ENCLOSURE 2

THREE MILE ISLAND, UNIT 1 - FIRE PROTECTION

EVALUATION OF SUPPLEMENT ITEMS THAT ARE COMPLETE

3.1.10 THERMAL INSULATION OF VALVES

SER Section 3.1.10 indicates that thermal insulation will be installed on decay heat valves in the reactor building. The purpose of this insulation is to protect the valves from a reactor coolant pump lubricating oil fire.

By letter of August 27, 1979, the licensee proposed to install lubricating oil splash shields on the reactor coolant pumps, contending that the installation of such shields would prevent a valve-disabling oil fire. The licensee further requested that the proposed modification of the decay heat valves in the reactor building be rescinded.

We agree with the licensee's contention that a valve disabling oil fire is not likely after the reactor coolant pump lube oil collection systems are installed. However, in view of the significance of these valves in providing reactor cooling, the staff requested further assurance on the operability of these valves. Subsequently on November 30, 1979, the licensee confirmed over the telephone that at least one of these valves is accessible for and capable of manual operation. We, therefore, accept the licensee's proposal of not insulating these valves.

3.2.7 ALARM CIRCUIT SUPERVISION

SER Section 3.2.7 indicates that the licensee will perform a study to ensure that the signal initiating and alarm circuits for all fire detection and suppression systems are supervised to detect circuit breaks, ground faults, and power supply failures, and to annunciate in the control room. Additional modification(s) will be proposed if the study determines the need for such.

By letter dated December 28, 1978, the licensee provided the results of such a study to confirm that the presently installed detection system circuits meet the requirements for Class B supervision as defined by NFPA 72D. The proposed detection system will be installed to meet the same supervision requirements. Additional modification is therefore unnecessary.

We accept the licensee's conclusion that there is no need for additional modification to the signal initiating and alarm circuits of the fire detection and suppression systems.

3.2.8 REMOTE SHUTDOWN STATIONS

Section 3.2.8 of our SER indicates that the licensee will perform an analsysis to determine whether a single fire at any location could cause loss of both local control and control from the control room of any safe shutdown system. If the analysis indicates such loss could occur, appropriate corrective modification will be provided.

The Licensee's response of December 28, 1978 indicated that the results of such study revealed that the only location where a fire could simultaneously cause loss of local control and control from the control room of any safe shutdown system is the relay room i.e., cable spreading room.

Because the licensee has already committed to provide an alternate shutdown capability independent of this room, among other commitments identified in Section 5.11 of SER, we will not require additional modification to preserve the shutdown capability from the fire in the relay room.

3.2.10 CONTROL BUILDING HVAC LOSS

Our SER, Section 3.2.10 indicates that the licensee will provide a study of the possible effects of a fire in the area containing the control building HVAC equipment and propose corrective measures if a fire in the area could adversely affect the safe shutdown.

By letter dated December 28, 1978, the licensee provided the results of a study which indicated that the only major redundant components that could be simultaneously affected by a single fire are ventilation exhaust fans. A test was run with these fans out of service but with doors open, and it was estimated that the control room temperature could reach 100°F. Since the plant's Architect-Engineer assured that they do not anticipate any equipment operating problem because of a 95°F-100°F control room temperature, the licensee does not believe any additional modification is necessary.

We accept the licensee's conclusion.

3.2.11 INTERIOR HOSE STATION STANDPIPE LESS THAN 4 INCH DIAMETER

SER Section 3.2.11 indicates that the licensee will demonstrate, by test or calculation, that the subject standpipes are capable of delivering a water flow of at least 100 gpm at a residual pressure of at least 65 psig at the outlet of the hose station.

By letter dated July 5, 1979 the licensee indicated that calculations had been performed which confirmed the subject standpipes are capable of delivering 100 gpm at a residual pressure of at least 65 psig.

We accept the results of the licensee's calculation.

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ENCLOSURE 3
THREE MILE ISLAND, UNIT 1 - FIRE PROTECTION
EVALUATION OF SUPPLEMENT ITEMS FOR WHICH ADDITIONAL
INFORMATION IS REQUIRED

3.1.1 FIRE DETECTORS

Safety Evaluation Report (SER) Section 3.1.1 indicates that the fire detectors will be installed on all levels of the reactor building, in several areas of the auxiliary building, in several areas of the intermediate building, in certain areas of the fuel handling building, and in safety-related control cabinets in the control room.

