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April 29, 1983

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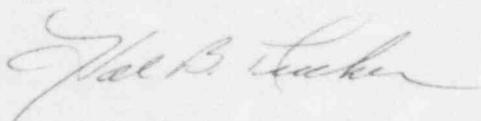
Mr. James P. O'Reilly, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW. Suite 2900
Atlanta, Georgia 30303

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Mr. O'Reilly:

Duke Power Company is hereby submitting documentation relevant to LERs RO-269/83-10 and RO-287/83-04 that was discussed in our meeting of April 29, 1983. At that meeting information was provided in the areas of incident investigation and response, review of operating, test, and maintenance procedure, review of design, implementation, and procedures revision pertaining to modifications; and independent verification. The attached report provides documentation of Duke Power Company's response to the recent incidents at Oconee Nuclear Station related to containment integrity. In addition, a management audit is currently in progress to provide further assurance that operating activities are conducted in a reliable, safe manner with due consideration to regulatory and corporate requirements. The Management Audit Team is headed by the Catawba Station Manager and is interdepartmental with outside-the-company representation. If you have any questions regarding our incident investigations, station reviews, or management audit, please advise. For your information, a summary list of completed and remaining activities with projected completion dates is provided in the attachment.

Very truly yours,



Hal B. Tucker

RLG/php

Attachment

cc: Mr. J. C. Bryant
NRC Resident Inspector
Oconee Nuclear Station

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INTRODUCTION

On December 12, 1982, Oconee personnel discovered two instrument air valves, 3IA-90 and -91, open. This incident was considered to be a degradation of containment integrity and was reported to the NRC in Licensee Event Report (LER) RO-287/82-15. In a follow-up action to this incident, the Oconee Operations Superintendent requested an investigation of activities related to containment integrity within the Operations group. This investigation resulted in the discovery of two additional incidents.

The first was discovered on March 3, 1983 and involved a manual sample valve, CF-19, being left in the open position by procedure, even though it is a containment isolation valve. This incident was reported to the NRC by LER RO-269/83-07. The second involved the failure to meet containment isolation design criteria for the tie-in of the Standby Shutdown Facility to fuel transfer tubes of each unit. This incident was reported to the NRC by LER RO-269/83-05.

Following these events, two additional incidents related to containment integrity occurred during performance of the required quarterly surveillance tests. In one incident, a pressurization valve was left open following the surveillance of the Emergency Personnel hatch on Unit 3, and in the other, the inner door of the Emergency Personnel hatch on Unit 1 was not fully closed. Additional descriptions of these last two incidents are provided in the next section and were provided in LERs RO-287/83-04 and RO-269/83-10. The root causes of these five incidents are described later in this report.

Station personnel took such corrective actions as were necessary in each specific case and completed an investigation of each incident. However, to ascertain the effectiveness of the generic management controls associated with containment integrity and other safety-related systems, Duke initiated a review of procedures affecting operating activities to assure proper implementation of independent verification of containment integrity and other important procedures; a review of the modification process to assure modifications are properly designed, implemented, and appropriate procedures revised; and a review of station directives to assure compliance with the applicable regulations and corporate requirements. Finally, Duke established a Management Audit Team to review operational activities at all our nuclear stations in order to assure ourselves that such activities are being conducted in a quality manner. Descriptions of these activities are provided in later sections of this report.

Duke has met with the NRC, Region II Regional Administrator and his staff on March 23, 1983 and April 19, 1983 to discuss the last two incidents and the corrective actions taken as a result of the incidents. In concluding this second meeting, Duke committed to document the information provided verbally and to submit a report by April 29, 1983. This report constitutes fulfillment of this commitment.

SUMMARY OF INCIDENTS

Since December 1982, five incidents have occurred at Oconee related to containment integrity. The following paragraphs provide brief descriptions of each incident.

On December 12, 1982 two Manual Containment Isolation Valves (instrument air valves 3IA-90 and 3IA-91) were found open when operators were making preparations to line up instrument air to the Unit 3 Reactor Building.

