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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 23, 2000

Mr. Thomas F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: TURKEY POINT PLANT, UNITS 3 AND 4 - SITE-SPECIFIC WORKSHEETS FOR USE IN THE NUCLEAR REGULATORY COMMISSION'S SIGNIFICANCE DETERMINATION PROCESS (TAC NO. MA6544)

Dear Mr. Plunkett:

The purpose of this letter is to provide you with one of the key implementation tools to be used by the U.S. Nuclear Regulatory Commission (NRC) in the revised reactor oversight process, which is currently expected to be implemented at Turkey Point Units 3 and 4 in April 2000. Included in the enclosed Risk-Informed Inspection Notebook are the Significance Determination Process (SDP) worksheets that inspectors will be using to risk-characterize inspection findings. The SDP worksheets were e-mailed to your staff on March 21, 2000, and the SDP is discussed in more detail below.

On January 8, 1999, the NRC staff described to the Commission plans and recommendations to improve the reactor oversight process in SECY-99-007, "Recommendations for Reactor Oversight Process Improvements." SECY-99-007 is available on the NRC's web site at www.nrc.gov/NRC/COMMISSION/SECYS/index.html. The new process, developed with stakeholder involvement, is designed around a risk-informed framework, which is intended to focus both the NRC's and licensee's attention and resources on those issues of more risk significance.

The performance assessment portion of the new process involves the use of both licensee-submitted performance indicator data and inspection findings that have been appropriately categorized based on their risk significance. In order to properly categorize an inspection finding, the NRC has developed the SDP. This process was described to the Commission in SECY-99-007A, "Recommendations for Reactor Oversight Process Improvements (Follow-up to SECY-99-007)," dated March 22, 1999, also available at the same NRC web site noted above.

The SDP for power operations involves evaluating an inspection finding's impact on the plant's capability to limit the frequency of initiating events; ensure the availability, reliability, and capability of mitigating systems; and ensure the integrity of the fuel cladding, reactor coolant system, and containment barriers. As described in SECY-99-007A, the SDP involves the use of three tables: Table 1 is the estimated likelihood for initiating event occurrence during the degraded period, Table 2 describes how the significance is determined based on remaining mitigation system capabilities, and Table 3 provides the bases for the failure probabilities associated with the remaining mitigation equipment and strategies.

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As a result of the recently concluded Pilot Plant review effort, the NRC has determined that site-specific risk data is needed in order to provide a repeatable determination of the significance of an issue. Therefore, the NRC has contracted with Brookhaven National Lab (BNL) to develop site-specific worksheets to be used in the SDP review. These enclosed worksheets were developed based on your Individual Plant Examination (IPE) submittals that were requested by Generic Letter 88-20. The NRC plans to use this site-specific information in evaluating the significance of issues identified at your facility when the revised reactor oversight process is implemented industry wide. It is recognized that the IPE utilized during this effort may not contain current information. Therefore, the NRC or its contractor will conduct a site visit to discuss with your staff any changes that may be appropriate. Specific dates for the site visit have not been determined, but will be communicated to you in the near future. All site visits should be accomplished by June 2000. The NRC is not requesting a written response or comments on the enclosed worksheets developed by BNL.

We will coordinate our efforts through your licensing or risk organizations as appropriate. If you have any questions, please contact me at 301-415-1496.

Sincerely,

/RA/

Kahtan N. Jabbour, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

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RISK-INFORMED INSPECTION NOTEBOOK FOR

TURKEY POINT NUCLEAR PLANT

UNITS 3 AND 4

PWR, WESTINGHOUSE, THREE-LOOP PLANT WITH LARGE DRY CONTAINMENT

Prepared by

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Enclosure

NOTICE

This notebook was developed for the NRC's inspection teams to support risk-informed inspections. The activities involved in these inspections are discussed in "Reactor Oversight Process Improvement," SECY-99-007A, March 1999. 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. This notebook will be periodically updated with new or replacement pages incorporating additional information on this plant. Technical errors in, and recommended updates to, this document should be brought to the attention of the following person:

Mr. Jose G. Ibarra
U. S. Nuclear Regulatory Commission
M/S TWFN T4 A9
11545 Rockville Pike
Rockville, MD 20852

ABSTRACT

This notebook contains summary information to support the Significance Determination Process (SDP) in risk-informed inspections for Turkey Point Nuclear Plant Units 3 and 4.

SDP worksheets support the significance determination process in risk-informed inspections and are intended to be used by the NRC's inspectors in identifying the significance of their findings, i.e., in screening risk-significant findings, consistent with Phase-2 screening in SECY-99-007A. To support the SDP, additional information is given in an Initiators and System Dependency table, and as simplified event-trees, called SDP event-trees, developed in preparing the SDP worksheets.

The information contained herein is based on the licensee's IPE submittal. The information is revised based on IPE updates or other licensee or review comments providing updated information and/or additional details.

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TABLES

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 based on the specifics of the inspection findings. To aid in this process, this notebook provides the following information:

1. Initiator and System Dependency Table
2. Significance Determination Process (SDP) Worksheets
3. SDP Event Trees

The initiator and system dependency table shows the major dependencies between front-line- and support-systems, and identifies their involvement in different types of initiators. The information in this table identifies the most risk-significant front-line- and support-systems; it is not an exhaustive nor comprehensive compilation of the dependency matrix as known in Probabilistic Risk Assessments (PRAs). For pressurized water reactors (PWRs), the support systems for Reactor Coolant Pump (RCP) seals are explicitly denoted to assure that the inspection findings on them are properly accounted for. This table is used to identify the SDP worksheets to be evaluated, corresponding to the inspection's findings on systems and components.

To evaluate the impact of the inspection's finding on the core-damage scenarios, the SDP worksheets are developed and provided. They contain two parts. The first part identifies the functions, the systems, or combinations thereof that can perform mitigating functions, the number of trains in each system, and the number of trains required (success criteria) for each class of initiators. The second part of the SDP worksheet contains the core-damage accident sequences associated with each initiator class; these sequences are based on SDP event trees. In the parenthesis next to each of the sequence 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. The classes of initiators that are considered in this notebook are 1) Transients, 2) Small Loss of Coolant Accident (LOCA), 3) Stuck-open Power Operated Relief Valve (PORV), 4) Medium LOCA, 5) Large LOCA, 6) Loss of Offsite Power (LOOP), 7) Steam Generator Tube Rupture (SGTR), and 8) Anticipated Transients Without Scram (ATWS). Main Steam Line Break (MSLB) events are included separately if they are treated as such in the licensee's Individual Plant Examination (IPE) submittal.