By letter dated March 16, 1979, the licensee provided six drawings which show the location of the proposed detectors in the reactor building, the auxiliary building, the intermediate building, diesel generator buildings, the fuel handling building, and the control room.

By letter dated May 18, 1979, the licensee indicated that Nuclear Instrument and Reactor Protection System cabinets A, B, C, and D will not be provided with fire detectors. The bases cited for taking such deviation from the earlier commitment are:

- There are no ionization type products of combustion detectors presently manufactured that could be installed inside the cabinets in such a manner that the normal air flow past a proposed detector location would be conducive to the detection of an incipient fire.

- The cabinets are located in an area that is continuously manned, precluding the possibility of fire in the cabinets going undetected.

The licensee, however, did not provide any information concerning the separation of redundant cable (wiring)/equipment inside the cabinets nor the safety consequences of fire damage in these cabinets.

Although these cabinets are located in a constantly manned area and a fire in the cabinets will eventually be detected by persons in the area, possible fire damage should be further limited unless it can be demonstrated that fire damage in these cabinets will not have adverse effect on safe shutdown. Early detection of a fire in these cabinets by fire detectors located therein will allow fire fighting activities be initiated when the fire is at its incipent stage and allow prompt operator actions to limit the possible consequence of fire damage to the plant system.

As to the feasibility of the detector design, the staff has previously evaluated and accepted proposals for installation of automatic fire detectors at similar equipment cabinets at other plants. These proposed installations utilized other detector types or installation of smoke detectors at the ventilation air outlets of the cabinets.

In conclusion, we find that the licensee did not provide sufficient justification for his request, in the May 18, 1979 letter, for deviation from the earlier commitment. We request the licensee to provide additional information for our evaluation of such request. The information should include: (1) Separation of redundant cable/equipment in these cabinets, (2) Fire hazards, such as combustibles, ignition sources, etc., in and around these cabinets and (3) Safe shutdown consequence of fire damage in these cabinets considering a possible spurious transient(s) caused be faulting of circuits in the cabinets.

3.1.9 FIRE BARRIER PENETRATIONS

SER Section 3.1.9 indicates that various types of fire barrier penetrations, including cable and pipe penetrations and building construction joints, will be sealed in various areas of the plant to provide appropriate fire resistance.

By letter dated June 12, 1979, the licensee provided test reports and a NEL-PIA (now ANI) Certificate of Approval for the cable and pipe penetration seal design to be installed at the plant. The test procedure met the staff's criteria for penetration seal fire tests, except that no pressure differential was applied across the seal. The Licensee's letter stated that no significant pressure differentials exist between various plant areas where those seals would be installed.

The licensee has not provided any information on the sealing of building construction joints where the fuel handling building walls abut the reactor building.

We will require the Licensee to quantify the pressure differential between plant areas where the proposed penetration seals will be installed, and to demonstrate by analysis or tests that the proposed penetration will perform as required under such pressure differential and fire conditions. We will further require the licensee to verify that the proposed building construction joint seals have a fire resistance rating of three hours (ASTM E-119), and flame spread and smoke development ratings of 25 or less (ASTM E-84).

3.1.13 REACTOR COOLANT PUMP LUBRICATING OIL COLLECTION SYSTEM

SER Section 3.1.13 indicates that the existing lubricating oil splash guard on each reactor coolant pump will be modified to enclose the pump motor and to drain the collected oil in a drain tank located inside the secondary shield.

By letter dated August 27, 1979, the licensee submitted a drawing and several photographs of the proposed lubricating oil collection system for the staff's review and requested deletion of the requirement of SER Section 3.1.6 (curbs in reactor building) and 3.1.10 (thermal insulation on valves). We accepted the licensee's contention that a satisfactory lubricating oil collection system will obviate the necessity for curbs specified in Section 3.1.6 of the SER. The request to waive the requirement for insulating the valves was discussed earlier in the staff's review of Section 3.1.10. The drawings and photographs of the lubricating oil

collection system showed its outline and design; but did not adequately describe the system. We cannot determine from the available information that all the potential leak points are enclosed by the system. Further, the seismic design criteria of the system are not known to the staff.

