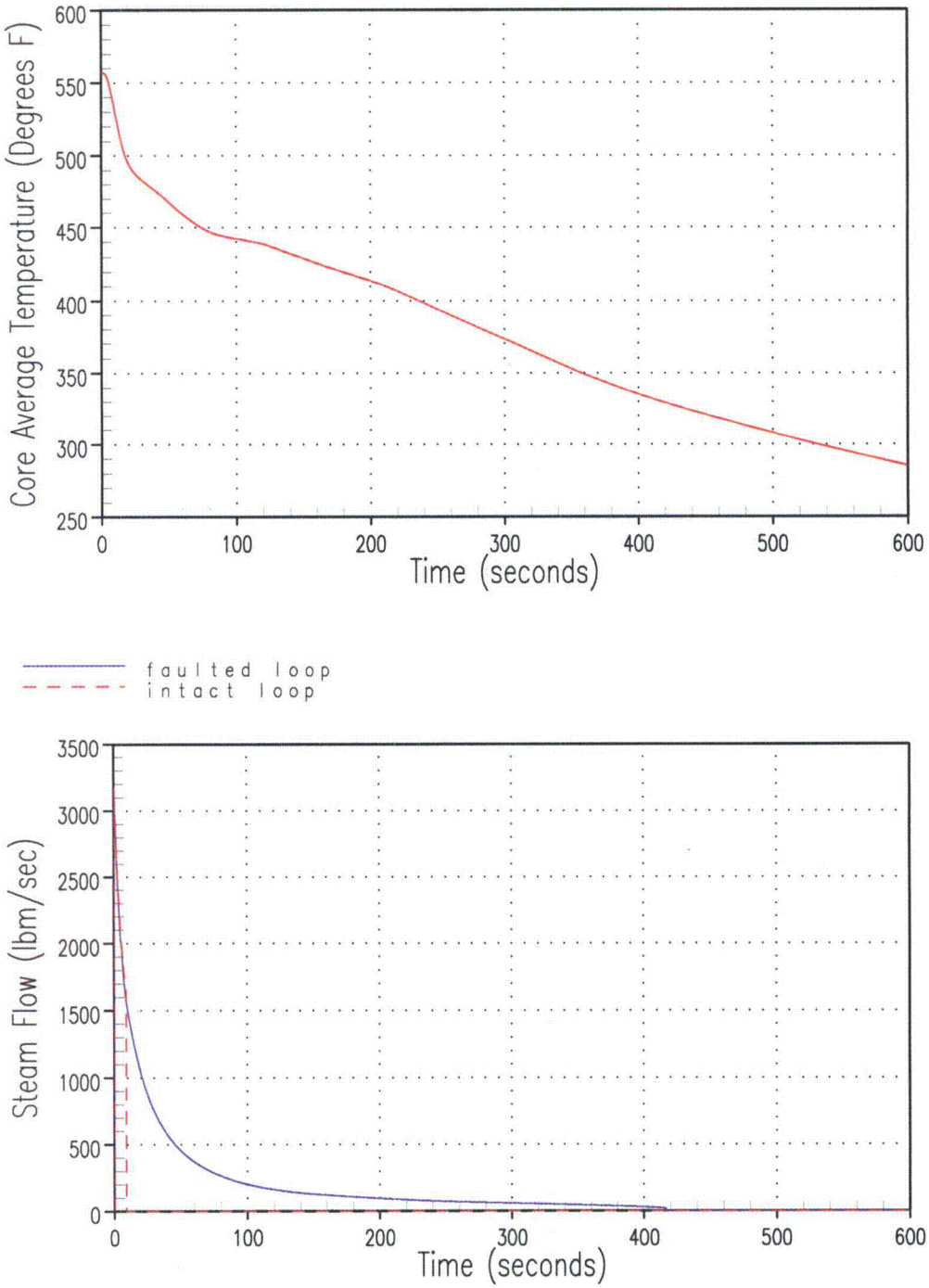


Figure 6 – Watts Bar Unit 2 Hot Zero Power Steamline Break Core Average Temperature and Steam Flow Transients (Case B - Offsite Power Not Available)

ATTACHMENT 7

TABLE 3. AND FIGURES FOR RESPONSE TO RAI 15.3.1 - 1.a.

BREAK SIZE	SCENARIO	ANALYSIS
DEG	<u>Large Breaks</u> Large breaks will rapidly depressurize to very near containment pressure.	<u>Large Breaks</u> Represented by 14.7 psia boric acid build-up calculation. Dilution flows confirmed for 14.7 psia RCS backpressure.
1.0 FT^2	<u>Large Small Breaks</u> Large small breaks will depressurize to below 120 psia without operator action.	<u>Large Small Breaks</u> Represented by 120 psia boric acid build-up calculation. Dilution flows are confirmed at 120 psia RCS backpressure.
0.2 FT^2	<u>Small Breaks</u> Emergency procedures will instruct operators to take action to depressurize RCS. Eventually the system will be put into SDC or it will remain in indefinite recirculation cooling.	<u>Small Breaks</u> Credit operator action to depressurize the RCS. If the 120 psia is reached before HLSO time, the 120 psia boric acid buildup calculation applies. If 120 psia is not reached before HLSO time, credit the higher boric acid solubility limit. If core subcooling conditions are reached, boric acid precipitation is not a concern since there will be no net boiling in the core.
0.005 FT^2	<u>Very Small Breaks</u> Emergency procedures will instruct operators to take action to depressurize RCS. Subcooled conditions will be reached prior to depressurization to 120 psia (the threshold for boric acid precipitation concerns). Eventually the RCS will be depressurized under controlled conditions to shutdown cooling entry conditions.	<u>Very Small Breaks</u> Natural circulation, if lost, will be quickly restored. While in natural circulation, boric acid precipitation is not a concern because the core region will not be stagnant. Eventually, RCS will be filled and depressurized under controlled conditions to SDC entry conditions.
0.01 FT^2	Charging Flow Makeup Capacity	

