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

DOCKETED
USNRC

'82 SEP 22 A10:07

OFFICE OF THE
COMMISSIONER

50-387/388
~~50-358~~

September 17, 1982

MEMORANDUM TO FILE

FROM: Edward Abbott, Technical Assistant to Commissioner Gilinsky

SUBJECT: VISIT TO THE SUSQUEHANNA STEAM ELECTRIC STATION

SUMMARY

Commissioner Gilinsky and I visited the Susquehanna plant on September 13, 1982. We toured the simulator and the plant. We had discussions with the Regional Adminstrator, Mr. Ronald Haynes and the Resident Inspector, Mr. John McCann. At the conclusion of our visit, we met with the licensee and toured the Emergency Operations Facility.

SIMULATOR TOUR

We arrived at the training center early in the morning. We were met by Mr. Art Fitch, an instructor. Mr. Fitch described the simulator's layout, operation and capabilities. The Susquehanna simulator has computer displays above the controls for reactivity, feedwater and condensate and the turbine. Each panel has a selector switch which enables the operator to look at any of the displays at any one of the panels. The controls for the emergency systems are to the right and do not have the displays. The control switches are small in comparison to the pistol grip type switches found in older plants. The control room is similar to but not as advanced as the "Nuclenet" control room recently developed by General Electric.

Mr. Fitch initialized the simulator for a start-up. After he familiarized me with the panels, I pulled control rods until the "reactor" went critical and continued increasing power until some of the Intermediate Range Monitor downscale alarms cleared. This took about twenty minutes. There was little difference between the computer driven display information and the hard-wired instrumentaion I have used under similar plant conditions. The hard-wired instrumentation for this plant is at the operator's back when he is standing at the control panel. Verifying that the hard-wire instrumentation is tracking with the computer display information requires turning away from the control panel and looking over your shoulder at the back panel.

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The Plant Manager, Mr. Harry Kieser, discussed various other displays for the turbine driven feed pumps, reactor vessel water level and reactor pressure. He also demonstrated the way in which the displays tracked during a loss of a main feedpump and a main steam line break. During the main steam line break, it was easy to follow water level on the CRT display. Parameters such as rod position and ECCS pump starts were more difficult to follow as they had to be observed using the more traditional front panel indicators such as annunciators and valve indicating lights.

PLANT TOUR

After the tour of the simulator, we went to the Unit 1 guard house and were processed through security. We met briefly in Mr. McCann's office, discussed the progess of the startup test program and began our plant tour accompanied by Mr. Kieser and Mr. Mel Gmyrek, a shift supervisor. We toured the following areas:

Recirculation Pump Motor Generator Set Room
Turbine Deck
Emergency Core Cooling Pump Rooms
Technical Support Center
Control Room
Refuel Floor
Main Steam Line Tunnel
Hydraulic Control Units and Control Rod
Drive System Equipment Areas
Lower Cable Spreading Room
Relay Room
Remote Shutdown Panel
Condensor Bay

During the tour, we looked at several TMI related changes to the plant. These included the tie-ins in the relay room for the Safety Parameter Display Panel (SPDS), the Post Accident Sampling Station in the Recirculation Pump Motor Generator Set Room and the dose-assessment computer in the TSC. While we were in the TSC, Mr. Kieser demonstrated the methods available to the plant staff for evaluating the off-site doses using the meterological and release data. We also discussed the manning of the TSC, the EOF and the plant procedures for handling accidents which result in off-site releases. Mr. Kieser, who has training in these procedures, seemed to know them well.

The tour of the control room included a look at the seismic monitor, excess-flow check valve indicators, TIP control panel and the loose parts monitor. The Unit 2 side of the control is not complete. Mr. Kieser said that measures would be taken to keep the construction activity in Unit 2 from interferring with start-up operations in Unit 1 when work re-starts in the Unit 2 control room.

The operators are currently in a four shift rotation for start-up testing. Once the testing is complete, they will be in a six shift rotation. Each shift has a shift supervisor, a senior reactor operator, two reactor operators and two auxiliary operators. Shift manning when Unit 2 becomes licensed is still under development.

