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July 3, 1986

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Region III
US Nuclear Regulatory Commission
799 Roosevelt Road
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -
RESPONSES TO THE MAY 21, 1986 CONFIRMATORY ACTION LETTER

In response to the May 21, 1986 NRC Confirmatory Action Letter, Consumers Power Company is submitting the attached report. This report provides a description of the work performed by the Palisades Plant Material Condition Review Task Force, the results of this work and the corrective actions being taken.

The information contained in this report has already been presented to the NRC Region III Administrator June 25, 1986, as stipulated in the Confirmatory Action Letter.

This submittal fulfills the agreed to commitment date of July 3, 1986 docketed in our letter dated June 23, 1986.

Kenneth W Berry

Kenneth W Berry
Director, Nuclear Licensing

CC Director, Office of Nuclear Reactor Regulation
Director, Office of Inspection and Enforcement
NRC Resident Inspector - Palisades

Attachments

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PALISADES

PLANT MATERIAL CONDITION

REVIEW TASK FORCE

FINAL REPORT

July 3, 1986

PLT MATL TF-MD02

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1.0 INTRODUCTION AND SUMMARY

1.1 Introduction

On May 19, 1986, the Palisades Plant reactor tripped on high pressurizer pressure following a failure of the redundant Electro Hydraulic System (EHC) system power supplies which resulted in closure of the turbine control valves. A number of equipment problems, some of which were known prior to the event, hampered the operators' response to the subsequent plant transient.

On May 21, 1986, a confirmatory action letter was issued which required the Company to proceed immediately to cold shutdown and to remain shutdown until investigations were conducted of the May 19, 1986 reactor trip, and of the general status of plant safety-related and non safety-related equipment.

On May 22, 1986, a Material Condition Review Task Force was formed to address the actions required by the Confirmatory Action Letter, develop a plant test program to supplement Technical Specification testing, and address programmatic issues related to current plant problems.

This report describes the Task Force organization and the scope, approach, and results of its efforts. These results were conveyed to NRC Region III Management on June 25, 1986 in a meeting in their office in Glen Ellyn, Il. The report serves as the Company's response to the NRC's May 21, 1986 Confirmatory Action Letter.

1.2 Summary

1.2.1 Task Force Description

The Task Force consisted of eleven members some of whom are not Palisades employees and were chosen to provide extensive nuclear

power experience, and also to provide an outside perspective by incorporating experienced personnel without any significant Palisades Plant experience but considerable plant specific knowledge in Emergency Maintenance, Operations and QA. The eleven members have an average of 17 years of industry experience, with an average of 5 years of Palisades Plant experience.

The Task Force charter was to conduct investigations of the May 19, 1986 reactor trip, and of safety systems and balance of applicable plant systems as required by the NRC confirmatory action letter of May 21, 1986, and to provide a description of actions taken or planned to assure safe plant startup and subsequent operation. The methods and results would be documented in an auditable package and there could be progress briefings to NRC Regional personnel.

The Task Force reported to the Plant General Manager who was updated daily as to progress and findings. The Vice President-Nuclear Operations also participated in frequent briefings.

1.2.2 Task Force Scope

The scope of the Task Force efforts was prepared on and approved by the Plant General Manager and the Vice President-Nuclear Operations.

The approved Task Force scope was as follows:

1. Conduct a thorough investigation of the May 19, 1986, trip as follows:

    a. Review existing trip report and conduct interviews with on-shift personnel to determine direct or indirect problems which affected their response (ie, identify any problem which required operator action, attention, or concern during the trip and subsequent Plant stabilization).

b. Review the history of the problems identified in "a" above:

- How long has it existed?
- Was operations aware of the problem prior to the recent trip?
- What corrective action had been taken to resolve the problem prior to the trip?
- What testing had been performed to assure that previous maintenance was successful?
- What corrective actions have been taken since the trip? Are they adequate?
- What testing has been performed since the trip?

c. Determine the safety consequences of the problems identified above under postulated accident conditions.

d. Recommend immediate and follow-up corrective actions:

- Repairs and testing that must be completed prior to startup.
- Repairs, testing, and monitoring to be performed during subsequent operations.
- Repairs, modifications, testing, etc. to be performed during a subsequent outage.

e. Review CPCo's post-trip review practices and methods of documenting, reviewing, and verifying corrective actions. Provide assessment of adequacy and recommendations for improvement.

2. Conduct a thorough investigation of the status of applicable systems important to safety as follows:

   a. Define the systems/components included by:

      . Identification of systems designated important to safety in the NPRDS System.
      . Review of accident sequences using current PRA.
      . Review of items overlooked by an SRO during post-trip review.
      . Inclusion of components which have failed resulting in past Plant trips.

   b. Develop a list of known or potentially significant deficiencies important to reliable plant operation* through:

      . Review of the current operator concern list.
      . Review of the existing work order backlog for additional significant items.
      . Interviewing Operations personnel and System Engineers.
      . Review of recent work order history for repeat problems.
      . Review of recently completed work orders/procedures for completion of post-maintenance testing as required.
      . Review of recent surveillance test history for repeat failures.

      . Review of recent corrective action reports, audit reports, NRC inspection reports, etc., for equipment-related problems.

*Important to Reliable Plant Operation is defined as any plant equipment or system whose failure to operate properly will result in a challenge to safety-related equipment.

- Review of the results of the Operational Readiness Review recently conducted on the Auxiliary Feedwater System.

c. Assess the significance of known or potential deficiencies through SRO review and use of the Palisades PRA.

d. Disposition all significant concerns through:

- Recommend repair/testing prior to startup.
- Justification for continued operation with recommendations for repair/testing following startup.

3. Recommend the scope of the augmented surveillance program which targets equipment with a failure history.

4. Recommend programmatic changes to assure that corrective actions taken to resolve future problems are adequate and timely.

1.2.3 Results

The following is a brief summary of the Task Force results. More detailed descriptions of the work performed, observations, and planned actions are included in Sections 2.0 through 5.0 of the report.

1. May 19, 1986 Trip Investigation

In summary, the Operations Department personnel felt that the trip was routine and that the Plant responded well to the transient. While a number of equipment problems, some known prior to the event, had some impact on plant response or required operator actions, only two were considered to be of any significance to the Operators:

- Failure of charging pump P-55A to start and run, and

- Failure of letdown intermediate backpressure regulator CV-2012 to open.

Each of the problems which impacted the plant or operator response will be appropriately repaired and extensively tested to assure operability prior to plant restart.

Overall, the post-trip review process is thorough, demanding a detailed review and appropriate approvals prior to plant restart. The Shift Engineer did a prompt, thorough job in performing the post-trip review for this event, though there were some minor deficiencies identified during subsequent investigations. The Shift Engineer's recommendations for plant restart, as well as the Duty and Call Superintendent's approval, were in accordance with the plant procedure and met previously applied standards of plant equipment operability.

Several recommendations were made to improve the post-trip review process, primarily in terms of increasing the standards of plant operability, increasing the visibility of the decision-making process prior to plant restart, and improving communications with the NRC immediately subsequent to the event.

2. Plant Equipment Status Investigation

An extensive investigation was conducted into the status of plant equipment which is safety-related or considered important to safe and reliable plant operation. The focus of the effort was on improving overall plant operability and reliability by

The effort involved a detailed investigation of 222 items by the Task Force, resulting in approximately 480 recommended actions. These actions included such things as maintenance, modifications, inspections, testing and establishment and completion of preventive maintenance activities. Many of these items were considered insignificant, and some were found to have been previously resolved, so that the number of the items is more indicative of the thoroughness of the review rather than the extent of significant plant problems.

All of the items and associated recommended actions were reviewed in detail by a joint Executive/Plant Review Committee over approximately 30 hours of meetings. The committees actions resulted in a general acceleration or expansion of the actions recommended by the Task Force, resulting in a total of 544 action items, 58 percent of which are to be completed prior to startup from the current outage.

The details of this investigation are provided in Section 3.0 and examples of the specific observations and planned resolutions are provided in Appendix A of this report. A complete list of the specific observations and planned resolution is available at the Palisades Site for inspection.