Table 3 - Post-LOCA Boric Acid Precipitation Control (BAPC) Plan

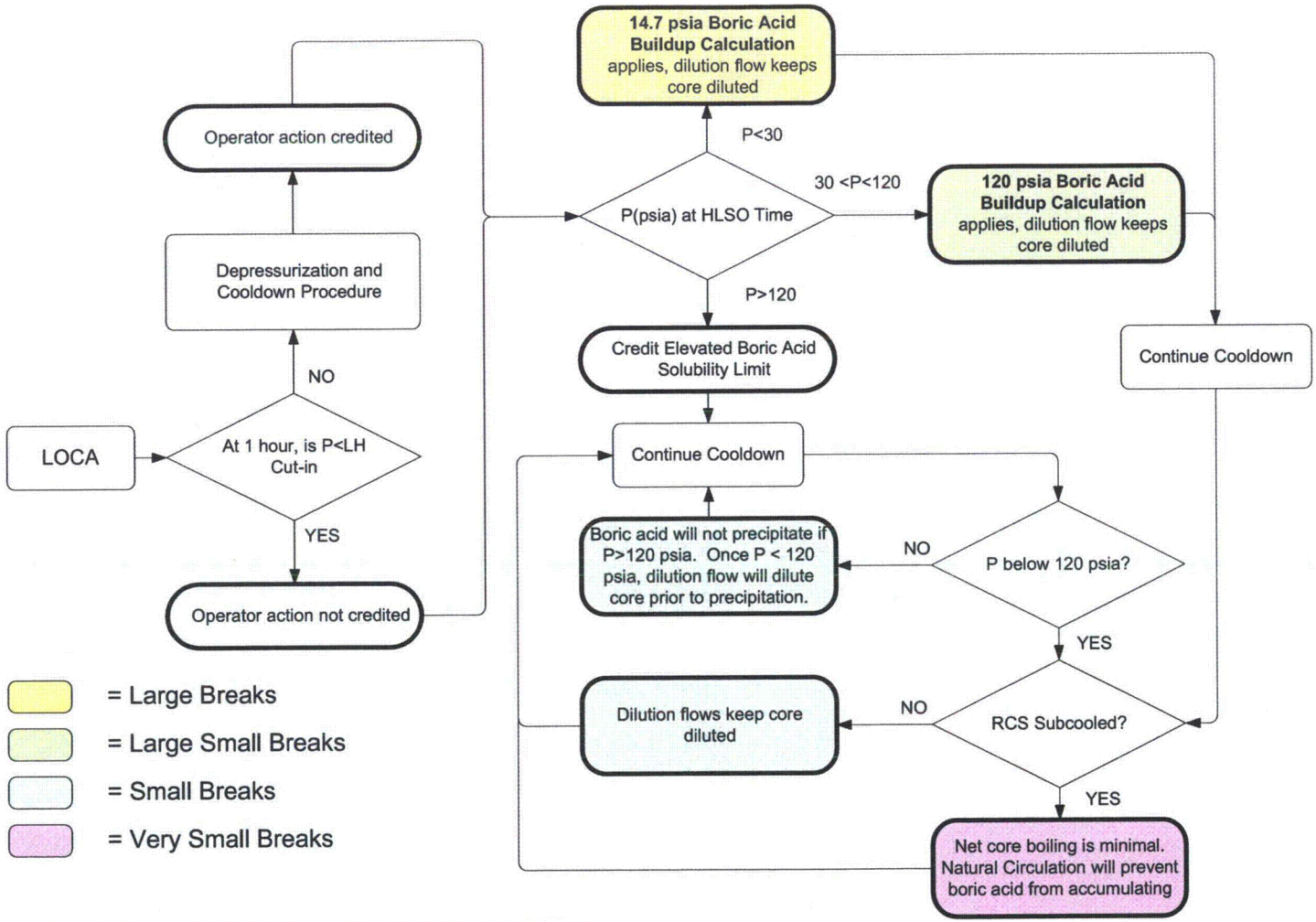


Figure 2 - Post-LOCA Boric Acid Precipitation Control Plan

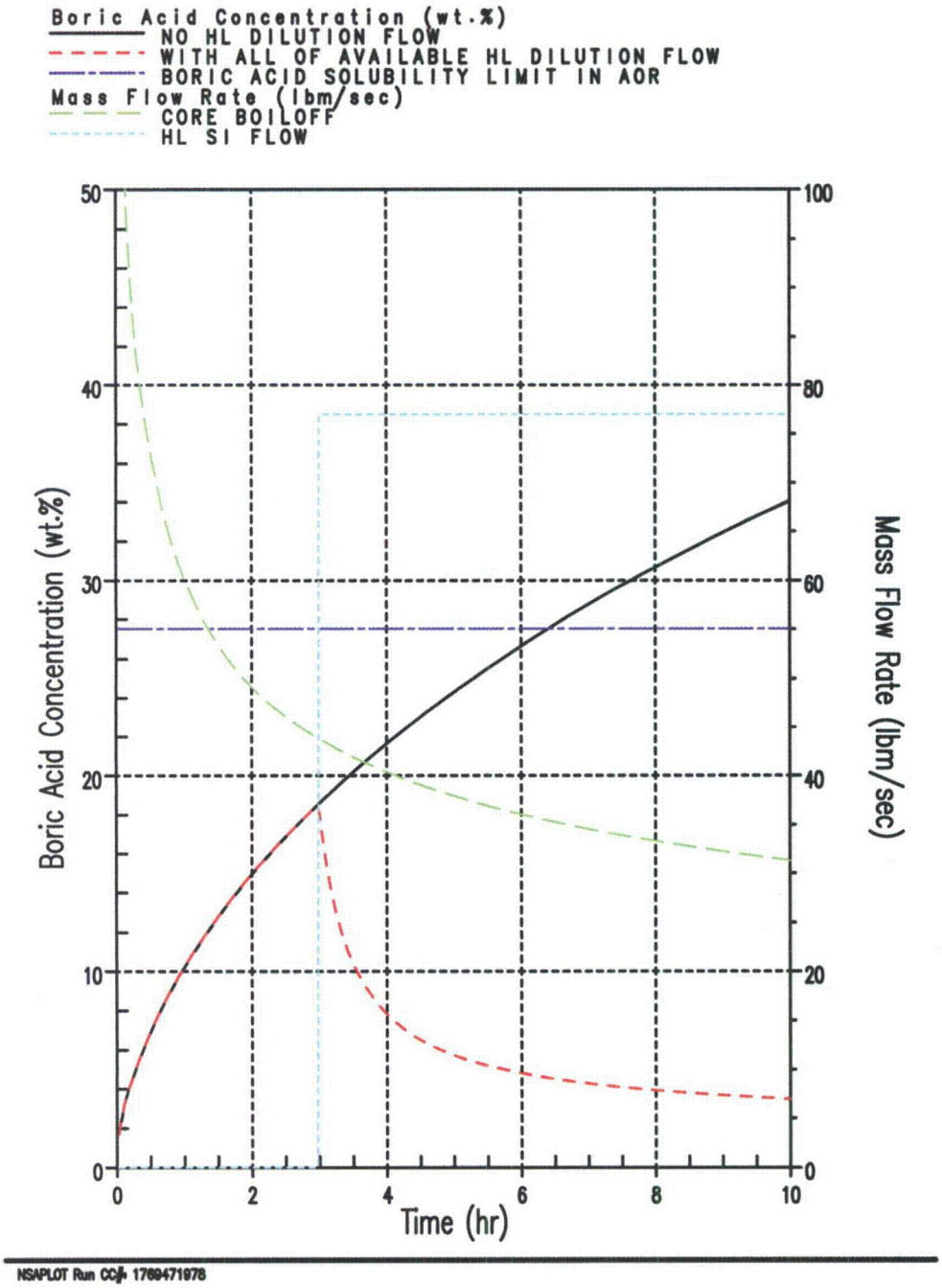