MEETING

After the tour, we met with some of the corporate managers responsible for Susquehanna. The agenda and handouts are attached. The management organization appears to be staffed adequately with experienced people. Corporate management meets weekly with the company's president and monthly with the board of directors to discuss the Susquehanna project. In addition, there is a corporate safety assessment group reporting to the senior nuclear vice president. The Shift Technical Advisors are part of this group. The operating staff has reactor operators that are mostly from within the company and supervisors that have operating experience outside the company. They have committed to having at least one operator on each shift with previous commercial operating experience. There are no college degreed operators and the STA's are not licensed.

The utility appears to have handled the Mark II containment problems well. They were involved early in the resolution of the problems and had plant specific research performed in Germany.

At the end of the meeting there was a lengthy discussion about the control room CRT displays. Mr. Kenyon stated that the design of display information had operator input and trained operators could use the displays effectively. We agreed that this was probably true but that the information was dispersed and detailed. Placing important safety information on one CRT would not be difficult and could improve the operator's assessment of transients and accidents. Completion of the SPDS may solve this problem. Mr. Kenyon and Mr. Kieser also said that the plant could be run without the computers and their displays. Exactly what action would be required in the event of their failure was not discussed in detail.

EMERGENCY OPERATING FACILITY TOUR

After our meeting, Mr. Charlie Wike of the licensee's staff gave us a tour of the EOF. The facility is nearing completion and located near the site boundary. We briefly discussed the operation and manning of the EOF. The building is equipped with a filtered ventilation system, independent power supply, decontamination station, communication center and computer link with the plant's computer.

CONCLUSIONS

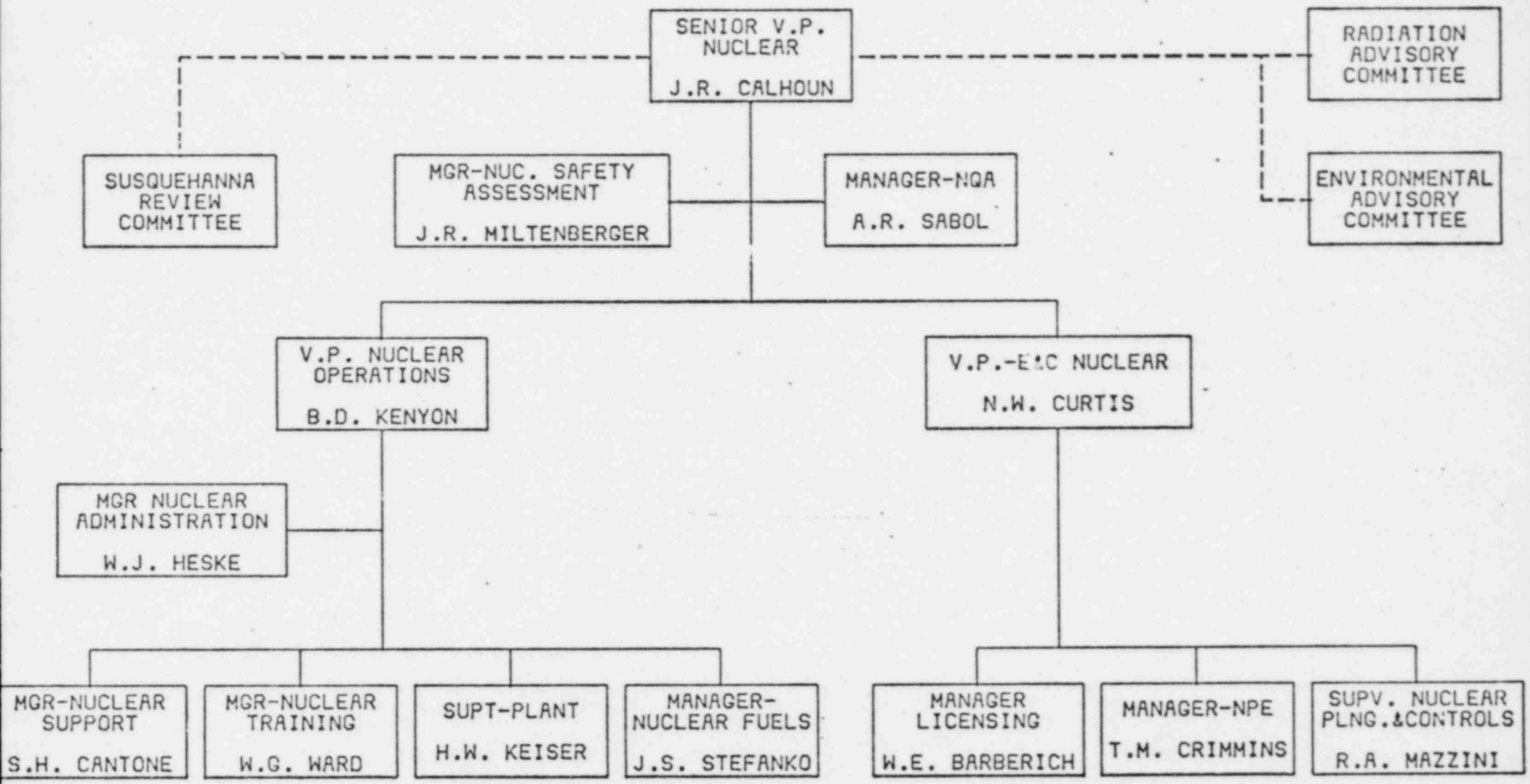
The plant was clean and the control room orderly. The EOF, TSC and emergency planning appear to exceed the requirements of our recently issued policy statement on those subjects (SECY-82-111). The control room design may be a problem. I have, therefore, asked Mr. Hugh Thompson, the Director of the Division of Human Factors Safety, for a briefing on the control design review for Susquehanna and the NRC's policy on the use of computer displays.