These valves had been opened during the previous forced outage due to the 3A Steam Generator Leak per Removal and Restoration (R&R) procedure. They were then kept open to supply instrument air to power tools used to furmanite Unit 3 Reactor Coolant Pumps (RCP) found leaking at the beginning of startup. The work was completed on December 8, 1982. Between the days of December 6, 1982 and December 12, 1982, Unit 3 was at or above 300 psig and 200°F with fuel in the core and in violation of Technical Specification 3.6.1 which requires that containment integrity be maintained.

The apparent cause of the incident was related to the documents used to control systems in an off-normal condition. The pre-heatup checklist section of the Unit Startup Procedure included a step to review the R&R Book for any items which may affect unit heatup. On December 4, 1982, the Assistant Shift Supervisor noticed that the subject valves were outstanding due to the need for instrument air for furmaniting the RCP during startup. This particular R&R was not required to be closed out prior to continuing heatup. The Assistant Shift Supervisor, assuming that another R&R audit would be done prior to going critical and would result in closing these valves, signed the step off as complete without noting the open IA valves. In the pre-heatup checklist, there was also a checklist for the manual Reactor Building isolation valves themselves. While reviewing these checklists, it was verbally noted that valves 3IA-90 and 3IA-91 were open. Control Room personnel instructed the operators to sign these off as closed since an R&R was outstanding on the valves to "flag" them as still being open. The R&R was to have ensured that the valves were closed after the furmanite process was completed. Afterwards, however, no Control Room personnel noted the importance of the outstanding R&R on the Reactor Building manual isolation valves. An inadequate review of the unit's outstanding items was done by the Shift personnel during that four day period. This incident was caused by personnel error (incomplete review of the unit's outstanding items as required by turnover procedures), and also by a deficiency in procedure (deletion of R&R audit from precriticality check).

In a follow-up action to this first incident, the Oconee Operations Superintendent requested an investigation of activities related to containment integrity within the Operations group. The discovery of the next two incidents occurred as a direct result of this investigation.

On March 3, 1983 it was discovered that valve CF-19 was required to be closed by Oconee Technical Specifications, but was open, by procedure, on all three units. CF-19 is a manual containment isolation valve on the sample line from the Core Flood Tanks. All manual containment isolation valves are required by Technical Specifications to be closed for containment integrity.

Previously, a procedure change had been approved to allow CF-19 to remain open continuously. The reason for the change was to provide for easier sampling of the Core Flood Tanks. The cause of this incident is classified as personnel error since the Technical Specifications applications of opening the valve were overlooked during the usual review process for procedure approval.

On March 16, 1983, an engineering evaluation conducted as part of follow-up actions from the December 12, 1982 incident determined that the double isolation criterion was not met for the Standby Shutdown Facility (SSF) Reactor Coolant Makeup Pump tie-in to the Fuel Transfer Tubes. At the time of this determination the status of the valves inside the RB containment could not be confirmed. Later, during the course of the investigation, the position of the valves was determined by documentation review. This incident was determined to be a violation of the Final Safety Analysis Report (FSAR) General Design Criterion 53, and a degraded mode of operation per Technical Specification (T.S.) 3.6.

The SSF was designed to provide an alternate means of shutting down each Oconee unit to hot shutdown condition and maintaining the unit(s) at this condition for approximately three days. It is not yet operational. The design for the SSF was submitted in February 1978 to the NRC, and Duke received their conceptual approval in December 1978. In July 1981, work was started on the SSF Reactor Coolant (RC) Makeup System on Unit 1 during its refueling outage. Similarly, work was started on the same system on Units 2 and 3 in January 1982 and May 1982, respectively. The tie-ins were completed during each unit's outage. The cause of this occurrence was design deficiency resulting from inadequate review on the part of the designers and other responsible qualified personnel. It was not recognized that the connection to the transfer tubes required double isolation.

In March 1983, two incidents occurred related to the personnel emergency air locks at Oconee. One occurred on March 17, 1983 on Unit 3 when the pressurization valve located outside the air lock was inadvertently left open following the quarterly air lock performance test. The second occurred on Unit 1, also on March 17, 1983, and involved personnel inadvertently leaving the inner door of the emergency air lock ajar. These have been reported to the NRC by Licensee Event Reports RO-287/83-04, dated April 15, 1983, and RO-269/83-10, dated April 15, 1983, respectively.

