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

SEP 2 7 1982

MEMORANDUM FOR: M. Srinivasan, Chief
Power Systems Branch, DSI

FROM: O. P. Chopra, Electrical Section
Power Systems Branch, DSI

A. R. Ungaro, Section Leader
Power Section, PSB, DSI

SUBJECT: SUMMARY OF SITE VISIT HELD ON AUGUST 30 THROUGH SEPTEMBER 2, 1982 AT ST. LUCIE UNIT NO. 2

On August 30 through September 2, 1982, the undersigned visited the St. Lucie 2 site to review the design drawings, and view the installation and arrangement of electrical and mechanical equipment. The purpose of this visit was to assure the installation of safety related equipment were implemented in accordance with the design described and the criteria specified in the FSAR.

Enclosure 1 summarizes the major areas and systems observed and identifies areas of concern and their resolutions. A day and a half was spent touring the various areas of the plant and a half day was spent in drawing review and exit interview. Enclosure 2 is a list of attendees. Enclosure 3 is the agenda.

Verification and field inspection for implementation of modifications identified in Enclosure 1 are to be performed by Region II. By copy of this memorandum, it is thus recommended that DL formally request Region II to perform the verification and field inspection of items identified in Enclosure 1.

Om P Chopra
Om P. Chopra
Power Systems Branch, DSI

A. R. Ungaro
A. R. Ungaro, Section Leader
Power Systems Branch, DSI

Enclosures:
As stated

cc: R. Mattson
L. Rubenstein
T. Novak
LB #3 BC
J. Knight
[redacted]
S. Elrod-IE Res. Insp.

8211030251
XA

ENCLOSURE 1

ST. LUCIE UNIT NO. 2

AUGUST 30 THROUGH SEPT. 2, 1982

A site visit and an audit drawing review was conducted by Om Chopra and Al Ungaro of PSB at the St. Lucie Unit 2 station on August 30 through September 2, 1982 to assure that the installation of safety related electrical and mechanical equipment was implemented in accordance with the design described and the criteria specified in the FSAR.

A. Plant Walk Through

The following areas were observed:

1. Control Room

   a. General layout
   b. Diesel control board
   c. Cabling in control room
   d. Power system control and mimic panel
   e. DC system monitoring and alarms

2. Cable Runs and Cable Spreading Area

   a. General layout
   b. Implementation of separation criteria

3. Vital Instrumentation and Control Power Supply Installation

   a. General layout
   b. Physical and electrical separation (divisional)
   c. Potential for damage from fire, missiles, high energy line break, etc.

4. ESF Systems and Pump Rooms

   a. General layout
   b. Physical and electrical independence (interlocks)
   c. Potential for damage due to fire, missiles, etc.
   d. Cabling for equipment identification

5. Other Areas

   a. Electrical penetration areas
   b. Battery and battery charger rooms
   c. Switchgear rooms
   d. Diesel generator rooms
   e. Switchyard
   f. Turbine building
   g. Reactor building
   h. SER items

6. SYSTEM DRAWING

B. Comments

1. In general, we verified that the separation (item 2b) between the redundant divisions or between the Class 1E and non-1E circuits of the same division is maintained. We were informed by the applicant that barriers or cable tray covers will be installed (where separation is marginal) after all the cables are pulled. We expressed concern how this can be verified. We require the applicant to specifically identify on a marked set of drawings all areas where barriers or cable tray covers will be installed so that I&E can verify these installations on completion. The drawings shall include all pertinent data, i.e., material, size, width, thickness, location, etc., for identification of each barrier installed.

2. As part of the in-plant observation (item 4a), we traced control and power cable routes for two redundant high pressure safety injection pumps from switchgear to the pump installations. It was demonstrated that the minimum separation requirements had been met for the two trains of safety injection pumps.

3. The implementation of the identification and color coding schemes (item 4d) for safety-related circuits and equipment were observed. We found only one place where a small portion of a cable tray (for the selected systems observed) was not identified. The applicant committed to properly identify that portion of the cable tray and would also check circuits to assure this condition does not exist elsewhere in the plant.

4. We identified certain items identified in the SER and listed in our site agenda* for design verification during our site visit. Item (12b) of the agenda regarding dc alarms was not implemented and no completion date was given by the applicant for this item. Hence, we request I&E to verify this item on completion. Item (12d) of the agenda regarding correction of unacceptably low voltages on panel PP247 is complete and the applicant will submit the calculations for our review. We will address this item in a supplement to the St. Lucie Unit No. 2 SER.

5. Item (13g) of the agenda*, the applicant has the capability to test fast-dead bus transfer of onsite distribution system buses from unit auxiliary transformer to the startup transformers. However, the capability to test this circuitry during operation does not exist. We require the applicant to modify the design to include this design feature. In addition, we require that this circuitry be included in the Plant Technical Specification for periodic testing. We will address this item in a supplement to the St. Lucie Unit No. 2 SER.

agreed it's in TS.

6. Item 13a of the agenda*, our review of the D/G control drawings revealed that RG 1.108, position '1b5' regarding surveillance system which indicates which of the D/G protective trips is activated first in order to facilitate trouble diagnose, is not implemented in the St. Lucie Unit No. 2 design. We require the applicant to modify the design to include this design feature. We will address this item in a supplement to the St. Lucie Unit No. 2 SER.