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.

The following items were considered in establishing the SDP event trees and the core-damage sequences in the SDP worksheets:

1. Event trees and sequences were developed such that the worksheet contains all the major accident sequences identified by the plant-specific IPEs. In cases where a plant-specific feature introduced a sequence that is not fully captured by our existing set of initiators and event trees, then a separate worksheet is included.

2. The event trees and sequences for each plant took into account the IPE 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 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 IPEs also may define several classes of transients, depending on the initiator's impact on the systems. Such differentiations generally are not considered in the SDP worksheets unless they could not be accounted for by the Initiator and System Dependency table.

5. Major operator actions during accident scenarios are assigned as high stress operator action or an operator action using simple, standard criteria among a class of plants. This approach resulted in the designation of some operator actions as high-stress ones (as opposed to normal), even though the PRA may have assumed a (routine) operator action; hence, they have been assigned an error probability less than 5E-2 in the IPE. In such cases, a note is given at the end of the worksheet.

The three sections that follow include the initiators and dependency table, SDP worksheets, and the SDP event-trees for the Turkey Point Nuclear Plant Units 3 and 4.

1.1 INITIATORS AND SYSTEM DEPENDENCY

Table 1 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 1 Initiators and System Dependency for Turkey Point Units 3 & 4

Affected System		Major Components	Support Systems	Initiating Event Scenarios
Code	Name			
ACC	Accumulators	Three accumulators		LLOCA
AFW	Auxiliary Feedwater System	Three TDPs	EPS (3, 4)[1], DC, ESF (3,4), IA	Transient, SLOCA, LOOP, SGTR, ATWS
CCW	Component Cooling Water System	Two cooling loops	EPS (3, 4), DC, ESF (3,4), ICW (3, 4)	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR, ATWS, RCP Seal LOCA
CIS	Containment Isolation System	Containment isolation valves	EPS (3, 4), DC, ESF (3,4)	
CSS	Containment Spray System	Two pump trains	LHSI/RHR (3, 4), EPS (3, 4), DC, ESF (3,4), CCW (3, 4), HVAC	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR
CVCS	Chemical and Volume Control System	Three charging pumps and two boric acid transfer pumps	EPS (3, 4), DC, CCW (3, 4), IA, HVAC	Transient, LOOP, ATWS, RCP Seal LOCA
CVHRS	Containment Ventilation and Heat Removal System	Three Emergency Containment Coolers	EPS (3, 4), DC, ESF (3,4), CCW (3, 4)	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR
EPS	Electric Power System (Power Generation and AC and DC Power Distribution)	Four 4.16 kV buses with two EDGs	DC, ESF (3,4), IA (only EPS3), HVAC	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR, ATWS, RCP Seal LOCA
		Four 125 VDC buses shared by both units	AC (3, 4)	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR, ATWS, RCP Seal LOCA

Table 1 (Continued)

Affected System		Major Components	Support Systems	Initiating Event Scenarios
Code	**Name**			
ESF/RPS	Engineered Safeguard Feature Actuation System / Reactor Protection System	Protection and safeguards logic cabinets	ESF: DC, HVAC RPS: DC	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR, ATWS, RCP Seal LOCA
HHSI	High Head Safety Injection	Four HHSI pumps (two per unit)	CSS (3, 4), CVHRS (3, 4), LHSI/RHR (3, 4), EPS (3, 4), DC, ESF (3,4), CCW (3, 4), HVAC	Transient, SLOCA, MLOCA, LOOP, SGTR
HVAC	Heating, Ventilation and Air Conditioning System	Several independent subsystems	EPS (3, 4), ESF (3,4)	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR, ATWS, RCP Seal LOCA
IA	Instrument Air System	Two diesel compressors		Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR, ATWS, RCP Seal LOCA
ICW	Intake Cooling Water System	Three ICW pumps	EPS (3, 4), DC, ESF (3,4)	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR, ATWS, RCP Seal LOCA
LHSI / RHR	Low Head Safety Injection / Residual Heat Removal System	Two LHSI/RHR pumps per unit (1 Multi-Train System)	CSS (3, 4), CVHRS (3, 4), EPS (3, 4), DC, ESF (3,4), CCW (3, 4), IA, HVAC	Transient, SLOCA, MLOCA, LLOCA, LOOP, SGTR
PCS	Power Conversion System	Two MFW pumps, three ADVs, four SCDVs, three condensate pumps, two standby FW pumps	EPS (3, 4), DC, ESF (3,4), ICW (3, 4), IA	Transient
PPC	Primary Pressure Control System	Two PORVs, three Code Safety Valves	EPS (3, 4), DC, IA	Transient, SLOCA, LOOP, SGTR, ATWS

Turkey Point

Table 1 (Continued)

Affected System		Major Components	Support Systems	Initiating Event Scenarios
Code	**Name**			
RCP	Reactor Coolant Pumps	Seals	1 / 3 CVCS trains in seal injection (1 multi-train system) or 1 / 2 CCW trains to thermal barrier in RCPs (1 multi-train system)	Transient, LOOP, RCP Seal LOCA
V	Interfacing Systems LOCA / Containment Bypass	Four penetrations: 1, 2, 11, 43		Interfacing Systems LOCA

Notes:

(1) (3, 4) means that a system in Unit 3 will be supported by a support system in Unit 3; the same applies to Unit 4. For example, the CVCS of Unit 3 is supported by the EPS of Unit 3, and the CVCS of Unit 4 is supported by the EPS of Unit 4.

(2) CDF of a single unit: 1.0E-4/reactor year. In the SDP Worksheets, the success criteria are per unit, except where a dual-unit initiator is noted.