On March 17, 1983 at 0200, while preparing to perform the quarterly Reactor Building (RB) Emergency Lock Leak Rate Test, it was discovered that air was leaking from the Unit 3 RB Emergency Personnel Air Lock Hatch (EPAL) pressurization connection valve. The valve does not connect into the Reactor Building but into the EPAL. The valve is a containment isolation valve but was found to be open. The cause of this occurrence was personnel error. In July, 1981, a modification added the subject valve on the 3/4 inch line extending from the Emergency Air Lock outside end. In the process of modification review, one step is to check for necessary procedure changes. The procedure for the Leak Rate Test on the EPAL was not changed to specifically include the valve. The procedure stated to "pressurize the hatch volume", requiring the pressurization valve to be opened. The procedure stated "remove test equipment", for which in past tests the pressurization valve was closed. In this case, the valve was left open.

The Unit 1 incident occurred when plant technicians entered the Emergency Personnel Air Lock through the outer door to perform the Reactor Building Emergency Local Leak Rate Test. After completing testing and leaving the Emergency Hatch area through the outer door, the outer hatch door was closed and due to personnel error the inner hatch door was inadvertently opened. During the performance of the test as well as after, the Emergency Hatch inner/outer door open statalarm in the control room was actuated. At the time of the incident, the statalarm was considered by the control room operators to be inoperable because the statalarm was on when both doors were known to be closed. Therefore, a work request was written to have it checked. As a result, upon completion of the Air Lock Test, the operators did not acknowledge that the air lock had not been returned to normal. They failed to effectively follow up on the indication even though a substantial amount of trouble-shooting was conducted by maintenance personnel. At approximately 0930 on March 21, 1983 operations personnel visually verified that the inner door was open approximately 6 to 10 inches. The apparent cause of this incident has been classified as a personnel error and defective procedures. The person involved in the closing of the hatch door positioned the pointer on the handwheel outside the "both doors closed and latched" indication marks. The procedure used to perform the Leak Rate Test did not include a step to close the outer door. There was no step in the procedure to perform an independent verification to assure both doors are properly closed. On March 21, 1983, the new oncoming shift investigated the alarm condition and found the inner door open 6 to 10 inches.

While the requisite specific actions for each unit, such as closure of the affected valve/door, check of the other units' similar equipment, and notification of the NRC were taken, these incidents also raised generic concerns relative to the effectiveness of programs which control activities affecting safety related equipment. Aggressive actions were taken promptly in several areas. The review of procedures affecting operating activities was expanded to include the entire station; the process by which station modifications are designed and processed was reviewed; and station directives were reviewed to assure compliance with applicable regulations and corporate requirements. Additionally, Duke established a Management Audit Team to specifically review operational activities at all of our nuclear stations. Further descriptions of these actions are provided in the next two sections.

CORRECTIVE ACTIONS

These incidents, as a group, indicate that the control of activities at Oconee warrants a broad review. This review has been conducted in three areas: control of operational activities; control of the station modification process; and establishment of effective management directives. The following paragraphs describe the actions that have been taken.

Operation Controls

With the area of control of operational activities, actions have been taken to review all operations procedures, to review all activities related to containment integrity, to establish a containment integrity controlling procedure, and to establish a means to assure prompt/effective follow-up to alarms/indications which monitor safety-related equipment.

The Operations group investigation which had been underway since the incident involving the instrument air valves in December 1982 identified two incidents related to containment integrity. One involved manual outside containment isolation valves being routinely left open at power; the other involved an improper design associated with the Standby Shutdown Facility tie-in to Fuel Transfer Tubes. Upon discovery of the incident related to the Unit 3 Emergency Personnel Air Lock, the number of personnel involved in this effort were expanded to include representatives from all station groups.

This new Task Force, dedicated to the complete review of all activities affecting containment, has accomplished several actions. A master list of all components performing a containment isolation function was compiled from existing procedures. To validate this list, all accessible penetrations were visually checked. All accessible components have been labeled to assure personnel awareness that the component is part of containment and is required to be functional to maintain integrity. Inaccessible components will be labeled as they become available. Actions have been taken to update drawings as appropriate.

