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ComEd

February 6, 1997

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Zion Station Units 1 and 2
Request for Information Pursuant to 10 CFR 50.54(f) Regarding Adequacy and Availability of Design Basis Information
NRC Docket Numbers: 50-295 and 50-304

References: (a) J. M. Taylor letter to J. J. O'Connor dated October 9, 1996, "Request For Information Pursuant to 10 CFR 50.54(f) Regarding Adequacy And Availability Of Design Basis Information"

(b) T. J. Maiman letter to A. B. Beach dated November 12, 1996, "Programs to Improve the Quality, Maintenance, and Accessibility of the Design Bases at ComEd Nuclear Stations"

(c) T. J. Maiman letter to A. B. Beach dated January 30, 1997, "ComEd Plan for Upgrading the Quality and Access to Design Information at All Six Nuclear Stations"

This letter transmits Zion Station's response to the Nuclear Regulatory Commission's (NRC) request for information under 10 CFR 50.54(f) (Reference (a)). For the reasons described in detail in the attachment to this letter, we conclude that there is reasonable assurance that Zion Station's procedures reflect the design bases and that the plant is configured and operated in a manner that is substantially consistent with the design bases, as defined in 10 CFR 50.2, or as otherwise permitted under the NRC's regulations. Any discrepancies that may be identified from time to time involving the design bases are resolved appropriately.

Zion's process for developing this response was structured to take a comprehensive look at the configuration management program as it applies to the design bases, and to assure accuracy and completeness. Verification and review of the response were conducted at several levels, including reviews by site management, a ComEd

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Corporate Team, and Zion's On-Site Review. Finally, an external review team comprised of individuals who have extensive experience with the nuclear regulatory process and who are not involved in ComEd's day-to-day activities provided an independent assessment of the quality, completeness and responsiveness of the reply. These processes for preparing and reviewing the response provide a high level of assurance of its completeness and accuracy.

This response is structured around the five action items in the 50.54(f) request. The attachment to this letter is supplemented with three appendices:

- Appendix I, "ComEd Organizational Restructuring to Improve Zion Station's Ownership and Control of the Design Bases," discusses other support provided by Corporate and site organizations which oversee conformance with the design bases.

- Appendix II, "Design Control and Configuration Control Processes," presents a summary of the major processes deployed at Zion and ComEd's other Nuclear Stations.

- Appendix III, "Nuclear Fuel Services' Design Processes," discusses the role of the Corporate Nuclear Fuels Group in supporting Zion and other ComEd nuclear stations in reload analysis and fuel management.

This response captures and condenses a substantial body of information relating to existing Zion Station processes, programs and audit and assessment results. Additional detail is available in other correspondence and company documents. Commitments related to the processes and programs associated with this submittal are contained in other relevant docketed correspondence and are controlled in accordance with approved Station processes. To alleviate any ambiguity as to our commitment to future actions regarding the quality, maintenance, and accessibility of design bases information, we have provided those commitments under separate cover to the NRC (References (b)and (c)).

Current Situation

Zion Station's conclusion that there is reasonable assurance that the plant is substantially configured and operated consistent with its design bases is based on several factors. The first of these stems from activities conducted at the time of initial plant licensing. These activities included construction verification, plant and system walkdowns, and preoperational and startup testing.

Since initial licensing, changes to the Station's design, physical configuration and procedures have been made in accordance with controlled processes and programs. These processes and programs were designed to assure continuing consistency with

the design bases. Under these programs, changes to the design and physical configuration are controlled and design bases information is updated by procedure. Significant changes to the Station's configuration and its operating procedures are also subject to Onsite Review and Offsite Review.

Zion Station's design and configuration programs, including the availability and accessibility of design information, have been improved and upgraded over time. This is a result of Zion Station and ComEd responding to industry and regulatory initiatives and operating experience review. In addition, feedback and lessons learned from the Station's corrective action program have enhanced our configuration management program.

ComEd's assessment processes, NRC inspections and third party reviews have repeatedly probed the status of the plant configuration and procedures, as well as the processes and programs implemented to maintain the plant configuration consistent with the design bases. When discrepancies were identified, they were reviewed for operability considerations and reportability, the causes and extent of occurrence were determined, and the discrepancies were corrected. The results of the actions taken in addressing deficiencies have been successful overall. However, Zion Station has taken additional action to strengthen two fundamental areas identified as weak in recent internal audits and NRC inspections, i.e., the timeliness of implementing corrective actions and the effectiveness of the corrective actions in preventing problem recurrence.