Figure 3 – Boil-off, SI, and Core Dilution Rate at a 3 Hour HLSO Time at 14.7 psia

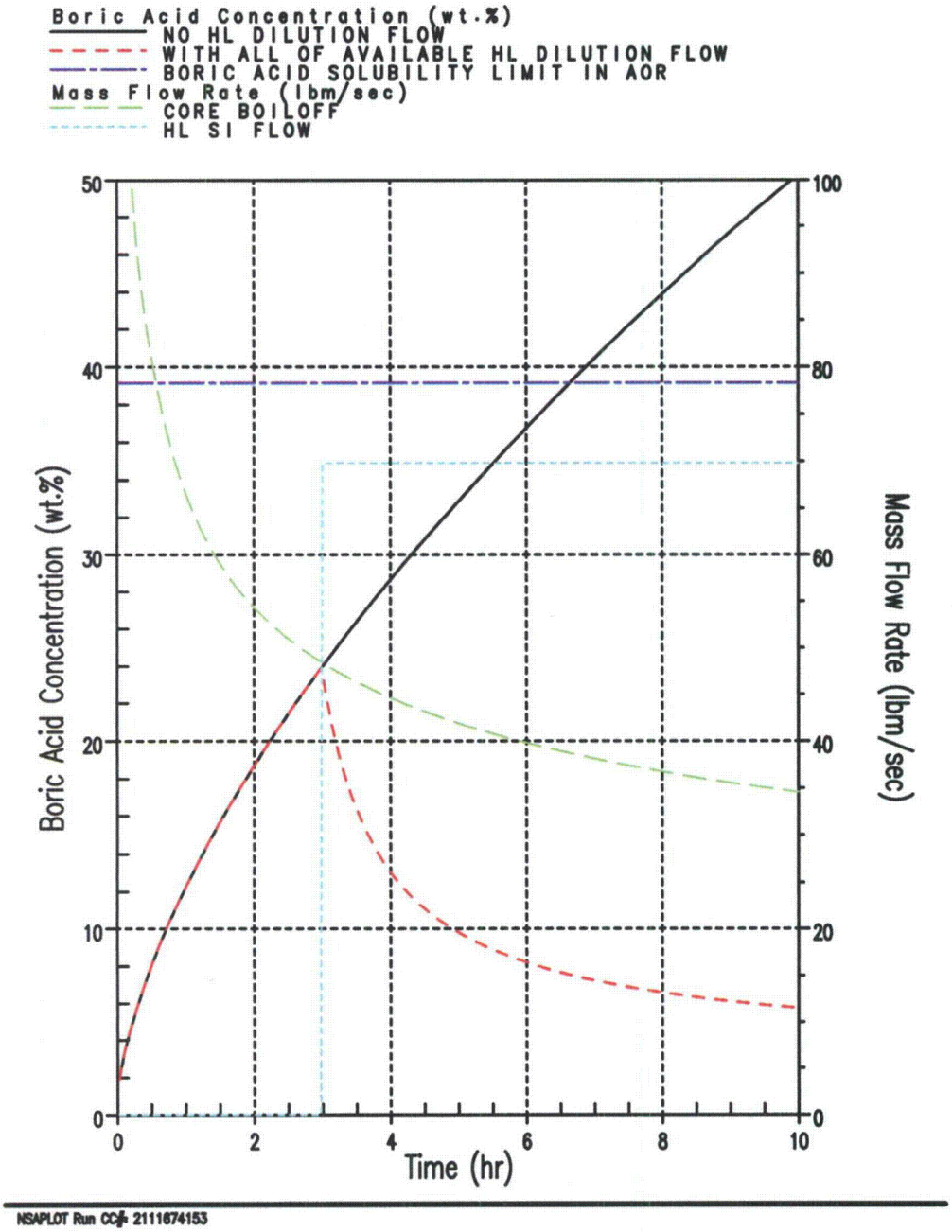


Figure 4 – Boil-off, SI, and Core Dilution Rate at a 3 Hour HLSO Time at 120 psia