3. Augmented Test Program

At the direction of the Vice President-Nuclear Operations, a test program was developed to augment the existing Technical Specification surveillance program. The program was developed primarily by the plant Probabilistic Risk Assessment (PRA) Administrator as a member of the Task Force to address plant equipment which could have significant impact on plant reliability and safety, but is not addressed by Technical

Specification testing requirements. The program was reviewed by the full Task Force for concurrence.

The program involves testing prior to or during plant shutdown to ascertain the status of the equipment and determine whether maintenance is required during the outage to assure reliability during the subsequent plant operating cycle. It also involves occasional testing (approximately every 5 years) of balance of plant equipment which is not routinely challenged or verified during normal operation.

The program will be administered through the plant's Periodic Activities Control System (PACS) program. The specific PACS entries will be developed prior to startup from the current outage, and the majority of them will be performed prior to startup.

The specific test activities and associated frequencies are described in Section 4.0 of this report.

4. Programmatic Issues

The Task Force participated with line management to develop a program to enhance the effectiveness of the maintenance process to support a higher standard of plant operability. Input to this effort included the findings of the NRC Augmented Inspection Team (AIT), the 1985 Maintenance Order Task Force, the Operational Readiness Assessment recently conducted by CPCo internally on the Auxiliary Feedwater System, and observations of the Task Force members during their investigations of plant problems.

Recommendations were developed in the following areas:

- Work Order Problem Description
- Diagnosis (Troubleshooting)
- Quality of Repair
- Pre- and Post-Maintenance Testing
- Communication
- Use of Industry Experience

5. Root Cause Determination

Consumers Power Company is supporting a Combustion Engineering Owner's Group Task to establish a root cause determination process. The activity will result in the preparation of a summary report that includes root cause determination practices being utilized by participating utilities, INPO, and other commercially available programs. We anticipate our participation in this effort will aid our as well as other industry participants process of determining the root cause of a trip/event.

The recommendations focused on increased management attention, personnel training, and reliance on a strengthened System Engineer program. Drastic changes were avoided based on both internal and external feedback that the performance trend in the areas of plant material condition and maintenance are and have been improving. The proposed actions are intended to accelerate those trends.

The specific proposed actions, which have been reviewed with and agreed to by plant management, are presented in Section 5.0 of this report.

2.0 MAY 19, 1986 TRIP INVESTIGATION

2.1 Introduction

The Task Force was chartered in part to conduct an investigation of the May 19, 1986 reactor trip as required by NRC Confirmatory Action Letter of May 21, 1986. The investigation included a review of the trip report and controlling procedure, as well as interviews with Operations personnel on shift at the time of the trip. An effort was made to determine direct or indirect problems which affected their response during the trip and subsequent plant stabilization period. A detailed examination of the Post Trip Review report data package was performed to assess the adequacy of the initial reviews. Interviews with Operations personnel who were not on shift at the time of the trip were also conducted to ascertain the overall attitude with regard to Plant condition and the maintenance process. Results of these interviews were utilized in addressing programmatic issues, which are discussed in Section 5 of the report.

Also included within the scope of the trip investigation were:

1) A review of the history of the equipment problems identified during the investigation;
2) A determination as to the impact of those problems under postulated accident conditions;
3) Recommendations for immediate and follow-up corrective actions;
4) A review of CPCo's Post Trip review practices and methods of documenting, reviewing and verifying corrective actions.

2.2 Description of Trip Event

On May 19, 1986, at 1416, an automatic reactor trip occurred at the Palisades Plant due to high pressurizer pressure. The Plant was operating at approximately 99% power at the time of the occurrence.

The reactor protection system (RPS) functioned normally in response to the occurrence.

Shortly before the trip, the reactor operator noticed that average primary coolant system (PCS) temperature was increasing and began driving control rods into the core. When temperature and pressure continued to increase, he looked at the turbine control panel and saw that the indicating lights were out. From the turbine control panel, the control operator informed the reactor operator that the turbine governor valves had closed. Shortly thereafter, the reactor tripped, initiating a turbine trip. In verifying the reactor trip, the operator noticed control rod #34 bottom light was not lit. However, available rod position indication confirmed that the rod was fully inserted.

The plant cooled down from 576 degrees F to 533 degrees F in approximately two minutes. The resulting shrinkage of the PCS caused pressurizer level to drop and system pressure to drop to 1690 psia before recovering. The level control system automatically de-energized pressurizer heaters and isolated letdown. An unsuccessful attempt was made to start the variable speed charging pump (P-55A) (previously declared inoperable, but presumed available for emergency use) to increase PCS pressure and volume. An alternate charging pump (P-55B) was subsequently started. One of the pressurizer spray valves (CV-1059) remained slightly open, slowing the rate at which PCS pressure recovered.

As pressurizer pressure increased, the letdown backpressure control valve (CV-2012) did not reopen, requiring the operator to shift to the alternate backpressure control valve (CV-2122). The turbine bypass valve (CV-0511) and one of four atmospheric steam dump valves (CV-0779) failed to automatically open. Consequently, PCS temperature was controlled using the three remaining atmospheric steam dumps.

The reactor trip was initially attributed to a loss of load and classified as a four-hour reportable non-emergency event. Notification of the trip was given to the NRC at 1458 May 19, 1986 as well as to the State and Local agencies by the Shift Engineer (SE) on duty at the time of trip. After further investigation it was determined the reactor trip was attributable to high pressurizer pressure and not as previously reported. Notification of this determination was made to the NRC at 1616. At 1745 an Unusual Event was declared as required in the event of a high pressurizer pressure trip. The Unusual Event was terminated at 1745 and the NRC notified at 1752.

A Post-Trip Review Report (included along with the controlling procedure as Appendix D) was prepared by the Shift Engineer during the hours immediately following the event, and at 2230 on May 19, 1986 the SE signed the report classifying the trip as a Condition II event, reflecting the fact that the complete cause of the trip had not yet been determined, and that safety-related equipment did not function normally during the event. The SE recommended reactor restart to the Hot Standby condition for steam generator chemistry and to test the Electro-Hydraulic Control (EHC) System. He recommended not exceeding 15% power unless testing showed with reasonable assurance that the EHC power supplies would not trip again. At 2230 on May 19, 1986 the Plant Safety Engineering (PSE) Preliminary Analysis was completed by the PSE lead assessor who was in agreement with the SE's recommendation. The Operations Superintendent agreed via telecon with the conditions necessary for a reactor restart.

At 0015 on May 20, 1986, permission to start-up was authorized by the Duty and Call Superintendent, and at 0303 on May 20, 1986 the plant was returned to the Hot Standby condition and troubleshooting of the EHC System performed.

On the afternoon of May 20, 1986, a special meeting of the Palisades Plant Review Committee was held, wherein the Event Report entitled, "Notification of Unusual Event Due to Reactor Trip on Pressurizer High Pressure", and the Post Trip Review of the May 19, 1986 Reactor Trip were reviewed. (PRC minutes included in Appendix D).

During the afternoon of May 21, 1986 Palisades Plant Officials were notified by NRC Region III of a forthcoming Confirmatory Action Letter, and were informed as to the content of the letter, which required an immediate Cold Shutdown. The letter also specified additional investigations to be completed prior to plant restart.

On May 22, 1986 Consumers Power received the Confirmatory Action Letter.

On May 22, at 2159 the plant achieved Cold Shutdown.

A detailed chronology of the significant events after 1400 hours on 5/19/86 is included as Appendix E to this report. The chronology was compiled utilizing information gathered from the following sources and identified as such within the chronology:

a) Shift Supervisors Log - SSL
b) Reactor Log - RXL
c) Control Room Log - CRL
d) Shift Engineer Log - SEL
e) Plant Data Logger - DTL

The chronology is terminated at 2159 May 22, 1986 at which time the Primary Coolant System was in Cold Shutdown in compliance with the Confirmatory Action Letter dated May 21, 1986.

