

U.S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos.: 50-528/91-30, 50-529/91-30, 50-530/91-30

Docket Nos.: 50-528, 50-529, 50-530

License Nos. NPF-41, NPF-51, NPF-74

Licensee: Arizona Nuclear Power Project
P.O. Box 53999, Station 9012
Phoenix, Arizona 85072-3999

Facility Name: Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection Conducted: August 12-30, 1991

Inspectors: W. J. Wagner, Reactor Inspector, RV

Approved by:


F. R. Huey, Chief, Engineering Section

10/15/91
Date Signed

Summary:

Inspection August 12-30, 1991 (Report Nos. 50-528/91-30, 50-529/91-30, 50-530/91-30)

Areas Inspected: An announced routine inspection by a regional inspector of licensee activities taken to address previously identified items in the area of fire protection. Inspection procedures 64704 and 92702 were used as guidance during this inspection.

Results:

General Conclusions on Strengths and Weaknesses:

Areas of Strength:

The licensee has implemented an Emergency Lighting Team (ELT) which appears to have been effective at focusing emergency lighting system improvements. Numerous design modifications have been implemented which have significantly improved available design margin in the emergency lighting system.

Areas of Weakness:

- The licensee does not appear to have effectively implemented a method to monitor whether recent system modifications are actually resulting in improved emergency lighting system performance.

:



- ° Several types of emergency lighting system deficiencies, similar to those noted during previous NRC inspections appear to be recurring.
- ° Appropriate licensee engineering and management personnel do not appear to be properly involved in the timely evaluation and correction of those recurring deficiencies.

Significant Safety Matters: None

Summary of Violations or Deviations: None

Open Items Summary: Two unresolved items were opened.

DETAILS

1. Persons Contacted

- *E. Simpson, Vice President, Engineering and Construction
- *B. Ballard, Sr., Director, Quality Assurance
- *E. Dotson, Director, Site Nuclear Engineering
- *R. Stevens, Director, Nuclear Licensing and Compliance
- *C. Stevens, Manager, Nuclear Engineering Analysis
- *L. Henson, Electrical Supervisor, Site Nuclear Engineering
- *M. Hypse, Electrical Supervisor, Balance of Plant
- *C. Cooper, System Engineer
- *R. Bouquot, Senior Specialist, Quality Audits
- *C. Emmett, Owner Services
- *K. Clark, Senior Engineer, Licensing
- *R. Henry, Site Representative, Salt River Project
- *S. Gross, Engineer, El Paso Electric
 - L. Mitchell, System Engineer
- T. Braddish, Manager, Compliance
 - R. Rouse, Supervisor, Compliance
 - J. Baxter, Compliance Engineer

The inspector also interviewed other licensee employees during the course of the inspection.

