ENCLOSURE

March 3, 1981

INTERIM REPORT
PRINCIPAL (BNL) REVIEWER - VINCENT LETTIERI

POST FIRE SHUTDOWN CAPABILITY
ZION STATION, UNITS 1 and 2

Section 4.1 of the SER, Safe Shutdown Systems, states that the licensee has proposed to reevaluate critical areas to demonstrate by analysis, that fire related damage would not inhibit the capability to safely shutdown. The fire areas addressed in the SER are as follows:

- Control Room (Fire Area 2.0-0),
- Cable Spreading Areas (3.1-1, 3.1-2, 3.2-1, 3.2-2),
- Containment Peretration Cable Vaults (3.3-1, 3.1-2, 3.4-1, 3.4-2),
- Auxiliary Electrical Equipment Rooms (5.6-1, 5.6-2),
- Auxiliary Building - Elevation 642 (11.7-0),
- Auxiliary Building - Elevation 617 (11.5-0),
- Auxiliary Building - Elevation 592 (11.4-0),
- Auxiliary Building - Elevation 560 (11.2-0),
- Auxiliary Building - Elevation 579 (11.3-0),
- Auxiliary Building - Elevation 542 (11.1-0),
- Reactor Containment (1.3-1, 1.3-2, 1.2-1, 1.2-2, 1.4-1, 1.4-2), and
- Crib House (18.4A, 18.4B)

By letters dated April 30, 1980, May 28, 1980, September 30, 1980, and November 24, 1980 the licensee has addressed these areas. These documents are titled respectively, Attachment 2, Safe Hot Shutdown Analysis, April 1980; Attachment 1, Safe Cold Shutdown Analysis, May 1980; Enclosure - Response to Items in Enclosure 5 of the March 24, 1980 letter from A. Schwencer to D.L. Peoples; and Attachment 1 - Response to request for information dated March 24, 1980, from A. Schwencer to D.L. Peoples.

The Zion program for safe shutdown relies on existing system equipment with some modifications plus manual realignments of valves and local control of pumps and circuit breakers to achieve hot and cold shutdown. The safe shutdown program also relies heavily on existing or proposed fire protection methods. Primary coolant inventory will be maintained using either the centrifugal charging pumps or the safety injection pumps with suction from the refueling water storage tank (RWST). Overpressure protection is provided by three safety valves on the pressurizer. Decay heat removal will be accomplished by dumping steam to the atmosphere via the atmospheric relief valves, with the steam generator makeup being supplied by the auxiliary feedwater pumps. The auxiliary feedwater pumps will draw suction from the condensate storage tank. To perform a cold shutdown the residual heat removal (RHR) system will be used to reduce the coolant temperature and the pressurizer will be used to maintain pressure. Reactivity control will be maintained by boron concentration in the coolant.

We have evaluated the Zion post fire shutdown capability using NRC guidelines "Staff Position, Safe Shutdown Capability" dated June 19, 1979 and NRC requirements in Section III L of Appendix R to 10 CFR 50. We have found that:

1. Fire areas described in the SER requiring analysis have not all been satisfactorily addressed. The Control Room (2.0-0), Auxiliary Electrical Equipment Room (5.6-1, 5.6-2) and Cable Spreading Areas (3.2-1, 3.2-2) have not been addressed in these submittals except for a sentence on page 1-2 of the Safe Hot Shutdown Analysis. This sentence states "By taking credit for local manual control of pumps, coolers, fans, etc, and manual operation of breakers at switch gear and motor control centers, dependency on control cable contained in the Control Room, Cable Spreading Room and Auxiliary Electric Equipment Room is eliminated."

2. The modifications described in both the Safe Hot Shutdown Analysis and Safe Cold Shutdown Analysis do not provide sufficient detail to state that shutdown can be achieved. The modifications are described in broad, generally one sentence statements in Section 4 of each analysis. For example Item 4.0.d on page 4-1 of the April 30, 1980 letter states "Modifications are planned to ensure the availability of one Auxiliary Building Supply Fan for Safe Shutdowns." The licensee has stated, during a conference call between the NRC, the licensee, and BNL on February 2, 1981, that sufficient detail has been supplied in the form of Attachment 2 of the September 30, 1978 submittal. BNL's review of this attachment indicates that this material needs to be reviewed by a fire protection engineer, in addition to item 3 below.