2.3 Cause of the Event

Prior to the occurrence, an Instrument and Control Technician was cleaning the turbine Electro-Hydraulic Control System (EHC) power supply cabinet cooling fans and filters as part of a preventive maintenance program. Investigation showed that when one fan was unplugged, AC line noise was generated, which caused the 15-volt primary power supply to the EHC system to trip. At the time, the technician would have been completely unaware that the primary power supply had tripped.

With the primary power supply tripped, the 15-volt secondary power supply maintained power to the EHC system. Within approximately fifteen minutes, a second fan was unplugged, which again generated an AC line disturbance, and tripped the secondary power supply. This complete loss of power to the EHC system caused the four turbine governor valves to close. Removal of the heat sink from the PCS caused a temperature and pressure transient which initiated the actuation of the RPS.

The cabinet fans had not previously been unplugged during power operation. The EHC power supplies were not known to be sensitive to line noise or other sources of noise such as radio frequency noise.

An EHC Power Supply Trip Investigation Report was prepared by the Consumers Power Laboratory Field Testing and Services Department following extensive testing to verify the cause of the power supply failures.

2.4 Equipment Problems

Utilizing the Post Trip Review Report and interviews with Operations and Engineering and Maintenance Department personnel, a listing of equipment problems related to the May 19, 1986 trip was compiled.

Individual detailed accounts of each equipment problem were prepared and are included in Appendix C for the following equipment.

a) Turbine Generator Electro-Hydraulic Control (EHC) System power supplies (C-1)

Tripped due to line noise introduced when two EHC Cabinet Cooling Fans were unplugged for preventive maintenance. Caused turbine valves to close, resulting in eventual reactor trip on high pressure.

b) Turbine Lube Oil Lift Pumps (C-2)

Failed to autostart at 600 RPM; required operator action to start manually.

c) Pressurizer Spray Valve CV-1059 (C-3)

Failed to indicate closed in the Control Room.

d) Turbine Bypass Valve CV-0511 (C-4)

Failed to open in auto or manual.

e) Atmospheric Steam Dump Valve CV-0779 (C-5)

Failed to open

f) Coolant Charging Pump P-55A (C-6)

Failed to start.

g) Letdown Back-Pressure Regulator CV-2012 (C-7)

Failed closed.

h) Reheat Stop Valve CV-0544 (C-8)

Failed to indicate closed on the events recorder.

i) Control Rod #34 (C-9)

Rod bottom light failed to light on control panel following trip.

j) Condensate Recirculation Valve CV-0730 (C-10)

Required operator action to open following trip to avoid deadheading condensate pump.

k) Air Ejector Pressure Control (C-11)

Required Auxiliary Operator action to manually control.

l) Turbine Stop Valves CV-0571/0575 (C-12)

May not have closed until 3 seconds (CV-0571) and 25 seconds (CV-0575) after turbine trip signal.

m) Data Logger/Events Recorder (C-13)

13 discrepancies between the event recorders and the data logger system (ie, sequence of events monitor).

Each of these problems and associated information is provided in detail in Appendix C using the format described below:

a) Problem Description

b) History

History of the component problems developed from a review of the work order history, corrective action documents, and the Nuclear Plant Reliability Data System, and interviews with Plant personnel.

c) Significance to Operations

The Significance to Operations statement was developed by the Senior Reactor Operator (SRO) member of the Plant Material Conditions Task Force.

d) Impact of Problem under Postulated Accident Conditions

The impact of the problem under postulated accident conditions was established by the plant Probabilistic Risk Assessment (PRA) Administrator as a Task Force member based on his knowledge of the plant and the PRA model.

e) Status/Actions

The Status of work on the problem and a description of actions completed or planned as of June 24, 1986 as provided by the plant Engineering and Maintenance Department.

f) Resolution

The resolution represents the actions agreed upon based on Task Force recommendations and subsequent review by the Executive/PRC group.

The development of the problem resolutions is discussed in Section 3 of this report.

2.5 Summary of Operator Interviews

The following observations were made following interviews with Operations personnel on shift at the time of the trip, as well as other Operations Department SRO's.

a) Plant response to the trip was considered extremely smooth and went the way it was expected to go. It was overwhelmingly considered a "routine trip".

b) Two equipment problems were considered significant distractions and unexpected events during the trip:

- Charging Pump P-55A failed to start.
- Letdown Backpressure Regulator CV-2012 failed to work in manual.

c) The number of people in the control room and viewing gallery immediately following the trip represented an operator distraction.

d) Operations personnel are not satisfied with plant problem trouble-shooting and feel maintenance rework is excessive. They consider these issues to be a joint Operations and Maintenance problem.

e) While Operations personnel are not satisfied with current plant material condition, they feel that we are headed in the right direction and are concerned that drastic changes will emerge from current efforts.

f) Operations personnel were aware of plant conditions at start-up following the 1985/86 refueling outage. However, factors taken into consideration during the decision-making process surrounding start-up do not appear to have been adequately communicated to all members of the Operations Department. Operators felt that they would have had to "operate around too many problems".

g) Operations personnel do understand the avenues available to them to voice their concerns regarding plant conditions. They are aware of their responsibilities and the remedies available to them should a situation arise where it is determined that a safety issue is not being properly addressed.

2.6 Post-Trip Review Practices

2.6.1 Introduction

Palisades Nuclear Plant Administrative Procedure 4.08, "Post Trip Review Requirements", is designed to provide a documented review that will help ensure that events which have had an impact on the cause of a trip and subsequent equipment responses are identified and thoroughly understood and allow the determination as to the readiness of the plant to be safely returned to operation.

The most recent revision to the Procedure was issued on 5/8/86. The procedure represents a significant improvement in establishing a systematic review process, as well as documenting the conditions of equipment and the sequential decision-making process leading to a restart.

A copy of the procedure, along with completed attachments associated with the May 19, 1986 reactor trip is included as Appendix B to this report.

2.6.2 Procedural Requirements

Post Trip Review Requirements are contained in Plant Administrative Procedure 4.08, Rev 1, "Post Trip Review Requirements". This procedure provides a systematic method for diagnosing the cause(s) of a reactor trip, ascertaining the proper functioning of safety-related and other important equipment during the trip, determining any

detrimental effect on plant equipment caused by the trip, and making the determination that the plant can be restarted safely.

The duty Shift Engineer is responsible for preparing the trip report, collecting data for inclusion in the trip report, interviewing plant personnel involved in the trip and making recommendations to the Plant General Manager in reactor startup.

The Plant General Manager or his designate, the Duty and Call Superintendent, is responsible for making the decision to restart the reactor. He is also responsible for verifying that the cause of the trip has been determined and that appropriate corrective action taken.

Plant Safety Engineering is responsible for performing an assessment of every inadvertent plant trip and providing the results of such assessment to the Plant General Manager.

The Post-Trip Review Report final data package consists of:

1) Attachment 1 of Procedure 4.08, "Post Trip Review Report"
2) Attachment 2 of Procedure 4.08, "Plant Personnel Statements", (one for each person involved)
3) collected data and additional documentation (such as PRC minutes) as required.

2.6.3 Post-Trip Review of the May 19, 1986 Trip

The post-trip review of the May 19, 1986 trip was conducted primarily by the Shift Engineer who was on shift during the event. The post-trip review was initiated immediately after the event, and was completed during the subsequent shift.

The following observations were noted by the Task Force in reviewing the post-trip review effort:

1. The duty Shift Engineer performed a comprehensive analysis of the trip in accordance with Procedure 4.08, "Post-Trip Review Requirements"; however, some minor deficiencies/inconsistencies were overlooked. These were:

   a) Under Part 2.f, "Manual Actions", the following equipment was not noted as requiring manual actuation even though manual actuation was required:
      1) Air ejector steam pressure had to be manually controlled; air ejector relief valves lifted and did not reseat.
      2) Condenser Recirculation Valve CV-0730 was closed (due to leakage) approximately two weeks before the reactor trip and had to be opened manually.
      3) Turbine lift pumps had to be started manually.
      4) Control Rod Drive #34 bottom light not working, rod position had to be verified on Primary Position Indication readout.

   b) Under Part 2.1, "Other Comments", the following equipment failure was not identified:
      1) Several (13) inconsistencies existed between the events recorder trace and Tennecomp data logger system printout; ie, Reactor load (Turbine trip) Channel B (lost) Reactor Control Rod Drive Clutch "A" Relay K-2 (de-energized), etc.

   c) Under Part 6, "Identification of Systems with Inadequate Performance", could include:
      1) Reheat Stop Valve CV-0544; no indication of operation.
      2) Main Stop Valve CV-0571; closed 3.156 seconds late.

