

PROGRAM PLAN
FOR
TMI IMPROVEMENTS
INTEGRATION EFFORT
FOR
WASHINGTON NUCLEAR PROJECT NO. 3

LIST OF REVISION

REV

0 Initial Issue

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1.0 INTRODUCTION

As a result of the accident at Three Mile Island (TMI), the Nuclear Regulatory Commission (NRC) developed a number of regulatory criteria to improve the emergency response capabilities for nuclear power plants. This document provides the programmatic elements and simplified planning schedule for the Washington Nuclear Project No. 3 (WNP-3) effort to implement the various TMI promulgated improvements.

2.0 OVERVIEW

The major activities currently underway involving TMI promulgated improvements are summarized below:

- 2.1 Control Room Design Review (CRDR) Program, as principally governed by references 4.3, 4.4 and 4.5.
- 2.2 Post Accident Instrumentation Program, which is mainly governed by references 4.2 and 4.3.
- 2.3 Emergency Procedures Program, as guided primarily by references 4.3 and 4.6.
- 2.4 Safety Parameter Display System (SPDS) Program, which is primarily governed by references 4.3 and 4.7. WNP-3 utilizes the term Emergency Data System (EDS) and this term will be used throughout this plan.
- 2.5 Plant Monitoring System (PMS) Program.
- 2.6 Off-site Dose Assessment Program, as guided chiefly by reference 4.2.
- 2.7 Operating Procedures Program, which utilizes references 4.3 and 4.6 for guidance.
- 2.8 Emergency Preparedness Program, as guided mainly by references 4.3 and 4.10.
- 2.9 Operator Training Program, as governed primarily by reference 4.3.

The above programs involve multiple discipline elements (e.g., Engineering, Licensing, Operations, etc.) from the Supply System, Architect Engineer (Ebasco Services, Inc.), reactor vendor (Combustion Engineering) and various consultants. All of the above efforts must ultimately be integrated into the operator and plant personnel training effort and subsequently shown to properly support plant operation.

3.0 PROGRAMMATIC ELEMENTS

Reference 4.3 provides the primary NRC guidance with respect to criteria for post TMI improvements, which can be broadly categorized as involving enhancements to the control room, operator training/procedures and accident monitoring instrumentation. Major WNP-3 programs involving these enhancements include:

- a) Control Room Design Review (CRDR)
- b) Post Accident Instruments
- c) Emergency Operating Procedures
- d) Emergency Data System (EDS)
- e) Plant Monitoring System (PMS)
- f) Off-site Dose Assessment
- g) Operating Procedures
- h) Emergency Preparedness Program
- i) Operator Training

Figure 3-1 provides a simplified logic network for these programs and their interrelationships with a more detailed discussion provided later in this plan. Appendix B of this plan provides key milestone dates for the TMI Improvements Integration Effort.

A number of organizations from the Supply System, Architect Engineer, Reactor Vendor and consultants are involved in the TMI improvements effort, with overall coordination and integration provided under the auspices of the Project Completion Manager for WNP-3. Management control of the various reference 4.3 criteria is effected through the Project Change Management System while the status of the TMI improvements is followed by Project Engineering. Appendix A is an organizational chart for WNP-3 and is provided for informational purposes.

3.1 Control Room Design Reviews (CRDR) Program

The objective of the Control Room Design Review Program is to improve the ability of the control room operators to prevent accidents, as well as deal with those that might occur, by improving the quality of the available information thereby facilitating appropriate responses.

The CRDR Program is managed by the Supply System's WNP-3 Project Engineering organization, and heavily supported by the Plant Operations organization. The Project Manager provides the decision authority for acceptance of the program and subsequent plant enhancements, with reference 4.5 being used as an acceptance guideline.

The CRDR Program is the core of the WNP-3 TMI improvements effort and is conducted pursuant to references 4.4. and 4.5, with implementation being effected by the Supply System, the Architect Engineer (Ebasco), and human factors consultant(s) (Lund Consulting Inc.) with the reactor vendor (Combustion Engineering, Inc.) providing support as necessary.

