

BROOKHAVEN NATIONAL LABORATORY

TECHNICAL REVIEW REPORT

MODIFICATION PROGRAM CONTROLS

FIN A-3552, TASK ORDER 004

DATE OF REVIEW: February 10-14, 1986

LICENSEE: Commonwealth Edison Company


PLANT: LaSalle County Nuclear Station

BNL TECHNICAL SPECIALIST:

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2/26/86
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BROOKHAVEN NATIONAL LABORATORY 
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CONTENTS

	<u>Page</u>
1. BACKGROUND AND OBJECTIVE.....	1
2. SUMMARY OF RESULTS.....	1
3. PERSONNEL CONTACTED.....	2
4. INFORMATION REVIEWED.....	3
4.1 Procedures.....	3
4.2 Documents.....	4
5. DESCRIPTION OF REVIEWED AREAS.....	5
5.1 Modification Package Review.....	5
5.1.1 Setpoint Discrepancy Mod. Package 82-305.....	5
5.1.2 FCRs/ECNs Subsequent to Mod. Approval.....	5
5.2 Training.....	6
5.3 Drawing Controls.....	7
5.3.1 Drawing Revision Delay.....	8
5.3.2 Drawing Status Review.....	8
5.4 Quality Assurance.....	9
5.5 Procedure/Tech Spec Changes Due to Mods.....	9
6. CONCLUSIONS.....	10
APPENDIX A Audit Outline.....	11

1. BACKGROUND AND OBJECTIVES

The LaSalle County Nuclear Station is a two unit BWR owned and operated by the Commonwealth Edison Company (CECo). Under the direction of NRC Region III, BNL was contracted to review the modification program controls being employed by CECo during the first Unit 1 refueling outage.

On February 10, 1986, W. Gunther of BNL arrived at the LaSalle County Nuclear Station to conduct this review with the following objectives in mind:

1. Determine by review if 10CFR50.59 design change evaluations were properly performed, including a written safety evaluation to insure that the change does not affect safety margin or involve an un-reviewed safety question.
2. Determine whether quality assurance and quality control were applied toward the approval and implementation of the modification.
3. Determine that complete testing is planned or has been performed to insure proper design and implementation of the modification package.
4. Review the as-built modifications to determine if the changes were made consistent with NRC and licensee commitments.
5. Determine that system changes have been properly documented in plant drawings and procedures, including licensed operator training.

In order to achieve these objectives, a comprehensive review of selected modification packages was conducted with specific attention given to the 50.59 safety evaluations, identified procedure changes and licensed operator training requirements, modification package technical content, completeness and organization, and post modification testing instructions. The packages were selected with input from the NRC resident inspection group who provided a listing of licensee commitments for the outage along with various outage installation information. An engineering synopsis of selected modifications was provided by the licensee prior to the on-site inspection which permitted the compilation of an audit outline (Appendix A) using various source documents such as LaSalle updated FSAR and the appropriate NRC Inspection and Enforcement Manual Inspection Procedures. The licensee's co-operative attitude, particularly the engineers in the technical staff engineering group responsible for modification package coordination, enhanced the inspection effort and permitted the objectives to be met.

2. SUMMARY OF RESULTS

During the present LaSalle Unit 1 refueling outage, a large number of modifications are being performed, many resulting from changes required by the Facility Operating License, known as license conditions. A number of specific modification packages relating to these license conditions were reviewed in depth to verify that the LaSalle Station modification program commitments are

being followed, including proper interfaces between the engineering group, construction group, operations, training, and administrative groups involved with procedure and drawing controls.

