January 17, 1990

MEMORANDUM FOR: Docket Files 50-206, 50-361, 50-362, 50-275, 50-323, 50-528, 50-529, 50-530

FROM: Dennis F. Kirsch, Chief
Reactor Safety Branch

The attached document titled "Systems Engineering" has been provided to certain licensee staff personnel with responsibility related to certain of the above docket numbers.

/S/

Dennis F. Kirsch, Chief
Reactor Safety Branch

RV/jk

[REQUEST COPY]
[(YES) / NO]
[SEND TO PDR]
[(YES) / NO]

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memo

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CALIFORNIA 94596

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MEMORANDUM FOR: Docket Files 50-206, 50-361, 50-362, 50-275, 50-323, 50-528, 50-529, 50-530

FROM: Dennis F. Kirsch, Chief
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D.F. Kirsch

Dennis F. Kirsch, Chief
Reactor Safety Branch

SYSTEMS ENGINEERING

The system design basis needs to be understood and maintained by the site engineering staff. This is an important aspect to the quality performance of technical work - the maintenance of plant systems in conformance with the design basis throughout the plant operation activities. The following defines a method for accomplishing this aspect of technical work performance. The stated purposes can be accomplished in a variety of ways; but, their accomplishment is desirable and can result in improved reliability, reduced plant challenges, and reduced system down-time.

A. Purpose

1. Assure that system design bases are maintained throughout the plant operation and design change process.

2. Assure that the as-built configuration of the system is maintained in accordance with the approved design.

3. Assure that performance degradation is detected and corrected before manifestation in plant events, transients, or system downtime.

4. Assure that components exhibiting unsatisfactory or unreliable operation or characteristics are identified and action taken to improve performance.

B. Suggested Considerations for Program Attribute Definition

1. System Engineer program expectations should be clearly established and communicated.

2. The responsibilities of the System Engineer (SE) should be clearly established and communicated.

3. The information needed by the Systems Engineer to accomplish the stated responsibilities should be identified and a mechanism put into place to provide that information to the SE.

4. For each system, management should carefully assess and define those parameters which are critical to assuring operation of the system within the design basis.

5. An assessment should be performed to establish how many systems (workload) can reasonably be assigned to one systems engineer consistent with program expectations, systems engineer responsibilities, and system complexity.

6. The staff size required to effect the program consistent with the above attributes should be assessed and established.

7. System engineers should be selected based on a careful assessment matching systems to individual engineer skills.

B. 8. A documented training program should be established which:

a. Assesses and provides for the training needs of each individual systems engineer.

b. Provides a means of assessing the effectiveness and retention of the training.

9. Interface expectations with other utility organizations should be defined and communicated, including individual contacts, documents needed to accomplish interface requirements, and responsibility.

C. Suggested Training Needs for Systems Engineers

1. Design (Supplied by Engineering and Licensing)

a. Assumptions used by the designer.
b. System design basis and limits.
c. Reasons for specific component installation and selection.
d. Licensing basis accidents and technical specifications.

2. Operational Characteristics

a. System functions and theory of operation.
b. Interfaces with and effects on other plant systems.
c. Component functions, and environmental qualification requirements.
d. Operational limits.
e. Instrumentation installed; automatic functions and controls; tolerances; protective functions, and alarm, control, and protection setpoints.
f. Power plant integrated operation.
g. Instrumentation and control theory and installation.
h. System normal and emergency operating procedures.
i. System surveillance and IST procedures, including scheduling.
j. Applicable technical specifications and bases.

3. Major Component Manufacturer Technical Manuals to Establish

a. Parts and components which are particularly sensitive and require special knowledge or precision in the performance of preventative and corrective maintenance.
b. Manufacturer's recommended operating limits.
c. Manufacturer's recommended preventive maintenance details and frequency.
d. Testing activities used which differ from manufacturer's recommendations and why.

4. Industry Codes and Standards Applicable to the System

5. Applicable ASME B&PV Code, Section XI, regarding repair rules, ISI requirements, and IWP/IWV test applicable to the system, including the bases and trending requirements.

6. 50.59 review requirements.

D. Suggested Information Needed by the Systems Engineer to Effectively Accomplish the Stated Purpose

1. Equipment history records.

2. Preventive maintenance and corrective maintenance requests and documentation of completed work to enable:

   a. holdpoint assignment consistent with important or sensitive activities;
   b. problems encountered in the performance of the maintenance activity;
   c. assessment of acceptance criteria and data correctness and completeness;
   d. maintenance procedure recognition of manufacturer's recommendations;
   e. assessment of the adequacy of operability retest requirements and data.

3. ISI, IWP, IWV data and trends.

4. Surveillance test data and trends.

5. Before/after calibration data, history, and frequency.

6. Equipment/component problems experienced in the industry and within the utility and applicable to the components installed in the particular system.

7. Design Change/Modification information.

8. Open maintenance work items remaining.

9. Changes to operating, surveillance, IST, maintenance procedures and technical specifications.