The basic elements of the CRDR are listed and briefly discussed below -- also see Figure 3-1.

- 3.1.1 Control Room Survey/Inventory - This phase of the program involves a survey of the existing control room and comparison with standardized human engineering guidelines.
- 3.1.2 System/Task Analysis - This phase of the program identifies and defines the functions and tasks performed in the control room. The effort is based on the reference 4.11 generic emergency guidelines developed by the Combustion Engineering Owners Group (CEOG), as augmented by WNP-3 specific guidelines. In addition, information is utilized from the evolving Emergency Data System, Plant Monitoring System, and Post Accident Instrumentation Programs. The effort also provides feedback to the Emergency Operating Procedures Program.
- 3.1.3 Human Engineering Discrepancies (HEDs) - In parallel with the preceding program elements, potential control room shortfalls in human engineering principles are developed. The HED development efforts can generally be categorized as follows:
 - (i) Potential HED involving relatively easily correctable shortfalls in control board format presentation. These potential HEDs are developed from and with the control room survey/inventory effort.
 - (ii) Shortfalls in control room's ability to optimally support operator actions identified during the system/task analysis effort.
- 3.1.4 HED Assessment - This effort involves evaluation of the seriousness of potential HEDs and subsequent categorization according to safety significance.

- 3.1.5 Development of Plant Enhancements - Modifications to the control room and plant are developed in response to those HEDs judged to warrant design enhancements. Information on these changes is integrated as appropriate into the Emergency Operating Procedures Program, Operating Procedures Program, Emergency Preparedness Program, Emergency Data System Program (EDS), Plant Monitoring System (PMS) Program and Post Accident Instrumentation Program.
- 3.1.6 Implementation of Plant Enhancements
- 3.1.7 Verification of Improvements - This effort basically entails assuring that various hardware improvements (e.g., Post Accident Instruments, EDS, PMS enhancements) are actual betterments to the plants safety.
- 3.1.8 Validation Effort - This effort involves operator walk throughs using the plant's emergency/operating procedures and fully improved control boards, the effort provides validation that the WNP-3 control room does indeed acceptably support safe plant operations.
- 3.1.9 Final Report - A final report, documenting the entire CRDR, is forwarded to the NRC at the conclusion of the program.

Reference 4.1 provides the specific details of the WNP-3 Control Room Design Review Program.

3.2 Post Accident Instrumentation Program

The objective of the Post Accident Instrumentation Program is to integrate into the WNP-3 design the applicable instrumentation improvements discussed primarily in Regulatory Guide 1.97, reference 4.2.

This program is managed by WNP-3 Project Engineering with the various hardware and allied documentation changes being implemented by the Architect Engineer and NSSS vendor. The effort provides input to the System/Task Analysis effort of the CRDR as well as Training Program and Emergency/Operating Procedures Programs. The Project Manager provides the decision authority for acceptance of the program and subsequent plant enhancements, with reference 4.2 serving as an acceptance guideline.

A detailed report of the post accident instrumentation used at WNP-3 is forwarded to the NRC upon finalization of the design development effort.

3.3 Emergency Operating Procedures Program

The objective of this program is to provide for operating procedures to assist operator response to emergency situations. This effort is guided primarily by references 4.3 and 4.6.

This program is managed by Plant Operations, with input from Project Engineering and Licensing as appropriate. Actual development of the emergency operating procedures is provided through the NSSS vendor and/or consultants as necessary. The Plant Manager provides the decision authority for acceptance of the Emergency Operating Procedures, with reference 4.9 being used as an acceptance guideline.

The effort is built upon the Emergency Guidelines developed by the Combustion Engineering Owners Group (GEOG) - see reference 4.11. WNP-3 specific guidelines are utilized to create the actual emergency procedures as well as support the System/Task Analysis effort of the CRDR. Feedback from the CRDR Task Analysis effort is also used to assist in development of procedures.

The Emergency Operating Procedures are integrated into the Operator Training Program as the procedures are developed and modified as a result of other TMI improvements programs. The CRDR Validation Effort provides for demonstration of the adequacy of these procedures.