The licensee should verify that:

- The proposed system provides a complete enclosure for all potential leakage points, including lift pump and piping, external oil cooler, flanged connections, drain plugs, fill points, upper and lower reservoirs, sight glasses, and overflow lines.
- During a safe shutdown earthquake, the effects of the seismic event on the system will not adversely affect plant safety.
- Strainers or other means of preventing clogging of drain piping are provided.
- A stream of leaking oil from pressurized parts will not impinge on the ventilation louvers at an angle which permit the oil to escape.

We accept the design of the proposed lubricating oil collection system subject to a satisfactory resolution of the staff's concerns identified above.

3.2.3 EFFECTS OF WATER SPRAY

Our SER, Section 3.2.3 indicate that the licensee will analyze the effect of water spray to ensure that both divisions of safety-related equipment will not be incapacitated by rupture or inadvertent operation of the fire water system, or the application of fire hoses. Additional modifications(s) will be provided as necessary.

By letter dated December 28, 1978, the licensee indicated that all plant areas containing safety related equipment have been reviewed and with the exception of two areas, it was determined that water spray from fire protection sources will not simultaneously affect divisions of safety-related equipment. Drip shields will be provided to preserve at least one division of electrical equipment in each of these two areas. Design description of such drip shield should be submitted for the staff's review.

The licensee's submittal, however, provided no information with regard to the assumptions, method, and criteria used in performing such study. The staff is, therefore, unable to determine the adequacy of the licensee's method of analysis and the propriety of their conclusion. The licensee is requested to submit these information for the staff's review.

The licensee has confirmed in November 30, 1979's telecon that their analysis has considered possible additions or modifications of the fire water system identified in the fire protection SER.

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3.2.4 ADEQUACY OF THE DETECTOR SYSTEM DESIGN

SER Section 3.2.4 indicates that the licensee will perform a study and/or testing to verify the adequacy of existing and proposed fire detector placement and distribution.

By letter dated July 11, 1979, the licensee indicated that a study had been done which concluded that the existing fire detection system, when supplemented with the proposed additions, would be adequate to detect a fire in a timely manner.

A summary of the results of the study was attached to the submittal. However, the submittal gave no information regarding the parameters which were considered in the study and the acceptance criteria by which conclusions were reached. The licensee is requested to provide this information.

It was also indicated in this submittal that the design for the proposed additions to the detection system was submitted to the NRC by a separate letter dated March 16, 1979. The drawings attached to this letter indicated that the criteria for installation of the proposed detectors were specified in the licensee's letter to Mr. R. M. Rogers for Mr. R. M. Klingaman dated February 16, 1979. The licensee is requested to provide copies of this letter.

3.2.5 FIRE PROTECTION INSIDE THE REACTOR BUILDING

SER Section 3.2.5 indicates that the licensee will study the feasibility of providing manual hose stations inside the reactor building and propose modifications.

By letter dated October 5, 1978, the licensee indicated that their study showed that it is possible to install hose stations in the reactor building and proposed to install hose stations on all elevations. The designs were to be submitted for our review by February 16, 1979, but we have not yet received such information.

We accept the licensee's proposal for installation of manual hose station inside the reactor building subject to our approval of the design description.

3.2.14 FIRE DOOR SUPERVISION

SER Section 3.2.14 indicates that the licensee will provide a proposal with regard to fire door supervision. The staff agreed to address the acceptability of the licensee's proposal upon completion of our review of the submittal.

By letter dated November 1, 1978, the licensee provided a list identifying those fire doors that are electrically locked and alarmed, fire doors that are mechanically locked, and fire doors that are neither locked nor alarmed.

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The licensee's submittal, however, did not include any justification of the decision not to supervise those fire doors which are neither locked nor alarmed. Specifically, the licensee did not describe the hazards (including combustibles and safety-related equipment or cabling) on both sides of each fire door that are not supervised, and the safety consequences of a fire communciating through these open doorways.

The licensee should provide justification(s) for not providing electrical supervision, or locking closed those fire doors that are neither locked closed or electrically supervised. Electrical supervision of fire doors should provide a time delayed alarm at a constantly occupied area.

3.2.15 ENGINEERED SAFEGUARD CABINETS

Section 3.2.15 of the SER indicates that the licensee will perform a study to determine if safe shutdown of the reactor can be accomplished assuming loss of both engineered safeguards actuation (ESAS) cabinets in Fire Zone CB-3C. If the study indicates that the capability for safe shutdown could be adversely affected the licensee will propose additional fire protection measures.