In order to provide assurance that containment integrity is properly established and effectively maintained, a containment integrity procedure is being established. The procedure will be referenced in the existing unit startup procedure and will require verification that all components which are related to containment integrity are functional and capable of maintaining containment integrity. Two component checklists, isolation and verification, will be run during each refueling startup. A verification checklist will be run on startup from non-fueling cold shutdown. In all cases, these checklists will be completed prior to plant conditions which require containment integrity.

As an added measure, these checklists will be run on a quarterly basis on all accessible components, during power operations. This

frequency of surveillance is considered to be reasonable in view of the number of components that will be checked and the fact that is is consistent with other quarterly surveillance such as routine pump and valve performance tests required by ASME Section XI and an existing system check program on ESF equipment and emergency feedwater that has been in effect at Oconee since 1979.

This system check program was instituted in the summer of 1979 when an incident occurred which effectively degraded the emergency CCW system. Quarterly, all accessible valves in the main flow paths and the requisite power supplies of the following safety-related systems are checked to assure the systems are capable of functioning:

- * High Pressure Injection
- * Low Pressure Injection
- * Low Pressure Service Water
- * Condenser Circulating Water
- * Penetration Room Ventilation
- * Reactor Building Spray
- * Emergency Feedwater

Since implementation of this system check program, no system has been found in a degraded mode.

Oconee Operations personnel have also recently reviewed the response to alarms/indicators which monitor safety-related equipment to ensure that control room operators will take the appropriate actions in response to alarms which monitor safety-related equipment. This action will include a comparison/check of relevant supporting parameters to validate the alarm. Training will be conducted to reemphasize this existing program. Additionally, an interim program will be developed by June 1, 1983, to provide additional assurance that operators will take specific actions to determine the status of safety-related equipment when the alarm/indicator for that equipment has been determined or is believed to be faulty. Duke will also develop a program for use at all of our nuclear stations to address proper alarm response.

Modification Process

Within the area of control of the station modification process, actions have been taken to review the design process, the pre-implementation review process, and the post-implementation review process. The Duke program for verification of design activities and related documents is based on the requirements of 10 CFR 50, Appendix B. Major station modifications which affect safety-related equipment are designed by Duke's Design Engineering Department (DED). The Design Engineering Department (DED) program requires origination of design by qualified

personnel, checking of the design by equally qualified personnel and management approval of the final design. The final design products (e.g., drawings, specifications, procedures, etc.) are collectively defined as a Nuclear Station Modification (NSM) limited edition package. Each NSM limited edition package is subjected to a safety-evaluation conducted by the engineering organizations developing the design. This evaluation confirms the adequacy of the design regarding compliance with plant design criteria and safe plant operation. As a supplemental requirement, the department's Safety Review, Analysis and Licensing Division performs an independent safety evaluation of each NSM. The results of this safety evaluation are documented in accordance with Department Quality Assurance procedures. The final NSM package is then released to the station for implementation.

Any design deficiencies identified following document sign-off are considered design non-conformances (DNC). Each DNC is documented and then carefully scrutinized to assure that any contributing process weaknesses are identified and strengthened to reduce the likelihood of similar occurrences in the future. Each DNC is reviewed for regulatory reportability in accordance with 10 CFR 21 and 10 CFR 50.55(e). The DNC is further reviewed in accordance with 10 CFR 50, Appendix B, Criterion XVI. On a quarterly basis, all department DNCs are trended to identify areas for improvement. Corporate QA Department and Design Engineering Department management formally evaluate each identified trend and take corrective action, as required.

DNC-0049, regarding reactor building isolation valve arrangements for the Standby Shutdown Facility connections to the fuel transfer tubes, was reported to the NRC. The evaluation of this DNC concluded that a similar connection at McGuire and Catawba Nuclear Stations was designated properly and in accordance with station design criteria. Other NSMs involving design of containment isolation valve arrangements at Oconee were also reviewed and it was confirmed that these NSM designs fully complied with station design criteria. DNC trending history was reviewed and it was determined that the character of this DNC was not consistent with any identifiable trend for the responsible engineering section which performed the work.

The program to assure proper implementation of station modifications at Oconee includes both pre-implementation and post-implementation reviews. For all modifications, the appropriate design criteria are established, a safety evaluation checklist is completed and reviewed by a second qualified individual. Additionally, to assure that all the steps are conducted, a process record checklist is reviewed by a qualified reviewer and, if appropriate, a cross-disciplinary review is conducted. An accountable individual reviews the modification package to ensure that all of the preceding is properly completed. As a final step prior to implementation of the modification, the station modification coordinator verifies the proper completion of all elements.

