June 12, 2001

Mr. Oliver D. Kingsley, President
Exelon Nuclear
Exelon Generation Company, LLC
1400 Opus Place, Suite 500
Downers Grove, IL 60515

SUBJECT: LASALLE COUNTY STATION, UNITS 1 AND 2 - SIGNIFICANCE DETERMINATION PROCESS, SITE-SPECIFIC WORKSHEETS (TAC NO. MA6544)

Dear Mr. Kingsley:

Enclosed is the Risk-Informed Inspection Notebook which 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 will be publically available through the Nuclear Regulatory Commission (NRC) external website at http://www.nrc.gov/NRC/IM/index.html.

The 1999 Pilot Plant review effort clearly indicated that significant site-specific design and risk information was not captured in the previous worksheets forwarded to you. 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 enclosed document reflects the results of that visit.

The enclosed Phase 2 Worksheets have incorporated much of the information we obtained during our site visit. The staff encourages further licensee comments where it is identified that the Worksheets give inaccurately low significance determinations. Any comments should be forwarded to the NRC Document Control Desk, with a copy to the Chief, Probabilistic Safety Assessment Branch, Nuclear Reactor Regulation. We will continue to assess SDP accuracy and update the document based on continuing experience.

Contact me if you have any questions.

Sincerely,

/RA/

Jon B. Hopkins, Senior Project Manager, Section 2
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-373 and 50-374

Enclosure: As stated

cc w/encl: See next page

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NAME	JHopkins	CRosenberg	AMendiola
DATE	6/11/01	6/11/01	6/12/01

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cc:

Mr. O. Kingsley, President
Nuclear Generation Group
Commonwealth Edison Company
Executive Towers West III
1400 Opus Place, Suite 500
Downers Grove, Illinois 60515

Phillip P. Steptoe, Esquire
Sidley and Austin
One First National Plaza
Chicago, Illinois 60603

Assistant Attorney General
100 W. Randolph Street
Suite 12
Chicago, Illinois 60601

U.S. Nuclear Regulatory Commission
LaSalle Resident Inspectors Office
2605 N. 21st Road
Marseilles, Illinois 61341-9756

Chairman
LaSalle County Board
707 Etna Road
Ottawa, Illinois 61350

Attorney General
500 S. Second Street
Springfield, Illinois 62701

Chairman
Illinois Commerce Commission
Leland Building
527 E. Capitol Avenue
Springfield, Illinois 62706

Illinois Department of Nuclear Safety
Office of Nuclear Facility Safety
1035 Outer Park Drive
Springfield, Illinois 62704

Regional Administrator
U.S. NRC, Region III
801 Warrenville Road
Lisle, Illinois 60532-4351

Commonwealth Edison Company
LaSalle Station Manager
2601 N. 21st Road
Marseilles, Illinois 61341-9757

Robert Cushing
Chief, Public Utilities Division
Illinois Attorney General's Office
100 W. Randolph Street
Chicago, Illinois 60601

Document Control Desk-Licensing
Commonwealth Edison Company
1400 Opus Place, Suite 400
Downers Grove, Illinois 60515

Commonwealth Edison Company
Site Vice President - LaSalle
2601 N. 21st Road
Marseilles, Illinois 61341-9757

Mr. David Helwig
Senior Vice President
Commonwealth Edison Company
Executive Towers West III
1400 Opus Place, Suite 900
Downers Grove, Illinois 60515

Mr. Gene H. Stanley
Vice President - Nuclear Operations
Commonwealth Edison Company
Executive Towers West III
1400 Opus Place, Suite 900
Downers Grove, Illinois 60515

Mr. Christopher Crane
Senior Vice President - Nuclear Operations
Commonwealth Edison Company
Executive Towers West III
1400 Opus Place, Suite 900
Downers Grove, Illinois 60515

Mr. R. M. Krich
Vice President - Regulatory Services
Commonwealth Edison Company
Executive Towers West III
1400 Opus Place, Suite 500
Downers Grove, Illinois 60515

Commonwealth Edison Company
Reg. Assurance Supervisor - LaSalle
2601 N. 21st Road
Marseilles, Illinois 61341-9757

Ms. Pamela B. Stroebel
Senior Vice President and General Counsel
Commonwealth Edison Company
P.O. Box 767
Chicago, Illinois 60690-0767

RISK-INFORMED INSPECTION NOTEBOOK FOR

LA SALLE NUCLEAR POWER STATION

BWR-5, GE, WITH MARK II CONTAINMENT

Prepared by

Brookhaven National Laboratory
Energy Sciences and Technology Department

Contributors

M. A. Azarm
T. L. Chu
A. Fresco
J. Higgins
G. Martinez-Guridi
P. K. Samanta

NRC Technical Review Team

John Flack	RES
Jose Ibarra	RES
Doug Coe	NRR
Gareth Parry	NRR
Peter Wilson	NRR
See Meng Wong	NRR
Jim Trapp	Region I
Michael Parker	Region III
William B. Jones	Region IV

Prepared for

U. S. Nuclear Regulatory Commission
Office of Nuclear Regulatory Research
Division of Analysis and Regulatory Effectiveness

Enclosure

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.

U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

ABSTRACT

This notebook contains summary information to support the Significance Determination Process (SDP) in risk-informed inspections for the La Salle Nuclear Power 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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TABLES

FIGURES

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 g1frequency 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 La Salle Nuclear Power Station.

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 La Salle Nuclear Power Station

Row	Approximate Frequency	Example Event Type	Estimated Likelihood Rating		
I	> 1 per 1-10 yr	Transient (Reactor Trip) (TRAN), Loss of Power Conversion System (Loss of condenser, Closure of MSIVs, Loss of feedwater) (TPCS)	A	B	C
II	1 per 10-10^2 yr	Loss of offsite power (LOOP), Inadvertent or stuck open SRVs (IORV), Loss of instrument air (LOIA)	B	C	D
III	1 per 10^2 - 10^3 yr	Loss of Div 1 DC Bus (LDC1), Loss of Div 2 DC Bus (LDC2), Loss of Service Water (LSW)	C	D	E
IV	1 per 10^3 - 10^4 yr	Small LOCA (RCS rupture) (SLOCA), Medium LOCA (RCS rupture) (MLOCA), Loss of a 4 kV Bus (LAC1 &2)	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, 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 Table for La Salle Nuclear Power Station

Affected System	Major Components	Support Systems	Initiating Event Scenarios
Power Conversion System (PCS)	2 TD pumps 1 MD pumps, MOVs	Normal 6900 VAC power, Normal 125 VDC power, instrument/service air (IA), lube oil, turbine building closed cooling water (TBCCW) system, MSIV, Turbine Bypass Valves	TRAN, LAC1, LAC2, SLOCA, IORV, ATWS
Condensate System (CDS)	4 MD condensate pumps, 4 MD condensate booster pumps, 4 MD heater drain pumps	Normal 6900 VAC power, Normal 125 VDC power, instrument/service air (IA), actuation logic and control, lube oil, turbine building closed cooling water (TBCCW) system, Circwater, heater drain tank	TRAN, LAC1, LAC2, SLOCA, IORV, MLOCA, LLOCA, ATWS
High Pressure Core Spray (HPCS)	1 MD pump with dedicated diesel-generator (DG), MOVs	Div 3 AC Power, Div 3 DC Power, Core Standby Cooling System (CSCS), Emergency Core Cooling System (ECCS) HVAC	All
Reactor Core Isolation Cooling (RCIC)	1 TD pump, MOVs	480 VAC Power, 250 VDC Power, ECCS HVAC	All except MLOCA, LLOCA, ATWS
Control Rod Drive (CRD) Pumps	2 MD pumps, MOVs	AC power, 125V DC power, reactor building component cooling water (RBCCW), ECCS HVAC	TRAN, TPCS, LDC1, LDC2, SLOCA, IORV, LOOP, ATWS
Automatic Depressurization System (ADS)	18 SRVs including 7 ADS Valves	Div 1 and Div 2 125 VDC power, instrument nitrogen/drywell pneumatic system (IN)	All except LLOCA
Residual Heat Removal (RHR) System / Low Pressure Coolant Injection (LPCI)	3 MD RHR/LPCI pump trains, MOVs	Div 1 and Div 2 AC power (Trains A and B, respectively), Div 1 and Div 2 DC power (Trains A and B respectively), CSCS, ECCS HVAC	All except LLOCA, ATWS

Table 2 (Continued)

Affected System	Major Components	Support Systems	Initiating Event Scenarios
RHR/ Suppression Pool Cooling (SPC)- Shutdown Cooling (SDC)	2 MD RHR pumps and 2 heat exchangers Trains A and B, MOVs	Same as RHR/LPCI Trains A and B	All
Low Pressure Core Spray (LPCS)	1 MD pump, MOVs	Div 1 AC Power, Div 1 DC Power, CSCS, HVAC ECCS	TRAN, TPCS, SLOCA, LDC1, LAC2, LSW, LOIA, IORV, MLOCA, LLOCA, LOOP, ATWS
Containment Venting (VENT)	MO dampers, AOVs, MOVs	480V AC Power, IA	TRAN, TPCS, LDC1, LDC2, SLOCA, IORV, MLOCA, LLOCA, LOOP, ATWS
Recirculation Pump Trip (RPT)	Instrumentation logic and controls circuits	6900V AC Power, DC Power	ATWS
Standby Liquid Control (SBLC)	2 MD pumps, explosive MOVs	Div 1 and Div 2 AC Power, Div 1 & 2 DC Power	ATWS
Electrical AC Power	Div 1 and Div 2 AC Buses	Div 1 and Div 2 DC	All
Emergency Diesel generators (EDG)	1 Emergency Diesel Generators (EDGs) per unit (Div 1 and Div 2) plus 1 EDG shared between units	Div 1 and Div 2 DC Power, fuel oil, CSCS, DG HVAC	LOOP

Table 2 (Continued)

