March 1, 2001

Mr. H. L. Sumner, Jr.
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Southern Nuclear Operating
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Post Office Box 1295
Birmingham, Alabama 35201-1295

SUBJECT: SITE-SPECIFIC WORKSHEETS FOR USE IN THE NUCLEAR REGULATORY COMMISSION'S SIGNIFICANCE DETERMINATION PROCESS (TAC NO. MA6544)

Dear Mr. Sumner:

Enclosed please find the Risk-Informed Inspection Notebook for Edwin I. Hatch Nuclear Plant, Units 1 and 2. This notebook incorporates the updated Significance Determination Process (SDP) Phase 2 Worksheets that inspectors will be using to characterize and risk-inform inspection findings. This document is one of the key implementation tools of the reactor safety SDP in the reactor oversight process and is also publically available through the Nuclear Regulatory Commission (NRC) ADAMS system.

Our pilot plant review effort clearly indicated that significant site-specific design and risk information was not captured in the Phase 2 Worksheets forwarded to you last spring. Subsequently, a site visit was conducted by the NRC to verify and update plant equipment configuration data and to collect site-specific risk information from your staff. The Phase 2 Worksheets have incorporated much of the information we obtained during our site visits. The staff encourages further licensee comments where it is identified that the Worksheets give inaccurate significance determinations. Any comments should be forwarded to the Chief, Probabilistic Safety Assessment Branch, Nuclear Reactor Regulation.

While the Phase 2 Worksheets have been verified by our staff to include the site-specific data we will continue to assess its accuracy throughout implementation and update the document based on comments by our inspectors and your staff.

We will coordinate our efforts through your licensing or risk organizations as appropriate. If you have any questions, please contact me at 301-415-1419.

Sincerely,

/RA/

Leonard N. Olshan, Senior Project Manager, Section 1
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-321 and 50-366

Enclosure: As stated

cc w/encl: See next page

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RISK-INFORMED INSPECTION NOTEBOOK FOR

EDWIN I. HATCH GENERATING STATION

UNITS 1 AND 2

BWR-4, GE, WITH MARK I CONTAINMENT

Prepared by

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NOTICE

This notebook was developed for the NRC's inspection teams to support risk-informed inspections. The "Reactor Oversight Process Improvement," SECY-99-007A, March 1999 discusses the activities involved in these inspections. The user of this notebook is assumed to be an inspector with an extensive understanding of plant-specific design features and operation. Therefore, the notebook is not a stand-alone document, and may not be suitable for use by non-specialists. It will be periodically updated with new or replacement pages incorporating additional information on this plant. All recommendations for improvement of this document should be forwarded to the Chief, Probabilistic Safety Assessment Branch, NRR, with a copy to the Chief, Inspection Program Branch, NRR.

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ABSTRACT

This notebook contains summary information to support the Significance Determination Process (SDP) in risk-informed inspections for the Edwin I. Hatch Generating Station.

The information includes the following: Categories of Initiating Events Table, Initiators and System Dependency Table, SDP Worksheets, and SDP Event Trees. This information is used by the NRC's inspectors to identify the significance of their findings, i.e., in screening risk-significant findings, consistent with Phase-2 screening in SECY-99-007A. The Categories of Initiating Event Table is used to determine the likelihood rating for the applicable initiating events. The SDP worksheets are used to assess the remaining mitigation capability rating for the applicable initiating event likelihood ratings in identifying the significance of the inspector's findings. The Initiators and System Dependency Table and the SDP Event Trees (the simplified event trees developed in preparing the SDP worksheets) provide additional information supporting the use of SDP worksheets.

The information contained herein is based on the licensee's Individual Plant Examination (IPE) submittal, the updated Probabilistic Risk Assessment (PRA), and system information obtained from the licensee during site visits as part of the review of earlier versions of this notebook. Approaches used to maintain consistency within the SDP, specifically within similar plant types, resulted in sacrificing some plant-specific modeling approaches and details. Such generic considerations, along with changes made in response to plant-specific comments, are summarized.

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1. INFORMATION SUPPORTING SIGNIFICANCE DETERMINATION PROCESS (SDP)

SECY-99-007A (NRC, March 1999) describes the process for making a Phase-2 evaluation of the inspection findings. In Phase 2, the first step is to identify the pertinent core damage scenarios that require further evaluation consistent with the specifics of the inspection findings. To aid in this process, this notebook provides the following information:

1. Estimated Likelihood Rating for Initiating Events Categories
2. Initiator and System Dependency Table
3. Significance Determination Process (SDP) Worksheets
4. SDP Event Trees.

Table 1, Categories of Initiating Events, is used to obtain the estimated likelihood rating for applicable initiating events for the plant for different exposures times for degraded conditions. This Table follows the format of the Table 1 contained in SECY-99-007A. Initiating events are grouped in frequency bins covering one order of magnitude. The table includes the initiating events that should be considered for the plant and for which SDP worksheets are provided. Categorization of the following initiating events is based on industry-average frequency: transients (Reactor Trip) (TRANS); transients without power conversion system (TPCS); large, medium, and small loss of coolant accidents (LLOCA, MLOCA, and SLOCA); inadvertent or stuck open relief valve (IORV or SORV); anticipated transients without scram (ATWS); interfacing systems LOCA (ISLOCA) and LOCA outside containment (LOC). The frequency of the remaining initiating events vary significantly from plant to plant, and accordingly, they are categorized using the plant-specific frequency obtained from the licensee. These initiating events include loss of offsite power (LOOP) and special initiators caused by loss of support systems.

The Initiator and System Dependency Table shows the major dependencies between frontline and support systems, and identifies their involvement in different types of initiators. This table identifies the most risk-significant systems; it is not an exhaustive nor comprehensive compilation of the dependency matrix, as shown in Probabilistic Risk Assessments (PRAs). This table is used to identify the SDP worksheets to be evaluated, corresponding to inspection findings on systems and components.

To evaluate the impact of an inspection finding on the core-damage scenarios, we developed the SDP worksheets. They contain two parts. The first part identifies the functions, the systems, and the combinations thereof that can perform mitigating functions, the number of trains in each system, and the number of trains required (success criteria) for each the initiator. It also characterizes the mitigation capability in terms of the available hardware (e.g., 1 train, 1 multi-train system) and the operator action involved. The second part of the SDP worksheet contains the core-damage accident sequences associated with each initiator; these sequences are based on SDP event trees. In the parentheses next to each of the sequences the corresponding event tree branch number(s) representing the sequence is included. Multiple branch numbers indicate that the different accident sequences identified by the event tree are merged into one through the Boolean reduction.

SDP worksheets are developed for each initiating event, including "Special Initiators," which are typically caused by complete or partial loss of support systems. A special initiator typically leads to a reactor scram and degrades some front-line or support systems (e.g., Loss of Service water in BWRs). The SDP worksheets for initiating events that directly lead to core damage are different. Of this type of initiating events, only the interfacing system LOCA (ISLOCA) and LOCA outside containment (LOC) are included. This worksheet identifies the major consequential leak paths and the number of barriers that may fail to cause the initiator to occur.

For the special initiators, we considered those plant-specific initiators whose contribution to the plant's core damage frequency (CDF) is non-negligible and/or have the potential to be a significant contributor to CDF given an inspection finding on system trains and components. We defined a set of criteria for their inclusion to maintain some consistency across the plants. These conditions are as follows:

1. The special initiator should degrade at least one of the mitigating safety functions changing its mitigation capability in the worksheet. For example, a safety function with two redundant trains, classified as a multi-train system, degrades to an one-train system, to be classified as 1 Train, due to the loss of one of the trains as a result of the special initiator.

2. The special initiators, which degrade the mitigation capability of the accident sequences associated with the initiator from comparable transient sequences by two and higher orders of magnitude, must be considered.

Following the above considerations, the classes of initiators that we consider in this notebook are:

1. Transients with power conversion system (PCS)available, called Transients (Reactor trip) (TRANS),
2. Transients without PCS available, called Transients w/o PCS (TPCS),
3. Small Loss of Coolant Accident (SLOCA),
4. Inadvertent or Stuck-open Power Operated Relief Valve (IORV or SORV),
5. Medium LOCA (MLOCA),
6. Large LOCA (LLOCA),
7. Loss of Offsite Power (LOOP)
8. Anticipated Transients Without Scram (ATWS).

Section 1.3 lists the plant-specific special initiators addressed in this notebook. Examples of special initiators are as follows:

1. LOOP with failure of 1 Emergency AC (LEAC) bus or associated EDG (LEAC),
2. LOOP with stuck open SORV (LORV),
3. Loss of 1 DC Bus (LDC),
4. Loss of component cooling water (LCCW),
5. Loss of instrument air (LOIA),
6. Loss of service water (LSW).

The worksheet for the LOOP may include LOOP with emergency AC power (EAC) available and LOOP without EAC, i.e., Station Blackout (SBO). LOOP with partial availability of EAC, i.e., LOOP with loss of a bus of EAC, is covered in a separate worksheet to avoid making the LOOP worksheet too large. LOOP with stuck open SORV is also covered in a separate worksheet, when applicable. In some plants, LOOP with failure of 1 EAC bus and LOOP with stuck-open SORV are large contributors to the plant's core damage frequency (CDF).

Following the SDP worksheets, the SDP event trees corresponding to each of the worksheets are presented. The SDP event trees are simplified event trees developed to define the accident sequences identified in the SDP worksheets. For special initiators whose event tree closely corresponds to another event tree (typically, the Transient(Reactor trip) or Transients w/o PCS event tree) with one or more functions eliminated or degraded, a separate event tree may not be drawn.

We considered the following items in establishing the SDP event trees and the core-damage sequences in the SDP worksheets; Section 2.1 gives additional guidelines and assumptions.

1. Event trees and sequences were developed such that the worksheet contains all the major accident sequences identified by the plant-specific IPEs or PRAs. The special initiators modeled for a plant is based on a review of the special initiators included in the plant IPE/PRA and the information provided by the licensee.

2. The event trees and sequences for each plant took into account the IPE/PRA models and event trees for all similar plants. Any major deviations in one plant from similar plants typically are noted at the end of the worksheet.

3. The event trees and the sequences were designed to capture core-damage scenarios, without including containment-failure probabilities and consequences. Therefore, branches of event trees that are only for the purpose of a Level II PRA analysis are not considered. The resulting sequences are merged using Boolean logic.

4. The simplified event-trees focus on classes of initiators, as defined above. In so doing, many separate event trees in the IPEs often are represented by a single tree. For example, some IPEs define four or more classes of LOCAs rather than the three classes considered here. The sizes of LOCAs for which high-pressure injection is not required are some times divided into two classes; the only difference between them being the need for reactor scram in the smaller break size. Some consolidation of transient event tree may also be done besides defining the special initiators following the criteria defined above.

5. Major actions by the operator during accident scenarios are credited using four categories of Human Error Probabilities (HEPs). They are termed operator action =1 (representing an error probability of 5E-2 to 0.5), operator action=2 (error probability of 5E-3 to 5E-2), operator action=3 (error probability of 5E-4 to 5E-3), and operator action=4 (error probability of 5E-5 to 5E-4). An human action is assigned to a category bin, based on a generic grouping of similar actions among a class of plants. This approach resulted in designation of some actions to a higher bin, even though the IPE/PRA HEP value may have been indicative of a lower category. In such cases, it is noted at the end of the worksheet. On the other hand, if the IPE/PRA HEP value suggests a higher category than that generically assumed, the HEP is assigned to a bin consistent with the IPE/PRA value in recognition of potential plant-specific design; a note is also given in these situations. Operator's actions belonging to category 4, i.e., operator action=4, may only be noted at the bottom of worksheet because, in those cases, equipment failures may have the dominating influence in determining the significance of the findings.

The four sections that follow include the Categories of Initiating Events Table, Initiators and System Dependency Table, SDP Worksheets, and the SDP Event Trees for the Edwin I. Hatch Generating Station, Units 1 and 2.

1.1 INITIATING EVENT LIKELIHOOD RATINGS

Table 1 presents the applicable initiating events for this plant and their estimated likelihood ratings corresponding to the exposure time for degraded conditions. The initiating events are grouped into rows based on their frequency. As mentioned earlier, loss of offsite power and special initiators are assigned to rows using the plant-specific frequency obtained from individual licensees. For other initiating events, industry-average values are used, as per SECY-99-007A.