Attachments: a/s

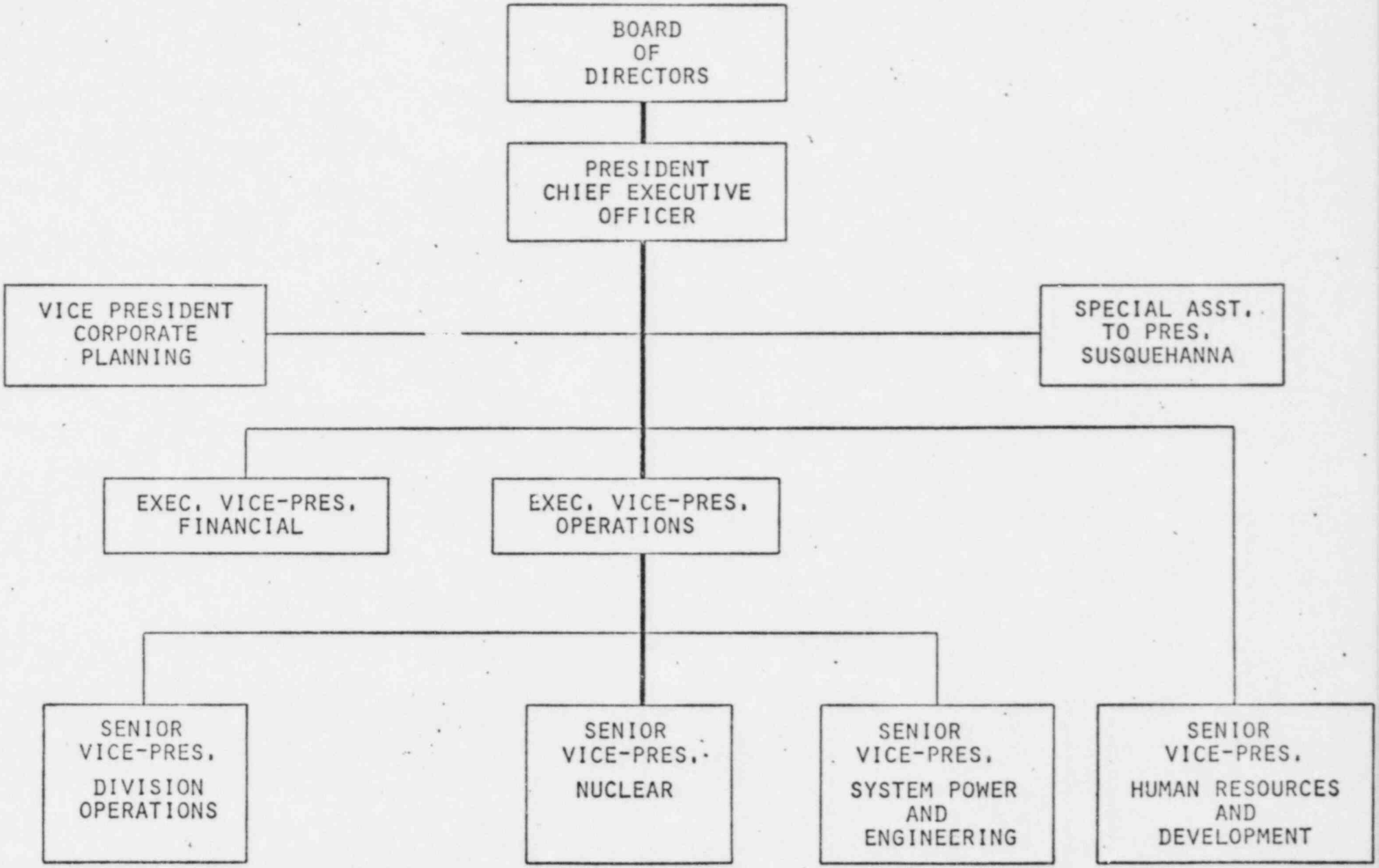
AGENDA

NUCLEAR DEPARTMENT ORGANIZATION	BRUCE KENYON
EMERGENCY RESPONSE	BRUCE KENYON
STARTUP TEST PROGRAM	HARRY KEISER
MK II CONTAINMENT PROGRAM	TOM CRIMMINS
CORE COOLING INSTRUMENTATION	TOM CRIMMINS
TMI HARDWARE CHANGES	TOM CRIMMINS
INSPECTION PROGRAM	NORM CURTIS