Affected System	Major Components	Support Systems	Initiating Event Scenarios
Electrical DC Power	Station Batteries (Div 1 and Div 2) 125V DC Battery and battery Chargers Safeguards Busses (Div 1 and Div 2)	AC powered battery chargers	All
Core Standby Cooling System (CSCS)	Cooling pond, 3 MD pumps per unit (Div 1 for Unit 1, Div 2 for Unit 2, and Div 0 is shared) 5 DG cooling water pumps per site; 4 RHR service water pumps per unit	Divs 1, 2, and 3 AC Power, Divs 1, 2, and 3 DC Power	All
Instrument Air/ Service Air (IA) System	Compressors	AC Power, TBCCW	LOIA
Reactor Building Closed Cooling Water (RBCCW) System	2 pumps, MOVs, 2 heat exchangers	AC Power, Service Water System (SWS)	TRAN, TPCS, LDC1, LDC2, SLOCA, IORV, LOOP, ATWS
Turbine Building Closed Cooling Water (TBCCW) System	2 pumps, MOVs, 2 heat exchangers	AC Power, SWS	TRAN, LAC1, LAC2, SLOCA, IORV, MLOCA, LLOCA, ATWS
Service Water System (SWS) (Non safety Related)	5 pumps, MOVs	AC Power	LSW

Table 2 (Continued)

Affected System	Major Components	Support Systems	Initiating Event Scenarios
Emergency Core Cooling System (ECCS) Heating, Ventilating and Air Conditioning (HVAC)	Fans, MO dampers, ducts	AC Power, CSCS	All

Notes:

1. The above information is based upon the CECo Response for LaSalle Units 1 & 2 to Generic Letter 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities" submitted to the NRC by letter dated April 28, 1994. NUREG/CR-4832, ten volumes, "Analysis of the LaSalle Unit 2 Nuclear Power Plant: Risk Methods and Integration and Evaluation Program (RMIEP)," and LaSalle PSA Quantification Summary Document, LS PSA -013, February 2000.

2. The core damage frequency (CDF) for internal events is 8.58E-6 per reactor-year (LS PSA -013, February 2000).

3. The shared EDG can be cross-ties to either unit.

4. A complete failure of the Core Standby Cooling System (CSCS) will result in failure of all mitigation capability resulting in a core damage. Failure of all strainers in the system will result in failure of CSCS. CSCS provides equipment cooling water to RHR Heat Exchangers, diesel generator coolers, CSCS area coolers, the LPCS, and the RHR pumps. Each units's CSCS consists of three separate electrical and physical divisions, one of which is shared between the units.

5. The Service Water (SW) system supplies cooling water for turbine generator and miscellaneous HVAC loads, fuel pool cooling, and HXs in TBCCW and RBCCW systems.

6. The heater drain pumps draw from the heater drain tank. Condensate makeup pumps and condensate transfer pumps are used to supply the heater drain tank. A backup supply is the fire makeup pumps.

1.3 SDP WORKSHEETS

This section presents the SDP worksheets to be used in the Phase 2 evaluation of the inspection findings for the La Salle Nuclear Power Station. The SDP worksheets are presented for the following initiating event categories:

1. Transients (Reactor Trip) (TRANS)
2. Transients w/o PCS (TPCS)
3. Loss of Div 1 DC Bus (LDC1)
4. Loss of Div 2 DC Bus (LDC2)
5. Loss of 4160V AC Bus 241Y (LAC1)
6. Loss of 4160V AC Bus 242Y (LAC2)
7. Loss of Service Water (LSW)
8. Loss of Instrument Air (LOIA)
9. Small LOCA (SLOCA)
10. Inadvertent Open Relief Valve (IORV)
11. Medium LOCA (MLOCA)
12. Large LOCA (LLOCA)
13. Loss of Offsite Power (LOOP)
14. Anticipated Transients Without Scram (ATWS)
15. Interfacing System LOCA (ISLOCA) and LOCA Outside Containment (LOC)

Table 3.1 SDP Worksheet for La Salle Nuclear Power Station — 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)	1/2 Turbine Driven feed pumps or 1/1 Motor Driven feed pump and 1/4 condensate/ condensate booster pump and Turbine Bypass and operable condenser (operator action = 2) (1)
High Pressure Injection (HPI)	HPCS pump (1 train) or RCIC pump (1 ASD train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2) (2)
Low Pressure Injection (LPI)	1/3 RHR pumps in LPCI mode (1 multi-train system) or 1/1 LPCS pumps (1 train)
Containment Heat Removal (CHR)	1/2 RHR pumps in suppression pool cooling (SPC) mode or in SDC mode (1 multi-train system) (3)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2) (4)
Late Inventory, Makeup (LI)	DEP with 2/7 ADS valves with 1/2 CRD pumps or 1/2 diesel driven fire water pump or 1/4 heater drain pumps (operator action = 2) (5)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 TRAN - PCS - CHR - LI (4, 8)			
2 TRAN - PCS - CHR - CV (5, 9)			
3 TRAN - PCS - HPI - LPI (10)			
4 TRAN - 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. Following a reactor trip, only one feedwater pump is required to provide flow to the reactor. A credit of 2 is assigned based on a survey of other BWR plants. LaSalle HEP for manually starting MDMFW pump is 7.9E-2.

2. HEP for DEP is estimated at 2.1E-4, considering HEP for other BWRs it has been assigned a credit of 2.

3. There are three LPCI pumps : A, B, and C. However only two of them A and B are connected to RHR heat exchanger. HEP for initiating SDC and manipulating valves is 4.1E-3 and HEP for SPC is 1.6E-4. Because of low HEP for this action, the mitigating function is defined in terms of hardware failures, 1 multi-train system.

4. HEP for containment venting is 4.77E-2.

5. HEP for aligning heater drain system or for starting/aligning fire pumps is 2.22E-2.

Table 3.2 SDP Worksheet for La Salle Nuclear Power Station — Transients w/o 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)	HPCS pump (1 train) or RCIC pump (1 ASD train) or 1/1 MDFP(operator action = 1) (1)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2) (2)
Low Pressure Injection (LPI)	1/3 RHR pumps in LPCI mode(1 multi-train system) or 1/1 LPCS pumps (1 train)
Containment Heat Removal (CHR)	1/2 RHR pumps in suppression pool cooling (SPC) mode or in SDC mode (1 multi-train system) (3)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2) (4)
Late Inventory, Makeup (LI)	DEP with 2/7 ADS Valves with 1/2 CRD pumps or 1/2 diesel driven fire water pump or 1/4 heater drain pumps (operator action = 2) (5)

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. Since the MDMFW is normally in standby, manual restart of this pump is credited following loss of PCS. HEP for manually starting MDMFW pump is 7.9E-2. An operator action credit of 1 is assigned.

2. HEP for DEP is estimated at 2.1E-4, considering HEP for other BWRs it has been assigned a credit of 2.

3. There are three LPCI pumps : A, B, and C. However only two of them A and B are connected to RHR heat exchanger. HEP for initiating SDC and manipulating valves is 4.1E-3 and HEP for SPC is 1.6E-4. Because of low HEP for this action, the mitigating function is defined in terms of hardware failures, 1 multi-train system.

4. HEP for containment venting is 4.77E-2.

5. HEP for aligning heater drain system or for starting/aligning fire pumps is 2.22E-2.

Table 3.3 SDP Worksheet for La Salle Nuclear Power Station — Loss of Div 1 DC Bus (LDC1)[1,3]

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)	HPCS pump (1 train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2) [2]
Low Pressure Injection (LPI)	1/1 RHR pump in LPCI mode (1 train) or 1/ 1 LPCS train (1 train)
Containment Heat Removal (CHR)	1/1 RHR pumps in suppression pool cooling (SPC) mode or SDC mode (1 train)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2) [2]
Late Inventory, Makeup (LI)	DEP with 2/7 ADS Valves with 1/1 CRD pump or 1/2 diesel driven fire water pumps or 1/4 heater drain pumps (operator action = 2) [2]

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LDC1 - CHR - LI (3,7)			
2 LDC1 - CHR - CV (4,8)			
3 LDC1 - HPI - LPI (9)			
4 LDC1 - 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. Loss of Div 1 or 2 125V DC Bus results in high drywell pressure and subsequent reactor scram. Here, loss of 125V DC Div 1 is considered. Loss of Div 1 or 2 DC results in loss of feedwater control and subsequent loss of feedwater/condensate system. One logic train of the ADS actuation logic is affected, but system operation is unaffected. In addition, Loss of Div 1 125V DC results in loss of RCIC, 2 RHR trains (1 RHR/ LPCI train plus 1 RHR pump with HX train), and 1 CRD pump train. Loss of Div 2 DC results in loss of 1 RHR/LPCI train, LPCS train, and 1 CRD pump train. The initiating event frequency in the LaSalle PRA is 1E-3/yr.

2. See the Transient (Reactor Trip) worksheet for the HEPs.

3. No separate event tree is provided. Please refer to the TPCS tree.

Table 3.4 SDP Worksheet for La Salle Nuclear Power Station — Loss of Div 2 DC Bus (LDC2)[1,3]

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)	HPCS pump (1 train) or RCIC pump (1 ASD train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2) [2]
Low Pressure Injection (LPI)	1/2 RHR pump train in LPCI mode (1 multi-train system)
Containment Heat Removal (CHR)	1/1 RHR pumps in suppression pool cooling (SPC) mode or SDC mode (1 train)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2) [2]
Late Inventory, Makeup (LI)	1/1 CRD pump or 1/2 diesel driven fire water pumps or 1/4 heater drain pumps (operator action = 2) [2]

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LDC2 - CHR - LI (3,7)			
2 LDC2 - CHR - CV (4,8)			
3 LDC2 - HPI - LPI (9)			
4 LDC2 - 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. Loss of Div 1 or 2 125V DC Bus results in high drywell pressure and subsequent reactor scram. Here, loss of 125V DC Div 2 is considered. Loss of Div 1 or 2 DC results in loss of feedwater control and subsequent loss of feedwater/condensate system. One logic train of the ADS actuation logic is affected, but system operation is unaffected. In addition, Loss of Div 1 125V DC results in loss of RCIC, 2 RHR trains (1 RHR/LPCI train plus 1 RHR pump with HX train), and 1 CRD pump train. Loss of Div 2 DC results in loss of 1 RHR/LPCI train, LPCS train, and 1 CRD pump train. The initiating event frequency in the LaSalle PRA is 1E-3/yr.