As part of the post-implementation review process, the accountable individual for the specific station modification assures that control of the modified system is effectively returned to the Operations group for use. This process includes verification that drawings, descriptions and component information are provided to the group accepting the system.

The planned changes to this process include a broader scope of review. This, along with documentation of such a review, would assure that all station personnel that are associated with activities that could be affected by a station modification are properly notified and that they complete the required procedural changes and training. This process will be monitored through the station modification coordinator.

Additionally, a review of certain completed modifications will be conducted to assure that procedures and documentation have been appropriately updated as a result of the modification.

Management Directives

Following these incidents related to containment integrity, Oconee personnel undertook an extensive review of directives and procedures related to independent verification of performance of operational activities affecting safety-related equipment. This effort included a review of guidance provided in 1979 and 1980; of the procedures in effect at the times of these incidents previously described herein; of past incidents that have occurred as a result of personnel error or procedural deficiency; and of station directives currently in effect. The following paragraphs describe the results of these reviews.

Duke has reviewed the history at Oconee associated with the implementation of an independent verification program, and confirmed that Oconee implemented the concept of independent verification well before NUREG-0737 was issued. In early May 1979, directives from station management required that independent verification be applied to activities associated with removal and restoration of safety-related systems. Throughout 1979 and 1980, the program to implement the concept of independent verification was established and refined as necessary. Station Directive 4.2.5, "Independent Verification Requirement", was initially issued in February 1980. Independent verification was implemented in procedures controlled by Operations, Maintenance, Performance, and other station groups as necessary, such that by January 1, 1981, the program was effectively implemented. This program covered operating activities related to test and maintenance of safety-related systems and components and required two individuals to verify that the equipment had been properly returned to service. The procedure review recently conducted identified only nine procedures of over 2,500 in place on January 1, 1981 where implementation of independent verification appeared to be deficient (see Table 1). The

three Operations procedures relate to electrical power distribution. Five of the six Performance procedures relate to containment air locks; the sixth dealt with electrical penetrations.

In early 1982, an incident occurred that caused a review of the program which was to implement independent verification. Although this program had been very successful in the Instrumentation and Electrical (I&E) area in returning thousands of components successfully back to service, a personnel error created the incident wherein an instrument test tee cap on a Reactor Building pressure switch was not reinstalled following testing. This resulted in procedural upgrades to contain specific items required to be verified to assure proper return to service of the components. Following a Station Manager requested QA audit in mid 1982, additional procedural improvements were made. These included minor clarifications of actions necessary to assure proper removal or return to service. In late 1982, when an inadvertent reactor trip occurred due to personnel error associated with work on non-safety equipment, the program directive was again revised to require independent verification prior to actions which may, if not done correctly, degrade safety or plant operation. In a further effort to assure that independent verification is effectively implemented, the incidents of the past three years have been reviewed to determine if other operating activities related to safety systems should be added to the program. To improve reliability, additional items have been identified which are intended to be included in the program. As a result of the reviews that have been conducted, the station directive which addresses independent verification has been drafted. After review and approval, this revised station directive will be implemented. Included will be the definition, application, and implementation of independent verification. Listed will be specific examples of items to be independently checked such as valves, hatches, flanges, and lifted leads. The station directive on procedures is also being revised to more explicitly state the program to use, change, write, and review procedures. Other directives will be revised to support these directives, as necessary. Upon issuance of these revised station directives, all procedures will be revised as necessary. Where appropriate, interim programs will be established until final procedure revisions are made.