NUCLEAR DEPARTMENT ORGANIZATION



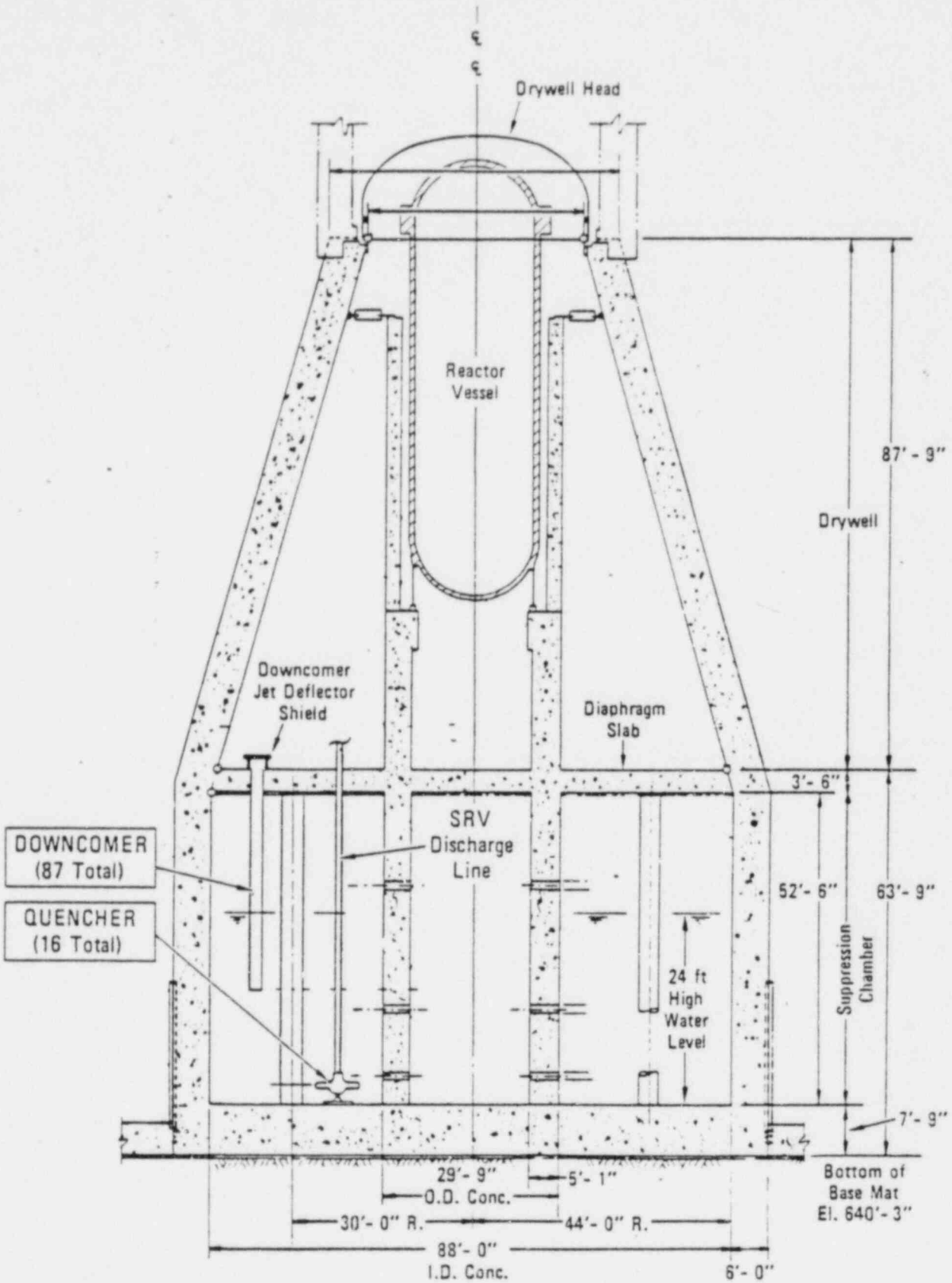
CORPORATE MANAGEMENT ORGANIZATION



SUSQUEHANNA SES

PP&L HYDRODYNAMIC LOADS PROGRAM INTRODUCTION

- Presentation describes the PP&L hydrodynamic loads program used to evaluate SSES
  - SRV
  - LOCA Loads
- Description of SSES containment
- Background on the hydrodynamic loads program
- SSES containment program
  - SRV load definition and Karlstein test program run to verify SRV load
  - LOCA load definition and SSES plant unique GKM II-M test program
- Conclusion



CROSS SECTION OF CONTAINMENT

PP&L HYDRODYNAMIC LOADS PROGRAM
BACKGROUND

- In April 1972, at the Wurgassen Nuclear Plant, a stuck open relief valve caused high vibratory loads which failed a portion of the containment liner plate.

- On November 14, 1974, the Atomic Energy Commission issued Bulletin 74-14 to all BWR Owners to alert them to the potential problems of condensation instability due to SRV operation.

- In January 1975, GE identified several loads which had not been included in the original design basis of the Mark II BWR containments:

  - SRV discharge - thermo-hydrodynamic phenomena

  - Design basis accident (DBA), LOCA hydrodynamic phenomena

PP&L HYDRODYNAMIC LOADS PROGRAM
BACKGROUND

- After GE announcement, PP&L altered the containment construction sequence for SSES to evaluate the effects of these phenomena on the existing SSES design.

- In March 1975, PP&L found a task force with Bechtel and GE to investigate the newly defined SRV and DBA-LOCA loadings.