2. See the Transient (Reactor Trip) worksheet for the HEPs.

3. No separate event tree is provided. Please refer to the TPCS tree.

Table 3.5 SDP Worksheet for La Salle Nuclear Power Station — Loss of 4160V AC Bus 241Y (LAC1)[1]

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

<u>Safety Functions Needed</u>:	<u>Full Creditable Mitigation Capability for Each Safety Function:</u>
Power Conversion System (PCS)	1/2 Turbine Driven feed pumps or 1/1 Motor Driven feed pump and 1/ 4 condensate/ condensate booster pump and Turbine Bypass and operable condenser (operator action = 2) [1]
High Pressure Injection (HPI)	HPCS pump (1 train) or RCIC (1 ASD train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2)
Low Pressure Injection (LPI)	1/2 RHR pumps in LPCI mode (1multi-train system) or 1/4 heater drain pumps (operator action = 2)
Containment Heat Removal (CHR)	1/1 RHR pump in suppression pool cooling (SPC) mode or in SDC mode (1 train)

<u>Circle Affected Functions</u>	<u>Recovery of Failed Train</u>	<u>Remaining Mitigation Capability Rating for Each Affected Sequence</u>	<u>Sequence Color</u>
1 LAC1 - PCS - CHR (3, 5)			
2 LAC1 - PCS - HPI - LPI (6)			
3 LAC1 - PCS - 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.

<u>Notes</u>:

1. Loss of 4160V AC Bus 241Y results in loss of drywell cooling which, if not properly restored, subsequently leads to a high drywell pressure, causing a reactor scram. CRD pump 1A, RHR pump 1A, and the LPCS pump will be made unavailable by this bus failure. Containment venting is lost due to loss of an AC bus. The initiating event frequency in the IPE is assumed to be 1.33E-04/yr.

2. See the Transient (Reactor Trip) worksheet for the HEPs.

3. The event tree is developed for a loss of AC Bus (LAC). It applies to both LAC1 and LAC2.

Table 3.6 SDP Worksheet for La Salle Nuclear Power Station — Loss of 4160V AC Bus 242Y (LAC2)[1]

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)	1/2 Turbine Driven feed pumps or 1/1 Motor Driven feed pump and 1/ 4 condensate/ condensate booster pump and Turbine Bypass and operable condenser (operator action = 2) [1]
High Pressure Injection (HPI)	HPCS pump (1 train) or RCIC (1 ASD train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2)
Low Pressure Injection (LPI)	1/1 RHR pump in LPCI mode (1train) or 1/1 LPCS train (1 train) or 1/4 heater drain pumps (operator action = 2)
Containment Heat Removal (CHR)	1/1 RHR pump in suppression pool cooling (SPC) mode or in SDC mode (1 train)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LAC2 - PCS - CHR (3, 5)			
2 LAC2 - PCS - HPI - LPI (6)			
3 LAC2 - PCS - 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. Loss of 4160V AC Bus 242Y results in loss of drywell cooling which, if not properly restored, subsequently leads to a high drywell pressure, causing a reactor scram. CRD pump B, RHR pumps B & C will be made unavailable by this bus failure. Containment venting is lost due to loss of an AC bus. The initiating event frequency in the IPE is assumed to be 1.33E-04/yr.

2. See the Transient (Reactor Trip) worksheet for the HEPs.

3. No separate event tree is provided. Please refer to the LAC tree.

Table 3.7 SDP Worksheet for La Salle Nuclear Power Station — Loss of Service Water (LSW)

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)	HPCS pump (1 train) or RCIC pump (1 ASD train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2) [(2)]
Low Pressure Injection (LPI)	1/3 RHR pumps in LPCI mode(1 multi-train system) or 1/1 LPCS pumps (1 train)
Containment Heat Removal (CHR)	1/2 RHR pumps in suppression pool cooling (SPC) mode or in SDC mode (1 multi-train system)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LSW - CHR (2,4)			
2 LSW - HPI - LPI (5)			
3 LSW - 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. Service Water (SW) system provides cooling for heat exchangers in TBCCW and RBCCW systems. Loss of SW results in failure of PCS, as result of loss of TBCCW heat exchangers, resulting in a reactor trip. Also, instrument air is lost which is assumed to affect capability to vent the containment. The IE frequency in the LaSalle PRA is 2.7E-03/yr.

2. Please refer to the Transient(Reactor trip) Worksheet for HEP values.

Table 3.8 SDP Worksheet for La Salle Nuclear Power Station — Loss of Instrument Air (LOIA)(1)

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)	HPCS pump (1 train) or RCIC pump (1 ASD train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2) (2)
Low Pressure Injection (LPI)	1/3 RHR pumps in LPCI mode(1 multi-train system) or 1/1 LPCS pumps (1 train)
Containment Heat Removal (CHR)	1/2 RHR pumps in suppression pool cooling (SPC) mode or in SDC mode (1 multi-train system) (3)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LOIA - CHR (2,4)			
2 LOIA - HPI - LPI (5)			
4 LOIA - 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. The loss of instrument air (LOIA) results in loss of the PCS and containment venting. Containment venting is lost because the AOVs in the vent path will fail closed. The impact is very similar to loss of service water (LOSW); the initiating event frequency estimated in LaSalle PPA is 2.36E-02/yr.

2. HEP for DEP is estimated at 2.1E-4, considering HEP for other BWRs it has been assigned a credit of 2.

3. There are three LPCI pumps : A, B, and C. However only two of them A and B are connected to RHR heat exchanger. HEP for initiating SDC and manipulating valves is 4.1E-3 and HEP for SPC is 1.6E-4. Because of low HEP for this action, the mitigating function is defined in terms of hardware failures, 1 multi-train system.

4. No separate event tree is provided. Please refer to the LOSW tree.

Table 3.9 SDP Worksheet for La Salle Nuclear Power Station — 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:**
Early Containment Failure (EC)[(1)]	4/4 Vaccum breakers (1 train) or 1/2 RHR pumps in CSC (operator action = 1) [(1)]
Power Conversion System (PCS)	1/1 Motor Driven feed pump and 1/4 condensate pump and 1/4 condensate booster pump and Turbine Bypass and operable condenser (operator action = 2)[(2)]
High Pressure Injection (HPI)	HPCS pump (1 train) or RCIC pumps with 1/ 2 CRD pumps (1 ASD train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2)
Low Pressure Injection (LPI)	1/3 RHR pumps in LPCI mode(1 multi-train system) or 1/1 LPCS pump (1 train)
Containment Heat Removal (CHR)	1/2 RHR pumps in suppression pool cooling (SPC) mode or in SDC mode (1 multi-train system)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2)
Late Inventory, Makeup (LI)	DEP with 2/7 ADS valves with 1/2 CRD pumps or 1/2 firewater pump or 1/4 heater drain pumps (operator action = 2)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 SLOCA - CHR - LI (3, 7, 11)			
2 SLOCA - CHR - CV (4, 8, 12)			
3 SLOCA - PCS - HPI - LPI (13)			

3 SLOCA - PCS - HPI - DEP (14)			
4 SLOCA - EC (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. Licensee PRA assumes that failure of vacuum breakers or failure to initiate containment spray cooling (CSC) following small LOCA will result in core damage. The HEP for initiating containment spray system and manipulate valves is 6.7E-02.

2. Turbine driven feed pumps are not credited here following the assumptions in the LaSalle PRA. This may be conservative.

3. See Transient (Reactor trip) Worksheet for HEPs.

Table 3.10 SDP Worksheet for La Salle Nuclear Power Station — Inadvertent or Stuck-Open Relief Valve (IORV)[1,2]

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:**
Main Feed Water (MFW)	Manual Operation of 1/1 Motor driven feed pump (No credit)[3]
High Pressure Injection (HPI)	HPCS pump (1 train) or RCIC pump with 1/ 2 CRD pumps (1 ASD train)
Depressurization (DEP)	1/6 ADS relief valves (SRVs) (operator action = 2)
Low Pressure Injection (LPI)	1/3 RHR pumps in LPCI mode(1 multi-train system) or 1/1 LPCS pumps (1 train) or {1/4 condensate pumps and 1/4 condensate booster pumps and RPV injection path} (operator action = 2)
Containment Heat Removal (CHR)	{1/2 RHR pumps in suppression pool cooling (SPC) mode or in SDC mode} (1 multi-train system)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2)
Late Inventory, Makeup (LI)	1/2 CRD pumps or 1/2 firewater pump or 1/4 heater drain pumps (operator action = 2)

Circle Affected Functions	**Recovery of Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 IORV - CHR - LI (3, 7, 11)			
2 IORV - CHR - CV (4, 8, 12)			
3 IORV - HPI - MFW - LPI (13)			
4 IORV - HPI - MFW - DEP (14)			

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. IORV may be detected by any of the numerous indications in the control room (SRV open alarms, suppression pool level or temperature indication, etc.). Once detected, operator is directed to try to close the valve. Failing to close the valve, operator will scram the reactor. One open SRV is similar to a small LOCA, two open SRV is similar to medium LOCA, three open SRV is similar to large LOCA. We assume one open SRV.

2. Following an IORV, MSIV closure is assumed. All decay heat would be dumped to the suppression pool. If the drywell pressure is high, automatic depressurization of the vessel will occur. If ADS fails, the operator could manually depressurize the vessel to allow low pressure injection system.

3. Loss of feedwater is assumed to lead to the stuck-open relief valve. Accordingly, no credit is given for recovering the feedwater.

4. See Transient (Reactor trip) Worksheet for HEPs.

Table 3.11 SDP Worksheet for La Salle Nuclear Power Station — 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:**
Early Containment Failure (EC)	4/4 vacuum breakers (1 train) or 1/2 RHR pumps in CSC (operator action = 1) [1]
Early Inventory (EIHP)	HPCS (1 train)
Depressurization (DEP)	2/7 ADS relief valves (SRVs) (operator action = 2) [2]
Low Pressure Injection (LPI)	[1/3 RHR pumps in LPCI mode] (1 multi-train system) or [1/1 LPCS pumps] (1 train)
Containment Heat Removal (CHR)	1/2 RHR pumps in suppression pool cooling (SPC) mode (1multi-train system)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2)
Late Inventory Makeup (LI)	[1/4 Condensate Injection or 1/2 diesel fire pumps or 1/4 heater drain pumps] (operator action = 2)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 MLOCA - CHR - LI (3,7)			
2 MLOCA - CHR - CV (4, 8)			
3 MLOCA - EIHP - LPI (9)			
4 MLOCA - EIHP - DEP (10)			
4 MLOCA - EC (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. The HEP for initiating containment spray system and manipulate valves is 6.7E-02.