Normal operating experience has shown that the plant's structures, systems, and components have substantially operated as designed. A comprehensive program of inspections and surveillance testing is performed on an ongoing basis. Also, over the operating life of the plant, Zion Units 1 and 2 have generally responded as expected during transients and unplanned events. The plant performance results support the conclusion that there is reasonable assurance that the plant is currently configured and operated in accordance with the design bases.

As you are aware, we have a new management team in place. We recognize that our overall performance, including configuration and plant operational controls, human errors and plant events, has not met our expectations. Zion Station has taken significant actions over the past few months to arrest the causes of declining station performance and to improve our performance to attain levels comparable to the best performing plants in the industry. We have taken specific actions to build a new, experienced Zion management team, establish higher performance standards and hold the organization accountable for achieving these standards. We have established meaningful performance-based plans to guide our improvement agenda. We have also implemented aggressive action and set new standards for improving plant material condition and engineering support. We realize that, as a result of these actions, there

is the potential that additional deficiencies will be identified. We will deal with these issues aggressively.

Future Action

Our letter, (Reference (b)), described actions taken to improve the quality, maintenance and accessibility of the design bases. At the time of preparation of that letter, we recognized the need to develop a long-term plan at Zion Station to improve the quality and accessibility of design information. The plan addresses updating the existing Design Basis Document (DBD) process at Zion to include additional DBDs, and validating existing and planned DBDs for adequacy, correctness, and consistency with the UFSAR, other applicable design documents, and plant procedures. It also addresses critical calculation control and any necessary reconstitution, and UFSAR validation. These future actions are described under a separate transmittal to the NRC in Reference (c).

Please contact us should you have any questions on the attached information.

Very truly yours,

Thomas J. Maiman
Executive Vice President
Chief Nuclear Officer

J. H. Mueller
Site Vice President
Zion Nuclear Power Station

TJM/tb

Attachment

cc: A. B. Beach, Regional Administrator - RIII
J. Callan, Executive Director for Operations
S. Collins, Director - NRR
C. Shiraki, Zion Project Manager - NRR
A. Vegel, Senior Resident Inspector - Zion
Office of Nuclear Facility Safety - IDNS

COUNTY OF DuPage
STATE OF Illinois

AFFIDAVIT

I, Thomas J. Maiman being first duly sworn, do hereby state and affirm that I am the Chief Nuclear Officer for Commonwealth Edison Company, that I am authorized to submit the attached letter and attachments on behalf of the company, and that the statements in the letter and attachments are true and correct to the best of my information, knowledge, and belief.

Thomas J. Maiman

Thomas J. Maiman
Executive Vice President
Chief Nuclear Officer

Subscribed and sworn before me on this 6th day of February, 1997.

My commission expires 5-19-98

"OFFICIAL SEAL"
MICHELLE KOWALKOWSKI
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 5/19/98

Michelle Kowalkowski

Notary Public

EXECUTIVE SUMMARY

The following provides a summary of the Zion Station response to the NRC's October 9, 1996 request for information pursuant to 10 CFR 50.54(f) regarding the adequacy and availability of design basis information:

Action (a): Description of Engineering Design and Configuration Control Processes. Zion Station and related corporate engineering design and configuration control processes and programs, including those that implement 10 CFR 50.59, 10 CFR 50.71(e) and Appendix B to 10 CFR Part 50, are described in this response in Section 1.0 and Appendix II. These processes and programs implement regulatory requirements for maintaining the design configuration of the plant. As a result of internal and external audits and assessments, we continue to identify areas for improvement in our processes and programs. For example, we have identified specific weaknesses in the adequacy of safety evaluations to support the 10 CFR 50.59 process. To correct these weaknesses, we have implemented specific actions to improve the depth of the review process and to provide additional management involvement and oversight of the process.