Table 1 Categories of Initiating Events for Hatch Units 1 & 2

Row	Approximate Frequency	Example Event Type	Estimated Likelihood Rating		
I	> 1 per 1-10 yr	Reactor Trip, Loss of Power Conversion System (Loss of condenser, Closure of MSIVs, Loss of feedwater)	**A**	**B**	**C**
II	1 per 10-10^{2} yr	Loss of offsite power (LOOP), Inadvertent or stuck open SRVs (IORV or SORV)	**B**	**C**	**D**
III	1 per 10^{2} - 10^{3} yr	Small LOCA (RCS rupture), Loss of Station Battery A (LODC), Loss of 600 VAC Bus C (LBUSC)	**C**	**D**	**E**
IV	1 per 10^{3} - 10^{4} yr	Medium LOCA (RCS rupture), Loss of Plant Service Water (LOPSW)	**D**	**E**	**F**
V	1 per 10^{4} - 10^{5} yr	Large LOCA (RCS rupture), ATWS	**E**	**F**	**G**
VI	less than 1 per 10^{5} yr	ISLOCA, LOC, Vessel rupture	**F**	**G**	**H**
			> 30 days	**3-30 days**	**< 3 days**
			Exposure Time for Degraded Condition		

Note:

1. The SDP worksheets for ATWS core damage sequences assume that the ATWS is not recoverable by manual actuation of the reactor trip function or by ARI (for BWRs). Thus, the ATWS frequency to be used by these worksheets must represent the ATWS condition that can only be mitigated by the systems shown in the worksheet (e.g., boration).

1.2 INITIATORS AND SYSTEM DEPENDENCY

Table 2 provides the list of the systems included in the SDP worksheets, the major components in the systems, and the support system dependencies. The system involvements in different initiating events are noted in the last column.

Table 2 Initiators and System Dependency for Hatch Units 1 & 2

Affected System		Major Components	Support Systems	Initiating Event Scenarios
Code	**Name**			
PCS	Power Conversion System	6 MDPs, MOV, 2 TDPs	AC , DC, PSW, CW, IA, EHC	TRANS, SLOCA, MLOCA, IORV, LOOP, ATWS, LODC
HPCI	High Pressure Coolant Injection	1 TDP	DC , ACT, HVAC	All but LLOCA & LOPSW
RCIC	Reactor Core Isolation Cooling	1 TDP	DC , ACT	TRANS, TPCS, SLOCA, LOOP, LBUSC, LOPSW
ADS/SRVs	Safety Relief Valves	11 RVs, AOV	DC , ACT, N2	All but LLOCA
LPCI	Low Pressure Coolant Injection	4 MDPs, MOV	AC , DC , ACT, HVAC	All
RHR	Residual Heat Removal	4 MDPs, MOV, 2 HXs	AC , DC , HVAC, RHRSW	All
CS	Core Spray	2MDPs, MOV	AC , DC , ACT, HVAC	All
CRD	Control Rod Drive	2 MDPs, MOV, AOV	AC , DC, RBCCW, IA	All but LLOCA & LOOP (see note 7)
EDGs	AC power (EDGs)	3 Engine Generators	EDG HVAC, act, PSW, FO transfer, DC	LOOP
EDG HVAC	EDG ventilation system	Fans	AC	LOOP
FO transfer	EDG fuel oil transfer	MDPs	AC	LOOP
DC	DC power - station batteries	Battery, charger	AC for chargers	All

Table 2 (Continued)

Affected System		Major Components	Support Systems	Initiating Event Scenarios
Code	**Name**			
	DC power - EDG batteries	Battery, charger	AC for chargers	LOOP
AC	AC power (non-EDG)	Breakers, SUT	DC	All
IA	Instrument & Service Air	3 Air comp., valves	AC	All but LBUSC
HVAC	ECCS Heating ventilation and air conditioning	Valves, fan coolers	AC , PSW, ACT	All but LOPSW
N2	Drywell Pneumatic/ Nitrogen	Accumulators, valves	AC	All
RBCCW	Reactor Building Component Cooling Water	3MDPs, MOV, 2 HXs	AC, DC, PSW	None
SBLC	Standby Liquid Control	2MDPs, MOV, explosive valves	AC	ATWS
RPT	Recirculation pump trip	RPT Breakers	DC, ACT	ATWS
ACT	ECCS Actuation or Analog Transmitter Trip system (ATTS)	Instrumentation	DC	All
PSW	Plant Service Water	4 MDPs, MOV	AC , DC, ACT	LOPSW
RHR SW	RHR Service Water	4 MDPs, MOV	AC , DC, PSW	All

Table 2 (Continued)

Affected System		Major Components	Support Systems	Initiating Event Scenarios
Code	**Name**			
CV	Purge & Inerting System / Standby Gas Treatment (Venting)	Valves	AC , IA or N2	All but LBUSC
CW	Circulating Water	MDPs	AC	Same as PCS
EHC	Electro-hydraulic control	control valves and electronics	AC, DC	Same as PCS

Notes:

1. Information herein was originally developed from the Hatch Nuclear Plant IPE dated December, 1992, including Rev. 1 changes, dated January 10, 1994, and also with 35 RAI responses dated October 7, 1994. This IPE uses the large ET, small fault tree PLG approach. This original document is referred to herein as the IPE. Rev. 1 to this Inspection Notebook was updated from licensee information based on the new Hatch PRA model, received in April, 2000. This information is referred to herein as based on the PRA, as differentiated from the IPE. The IPE and PRA were both performed in detail for Unit 1, but Unit differences were considered and then results were also developed for Unit 2.

2. The baseline IPE core damage frequency (CDF) from internal events was 2E-5 events/year for each unit and the PRA CDF was 1.6 E-5 events/yr.

3. The 'Initiating Event Scenarios' column provides a guide as to which worksheets contain credit for a particular system. The ISLOCA/LOC worksheet is not referenced in this column.

4. Equipment that is powered by either offsite power or from the EDGs on a LOOP is shown above as depending on AC power. Hatch has five EDGs: two per Unit (1A, 1C; 2A, 2C) and one swing EDG (1B). The swing EDG can supply 600 VAC power to either safety division on either Unit. The swing EDG also has its own standby service water pump. The EDGs have a 1000 gallon day tank with sufficient fuel oil to last four hours. Operation beyond four hours requires use of the fuel oil transfer pumps. EDG HVAC is not needed to initially start the EDG but is needed for sustained operation.

5. For Hatch: One IORV has the equivalent break size between a SLOCA and a MLOCA;
   Two SORVs have the equivalent break size of a MLOCA;
   Three SORVs have the equivalent break size of a LLOCA.

Table 2 (Continued)

6. Drywell cooling fan coolers are cooled by PSW on U1 and by a separate chilled water system on U2.

7. CRD pumps are modeled in the Hatch ETs to provide HPI; however, they are not sufficient by themselves to prevent CD and hence do not appear in the success criteria. CRD use provides more time for depressurization or recovery of HPI. CRD can be used in this manner for all sequences except LLOCA and LOOP.

8. Battery duration for an SBO is 2.5 hours. Hatch has three turbine bypass valves and a turbine bypass capacity of 25%.

9. The Power Conversion System (PCS) as used herein designates both the steam supply, condenser, and feedwater return portions of the secondary plant, as listed in the worksheets (e.g., see the full creditable mitigation capability for the Transients worksheet). Portions of the PCS may also be credited separately for DEP or LPI.

10. The Circulating Water (CW) System and the Electro-hydraulic Control (EHC) System are support systems for the PCS, but they are not described in the IPE.

1.3 SDP WORKSHEETS

This section presents the SDP worksheets to be used in the Phase 2 evaluation of the inspection findings for the Edwin I. Hatch Units 1 & 2 Generating Station. The SDP worksheets are presented for the following initiating event categories:

1. Transients (Reactor Trip) (TRANS)
2. Transients without PCS (TPCS)
3. Small LOCA (SLOCA)
4. Medium LOCA (MLOCA)
5. Inadvertently Open Relief Valve (IORV)
6. Large LOCA (LLOCA)
7. Loss of Offsite Power (LOOP)
8. Anticipated Transients Without Scram (ATWS)
9. Loss of Station Battery A (LODC)
10. Loss of 600 VAC Bus C (LBUSC)
11. Loss of Plant Service Water (LOPSW)
12. Interfacing System LOCA (ISLOCA) and LOCA Outside Containment (LOC)

Table 3.1 SDP Worksheet for Hatch 1 & 2 — Transients (Reactor Trip) (TRANS)

Estimated Frequency (Table 1 Row) __________ Exposure Time __________ Table 1 Result (circle): A B C D E F G H

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
Power Conversion System (PCS)	1/4 steam lines, 1/3 turbine bypass valves (TBVs), Main Condenser, 1/2 steam jet air ejectors, 1/2 circ. water pumps, 1/3 condensate pumps, 1/3 condensate booster pumps, 1/2 reactor feed pumps (operator action = 3)
High Pressure Injection (HPI)	HPCI (1 ASD train) or RCIC (1 ASD train)
Depressurization (DEP)	3/11SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection (LPI)	1/4 RHR pumps in 1/2 trains in LPCI Mode (1 multi-train system) or 1/2 CS pumps (1 multi-train system)
Containment Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system)
Containment Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/3 Condensate pumps (operator action = 2) or 1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 TRANS - PCS - CHR - LI (4, 8)			
2 TRANS - PCS - CHR - CV (5, 9)			
3 TRANS - PCS - HPI - LPI (10)			
4 TRANS - PCS - HPI - DEP (11)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event: If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

<u>Notes</u>:

1. Hatch gives failure to depressurize an HEP value of 0.02.

2. Hatch gives failure to align for and operate alternate injection (LI) an HEP value of 0.04.

3. For CHR, the success criteria is (1/4 RHR pumps and 1/4 RHRSW pumps). Operator action is required for this but the HEP is quite low. Therefore, we have classified this as a multi-train system.

4. Hatch gives some credit for operator recovery of the following systems: RFP, HPCI, RCIC, condensate, AC bus, & CHR systems. In this regard, we have allowed credit for the PCS TBVs in CHR even though PCS may have failed earlier. Typically, PCS may have failed due to condensate or feedwater failures, but TBVs may be available anyway.

5. LI can use a condensate pump in the following way, either by itself at low pressures or in series with a condensate booster pump at somewhat higher pressures.

6. The Hatch PRA combines the functions LPI and LI into one function LO. The Hatch PRA also combines the functions of CHR and CV into the single function of QR. These functions are maintained separately in these notebooks for consistency with other NRC notebooks and to simplify the use of the notebooks in evaluating the risk significance of findings. This also highlights the importance of CV.

Table 3.2 SDP Worksheet for Hatch 1 & 2 — Transients without PCS (TPCS)

Estimated Frequency (Table 1 Row) __________ **Exposure Time __________** **Table 1 Result (circle): A B C D E F G H**

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
High Pressure Injection (HPI)	HPCI (1 ASD train) or RCIC (1 ASD train)
Depressurization (DEP)	3/11SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection (LPI)	1/4 RHR pumps in 1/2 trains in LPCI Mode (1 multi-train system) or 1/2 CS pumps (1 multi-train system)
Containment Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system)
Containment Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 TPCS - CHR - LI (3, 7)			
2 TPCS - CHR - CV (4, 8)			
3 TPCS - HPI - LPI (9)			
4 TPCS - HPI - DEP (10)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event: If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. The TPCS initiator includes MSIV closure, Loss of condenser/vacuum, turbine trip without bypass, and loss of FW.

2. Hatch gives failure to depressurize an HEP value of 0.02.

3. Hatch gives failure to align for and operate alternate injection (LI) an HEP value of 0.04.

4. For CHR, the success criteria is (1/4 RHR pumps and 1/4 RHRSW pumps). Operator action is required for this but the HEP is quite low. Therefore, we have classified this as a multi-train system.

5. Hatch gives some credit for operator recovery of the following systems: condensate, RCIC, HPCI, AC bus, & CHR systems.

Table 3.3 SDP Worksheet for Hatch 1 & 2 — Small LOCA (SLOCA)

Estimated Frequency (Table 1 Row) __________ **Exposure Time** __________ **Table 1 Result (circle): A B C D E F G H**

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
Power Conversion System (PCS)	1/4 steam lines, 1/3 turbine bypass valves (TBVs), Main Condenser, 1/2 steam jet air ejectors, 1/2 circ. water pumps, 1/3 condensate pumps, 1/3 condensate booster pumps, 1/2 reactor feed pumps (operator action = 2)
High Pressure Injection (HPI)	HPCI (1 ASD train) or RCIC (1 ASD train)
Depressurization (DEP)	3/11 SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection (LPI)	1/4 RHR pumps in 1/2 trains in LPCI Mode (1 multi-train system) or 1/2 CS pumps (1 multi-train system)
Containment Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system)
Containment Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/3 Condensate pumps (operator action = 2) or 1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 SLOCA - PCS - CHR - LI (4, 8)			
2 SLOCA - PCS - CHR - CV (5, 9)			
3 SLOCA - PCS - HPI - LPI (10)			
4 SLOCA - PCS - HPI - DEP (11)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event:
If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. Hatch lists the top 100 core damage (CD) sequences for Unit 1 in the IPE. None of these 100 sequences are SLOCA sequences.
2. Hatch gives failure to depressurize an HEP value of 0.02.
3. Hatch gives failure to align for and operate alternate injection (LI) an HEP value of 0.04.
4. Hatch gives some credit for operator recovery of the following systems: CHR systems.