2. The HEP to initiate emergency RPV depressurization following medium LOCA is 7E-04. An operator action credit of 2 is assigned based on survey of similar action in other BWR plants.

3. Please see the Transient (Reactor trip) worksheet for other HEPs.

Table 3.12 SDP Worksheet for La Salle Nuclear Power Station — 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:**
Early Containment Control (EC)	4/4 vacuum breakers (1 train) or 1/2 RHR pumps in CSC (operator action = 1) (1)
Early Inventory (EI)	HPCS (1 train) or 1/3 RHR pumps (A, B, or C) in LPCI mode (1 multi-train system) or 1/1 LPCS pumps}(1 train)
Containment Heat Removal (CHR)	1/2 RHR (A or B) pumps in SPC modes (1 multi-train system)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2)
Late Inventory Makeup (LI)	1/4 Condensate Injection or 1/2 diesel fire pumps or 1/4 heater drain pumps (operator action =2)

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 - EI (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. The HEP for initiating containment spray system and manipulate valves is 6.7E-02.

2. Please see the Transient (Reactor trip) for the HEPs.

Table 3.13 SDP Worksheet for La Salle Nuclear Power Station — 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 Div 1 or Div 2 DGs (EAC)	1/1 EDGs (1 train) or cross-tie shared EDG (operator action = 1) (1)
High Pressure Injection (HPI)	HPCS pump (1 train) or RCIC pump (1 ASD train)
High Pressure Coolant Injection (HPCS)	HPCS pump with associated EDG (1 train)
Reactor Core Isolation cooling (RCIC)(2)	RCIC pump (1 ASD train)
Recovery of Offsite Power within 6 hours (REC6)	Operator action = 1 (3)
Recovery of Offsite Power within 20 hours (REC20)	Operator action = 2 (3)
Containment Heat Removal (CHR)	1/2 RHR (A or B) pumps in SDC or SPC mode (1 multi-train system)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2)
Late Inventory Makeup (LI)	DEP with 2/7 ADS Valves with 1/2 CRD pumps or 1/2 Diesel Driven Fire Water pumps or 1/4 heater drain pumps (operator action = 2)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 LOOP - HPI - LPI (1)			
2 LOOP - HPI - DEP (1)			
3 LOOP - CHR - LI (1, 4, 9)			

4 LOOP - CHR - CV (1, 5, 10)			
4 LOOP - EAC - REC 20 (6)			
5 LOOP - EAC - HPCS - REC6 (11)			
6 LOOP - EAC - HPCS - RCIC (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. There is one dedicated EDG per unit. One additional diesel is shared between the units. Also, there is a capability to cross-tie other unit's bus. The HEP to crosstie Bus 241Y to 141Y is estimated at 8.5E-3. The cross-tie may be credited as a recovery action. Also, a credit of 1 is assigned for connecting to the shared EDG.

2. In the case of complete loss of AC power, i.e., station blackout, loss of offsite power and failure of the diesel generators) coolant makeup can still be provided by the steam-driven RCIC system. However, RCIC requires DC power for system control and room cooling for the pump. A dedicated battery provides the necessary loads for about six (6) hours. Without offsite power or other recovery actions, RCIC will fail upon battery depletion. The RCIC pump room cooling system requires AC power for operation. However, the high temperature trip is inoperative if both Trains A and B of onsite power have failed. In this case, the RCIC system can operate without room cooling. (See NUREG/CR-4832,

Vol. 4, page 2-53).

3. The HEP for recovery of offsite power in 6 hrs. is 9E-2 and that for recovery in 20 hrs. is 2E-2. HEP for recovery in 30 mins. Is estimated at 0.685 which is not credited in this worksheet.

4. For other HEPs, please see the Transient (Reactor trip) worksheet.

Table 3.14 SDP Worksheet for La Salle Nuclear Power Station — 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)	16/18 SRVs (1 multi-train system)
Feedwater (FW)	{[1/1 Motor FW Pump or 1/2 Turbine FW Pumps] and 1/3 condensate pumps and 1/3 condensate booster pump and 1/4 Main Steam lines and Turbine Bypass and operable condenser} (operator action = 1) (1)
Recirculation Pump Trip (RPT)	Manual or automatic trip of recirculation pumps (1 train)
Power Conversion System (PCS)	1/4 Main Steam lines with turbine bypass with operable condenser (operator action = 2)
Inhibit ADS and HPCS (INH)	Operator inhibits HPCS and resets ADS timer (operator action = 2) (2)
Reactivity Control (SLC)	2/2 SLC pumps and valves and controls level (operator action = 1) (3)
High Pressure Core Spray (HPCS)	1/1 HPCS pump (operator action = 1) (4)
Containment Heat Removal (CHR)	1/2 RHR (A or B) pumps in SPC mode (1 multi-train system)
Containment Venting (CV)	1/2 Containment Venting paths (operator action = 2)
Late Inventory Makeup (LI)	DEP with 2/7 SRVs and [1/2 CRD pumps] or [1/2 Diesel Driven Fire Water pumps]}or 1/4 heater drain pumps (operator action = 2)

Circle Affected Functions	**Recovery or Failed Train**	**Remaining Mitigation Capability Rating for Each Affected Sequence**	**Sequence Color**
1 ATWS - PCS- CHR - LI (4)			
2 ATWS - PCS - CHR - CV (5)			

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3 ATWS - PCS - SLC (6)			
4 ATWS - FW - CHR - LI (9)			
5 ATWS - FW - CHR - CV (10)			
6 ATWS - FW- HPCS (11)			
7 ATWS - FW - SLC (12)			
8 ATWS - FW - INH (13)			
9 ATWS - RPT (14)			
10 ATWS - OVERP (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. HEP for manually starting MDFWP is estimated at 7.9E-2.

2. HEP for inhibiting ADS is 3.4E-2.

3. HEP for initiating SBLC is 4.7E-2.

4. HEP for failure to prevent overfill is 8E-02. An operator action credit of 1 is assigned.

Table 3.15 SDP Worksheet for La Salle Nuclear Power Station — 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	
Initiation Pathways: ISLOCA PATHWAYS: LPCI Injection Lines Core Spray Injection Lines RHR Drop Line LOC PATHWAYS: HPCI steam Line RCIC steam Line RWCU System Lines Feedwater Lines Main Steam Lines	Mitigation Capability: Ensure Component Operability for Each Pathway		
Circle Affected Component in Pathways	Recovery of Failed Train	Remaining Mitigation Capability Rating for Each Affected Pathway	Sequence Color

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 and applicable components are defined using generic insights based on NRC studies on ISLOCA. Plant-specific adjustments may apply.

2. This worksheet contains pathways for both ISLOCA and LOC. Licensees typically analyze these events separately. ISLOCA and LOC contribute approximately 0.2% and 0.5% of the CDF.

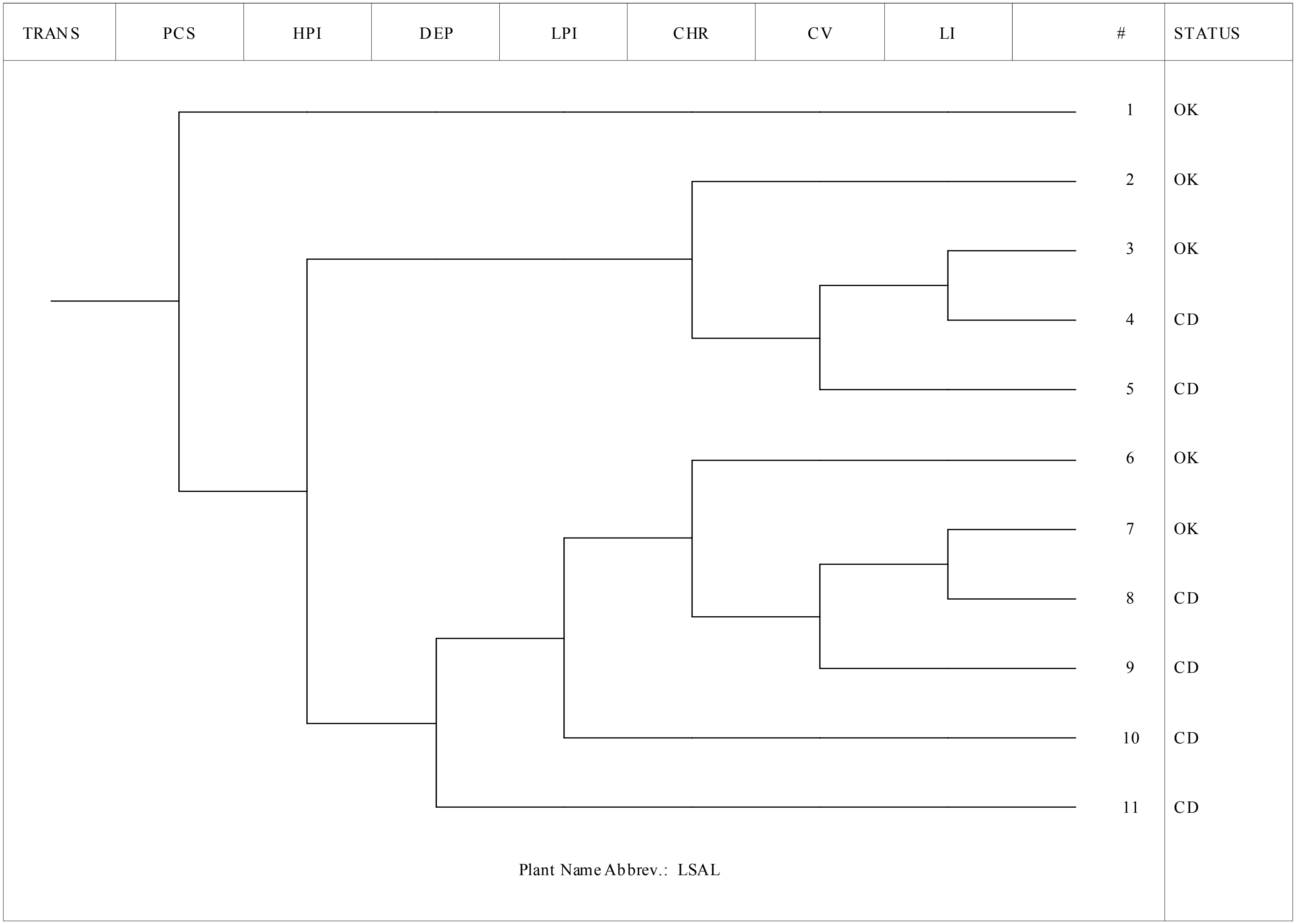
3. This worksheet is different from the other worksheets, in that ISLOCA is typically an unmitigated initiating event in most PRAs. Therefore the right side of the worksheet contains valves, whose failure may lead to an ISLOCA or LOC rather than mitigating systems to address an event in progress.