3) Main Stop Valve CV-0575; closed 25.052 seconds late.

d) Under Part 9.b.2, "Maintenance and Testing Required before Reactor Restart":

1) Entry "None". No mention was made of dispositioning of 13 identified problem areas.

(a) CV-1059; failure to close.

(b) P-55A; failure to start.

(c) CV-0511; failure to open.

(d) CV-2012; failure to regulate.

(e) CV-0779; failure to open.

(f) CV-0544; failure to close signal.

(g) Control Rod Drive #34; rod bottom light failure.

(h) Air Ejector System Pressure Control; failure.

(i) Condensate Recirculation Valve CV-0730; failure

(j) Turbine Lift Pump; fail to start problem.

(k) Inconsistencies between Events Recorder and Data Logger System.

(l) CV-0571; three (3) second delay in closing.

(m) CV-0575; twenty-five (25) second delay in closing.

e) Under Part 9.b.5, "Conditions Necessary for a Reactor Restart (other than listed above)":

1) Entry "None". Again, no mention was made of dispositioning of 13 identified problem areas.

2. Notification of the trip initially diagnosed as due to loss of load and Emergency Class NA was provided the NRC at 1458. After reevaluation, the trip was attributed to High Pressurizer Pressure and the NRC notified at 1616. Upon further consideration the Emergency class was revised

to that of an Unusual event and the NRC notified at 1752. The Unusual Event was declared and terminated at 1745, May 19, 1986.

The Emergency action level should have been reevaluated at the time the initiating condition was determined to be different than originally thought.

3. The trip was correctly identified as a Condition II Event. A Condition II Plant trip is one where:

   a) The cause of the trip is not positively known;
   b) Safety-related equipment or other equipment functioned in an abnormal or degraded manner during the trip and the malfunction has not been corrected;
   c) Safety related equipment or other equipment functioned in an abnormal or degraded manner during the trip and redundant equipment is not available for startup.

4. Recommendations for reactor startup to hot standby (not to exceed 15% power) for steam generator chemistry and EHC System testing were logical. At the time the recommendation was made, the cause of the trip had been identified, and problems with safety-related equipment were understood (except P-55A) which was administratively inoperable due to a cracked block. The SE's recommendation was based on the fact that the event could not be repeated until further testing and troubleshooting had been conducted.

5. While it is apparent that the Shift Engineer went through a conscious decision-making process to determine that no repairs were necessary prior to reactor restart, the basis for not requiring corrective action is not documented.

6. The decision by the Duty and Call Superintendent to start up the reactor without prior PRC approval (but not to exceed 15% power) was in accordance with the procedure at the time it was made based on the information known regarding the cause of the trip and performance of safety systems.

7. It is apparent in the statements by the Shift Engineer during the "Red Phone" report, and by the Plant Safety Engineering representative made in the text of the post-trip review report that a threshold of significance was applied in responding to whether systems operated as expected. Both did not report what they considered to be minor problems and responded in the context of overall plant/system performance. There is no evidence of any intent to withhold or misrepresent any information.

8. The initial review of the trip data by the Shift Engineer and the Plant Safety Engineer, as well as the follow-up reviews by the Operations Superintendent, Lead Shift Engineer, and Plant Safety Engineer, all failed to identify one of the equipment problems which was eventually identified by the Task Force and NRC reviewers: the failure of one of the turbine stop valves to indicate closed until 25 seconds after the first ones closed. It is considered impractical to expect the Shift Engineer to detect all such "hidden" deficiencies, but they should be detected in follow-up reviews.

9. Procedure 4.08, Revision 1, "Post Trip Review Requirements", is a comprehensive document requiring extensive data gathering to reconstruct, analyze and evaluate the event. However, no single mechanism is utilized to disposition and track completion of deficient items or systems.

10. The Post Trip Review Report does not include provisions for documentation regarding notification to regulatory, state or county agencies nor provisions for classification of the event (ie 4-Hour Non-Emergency, Unusual Event, etc). However, it should be noted that Nuclear Operations Department form, Documentation of Notification to Regulatory Agencies (Form 3160-1-84) is and was utilized to document the trip of May 19, 1986.

2.6.4 Recommendations

The following Task Force recommendations have been reviewed with Plant management, and will be adopted:

1. Review requirements and expectations with appropriate personnel regarding 10CFR50.72 reporting. Emphasize the need to report all equipment problems which had an influence on the plant response or operator response to the transient.

2. Revise Administrative Procedure 4.08 to require and document the resolution of, or justification for startup without resolving, each deficiency noted during the event.

3. The independent follow-up review by the plant Safety Engineering group should be much more detailed and comprehensive to assure that all associated Plant problems are appropriately identified.

4. A list of problems which should be repaired in the event of an outage should be maintained during operation and implemented prior to Plant restart.

5. Emphasize to Duty and Call Superintendents the need to consider the overall number of equipment failures and required operator actions in considering recommendations for Plant restart.

6. Participate in the Combustion Engineering Owners Group (CEOG) - Industry Review Group concerned with root cause determinations. The group will review current practices of a number of plants and recommend actions to improve the root cause determination process. It will incorporate Lessons Learned from the Davis-Besse loss of feedwater event that when problems which do not directly prevent plant operation are set aside in favor of continued power productions, the consequences can be expensive, embarrassing and potentially hazardous.

3.0 PLANT EQUIPMENT STATUS

3.1 Introduction

The May 21, 1986 NRC Confirmatory Action Letter required that Consumers Power Company conduct "a thorough investigation of plant safety systems and balance of plant systems important to safety, with regard to operability and required maintenance." This evaluation was required to be completed prior to Plant Startup. This section of the Task Force report describes the process that was employed to define the scope of the investigation, to conduct the investigation, and to review the results and define the work scope for the current outage. It also describes the follow-up controls which will be applied to assure the program results are properly implemented.

3.2 Investigation Process

The approach chosen to conduct the investigation was to compile a list of known or potential operability or maintenance problems through a number of diverse sources, to screen the list for significance, and to investigate in detail the history and current status of each item. Recommendations were made by the Task Force for each item, and reviewed by an Executive Review Group and Plant Review Committee. This process is described in detail in the following sections.

3.2.1 Item Identification

The list of known or potential significant problems was compiled through the following means:

1) Review of Work Order History

Two members of the Task Force independently reviewed the complete work order history which currently resides on the Company's Advanced Maintenance Management System (AMMS). The review included currently open Work Orders (WO's), three years of past WO's for the safety-related equipment, and one year of past WO's for non-safety-related equipment. A list of approximately 9500 total work orders was reviewed. The reviewers scanned the work order listing for evidence of repeat maintenance problems and generic maintenance problems. Once the initial, independent, lists were compiled, they were reviewed in detail by the full Task Force for applicability to the effort, and consolidated as appropriate into a pproximately 140 items which were deemed to merit further investigation. In general, where the Task Force could not eliminate an item as being insignificant, the item was retained for further research.

2) Review of Nuclear Plant Reliability Data System (NPRDS)

A member of the Task Force with extensive knowledge of NPRDS reviewed the historical failure data on the system for repeat equipment problems. A number of additional items were identified for more extensive evaluation through this means.

3) Review of the Current Operator Concern List

The Palisades Plant Operations Department maintains a list of current operator concerns as a means of communicating their priorities to the Engineering and Maintenance Department for resolution. This is in addition to communication of work order priorities which are communicated daily in the Plant scheduling meeting. The operator concern list utilized, dated April 21, 1986, includes 55 items ranging from desired improvement of the

piping and instrument diagrams (P&ID's) to desired repairs to safety-related equipment. Those within the scope of this effort were each included as line items for further investigation. Many items, such as eighteen which deal with radwaste or makeup water systems, were excluded.