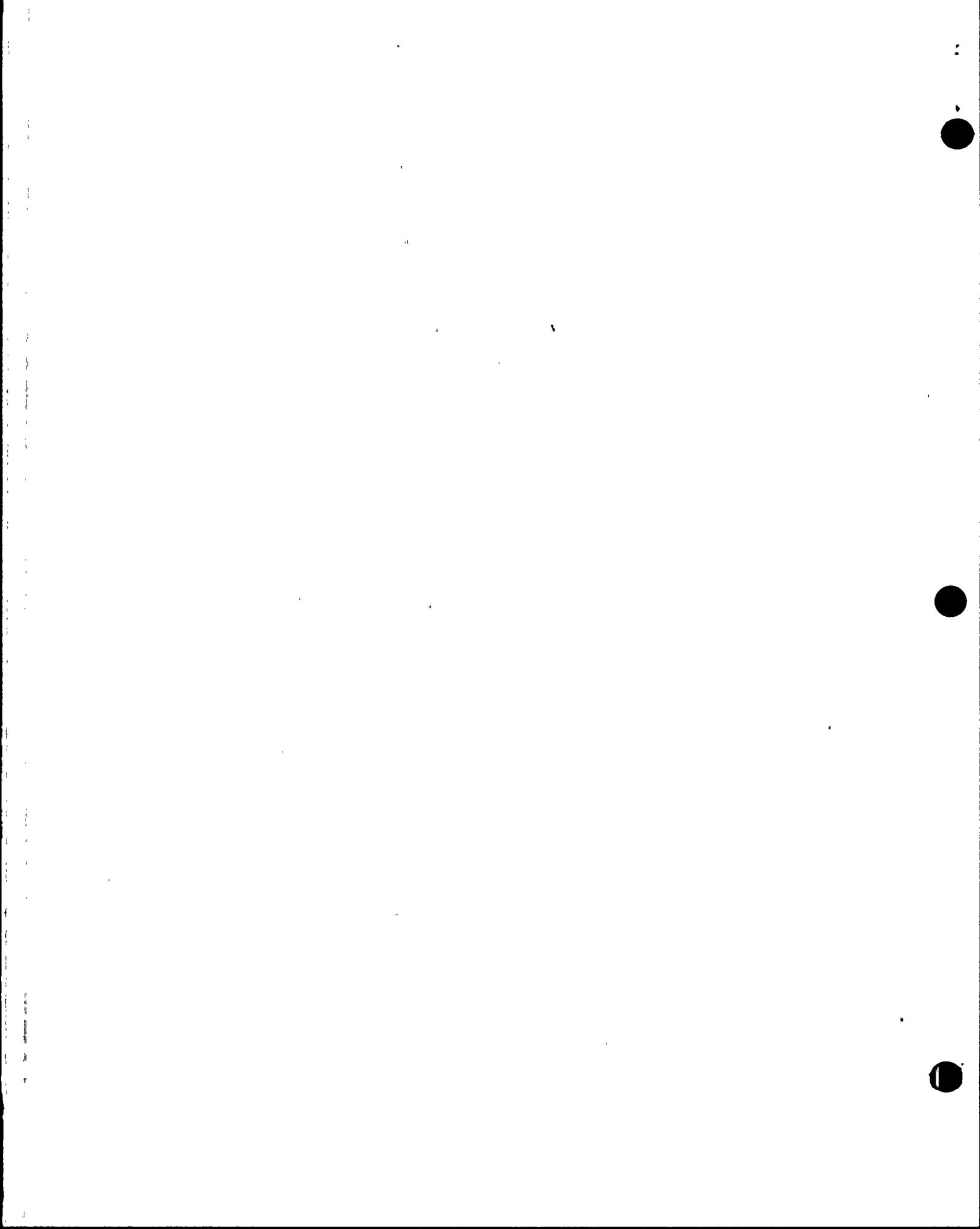
*Denotes those attending the Exit Meeting on August 30, 1991 which was also attended by Mr. F. R. Huey of the NRC Region V offices.

2. Fire Protection/Prevention Program (64704) and Followup on Fire Protection Enforcement Items (92702)

The purpose of this inspection was to review licensee corrective actions taken to address enforcement items related to emergency lighting identified in NRC Inspection Report 50-528/90-25. Although none of the enforcement items were closed out during this inspection, considerable progress was being made by the licensee to resolve emergency lighting concerns.

To ensure that management and employees are kept informed of emergency lighting issues and that all regulatory commitments in this area are addressed, the licensee established a task force, referred to as the Emergency Lighting Team (ELT) in January 1991. The inspector attended an ELT meeting held on August 13, 1991. The ELT consists of a team leader and representatives from Site Nuclear Engineering, System Engineering, Electrical Maintenance Standards, Unit Maintenance/Operations, Compliance, Nuclear Engineering, Fire Protection and Quality Assurance. The following observations were noted by the inspector and presented to licensee management during the NRC Exit Meeting on August 30, 1991:

- o The ELT Team Leader had an understanding of both new and old issues and provided a documented agenda for review and updating of action items.



- o Team members appeared to cooperate in providing input to action items. These action items were not only to resolve essential and emergency lighting issues but also included items such as spurious actuation/pre-fire strategies review, fire barrier concerns in the Auxiliary Building, and developing a transition plan for team demobilization.
- o The fire protection representative had been absent from these meetings over the past several months. The inspector expressed concern that information from ELT meetings would not be integrated into the fire protection program if the fire protection representative did not attend the ELT meetings.
- o The ELT was scheduled to dissolve in September 1991 in accordance with the ELT demobilization plan. The inspector expressed concern regarding responsibility for ensuring that incomplete work is accomplished. During the exit meeting the licensee stated that the ELT task force would not be abandoned in September and that emergency lighting would be a continuing high priority item at Palo Verde.