3. The post fire shutdown capability depends on fire protection measures at least in part in every fire area. These protection features should meet the NRC requirements of Section III G of Appendix R to 10 CFR Part 50.

4. In the licensee's September 30, 1980 response, Enclosure, page E3, response to question 8, the licensee simply states there is sufficient manpower available for shutdown. Appendix R, III L 4 requires sufficient manpower be available to achieve and maintain hot shutdown. The licensee has not demonstrated that the manpower required to perform the shutdown functions are available. The submittal implies numerous individuals would be required to manually and locally control the various components required to shutdown the plant given fires in certain areas as described on pages 2-1 thru 2-3 of the Safe Hot Shutdown Submittal.

5. The licensee did not show the use of flow indication in their list of process monitoring instruments for every system used to safely shutdown the plant.

6. The post fire shutdown capability has not been shown to be isolated from nonsafety related associated circuits so that fire damage to the nonsafety related associated circuits in a fire area may not prevent the operation of shutdown equipment.

We conclude that the proposed alternative shutdown capability for the Zion Station, Units 1&2 does not conform with NRC guidelines and requirements and, therefore, is unacceptable.

We recommend the following:

A. The alternative shutdown capability should be modified to meet the requirements of Section III L of Appendix R to 10 CFR Part 50, taking into consideration the above findings.

B. The licensee should demonstrate that adequate acceptance tests are being performed to provide local control as a replacement for the Control Room (2.0-0) Auxiliary Electrical Equipment Room (5.6-1, 5.6-2) and the Cable Spreading Room (3.2-1, 3.2-2) in regards to the concerns addressed in the SER. These tests should verify that: The equipment operates from the local control station when the transfer or isolation switch is placed in the "local" position and that the equipment cannot be operated from the control room; and that equipment operates from the control room but cannot be operated at the local control station when the transfer or isolation switch is in the "remote" position. The response to question 8(i) on page E3 of the September 30, 1980 submittal does not fully answer this question. If the CECo. Quality Assurance Program Procedures for fire protection cover these types of tests the resubmittal should so state explicitly. (Item 1)

C. The licensee should demonstrate that procedure(s) have been developed which describe the tasks to be performed to effect the shutdown method. Also, the licensee should demonstrate that the manpower required to perform the shutdown functions using these procedures, as well as to provide fire brigade members to fight the fire is available as required by the fire brigade technical specifications. The answers to items 8(h) and 8(f) in the September 30, 1980 submittal are incomplete. (Item 4)

D. The licensee should demonstrate that repair procedures for cold shutdown systems are developed and material for repairs is maintained onsite. Based on a conference call with the licensee on February 5, 1981, the licensee stated that the resubmittal will be clear and that no repairs will be necessary. At that time this item can be deleted. However, the current submittals have a conflict. Item A3.1.3, Page A3-4 of the May 28, 1980 submittal requires the replacement of cables and is in conflict with item 8(l) in the September 30, 1980 submittal, page E-5.

E. The licensee should demonstrate that process monitoring instrumentation is available to completely monitor the plant to assure a safe shutdown is being reached. This should include flow indication for each system used to safely shutdown the plant such as the Component Cooling System and the Service Water System which are being utilized as referenced in paragraph A1.3(2) on page A1-2 of the Safe Cold Shutdown Analysis. Additional process monitoring capability should include pressurizer temperature, steam generator level, condensate storage tank level, and radiation levels. (Item 5).

F. The licensee should demonstrate that an alternative method is available and will be utilized to maintain reactor coolant pressure other than starting and stopping the charging pumps. In our opinion it is not a good practice to control pressure by starting and stopping the charging pump as will be done in item A3.2-2 on page A3-6 of the safe Cold Shutdown Analysis. This practice could lead to a failure of the pump and loss of pressure control. Based on a conference call with the licensee on February 5, 1981, the licensee stated that the resubmittal will delete the starting and stopping of the charging pumps. Another method of pressure control will be utilized in the resubmittal which will require further review.