By letter dated September 29, 1978, the licensee provided the results of his study concluding that the capability to achieve safe shutdown is not adversely affected by the loss of both ESAS cabinets. The study is based on two major assumptions:

- The ESAS cabinets were totally disabled by an exposure fire such that they did not cause and equipment to start or stop, and
- A LOCA neither preceeded, occurred coincident with, nor followed the postulated fire.

The latter assumption is acceptable because it is consistent with our guideline. However, the licensee should justify his assumption that no equipment will be started or stopped by ESAS cabinets that are damaged by fire. The license should also describe means to achieve safe shutdown, in case of the loss of ESAS cabinets, and discuss if such means meets the minimum requirement identified in our generic position for safe shutdown capability that was forwarded by our letter, dated September 11, 1979.

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ENCLOSURE 4
THREE MILE ISLAND, UNIT 1 -- FIRE PROTECTION
EVALUATION OF SUPPLEMENT ITEMS FOR WHICH THE LICENSEE'S PROPOSAL IS UNACCEPTABLE

3.1.4 AUTOMATIC SPRINKLER SYSTEMS OR COATING OF ELECTRICAL CABLES

SER Section 3.1.4 indicates that the licensee will install automatic sprinkler systems or apply a flame retardant coating to protect electrical cables on Elevation 281 feet of the fuel handling building. This modification was to supplement protection offered by existing marinite board barriers between redundant cable trays. The adequacy of the marinite board barriers was to be demonstrated by tests or analyses (see section 3.2.2).

On September 29, 1979, the licensee requested deviation from the previous commitment in that these sprinkler systems or the cable coating would be provided only if the results of the proposed marinite board barrier test does not establish that the fire protection afforded by the marinite board is adequate.

Because the precise conditions under which fire initiates and propagates are not predictable and because fire damage to a nuclear plant could pose a great danger to the public health, fire protection of nuclear power plants requires defense-in-depth; every area where fire damage could have safety consequences must have the capability to promptly detect and suppress fire in addition to preserving the shutdown capability of the plant from possible fire damage.

The area of concern contains a large concentration of irregularly stacked cable trays. Many of these are difficult to reach even under non-fire conditions. Manually fighting a fire in a cable tray obstructed by interposing cable trays and obscured by smoke is difficult. We, therefore, will require that an automatic water fire suppression system be provided to protect electrical cables in this area. The need for the shutdown capability independent of cables in the area is discussed in Section 3.2.2.

3.1.11 FIRE BARRIERS AT REACTOR BUILDING EMERGENCY COOLING VALVES

SER Section 3.1.11 indicates that additional fire barriers will be installed to reduce the possibility of the loss of function of the reactor building emergency cooling valves due to a fire.

By letter dated August 27, 1979, the licensee stated that fire protection for this area had been reviewed and that the proposed barriers were found to be unnecessary because:

- Safe shutdown can be achieved using the normal reactor building cooling system.

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o A fire detection system was to be installed in the area.

Subsequently on November 30, 1979, the licensee has verified over the telephone that although equipment and cabling of the normal reactor building cooling system are located outside this area the system cannot be operated on emergency on-site power. Consequently, the two systems are not equal.

We conclude that the licensee's request for deviation is not acceptable and will require the licensee to protect these reactor building emergency cooling valves as originally committed by the licensee.

3.2.1 PROTECTION OF EMERGENCY FEEDWATER PUMPS

SER Section 3.2.1 indicates that the licensee will analyze the fire hazards in the emergency feedwater pump area and will propose additional modifications necessary to preserve the safe shutdown capability.

By letter dated December 28, 1978, the licensee stated that fire protection in this area was evaluated and it was concluded that no additional protection is necessary for two reasons. First, because the motor-driven and turbine-driven pumps are separated by more than 35 feet of space and interposing partial barriers. Second, because the detection system, portable extinguishers, and fire hoses provide adequate protection for this area of low combustible loading.

The licensee did not provide any analysis of fire hazards in this area to support their conclusion that a rated fire barrier is not required between redundant pumps.

We conclude from our evaluation of information submitted to date that there is no positive evidence to justify the licensee's contention that at least one emergency feedwater pump would be available for shutdown in the event of a fire in this area. Therefore, we will require the licensee to separate the turbine-driven emergency feedwater pump from its redundant counterparts and from other plant areas by three hour rated fire barriers. This includes sealing the penetrations (piping, cable, and ventilation duct) protecting doorways by fire doors, and enclosing or rerouting related cables.