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 w/o PCS (TPCS)
3. Loss of 4160V AC Bus 241Y (LAC1)
4. Loss of Service Water (LSW)
5. Small LOCA (SLOCA)
6. Inadvertent Opening of Relief Valve (IORV)
7. Medium LOCA (MLOCA)
8. Large LOCA (LLOCA)
9. Loss of Offsite Power (LOOP)
10. Anticipated Transients Without Scram (ATWS)


TRANS
PCS
HPI
DEP
LPI
CHR
CV
LI
#
STATUS
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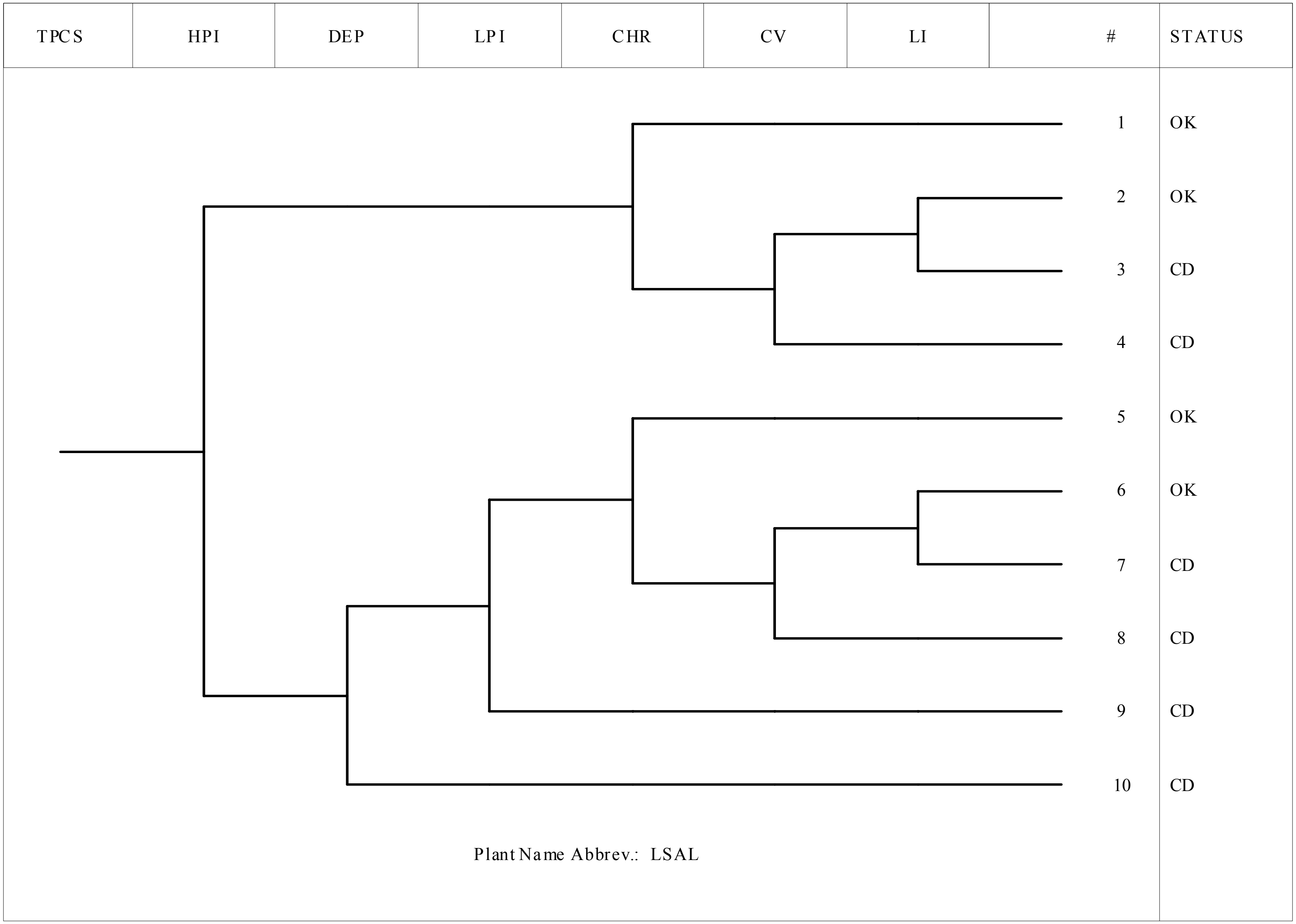
2 OK
3 OK
4 CD
5 CD
6 OK
7 OK
8 CD
9 CD
10 CD
11 CD
Plant Name Abbrev.: LSAL


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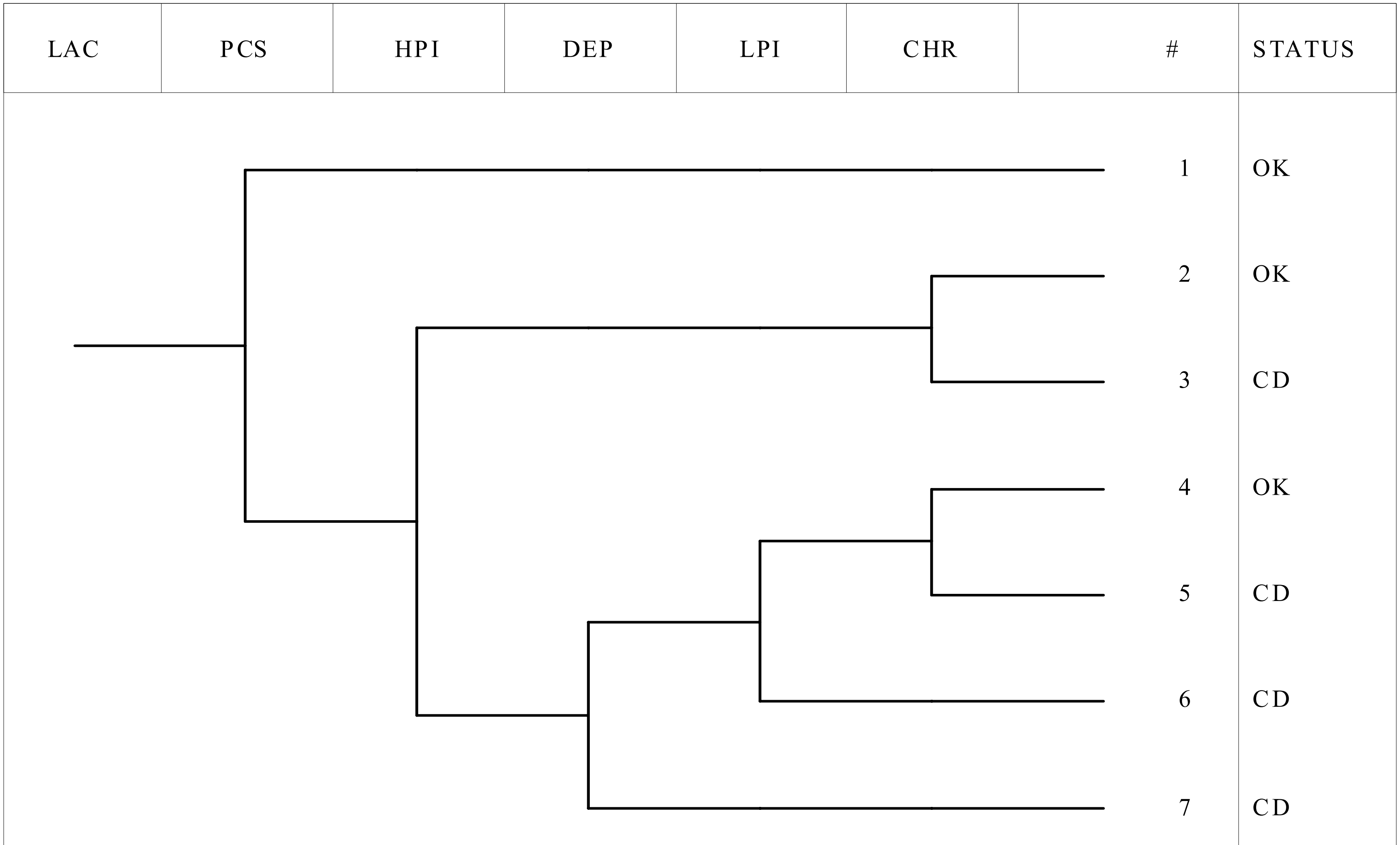
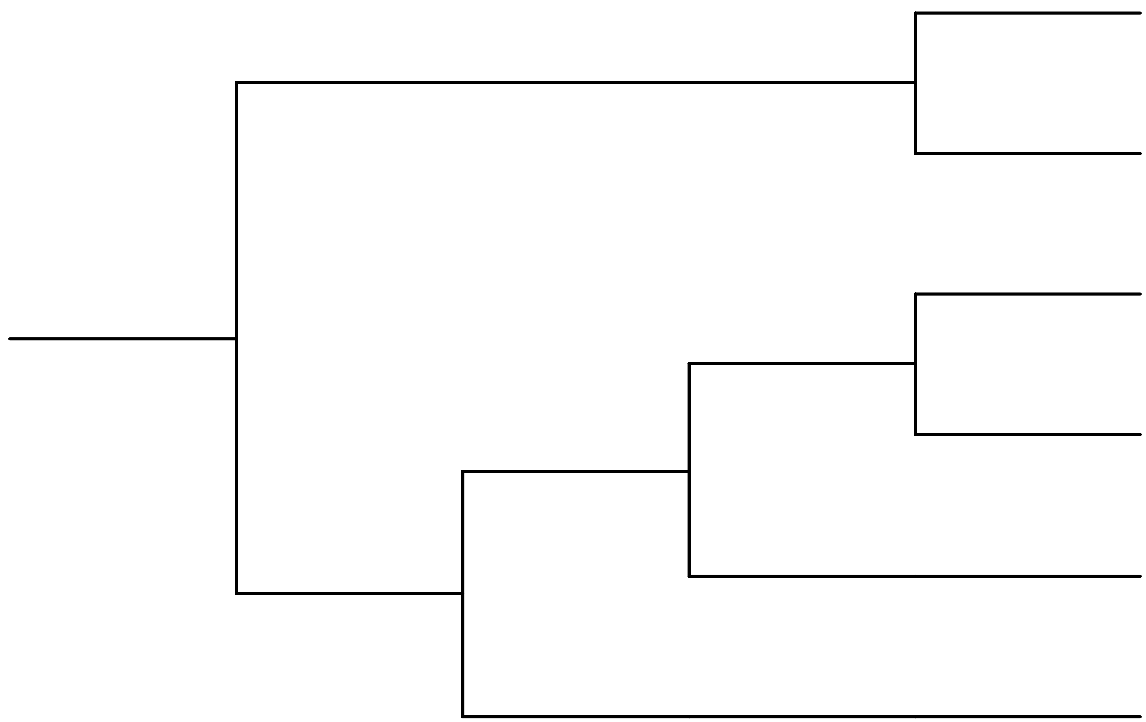
2 OK
3 CD
4 CD
5 OK
6 OK
7 CD
8 CD
9 CD
10 CD
Plant Name Abbrev.: LSAL