The LaSalle Modification Program satisfactorily meets NRC requirements and CECO commitments with the following exceptions:

1. The training of personnel, especially licensed operators, on the system changes resulting from a modification, should be accomplished prior to declaring the modification operable (see Section 5.2).
2. Modification 83-018 regarding the upgrade of the dc system instrumentation and annunciation should specify that procedures be changed and operator training be conducted prior to returning the modified system to service (see Section 5.5).
3. Conflicting setpoint information provided in the CRD Auto Scram modification package (82-305) should be resolved by approved documentation within the package (see Section 5.1.1).
4. Complete engineering and design of the modification, including a physical walkdown of the proposed installation, should be conducted prior to submittal of the package to the plant (see Section 5.1.2).
5. An excessive turnaround time for drawing changes resulting from modifications exists which could increase the potential for operating errors (see Section 5.3.1).
6. Quality Assurance (QA) involvement in the station modification program should address the operationally significant aspects of the program (see Section 5.4).
7. Licensed operators should be made aware of procedure and technical specification changes resulting from certain safety related modification activities prior to system operability (see Section 5.5).
8. An inventory of "critical control room drawing" status is performed on a quarterly basis. The results of the inventory should be reviewed by technical staff management to insure appropriate action is taken to correct discovered discrepancies (see Section 5.3.2).

3. PERSONNEL CONTACTED

The following CECO personnel provided information for this inspection:

- | | | |
|----|-----------------|----------------------------|
| 1. | G. J. Diederich | Station Manager* |
| 2. | C. E. Sargent | Production Superintendent* |
| 3. | R. D. Bishop | Services Superintendent* |
| 4. | H. Hentschel | Shift Engineer |
| 5. | W. Jakielshi | Shift Foreman |
| 6. | R. D. Crawford | Training Supervisor* |

7.	P. F. Manning	Tech. Staff Supervisor*
8.	B. K. Wong	Station Nuclear Engineering Dept (SNED)*
9.	S. R. Harmon	Training Operations Supervisor*
10.	W. C. Kirchhoff	Tech. Staff Engineering Group Supvr.*
11.	G. Ford	Tech. Staff - Mechanical Group Leader
12.	K. Keller	Tech. Staff Mechanical Engineer
13.	T. A. Hammerich	Tech. Staff Compliance Group Supervisor*
14.	T. Bozan	Drawings Control Clerk
15.	M. Jeisy	Station QA Supervisor*

Additionally, NRC Senior Resident Inspector Mike Jordan and NRC Resident Inspectors John Bjorgen and Ron Kopriva participated in various phases of this technical review.

* Attended entrance and/or exit meeting.

4. INFORMATION REVIEWED

4.1 Procedures

1. Plant Modifications, LAP-1300-2, Rev. 19, 1/6/86.
2. Guidelines for Development of Tests for Modifications LTP-800-9, Rev. 1, 8/26/85.
3. Initial Review of Modification Work Request, LTP-800-7, Rev. 2, 1/19/82.
4. Final Review of Modification Work Request, LTP-800-8, Rev. 1, 1/19/82.
5. Procedure Change Control, LAP-820-2, Rev. 26, 11/1/85.
6. Receipt and Distribution of Drawings, LAP-810-8, Rev. 9, 9/11/85.
7. Control of Drawing Modification, LAP-810-9, Rev. 10, 12/11/85.
8. Field Change Requests, LAP-1300-S, Rev. 6, 1/9/86.
9. Calibration of 4kV Emergency Bus Loss of Voltage Relays by O.A.D., LES-GM-119, Rev. 4, 9/20/85.
10. Unit 2 Control Rod Drive Scram Discharge Level Sensing Line Check, LIP-RD-603, Rev. 1, 11/21/85.
11. Conduct of Operations, LAP-1600-3, Rev. 27, 1/13/86.
12. 250V DC Battery Trouble Annunciator Response Procedure, LOA 2PM01JA108, Rev. 1, 8/84.

13. 250V DC Battery Charger Trouble Annunciator Response Procedure, LOA 1(2)PM01JA109, Rev. 3, 5/83.
14. Design Control for Operations - Plant Modifications, Q.P. 3-51, 11/20/85.

Note: Modification Packages contain multiple station drawings, Field Change Requests (FCR), Engineering Change Notices (ECNs), correspondence, work requests, safety evaluations, proposed tech spec changes, and various check lists included in LAP-1300-2 attachments.