3.2.2 CABLE SEPARATION

SER Section 3.2.2 indicates that the licensee will perform a study and/or testing to verify the effectiveness of the asbestos board barrier design in preventing the spread of a tray fire to nearby trays with or without the presence of interposing non-safety-related cables, and in preventing damage to redundant cables from a possible exposure fire. Where the study indicates that the present design is inadequate, corrective modification will be proposed.

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By letters dated July 13 and September 14, 1979, the licensee provided the results of these tests and concluded that the test results demonstrated that cable separation provided by the existing Marinite board barriers is adequate. The licensee then went on to review the cable installation in various plant areas. The following assumptions are implicit in this review:

(1) A 3' horizontal separation, or less if approve by ENGINEER, between redundant engineered safeguard (ES) cable trays is considered adequate to preserve safe shutdown.

(2) Marinite board barrier of the existing design and construction provides adequate protection for redundant ES cable trays less than 3' apart.

(3) Six inches' spatial separation between conduits, containing cables from different channels, is considered adequate.

(4) Separation of ES cable trays with non-ES trays is adequate even the spatial separation could be as little as 1'-3".

(5) Separation of other safety related cables than ES cables need not be considered.

The results of the licensee's fire barrier test are presented in the report entitled "Cable Raceway Fire Barrier Tests -- Three Mile Island Nuclear Station, Unit 1," dated July 20, 1979 and the study of cable installation in various plant areas is presented in the document entitled "Review of Cable Installation at Three Mile Island Nuclear Station, Unit 1," dated August 1979.

We disagree with all the assumptions listed above, and consequently find the licensee's conclusions unacceptable because they are based on unacceptable assumptions.

The licensee has not provided any information to justify assumptions (1), (3), (4) and (5). Indeed, there are some test results (notably those cable tray fire tests conducted by Sandia Laboratory) available which tend to disprove the validity of Assumptions (1), (3) and (4).

We disagree with the licensee's conclusion based upon their Marinite board fire barrier tests for the following reasons:

o The licensee's test procedure stated that only two fire tests, one tray fire test and one exposure fire test, would be performed, and the results applied to all plant areas. The selected test configuration, therefore, should represent the upper bound of all configurations in various areas of the plant, and that each test parameter should reflect the most conservative condition existing in the plant. The final test configuration and test conditions were not conservative on at least two counts.

  Ventilation - The test chamber was provided with a large opening at the top which allowed hot air to be vented from the test chamber rather

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than confined in it. Fire dampers in ventilation ducts serving fire areas in the plant are designated to close when the upper room air temperature approached 200°F. Therefore, the air temperatures experienced in the upper part of the test chamber during the test are in all likelihood lower than those which would be experienced in an area of the plant during an actual fire.

Cable Trays - Section 4-5 on page 3 of the licensee's final test procedure stated that cables would be randomly laid in cable trays, but the actual tests were conducted with trays neatly packed solid with cables. Cables in the bottom layer were tied to the tray and cables in each layer were carefully laid side by side to leave no air gaps. Not only is this arrangement nonconservative with respect to maximizing the burning rate, but it accounted for only a small proportion of the cable tray arrangements observed during the staff's plant site visit. The tray fire test proceeded despite strong reservations expressed by staff members observing the test, and ended when the lower cable tray failed to be ignited.

Subsequently, at the staff's request, the licensee conducted an additional improvised test using remnant cables to test the licensee's contention that their cables will not burn. The results of this test showed that a randomly laid cable tray, similar to those in the plant, will burn vigorously. Eleven minutes after ignition it was agreed that the fire would not self-extinguish, whereupon it was suppressed by water spray from a garden hose. Five minutes later the cables in this tray reignited due to the residual heat in the cables and the tray. This fire was extinguished by a complete wetting down on all cables in the entire tray.

Although multiple stacked trays avove and/or below horizontal fire barriers is rather common in the plant, the licensee chose to test the barrier with only one tray above and one tray below. Stacked trays not only contained a larger number of combustible cables, but such an arrangement generally results in a more severe fire. The licensee has not provided any information to support the claim that the test configuration represents the most conservative condition found in the plant.