Rev 0 Nov 15, 99

1.2 SDP WORKSHEETS

This section presents the SDP worksheets to be used in the Phase 2 evaluation of the inspection findings for the Turkey Point Nuclear Plant Units 3 & 4. The SDP worksheets are presented for the following initiating event categories:

1. Transients
2. Small LOCA
3. Stuck-open PORV
4. Medium LOCA
5. Large LOCA
6. LOOP
7. Steam Generator Tube Rupture (SGTR)
8. Anticipated Transients Without Scram (ATWS)
9. Special Initiators

Table 2.1 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 Transients

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)	Operator restores feedwater to SGs using 1 / 2 Main Feedwater pumps or 1 / 2 Standby SG Feedwater pumps (operator action)		
Secondary Heat Removal (AFW)	1/3 TDP trains of AFW (375 gpm) (1 multi-train system)		
Early Inventory, High Pressure Injection (EIHP)	2 / 4 HHSI pump trains (1 multi-train system)		
Primary Heat Removal, Feed/Bleed (FB)	2 / 2 PORVs (Operator action)		
High Pressure Recirculation (HPR)	1 / 4 HHSI pump trains with 1/ 2 RHR pump trains (Operator action for switchover = operator action)		
Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
1 TRANS - PCS - AFW - HPR (4)			
2 TRANS - PCS - AFW - FB (5)			
3 TRANS - PCS - AFW - EIHP (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.

Table 2.2 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 Small LOCA

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:**
Secondary Heat Removal (AFW)	1/3 TDP trains of AFW (375 gpm) (1 multi-train system)
Early Inventory, HP Injection (EIHP)	2 / 4 HHSI pump trains (1 multi-train system)
RCS Cooldown/ Depressurization (RCSDEP)	Operator depressurizes RCS using 1 / 2 PORVs (operator action)
Primary Heat Removal (F&B)	2 / 2 PORVs (operator action)
Low Pressure Injection (LPI)	1 / 2 RHR pump trains (1 multi-train system)
High Pressure Recirculation (HPR)	1 / 4 HHSI pump trains with 1/ 2 RHR pump trains (Early Operator action to shut down the RHR pumps and switchover from injection to recirculation = operator action)
Low Pressure Recirculation (LPR)	1/ 2 RHR pump trains (Operator action to switchover = operator action)

Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
1 SLOCA - HPR - LPR (3)			
2 SLOCA - AFW - HPR (5)			

3 SLOCA - AFW - F&B (6)			
4 SLOCA - EIHP - LPR (8)			
5 SLOCA - EIHP - LPI (9)			
6 SLOCA - EIHP - RCSDEP (10)			
7 SLOCA - EIHP - AFW (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.

Table 2.3 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 — Stuck Open PORV (SORV)

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:**
Secondary Heat Removal (AFW)	1/3 TDP trains of AFW (375 gpm) (1 multi-train system)
Isolation of Small LOCA (BLK)	The closure of the block valve associated with stuck open PORV (recovery action)
Early Inventory, HP Injection (EIHP)	2 / 4 HHSI pump trains (1 multi-train system)
RCS Cooldown / Depressurization (RCSDEP)	Operator depressurizes RCS using 1 / 2 PORVs (Operator action)
Primary Heat Removal (F&B)	2 / 2 PORVs (Operatior action)
Low Pressure Injection (LPI)	1 / 2 RHR pump trains (1 multi-train system)
High Pressure Recirculation (HPR)	1 / 4 HHSI pump trains with 1/ 2 RHR pump trains (Early Operator action to shut down the RHR pumps and switchover from injection to recirculation = operator action)
Low Pressure Recirculation (LPR)	1 / 2 RHR pump trains (Operator action for switchover = operator action)

Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
1 SORV - BLK - HPR - LPR (3)			
2 SORV - BLK - AFW - HPR (5)			
3 SORV - BLK - AFW - F&B (6)			
4 SORV - BLK - EIHP - LPR (8)			
5 SORV - BLK - EIHP - LPI (9)			

6 SORV - BLK - EIHP - RCSDEP (10)			
7 SORV - BLK - EIHP - AFW (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.

Table 2.4 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 — Medium LOCA

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 Inventory, HP Injection (EIHP)	2 / 4 HHSI pump trains (1 multi-train system)
Low Pressure Recirculation (LPR)	1 / 2 RHR pump trains (Operator switchover from injection to recirculation = operator action)

Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
1 MLOCA - LPR (2)			
2 MLOCA - EIHP (3)			

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.

Table 2.5 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 — Large LOCA

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

Safety Functions Needed:	***Full* Creditable Mitigation Capability for Each Safety Function:**
Early Inventory, Accumulators (EIAC)	2 / 2 accumulators (1 train)[1]
Early Inventory, LP Injection (EILP)	1 / 2 pumps LHSI/RHR pump trains (1 multi-train system)
Low Pressure Recirculation (LPR)	1/2 pumps LHSI/RHR pump trains with operator switchover from injection to recirculation (operator action under high stress)[2]
Containment Pressure / Temperature Control (CNT)	1 / 2 pump trains of CSS with 2 / 3 Emergency Containment Coolers (1 multi-train system)

Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
1 LLOCA - CNT (2)			
2 LLOCA - LPR (3)			
3 LLOCA - EILP (4)			
4 LLOCA - EIAC (5)			

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) Accumulators are passive, highly reliable components and their probability of failure may be smaller than 1E-2.

(2) The human error probability assessed by the IPE (page 3.0-217) is 1.2E-1 (event U30PALPR).

Table 2.6 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 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 AC Power (EAC)	1 / 2 Emergency Diesel Generators (1 multi-train system)
Turbine-driven AFW pump (TDAFW)	1 / 3 TDP trains of AFW (375 gpm) (1 multi-train system)
Recovery of AC Power in < 2 hrs (REC2)	SBO procedures implemented (Operator action under high stress)[1]
Recovery of AC Power in < 5 hrs (REC5)	SBO procedures implemented (Operator action)[2, 3]
Early Inventory, HP Injection (EIHP)	2 / 4 HHSI pump trains (1 multi-train system)
Primary Heat Removal (FB)	2 / 2 PORVs (operator action)
High Pressure Recirculation (HPR)	1 / 4 HHSI pump trains with 1/ 2 RHR pump trains and with operator action for switchover (operator action)

Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
1 LOOP - TDAFW - HPR (3, 11)			
2 LOOP - TDAFW - FB (4, 12)			
3 LOOP - TDAFW - EIHP (5, 13)			
4 LOOP - EAC - HPR (7) (AC recovered)			

5 LOOP - EAC - EIHP (8) (AC recovered)			
6 LOOP - EAC - REC5 (9)			
7 LOOP - EAC - TDAFW - REC2 (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) The IPE's human action that is similar to "Recovery of AC Power in < 2 hrs (REC2)": is "LOOP with AFW failure" (RU3DT1D4-1), and it has a human error probability equal to 8.5E-2.