4.2 Documents

1. Task Force Review of Operational History for LaSalle County Station, Units 1 and 2, US NRC Final Report, 9/24/85.
2. LaSalle County Station Units 1 and 2 Request for Information Under 10CFR50.54(f), Commonwealth Edison Co., 2/4/86.
3. Prompt Change Request (PCR) Approval Form, PCR Log #86-6, PDM #L-LOP-85-68, 2/13/86.
4. Modification Package M-1-1-82-305, Control Rod Drive Low Charging Water Headers Scram.
5. Modification Package M-1-1-82-284, Degraded Voltage Protection.
6. Modification Package M-1-1-82-319, Emergency Diesel Generator 1B Pre-lubrication.
7. Modifications Package M-1-1-82-310, Relocation of Emergency Diesel Generator 1A Control.
8. Modification Package M-1-1-82-290, Electrical Penetration Redundant Fault Protection.
9. Modification Package M-1-1-83-018, DC Instrumentation and Annunciation Upgrade.
10. CECO Quality Assurance Program Manual for Nuclear Generating Stations, Rev. 12, 6/5/85.
11. Drawing Change Request (DCR) log of open DCRs.
12. NRC IE Inspection Modules 37700, Design, Design Changes, and Modifications; 37701, Facility Modifications; 37702, Design Changes and Modifications Program; 37828B, Modifications and Changes to Facility and Systems.

5. DESCRIPTION OF REVIEWED AREAS

To determine the adequacy of the LaSalle modification program, an audit plan was developed based on the NRC I&E Inspection Modules and on specific unit 1 information obtained from the licensee and NRC resident inspectors. The inspection as outlined in the audit plan (attachment 1), consisted of a review of specific modification packages to determine the engineering and design technical attributes, and the proper identification of procedure changes, drawing revisions, and training requirements. In addition, the completeness of post modification testing, the application of quality assurance during the entire modification process, and the physical inspection of modification work in progress were reviewed and are discussed in this report.

5.1 Modification Package Review

Six Unit 1 modification packages were reviewed in detail to determine compliance with various administrative controls identified in station procedures, and to determine the technical adequacy of the enclosed material. Each package contains the modification approval sheet, work requests, marked up drawings, Engineering Change Notices (ECNs), Field Change Requests (FCRs), a post modification test procedure, proposed tech spec changes, a 10CFR50.59 Safety Evaluation, and an engineering synopsis of the change. Forms which list the affected procedures and drawings as well as the required training and when it is to be accomplished are also included. Installation details and documentation demonstrating quality control and quality assurance reviews are contained in the package as well.

These voluminous packages were found to be technically accurate and complete, providing a traceable history of modification design, review, approval, installation, and testing. Adherence to the controls established by station procedure LAP-1300-2, Plant Modifications, was evident as was the knowledge of the responsible engineers assigned to each modification. Concerns and/or recommendations resulting from this aspect of the inspection are as follows:

5.1.1 Setpoint Discrepancy - Modification Package M-1-1-82-305

The Control Rod Drive (CRD) Automatic Scram on Low Discharge Pressure modification package contains conflicting information regarding the instrument setpoint. A detailed calculation was transmitted to the Station (G. Crane to R. Bishop - 8/9/84) which recommended a nominal trip point of 1170 psig and an allowable value of 1140 psig. Other information within the modification package, including a proposed tech spec submittal and a drawing change request, stated that the trip setpoint should be 1157 psig. While it appears that the 1157 psig set point is correct, approved documentation should be included within the modification package which justifies the deviation from the original calculation.