Table 3.4 SDP Worksheet for Hatch 1 & 2 — Medium LOCA (MLOCA)

Estimated Frequency (Table 1 Row) __________ **Exposure Time** __________ **Table 1 Result (circle): A B C D E F G H**

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
High Pressure Injection (HPI)	HPCI (1 ASD train)
Early Containment Control (EC)	Passive operation of SP with 12/12 vacuum breakers remaining closed (1single train system)
Depressurization (DEP)	3/11 SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection (LPI)	1/4 RHR pumps in 1/2 trains in LPCI Mode (1 multi-train system) or 1/2 CS pumps (1 multi-train system)
Cont. Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system)
Cont. Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/3 Condensate pumps (operator action = 2) or 1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 MLOCA - CHR - LI (3, 8)			
2 MLOCA - CHR - CV (4, 9)			
3 MLOCA - LPI (5, 10)			
4 MLOCA - HPI - DEP (11)			
5 MLOCA - EC (12)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event:
If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. Failure of EC/ Suppression Pool (SP) could be due to downcomer vent pipe failures, vacuum breaker failures, or inadequate SP level. At Hatch there are 12 vacuum breaker lines between the drywell and the suppression pool, each has a single vacuum breaker. Success requires that all 12 vacuum breakers remain closed.

2. Hatch gives failure to depressurize an HEP value of 0.02.

3. Hatch gives failure to align for and operate alternate injection (LI) an HEP value of 0.04.

4. Hatch treats MSLB and MFWB as a high pressure LOCA outside of containment (LOC). The initiating event frequency for this is 8.7 E-8 per reactor-year. The Hatch IPE model credits no mitigating systems for an LOC. Therefore, this sequence has a core damage frequency of 8.7 E-8 per reactor-year. Hatch treats ISLOCAs similarly.

5. LI can use a condensate pump in the following way, either by itself at low pressures or in series with a condensate booster pump at somewhat higher pressures.

Table 3.5 SDP Worksheet for Hatch 1 & 2 — Inadvertently Open Relief Valve (IORV)

Estimated Frequency (Table 1 Row) __________ **Exposure Time** __________ **Table 1 Result (circle): A B C D E F G H**

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
Power Conversion System (PCS)	1/4 steam lines, 1/3 turbine bypass valves (TBVs), Main Condenser, 1/2 steam jet air ejectors, 1/2 circ. water pumps, 1/3 condensate pumps, 1/3 condensate booster pumps, 1/2 reactor feed pumps (operator action = 2)
High Pressure Injection (HPI)	HPCI (1 ASD train)
Depressurization (DEP)	3/11 SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection (LPI)	1/4 RHR pumps in 1/2 trains in LPCI Mode (1 multi-train system) or 1/2 CS pumps (1 multi-train system)
Cont. Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system)
Cont. Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/3 Condensate pumps (operator action = 2) or 1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 IORV - CHR - LI (3, 7, 12)			
2 IORV - CHR - CV (4, 8, 13)			
3 IORV - PCS- LPI (9, 14)			
4 IORV - PCS- HPI - DEP (15)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event: If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. Hatch terms an inadvertently open relief valve (IORV) as an initiating event. If an SRV opens as a result of a transient and does not reclose on decreasing pressure, this is termed a stuck open relief valve (SORV).

2. For DEP, Hatch needs a total of 3 SRVs open, including the IORV. Hatch gives failure to depressurize an HEP value of 0.02.

3. Hatch gives failure to align for and operate alternate injection (LI) an HEP value of 0.04.

4. Hatch gives some credit for operator recovery of the following systems: RFP, RHR, and RHR SW.

5. LI can use a condensate pump in the following way, either by itself at low pressures or in series with a condensate booster pump at somewhat higher pressures.

Table 3.6 SDP Worksheet for Hatch 1 & 2 — Large LOCA (LLOCA)

Estimated Frequency (Table 1 Row) ________ Exposure Time ___________ Table 1 Result (circle): A B C D E F G H

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
Low Pressure Injection (LPI)	1/4 RHR pumps in 1/2 trains in LPCI Mode (1 multi-train system) or 1/2 CS pumps (1 multi-train system)
Early Cont. Control (EC)	Passive operation of SP with 12/12 vacuum breakers remaining closed (1 single train system)
Cont. Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system)
Cont. Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LLOCA - CHR - LI (3)			
2 LLOCA - CHR - CV (4)			
3 LLOCA - LPI (5)			
4 LLOCA - EC (6)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event:
If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. Failure of EC/ Suppression Pool (SP) could be due to downcomer vent pipe failures, vacuum breaker failures, or inadequate SP level. At Hatch there are 12 vacuum breaker lines between the drywell and the suppression pool, each has a single vacuum breaker. Success requires that all 12 vacuum breakers remain closed.

2. Hatch gives failure to align for and operate alternate injection (LI) an HEP value of 0.04.

3. Although the IPE success criteria table credits condensate and the RHRSW crosstie, Hatch IPE RAI 6(c) states that no credit was taken for these on a LLOCA. They have been included here only as late injection alternatives.

Table 3.7 SDP Worksheet for Hatch 1 & 2 — Loss of Offsite Power (LOOP)

Estimated Frequency (Table 1 Row) __________ **Exposure Time** __________ **Table 1 Result (circle): A B C D E F G H**

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
Emergency Power (EAC)	1/2 dedicated EDG or align the shared EDG (1 multi-train system)
Recovery of LOOP in 30 min (RLOOP30M)	Recovery of offsite power in 30 minutes. No credit (operator action = 0)
Recovery of LOOP in 2.5 hrs (RLOOP2.5H)	Recovery of offsite power in 2.5 hours (operator action = 1)
High Pressure Injection (HPI)	HPCI (1 ASD train) or RCIC (1 ASD train)
Depressurization (DEP)	3/11SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection (LPI)	1/4 RHR pumps in 1/2 trains in LPCI Mode (1 multi-train system) or 1/2 CS pumps (1 multi-train system)
Containment Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system)
Containment Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LOOP - CHR - LI (1, 2)			
2 LOOP - CHR - CV (1, 2, 5)			
3 LOOP - HPI - DEP (1, 2)			
4 LOOP - HPI - LPI (1, 2)			

5 LOOP - EAC - (RLOOP30M) - LPI [SBO sequence] (6)			
6 LOOP - EAC - (RLOOP30M) - HPI (RCIC only) [SBO sequence] (7)			
7 LOOP - EAC - RLOOP2.5H (8) [SBO sequence]			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event:

If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. For Hatch, on a station blackout, operator action is needed to recover offsite power (OSP) at 30 minutes or 2.5 hours for the following reasons:

   - After 30 minutes with no HPI the core becomes uncovered leading to core damage; on an SBO cannot credit HPCI for HPI since HPCI needs HVAC (which needs AC power). No credit is given here in this worksheet for RLOOP30M (to be conservative) since the PRA recovery probability is quite high at 0.5.

   - At 2.5 hrs Hatch will get failure of RCIC due to battery depletion leading to core damage. RLOOP2.5H represents operator action and other factors related to grid recovery and is 0.2.

   - Hatch does not consider recovery of failed HPCI and RCIC on a LOOP.

2. The LOOP IE frequency for Hatch is 2.2E-2.

3. Hatch gives failure to depressurize an HEP value of 0.02.

4. CRD pumps are modeled in the Hatch ETs for LOOP to provide HPI; however, they are not sufficient by themselves to prevent CD and hence do not appear in the success criteria.

5. The swing EDG can power either train of either unit. This may be important in evaluating findings related to EDGs. A credit of 1 can be assigned for the shared EDG.

6. Hatch does not credit RHRSW injection through the crosstie on SBO sequences. They do, however, credit CV for containment heat removal in the case of loss of the CHR function above. In this case, Hatch counts on the continued success of LPI since they have a hardened vent path and, thus, LPI should not be lost. There is some question of the continued viability of the NPSH for LPCI and CS due to the hot suppression pool water and the low pressure in the suppression pool. Most BWRs do not credit CV without some external LI separate from LPCI and CS.

7. On non-SBO LOOP events (where the EDGs function or offsite power is recovered promptly) the event progresses similarly to the TPCS initiator and LI is credited as in the TPCS worksheet.

8. For sequences in the above worksheet, the numbers in parentheses refer to the corresponding sequence in the ETs. For the LOOP ET there are some transfers to the TPCS ET. These are indicated by (1) and (2). All of the sequences in the TPCS event tree apply here, i.e., LOOP-CHR-LI, LOOP-CHR-CV, LOOP-HPI-DEP, and LOOP-HPI-LPI.

Table 3.8 SDP Worksheet for Hatch 1 & 2 — Anticipated Transients without Scram (ATWS)

Estimated Frequency (Table 1 Row) _________ Exposure Time _________ Table 1 Result (circle): A B C D E F G H

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
Overpressure Protection (OVERP)	9/11 SRVs or [6/11 SRVs plus 3/3 TBVs] (1 multi-train system)
Reactivity Control (SBLC/LC)	1/2 SBLC pumps inject (operator action = 2) or [PCS/turbine bypass plus power/level control or Level control at the TAF] (operator action = 1)
Recirculation Pump Trip (RPT)	Manual or automatic trip of 2/2 recirculation pumps (1 train)
Inhibit ADS (INH)	Operator inhibits ADS (operator action = 2)
High Pressure Injection (HPI)	HPCI (1 ASD train) or 1/2 reactor feed pumps (operator action = 2)
Depressurization (DEP)	3/11 SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection (LPI)	1/4 RHR pumps in 1/2 trains in LPCI Mode (1 multi-train system) or 1/2 CS pumps (1 multi-train system) or 1/3 condensate pumps (operator action = 2)
Overfill of Reactor Vessel (OVRFILL)	Control LPI after DEP with SBLC injection successful (operator action = 2)
Containment Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system) or PCS with turbine bypass valves (operator action = 2)
Containment Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/3 Condensate pumps (operator action = 2)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 ATWS - OVERP (17)			
2 ATWS - RPT (16)			
3 ATWS - INH (15)			

4 ATWS - SBLC/LC (14)			
5 ATWS - HPI - DEP (13)			
6 ATWS - LPI (6, 12)			
7 ATWS - OVRFILL (5, 11)			
8 ATWS - CHR - CV (4, 10)			
9 ATWS - CHR - LI (3, 9)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event:

If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

<u>Notes</u>:

1. For Hatch, overfill of the Reactor Vessel is a problem due to injection of cold water at a rapid rate (i. e., uncontrolled) after DEP. This can cause a power and pressure excursion, possibly leading to RPV failure and eventual core damage.

2. SBLC HEPs range from 8E-3 to 3E-2.

3. The success criteria for CHR in an ATWS vary a bit depending on which of the three options of SBLC/LC was used. See Table 3.1-4 of the Hatch IPE.

4. Hatch gives some credit for operator recovery of the HPCI System..

5. The Hatch PRA gives an HEP of 3 E-2 for [PCS/turbine bypass plus power/level control or Level control at the TAF].

Table 3.9 SDP Worksheet for Hatch 1 & 2 — Loss of Station Battery A (LODC)

Estimated Frequency (Table 1 Row) __________ Exposure Time __________ Table 1 Result (circle): A B C D E F G H

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
High Pressure Injection (HPI)	HPCI (1 ASD train)
Depressurization (DEP)	3/11 SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection (LPI)	1/2 RHR pumps in 1/2 trains in one train in the LPCI Mode (1 single train system) or 1/1 CS pumps (1 single train system)
Containment Heat Removal (CHR)	1/4 RHR pumps and 1/4 RHR SW pumps in 1/2 trains in shutdown cooling or torus cooling mode (1 multi-train system)
Containment Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)
Late Inventory, Makeup (LI)	1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1) of 1/3 Condensate pumps (operator action = 2)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LODC - CHR - LI (3, 7)			
2 LODC - CHR - CV (4, 8)			
3 LODC - HPI - LPI (9)			
4 LODC - HPI - DEP (10)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event:

If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. This special initiator is the loss of Station Battery A and has an IE frequency of 2.7E-3. The loss of the other division station battery B does not cause a turbine or plant trip. Loss of Battery A leads to a loss of DC on Bus S016 and Cabinets S001 & S003. Loss of Cabinet S001 or S016causes a turbine trip, thus PCS is lost. RCIC is also lost. Further, there is difficulty transferring the unit transformers to the startup transformers for 4160 VAC without DC. Additionally, half of the actuation logic is lost for ADS, CS, & LPCI.