4) Review of Recent Corrective Action Documents

Deviation and event reports issued on or after January 1, 1984 were reviewed for equipment-related problems. A total of 1146 documents were screened, yielding 368 documents for detailed review. The intent of the review of the corrective action documents was to identify repeat problems, and to look for depth and adequacy of corrective actions. Because surveillance test failures and quality assurance audit findings are also documented through issuance of corrective action documents, this process also encompassed a review of the last 2½ years of experience in these area.

5) Review of the Results of the "Operational Readiness Review"

The Vice President-Nuclear Operations Department commissioned a Task Force in early 1986 to evaluate the status of a safety system at each of Palisades and Big Rock Point. The evaluation considered system design, testing, maintenance, operation, and modification. At Palisades, the Auxiliary Feedwater System was evaluated, and a number of follow-up actions were recommended. The results and recommendations of this effort were incorporated into the Plant Material Condition Review Task Force evaluation.

6) Input from Task Force Members

With the extensive Palisades background on the Task Force, the members contributed items for additional investigation based on their knowledge of current or historical problems. The majority of this input came from the Shift Supervisor on the Task Force, and the Task Force member who heads up the Palisades Probabilistic Risk Assessment (PRA) effort. As part of their recommendations, this group was asked to identify any balance of plant equipment which is not routinely tested and may not have been challenged since the completion of the last refueling outage (ie, similar to the atmospheric dump valve). No such items could be identified.

7) Review of Palisades Plant Reactor Trip History

A review of all reactor trips which have occurred since initial plant startup was performed to identify repeat trip initiators. If not already identified through other means, failures which have been responsible for repeat trips in the past were added to the list for further investigation.

8) Review of the May 19, 1986 Reactor Trip Report

All equipment problems identified through review of the May 19, 1986 trip report and subsequent investigation were added as line items for additional research.

9) Interviews with Plant Personnel

As the final step in the problem/potential problem identification process, interviews were conducted with a substantial number of plant personnel to determine the completeness of the items identified through other means. The interviews included the Operations Manager, Operations

Superintendent, and Operations Supervisor, along with all of the Shift Supervisors and Shift Engineers, and four of the ten Control Operators. They also included thirty-two of the thirty-six System Engineers, and several of the Project Engineers.

3.2.2 Item Screening

The list of items (problems or potential problems) for further detailed investigation was limited (with a few exceptions) to equipment which is safety-related or "important to reliable plant operation". While safety-related equipment is specifically identified as such, the Task Force had to determine the bounds of balance of plant equipment which is relied upon by the Operators in response to a transient condition or during Plant stabilization. This was done primarily by two of the Task Force members: the Shift Supervisor and the PRA Administrator. The initial list was compiled by the PRA Administrator based on his knowledge of Plant operation and the PRA model which identifies balance of plant equipment which is important in accident scenarios. This list was supplemented by the Shift Supervisor based on his knowledge of the equipment relied upon by the Operator in response to a transient. Finally, the list was reviewed by the full Task Force, at which time a few additional items were included. The resulting list of "systems important to reliable plant operation", including safety-related systems, is included as Appendix F to this report.

3.2.3 Item Evaluation

The identification and screening processes described in Sections 2.2.1 and 2.2.2 resulted in approximately 228 line items for Task Force investigation. During the course of the evaluation, there were a few items added, and a number of items consolidated, so that the final number of items identified is 222.

The Task Force was subdivided into five teams to conduct the detailed investigations. Each of the teams was responsible to evaluate the items associated with assigned systems as follows:

Team #	Systems
#1	SPS, RIA, RPS, EPS, DTA, FOS, NMS/RRS
#2	ESS, CVS, SCS, TGS, AES
#3	MSS, FWS, CIS, CHM, CLP, PCS, CDS, HED
#4	CVC, AFW, CRD, FPS, PAS, VAS, CCS, SWS
#5	MIS

The evaluators were instructed to research the history and current status of the item, and to recommend both immediate and long term actions which should be performed to assure the reliability of the equipment. The recommendations were placed into one of four categories as follows:

1. Prior to Plant Startup - The recommendation should be implemented prior to startup from the current maintenance outage.

2. Before the End of Refout '87 - The recommendation should be implemented prior to startup from the next refueling outage, currently scheduled for the Fall of 1987.

3. As Part of the 5-Year Plan - The Palisades Plant was in the process of developing a Five-Year Plan for maintenance and modification activities at the time of Plant Shutdown on May 19, 1986. The plan represents an "Integrated Living Schedule" approach to prioritization and implementation of workload. A recommendation to include actions "as part of the 5-year Plan" means that the item should be evaluated and prioritized with respect to other Plant improvement projects and implemented accordingly. It is quite possible that recommendations of this category may not be implemented at all due to insufficient payback (dollars,

radiation exposure reduction, radwaste minimization, personnel safety, plant safety, and other such benefits). Development of the Five-Year Plan will resume following Plant startup.

4. No Further Action Required - In many cases, the evaluator determined that the item was no longer of concern, and deemed that no additional actions were necessary.

The investigations generally consisted of a review of work order history and corrective action documents, as well as discussions with plant personnel, primarily the responsible System Engineer. These discussions also included operators and repairmen as appropriate.

In parallel with the evaluator's efforts, a significance assessment was performed on each of the line items by the Shift Supervisor and PRA Administrator assigned to the Task Force. The assessment considered both the impact on the operators, as well as the significance of the equipment from a probabilistic risk assessment perspective.

3.2.4 Task Force Review

The item evaluators presented the results of their evaluations and associated recommendations to the full Task Force for discussion and comments in a series of meetings beginning June 2, 1986. All of the items were reviewed in this manner over the course of approximately 24 hours of meetings.

3.2.5 Executive/Plant Review Committee (PRC) Review

To assure proper management visibility and concurrence with the Task Force findings and recommendations, and also to provide a review for safety significance, a joint Executive/Plant Review Committee group was formed to review the Task Force results.

The Executive Review Committee consisted of:

- Vice President-Nuclear Operations Department
- Vice President-Energy Supply Services Department, former Vice-President of Nuclear Operations Department, and former Palisades Plant Manager
- Palisades Plant General Manager
- Palisades Plant Technical Director and former Palisades Plant Manager
- Palisades Plant Operations Manager
- Palisades Plant Operations and Maintenance Manager

In addition to the Palisades Plant Technical Director, the Palisades Plant Operations Manager, and the Palisades Plant Operations and Maintenance Manager, the following personnel constituted the PRC quorum:

- Palisades Plant Planning Director
- Palisades Plant Shift Supervisor

All of the Task Force line items which were evaluated as a part of the investigation of Plant equipment status were reviewed in detail by this group in a series of four meetings (totalling approximately 30 hours) held between June 12 and June 19. Also included in the meetings were:

- Palisades Plant PRA Administrator
- Control Operator - With the exception of a few hours of one meeting, a plant control operator was involved.
- System/Project Engineers - The engineers responsible for the associated system on equipment under discussion.

The purpose of the meetings was to establish a "resolution" for each of the 222 line items and concurrence or modification of the Task Force recommendations. In almost all cases, with a few minor exceptions, the resolutions involved expansion of or acceleration of the Task Force recommendations.

3.3 Investigation Results

An example of the results of the Task Force efforts to investigate the status of plant safety systems or balance of plant systems important to reliable plant operation is included in this report as Appendix A. In summary, 222 items were evaluated, involving 26 systems and including 11 generic issues which affect multiple systems. A total of 544 total action items were generated (not including the list of open work orders and control room deficiencies which are recommended for completion prior to startup). Of these action items, 58 percent are to be completed prior to startup, 29 percent are to be completed prior to the end of the next refueling outage, and 13 percent are to be considered for the 5-Year Plan.