5.1.2 FCRs/ECNs Subsequent to Modification Approval

To permit minor changes and/or corrections to be made to a modification subsequent to authorized release of the package for installation, a Field Change Request (FCR) may be processed. Of concern in the packages reviewed were the

type and number of errors or omissions in the submitted design package which required FCRs or ECNs to resolve the problem. These errors indicated a lack of knowledge and awareness of plant physical configuration. Several examples are given below:

- In modification package M-1-1-82-305 for the CRD discharge pressure automatic scram addition, ECNs were required to relocate proposed cable terminations in the Reactor Protection System (RPS) panels "due to existing cables presently terminated," correct cable separation problems, supply mounting details for the time delay relays and terminal blocks, and to relocate pressure transmitters. In addition, a number of FCRs had to be written to change the instrument stand heights to permit proper instrument tube sloping, and to change wire codes, terminal block numbers and labels including an incorrect annunciator label (High Pressure instead of Low Pressure). An error in the setpoint specified (1267 vs 1157), and re-routing of hangers and conduits due to interferences were also corrected through FCRs in this package.
- In modification package M-1-1-82-284 for installation of backup relays for monitoring safety system bus voltage, ten FCRs were required to obtain relay mounting requirements, correct relay wiring diagrams, and to resolve wiring discrepancies.
- For the EDG 1B pre-lubrication modification, M-1-1-82-319, which involves installation of a new 3 gpm pump to continuously supply lube oil to both the turbo-charger bearings and engine accessories, eighteen FCRs were required to resolve problems associated with pump relocation due to interferences, incorrect thermal overload settings, and hanger and piping rerouting.

While the number of FCRs is a concern, it is the basic nature of the changes required that is a concern that should be tracked in the future. The licensee stated that a commitment has been made to require engineers to physically walkdown the design prior to site submittal. Formal incorporation of this commitment into the Modification Program should improve the quality of the packages and decrease the potential for a design or installation error.

5.2 Training

Prior to the return to service of operationally significant systems that have been modified in a manner that affects the system operation, it is imperative that operating personnel be completely knowledgeable of the change. Similarly, certain modifications may require instrument technician, electrician, or maintenance mechanic training, but generally their training on a modification is based upon familiarization with the resulting procedural changes and may be accomplished subsequent to modification completion.

LaSalle Station management acknowledges the importance of training personnel on modifications, and has incorporated into the Modification Program several mechanisms for evaluating and implementing training requirements during the modification review and approval process. These include:

- Sign off by the Training Supervisor on the Modification Approval Sheet indicating that the Training Department is notified of the modification. This notification includes an Engineering Synopsis describing the change.
- Approval by the Operating Engineer and the Training Supervisor of a Training Summary Sheet (attachment J of LAP-1300-2) which notes if "Training required prior to Mod Operation," and what the training emphasis is. This same form is also used by the Tech. Staff Supervisor to notify the Training Supervisor when the modification is completed.
- Sign off by the Training Supervisor on Form 3-51-1, the modification approval sheet, that training is complete. The procedural wording explaining this sign off (step 34) states that the Training Supervisor "Assures that training required prior to operation is performed."

The method most often used by the Training Department to train operating personnel on modifications is through required reading. This is backed up by classroom training if questions arise or additional information becomes available. Several of the required reading write-ups for the modification packages reviewed were read and were found to accurately reflect the operating significance of those modifications. In general, modification training is properly addressed with the significant exception discussed in the following paragraphs.

Through discussions with Training and Operating Department personnel, it was learned that sign off by the Training Supervisor on the modification approval sheet of "Training Complete" indicated that the material had been prepared and, for the case of required reading, had been distributed to Operations. It was not indicative, as the procedure LAP-1300-2 states, that the training was performed. An operator responsible for unit operation with a modified system(s) could therefore potentially not receive training on the modification for up to 60 days following the return of the modified system to service. The 60 days corresponds to the CECO completion commitment for this mode of notification. This is unsatisfactory and does not meet the intent of the Modification Program.

The licensee concurred with this potential problem and took action through the use of a Prompt Change Request (PCR #86-6) to provide an alternate method of notifying operators of important modifications prior to the operator assuming responsibility for the shift. While the action taken does not meet the full intent of the procedure, as a temporary measure it does provide reasonable assurance that operators taking the watch are aware of the modifications and how they affect system operation. A permanent change should be accomplished in the very near future - certainly prior to Unit 1 start-up.