2. This worksheet can be used with the event tree for TPCS, since it causes a loss of the PCS and behaves similarly.

3. Credit is given for only one train of LPCI and CS in LPI due to the loss of automatic actuation. However, recovery of the second train of LPCI and Core Spray is possible by operator action. Since CHR is all manual, credit is given for all four RHR pumps in the CHR function.

Table 3.10 SDP Worksheet for Hatch 1 & 2 — Loss of 600 VAC Bus C (LBUSC)

Estimated Frequency (Table 1 Row) __________ Exposure Time __________ Table 1 Result (circle): A B C D E F G H

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
High Pressure Injection (HPI)	HPCI (1 ASD train) or RCIC (1 ASD train)
Depressurization (DEP)	3/11 SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Low Pressure Injection / Late Injection (LPI/LI)	1/2 RHR pumps in one train in the LPCI Mode (1 single train system); or 1/1 CS pumps (1 single train system); or 1/4 RHR SW pumps injecting via crosstie to LPCI (operator action = 1)
Containment Heat Removal (CHR)	1/2 RHR pumps in one train and 1/4 RHR SW pumps in torus cooling mode (1 single train system)
Containment Venting (CV)	Lost due to loss of IA and backup nitrogen.

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LBUSC - CHR (2, 4)			
2 LBUSC - HPI - LPI/LI (5)			
3 LBUSC - HPI - DEP (6)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event:
If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. This special initiator is the loss of the 600 VAC Bus C and has an IE frequency of 8.5E-3. It causes the loss of the following equipment: Station Service Battery System "A," Diesel Generator "A" Battery, Backup Nitrogen for Non-Interruptible Instrument Air, Instrument Air, Containment Vent, Division I PSW strainer backwash, RHR pumps in the "A" loop, RHR Shutdown Cooling, Core Spray "A" loop, RHR Drywell Spray "A" loop, Steam Jet Air Ejectors thereby losing the Main Condenser, CRD System, 2 of 3 RBCCW pumps, and the RPS MG Set "A" is lost causing a ½ scram condition. Additionally, other equipment is potentially lost, but are backed up by redundant equipment.

2. The loss of the 600 VAC Bus C causes a FW transient and a low reactor vessel level trip. It is generally modeled as a loss of FW event, with the additional failures noted above. The loss of the corresponding bus D in the other division is not as serious and may not even cause a plant trip.

3. CV is lost in this initiating event, but the IPE still credits the LI systems for injection, therefore we have combined LPI and LI for this ET and worksheet.

Table 3.11 SDP Worksheet for Hatch 1 & 2 — Loss of Plant Service Water (LOPSW)

Estimated Frequency (Table 1 Row) __________ **Exposure Time** __________ **Table 1 Result (circle): A B C D E F G H**

Safety Functions Needed:	**Full Creditable Mitigation Capability for Each Safety Function:**
High Pressure Injection (HPI)	RCIC (1 ASD train)
Depressurization (DEP)	3/11 SRVs (7 ADS and 4 other SRVs) manually opened (operator action = 2)
Secure excess pumps (VOPA)	Control room operator secures all but one pump in each of the two ECCS (RHR/CS) corner rooms (operator action = 2)
Low Pressure Injection (LPI)	1/2 RHR pumps in LPCI Mode or 1/2 CS pumps (1 multi-train system) {A total of only two LPI pumps is available on a LOPSW}
Containment Venting (CV)	CV through 18" hardened torus or drywell vent path (operator action = 2)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LOPSW - CV (2, 4)			
2 LOPSW - HPI - LPI (5)			
3 LOPSW - HPI - VOPA (6)			
4 LOPSW - HPI - DEP (7)			

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event: If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. This special initiator is complete Loss of the Plant Service Water System. The IPE uses an IE frequency of 1.2E-4 per reactor year. The current Hatch PRA models loss of all PSW and loss of the intake structure separately using a conservative fault tree model. Both result in a loss of PSW. Hatch also models as a separate initiator, PSW strainer plugging, with credit for recovery. This initiator is less important and is not considered as part of the loss of PSW modeled in this worksheet. Normal PSW cooling for the RHRSW pumps is division-based with crossties available between divisions. Loss of PSW causes a loss of PCS, EDGs, CRD, HVAC for ECCS (see note 2), and cooling to the RHRSW pumps.

2. Hatch Unit 1 has four ECCS corner rooms with HPCI in one, RCIC in one, and then 2 RHR pumps and 1 CS pump in each of the other two rooms. The rooms have ECCS HVAC coolers from each of the two divisions. Loss of PSW causes a loss of all ECCS HVAC. This causes an immediate loss of HPCI. RCIC can continue to function. RHR, LPCI, and CS can continue to function if the control room operator secures all but one pump in each room. The PRA takes credit for this operator action (VOPA) and assigns an HEP of 1E-3. Thus, it is considered an operator action in this worksheet. If VOPA fails, then both LPI and CHR will fail.

3. The CDF for the Loss of all PSW sequence in the Hatch PRA is 4% of total CDF with an accident sequence frequency of 6.6 E-7 events per reactor year. The CDF for the Loss of intake structure sequence in the Hatch PRA is 1% of total CDF with an accident sequence frequency of 1.7 E-7 events per reactor year. The licensee considers these values to be conservative due to the conservative fault tree models for the initiators.

4. Regarding sequences 1 & 2 on the event tree, the RCIC system serves the HPI function early in the event and also serves the LI function late in the event. There appears to be an implicit assumption that at some point in time (probably well after 24 hours) that the operator will need to provide an alternate source of water for RCIC after the CST is expended. This is similarly true for sequences 3 & 4 on the ET; if CV is utilized then the operator will need to provide an alternate source of water for LPI after the suppression pool becomes saturated due to use of CV.

Table 3.12 SDP Worksheet for Hatch 1 & 2 — Interfacing System LOCA (ISLOCA) and LOCA Outside Containment (LOC)

Estimated Frequency (Table 1 Row) ________ Exposure Time __________ Table 1 Result (circle): A B C D E F G H

<u>Initiation Pathways</u>:	**<u>Mitigation Capability</u>: <u>Ensure Component Operability for Each Pathway</u>**
ISLOCA PATHWAYS:	
Core Spray Injection Lines	2 lines each with one air-operated check valve (AO-F006 A & B) and a normally closed MOV (MO-F005 A & B)
LPCI Injection Lines	2 lines each with one air-operated check valve and a normally closed MOV
RHR Drop Line	Line with 2 MOVs, MO-FO-0088 & MO-FO-0098
LOC PATHWAYS:	
RWCU System Lines	Valves in RWCU lines
Feedwater Lines	2 feedwater lines each with 2 check valves
Main Steam Lines	4 lines each with 2 MSIVs

<u>Circle Affected Component in Pathways</u>	**<u>Recovery of Failed Train</u>**	**<u>Remaining Mitigation Capability Rating for Each Affected Pathway</u>**	**<u>Sequence Color</u>**

Identify any operator recovery actions that are credited to directly restore the degraded equipment or initiating event:
If operator actions are required to credit placing mitigation equipment in service or for recovery actions, such credit should be given only if the following criteria are met: 1) sufficient time is available to implement these actions, 2) environmental conditions allow access where needed, 3) procedures exist, 4) training is conducted on the existing procedures under conditions similar to the scenario assumed, and 5) any equipment needed to complete these actions is available and ready for use.

Notes:

1. The initiation pathways defined are primarily based on NUREG/CR-5928, ISLOCA Research Program, Final Report, July 1993. Adjustments are made using available information from the PRAs/IPEs on plant-specific pathways.

2. This worksheet is different from the other worksheets in that ISLOCA is typically an unmitigated initiating event in most PRAs. Therefore, the right side of the worksheet contains valves whose failure may lead to an ISLOCA or LOC rather than mitigating systems to address an event in progress. As such, it is not intended to be referenced by the last column of Table 1.2, Initiators and System Dependency Table.

3. This worksheet contains pathways for both ISLOCA and LOC. Licensees typically analyze these events separately. Hatch treats MSLB and MFWB as a high pressure LOCA outside of containment (LOC). The initiating event frequency for this is 8.7 E-8 events per reactor-year. The Hatch IPE model credits no mitigating systems for an LOC. Therefore, this sequence has a core damage frequency of 8.7 E-8 events per reactor-year. Hatch treats ISLOCAs similarly.

4. ISLOCAs constitute 11.3% of CDF for the Hatch PRA model, with a total sequence frequency of 1.85 E-6 events per reactor-year. This is a total of various system line breaks outside containment.

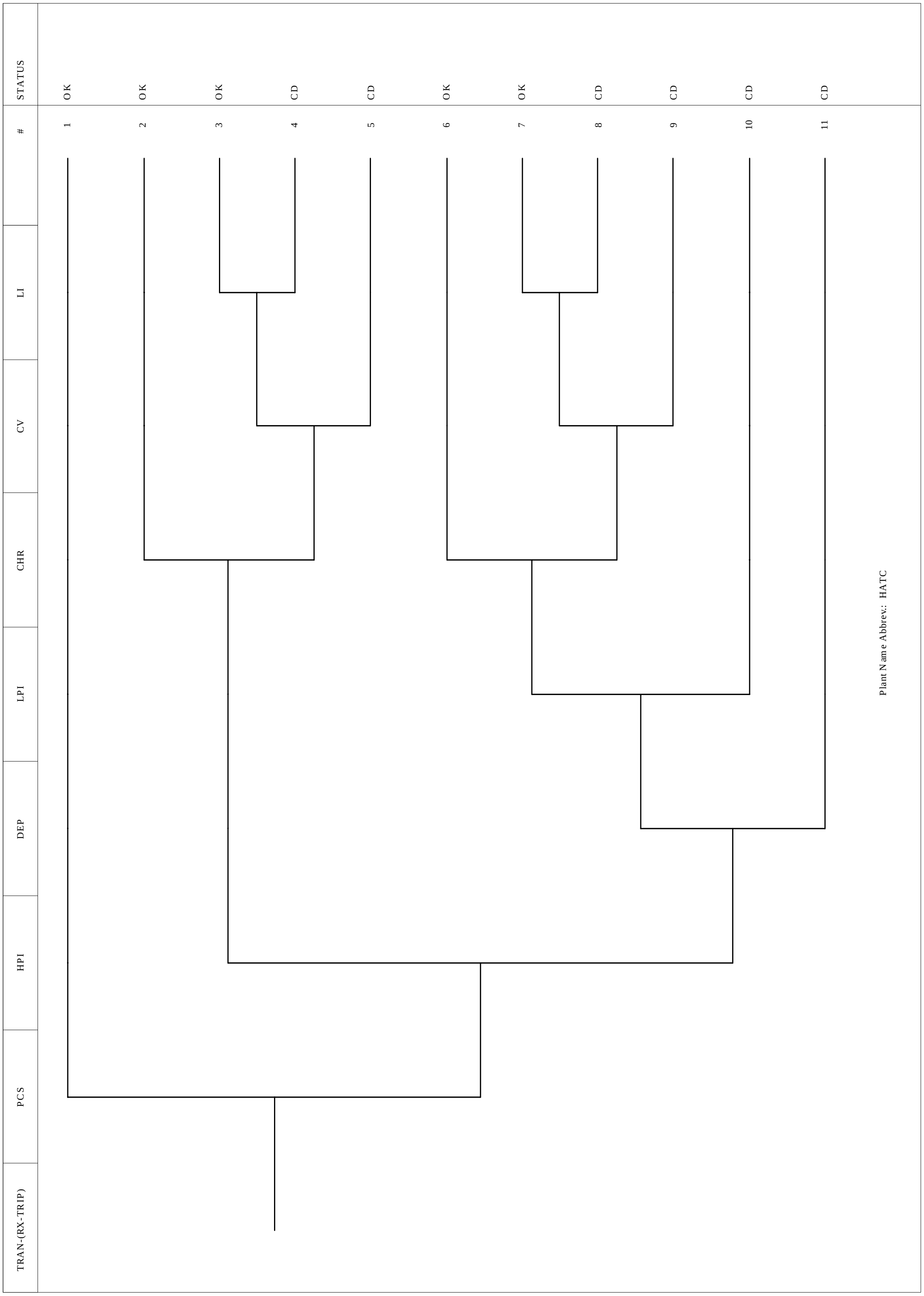
1.4 SDP Event Trees

This section provides the simplified event trees, called SDP event trees, used to define the accident sequences identified in the SDP worksheets in the previous section. The event tree headings are defined in the corresponding SDP worksheets.