(2) The IPE's human action that is similar to "Recovery of AC Power in < 5 hrs (REC5)" is "Offsite Power Restoration Prior to Battery Depletion" (RU3BATDEP), and it has a human error probability equal to 1.0E-2.

(3) In an SBO situation, an RCP seal LOCA may occur, with subsequent core damage at about 5 hours.

Table 2.7 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 SGTR

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:**
Secondary Heat Removal (SHR)	1 / 3 TDP trains of AFW (375 gpm) (1 multi-train system)
Early Inventory, HP Injection (EIHP)	2 / 4 HHSI pump trains (1 multi-train system)
Pressure Equalization (EQ)	Operator isolates ruptured SG and depressurizes RCS to less than setpoint of relief valves of SG (operator action under high stress[1])
Feed-and-Bleed (FB)	2 / 2 PORVs (operator action)
High Pressure Recirculation (HPR)	1 / 4 HHSI pump trains (1 multi-train system) with 1/ 2 RHR pump trains and with operator switchover to recirculation (operator action)
Long-Term RCS Makeup Source (LTMS)	Operator refills RWST (operator action)

Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
1 SGTR - EQ - LTMS (3)			
2 SGTR - EIHP - EQ (5)			
3 SGTR - SHR - HPR - LTMS (8)			
4 SGTR - SHR - FB (9)			
5 SGTR - SHR - EQ (10)			

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6 SGTR - SHR - EIHP (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.

Note:

(1) Operator isolates the ruptured SG and depressurizes RCS is represented in the IPE (page 3-217) by two human actions: 1) "Operator Fails to Control SG Level (Overfill)" (event AHFF3SGLC, human error probability (HEP) = 7.5E-5), and 2) "Failue to Depressurize to Reduce Primary / Secondary Leak (SGTR)" (Event U3OPRDPZ, negligible HEP).

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Table 2.8 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 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:**
Turbine trip (TTP)	Operator trips the turbine or closes MSIVs (operator action)
Emergency Boration (EB)	Operator conducts emergency boration using 3 / 3 CVCS pump trains with 1 / 2 boric acid (operator action)
Secondary Heat Removal (AFW)	2 / 3 TDP trains of AFW (750 gpm) (1 train system)
Primary Relief (SRV)	3 / 3 SRVs or (2 / 3 SRVs and 2 / 2 PORVs) open (1 train)

Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
1 ATWS - SRV (3)			
2 ATWS - AFW (4)			
3 ATWS - EB (5)			
4 ATWS - TTP (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.

Table 2.9 SDP Worksheet for Turkey Point Nuclear Plant Units 3 & 4 Special Initiators

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:**
"B" charging pump (CHB)	"B" charging pump providing RCP seal injection (operator action under high stress)[1]
Component Cooling Water (CCW)	1 / 2 cooling loops (1 train)[2]
Valve FCV-626 (FCVFAC)	Valve FCV-626 automatically closes on a high flow signal from flow instrument FIC-626 (1 train)
Isolate ISLOCA (OPFTCMGV)	Operator isolates ISLOCA by locally closing a manual gate valve (operator action)

Circle Affected Functions	**Recovery of Failed Train**	***Remaining Mitigation Capability Rating for Each Affected Sequence***	**Sequence Color**
Initiator: Loss of CCW (LOSSCCW)[3] (transient-induced LOCA)[4] 1 LOSSCCW - CHB (Dom 1)			
Initiator: Loss of Grid (LOSSGRID) (dual-unit initiator: transient-induced LOCA)[5] 2 LOSSGRID - CCW - CHB (Dom 2)			
Initiator: Interfacing system LOCA (ISLOCA: RCP thermal barrier heat exchanger tube rupture) 3 ISLOCA - FCVFAC - OPFTCMGV (Dom			
Initiator: Interfacing system LOCA in Penetration 11: failure of two in-series check valves (*-875A, B or C and *876D or E) (TWOCKVLV) 4 TWOCKVLV[5] (Dom 16)			

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 IPE assesses the probability of "Charging pump B out due to maintenance" equal to 4.79E-2 (Table 3.3-5, page 3.0-192)

(2) 1 train selected for event CCW to approximate the frequency of sequence 2 (4.69E-5/reactor year).

(3) In sequence 1, in addition of the initiator loss of CCW (LOSSCCW), other initiators leading to transient-induced LOCAs are: loss of DC bus, loss of 4.16 kV bus, loss of Instrument Air, loss of Intake Cooling Water, Feedline break and loss of Vital Instrument Panels (those panels whose loss will not initiate SI).

(4) A total loss of Component Cooling Water causes an RCP seal LOCA which, in turn, causes core damage. "B" charging pump can provide RCP seal injection independent of the CCW/ICW system.