Plant Name Abbrev.: LSAL

LOSW	HPI	DEP	LPI	CHR	#	STATUS



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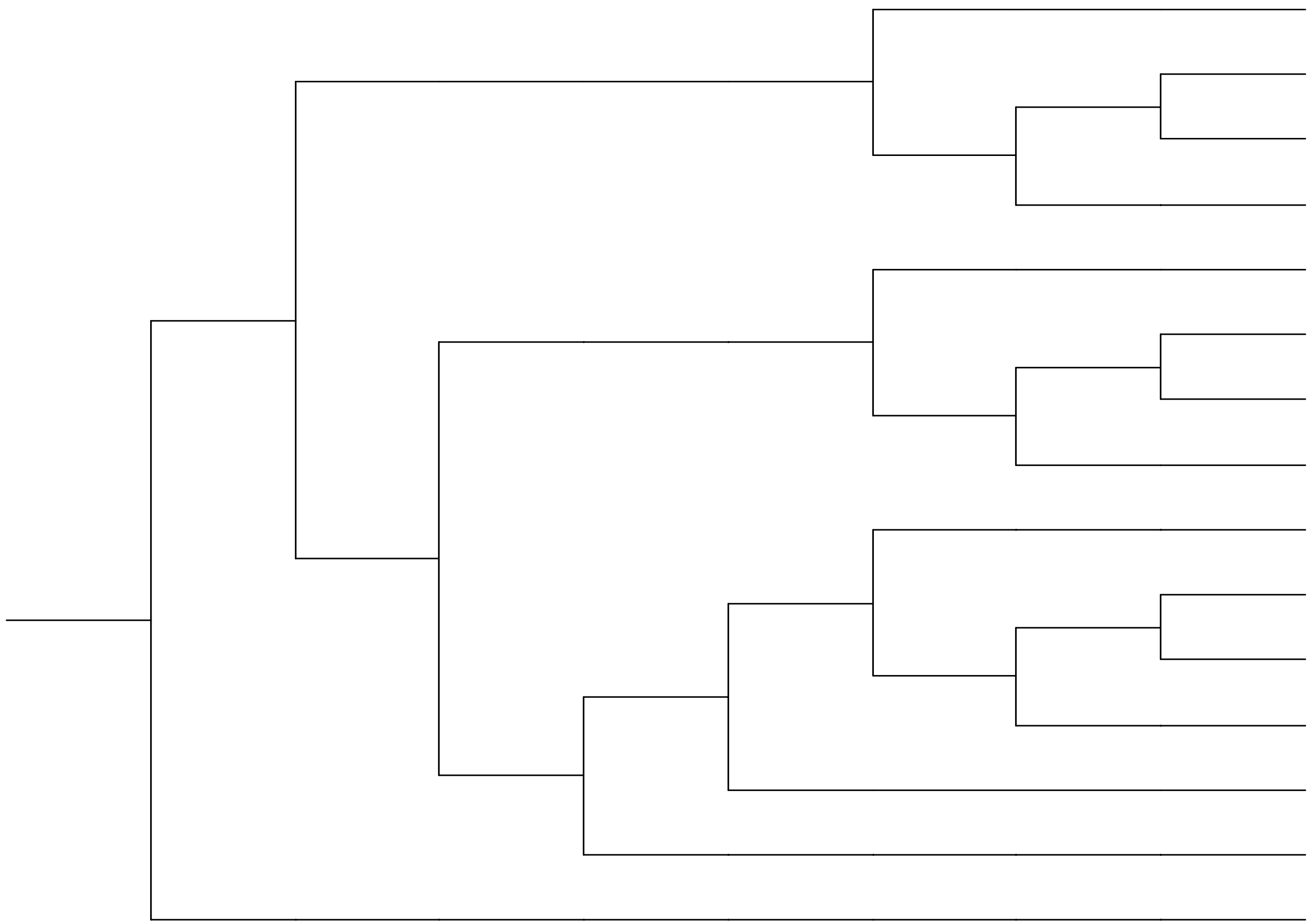
3	OK
4	CD
5	CD
6	CD

Plant Name Abbrev.: LSAL

SLOCA	EC	PCS	HPI	DEP	LPI	CHR	CV	LI	#	STATUS



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4	CD
5	OK
6	OK
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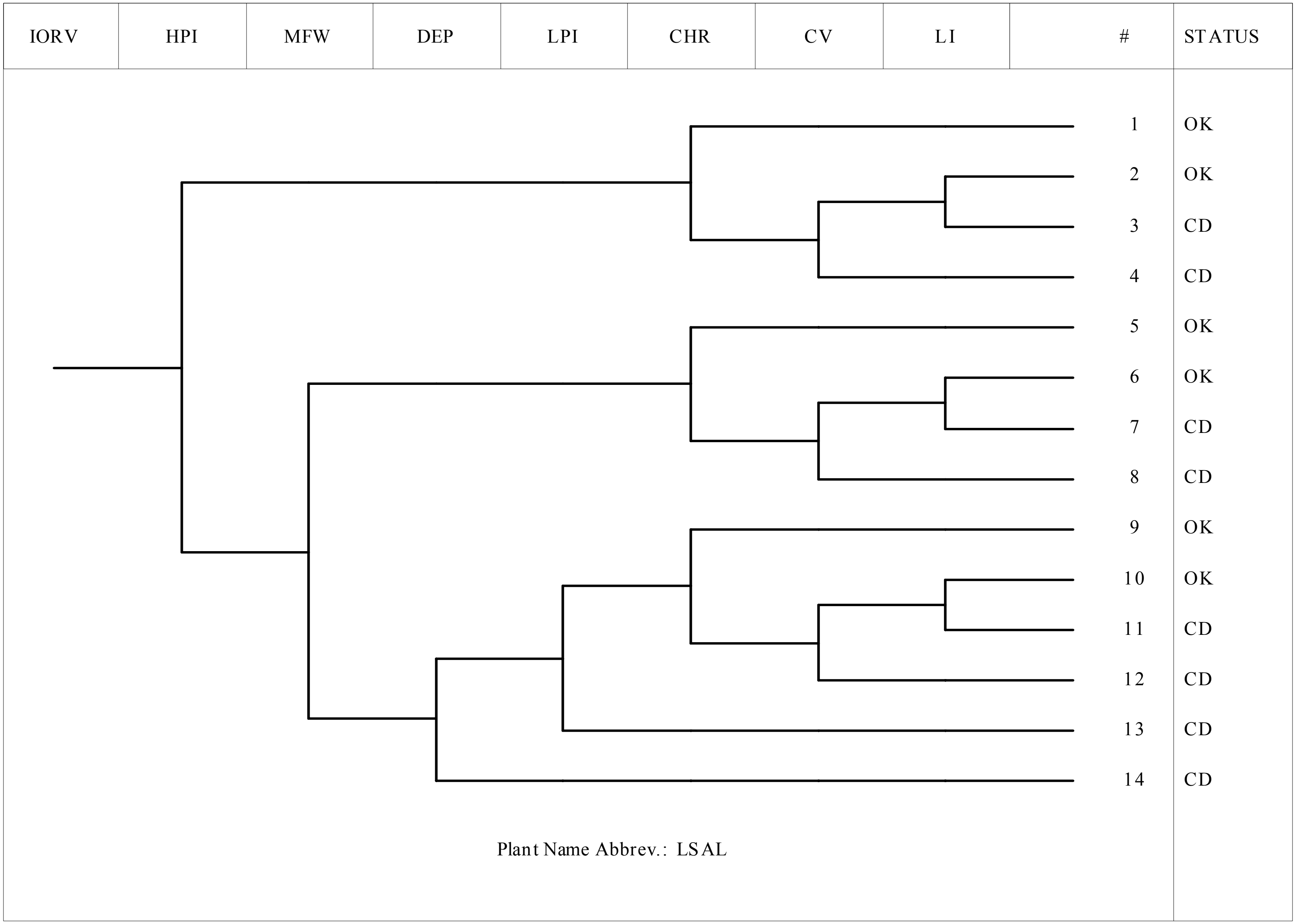
8	CD
9	OK
10	OK
11	CD
12	CD
13	CD
14	CD
15	CD