Review of Procedures for Independent Verification

GROUP	PROCEDURES REVIEWED	PROCEDURES INCORPORATING IV*	ADDITIONAL PROCEDURES REVISED
OPERATIONS	~ 300	~ 200	3
MAINTENANCE	~ 1,700	~ 1,300	0
TECHNICAL SERVICES	~ 500	~ 100	6
TOTAL	~ 2,500	~ 1,600	9

NOTE: NUMBERS ARE APPROXIMATE

*INDEPENDENT VERIFICATION

TABLE 1

MANAGEMENT AUDIT

In order to provide further assurance that the operational activities at all of our nuclear stations are conducted in a quality manner, a Management Audit Team has been established. Five specific areas will be reviewed:

- 1) Process of review and determination of compliance with regulatory requirements;
- 2) The nuclear station modification process relative to safety evaluation, review of design, quality of implementation, procedural revisions, and training of personnel associated with a nuclear station modification;
- 3) Procedural development, implementation, and review;
- 4) Overall audit process to include QA, Nuclear Safety Review Board, Nuclear Production Department, NRC, and insurance;
- 5) Personnel qualification.

The Audit Team is chaired by the Manager of the Catawba Nuclear Station and consists of representatives from McGuire Nuclear Station, Quality Assurance, Design Engineering, Nuclear Production, and an outside consultant, Dr. Raymond Murray (retired), North Carolina State University. The review of each of the identified areas of concern will be conducted to determine if the proper management controls and criteria are in place to assure a high degree of confidence that the efforts in each of the above areas will produce high quality results. This review will be completed by May 13, 1983. A report will be prepared shortly thereafter.

SUMMARY

Duke Power has taken effective and aggressive actions following recent incidents related to containment integrity:

- Duke had implemented the concept of independent verification of safety systems prior to the issuance of NUREG-0737.
- Duke has in place a program to effectively review plant modifications.
- Past modifications will be appropriately reviewed to assure proper inclusion of components into the appropriate procedures.
- Duke established a Task Force to review all activities related to maintaining containment integrity.
- Duke has reviewed the recent incidents, identified the causes, and implemented the necessary corrective actions.
- Incidents for the past three years have been reviewed to determine other causes of personnel error where independent verification would be effective to prevent recurrence.
- A review of the independent verification program including some 2500 procedures has been conducted and appropriate procedures will be revised.
- A containment integrity controlling procedure will be established to assure that appropriate containment isolation is achieved on startup; the procedure will be conducted quarterly to confirm continued containment integrity.
- Duke will conduct an independent management audit, utilizing resources from the corporate office and our other nuclear stations.

The lessons learned from this experience will be incorporated into the operational activities at our McGuire and Catawba Nuclear Stations, as necessary. All these actions have been summarized on the attached table along with the current status.

Duke Power Company
 Oconee Nuclear Station
 April 29, 1983 Submittal
 Status of Actions

<u>Action</u>	<u>Status</u>
1. Air Lock Door Open Incident - close door, check other units, notify NRC, file LER	Complete
2. Air Lock Valve Open Incident - close valve, check other units, notify NRC, file LER	Complete
3. Establish Containment Integrity Task Force:	Complete
● Compile master list of CI components	Complete
● Visual check of all accessible penetrations	Complete
● Label all CI components	Complete
● Control Room drawings updated	Complete
● Controlled drawings revised	Complete
4. Establish controlling procedure for containment integrity	Complete by June 30, 1983
5. Establish quarterly and prior to S/U surveillance of containment integrity	Complete by June 30, 1983
6. Establish procedure to require effective/timely follow-through to alarm conditions	Complete by July 1, 1983
7. Revise SD 4.4.4 to expand modification process review to all affected sections	Final by June 1, 1983
8. Initial review of station procedures	Complete
9. Revise three Operations Procedures as a result of initial review	Complete by June 17, 1983
10. Revise six Performance Procedures found as a result of initial review.	Complete
11. Review incidents of past three years for incidents related to personnel error	Complete
12. Review of past modifications to assure procedures have been appropriately updated	Phase I review completed April 27, 1983; Phase II to be established

Action

Status

- | | |
|--|--|
| 13. Revise/implement SD 4.2.5 to reflect results of past/recent incidents | Complete by June 1, 1983 |
| 14. Revise/implement SD 4.2.1 on procedures | Complete by June 1, 1983 |
| 15. Revise/implement other SDs as required as a result of these changes | As needed |
| 16. Review procedures, again, based on new SDs | (Interim measures
(and schedule for procedure review
(be completed by June 1, 1983 |
| 17. Establish interim programs | |
| 18. Conduct an independent management audit | In progress, Complete by May 13, 1983 |
| 19. Incorporate Lessons Learned into operational activities at McGuire and Catawba | Schedule to be established |