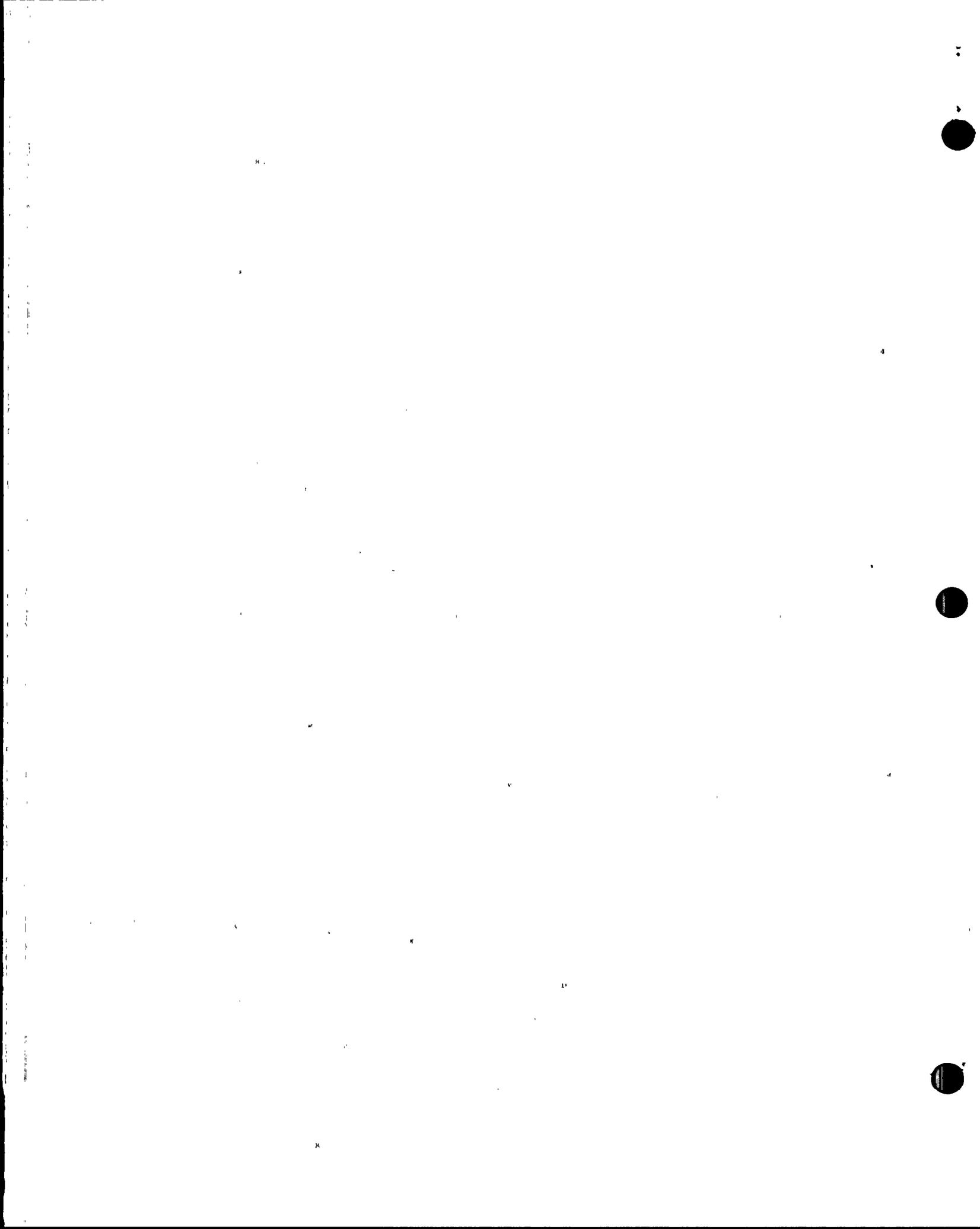
The corrective actions taken by the licensee to address the following emergency lighting enforcement items, although still in progress, were reviewed by the inspector.

a. (Open) Enforcement Item 50-528/90-25-01: Failure of Appendix R
Emergency Lighting

This violation was issued for failure to provide reliable emergency lighting, as required by the Facility Operating License to support safe shutdown in the event of a fire. Specific concerns were that the Emergi-Lite, Holophane and Exide lighting units were experiencing high rates of failure without appropriate engineering evaluation or corrective action being taken by the licensee.