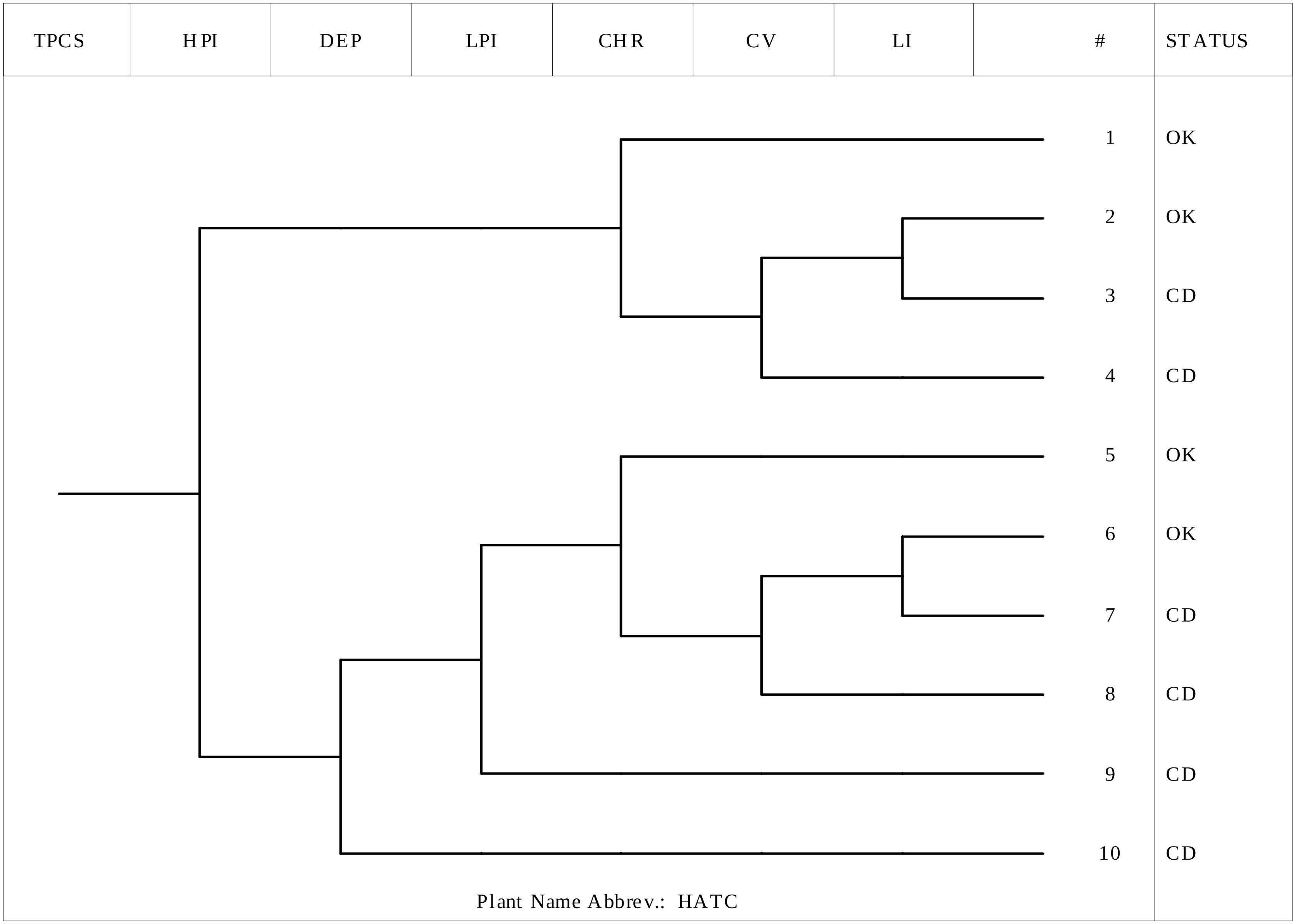
The following event trees are included:

1. Transients (Reactor Trip) (TRANS)
2. Transients without PCS (TPCS)
3. Small LOCA (SLOCA)
4. Medium LOCA (MLOCA)
5. Inadvertently Open Relief Valve (IORV)
6. Large LOCA (LLOCA)
7. Loss of Offsite Power (LOOP)
8. Anticipated Transients Without Scram (ATWS)
9. Loss of 600 VAC Bus C (LBUSC)
10. Loss of Plant Service Water (LOPSW)

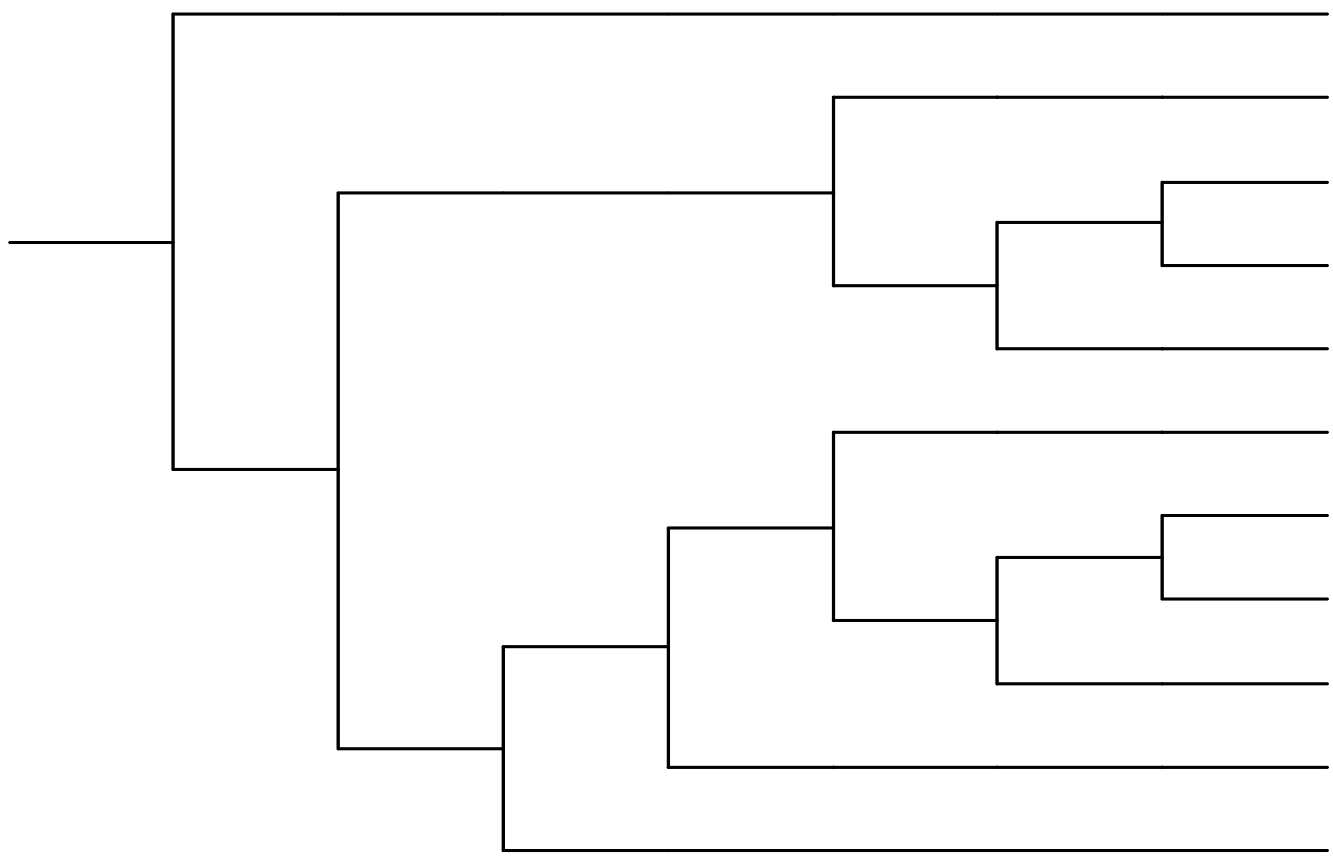
40



TRAN-(RX-TRIP)
PCS
HPI
DEP
LPI
CHR
CV
LI
#
STATUS
1 OK
2 OK
3 OK
4 CD
5 CD
6 OK
7 OK
8 CD
9 CD
10 CD
11 CD
Plant Name Abbrev.: HATC

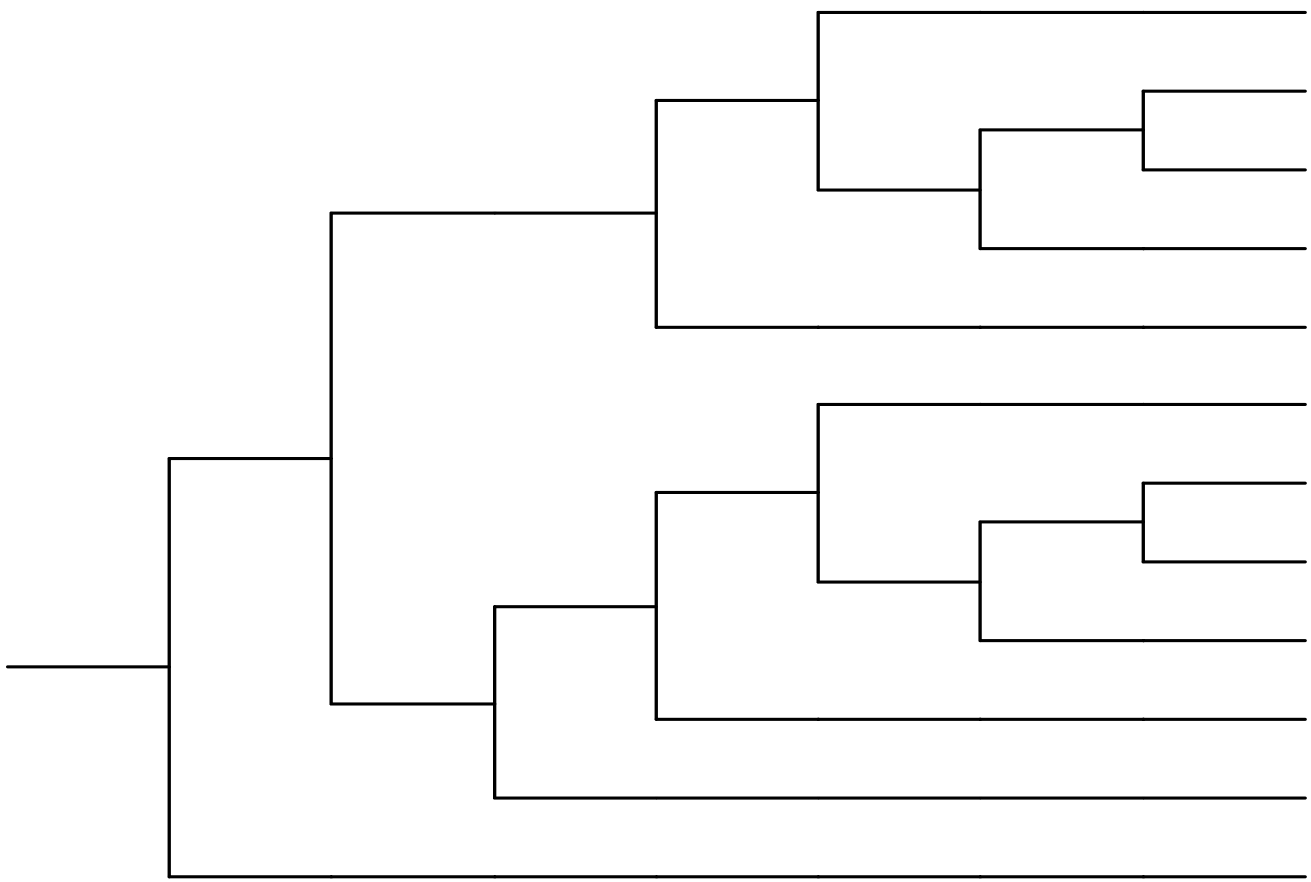

TPCS
HPI
DEP
LPI
CHR
CV
LI
#
STATUS
1 OK
2 OK
3 CD
4 CD
5 OK
6 OK
7 CD
8 CD
9 CD
10 CD
Plant Name Abbrev.: HATC

SLOCA	PCS	HPI	DEP	LPI	CHR	CV	LI	#	STATUS
								1	OK
								2	OK
								3	OK
								4	CD
								5	CD
								6	OK
								7	OK
								8	CD
								9	CD
								10	CD
								11	CD