Action (b): Rationale for Concluding that Design Bases Requirements Are Translated Into Operating, Maintenance and Testing Procedures. We have assessed our processes for translating design bases requirements into operating, maintenance, and testing procedures. Our rationale for concluding that there is reasonable assurance that procedures are consistent with design bases requirements includes the following:

(1) The original station procedures were written based on input from the designers.
(2) The process for revising procedures is controlled and has appropriate levels of technical and on-site review to address design basis requirements.
(3) Plant operation and transient response has confirmed that the procedures reflect the design bases correctly.
(4) Procedure improvement and upgrade programs have resulted in or corroborated the translation of design requirements into the procedures.
(5) Separate assessments and programs have provided additional assurance that the design requirements have been correctly incorporated into procedures.
(6) Audits and inspections have confirmed the effectiveness of the processes to incorporate requirements into the procedures.

Zion Station has found procedural deficiencies that were identified during plant operation and have been resolved through our corrective action program. For example, as a result of a review of the Inservice Test Program (IST), we identified deficiencies in implementation of testing requirements for certain components in the program. We have reviewed the scope of this problem and are taking actions to correct it.

Even though we have had deficiencies with our procedures, our continuing efforts in identifying and correcting them support our rationale for concluding that there is reasonable assurance that design bases requirements have been translated into our operating, maintenance, and testing procedures.

Action (c): Rationale for Concluding That System, Structure and Component Configuration and Performance are Consistent with the Design Bases. Our assessment addressed the rationale for concluding that system, structure and component configuration and performance are consistent with the design bases. Our rationale is based on:

(1) The original construction completion process, preoperational testing program and system walkdowns confirmed design basis consistency as part of the initial licensing process.

(2) Zion has procedural control of configuration changes, maintenance actions and operational changes to maintain consistency with the design bases.

(3) System, structure and component configuration are continuously reviewed during plant operations as a result of our system engineering program, our surveillance testing program, operator rounds and our control of plant operational configuration by the Operating Department.

(4) We have implemented special programs that have confirmed the capability of equipment to function during design basis seismic or accident conditions.

(5) Zion has been subject to internal and external audits and inspections of design and configuration control. These audits and inspections have identified documentation and plant deficiencies that are addressed by our corrective action program.

The new management team at Zion is placing significant emphasis on identifying problems and taking prompt corrective actions. For example, we found and corrected configuration control deficiencies with our containment recirculation sump vents and our fuel building ventilation system. The results of our assessment and our continuing focus on finding and correcting problems allows us to conclude that there is reasonable assurance that Zion Station systems, structures and components are maintained consistent with the design bases.

Action (d): Processes for Identification of Problems and Implementation of Corrective Actions. We have reviewed our processes for identifying problems and implementing corrective actions at Zion Station, including actions to determine the extent of problems, action to prevent recurrence, and reporting to NRC. Zion's problem identification and corrective action processes are capable of identifying, correcting and preventing the recurrence of any significant nonconformances with the plant design bases. However, external and internal audits have identified deficiencies, primarily in our ability to consistently implement timely and effective corrective action as evidenced by the slow closure of issues identified in the 1988 SSOMI. Zion Station management considers the identification and effective resolution of problems to be a fundamental part of configuration management. We are not satisfied with our current performance in this area and are taking aggressive action to improve this performance.

Action (e): Overall Effectiveness of Current Processes and Programs in Concluding That the Configuration of the Plant is Consistent with the Design Basis. We have assessed the overall effectiveness of current processes and programs and conclude that there is reasonable assurance that the configuration of Zion Station is consistent with its design bases. Although there have been deficiencies identified during Zion's operating history associated with the implementation of

the design and configuration control processes and programs, we have implemented corrective actions that have resulted in upgraded configuration controls. Recent audits and assessments continue to reinforce the need to improve the implementation of Station processes and to improve the timeliness and effectiveness of specific corrective actions taken. However, based on our review of the processes and programs in place to ensure consistency with the plant design bases, we believe that Zion Station's processes and programs have been effective overall in maintaining the plant consistent with its design bases. Major program improvements, such as the DBD validation and the implementation of the Technical Specification Improvement Program, will further support the long-term effectiveness of the configuration management program.