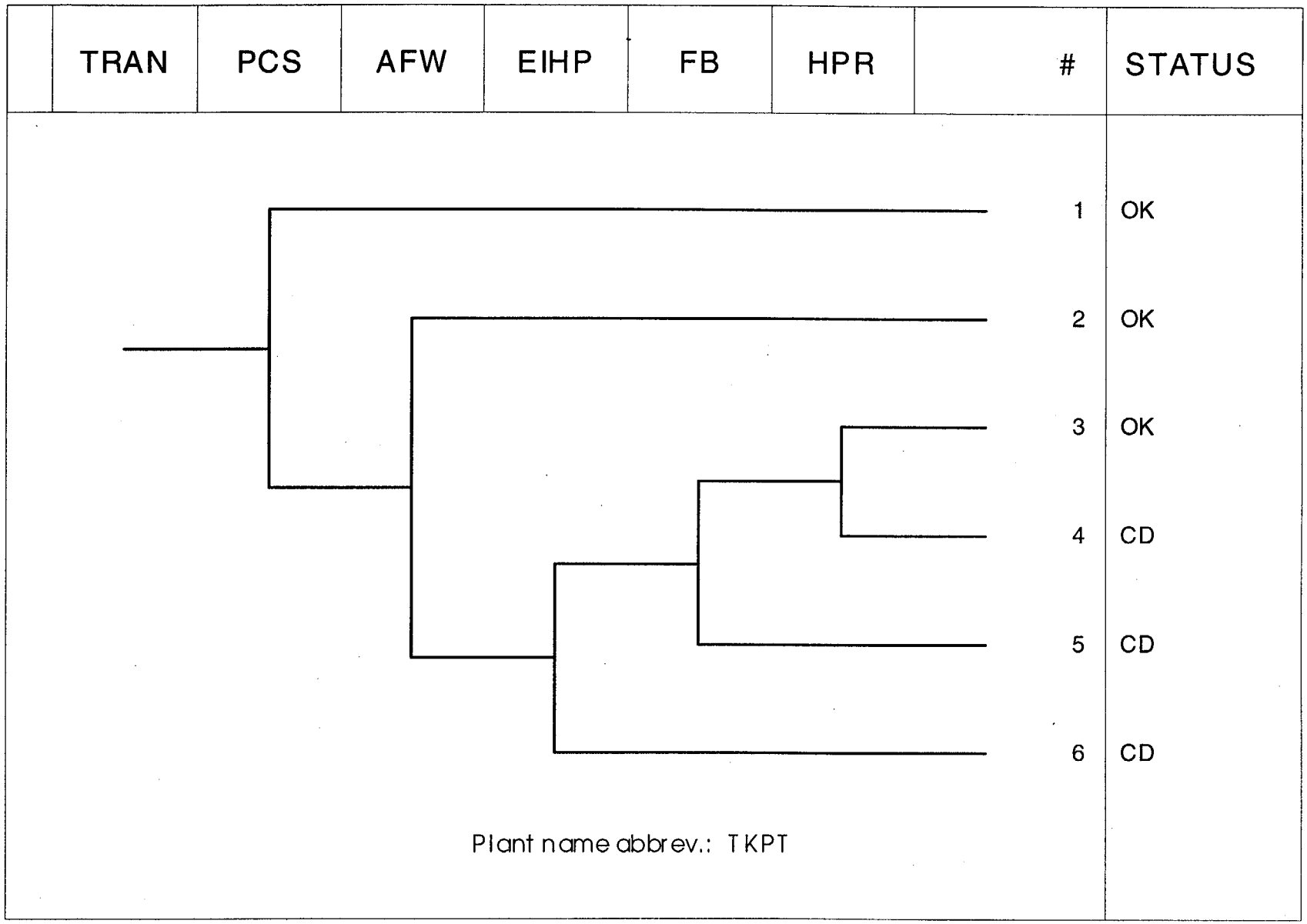
(5) The IPE assesses a frequency of 2.0E-6/reactor year for an interfacing system LOCA in penetration 11.