The staff also has reservations regarding the effect of the relative location of the test trays with respect to the floor and the ceiling. These test trays were located approximately 10 feet above the floor and five feet below the ceiling. The licensee has not provided any information to confirm that all cable trays in the plant are at least 10 feet from the floor and at least five feet below the ceiling.

- One of the staff's comments on the test procedure concerned the ignition source for the test fires. The staff requested that the proposed oil-soaked burlap be replaced by propane or heptane burners to assure a well-developed tray fire. The licensee agreed to use two methane burners, each with a 70,000 Btu per hour output, and assured

the staff that a well-developed fire would be produced for these tests. However, the staff was not informed until the morning of the test that the burners were to be place approximately 15 feet apart, essentially reducing the ignition heat input from 140,000 Btu per hour to 70,000. We believe that this contributed to the failure to ignite the cable tray in the cable tray fire test and to the delay in igniting the cable tray in the subsequent improvised test. The staff cannot concur in the licensee's conclusion that the Marinite board barrier prevented the spread of a cable tray fire when, in fact, sustained ignition of the first cable tray was not achieved.

- The staff also has reservations about the verification and certification of the test results. The test method did not strictly comply with the proposed test procedures, and the effects of such deviations on the outcome of the tests were not discussed in the test report. Also, it appears that the test report did not include all of the relevant information regarding the improvised cable fire test. Specifically, the test report did not indicate that at 27 minutes, after the tray had been burning for 11 minutes, the fire was suppressed by water spray from a garden hose in the test because the licensee's representative agreed that the fire was well developed and not likely to self-extinguish. Also, five minutes after the tray fire was suppressed using the garden hose, the cable tray reignited and within less than one minute was burning as vigorously as before. The fire was then extinguished by a complete wetdown of all cables in the entire tray.

Summarizing our evaluation, we cannot agree with the licensee's conclusion that these test results demonstrated that the existing Marinite board barriers provide adequate separation of redundant cables to preserve safe shutdown capability of the plant in the event of a major cable tray or exposure fire. We will require that, in all fire areas containing redundant cables needed for safe shutdown, either one division of these cables be enclosed by 3-hour (or lower rating if it can be justified) fire barriers, or alternate shutdown capability independent of the area be provided.

3.2.6 and
3.1.8 UNLABELED FIRE DOORS

SER Sections 3.1.8 and 3.2.6 indicate that the licensee will establish the adequacy of the fire resistance of presently unlabeled fire doors and frame assemblies. If the adequacy of the fire resistance of such assemblies cannot be established, they will be replaced by properly rated fire door assemblies.

The licensee's response of December 1, 1978 (GQL1919) indicates that several doors and frames will be replaced with Class A labeled doors and frames, and that some additional frames only will be replaced. However, the licensee proposes to retain many unlabeled doors on the basis that

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they are either oversize and identical in construction to Class A or B labeled fire doors and therefore not tested and labeled, or that engineering drawings and purchase order documentation specify a labeled fire door in the particular doorway. The licensee also proposed to leave in place one door frame which is tack-welded to the three hour rated metal wall in which it is installed, and an oversize rolling steel door in which is installed a pedestrian door.

Fire door test furnaces can accommodate doors up to 12 feet in height or width and up to 120 square feet in area. Larger doors cannot be tested and are termed "oversize." Underwriters Laboratories can furnish a Certificate of Inspection stating that an oversize door, except for its size, otherwise complies with all requirements for design, materials, and construction of a labeled fire door. A label indicating that a certificate has been issued is attached to the door. This label is the only way to identify such "oversize" doors.

Engineering drawings and purchase order documentation, in and of themselves, only indicate that a door of certain design was to be procured for installation in a given doorway. They do not demonstrate that the intended door was, in fact, installed. The door should be uniquely identified in a way which associates it with th design drawings and test results. The UL or FM label on a door is the commonly accepted form of unique identification. Unless some other form of permanent identification is found on an otherwise unlabeled door, there is no obvious indication of the fire resistance rating of the door. Fire door frames should likewise be tested and labeled, except that frames constructed in accordance with the provisions of UL Standard 63 may be labeled without further testing. Again, a UL or FM label is an indication that the construction of the frame conforms to an acceptable design.

Subsequent to the January 29, 1979 telecon with the staff, the licensee conducted a field survey and provided another submittal on January 7, 1979, in which the ratings of several doors were corrected and the roll-up door was proposed to be replaced with a rated door and frame assembly and a suitably constructed wall. However, it did not propose to replace any of the other doors on which there were questions of fire resistance rating, nor did it provide the technical basis for permitting these doors to remain in place.