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1.0 ACTION (a): DESCRIPTION OF ENGINEERING DESIGN AND CONFIGURATION CONTROL PROCESSES, INCLUDING THOSE THAT IMPLEMENT 10 CFR 50.59, 10 CFR 50.71(e), AND APPENDIX B TO 10 CFR PART 50

1.1 Introduction

The Zion Station processes for engineering design and configuration control, including those that implement 10 CFR 50.59, 10 CFR 50.71(e), and Appendix B to 10 CFR Part 50, are described in this section. These processes implement ComEd's configuration management model. It is followed at both the corporate office and Zion Station.

The complementary configuration management roles of the corporate office and Zion Engineering Departments are discussed in Appendix I. In the corporate office, implementation of the configuration management model is the responsibility of the Chief Engineer, Configuration Management, who reports directly to the Engineering Vice President. At Zion Station, implementation of the configuration management model is the responsibility of the Site Engineering Manager.

The major process elements relevant to engineering design and configuration control are summarized below and in Appendix II. A matrix in Appendix II illustrates how the various processes relate to the configuration model. The matrix also summarizes the processes for implementing 10 CFR 50.59 and 10 CFR 50.71(e). The corporate office is responsible for Nuclear Engineering Procedures (NEP) and Nuclear Station Work Procedures (NSWP). NEPs and NSWPs provide the sites with corporate guidance for configuration control processes.

Zion Station is responsible for Administrative Procedures that implement the processes that constitute the configuration management model. These procedures specify how work is performed at the Station and how Zion Station is operated to assure consistency with the design bases. Personnel implementing these procedures are trained in accordance with the requirements of Zion Station's accredited training program.

The Zion Administrative Procedures for engineering design and configuration control are structured to achieve the following objectives:

- Implement the quality assurance requirements in Appendix B to 10 CFR Part 50 as applied to design changes.
- Assure that changes continue to satisfy design basis requirements through controlled processes for review and approval of the design, its installation, its testing and its operation.
- Comply with 10 CFR 50.59.
- Implement the UFSAR update requirements in 10 CFR 50.71(e).

- Assure that all required QC inspections and post-modification tests are conducted for modifications.
- Assure timely update of documents, databases and drawings that are affected by changes.
- Assure that field changes to a modification are subject to engineering approval.
- Assure that personnel are trained.

The Nuclear Fuels Design Process is corporate sponsored for all Stations and is discussed in Appendix III.

1.2 Requirements of Procedures That Control Design Bases

Zion Station's procedures for implementing the configuration management model address four principal areas: (1) design control to determine and control the impact of proposed actions on the design bases; (2) configuration control to assure that documentation is updated in a timely manner after a change is made; (3) safety evaluation under 10 CFR 50.59 to determine if the change involves an Unreviewed Safety Question (USQ); and (4) licensing basis review to update the UFSAR. The following overviews of the Station's actions in each of these four areas provide a comprehensive summary of the important steps that are taken to maintain the plant's configuration and operation consistent with its design bases.

Design control processes conform to Criterion III of Appendix B and include the following provisions:

- Procedures apply to design changes for Zion structures, systems, and components.
- Design changes are reviewed for conformance with design bases.
- Design changes are documented in calculations, analyses, specifications, drawings, or other controlled documents.
- Design changes are subject to an independent review.
- Design changes are approved by management.

Configuration control procedures include the following provisions:

- Design changes are evaluated to determine their impact upon operating, maintenance and testing procedures and training programs, and appropriate changes are made to affected procedures and programs.
- Approved design changes are implemented in accordance with controlled documents (e.g., work packages, installation procedures or specifications).
- Safety-related modifications are subject to QC inspections in accordance with Station procedures.
- Modifications are subject to post-modification tests.
- Field changes are evaluated and are subject to Engineering approval.
- Temporary modifications and operation with nonconforming conditions are evaluated and reviewed by Engineering to assure compliance with design bases.

- Changes resulting from as-built conditions are reviewed and approved by Engineering and incorporated, as appropriate, into the design documents.
- Changes to operating, maintenance, and testing procedures are reviewed to verify their conformance with design documents.