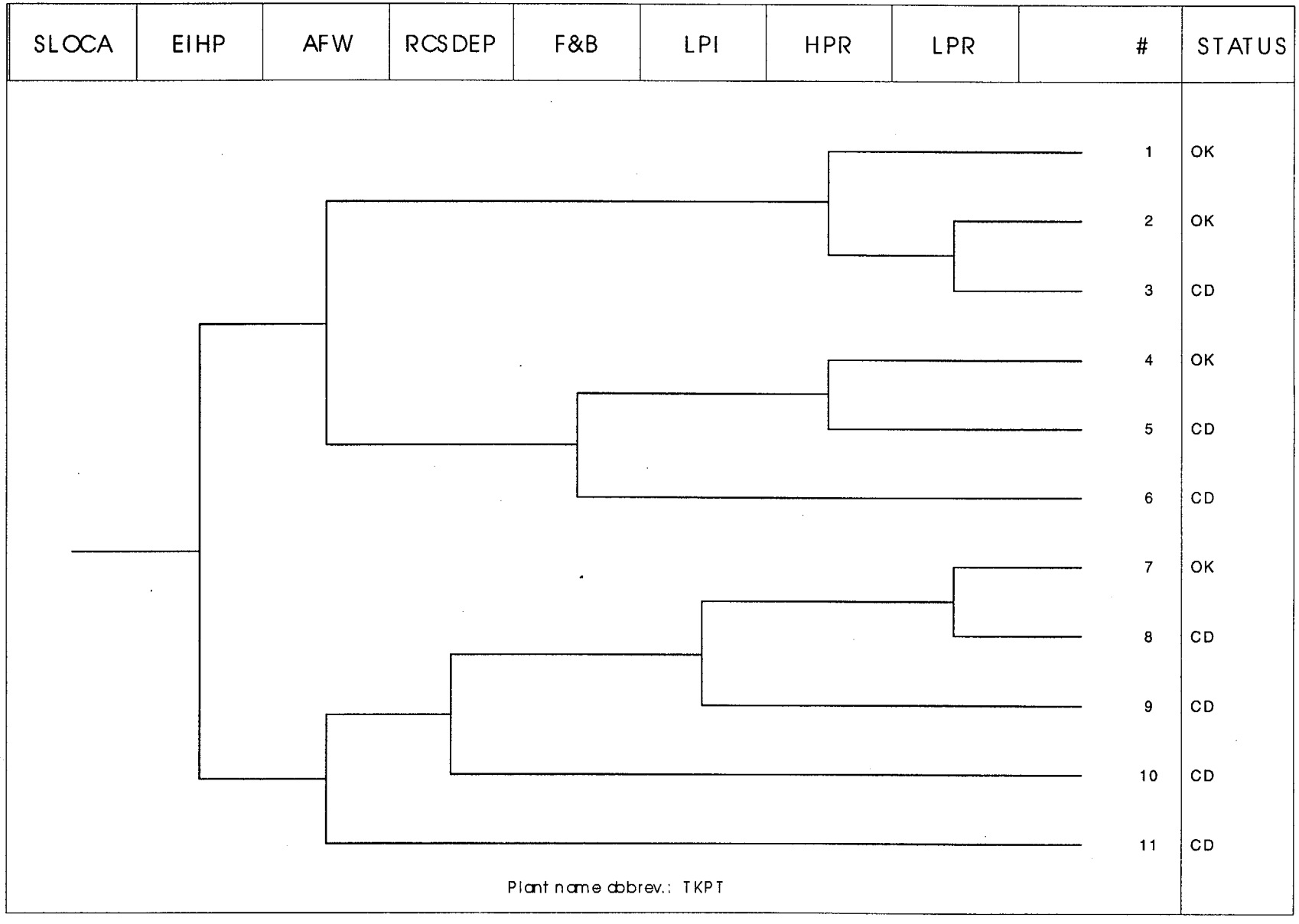
1.3 SDP Event Trees

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. An event tree for the stuck-open PORV is not included since it is similar to the small LOCA event tree. The event tree headings are defined in the corresponding SDP worksheets.

The following event trees are included:

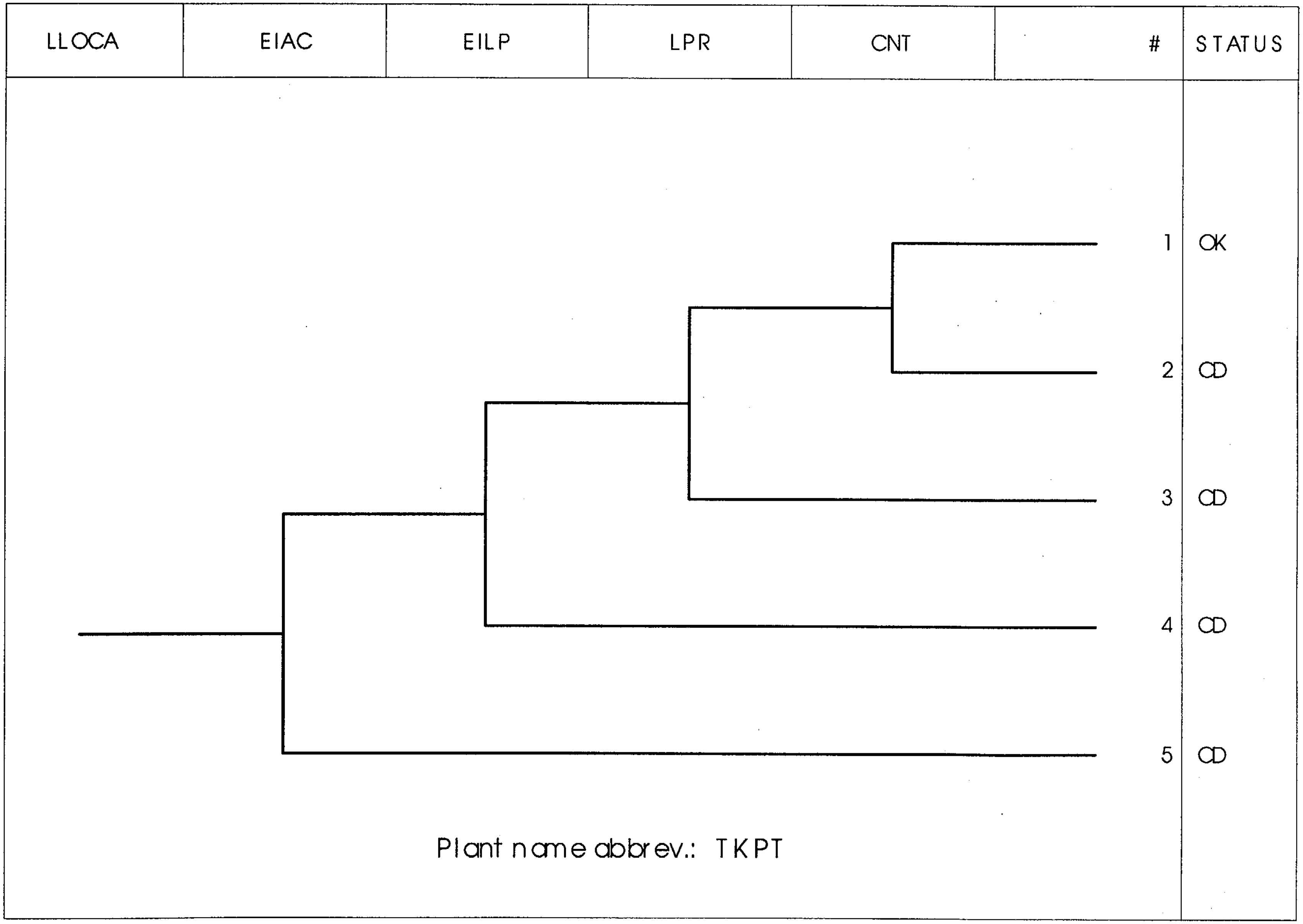
1. Transients
2. Small LOCA
3. Medium LOCA
4. Large LOCA
5. LOOP
6. Steam Generator Tube Rupture (SGTR)
7. Anticipated Transients Without Scram (ATWS)