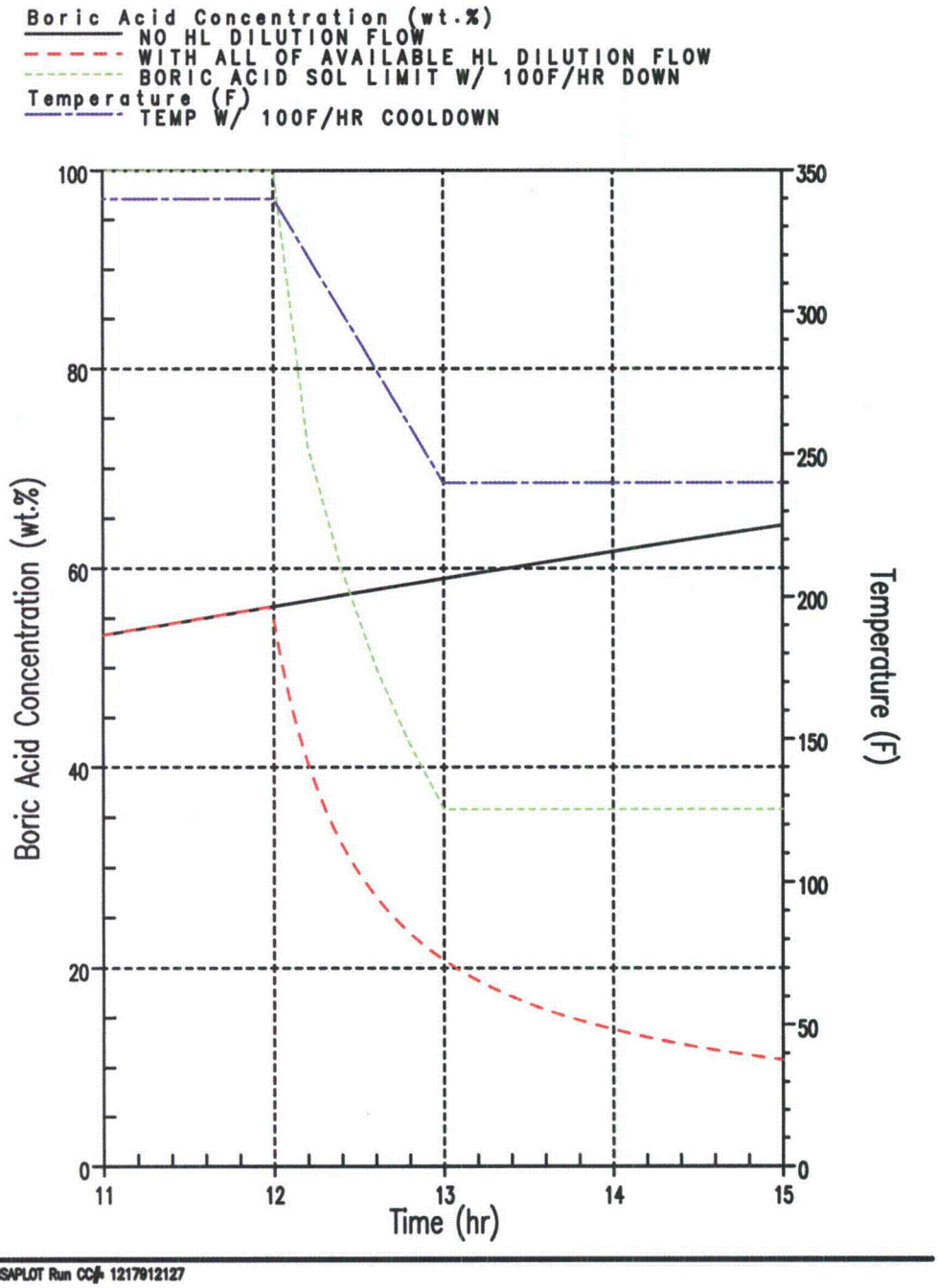


Figure 5 - Demonstration of Core Dilution at 12 hours

ATTACHMENT 8

NUCLEAR SERVICE ADVISOR LETTER NSAL-00-013, "CVCS MODELING ASSUMPTION FOR LOSS OF OFFSITE POWER ANALYSES"

Nuclear Safety Advisory Letter

Westinghouse Electric Company

This is a notification of a recently identified potential safety issue pertaining to basic components supplied by Westinghouse. This information is being provided to you so that a review of this issue can be conducted by you to determine if any action is required.