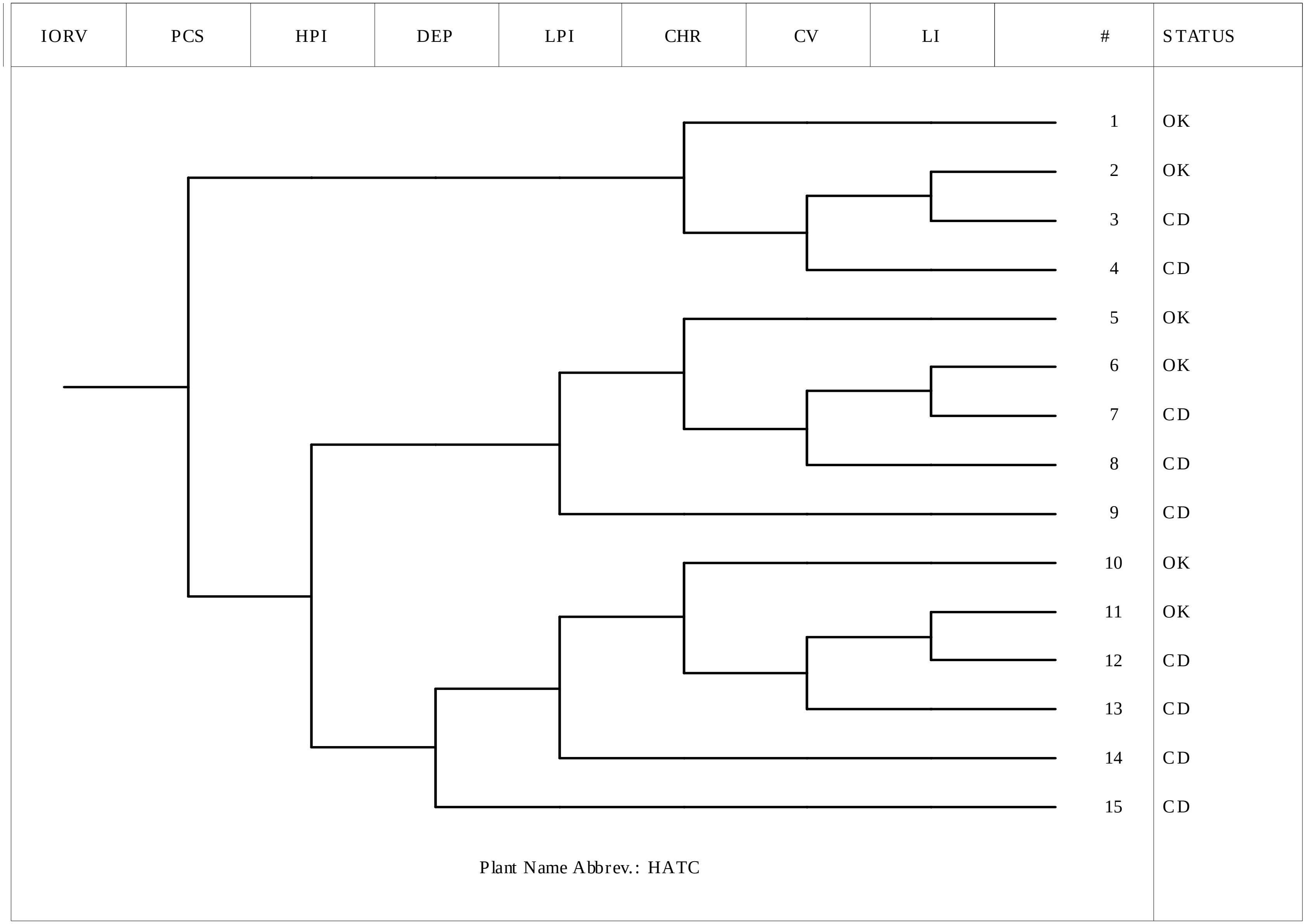
Plant Name Abbrev.: HATC

MLOCA	EC	HPI	DEP	LPI	CHR	CV	LI	#	STATUS

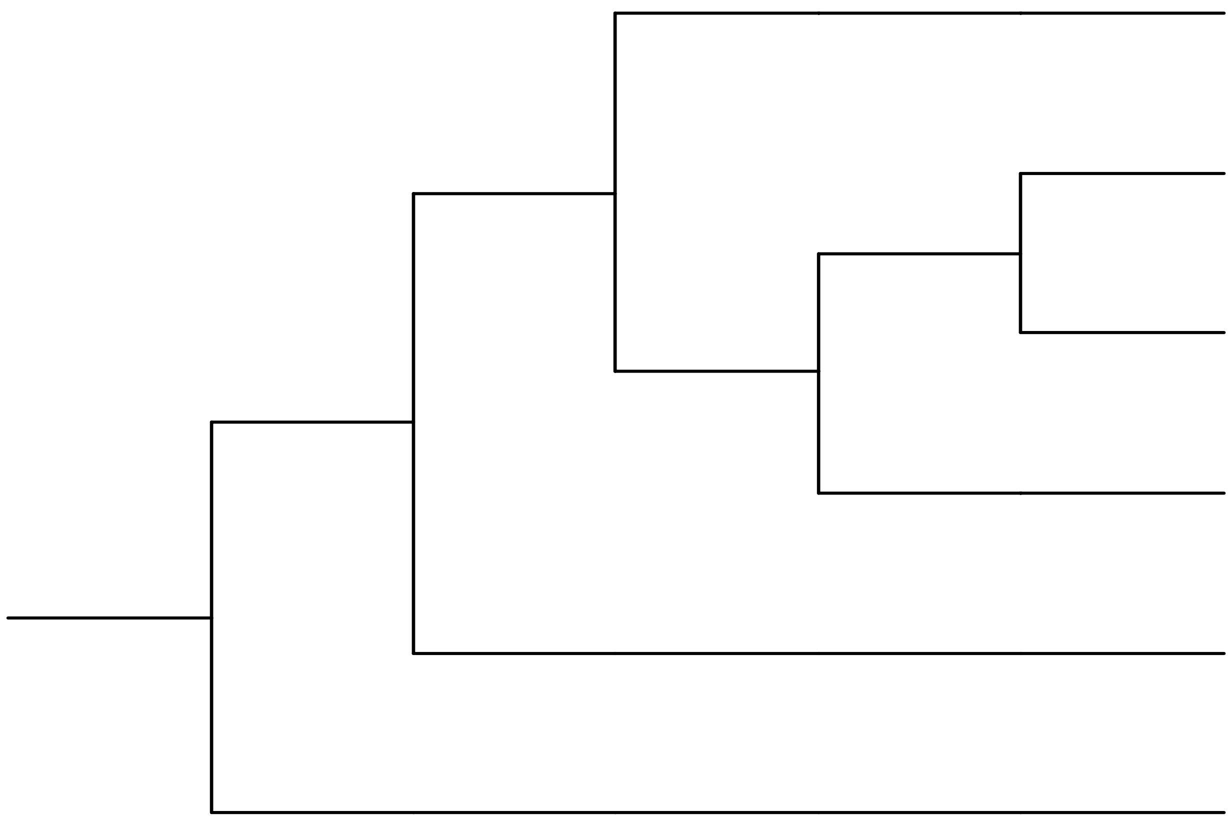


#	STATUS
1	OK
2	OK
3	CD
4	CD
5	CD
6	OK
7	OK
8	CD
9	CD
10	CD
11	CD
12	CD

Plant Name Abbrev.: HATC


IORV
PCS
HPI
DEP
LPI
CHR
CV
LI
#
STATUS
1 OK
2 OK
3 CD
4 CD
5 OK
6 OK
7 CD
8 CD
9 CD
10 OK
11 OK
12 CD
13 CD
14 CD
15 CD
Plant Name Abbrev.: HATC