7. Our observation during our site visit of item 3 of the agenda* revealed that there are high energy electrical equipment located in the cable spreading area. We informed the applicant that this was inconsistent with the recommendations of Regulatory Guide 1.75. This resulted in an apparent disagreement between FP&L and the staff about the definition of a cable spreading area as defined in IEEE-384. Generally, cable spreading areas are defined by concrete walls and are called cable spreading rooms. Such an area cannot be defined by imaginary lines on a layout drawing but must include adjacent areas (not separated by walls or barriers) in which may be located equipment having the potential to damage safety related cables in the CSR. In the St. Lucie Unit 2 design, high energy electrical equipment is not separated by walls or barriers in the cable spreading area and thus failure of such equipment could have an adverse affect on redundant Class 1E cables. The staff interpretation of the requirement of IEEE-384 with regard to cable spreading area is that it was written to preclude potential damage to redundant Class 1E equipment in the cable spreading area, therefore, the statement to the effect that high energy equipment should be excluded from the area.

   The applicant has argued that a safe shutdown capability independent of the cable spreading area is provided in St. Lucie Unit 2 design, however, that is not an adequate basis for not following the design requirements of R.G. 1.75 and IEEE-384. Using an analogous example, one might conclude that if a safe shutdown capability is provided independent of the cable spreading area, the separation requirements of RG 1.75 for redundant Class 1E cables need not be implemented. This is not, however, true; the requirement for separation per RG 1.75 is independent of the need for a safe shutdown system, as is the requirement for excluding high energy equipment from the cable spreading area. We, therefore, require that these high energy electrical equipment be separated by a wall or a barrier from the Class 1E cable spreading area or provide justification that failure of these equipment will not jeopardize the independence of the Class 1E cables.

* copy of site visit agenda Enclosure 3

ENCLOSURE 2

LIST OF ATTENDEES

NRC

O. P. Chopra
A. Ungaro
S. Elrod-Resident Inspector (part time)

FP&L

J. Franklin
W. Wehler
P. Gaffney
E. Dottson (part time)
J. Sheetz(part time)

Ebasco

W. Lundgran

ENCLOSURE 3

ST. LUCIE UNIT #2

AGENDA FOR SITE VISIT AND DRAWING REVIEW

1. Unresolved Items

   None

2. Control Room

   a. Diesel control board, D/G inoperable status alarm

   b. Power system control and mimic panel

   c. Annunciator panel

   d. D.C. system monitoring and alarm

   e. Cabling in control room (separation)

3. Cable Runs and Cable Spreading Area

   a. Degree of separation

   b. Penetrations and cable terminations

   c. Identification of cables and raceways

4. Switch Gear Rooms

   a. General layout

   b. Physical and electrical separation of redundant units

5. Battery and Charger Installations

   a. General layout

   b. Physical and electrical separation

   c. Ventilation independence

   d. Monitoring instrumentation and alarms

6. Diesel Generator

   a. Physical and electrical separation of redundant units

   b. D/G local control panels, instruments and control

   c. Auxiliary support systems

7. Switchyard

   a. General layout

   b. Physical and electrical separation of transmission lines, buses, and control circuits

   c. Relay house

   d. Control power supplies (AC and DC)

8. Reactor Building

   a. General layout

   b. Separation of piping and cable to redundant equipment

9. Shutdown Outsite Control Room

   a. Remote shutdown panel arrangement, separation and layout

   b. Identification of control and monitoring equipment

10. ESF Systems and Pump Rooms

   a. General layout

   b. Physical and electrical separation of redundant equipment

   c. Identification of cables, raceways and equipment

11. Vital Instrumentation Power Supply Installation

   a. General layout

   b. Physical and electrical separation

   c. Monitoring instrumentation

   d. Identification of cables, raceways and equipment

12. Verification of SER Items

   a. Verify that the tie breaker for DC bus SAB are locked open and closure of any tie breaker is alarmed in the control room

   b. Verify the implementation of alarms for DC system committed at the SER stage

   c. Decision on replacement of existing sequencing relays

   d. Correction of unacceptably low voltages on panel PP247

   e. Verification of analytical method used for calculating the

13. System Drawings

a. D/G control drawings

b. Sequencer schematic diagrams

c. Sample as built schematics showing thermal overload bypass

d. Sample as built schematics showing power lockout to active and passive valves - redundant valve indication

e. Sample as built schematics showing automatic disconnection of non-safety loads from the safety buses on a safety injection signal

f. Sample as built schematics showing electrical penetration overload protection

g. Schematics showing automatic fast-dead bus transfer of onsite distribution system buses from unit auxiliary transformer to the startup transformer

MEETING SUMMARY

Document Control (50-389)
NRC PDR
L PDR
NSIC
TERA

LB#3 Reading
J. Lee
G. Knighton
Project Manager V. Nerses
Attorney, OELD
E. L. Jordon
Regional Administrator, Region II
J. M. Taylor

PARTICIPANTS (NRC):

J. Knight
O. Chopra
D. Hoffman
V. Nerses