P.O. Box 355, Pittsburgh, PA 15230

Subject: CVCS Modeling Assumption for Loss of Offsite Power Analyses	**Number:** NSAL-00-013
Basic Component: Loss of Offsite Power Analysis	**Date:** August 23, 2000

Plants: See attached list

Substantial Safety Hazard or Failure to Comply Pursuant to 10 CFR 21.21(a)	Yes ☐	No ☒
Transfer of Information Pursuant to 10 CFR 21.21(b)	Yes ☐	
Advisory Information Pursuant to 10 CFR 21.21(d)(2)	Yes ☐	

References:

SUMMARY

A Westinghouse non-LOCA safety analysis modeling assumption related to the functionality of the Chemical and Volume Control System (CVCS) during a Loss of Offsite Power (LOOP) incident, also known as a Loss of Non-Emergency AC Power (LOAC) event, has recently been identified as potentially non-conservative. As analyzed by Westinghouse, the LOOP event is modeled initially as a loss of normal feedwater (LONF) transient, with a subsequent loss of offsite power assumed as a result of a reactor trip. This modeling contrasts with the plant response following a typical LOOP event in which a direct reactor trip would result from the loss of power to the rod cluster control assembly (RCCA) gripper coils. Westinghouse conservatively delays reactor trip, and subsequent reactor coolant pump (RCP) coastdown until a low-low steam generator water level signal is reached. A later reactor trip is conservative in the Westinghouse LOOP scenario (LONF+LOOP) because less secondary-side water mass is available for heat removal. Hereinafter, unless otherwise noted, all mentions of the loss of offsite power/LOOP event refer to the Westinghouse-analyzed scenario (LONF+LOOP).

The main acceptance criterion for the analysis of the LOOP event, as analyzed by Westinghouse, is that the pressurizer shall not become water solid. The primary concern with the pressurizer becoming water solid is the possibility of progressing to a more serious event, i.e., a small break loss of coolant accident (SBLOCA). The Westinghouse analysis methodology assumes that the CVCS has no net effect on the reactor coolant system (RCS) inventory. In effect, charging and letdown are assumed to balance each other with no mass or energy added to or subtracted from the RCS. This assumption is consistent with the Westinghouse philosophy of modeling the normal operation of control systems in non-LOCA safety analyses only if doing so leads to more limiting analysis results. As the primary design function of the CVCS is to maintain the pressurizer water level via charging and letdown adjustments, operation of the CVCS is not modeled.

Additional information, if required, may be obtained from the originator. Telephone 412-374-4459.

Originator(s): C.M. Marabon for DFH — D. Holderbaum, Manager, Transient Analysis

H. A. Sepp, Manager, Regulatory & Licensing Engineering

One typical consequence of a loss of offsite power is a loss of power supply to the instrument air system, which may eventually cause letdown isolation valves to close and charging isolation valves to open. Therefore, if the power supply of the charging pumps is sequenced onto the diesel generator, and charging and/or seal injection is initiated, there could be a net addition to the reactor coolant system water mass, and thus an increased potential for filling the pressurizer.

Loss of offsite power analyses in which a pressurizer fill criterion is applied are potentially affected. This includes safety analyses performed by Westinghouse, or others, using Westinghouse or similar non-LOCA methods. Westinghouse has determined that this issue does not result in a substantial safety hazard because the potential SBLOCA via the pressurizer pressure relief system is less severe than the SBLOCA analyzed in the plant Final Safety Analysis Report (FSAR). This issue is therefore not considered reportable under the provisions of 10 CFR Part 21 requirements.

For impacted plants, it is recommended that the LOOP licensing basis analysis be revised. This may be accomplished via revised analysis input assumptions and/or revised acceptance criteria. Note, however, that it will likely be difficult to obtain acceptable results for the LOOP analysis, i.e., to show the pressurizer does not become water solid, with the revised CVCS modeling assumptions. Therefore, an analysis revision may also need to credit operator action based on the emergency operating procedures. With respect to revising the event acceptance criteria, a risk-informed approach may be developed. In some cases, hardware modifications should be considered.

TECHNICAL EVALUATION

For the loss of offsite power event the safety analyses are performed to demonstrate compliance with the following ANS Condition II event acceptance criteria:

1. Pressure in the reactor coolant and main steam systems should be maintained below 110% of the design value.

2. Fuel cladding integrity shall be maintained by ensuring that the minimum departure from nucleate boiling ratio (DNBR) remains above the applicable safety analysis DNBR limit.

3. An incident of moderate frequency (i.e., ANS Condition II) should not generate a more serious plant condition, i.e., ANS Condition III or IV, without other faults occurring independently.

To show compliance with criterion 3 above, loss of offsite power safety analyses are conservatively performed to demonstrate that pressurizer filling does not occur. Precluding a water-solid pressurizer condition ensures that water is not discharged from the pressurizer through the pressurizer power-operated relief or safety valves, a condition that may not be within the design duty for these valves. If safety valves open and do not properly reseat following water relief, the reactor coolant system (RCS) pressure boundary integrity is not maintained, violating above criterion 3.

In loss of offsite power safety analyses performed by Westinghouse, the CVCS (charging, letdown, RCP seal injection) is not explicitly modeled. The Westinghouse philosophy with respect to modeling control systems in non-LOCA safety analyses is to model them to function as designed only if doing so leads to more limiting analysis results. Because the primary function of the CVCS is to maintain the pressurizer level, it would function to remove inventory from the RCS when the pressurizer level increases. Therefore, Westinghouse analysis methods do not recommend modeling the operation of the CVCS. However, consideration of net RCS inventory addition via the CVCS may result in more limiting results for the LOOP event. Recent investigations have identified that, for many plants, a loss of offsite power incident causes the loss of the

instrument air system, resulting in air-operated valves in the letdown line failing closed, and air-operated valves in the charging line failing open. Also, following a loss of offsite power, the charging pumps are typically removed from their normal offsite power source, loaded onto the emergency diesel generators, and automatically started. The result of this scenario is an addition of charging flow and seal injection flow to the RCS, without a compensating reduction of fluid through the letdown line. This mass addition to the RCS causes an increase in the pressurizer fill rate, which may lead to a water-solid pressurizer condition.