- In May 1975, Bechtel completed a preliminary study incorporating the effects of the new phenomena.

- As a result, PP&L implemented numerous civil-structural modifications to aid in load transfer and add additional conservation to the existing design.

- In June 1975, PP&L and the other Mark II utilities formed the Mark II BWR containment owners group to address the new load on a generic basis.

PP&L HYDRODYNAMIC LOADS PROGRAM
BACKGROUND

- In September 1975, based on the test programs and actions conducted by the Mark II Owners, a generic Dynamic Forcing Function Information Report (DFFIR) was issued jointly by GE and Sargent and Lundy.

- Based on the analytical techniques included in the DFFIR, PP&L completed a preliminary assessment of SSES in March 1976.

- As the body of useful supportive data increased, Revision 2 of the DFFIR was issued by the Owners on September 1, 1976.

PP&L HYDRODYNAMIC LOADS PROGRAM
BACKGROUND
SRV LOADS PROGRAM

- In November 1976, PP&L selected Stanford Research Institute (SRI), as a consultant to supplement PP&L in-house and Mark II technical resources.

- PP&L and SRI determined that the high, unstable steam condensation loads due to SRV actuation could be eliminated by using a quencher device at the discharge exit.

- The Mark II Owners had quencher related tasks in the program.

- However, based on PP&L's licensing schedule and the uncertainties associated with the Owner's quencher program, PP&L decided to employ the services of Kraftmark Union (KWU) to design a SSES-unique quencher device.

PP&L HYDRODYNAMIC LOADS PROGRAM

BACKGROUND

SRV LOADS PROGRAM

- In April 1978, PP&L submitted to the NRC the quencher load specification.
- To verify KWU's design approach, a full-scale SSES-unique quencher was tested by KWU at the Karlstein test facility.
- The documentation of this test series and verification of the design specification was submitted to the NRC in March 1979.
- Since then, all the Mark II plants except WPPSS have adopted the SSES quencher design.

PP&L HYDRODYNAMIC LOADS PROGRAM
BACKGROUND
LOCA LOADS PROGRAM

- For the most part, PP&L adopted the LOCA load specifications developed by the Mark II Owners.
- However, in NUREG 0487 "Mark II Contained Lead Plant Program Load Evaluation and Acceptance Criteria", the NRC expressed concern about the Mark II LOCA steam condensation load definition based on the original 4T (Temporary Tall Test Tank) tests.
- The Mark II Owners then ran a series of sub-scale tests to resolve the NRC's concerns.
- However, these test proved inconclusive, and PP&L decided that the most expedient way to resolve their concerns was to conduct a series of SSES-unique, full-scale, prototypical steam condensation tests.
- Again, PP&L contracted KWU to run these tests.
- In contrast, to respond to the NRC's concerns, the Mark II Owners modified the original 4T facility (so-called 4T-CO) and ran a new series of LOCA steam condensation tests.
- Based on the GKM II-M data, KWU developed and specified a new LOCA steam condensation load definition.
- The load specification was submitted to the NRC in February & March 1981