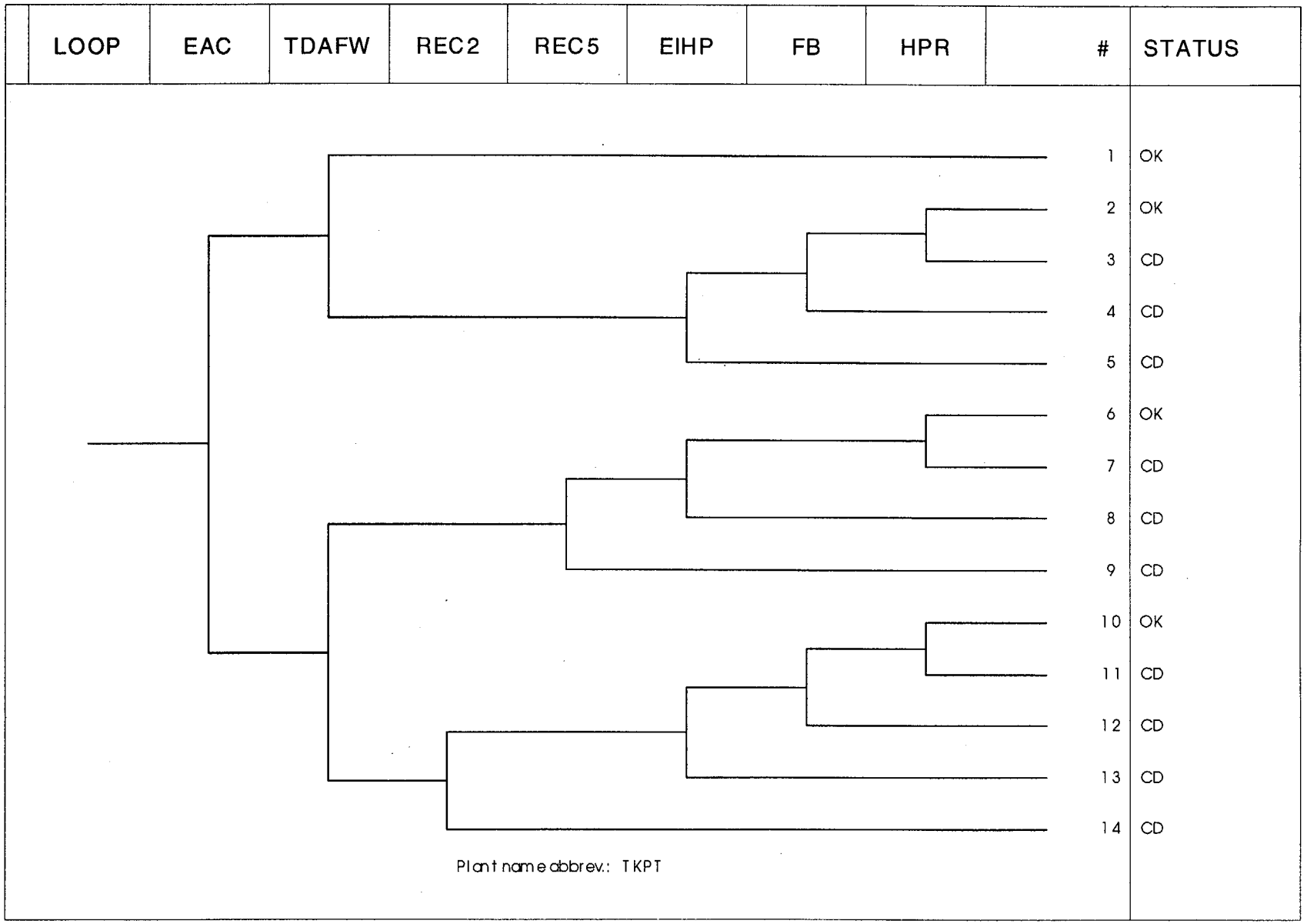

TRAN
PCS
AFW
EIHP
FB
HPR
#
STATUS
1
OK
2
OK
3
OK
4
CD
5
CD
6
CD
Plant name abbrev.: TKPT