Safety Analysis Assumptions

A LOOP event is an ANS Condition II event that results in a reduction of the capability of the secondary system to remove heat generated in the primary system. The assumed loss of main feedwater results in a reduction of the steam generator inventory. The loss of subcooled feedwater may cause an increase in Main Steam System pressure and reactor coolant average temperature and an insurge of water into the pressurizer, with RCS pressure increase. When the SG water level reaches the low-low setpoint, reactor trip and turbine trip occur, and the auxiliary feedwater (AFW) system is actuated, eventually delivering subcooled water to the steam generators. Loss of power to the reactor coolant pumps (RCPs) is assumed to occur following the reactor trip on low-low steam generator water level. With no power to the RCPs, the RCS flow coasts down to natural circulation conditions. Immediately after reactor trip, the heat removal capability of the steam generators exceeds the residual heat (decay heat) generated in the core. This results in a decrease in RCS temperature and pressure, and pressurizer water level. The secondary-side, non-safety-related power-operated relief valves and atmospheric steam dump valves are generally not credited in the analysis, so the steam generator pressure is controlled by the main steam safety valves.

With respect to the limiting case in most Westinghouse LOOP analyses (maximum decay heat, no credit for heat losses or other heart sinks, minimum AFW, and minimum SG water at the time of trip), early decay heat exceeds the capacity of the AFW and SG water level continues to decrease to the point where SG heat transfer is less than decay heat. At that point, the RCS temperature begins to increase again. This trend continues until the heat removal capability of the steam generators being fed auxiliary feedwater, exceeds the decay heat generated in the core. At that time, the RCS temperature and pressure, and the pressurizer water level begin to decrease again and the transient, as analyzed for the FSAR, is over. Subsequently, the plant operators can follow the applicable emergency operating procedures to first bring the plant to a stabilized temperature condition, and then, if necessary, eventually to a cold shutdown condition.

Typically, the limiting single failure for the LOOP analysis is the failure of the turbine-driven AFW pump to start. In addition, for many plants, one of the motor-driven auxiliary feedwater pumps is not credited in the analysis, so as to maximize operational flexibility and maintain consistency with auxiliary feedwater system reliability goals that were defined as a result of the NRC's review of the Three Mile Island Unit 2 (TMI-2) accident (See Reference 1).

The reactor trip is delayed in the Westinghouse-analyzed LOOP scenario (LONF+LOOP), leaving less secondary-side water mass available for heat removal. Thus, this scenario is more limiting than a typical LOOP event in which the LOOP occurs independently as an initiating event and not as a result of unit trip. A reactor trip from the loss of power to the RCCA gripper coils would occur following a typical LOOP incident. Therefore, for simplicity and conservatism, Westinghouse analyzes the LONF+LOOP scenario in support of a plant's licensing basis, and does not typically perform an explicit analysis of the typical LOOP event. However, there is no licensing requirement that prevents having a licensing basis analysis for the typical LOOP event.

ASSESSMENT OF SAFETY SIGNIFICANCE

Analysis Considerations

The greatest potential safety concern for those plants that are adversely affected by the modeling of the CVCS in LOOP analyses is that a water-solid pressurizer condition may occur. When the pressurizer becomes water-solid, water discharge through the PORVs or pressurizer safety valves (PSVs) is probable. Water discharge through these valves could then lead to overpressurization of the pressurizer relief tank (PRT), i.e., rupture of the PRT rupture disks. Water relief through the PSVs is considered to be the most serious with respect to safety analysis concerns because EPRI tests have demonstrated that some PSVs fail to properly reseat when exposed to water relief. For a LOOP event, the PSVs will not open as long as one pressurizer PORV is available. However, note that the PORVs may be air-operated such that a loss of instrument air caused by the LOOP makes them inoperable. Also, the PORVs are typically not classified as safety grade equipment, and may not be required to be in service (can be blocked). Thus, the pressurizer PORVs are typically not credited in safety analyses, but are modeled to relieve steam in the LOOP analysis because doing so leads to more limiting analysis results. If a PSV fails open during water relief conditions, the RCS becomes unisolable, and the ANS Condition II LOOP event will likely progress to the more severe ANS Condition III small break LOCA event. While such an event propagation is a violation of one of the applicable licensing basis acceptance criteria for a Condition II event, it is not considered a significant safety concern. As a LOCA event, discharge of coolant out of the pressurizer pressure relief system, especially from a post-reactor trip condition, is not significantly adverse relative to other Condition III LOCA events currently analyzed. This is particularly true considering that the pressurizer is located on the hot leg and a hot leg LOCA event is less severe than a cold leg LOCA event as currently considered as part of a plant's licensing basis safety analysis.

Furthermore, it should be noted that via NUREG-0737, Item II.D.1 (Reference. 2), the NRC required pressurized water reactor licensees and applicants to provide justification that their pressurizer relief and safety valves will be operable under all predicted FSAR operating conditions. This has not been an issue for LOOP analyses because it has always been demonstrated that the pressurizer does not become water-solid, i.e., no water relief through the pressurizer relief or safety valves. However, if water relief through the pressurizer relief or safety valves is predicted, the requirements of NUREG-0737 would need to be considered.

Operator Actions

In addition to the safety analysis considerations discussed above, the operator is provided guidance to control and stabilize the plant in the event of a LOOP occurrence, as described below.

Following a reactor trip and loss of offsite power, the primary actions that the operator is directed to perform focus on stabilizing the plant at no-load conditions. The first few actions are performed using Emergency Operating Procedures developed from the Emergency Response Guideline E-0 (Reactor Trip Or Safety Injection), which directs operators to verify that the reactor and turbine have tripped and that there is electrical power to at least one emergency bus. As a safety injection signal is not actuated during a loss of offsite power event, subsequent operator actions are performed using Emergency Response Guideline ES-0.1 (Reactor Trip Response).