3.4 Emergency Data System (EDS)

The objective of this program is to provide for a computer based, and optimally human engineered, graphic display of information important to the safe shutdown of the power plant. References 4.3 and 4.7 are the governing regulatory documents for this effort.

The EDS program is managed by Project Engineering, and heavily supported by Plant Operations. The NSSS vendor (CE) provides the computer, peripherals, display development and supporting documentation with the Architect Engineer (Ebasco) providing for integration of the equipment into the plant. The Project Manager provides the decision authority for acceptance of the EDS with reference 4.3 providing acceptance guidelines.

The EDS program provides information to the System/Task Analysis effort of the CRDR with a feedback loop providing data from the HED Assessment and Plant Improvements portion of the Control Room Design Review program. Information from the startup testing phase of the EDS Program is utilized in support of the CRDR verification effort. The EDS Program merges into the Training and Emergency and Operating Procedures effort. In addition, the EDS Program display format information is employed in the Plant Monitoring System Program to facilitate development of consistent displays. Color Cathode Ray Tubes (CRTs) from the EDS are provided in both the Technical Support Center and Emergency Off-site facility.

The EDS is based on the CE Critical Functions Monitoring System (CFMS) currently in use at Units 2 and 3 of the San Onofre Nuclear Generating Station.

3.5 Plant Monitoring System (PMS) Program

The objective of this program is to provide for a computer based and optimally human engineered, graphic display of information important to the power production phase of plant operations. While this system is not explicitly governed by post TMI regulatory criteria, WNP-3 considers that enhancement of accident prevention techniques is an important part of the overall TMI improvements effort. The PMS is therefore included in the integrated effort.

The Plant Operations organization is responsible for display development with Project Engineering providing for design interface control. The NSSS vendor (CE) provides the system with the Architect Engineer (Ebasco) providing for integration into the plant. Display development implementation is provided through the NSSS vendor, consultants and Plant Operations organization as necessary. The Plant Manager provides the decision authority for acceptance of the PMS displays with the Project Manager accepting PMS hardware modifications.

Design information from the PMS program is utilized in the System/Task Analysis portion of the CRDR Program and feedback loop from the HED Assessment and Plant Improvements portion of the CRDR program is used to enhance PMS displays. The PMS Program merges into the Training and Emergency/Operating Procedures efforts. Data from the Startup Test phase of the PMS Program is used in the CRDR verification of improvements effort. As previously noted, the SPDS Program provides information to assist in development of consistent CRT displays.

3.6 Off-site Dose Assessment Program

The objective of this program is to provide the plant with the capability to readily identify and project off-site radiation doses that may be attributable to accidents. This program is governed primarily by reference 4.2, 4.7, 4.12 and 4.13.

The program is managed by the Supply System's Emergency Preparedness Organization with design interface control provided by Project Engineering. The Plant Manager provides the decision authority for acceptance of the Off-Site Dose Assessments Program with the Project Manager accepting plant modifications with reference 4.2 providing acceptance guidelines.

The intent of WNP-3 is to utilize the EDS to provide for off-site dose assessment. As such atmospheric model and sensor inputs are provided to the EDS design development effort. Alternate off-site

dose assessment concepts are also evaluated in order to ultimately provide the plant with a cost effective system consistent with established regulatory criteria.

3.7 Operating Procedures Program

The objective of this program is to provide for operating procedures to assist operation of the power plant. While this effort is not explicitly governed by post TMI regulatory criteria, the Supply System considers that enhancement of accident prevention features is an important part of the TMI Improvement's Integration Effort. Accordingly, the Procedures Program is a part of the overall integration effort.

This program is managed by Plant Operations, with input from Project Engineering and Licensing as appropriate. Actual development of operating procedures is provided through the NSSS vendor, Architect Engineer, Plant Operations and/or consultants as necessary. The Plant Manager provides the decision authority for acceptance of the operating procedures.