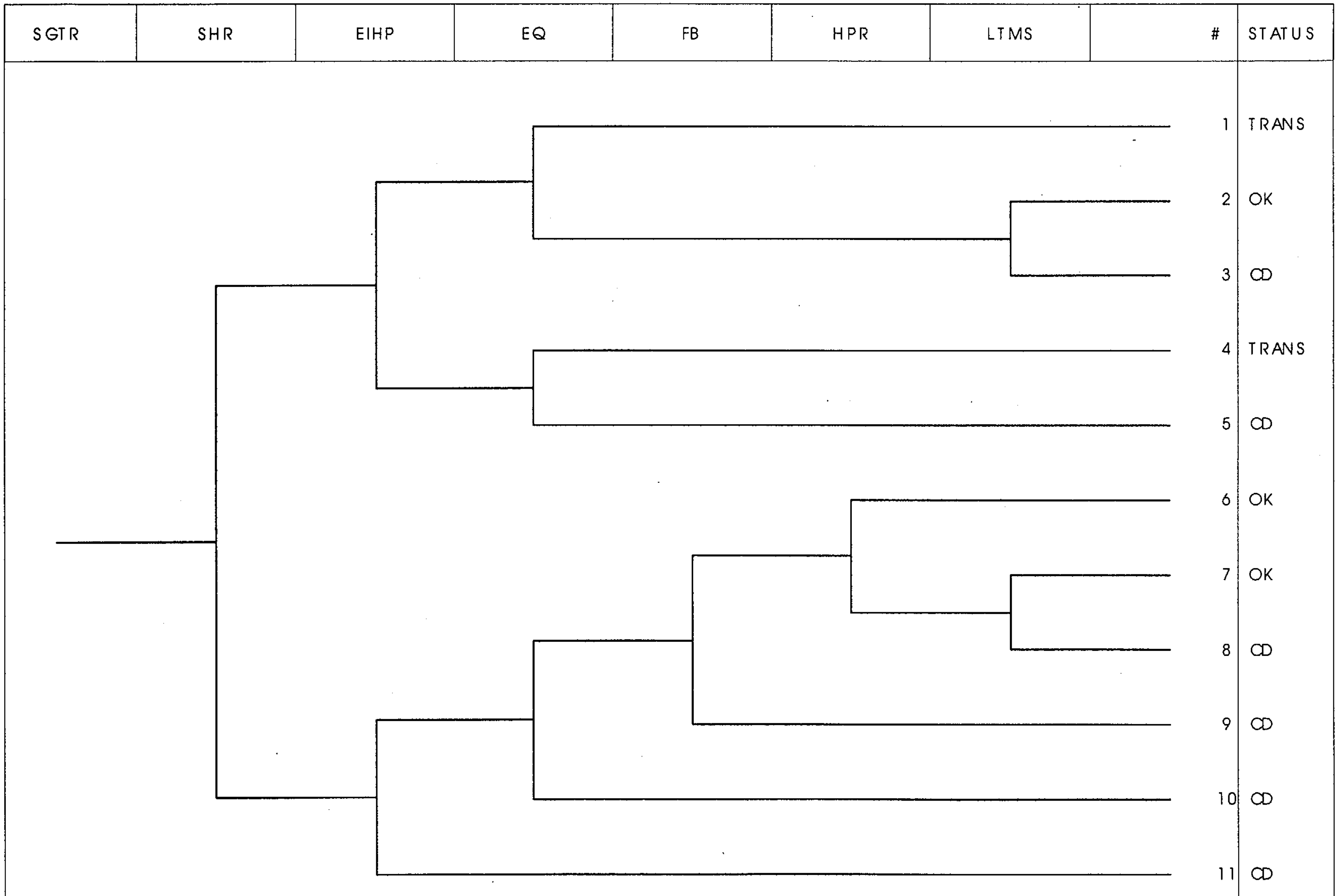

SLOCA
EIHP
AFW
RCSDEP
F&B
LPI
HPR
LPR
#
STATUS
1 OK
2 OK
3 CD
4 OK
5 CD
6 CD
7 OK
8 CD
9 CD
10 CD
11 CD
Plant name abbrev.: TKPT

	MLOCA	EIHP	LPR	#	STATUS
				1	OK
				2	CD
				3	CD

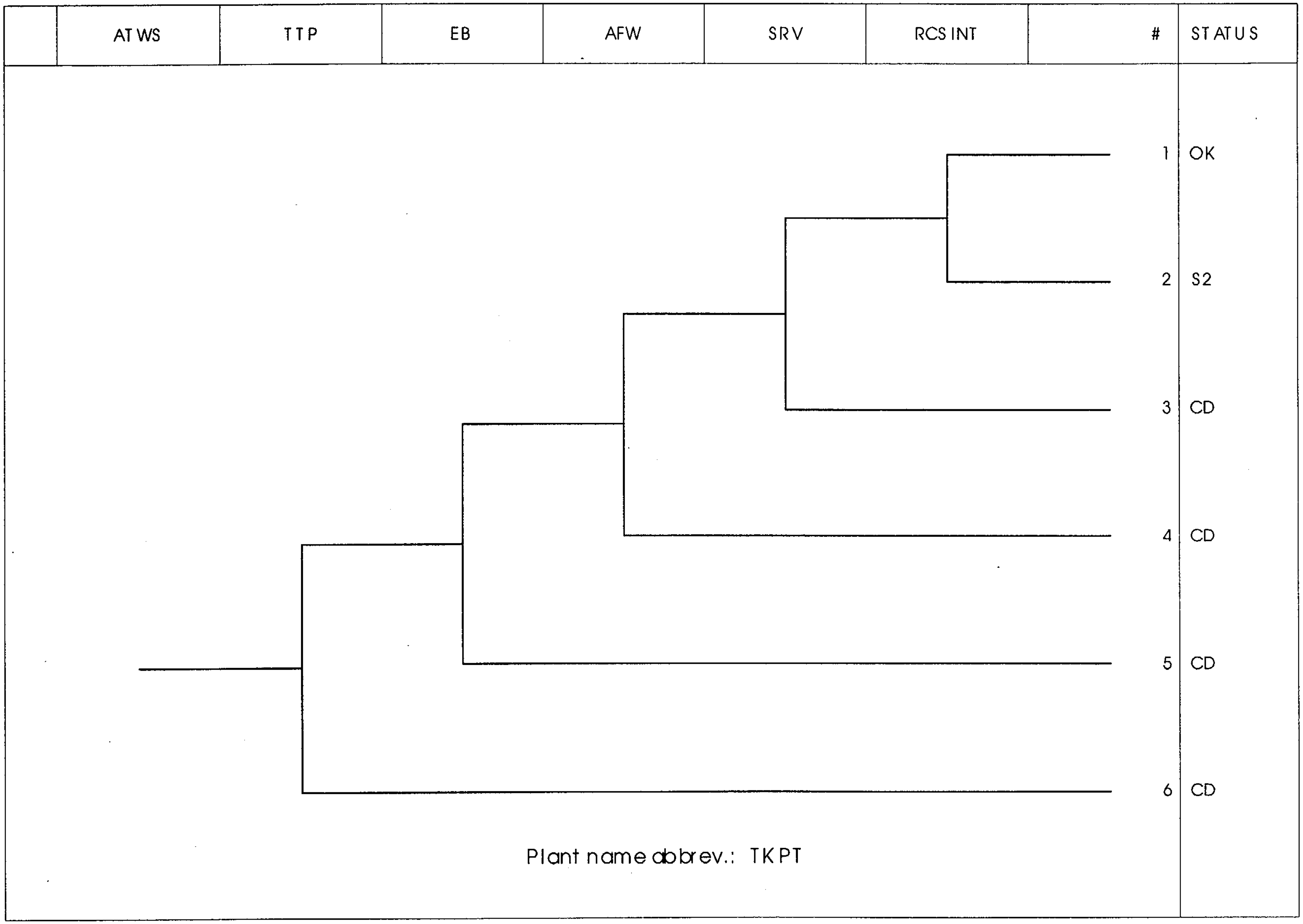
Plant name abbrev.: TKPT


LLOCA
EIAC
EILP
LPR
CNT
#
STATUS
1 OK
2 CD
3 CD
4 CD
5 CD
Plant name abbrev.: TKPT


LOOP
EAC
TDAFW
REC2
REC5
EIHP
FB
HPR
#
STATUS
1 OK
2 OK
3 CD
4 CD
5 CD
6 OK
7 CD
8 CD
9 CD
10 OK
11 CD
12 CD
13 CD
14 CD
Plant name abbrev.: TKPT



Plant name abbrev.: TKPT


ATWS
TTP
EB
AFW
SRV
RCS INT
#
STATUS
1 OK
2 S2
3 CD
4 CD
5 CD
6 CD
Plant name abbrev.: TKPT

2. RESOLUTION AND DISPOSITION OF COMMENTS

This section documents the comments received on the material included in this report and their resolution. This section is blank until comments are received and are addressed.

REFERENCES

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

2. Florida Power & Light Company, "Turkey Point, Units 3 & 4 – Individual Plant Examination Report," June 25, 1991.

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TURKEY POINT PLANT

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