ES-0.1 actions include:

- stabilizing RCS temperature at the expected no-load temperature by adjusting steam dump flow through the condenser steam dump system or the steam generator PORVs,

- assuring that there is feed flow to the steam generators to reestablish and/or maintain no-load program steam generator level,
- controlling pressurizer level at the no-load level which includes placing charging and letdown in service and adjusting flow as necessary to maintain pressurizer level at the no-load value,
- controlling pressurizer pressure at the no-load pressure by use of the pressurizer heaters, spray and pressurizer PORVs as necessary.

Although the operator is given direction to control pressurizer level by adjusting charging flow and letdown, in the unlikely event that he could not control charging flow and/or reestablish letdown, it is possible that the pressurizer would fill and either the pressurizer PORVs or safety valves would open and relieve water. If a PORV failed to reclose and the automatic block valve closure also failed, or if the PORV failed to open such that a PSV opened and subsequently failed to close, reactor coolant system pressure would eventually decrease below the safety injection actuation setpoint and the operator would be directed to actuate safety injection and return to Emergency Response Guideline E-0 (Reactor Trip Or Safety Injection). From that point on his actions would be the same as if the initiating event was a small break LOCA or a stuck open pressurizer relief valve that could not be isolated. The safety injection system would be operated to maintain core cooling while a plant cooldown is initiated and performed using the directions in Emergency Response Guidelines E-1 (Loss Of Reactor Or Secondary Coolant) and ES-1.2 (Post-LOCA Cooldown And Depressurization). If the refueling water storage tank (RWST) is drained during the cooldown, the suction of the safety injection would be switched to the containment sump using ES-1.3 (Transfer To Cold Leg Re-circulation).

Safety Significance Conclusion

Based on the conservatism in the safety analysis and the operator guidance currently in place, it is concluded that the effect of CVCS operation on the accident results does not represent a substantial safety hazard.

NRC AWARENESS

The NRC has not been informed of this issue by Westinghouse. This issue is not reportable pursuant to the requirements of 10 CFR Part 21.

RECOMMENDED ACTIONS

The CVCS modeling issues identified herein potentially affects plants whose acceptance criterion for the loss of offsite power analysis is to prevent filling the pressurizer. This includes plants with LOOP analyses performed with the LOFTRAN or RETRAN computer codes using current Westinghouse, or similar, modeling assumptions for this event. The effects of CVCS modeling may also need to be considered in Feedline Break (with a coincident loss of offsite power) transient analyses if a pressurizer overfill criterion was adopted in response to Three Mile Island action plan requirements of NUREG-0737 (Section II.D.1). Westinghouse has identified that the loss of offsite power licensing basis analysis for your plant is potentially affected by the charging and seal injection flow modeling issues described herein. Note that the Feedline Break transient analysis is only impacted if a pressurizer fill acceptance criterion is applicable.

Utilities should first determine if this issue applies to their units by reviewing their CVCS system behavior (including availability of instrument air) and the emergency diesel generator loading sequence for a loss of offsite power. If this review reveals that there is a net addition of charging or seal injection into the RCS

following a loss of offsite power, it would be necessary to determine when this additional flow causes the pressurizer to fill. If it is determined that filling occurs opportune to permitting operator actions to prevent filling, then the licensing basis analysis in the FSAR could be revised to credit these operator actions. Examples of operator actions that can delay or prevent pressurizer filling are as follows:

1. Restore letdown by restoring instrument air (e.g., manual loading of air compressor on emergency diesel-generator or other available power supply).

2. Reduce charging flow or isolate charging lines while maintaining seal injection.

3. Open PORV block valves if closed to make available one or more pressurizer power-operated relief valves (PORVs) for water relief. Analyses have demonstrated that one PORV is sufficient for most plants to provide a path for water relief and, thereby, maintain the pressurizer pressure below the PSV setpoint. While crediting operator action to make one pressurizer PORV available for water relief is a valid option, this option may require upgrading the PORVs. The use of PORVs in this manner has been formally reviewed and approved by the Nuclear Regulatory Commission (NRC).

   In choosing option 3, the design challenge to the PORVs is increased by the frequency of the LOOP event. Increasing this frequency has the potential to change the conclusions reached in response to NUREG-0737, item II.K.3.2, "Report on Overall Safety Effect of Power-Operated Relief Valve Isolation System". Item II.K.3.2 required the identification of actions taken to decrease the probability of a small-break LOCA caused by a stuck-open PORV and to show that these actions constitute sufficient improvements in reactor safety. WCAP-9804, "Probabilistic Analysis and Operational Data in Response to NUREG-0737, Item II.K.3.2 for Westinghouse NSSS Plants" presents a generic response to the Item II.K.3.2 requirement. WCAP-9804 examines the probabilities of a SBLOCA caused by a stuck-open PORV before and after TMI-related modifications to evaluate the significance of the modifications. Westinghouse has examined the impact of including the loss of offsite power frequency to item II.K.3.2 as reported in WCAP-9804 for High Head type plants, the plants most likely to have significant impact.

   For consideration of adding the frequency of the loss of offsite power event to SBLOCA, it was determined that the Pre-TMI LOCA frequency due to a stuck-open PORV is increased by 50% and the Post-TMI LOCA frequency due to a stuck-open PORV is increased by 100%. (Although this is a large increase, the overall contribution of a stuck-open PORV to small or medium LOCA initiating event categories is still small.) This maintains a conclusion of WCAP-9804 that compared to the WASH-1400 median frequency of a small break LOCA, the PORV LOCA is not a significant contributor to the probability of a small break LOCA. WCAP-9804 also concluded that the Post-TMI PORV LOCA frequency decrease was substantial (78%). With the loss of offsite power event frequency included, the Post-TMI PORV LOCA frequency decrease changes to 69%. This frequency decrease is still substantial.