All the various hardware related programs (e.g., EDS, PMS, Post Accident Instruments, etc.) merge into the operating procedures effort through the various technical/instruction manuals provided by the various vendors. The Architect Engineer and NSSS vendor as well as Project Engineering provide assistance in the proper utilization of the aforementioned information. Select operating procedures will be used during the CRDR Validation effort in order to demonstrate procedure adequacy.

3.8 Emergency Preparedness Program

The objective of this program is to provide the necessary arrangements, directions and organizations to effectively resolve any plant emergency to ensure the safety of the general public and to safeguard plant personnel and property. References 4.3, 4.7 and 4.10 provide the primary regulatory guidance for this program.

The program is managed by the Supply System's Emergency Preparedness Organization with support as necessary by Plant Operations and the Project. The Plant Manager provides decision authority for acceptance of this program with reference 4.10 providing the acceptance criteria.

The WNP-3 Emergency Preparedness Plan is detailed by reference 4.12. As noted in this plan, a Technical Support Center (TSC) is used to provide a location for on-site technical assistance to the plant staff during emergency situations. Also, an Emergency Operations Facility (EOF) is provided for overall management of off-site responses. Both of these facilities employ extensive communications and CRT displays driven by the EDS for information on

plant conditions as well as off-site dose projections and radioactive effluent monitoring. An off-site operations support center is also provided as the primary staging area for in-plant emergency recovery teams.

Emergency Plan Implementing Procedures are utilized to assist plant response to emergency situations with demonstration of program effectiveness is accomplished by drills leading to the WNP-3 emergency exercise which is observed and approved by the NRC and other cognizant regulatory organizations.

3.9 Operator Training Program

The objective of this effort is to ensure that the plant staff receives adequate training in order to support the safe and economic operation of the plant. TMI promulgated improvements are generally identified in reference 4.3.

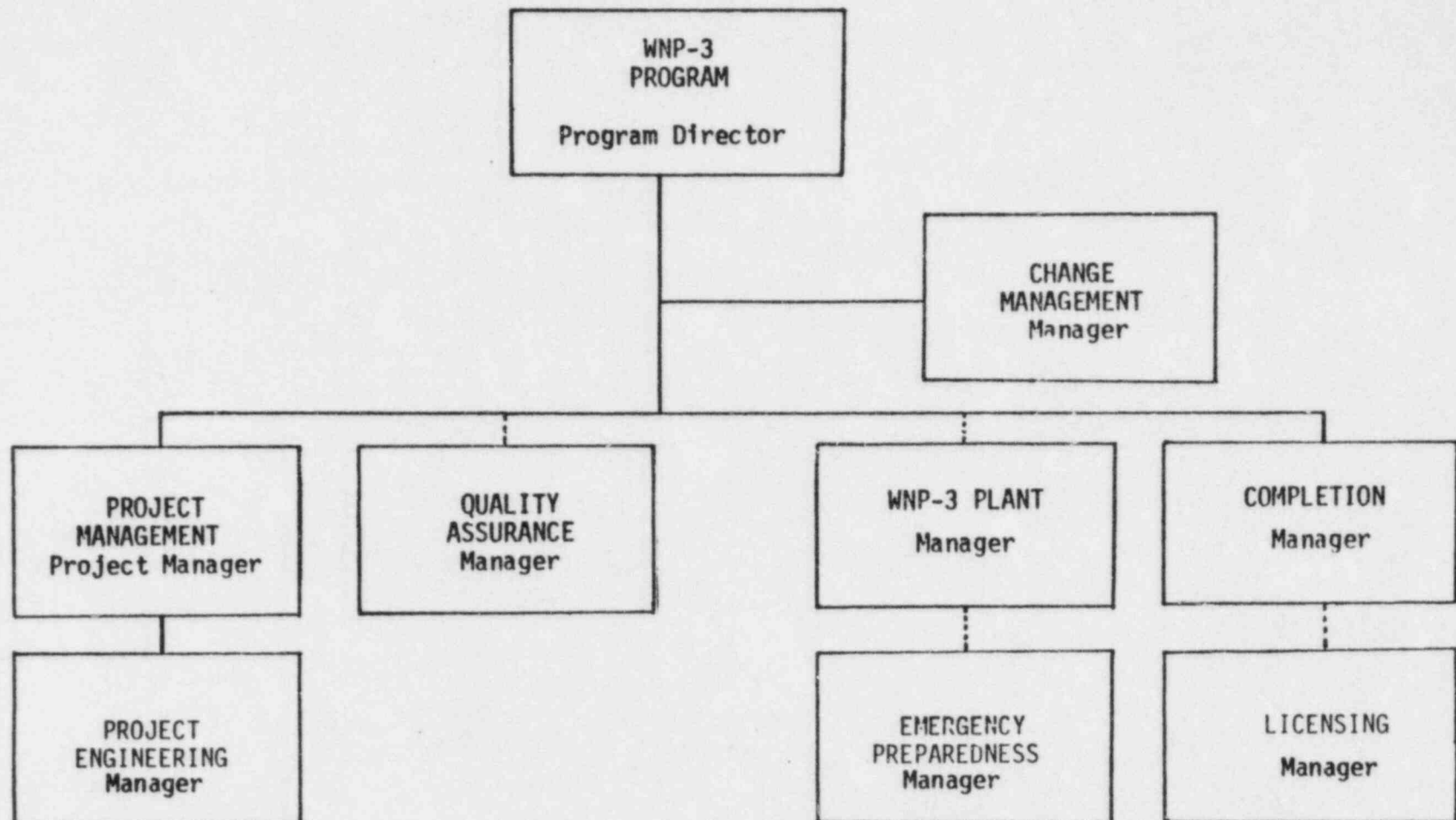
This program is managed by Plant Operations with input from Project Engineering and Licensing as appropriate. Actual training packages are developed by Plant Operations, the NSS vendor, Architect Engineer and/or consultants as necessary. Specialized advanced reactor training packages are provided through CE Owners Group (CEOG) activities. All the TMI improvements programs merge into the training program. The Plant Manager provides the decision authority for acceptance of the Training Program.