The Emergi-Lites, which experienced a high failure rate in 1990, were all replaced under Design Change Package (DCP) 1, 2, 3FE-QD-025 with fluorescent lighting fixtures powered from 2 centralized, 16 battery, Holophane MPS units located on the 120 foot level of the Auxiliary Building. The new Holophane units have been in service since December 14, 1990.

The Johnson Controls Model 6VHC-96, Dynasty GC 12V-100 and 12UPS-300 lead-acid and gel-cel batteries were replaced by Holophane MPS Units as a design equivalent change by Material Nonconformance Report (MNCR) Numbers 90-QB-004 and 90-QB-005. The replaced batteries were unable to meet capacity requirements at worst case minimum temperatures. The Holophane MPS Units were subsequently replaced by upgraded Holophane units that were installed under Site Modifications 1, 2, 3-SM-QD-007. Data showing that these upgraded power stations (Holophanes) are capable of providing 125 percent of the battery load profile requirements will be reviewed during a future inspection.



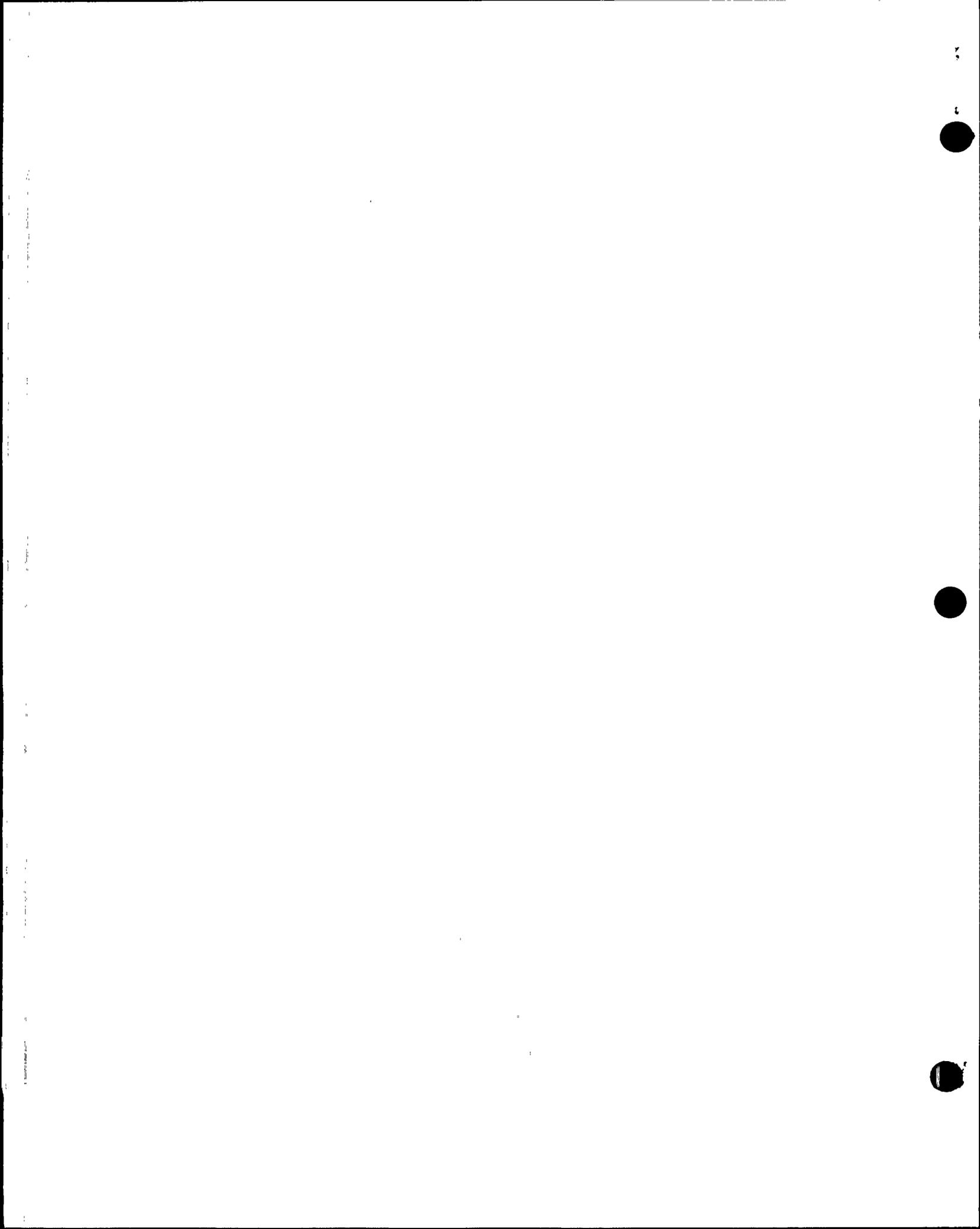
The inspector toured the following Unit 2 locations where essential and emergency lighting changes were made:

- (1) Switchgear Room Train B - the Holophane inverter, replaced under SM-QD-007, now includes 8 batteries whereas the original had 4 batteries.
- (2) Battery Room D - the batteries located in Room D feed the Exide inverters which supply half the Control Room lighting. The 500 foot long length of wiring between the 20 batteries that feed the Exide inverters had experienced a voltage drop of 6-7 volts which was a major reason why the batteries would not support an 8 hour discharge test. DCP 1, 2, 3-XE-QD-026 modified the design to reduce the loads on the power supply so that their associated batteries could carry the load for the required 8 hours.
- (3) Diesel Generator Room - 6 normal and 2 essential lights are located in this room. The inspector noted that a space heater partially blocks the light emitted from the essential light bulb and questioned whether, with loss of normal lights, there would be sufficient lighting to perform safe shutdown operations. The licensee identified this deficiency in Incident Investigation Report No. 3-1-91-037, entitled "Insufficient Essential Lighting for Safe Shutdown Operations", which states on page 11, Item 14, that "Essential Lighting alone is insufficient to perform Safe Shutdown tasks at valves EQIDs 2P-DGB-V013, V059 and V064."

b. (Open) Enforcement Item 50-528/90-25-04: Failure to Provide Emergency Lighting for Outdoor Use

The lighting concerns were that Appendix R Emergi-Lite units installed in the MSSS Breezeway (an outdoor "damp" location) were not of an approved design for outdoor use to support safe shutdown tasks. The Emergi-Lites were replaced by fluorescent fixtures under DCP 1, 2, 3 FE-QD-025. Other licensee actions taken to ensure more reliable operation of emergency lighting, such as increased preventive maintenance and performance of periodic capacity tests, will be reviewed during a future inspection.

The inspector noted that, although the licensee had issued numerous ELT status reports to plant management, providing detailed status on the progress of numerous ELT action items, the licensee had not developed an appropriate document for monitoring whether emergency lighting performance was improving as a result of the actions. During the exit meeting, plant managers could not quantitatively address recent emergency lighting system performance. The licensee agreed to more closely monitor specific emergency lighting component performance in a manner similar to that performed in response to previous NRC inspections.