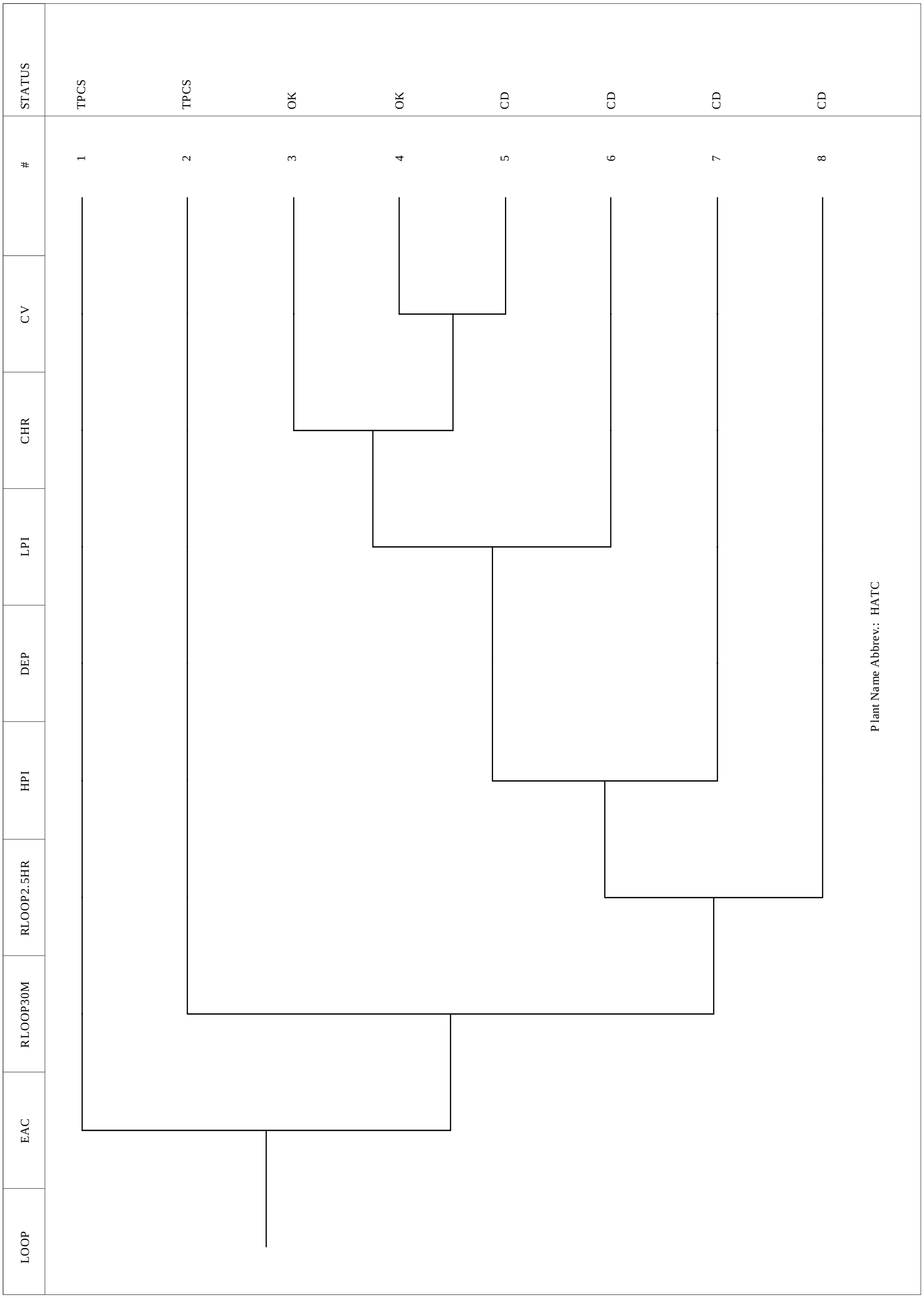
LLOCA	EC	LPI	CHR	CV	LI	#	STATUS



#	STATUS
1	OK
2	OK
3	CD
4	CD
5	CD
6	CD

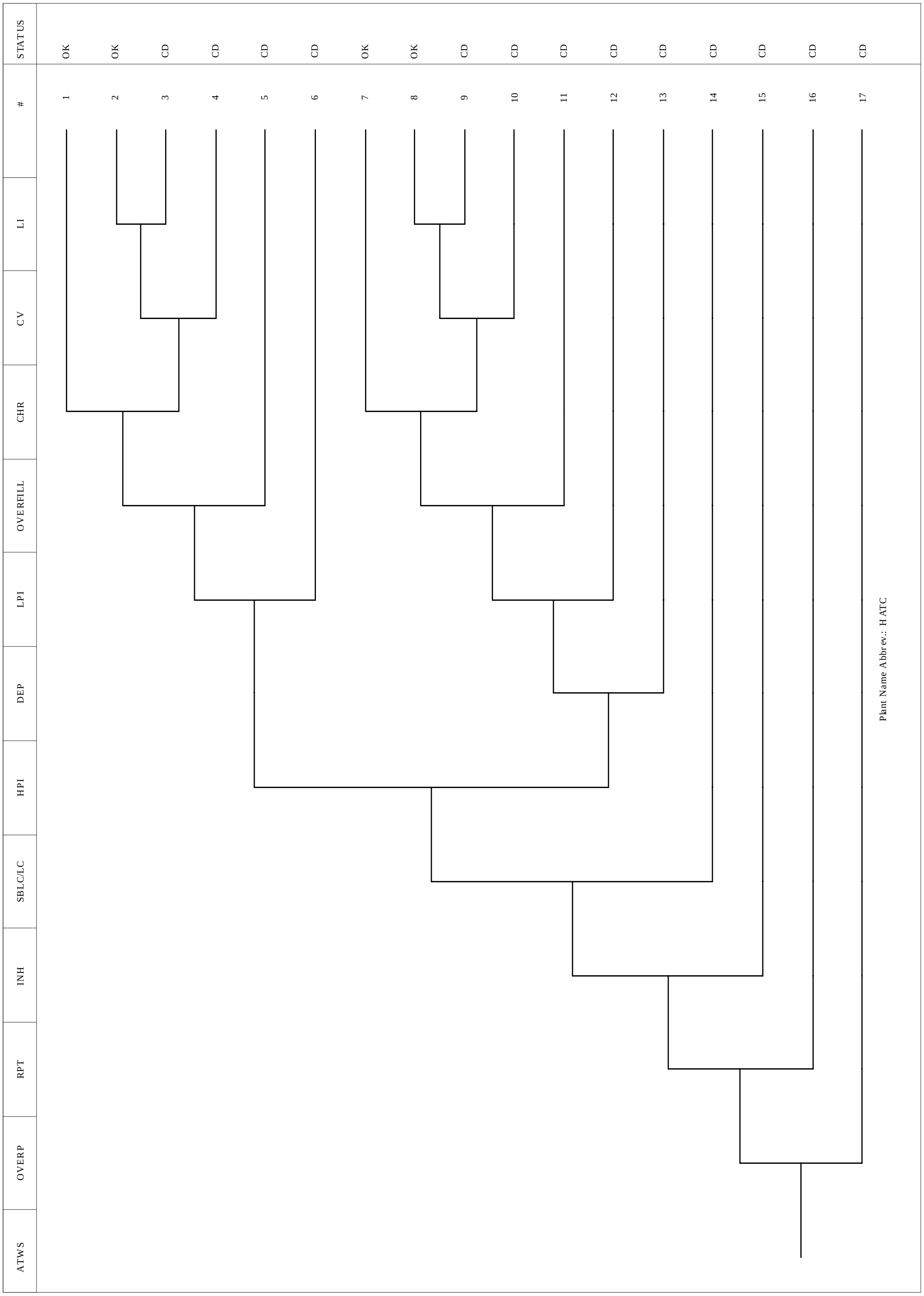
Plant Name Abbrev.: HATC

46

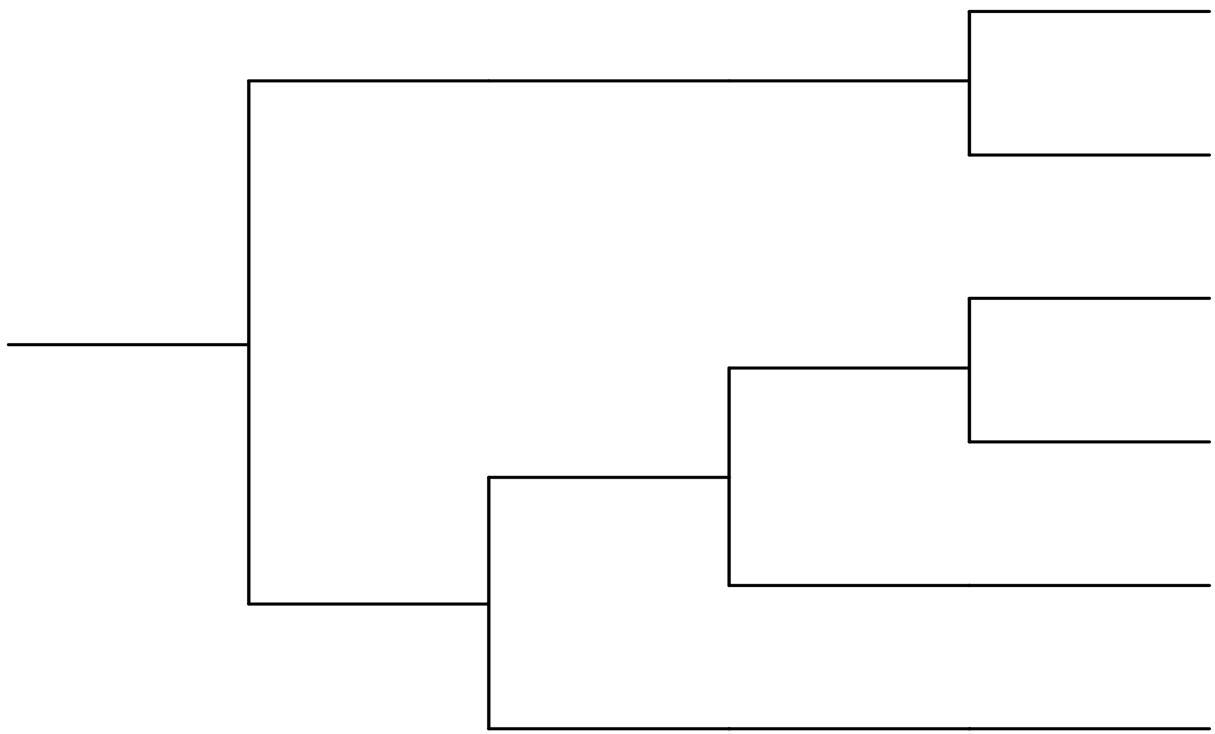


LOOP
EAC
RLOOP30M
RLOOP2.5HR
HPI
DEP
LPI
CHR
CV
#
STATUS
1 TPCS
2 TPCS
3 OK
4 OK
5 CD
6 CD
7 CD
8 CD
Plant Name Abbrev.: HATC

47

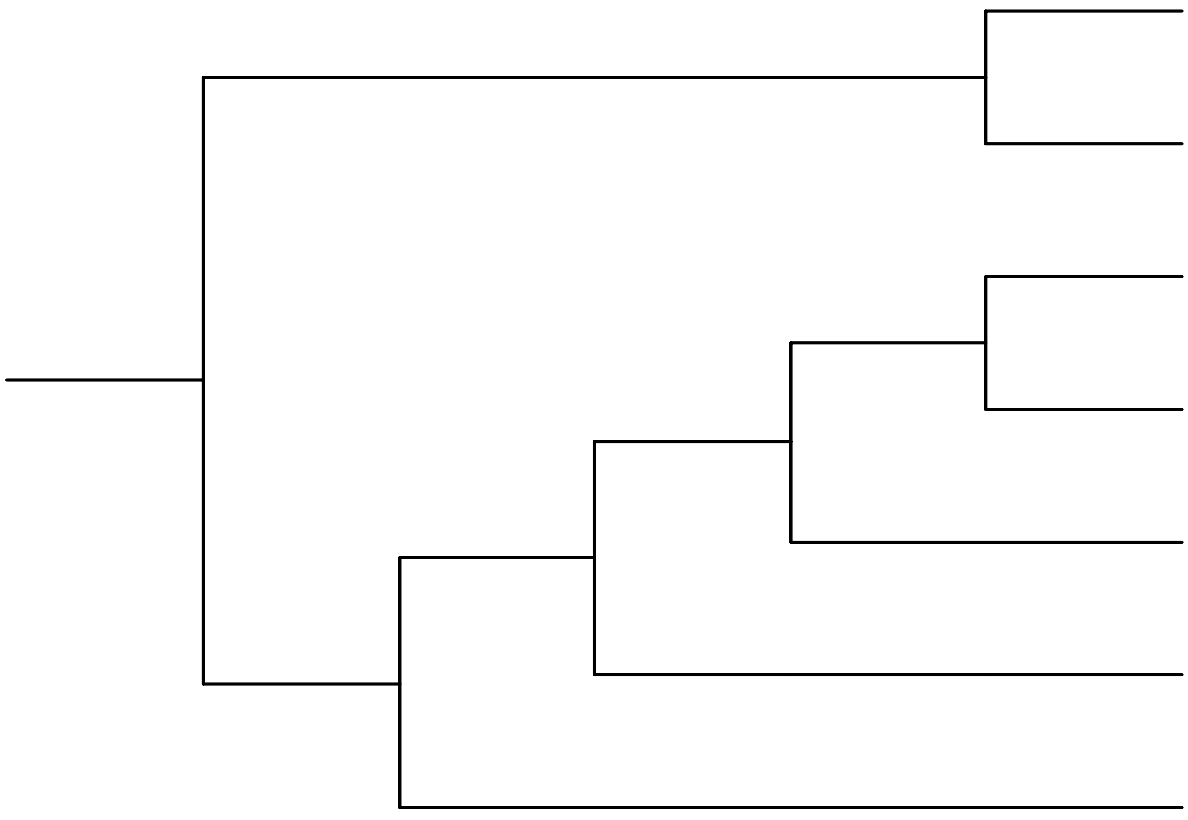

STATUS
#
LI
CV
CHR
OVERFILL
LPI
DEP
HPI
SBLC/LC
INH
RPT
OVERP
ATWS
OK OK CD CD CD CD OK OK CD CD CD CD CD CD CD CD CD
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Plant Name Abbrev.: HATC

LBUSC	HPI	DEP	LPI/LI	CHR	#	STATUS



#	STATUS
1	OK
2	CD
3	OK
4	CD
5	CD
6	CD

Plant Name Abbrev.: HATC



LOPSW	HPI	DEP	VOPA	LPI	CV	#	STATUS
						1	OK
						2	CD
						3	OK
						4	CD
						5	CD
						6	CD
						7	CD

Plant Name Abbrev.: HATC

2. RESOLUTION AND DISPOSITION OF COMMENTS

This section is composed of two subsections. Subsection 2.1 summarizes the generic assumptions that were used for developing the SDP worksheets for the BWR plants. These guidelines were based on the plant-specific comments provided by the licensee on the draft SDP worksheets and further examination of the applicability of those comments to similar plants. These assumptions which are used as guidelines for developing the SDP worksheets help the reader better understand the worksheets' scope and limitations. The generic guidelines and assumptions for BWRs are given here. Subsection 2.2 documents the plant-specific comments received on the draft version of the material included in this notebook and their resolution.

2.1 GENERIC GUIDELINES AND ASSUMPTIONS (BWRs)

Initiating Event Likelihood Rating Table

1. Assignment of plant-specific IEs into frequency rows:

Transient (Reactor trip) (TRANS), transients without PCS (TPCS), small, medium, and large LOCA (SLOCA, MLOCA, LLOCA), inadvertent or stuck-open SRVs (IORV), anticipated transients without scram (ATWS), interfacing system LOCA (ISLOCA), and LOCA outside containment (LOC) are assigned into rows based on consideration of industry-average frequency. Plant-specific frequencies can be different, but are not considered. Plant-specific frequencies for LOOP and special initiators are used to assign these initiating events.

2. Inclusion of special initiators:

The special initiators included in the worksheets are those applicable for the plant. A separate worksheet is included for each of the applicable special initiators. The applicable special initiators are primarily based on the plant-specific IPEs. In other words, the special initiator included are those modeled in the IPEs unless it is shown to be a negligible contributor. In some cases, in considering plants of similar design, a particular special initiator may be added for a plant even if it is not included in the IPE if such an initiator is included in other plants of similar design and is considered applicable for the plant. Except for the interfacing system LOCA (ISLOCA) and LOCA outside containment (LOC), if the occurrence of the special initiator results in a core damage, i.e., no mitigation capability exists for the initiating event, then a separate worksheet is not developed. For such cases, the inspection focus is on the initiating event and the risk implication of the inspection finding can be directly assessed. For ISLOCA and LOC, a separate worksheet is included noting the pathways that can lead to these events.