In view of the lack of information that can establish the fire resistance ratings of these doors, and the lack of bases to permit these doors to remain in place, we will require that the licensee replace all unlabeled fire door and frame assemblies with properly rated fire door and frame assemblies.

3.2.9 TRANSIENT COMBUSTIBLES

SER Section 3.2.9 indicates that the licensee will conduct a study to determine the effect of transporting transient combustibles through zones that

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were not previously analyzed for their presence. Corrective modifications will be provided as needed.

In their response dated November 1, 1979, the licensee indicated that a 55 gallon drum of oil or 1,000 pounds of Class A transient combustibles were postulated in each area, but the fire loading in each area still remained within the rating of the surrounding fire barriers. The licensee did not consider the zone of influence of fires involving transient combustibles.

The transient combustible study was intended to determine the maximum amounts of combustibles that could be brought into or through each plant area and the effects of fire involving such combustibles on systems and components important to safety within the fire area. Because such a fire would be concentrated and localized, it is meaningless to only consider the increase in fire loading caused by the transient combustibles. The fire loading is the average heat content per square foot, assuming that all combustibles are evenly distributed over the entire floor area of the fire area under consideration. The fire loading has little significance in evaluating the consequences of fire on adjacent redundant systems or components.

Without analyses of the localized effects of such fire, we find that the licensee lacks justification in contending that at least one division of redundant safe shutdown equipment or cabling located in the same fire area would be preserved in the event of a major fire in that area. We therefore will require that the licensee, in those plant areas that contain redundant equipment required for safe shutdown, provide an alternate means of performing the function of such equipment independent of the area containing the equipment, or to separate one division of such equipment from its redundant counterpart by a three hour fire barrier.

The areas in which these modifications should be required include, but are not limited to:

- The auxiliary feedwater pump area (see SER Section 3.2.1).
- Decay heat closed cycle cooling water pump and nuclear service closed cycle cooling water pump area.
- Engineered safeguard MCC area.

3.2.12 EMERGENCY LIGHTING

The SER, Section 3.2.12, indicates that the licensee has committed to conduct a survey to determine if adequate emergency lighting is provided for shutdown operation and fire fighting activities in safety-related areas.

By letter dated December 28, 1978, the licensee submitted the results of such survey acknowledging that there are potential problems if a fire takes place

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in the vicinity of the distribution panel or certain main lighting circuit feeders. The licensee contends that: (1) the plant could be shut down from the control room regardless of the fire, (2) a fire in these areas does not affect the ability to bring the plant to safe shutdown, and (3) adequate lighting to fight fire can be provided by portable hand lights. Additional modification, therefore, is unnecessary. The licensee, however, did not provide any basis to substantiate his contention on safe shutdown.

The staff disagrees that portable hand lights can provide adequate lighting for fire fighting. Portable lanterns are required to back up fixed lighting for defense-in-depth; but they provide much less lumen compared with fixed lighting units. Relying solely on hand lights for fire fighting will also force fire fighters to carry additional loads that the on-site fire brigade with limited manpower can ill afford to.

We will require the licensee to either (1) provide, where necessary, fixed sealed-beam emergency lighting units with self-contained 8-hour rated batteries, or (2) modify the lighting distribution systems; so that access to all safety-related areas, and certain locations where local operation may be necessary during emergency shutdown, can be assured of adequate lighting during and following any fire emergency.

3.2.13 PROTECTION OF RELAY ROOM

SER Section 3.2.13 indicates that the licensee will identify those areas in the relay room where he proposes to provide a manually actuated fixed water suppression system or will coat the electrical cables with an appropriate flame retardant coating. This is in addition to the licensee's other commitment to:

- Replace unlabeled doors and upgrade barrier penetration seals to provide a three hour barrier enclosing the room.
- Provide manual hoses to reach all points of the room effectively.
- Provide a shutdown capability independent of cabling and equipment in this area.

By letter dated October 31, 1979, the licensee requested a deviation from this commitment and indicated that no additional protection for this room is planned, but did not provide any justification for such request.

We will require the licensee to apply a suitable flame retardant coating to all cables in the relay room. The staff's bases for such requirement were discussed in our SER Section 5.11.

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