Plant Name Abbrev.: LSAL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HPI
MFW
DEP
LPI
CHR
CV
LI
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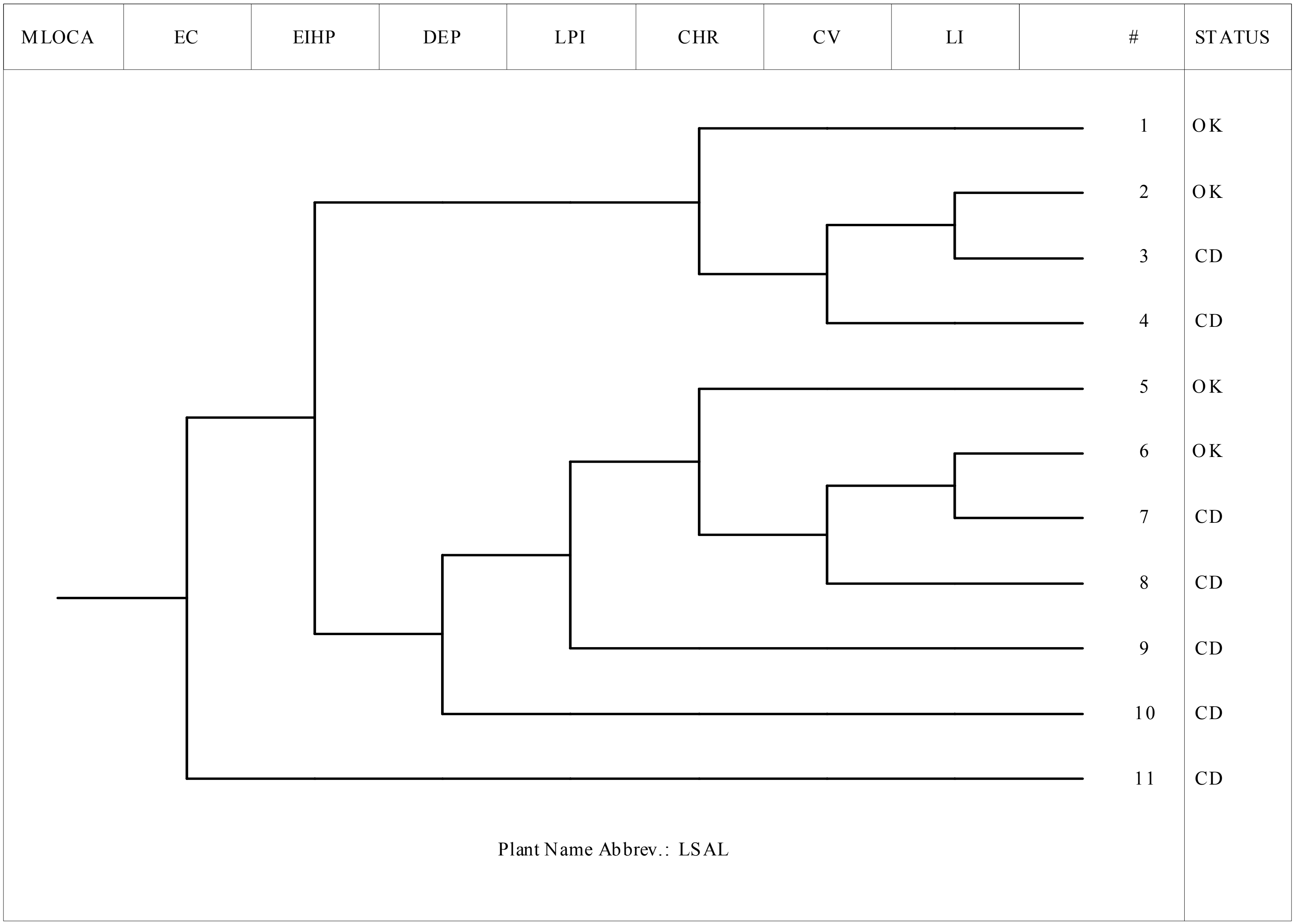
12 CD
13 CD
14 CD
Plant Name Abbrev.: LSAL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EIHP
DEP
LPI
CHR
CV
LI
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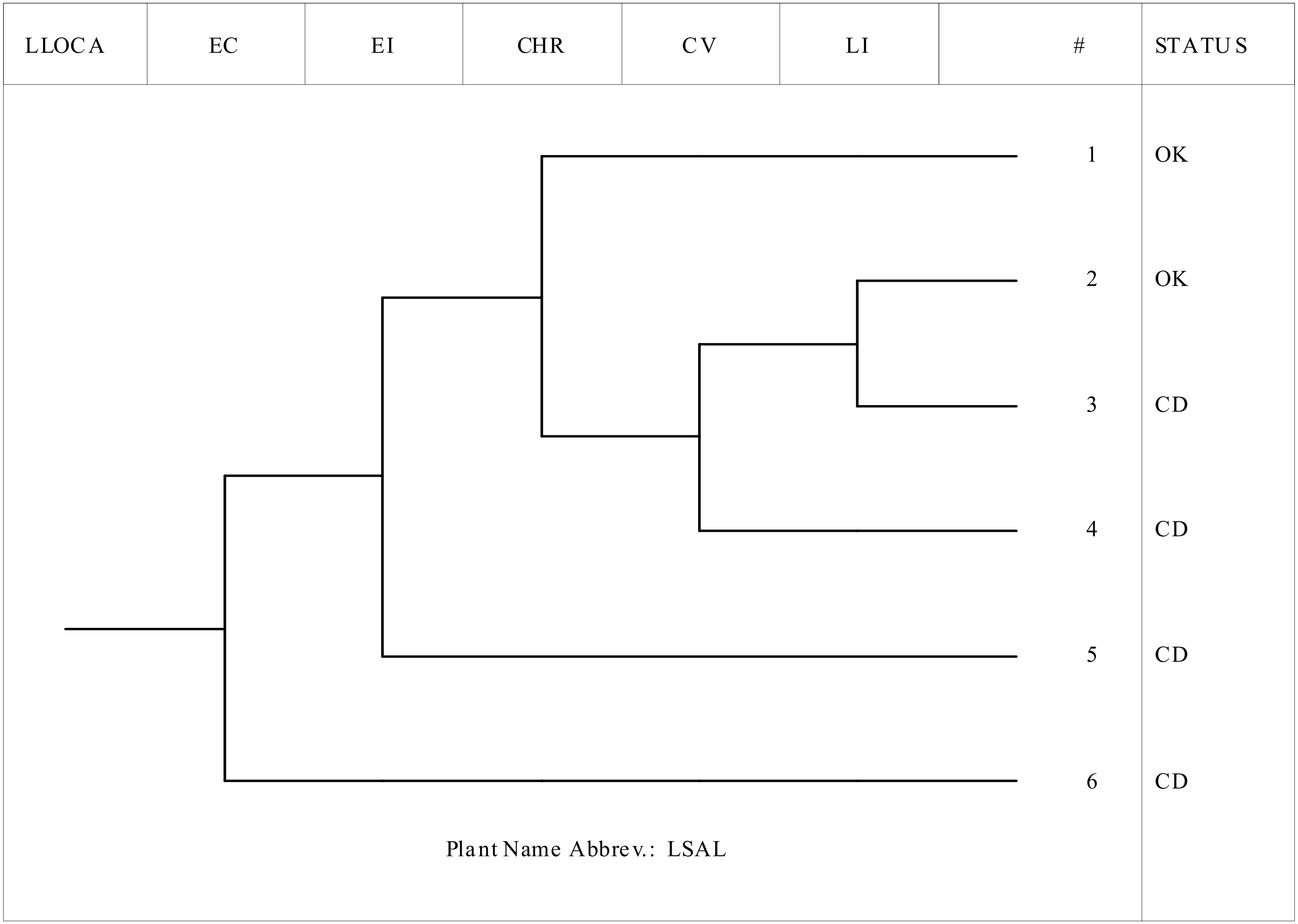
9 CD
10 CD
11 CD
Plant Name Abbrev.: LSAL



LLOCA
EC
EI
CHR
CV
LI
#
STATUS
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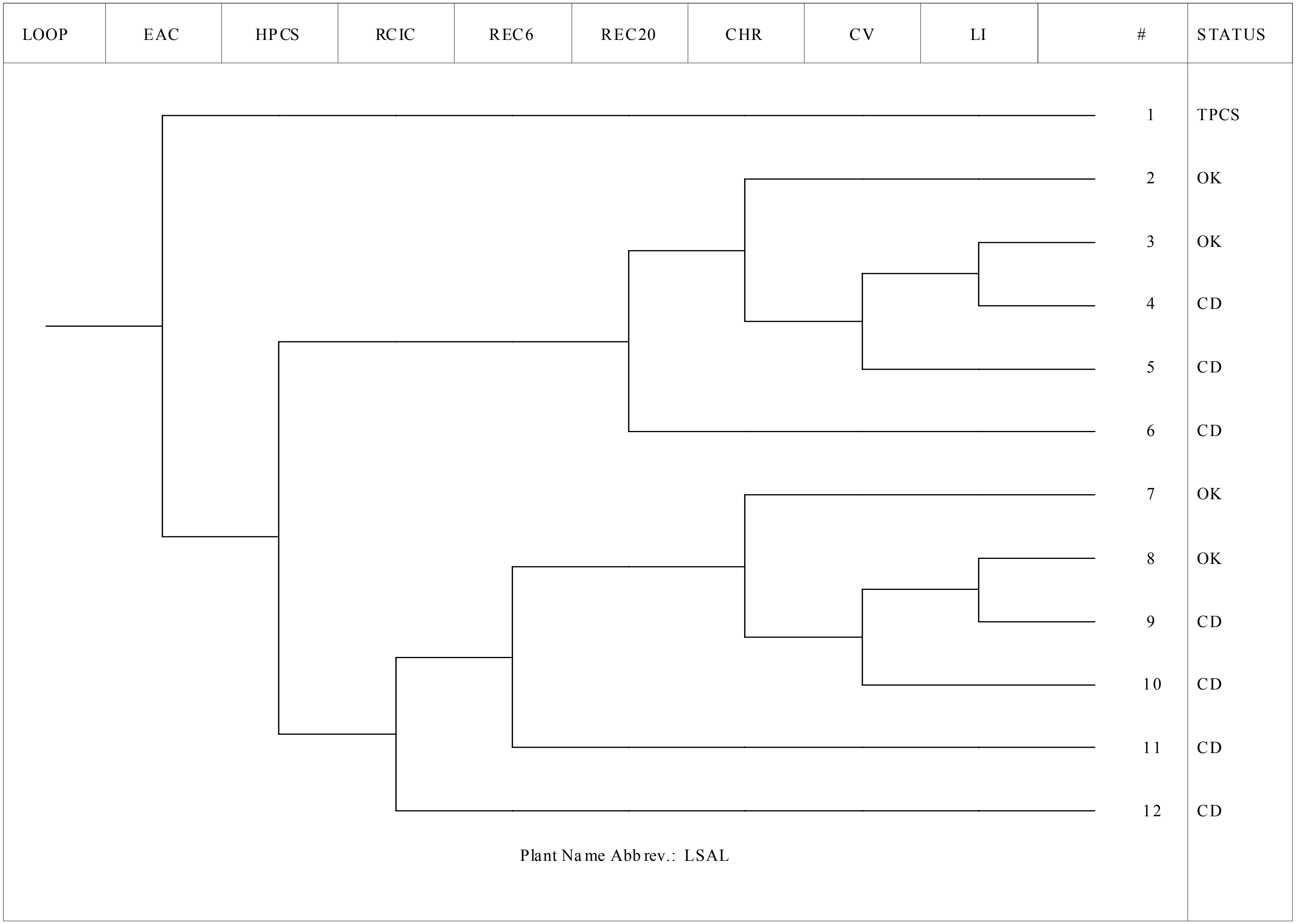
3 CD
4 CD
5 CD
6 CD
Plant Name Abbrev.: LSAL