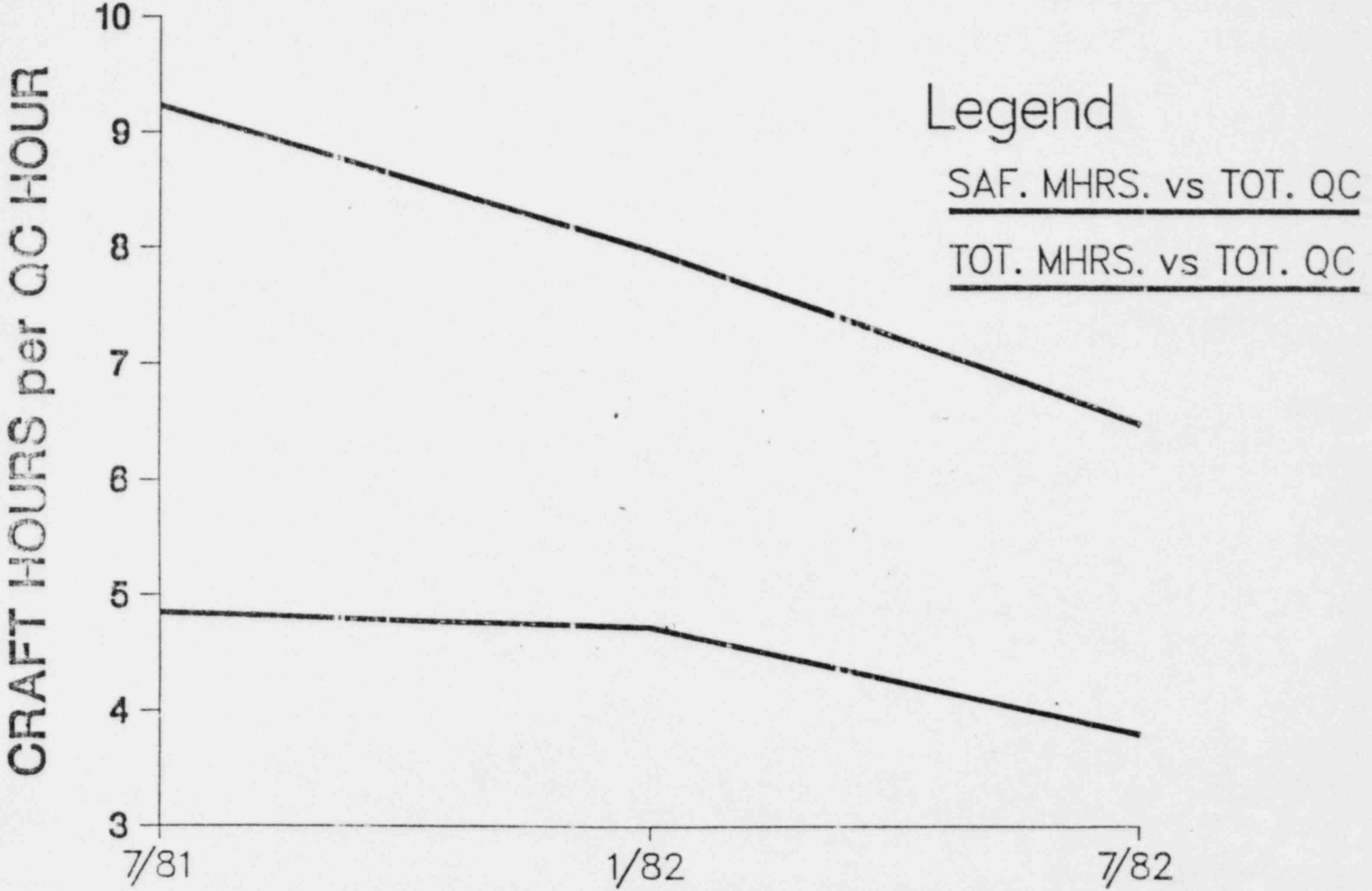
PP&L HYDRODYNAMIC LOAD PROGRAM
BACKGROUND
LOCA LOAD PROGRAM

- A COMPARISON OF THE NEW GKM II-M LOCA LOAD WITH THE 4T LOAD INDICATED POSSIBLE DIFFICULTIES WITH LICENSING THE 4T LOAD SPECIFICATION.

- SSES LICENSING SCHEDULE COULD NOT TOLERATE ANY POTENTIAL DELAYS.

- THUS, ON APRIL 1, 1981, PP&L DECIDED TO TERMINATE THE PLANT RE-ASSESSMENT BASED ON THE 4T LOAD, AND RE-EVALUATE THE ENTIRE SSES PLANT WITH THE ULTRA-CONSERVATIVE GKM II-M LOAD DEFINITION.

RATIO of QA/QC MANHOURS to CRAFT MANHOURS



CRAFT and QA/QC MANHOURS