5.3 Drawing Controls

Control of drawing changes resulting from a station modification is critical to assuring that an accurate record of station equipment design and operation is maintained throughout the plant life. Drawing controls are imposed in the LaSalle Modification Program through the following means:

- Two copies of drawings are submitted with any Design Change Request (DCR) associated with a modification, one of which is maintained at Central files in an "Open DCR File" and which may be accessed by station personnel.
- For certain special drawings, known as "critical control room drawings" the hard copy is marked up by the responsible engineers to reflect the as built condition. The mark up of those drawings is accomplished prior to system operation, and is reviewed and approved by the Tech. Staff Supervisor.
- Aperture cards in the Control Room, Tech. Support Center, and Central Files are marked with the modification number or the outstanding DCR number indicating that the drawing is not current.
- A quarterly inventory is performed to verify that the Critical Control Room Drawings are accurate.

These controls along with several other informal tracking mechanisms provide a satisfactory means for assuring that drawings exist which represent the current plant configuration. A review of the implementation of these controls for several of the Unit 1 modification packages revealed that these controls were being properly applied with the following exceptions.

5.3.1 Drawing Revision Delay

An excessive amount of time (6 to 8 months) exists from the initiation of a drawing change request to the time a revised drawing is received. Following the present refueling outage of Unit 1 where numerous modifications are being implemented, it is conceivable that marked up or outdated drawings and aperture cards will exist in the control room for 6-8 months of power operation. This increases the probability of an error occurring in routine or emergency conditions where drawings may be used in the decision making process, such as during valve lineups, equipment tagouts, or system trouble-shooting. While the mark-up of certain drawings declared by Operations to be special prior to mod. operability alleviates part of this concern, it should be noted that the critical control room drawings do not include drawings associated with the electrical distribution system, emergency diesel generator controls, Reactor Core Isolation Cooling (RCIC), and normal feedwater and reactor water level controls.

It is therefore necessary to insure a faster turnaround of drawing changes that are important to plant operation. Consideration should be given to reviewing and revising the critical control room drawing list to insure that complete and accurate drawings are available to the operator for the "P&IDs" and "Electricals" associated with those systems required for safe plant operation.

5.3.2 Drawing Status Review

An inventory of critical control room drawings and the aperture cards located in the control room, tech. support centers, and central files has been conducted on a quarterly basis since February 1985, to verify that drawings have been red-lined and aperture cards have been marked as appropriate with any and

all outstanding DCRs. The most recent inventory conducted during the week of February 10, 1986 found that two critical control room drawings were missing and one aperture card was not the latest revision. Of concern is that the cognizant engineers' action was simply to replace the missing drawings and update the obsolete aperture card rather than determine the cause for the discrepancy. The quarterly inventory performed as per LAP-810-9 should be reviewed/acknowledged by plant management to insure that proper long term and short term corrective actions are taken, including identification and mitigation of the root cause of the problem.

5.4 Quality Assurance (QA)

The Station Quality Assurance (QA) Department is involved with the modification approval process as specified in the Modification Program procedure LAP-1300-2. The QA Supervisor's signature on the modification approval sheet indicates that he has reviewed the modification installation and approves declaring the mod. operational. A second review by the QA Supervisor is performed to verify that the modification documentation is complete (Reference steps "U" and "AA" of LAP-1300-2).

Direction is provided to the QA Supervisor via the CECO Quality Assurance Program Manual which contains Q.P. #3-51, Design Control for Operations - Plant Modifications, and an audit check list, Evaluation Area No. 3 - Design Drawings and Document Control. The documents adequately address the Modification Program controls that should exist, and the QA responsibilities to verify that these controls are in place, with the exception that insufficient QA commitment to Modification Program implementation verification exists.

The recommendation to expand QA involvement beyond a cursory documentation/administrative verification is based on a review of several audits performed by QA in the past. These audits did not address the important requirements of the Modification Program stated in LAP-1300-2, including the commitments for training personnel, updating procedures, and updating critical control room drawings prior to modification operability. These attributes are important components of the modification installation, and are part of the responsibility accepted when the QA sign off on the modification approval sheet occurs. Verification of these attributes, at least on an audit basis should be performed regularly to provide the quality assurance committed to in the Modification Program.