LOOP
EAC
HPCS
RCIC
REC6
REC20
CHR
CV
LI
#
STATUS
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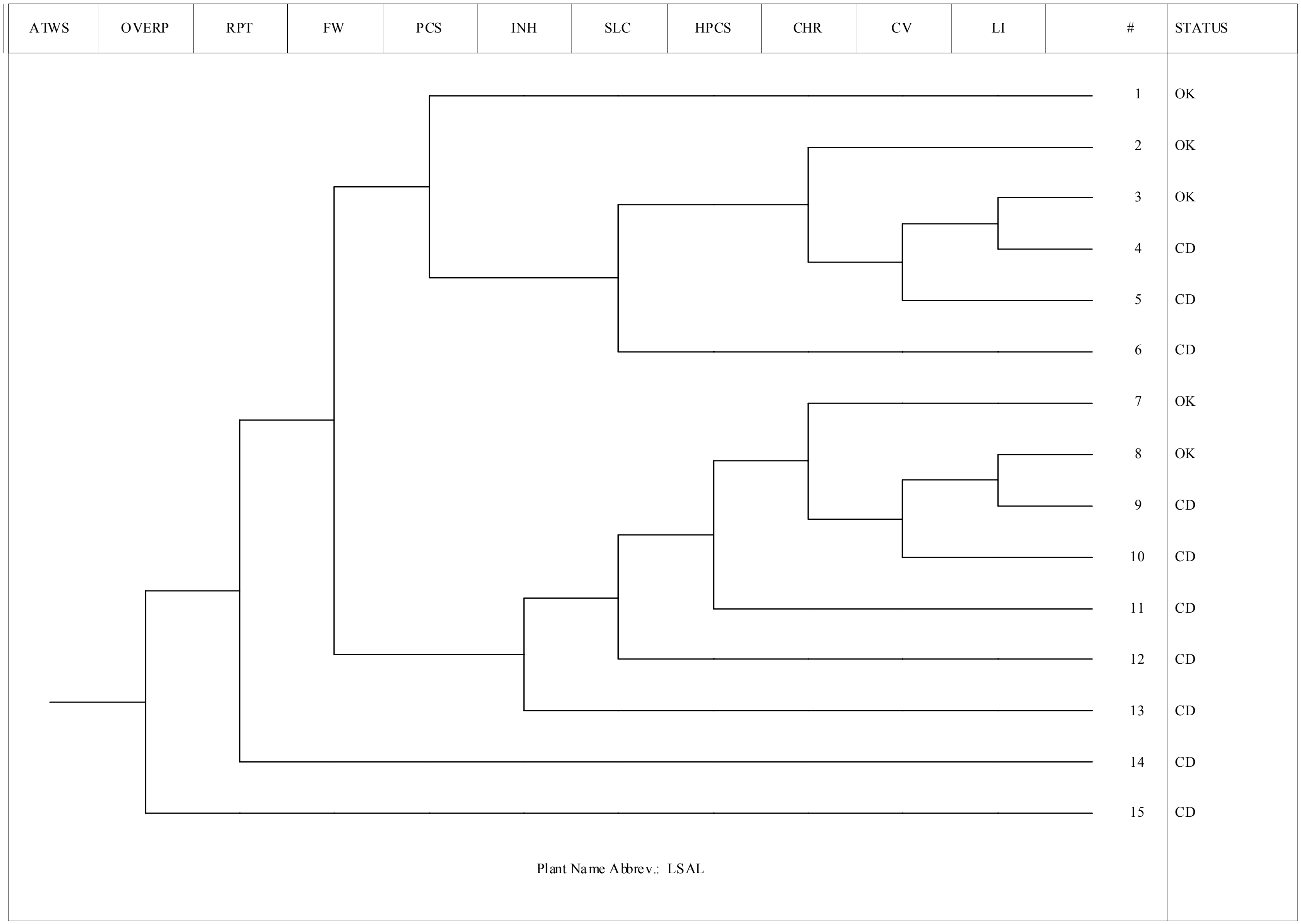
4 CD
5 CD
6 CD
7 OK
8 OK
9 CD
10 CD
11 CD
12 CD
Plant Name Abbrev.: LSAL


ATWS
OVERP
RPT
FW
PCS
INH
SLC
HPCS
CHR
CV
LI
#
STATUS
1 OK
2 OK
3 OK
4 CD
5 CD
6 CD
7 OK
8 OK
9 CD
10 CD
11 CD
12 CD
13 CD
14 CD
15 CD
Plant Name Abbrev.: LSAL

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

The following presents a summary of the comments based on a meeting with the LaSalle plant staff:

1. Comments on the Initiators and System Dependency Table

1.1 Emergency Diesel generators (EDGs)

EDG configuration is as follows: 1 EDG per unit plus 1 shared EDG between the units. Additionally, there is a capability to cross-tie other unit's bus.

1.2 Core Standby Cooling System (CSCS)

CSCS at LaSalle consists of two subsystems: 5 DGCW pumps per site (cooling water pumps) and 4 RHR SW pumps per unit (SW pumps).

A complete failure of CSCS will result in failure of all mitigation capability resulting in a core damage. Failure of all strainers in the CSCS will result in failure of the CSCS.

1.3 Dependency of systems on Instrument Air (IA)

Remove dependency of CRD, RBCCW, TBCCW, and NON-safety SW systems on IA.

1.4 Remove and modify footnotes; remove references to RMIEP assumptions.

2. Success Criteria for DEP in Worksheets

Success criteria for DEP is 2/7 ADS Relief Valves (SRVs) except IORV. For IORV, it is 1/6. DEP is not relevant for LLOCA.

3. Containment Venting (CV)

Containment Venting is not conducted thru SGTS. CV is defined as 1/ 2 containment venting paths (operator action) for all applicable cases.

4. Containment Heat Removal (CHR)

Replace 1/ 2 RHR pumps in CS mode by 1/ 2 RHR pumps in SDC mode.

5. Late Inventory, Makeup (LI)

The success criteria for LI fro different worksheets can be defined as follows:

TRAN, SLOCA, & IORV :
1/ 2 CRD pumps or 1/ 2 diesel firewater pumps or 1/ 4 heater drain pumps (operator action=2)

Loss of a AC or a DC bus:

1/1 CRD pump or 1/ 2 diesel fire water pump or 1/ 2 heater drain pumps (operator action=2).

MLOCA, LLOCA, ATWS: 1/4 condensate or 1/ 2 firewater pumps or 1/4 heater drain pumps (operator action=2).

LOOP: 1//4 condensate or 1/ 2 CRD pumps or 1/ 2 diesel firewater pumps or 1/4 heater drain pump or 1/ 3 RHR pump or 1/1 LPCS pump.

6. Vapor Suppression: Early Containment Failure (EC)

Include EC for SLOCA, MLOCA, & LLOCA.

Success criteria can be defined as follows:

4/4 Vacuum breakers (1 train) or 1/ 2 RHR pumps in drywell spray (operator action=1) or emergency depressurization (high stress operator action).

Note: emergency depressurization was not credited.

7. HPI Function

Define HPI function as follows:

TPCS: HPCS (1 train) or RCIC (1 ASD train) or 1/1 MFW pump (operator action).

Loss of a DC or an AC Bus: HPCS (1 train).

RCIC is lost due to loss of Bus 2A. Footnote to state that Worksheet models loss of Bus 2A; conservative case between Bus 2A and 2B.

SLOCA & IORV: HPCS (1 train) or RCIC (1 ASD train).

Note: 1/ 2 CRD pumps is credited as part of the LI function.

8. Loss of a 4160V AC Bus

Containment Venting is lost due to loss of 4160V AC Bus.

9. LOOP worksheet

Remove recovery of offsite power within 30 mins since HEP is ~0.7. Recovery within 6 to 20 hours is credited as an operator action=1 (HEP= 9E-2 for 6 hrs. and 2E-2 for 20 hrs.)

Remove credit for diesel fire pumps (should now be credited in the LI).

Redefine the sequences based on the revised ET incorporating the above comments.

10. ATWS Worksheet

Incorporate following changes:

SLC success criteria: 2/2 SLC pumps and valves (operator action=1)
(Add a footnote: on FW success, 1/ 2 SLC pumps is sufficient).

RPT to include ARI.

11. Modify the ETs, as appropriate, to reflect the above comments.

12. Modify footnotes in all worksheets. Keep only those footnotes noted above and those that are relevant for inspector use of worksheets.

REFERENCES

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

2. Commonwealth Edison Company, "La Salle County 2 – Individual Plant Examination Report," dated April, 1994.