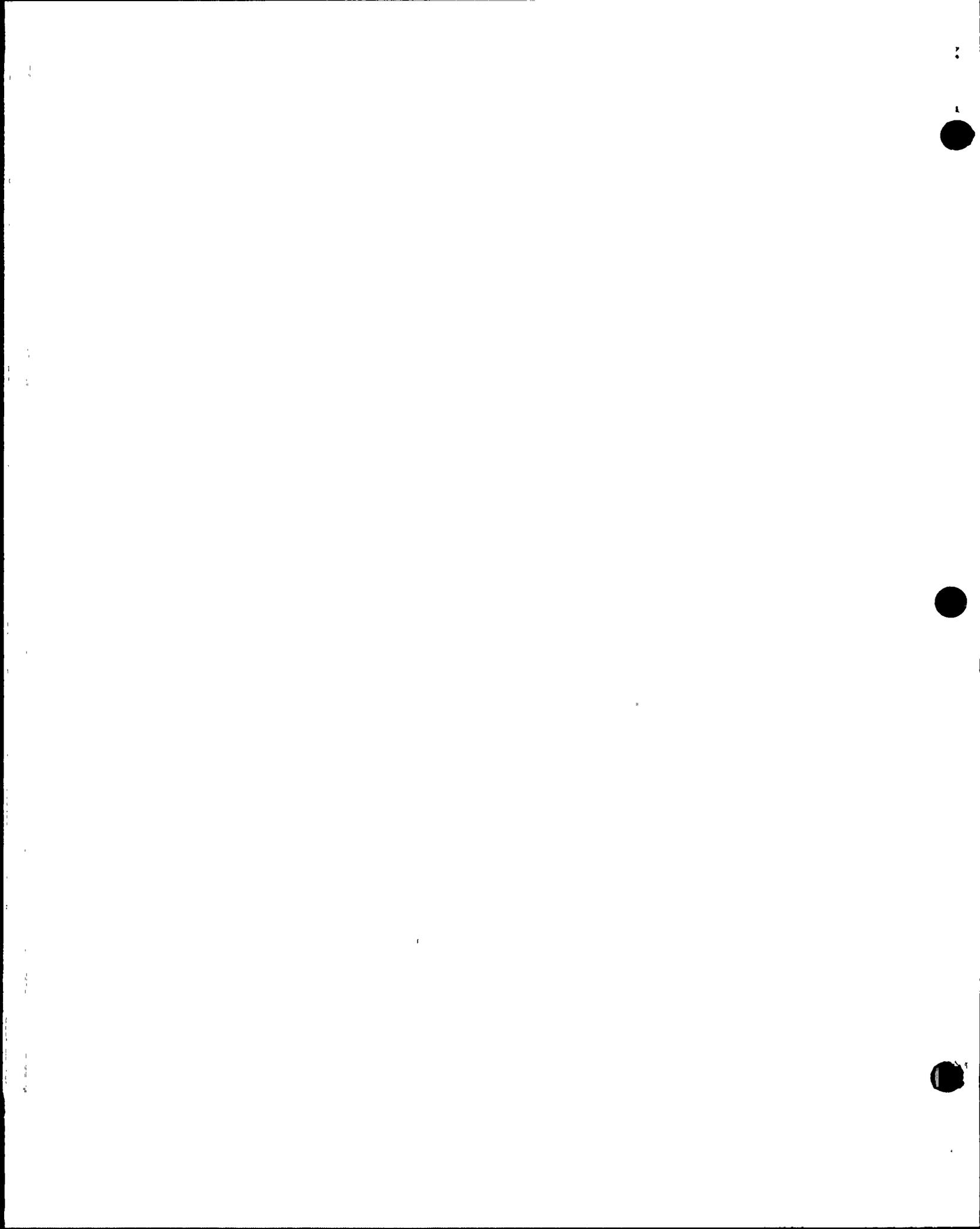


In order to develop a sense of current emergency lighting system performance and licensee actions to preclude recurrence of lighting system failures similar to those noted during previous NRC inspections, the inspector reviewed an "Individual Failure Record Report", dated August 27, 1991. This review identified several examples of emergency lighting system deficiencies similar to those experienced prior to licensee implementation of their emergency light task force. In some instances, it also appeared to the inspector that the licensee had not aggressively pursued root cause evaluation or correction of the observed deficiencies, resulting in emergency lighting system operability problems similar to those noted during previous NRC inspections. In particular, the inspector noted the following specific deficiencies:

- 1) On June 28, 1990, control room emergency lighting unit 1EQDNF01 failed as a result of its associated low voltage cut out relay being unable to achieve the required target drop out voltage of 105 vdc. Actual recorded drop out was 119 vdc and could not be adjusted below 118 vdc. Although, this same type failure had been noted before, the cause of the failure was listed as "unknown" and possibly attributed to "normal/cyclic wear".
- 2) On January 7, 1991, the Exide battery for control room emergency lighting unit 3EQDNF02 was noted to be degraded as a result of improper cell specific gravities. Similar specific gravity deficiencies were again noted on May 23, 1991. At that time, the cause of failure was listed as "unknown" and one battery jar containing some of the deficient cells was replaced. Finally on June 6, 1991, emergency lighting unit 3EQDNF02 failed an 8 hour discharge test after 6.25 hours. At that time, the "entire battery bank" was determined to have been "degraded to approximately 79% of rated capacity".
- 3) Although not punctuated with a discharge test failure similar to emergency lighting unit 3EQDNF02, similar repetitive battery specific gravity problems were noted on emergency lighting unit 2EQDNF01 during maintenance activities in October, 1990, December, 1990, January, 1991 and March, 1991. In each instance, no specific cause of the failure was indicated.