5.5 Procedure/Technical Specification Changes Due to Modification

The Modification Program provides a satisfactory mechanism for identifying procedural and/or tech spec changes that may result from a modification. Procedural changes resulting from modifications are statused regularly and are available to station personnel via a computerized tracking program. The modification packages reviewed were found to properly document the procedures which were affected by the modification and, in some cases, the revised procedures were already approved. Similarly, for those modifications that resulted in a tech spec change, a computerized tracking mechanism was available to status the approval of the change. In addition, the participation by the Station Compliance Engineer in the modification review process provides a second check that final approval of the modification be conditioned on NRC acceptance of the proposed tech spec change.

For those modifications which the operating and training supervisors decide must have procedures revised prior to declaring the mod. operable, it is apparent that a potential for personnel unfamiliarity with the change could exist at the time the modified system is returned to service. In procedure LAP-820-2 regarding station procedure control and distribution, it is noted in step 16 that "After Station Manager authorization... the Procedure Change Synopsis [is] promptly routed to the Training Supervisor for training as necessary." During the time that it takes to prepare and distribute training material to all of the licensed operators and for them to read and understand it, the modified system could be returned to service. While the station decision not to train personnel on unapproved procedures is reasonable, licensed operator cognizance of procedural changes resulting from a modification should exist at the time the mod. is declared operational. Likewise, the operator must be aware and knowledgeable of the implication of any tech spec changes resulting from the modification prior to the declaration of operability.

A second concern arose from a review of modification package M-1-1-83-018 involving the addition of dc system instrumentation and annunciation in the control room. The determination by the Responsible Engineer, and approved by the Operating and Training Supervisors, was that procedure changes and training could be conducted after modification operability. Because this mod. involves changes to annunciator response procedures (ARP) including one significant ARP for 250V DC Battery Trouble, it is recommended that at least a portion of the procedures and training be accomplished prior to mod. operation. The licensee agreed to have ARP 1PM01JA108 approved prior to declaring the modification operable.

6. CONCLUSIONS

Based on a detailed review of several modification packages being processed during the current LaSalle Unit 1 refueling outage, coupled with an examination of the LaSalle Modification Program procedures, and discussions with LaSalle personnel, it is apparent that controls have been established and are being properly implemented at LaSalle, with the exception of the items described within this report.

Recent Modification Program changes initiated by the licensee, along with the actions necessary to address the concerns expressed in this report, should result in achievement of the desired controls.

APPENDIX A

AUDIT OUTLINE
FIN A-3552 - TASK ORDER 4
LA SALLE OUTAGE MODIFICATION WORK CONTROLS
2/10-14/86

1. Review modifications for 10CFR50.59 evaluations including sample of non-safety related mods.
2. Selected safety related modifications reviewed for the following:
 - control room drawings reflect changes
 - procedures are revised as necessary
 - testing is planned or has been performed to verify operability
 - licensed operator training completed prior to system operation
 - review and approval process for modification implementation and testing is assured
3. Application of quality assurance and controls during design, implementation, and testing process.
4. Physical inspection of work in progress:
 - personnel qualifications
 - QA/QC involvement
 - impact on plant considered - backup systems maintained operable
 - impact on adjacent systems including instrumentation and cabling
 - appropriate controls such as fire watches are maintained

Partial List of Modifications to be Reviewed

- scram discharge volume vents and drains and level monitoring instrumentation; modification number M-1-1-82-263
- control rod drive low discharge pressure automatic scram during startup and refueling; modification number 1-1-82-305
- second level of undervoltage relaying protection for safety bus; License Condition #20
- emergency diesel generator upgrade including pre lube system; modification number 1-1-83-129
- addition of control room instrumentation for dc parameters; modification number 1-1-83-018

- installation of redundant fault current devices for high voltage reactor containment electrical penetrations; modification number 1-1-82-290

- RCIC steam line break logic modification; modification number 1-1-81-8.