If the pressurizer fills before operator actions can be credited, then the following options could be considered as potential solution paths:

I. Safety Analysis Options

The safety analysis assumptions can be revised to reduce conservatism in the analysis. The revised assumptions may provide enough time before the pressurizer fills to permit crediting the operator actions discussed above. Some examples of reduced analysis conservatisms are given below:

1. Increase the minimum available AFW flow rate (e.g., less conservatism in pump flow or credit two of the three AFW pumps).

2. Decrease the maximum AFW temperature.

3. Credit the heat sink effects of thick metal masses in the RCS.

II. Plant or Procedure Modifications Options

Modification of the plant procedures and/or physical modifications to the plant may also be considered. These include the following:

1. Delay loading of the charging pumps onto emergency diesel generators to delay the time to fill the pressurizer.

2. Upgrade the instrument air system to enable continuation of letdown after loss of offsite power.

3. Automatically load the instrument air compressor onto emergency diesel generators or other power source.

4. Qualify the pressurizer safety valves for water relief specific to the conditions of this transient.

III. Generic Risk Informed Resolution Options

Utilities may consider pursuing resolution of this issue through a Westinghouse Owner's Group program. This program would consider a risk-informed approach toward revised acceptance criteria for the event. A possible risk informed approach is discussed below:

In many LOOP safety analyses performed by Westinghouse, conservative, hybrid failure criteria are applied. Namely, the analyses assume a single failure for the limiting component (the turbine-driven AFW pump in most cases), plus the unavailability of a second AFW pump (to satisfy AFW system reliability goals). This unusual criteria mixes the standard deterministic single-failure criterion with an additional risk/reliability criterion, and goes beyond the typical single failure criterion, or typical risk-based criterion, considered separately. As an alternative to potential plant or procedure modifications, it can be shown that the deterministic analysis will satisfy the limiting single failure criterion and the risk-based criterion applied independently, then an analysis-based resolution path may be feasible. This approach is outlined below:

1. First attempt to show compliance with the loss of offsite power acceptance criteria by using reduced conservatisms in the FSAR analysis.

2. If the modified current safety analysis model does not show compliance, then separate the analysis into two parts:

   a. Perform a FSAR-type safety analysis with only the limiting single failure applied (not assuming a second pump is unavailable) to show that operators have sufficient time available to preclude pressurizer overfill;

   AND

b. Use a risk-informed approach to show that the case with two AFW pumps failed has insignificant contribution to plant risk.

The advantage of this approach is that the issue could be resolved with no changes to the plant or plant procedures. It is likely that NRC approval would be necessary for the risk informed solution path.

REFERENCES

1. United States Nuclear Regulatory Commission letter, "Actions Required from Operating License Applicants of Nuclear Steam Supply Systems Designed by Westinghouse and Combustion Engineering Resulting from the NRC Bulletins and Orders Task Force Review Regarding the Three Mile Island Unit 2 Accident," Ross, D. F., March 10, 1980.

2. NUREG-0737 Item II.D.1A, "Clarification of TMI Action Plan Requirements," November 1980.

TABLE 1
PLANT APPLICABILITY LIST

CVCS MODELING FOR LOSS OF OFFSITE POWER & FEEDLINE BREAK EVENTS

Plants Impacted or Potentially Impacted by
the Charging and Letdown Flow Modeling Issues

D. C. Cook 1[1] & 2[1]
Byron 1[1] & 2[1]
V. C. Summer[1]
Turkey Point 3[1] & 4[1]
Millstone 3[1]
Salem 1[1] & 2[1]
Wolf Creek[2]
South Texas 1[1][4] & 2[1][4]
North Anna 1[2] & 2[2]
Point Beach 1[1] & 2[1]
Kewaunee[2]
Shearon Harris[2]
Catawba 1[2] & 2[2]
Seabrook[1]
Sequoyah 1[2] & 2[2]

J. M. Farley 1[1] & 2[1]
Braidwood 1[1] & 2[1]
Beaver Valley 1[1] & 2[1]
A. W. Vogtle 1[1] & 2[1]
Diablo Canyon 1[1] & 2[1]
R. E. Ginna[1]
Callaway[1]
Surry 1[1] & 2[2]
Watts Bar 1[1]
Comanche Peak 1[2] & 2[2]
H. B. Robinson 2[2]
W. B. McGuire 1[2] & 2[2]
Indian Point 2[1]
Indian Point 3[1]
Prairie Island 1[2] & 2[2]

Almaraz 1[3] & 2[3]
Asco 1[3] & 2[3]
Beznau 1[2][5] & 2[2][5]
Ringhals 2[2][5]
Kori 2[1]
Zorita[3]
Kori 3[2] & 4[2]
Mihama 1[2] & 2[2]
Angra 1[2]
Doel 1[2][5], 2[2][5], & 4[2][5]
Ringhals 3[2][5] & 4[2][5]
Temelin[1]

Vandellos 2[3]
Krsko[2][5]
Sizewell B[2]
Kori 1[1]
Ulchin 1[2] & 2[2]
Yonggwang 1[2] & 2[2]
Ohi 1[2] & 2[2]
Takahama 1[2]
Tihange 1[2][5] & 3[2][5]
Maanshan 1[1] & 2[1]
Koeberg 1[2] & 2[2]

(1) The Loss of Offsite Power licensing basis analysis is potentially affected by the CVCS modeling issue.

(2) The Loss of Offsite Power and/or Feedline Break licensing basis analyses were potentially performed using Westinghouse or similar methods. Westinghouse is not cognizant of the current plant licensing basis analyses and, therefore, cannot directly assess the effect for this plant.

(3) ENUSA is cognizant of the non-LOCA safety analyses and may have performed Loss of Offsite Power and/or Feedline Break analyses using the LOFTRAN code and Westinghouse methods. Westinghouse cannot directly assess the effect for this plant.

(4) The Feedline Break licensing basis analysis is potentially affected by the CVCS modeling issue.

(5) Westinghouse-Brussels scope.