3.4 Implementation

It is the Plant's intention to complete all actions identified as "Prior to Plant Startup" before the Plant returns to power operations. In order to assure proper management attention to this goal, all of these action items will be individually tracked on the outage scope and schedule, and updates will be provided weekly to both the plant General Manager and the Vice President-Nuclear Operations.

In addition to this quantitative check, a subcommittee of the Task Force will be reassembled to audit the quality of the work accomplished to assure that it meets the intent of the original recommendation.

Items scheduled to be completed prior to the end of Refout '87 will be monitored as line items in the scope list for that outage, and the Plant General Manager and Vice President-Nuclear Operations will be updated monthly on the progress made to prepare for their implementation.

3.5 Final Review

A final review of the actual work completed relative to the action items scheduled to be completed prior to plant startup will be conducted by the Executive/Plant Review Committee. Any deviations from the original resolution will be considered for approval. For any deviations granted, a Justification for Continued Operation (JCO) will be prepared, and all such items will be reviewed with the NRC prior to startup.

In addition, a final review of the open work orders and control room deficiencies will be conducted prior to plant startup by the Operations Department to assure that any significant equipment operability problems are addressed.

4.0 AUGMENTED TEST PROGRAM

4.1 Introduction

As part of the Task Force scope, a program to perform inspections, testing, and preventive maintenance on plant equipment which is important to reliable plant operation was proposed. The program is intended to supplement the Plant Technical Specification surveillance testing program.

Development of this program was headed by the Probabilistic Risk Assessment (PRA) Administrator as a member of the Task Force. He was assisted in this effort, particularly with regard to program administration, by the Executive Director of Nuclear Assurance.

4.2 Scope

A review of systems important to reliable plant operation was made to identify equipment which should be tested, yet is not currently tested on any regular basis. Testing recommendations were categorized in the following manner:

Occasional Test - The proper operation of these items should be verified periodically. An interval of every three refueling cycles or every five years is suggested.

Pre-Refueling - The proper operation of this equipment should be assured shortly before, or at the very beginning of, each refueling outage or other major planned outage. It is suggested that each System Engineer ensure, (by these tests, contact with operations, and routine inspections) that all problems with his/her assigned equipment, which might prevent that equipment from satisfactorily completing another entire fuel cycle, are identified before, or at the beginning of, each refueling outage.

Each Startup/Shutdown - These items should be performed each time plant conditions will allow.

Surveillance - These items should be added to current Technical Specification surveillance procedures and treated as Technical Specification requirements.

The recommended periodic testing under this program is shown in Table 4-1, listed by system for each system identified as important to reliable plant operation.

TABLE 4-1

RECOMMENDED PERIODIC TESTING

	I. PRIMARY COOLANT SYSTEM
	A. Primary Coolant Pumps
Occasional Test	1. Verify operability of backstop oil pumps P-83 and P-84.
Occasional Test	2. Verify operability of low backstop oil flow alarm.
Occasional Test	3. Verify operability of reverse rotation alarm.
Each Shutdown	4. Check oil systems for leaks; repair and refill as necessary.
	B. Reactor Head/Pressurizer Vent System (PRV-1067, 68, 69, 70, 71, 72)
Pre-Refueling	1. Cycle each solenoid valve to verify operability.
Pre-Refueling	2. Ensure that each solenoid valve does not leak through.
	II. CHEMICAL AND VOLUME CONTROL SYSTEM
	A. Charging and Letdown stop valves CV-2001, 2113, 2115, 2117.
Pre-Refueling	1. Cycle each valve to ensure operability.
Occasional test	2. Ensure that each valve does not leak through.

NOTE: All instrument loop checks are to be complete loop checks, not component checks.

Pre-Refueling

B. Instrumentation

1. Verify setpoint and operability of high temperature trips:

a. Letdown stop CV-2001
b. Ion exchanger bypass CV-2023

C. Metering Pump P-57

Pre-Refueling

1. Verify Operability

D. Relief Valves

Occasional Test

1. Verify setting

a. Letdown RV-2006, 2013
b. Primary coolant pump leak-off RV-2083
c. Volume Control Tank RV-2079, 2080
d. Charging Pump Discharge RV-2092, 2098, 2104
e. Charging Pump Suction RV-2090, 2096, 2102

E. Alternate Power Supply

Surveillance

1. Run charging pumps on alternate power supply.

III. EMERGENCY CORE COOLING SYSTEM

A. Motor-Operated Valves

Surveillance

1. Cycle with differential pressure

a. HPSI sub-cooled suction MO-3070, 71
b. Charging to HPSI MO-3072

Pre-Refueling

2. Loop check instrumentation

a. High pressure interlock MO-3015, 16
b. Alternate shutdown panel (C-33) cooling controls for CV-3006, 25, 55

B. Relief Valves

Occasional Test

1. Verify setting

a. Shutdown cooling suction RV-3164
b. LPSI RV-3162
c. HPSI RV-3165, 3264, 3266

IV. MAIN STEAM SYSTEM

A. Atmospheric Steam Dumps CV-0779, 80, 81, 82.

Each Startup/Shutdown	1. Verify operability from control room.
Each Startup/Shutdown	2. Loop check all controls a. Quick opening on turbine trip b. Modulating on Tave c. Control from C-33
Pre-Refueling	3. Operate manual isolation valves to detect binding of linkage or excessive packing drag a. MV-0101 MS, 02MS, 03MS, 04MS
Occasional Test	4. Verify operability of solenoid isolation valve on control air supply. a. SV-0779A, 80A, 81A, 82A
Occasional Test	5. Verify integrity of control air to dump valve by leak down test.

B. Turbine Bypass Valve CV-0511

Each Startup/Shutdown	1. Verify operability from control room.
Pre-Refueling	2. Loop check all controls a. Quick opening on turbine trip b. Control on Tave c. Control on steam pressure
Pre-Refueling	3. Operate manual isolation valves to detect binding of linkage or excessive packing drag. a. MV-0101MS, 02MS, 03MS, 04MS
Occasional Test	4. Verify operability of solenoid isolation valve on control air supply. a. SV-0589A

Occasional Test

5. Verify integrity of control air to bypass valve by leak down test.

C. Auxiliary Feedwater Turbine Supply

Occasional Test

1. Verify Relief Valve Setting

a. RV-0521

D. Moisture Separator/Reheaters

Occasional Test

1. Verify relief valve settings

a. RV-0541, 42, 43, 44, 45
b. RV-0530, 31, 32, 33, 34, 40
c. RV-0549, 50, 51, 52, 58
d. RV-0535, 36, 37, 38, 39, 46