G. The licensee should demonstrate that spare fuses are available for control circuits where these fuses may be required in supplying power to control circuits used for the shutdown method and may be blown by the effects of a cable spreading room fire. The spare fuses should be located convenient to the existing fuses. The shutdown procedure should inform the operator to check these fuses. The response to question 8(g) on page E2 of the September 30, 1980 submittal does not adequately answer this question. The response does not demonstrate that spare fuses are located convenient to the existing fuses, and that the shutdown procedure informs the operator to check these fuses.

H. Section III.G of Appendix R to CFR Part 50 requires cabling for or associated with redundant safe shutdown systems necessary to achieve and maintain hot shutdown conditions be separated by fire barriers having a three hour fire rating or equivalent protection (see Section III.G.2 of Appendix R). Therefore, if option III.G.3 is chosen for the protection of shutdown capability cabling required for or associated with the alternative method of hot shutdown for each fire area, must be physically separated by the equivalent of a three-hour rated fire barrier from the fire area.

In evaluating an alternative shutdown method, associated circuits are circuits that could prevent operation or cause malfunction of the alternative train which is used to achieve and maintain hot shutdown conditions due to fire induced hot shorts, open circuits, or shorts to ground.

Safety related and nonsafety related cables that are associated with the equipment and cables of the alternative or dedicated method of shutdown are those that have a separation from the fire area less than that required by Section III.G.2 of Appendix R to 10 CFR 50 and have either (1) a common power source with the alternative shutdown equipment and the power source is not electrically protected from the post fire shutdown circuit of concern by coordinated circuit breakers, fuses, or similar devices, (2) a connection to circuits of equipment whose spurious operation will adversely effect the shutdown capability, e.g., RHR/RCS isolation valves or (3) a common enclosure, e.g., raceway, panel, junction box with alternative shutdown cables and are not electrically protected from the post fire shutdown circuits of concern by circuit breakers, fuses, or similar devices.

For each fire area where an alternative or dedicated utdown method, in accordance with Section III.G.3 of Appendix R 10 CFR Part 50 is provided by proposed modifications the following information is required to demonstrate that associated circuits will not prevent operation or cause malfunction of the alternative or dedicated shutdown method.

(1) Provide a table that lists all equipment including instrumentation and support system equipment that are required by the alternative or dedicated method of achieving and maintaining hot shutdown.

(2) For each alternative shutdown equipment listed in (1) above, provide a table that lists the essential cable (instrumentation, control and power) that are located in the fire area.

(3) Provide a table that lists safety related and nonsafety related cables associated with the equipment in cables constituting the alternative or dedicated method of shutdown that are located in the fire area.

(4) Show that fire induced failures of the cables listed in (2) and (3) above will not present operation or cause malfunction of the alternative or dedicated shutdown method.

(5) For each cable listed in (2) above provide a de iled electrical schematic drawing that show how each cab is isolated from the fire area.

I. The residual heat removal system is generally a low pressure system that interfaces with the high pressure primary coolant system. To preclude a LOCA through this interface, we require compliance with the recommendations of Banch Technical Position RSB 5-1. Thus, this interface most likely consists of two redundant and independent motor operated valves. These two motor operated valves and their associated cable may may be subject to a single fire hazard. It is our concern that this single fire could cause the two valves to open resulting in a fire-initiated LOCA through the subject high-low pressure system interface. To assure that this interface and other high-low pressure interfaces are adequately protected from the effects of a single fire, we require the following information:

Identify each high-low pressure interface that uses redundant electrically controlled devices (such as two series motor operated valves) to isolate or preclude rupture of any primary coolant boundary.

Identify the device's essential cabling (power and control) and describe the cable routing (by fire area) from source to termination.

Identify each location where the identified cables are separated by less than a wall having a three-hour fire rating from cables for the redundant device.

For the areas identified in the above paragraph, provide the bases and justification as to the acceptability of the existing design or any proposed modifications.