4.0 REFERENCES

- 4.1 Control Room Design Review Program Plan -- Washington Public Power Supply System, Nuclear Project No. 3. (To be issued.)
- 4.2 Regulatory Guide 1.97, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant Environs Conditions During and Following an Accident" Rev. 02.
- 4.3 NUREG-0737, "Clarification of TMI Action Plan Requirements" (November 1980).
- 4.4 NUREG-0700, "Guidelines for Control Room Design Reviews" (September 1981)
- 4.5 NUREG-0801, "Evaluation Criteria for Detailed Control Room Design Reviews" (September 1981).
- 4.6 NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures" (February 1982).
- 4.7 NUREG-0696, "Functional Criteria for Emergency Response Facilities" (January 1981).
- 4.8 Deleted.
- 4.9 Deleted.
- 4.10 Part 10 of the Code of Federal Regulations, Title 50.47 and Appendix E.
- 4.11 Combustion Engineering Emergency Procedures Guidelines, CEN-152 Rev. 01.
- 4.12 "Final Safety Analysis Report -- Emergency Preparedness Plan," Supply System Nuclear Project No. 3.
- 4.13 NUREG-0654/FEMA-REP 1 rev. 1 "Criteria for Preparation and Evaluation of Radiological Emergency Response Plant and Preparedness in support of Nuclear Power Plants.

Appendix A

WASHINGTON PUBLIC POWER SUPPLY SYSTEM



APPENDIX B

TMI IMPROVEMENTS INTEGRATION EFFORT -- KEY SUBMITTAL MILESTONES

- 1) Emergency Procedures Guidelines -- December 1982
(CE Owners Group - Issues)
- 2) Control Room Design Review Program Plan -- June, 1983
- 3) Writers Guide for Emergency Operating Procedures --
March 1984.
- 4) Post Accident Instruments Report -- March, 1984
- 5) Emergency Data System Safety Analysis -- May, 1984
- 6) Control Room Design Review Summary Report -- July, 1985

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