V. Feedwater and Condensate Systems

A. Condensate Pumps

Pre-Refueling

1. Inspection/performance monitoring

a. P-2A, P-2B

B. Feedwater Pumps and Turbines

Pre-Refueling

1. Inspection/performance monitoring

a. P-1A, P-1B

C. Heater Drain Pumps

Pre-Refueling

1. Inspection/performance

a. P-10A, P-10B

D. Recirculation Valves

Pre-Refueling

1. Verify operability, perform instrument loop check

a. CV-0730
b. CV-0710, 11

Pre-Refueling — E. Heater Drain Tank Level Control Valves

1. Verify operability, perform instrument loop check

a. CV-0608, 09

F. Feedwater Stop Valves

Pre-Refueling — 1. Verify operability

a. CV-0742, 44

Occasional Test — 2. Check for leakage

G. Feedwater Check Valves

Occasional Test — 1. Check for back leakage

a. CK-0701FW, 0702FW

H. Heater Bypass Valves

Occasional Test — 1. Cycle for operability verification

a. MV-0722CD, 23CD, 24CD, 27CD, 32CD
b. MV-114FW, 115FW

I. H.P. Heater Relief Valves

Occasional Test — 1. Verify settings

a. RV-0602, 06

VI. AUXILIARY FEEDWATER SYSTEM

A. Low Suction Trip

Surveillance — 1. Verify setpoints

a. PS-0741A, 0741B, 0741DD
b. PS-0762A, 0762B, 0762C

Occasional Test — B. Pump Discharge Relief Valve

1. Verify setting

a. RV-0783

C. Check Valves

Occasional Test — 1. Check for back leakage

a. CK-0703FW, 04FW, 28FWS, 29FWS

VII. SERVICE WATER SYSTEM

A. Isolation Valves

Pre-Refueling — 1. Cycle for operability verification

a. CV-0844, 45, 46, 57
b. CV-1318, 19

Occasional Test — B. Fire System Cross-Connect Valves

1. Cycle for operability verification.

a. MV-130FP, 131FP

VIII. COMPONENT COOLING WATER SYSTEM

A. No items

IX. INSTRUMENT AIR SYSTEM

A. Compressors

Pre-Refueling — 1. Inspection/performance monitoring

a. C-2A, B, C

B. Dryers

Pre-Refueling — 1. Inspection/performance monitoring

a. M-2

X. HIGH PRESSURE AIR SYSTEM

A. Compressors

Pre-Refueling — 1. Inspection/performance monitoring

a. C-6A, B, C

XI. DIESEL GENERATORS

A. No items

XII. FIRE SYSTEM

A. No items

XIII. CONTAINMENT

A. No items

XIV. TURBINE GENERATOR

A. EHC Hydraulic

Pre-Refueling	1. Verify backup pump auto start
Pre-Refueling	2. Pump inspection/performance monitoring

4.3 Administration

All of the proposed activities, with the exception of the "surveillance activities", will be administered through the Plant Periodic Activities Control System (PACS). For each PAC item, a basis document will be developed and retained in the plant's Document Control Center (DCC). The PACS sheets, which are issued automatically at the specified frequency, will include the specific steps to be taken in completing the activity, and will specify equipment performance data to be documented.

The PACS activities will also be incorporated in the forced outage plan and refueling outage plan to assure their completion.

The PACS sheets for the activities listed in the scope will be developed prior to startup from the current outage. It is expected that the majority of the specified items will be performed prior to startup. All will be performed no later than the end of Refout 87.

Surveillance items will be incorporated into the appropriate Technical Specification Tests. Technical Specification changes to reflect these tests will be submitted.

5.0 PROGRAMMATIC ISSUES

5.1 Introduction

Included in the Task Force scope was an effort to evaluate the adequacy of the Palisades Plant maintenance process and related issues with respect to achieving a higher level of Plant material condition and reliability. The Task Force reviewed the results of past efforts that have been made to effect improvements in this area, most significantly the result of the Maintenance Order Task Force which was established in early 1985. The review also included a look at the observations and recommendations of the recently completed "Plant Operational Readiness Assessment" which focused on the Auxiliary Feedwater System, but also addressed programmatic issues. Finally, the observations of the NRC Augmented Inspection Team investigation of May 23-25, 1986 were specifically reviewed.

The Task Force utilized the observations and recommendations from these sources to establish a framework on which to evaluate the effectiveness of improvement efforts of the past and focus on where additional or more intensive efforts are required. Because of the varied backgrounds of the Task Force members, including a significant amount of non-Palisades experience, the Task Force was able to provide specific recommendations for improvements in some areas, while others were established through a series of meetings with various plant management personnel and working-level representatives. In addition, a sub-set of original participants in the Maintenance Order Task Force was reassembled to develop specific recommendations related to maintenance process improvements.

5.2 Observations and Recommendations

In developing recommendations for effecting improvement, care was taken to acknowledge the feedback that was received from internal discussions with Plant personnel, particularly Operations Department

personnel, which indicated that revolutionary changes were neither required nor desirable. In fact, even personnel who expressed concern and dissatisfaction with Plant maintenance felt that things were improving, and that a significant change in direction would likely be detrimental. Consequently, the recommendations tend to be more in the line of accelerated or more intensive developmental efforts, rather than a change in direction.

The focus of the programmatic improvement efforts centers around two themes: management attention and personnel training. It is believed that the programs currently in place are sound and address appropriate issues, but that management emphasis and employee experience and knowledge levels have been inadequate to produce results at the desired rate.

The recommendations also reflect a philosophy of utilizing the System Engineers to provide an effective interface between Operations and Maintenance. To do this, it is believed that they will require additional training in Plant Systems and component maintenance, a reduction in paperwork workloads to provide more time to spend in the Plant, and an understanding of management expectations regarding their role.

The recommendations resulting from this process, which have been reviewed and agreed to by the Plant management team, are summarized as follows.

A. Work Order Problem Description

Work Order problem descriptions are often inadequate, leading to occasional misinterpretation and inappropriate repair activities. This problem also reduces the quality of work order history information and consequently, the effectiveness of trending efforts.

Actions

1. Re-emphasize to all plant personnel the need for concise and complete problem descriptions. This will be accomplished through meetings with the Operations and Engineering and Maintenance Departments, addressing the majority of the Work Request initiators. Communication of this expectation will be reinforced via the Palisades Weekly Bulletin. These actions will be completed by August 1, 1986.

2. Have Plant managers audit Work Orders for adequacy of problem descriptions, planning steps, summary of work performed, and post-maintenance testing. A group of managers, including the Operations Manager, the Engineering and Maintenance Manager, and Engineering and Maintenance Superintendents will audit a sample of both new and completed work requests and work orders for quality of information. This will begin by July 15, 1986 and continue until a uniform level of excellence is achieved. Feedback will be provided to initiators, planners, first-line supervisors, and repairmen.

3. Provide additional experienced operational staff to interface with the Maintenance Department and assist with problem description, trouble-shooting, prioritization, and post-maintenance testing. The Operations Department was reorganized, effective July 1, 1986. A key feature of the revised organization is the establishment of a group of experienced Operations personnel headed by a former Shift Supervisor to serve as an interface with engineering and maintenance. This group will ensure accurate and complete problem descriptions, assist with problem identification, trouble-shooting, prioritization, and definition and planning of post-maintenance testing.

B. Diagnosis (Troubleshooting)

Problem diagnosis is often inadequate to establish the true root cause and assure effective repairs are completed. This is recognized as a joint Operations/Maintenance concern.

Actions

1. Utilize the additional operations personnel set aside for this purpose. The newly created Operations planning group described earlier (see A.3 above) will be tasked with assisting and guiding Operations and Engineering and Maintenance with root cause determination related to problems identified through work orders.

2. Improve the effectiveness of the System Engineers and Work Planners:

   a. Decrease System Engineer work backlog by augmenting the engineering work force from within the company. Decreasing the System Engineers' workload (backlog) will enable them to spend more time in the plant with their systems. The Project Engineering and Construction Department has been contacted for support, which will commence subsequent to completion of this outage.

   b. Provide additional systems training for the System Engineers and Work Planners subsequent to completion of this outage. Training classes will, where feasible, include Operations Auxiliary Operators to provide a broad-based level of experience at the classes and to provide an environment to establish good relationships between the departments. Classes will commence immediately after completion of the

outage and, training for existing personnel will be completed by 12/31/87.

c. Provide specific component training to engineers and repairmen to enhance their maintenance skills. There is currently an on-going program at the Company's Muskegon Skills Center to provide maintenance skills training. More Palisades nuclear specific skills such as working with stainless steel valves and pumps and working under the adverse conditions for radiation safety will be incorporated into the training courses. This enhancement will be completed by 12/31/87.

d. Provide an orientation program for new System Engineers including Systems training, Administrative training, and time spent in various departments. The program is expected to be ready by 1/1/87.

C. Quality of Repair

The quality of repairs completed must be enhanced to reduce rework. System Engineer experience level is lower than desired and they do not provide adequate input to problem resolution. Repairmen skill levels with regard to nuclear plant component maintenance are sometimes inadequate.

Actions

1. Provide additional valve and machinist training for repairmen focused more specifically on Palisades plant components. Provide additional valve training and machinist training specifically targeted at conditions encountered at Palisades. This will include some training on unique valves at nuclear sites plus additional training on machining of stainless steels and other less common

materials utilized in the nuclear industry. This training will be complete by 12/31/87.