3. Inadvertent or stuck open relief valve as an IE in BWRs:

Many IPEs/PRAs model this event as a separate initiating event. Also, the failure of the SRVs to re-close after opening can be modeled within the transient tree. In the SDP worksheet, these events are modeled in a separate worksheet (and, are not included in the transient worksheets) considering both inadvertent opening and failure to re-close. We typically consider a single valve is stuck or inadvertently open. The frequency of this initiator is generically estimated for all BWR plants. This IE may behave similar to a small or medium LOCA depending on the valve size, and the mitigation capability is addressed accordingly.

4. LOCA outside containment (LOC):

A LOCA outside of containment (LOC) can be caused by a break in a few types of lines such as Main Steam or Feedwater. LOC is treated differently among the IPEs. Separate ETs are usually not developed in the IPEs for LOCs. Thus, credit is usually not taken for mitigating actions. LOC sequences typically have a core damage frequency in the E-8 range. As such, LOCs are included together with ISLOCAs in a separate summary type SDP worksheet. Plant specific notes are included to explain how the particular IPE has addressed LOCs.

Initiating Event and System Dependency Table

1. Inclusion of systems under the support system column:

This table shows the support systems for the support and frontline systems. Partial dependency, which usually is a backup system, is not expected to be included. If included, they should be so noted. The intent is to include only the support system and not the systems supporting the support system, i.e., those systems whose failure will result in failure of the system being supported. Sometimes, some subsystems on which inspection findings may be noted have been included as a support system, e.g., EDG fuel oil transfer pump as a support system for EDGs.

2. Coverage of system/components and functions included in the SDP worksheets:

The Initiators and System Dependency Table includes systems and components which are included in the SDP worksheets and those which can affect the performance of these systems and components. One to one matching of the ET headings/functions to that included in the Table was not considered necessary.

SDP Worksheets and Event Trees

1. Crediting of non-safety related equipment:

SDP worksheets credit or include safety-related equipment and also, non-safety related equipment as used in defining the accident sequences leading to core damage. In defining the success criteria for the functions needed, the components included are typically those covered under the Technical Specifications (TS) and the Maintenance Rule (MR). No evaluation was performed to assure that the components included in the worksheets are covered under TS or MR. However, if a component was included in the worksheet, and the licensee requested its removal, it may not have been removed if it is considered that the components is included in either TS or MR.

2. No credit for certain plant-specific mitigation capability:

The significance determination process (SDP) screens inspection findings for Phase 3 evaluations. Some conservative assumptions are made which result in not crediting some plant-specific features. Such assumptions are usually based on comparisons with plants of similar design and to maintain consistency across the SDP worksheets of similar plant designs.

3. Crediting system trains with high unavailability

Some system component/trains may have unavailability higher than 1E-2, but they are treated in a manner similar to other trains with lower unavailability in the range of 1E-2. In this screening approach, this is considered adequate to keep the process simple. An exception is made for steam-driven components which are designated as automatic steam driven (ASD) train with a credit of 1, i.e., an unavailability in the range of !E-1.

4. Treating passive components (of high reliability) same as active components:

Passive components, namely isolation condensers in some BWRs, are credited similar to active components. The reliability of these components are not expected to differ (from that of active components) by more than an order of magnitude. Pipe failures have been excluded in this process except as part of initiating events where appropriate frequency is used. Accordingly, a separate designation for passive components was not considered necessary.

5. Defining credits for operator actions:

The operator's actions modeled in the worksheets are categorized as follows: operator action=1 representing an error probability of 5E-2 to 0.5; operator action=2 representing an error probability of 5E-3 to 5E-2; operator action=3 representing an error probability of 5E-4 to 5E-3; and operator action=4 representing an error probability of 5E-5 to 5E-4. Actions with error probability > 0.5 are not credited. Thus, operator actions are associated with credits of 1, 2, 3, or 4. Since there is large variability in similar actions among different plants, a survey of the error probability across plants of similar design was used to categorize different operator actions. From this survey, similar actions across plants of similar design are assigned the same credit. If a plant uses a lower credit or recommends a lower credit for a particular action compared to our assessment of similar action based on plant survey, then the lower credit is assigned. An operator's action with a credit of 4, i.e., operator action=4, is noted at the bottom of the worksheet; the corresponding hardware failure, e.g., 1 multi-train system, is defined in the mitigating function.

6. Difference between plant-specific values and SDP designated credits for operator actions:

As noted, operator actions are assigned to a particular category based on review of similar actions for similar design plants. This results in some differences between plant-specific HEP values and credit for the action in the worksheet. The plant-specific values are usually noted at the bottom of the worksheet, when available.

7. Dependency among multiple operator actions:

IPEs or PRAs, in general, account for dependencies among multiple operator actions that may be applicable. In this SDP screening approach, if multiple actions are involved in one function, then the credit for the function is designated as one operator action considering the dependency involved.

8. Crediting late injection (LI) following failure of containment heat removal (CHR), i.e., suppression pool cooling:

Following successful high or low pressure injection, suppression pool cooling is modeled. Upon failure of suppression pool cooling, containment venting (CV) is considered followed by late injection. Late injection is credited if containment venting is successful. Further, LI is required following CV success. The suction sources for the LI systems credited are different from the suppression pool. HPCI, LPCI, and CS are not credited in late injection. No credit is given for LI following failure of CV. The survival probability is low and such details are not considered in the screening approach here.

9. Combining late injection (LI) with low pressure injection (LPI) or containment venting (CV):

In some modeling approaches, LI is combined with LPI or CV. In the SDP worksheet approach here, these functions are separate. As discussed above, LPI and LI use different suction sources, and CV and LI may be two different categories of operator actions. In these respects, for some plants, SDP event trees may be different than the plant-specific trees.

10. Crediting condensate trains as part of multiple functions: power conversion system (PCS), low pressure injection (LPI), and late injection (LI):

Typically, condensate trains can be used as an LPI and LI source in addition to its use as part of the power conversion system. However, crediting the same train in multiple functions can result in underestimation of the risk impact of an inspection finding in the SDP screening approach since it does not account for these types of dependencies in defining the accident sequences. To simplify the process and to avoid underestimation, condensate train is not credited in LPI, but may be credited in LI.

11. Modeling vapor suppression success in different LOCA worksheets:

Vacuum breakers typically must remain closed following a LOCA to avoid containment failure and core damage. Some plants justify that vapor suppression is not needed for SLOCA. These sequences typically have low frequency and are not among the important contributors. However, an inspection finding on these vacuum breakers may make these sequences a dominant contributor. Accordingly, success of vapor suppression is included in the SDP worksheets. It is included for all three LOCA worksheets (LLOCA, MLOCA, and SLOCA); for plants presenting justification that they are not needed in a SLOCA appropriate modifications are made.

12. ATWS with successful PCS as a stable plant state:

Some plants model a stable plant state when PCS is successful following an ATWS. Following our comparison of similarly designed plants, such credits are not given.

13. Modeling different EDG configurations, SBO diesel, and cross-ties:

Different capabilities for on-site emergency AC power exist at different plant sites. To treat them consistently across plants, they are typically combined into a single emergency AC (EAC) function. The dedicated EDGs are credited following the standard convention used in the worksheets for equipment (1 dedicated EDG is 1 train; 2 or more dedicated EDGs is 1 multi-train system). The use of the swing EDG or the SBO EDG requires operator action. The full mitigating capability for emergency AC could include dedicated Emergency Diesel Generators (EDG), Swing EDG, SBO EDG, and finally, nearby fossil-power plants. The following guidelines are used in the SDP modeling of the Emergency AC power capability:

1. Describe the success criteria and the mitigation capability of dedicated EDGs.

2. Assign a mitigating capability of "operator action=1" for a swing EDG. The SDP worksheet assumes that the swing EDG is aligned to the other unit at the time of the LOOP (in a sense a dual unit LOOP is assumed). The operator, therefore, should trip, transfer, re-start, and load the swing EDG.

3. Assign a mitigating capability of "operator action=1" for an SBO EDG similar to the swing EDG. Note, some of the plants do not take credit for an SBO EDG for non-fire initiators. In these cases, credit is not given.

4. Do not credit the nearby power station as a backup to EDGs. The offsite power source from such a station could also be affected by the underlying cause for the LOOP. As an example, overhead cables connecting the station to the nuclear power plant also could have been damaged due to the bad weather which caused the LOOP. This level of detail should be left for a Phase 3 analysis.

14. Recovery of losses of offsite power:

Recovery of losses of offsite power is assigned an operator-action category even though it is usually dominated by a recovery of offsite AC, independent of plant activities. Furthermore, the probability of recovery of offsite power in "X" hours (for example 4 hours) given it is not recovered earlier (for example, in the 1st hour) would be different from recovery in 4 hours with no condition. The SDP worksheet uses a simplified approach for treating recovery of AC by denoting it as an operator action=1 or 2 depending upon the HEP used in the IPE/PRA. A footnote highlighting the actual value used in the IPE/PRA is provided, when available.

15. Mitigation capability for containment heat removal:

The mitigation capability for containment heat removal (CHR) function is considered dominated by the hardware failure of the RHR pumps. The applicable operator action is categorized as an operator action with a credit 4, i.e., operator action=4. For this situation, the function is defined as 1 multi-train system since the operator action involved is considered routine and reliable, and is assigned a credit of 4. No other operator action in the worksheets is generically assigned this high credit.

16. Crediting CRD pumps as an alternate high pressure injection source:

In many plants, CRD pumps can be used as a high pressure injection source following successful operation of HPCI or RCIC for a period of time, approximately 1 to 2 hours. In some plants, CRD system is enhanced where it can be directly used and does not need the successful operation of other HPI sources. In the worksheets, if the CRD pumps require prior successful operation of HPCI or RCIC as a success criteria, then CRD is not credited as a separate high pressure injection source. If the CRD can be used and does not require successful operation of HPCI or RCIC, then it is credited as a separate success path within the HPI function.

2.2 RESOLUTION OF PLANT-SPECIFIC COMMENTS

This section documents the comments received on the material included in this report and their resolution.

BNL and the NRC met with Hatch PRA personnel on 4/27/200 and received a set of written comments. The licensee provided overall comments, specific comments on the individual SDP worksheets and ETs, and a set of revised SDP worksheets and ETs. These were discussed with the licensee personnel and addressed as indicated below. NRC, BNL, and the licensee agreed that some of the comments would be addressed and for others the worksheets would remain as is.

Overall Comments:

1) Licensee's comments on the Initiator and System Dependency Tables reflecting the up to date plant specific system interactions, clarification notes, and plant specific acronyms were all incorporated.

2) The following changes in success criteria were discussed, accepted, and incorporated to the SDP worksheet:

   a) Credit for TBV for overpressure protection in ATWS scenarios
   b) No credit for condensate and booster pumps in LOOP, and LLOCA scenarios as an injection source
   c) No credit for PCS in MLOCA scenarios for CHR functions
   d) Credit for RHRSW connection for LI

3) The licensee requested several changes related to the characterization of operator actions: shifting high stress operator actions to normal actions, use of a lower stress operator action, and customizing the classification of operator actions on each worksheet based on the HEP from the PRA. These recommendations are addressed through the generic guideline and resolution number 18. The licensee also requested that notes to be added for most worksheets indicating operator recovery actions that are credited in the Hatch PRA. The appropriate notes were added.

4) Hatch requested that we drop the sequences of the type Trans - PCS - CHR - LI, throughout all worksheets, however, these were retained per the generic resolution and guideline number 12.

5) Hatch requested that the functions LPI and LI be combined into one function LPI/LI to agree more closely with the updated Hatch PRA function of LO. This was not done per generic resolution number 13, except for the LOOP worksheet. The functions of CHR and CV were maintained separate (for consistency with other NRC worksheets and to highlight the importance of CV). CHR and CV together correspond to the Hatch PRA function of QR.

6) Licensee provided information for developing Three new worksheets for special initiators were added (LODC, BUSC, & LOPSW). The licensee also provided supporting information for adding the needed worksheets for IORV and TPCS.

REFERENCES

1. NRC SECY-99-007A, Recommendations for Reactor Oversight Process Improvements (Follow-up to SECY-99-007), March 22, 1999.

2. Southern Nuclear Operating Company, "Individual Plant Examination of Hatch 1 & 2, dated January 1994.