During the exit meeting, the inspector noted that the above types of repetitive battery deficiencies, without apparent timely licensee engineering evaluation or corrective action, appeared to indicate an inadequate level of engineering or management involvement in correcting the types of problems for which the emergency light task force was created.

The inspector requested that the licensee evaluate this concern in conjunction with completing their assessment of improved emergency lighting system performance. The licensee agreed. This item will remain unresolved, pending completion of the licensee evaluation (50-528/91-30-02).

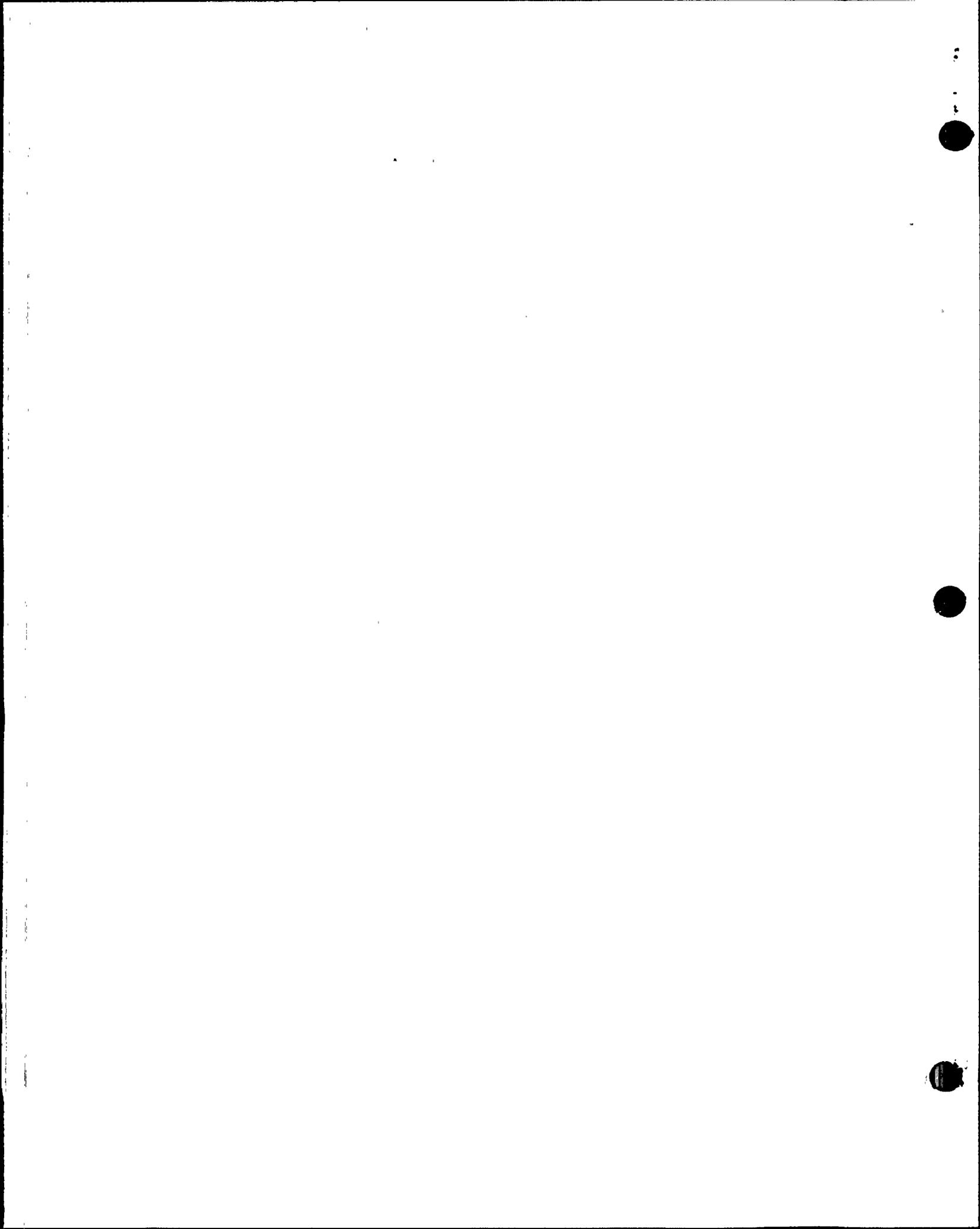


The reportability of essential lighting deficiencies was discussed with licensee personnel. MNCR 91-QB-9005 identified five specific locations with insufficient essential lighting; also numerous other locations, with similar inadequate essential lighting, were identified to the inspector in reports of walkdown inspections conducted by the licensee in 1989, 1990 and 1991. In addition, Condition Report/Disposition Request (CRDR) 910004 identified that the essential lighting fixtures and the emergency lighting units are fed from two different circuit breakers which, during a fire event concurrent with loss of offsite power, could result in the loss of illumination in 83 different safe shutdown areas. At the time of this inspection, it was not clear to what extent lighting would be simultaneously lost in the different safe shutdown areas. This question will be followed up during a subsequent inspection. Although the licensee had notified the NRC Resident and Regional Offices of these deficiencies, the inspector questioned whether these conditions should have been reported by issuance of a Licensee Event Report (LER). The licensee's position was as follows: according to Technical Specification (TS) 6.9.3 two conditions are required for reportability in accordance with 10 CFR 50.73; these are:

- (1) a violation of the requirements of the fire protection program described in the Final Safety Analysis Report, and
- (2) an adverse affect on the ability to achieve and maintain safe shutdown in the event of a fire.

Insufficient essential lighting is a violation of the fire protection program which the licensee has documented in MNCR 91-QB-9005. However, the second TS requirement necessary for issuance of an LER is not met because, according to the licensee, hand held lights, allowed by Branch Technical Position (BTP) 9.5-1, are provided as compensatory measures to provide sufficient lighting for operator actions to achieve and maintain safe shutdown in the event of a fire. The inspector reviewed the following requirements for licensee compliance:

- (1) FSAR Section 9.5.3.1, Safety Design Basis Two, requires a lighting system, comprised of normal, emergency and essential subsystems to be designed so that a single failure of any subsystem cannot terminate the system's ability to illuminate areas occupied during a reactor shutdown or emergency.
- (2) 10 CFR 50.73 (a) (2) (v) requires the reporting of any condition that alone could have prevented the fulfillment of the safety function of a system needed to shut down the reactor and maintain it in a safe shutdown condition.
- (3) FSAR Table 9B-1, NRC Branch Technical Position 9.5-1 Section 5(b) states that "Suitable sealed beam battery powered portable hand held lights should be provided for emergency use." The licensee states in Table 9B-1 that they comply with this BTP.
- (4) Administrative Procedure 14AC-OFPO1 "Fire System Impairment," Revision 2 of March 29, 1990, did not address BTP 9.5-1 regarding hand held lights until issuance of Procedure Change Notice (PCN) 01, Revision 2. PCN 01, Revision 2, effective date of October 26, 1990 added Section 9 addressing use of portable hand-held lighting when emergency lights are inoperable. This PCN was issued by the licensee to address previous NRC concerns regarding compensatory measures.



Based upon a review of the foregoing requirements and procedures, the licensee concluded that the essential lighting deficiencies did not represent a condition that alone would have prevented the fulfillment of a safety function, or have significantly compromised plant safety. The licensee's evaluation of this condition is documented in a letter to Region V, W. F. Conway (APS) to J. B. Martin (NRC) on July 1, 1991, that the essential lighting deficiencies described in MNCR 91-QB-005 are not reportable in accordance with TS 6.9.3. The licensee has implemented action to correct the essential lighting wiring deficiencies, however, the matter of reportability remains an unresolved item to be evaluated under the requirements of TS 6.9.3 (Unresolved Item No. 50-528/91-30-01).

No violations or deviations were identified in the areas reviewed.

3. Exit Meeting.

The inspectors met with the licensee management representatives denoted in paragraph 1 on August 30, 1991. The scope of the inspection and the findings as described in this report were discussed.

2
2
7
6