2. Provide Auxiliary Operating training for minor maintenance such as manual valve packing adjustment or lubrication of equipment. The training will begin by 1/1/87.

3. Develop and Utilize Component Specialists:

   a. Use vendors to augment our expertise and enhance our in-house skills for complex problems.

   b. Provide component training to build our in-house capability. Training will be provided to selected individuals to develop their expertise in areas such as pumps, valves, structural analysis, welding or other specialties. We expect the System Engineers to evolve toward certain areas of interest, then enhance their skills with specific training. The process has started and will continue as the engineers gain experience.

4. Accelerate the PM program development to assure better maintenance of our plant equipment. More resources will be devoted to creating more PM's and reviewing our present ones for adequacy. The PM program enhancement will be complete by 6/30/87.

5. Emphasize the implementation of the new trend program to acquire the ability to perform predictive maintenance. Full implementation of the Plant Trend Program will take place prior to completion of this outage. The program will be utilized to obtain baseline data on newly repaired systems and as a verification that maintenance performed was satisfactory.

D. Pre- and Post-Maintenance Testing

Pre- and Post-Maintenance Testing is not adequately performed. Often, little testing is prescribed other than verification of Technical Specification operability requirements. This process is hampered by plant conditions being inappropriate for testing when the repairs are complete. More feedback is required to repairmen regarding success of repair efforts.

Actions

1. Utilize the additional Operations personnel established to support the maintenance process. The newly formed section in Operations will be utilized to assist in the definition of testing to be performed and assisting in the coordination of the test effort. This enhancement will be utilized for testing of repairs completed this outage.

2. Provide training/guidance on testing techniques for System Engineers. Supervision and guidance on testing techniques will be provided for the System Engineers prior to startup. This training will be provided by the Operations section recently created and by experienced start-up personnel within Engineering and Maintenance Department. A guideline will be developed after the outage for subsequent use.

3. Obtain better equipment/facilities for testing. Better facilities for bench testing components and specific test equipment for verifying valves will be obtained for testing newly repaired equipment during the outage. Test taps are being installed concurrently with our CVC repairs to enhance our ability to assure successful maintenance.

4. Develop an augmented surveillance program for operability testing of selected non-Q components. An augmented testing program for non-Q systems important to reliable plant operations, described in Section 4.0 of this report, is being developed. Testing will be performed prior to plant startup to verify equipment performance.

E. Communication

More effective communication must occur between the Operations and Maintenance Departments. Operations should provide consistent priority for work and strong expectations for the repair groups. More effective communication of expectations and performance feedback is required within departments.

Actions

1. Flatten the maintenance organization to enhance vertical communication. The Mechanical Engineering and Maintenance Department has been reorganized to decrease the levels of supervision and improve vertical communication.

2. Flatten the Operations organization to enhance vertical communication. The Operations Department has been reorganized to decrease the levels of supervision and improve vertical communication. Specifically, the Operations Supervisor position has been eliminated. In addition, a new section was created to serve as an interface between Operations, Engineering, and Maintenance.

3. Strengthen the Operations organization through key personnel changes. Changes in the Operations Department have been made, including assignment of a new Operations Superintendent. Additional changes will be complete by 8/1/86.

4. Focus on improving the skills, knowledge, and availability of the System Engineers to enhance their relationship with Operations as discussed earlier.

5. Provide supervisory training to enhance employee feedback and coaching skills. In order to strengthen the System Engineer program, Engineering and Maintenance Superintendents, Section heads and Senior Engineers must be strong leaders with good supervisory skills. Training will be provided to enhance their supervisory skills, starting 1/1/87.

6. Provide additional experienced Operations personnel to interface with Maintenance. Operations Department has enhanced communication with Engineering and Maintenance Department by creating a new section to act as an interface. This provides a group with plant operating experience which is readily available for consultation.

7. Provide System Engineer systems training and relieve backlogs to allow for more time to spend in the Plant. Subsequent to this outage, System Engineers will be attending systems training. Other in-house engineering will be utilized to reduce the backlog of work to allow the engineers to concentrate on their systems and better maintain them. This backlog work is being identified presently and the PE&C assistance will transfer directly to these tasks immediately following the outage.

APPENDIX A

PLANT EQUIPMENT STATUS

OBSERVATIONS AND RESOLUTIONS

(EXAMPLES)

APPENDIX A

PLANT EQUIPMENT STATUS OBSERVATIONS AND RESOLUTIONS

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APPENDIX A

PLANT EQUIPMENT STATUS
OBSERVATIONS AND RESOLUTIONS

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OBSERVATION NO: PCS-14

COMPONENT(S): PRV-1067, 1068, 1069, 1070, 1071, 1072
Pressurizer & Reactor Head Vent Valves

EVALUATOR(S): RPMargol

REV NO: 2

DATE: 06/23/86

DESCRIPTION: Current leakage exists through PRV-1068 or PRV-1069 and PRV-1072.

SIGNIFICANCE: Important To reliable operation of Plant. May cause Plant shutdown due to PCS leakage. Distraction due to continuous alarm.

RESOLUTION:

Prior To Plant Startup

1. Repair PRV-1068, PRV-1069 & PRV-1072 to prevent existing leak through.
2. Physically inspect condition of all reactor head vent valves for any signs of degradation external to the valves (loose bolts, binding in manual valves, leakage, etc).
3. Stroke all PRV's for reactor head vent and demonstrate proper open/close indication.
4. Perform leak test to demonstrate adequacy of valve maintenance.

As Part Of 5-Year Plan - Perform system assessment for component reliability and adequacy of preventive maintenance.

OBSERVATION NO: ESS-20 COMPONENT(S): DBA/Normal Shutdown Sequencers

EVALUATOR(S): RESchrader REV NO: 03 DATE: 06/23/86

DESCRIPTION: Contacts fail to close, setpoints drift, continuously fails Tech Spec tests and intermittently stops operation partway through timing sequence. Actual failure rates on the sequencers is "clouded" by a) lack of a good preventive maintenance program; b) lack of familiarity with sequencer operation and testing devices and c) plant modifications (covers) to the sequencers which have caused some operating failures from interference.

REF: D-QP-84-02, D-PAL-84-190, E-PAL-84-047, D-PAL-86-63, D-PAL-86-76, D-PAL-86-104.

SIGNIFICANCE: Safety related. Does not cause operator distractions on normal plant trips but during accidents could pose significant distractions. Misaligned cams could cause improper loading sequence and subsequent loss of emergency power system.

RESOLUTIONS:

Prior To Plant Startup

1. Carefully examine the protective covers and redesign, if appropriate, to preclude additional sequencer failures from cover interference.

2. Utilize spare contacts on the sequencers, in parallel with those already in use, for redundancy in the most critical applications.

3. Perform procedures ESS-E-12 and ESS-I-13; include recommendation No 2 on Page 6 of IOM: D-PAL-84-195A from RESchrader (RES 32-84) dated 12/7/84.

4. Perform Technical Specification surveillance tests on each sequencer to ensure operability.

Before The End of REFOUT 87 Evaluate alternatives II, III and IV of IOM: RES 32-84 to determine if redesign/replacement provides a cost effective solution for resolution of sequencer failures.

OBSERVATION NO: ESS-27 COMPONENT(S): Recirculation Actuation Circuitry

EVALUATOR(S): BNYoung REV NO: 1 DATE: 06/23/86

DESCRIPTION: Previous failures of RAS circuitry as documented by corrective action documents. There are no repeat items. These items (E-PAL-84-032, E-PAL-84-031, Work Order 24602377) are all related to the same single item; other items are unrelated items on the same system.

REF: E-PAL-84-37, E-PAL-84-32, E-PAL-84-31, D-PAL-86-53

SIGNIFICANCE: Safety Related. Not an active operator concern or distraction. Listed due to repeat failures.

RESOLUTIONS:

No Further Action Required

APPENDIX B

PALISADES PLANT ADMINISTRATIVE PROCEDURE 4.08

"POST-TRIP REVIEW REQUIREMENTS"

AND

MAY 19, 1986 POST-TRIP REVIEW REPORT