Procedures implementing 10 CFR 50.59 include the following provisions:

- Changes are screened to determine whether they involve a change in the UFSAR or Technical Specifications.
- Evaluations are performed for the following: changes to the UFSAR and Technical Specifications, changes to the design of the facility, changes to procedures to operate the facility and temporary modifications.
- Safety evaluations pursuant to 10 CFR 50.59 are documented.
- Safety evaluations are reviewed and approved by management, reviewed by the Safety Evaluation Review Committee, and independently reviewed offsite.
- Unreviewed Safety Questions and changes to the Technical Specifications are submitted to the NRC for approval as part of a license amendment application prior to implementation.

Procedures implementing 10 CFR 50.71(e) include the following provisions:

- Changes that require 10 CFR 50.59 evaluations are reviewed to determine whether the UFSAR needs to be updated (e.g., for permanent changes).
- Changes to the design bases described in the UFSAR are reflected in the UFSAR update.
- The updates to the UFSAR include not only changed information but also new information.
- Between updates, identified changes for the UFSAR are controlled and accessible to plant personnel.

1.3 Overview of Processes That Control Design and Configuration

Processes that control design and configuration are grouped according to their primary objective:

- Work Initiation
- Work Planning and Design
- Interim or Temporary Actions
- Work Execution
- Document Updates

Figure 1-1 summarizes the relationships of these processes.

1.3.1 Work Initiation

Work may be initiated via a number of processes. For maintenance work, the Action Request (Appendix II, Process 1) is used. For engineering initiated work and evaluations, the Engineering Request (ER) can be used. For problem investigation and corrective action, the Problem

Identification Form (PIF) (discussed in Section 4.0) can be used to initiate the process to perform work.

Action Requests and PIFs are reviewed by a licensed Senior Reactor Operator (SRO) for impact on operability and reportability. The licensed SRO determines whether the identified problem results in a safety concern and whether immediate action is required. If immediate action is required, the appropriate notifications are made. An experienced, multidiscipline screening committee, including representatives from Operations, Engineering, and Maintenance, assign work priority consistent with the safety significance of the request. With Engineering as part of the screening committee, design and license issues are identified and receive the proper attention from Engineering in the resolution to maintain design control.

Action Requests are generally used for the initiation of maintenance work. Minor maintenance and facilities maintenance activities that do not affect the plant design bases may be performed without an AR provided they meet the strict criteria provided in Station procedures.

1.3.2 Work Planning and Design

Work is planned and work packages are prepared using the work control process (Section 1.4). Work may require a plant modification, a procedure change or new procedure, use of other than like-for-like replacement parts, or a setpoint change. Design change (Section 1.5), procedure contr . (Section 2.0), parts replacement (Section 1.10) or setpoint change (Section 1.11) processes are used.

A verification walkdown is performed prior to starting work. Any discrepancies between the plant configuration and the design documents are brought to the attention of the Engineering department. An ER is used to document discrepancies and their resolution and a PIF is initiated to provide the input to the plant problem identification process.

Like-for-like replacement parts are evaluated by the Parts and Materials Management personnel in accordance with Station procedures. For non like-for-like replacements, an ER is initiated to establish technical requirements and a design change, as required (Section 1.10).

Consistency between modification work, maintenance activities, and the plant's design bases is assured by the development of a work package. This Work Package process includes appropriate elements of the design, materials and parts procurement processes, and also includes post-modification/maintenance testing developed through the Engineering Modification or Work Package development processes.

1.3.3 Interim or Temporary Actions

At times it is necessary to take interim action to correct a potential or actual condition adverse to quality/safety, pending the completion of permanent corrective action. In such cases, operability evaluations (Section 1.15) are performed to assess whether a structure, system, or component is capable of performing its specified function in its present condition and to specify compensatory action, if required. Temporary Alterations (Section 1.6) or pre-approved task specific procedures (e.g., leak sealing, scaffolding) are used to specify and document the acceptability of an interim change to the plant configuration.

1.3.4 Work Execution

Work packages that modify the plant are based on a design change package prepared by Engineering. If deviations to the original design change are required, they are documented on field change requests, evaluated under provisions of 10 CFR 50.59, and reviewed and approved by Engineering prior to the completion of the work.

The Out of Service process (Section 1.12) provides assurance that operational plant configuration is controlled consistent with the plant drawings and procedures during performance of maintenance activities. Post maintenance testing provides assurance that work is done properly and that the equipment conforms to applicable requirements and can be returned to service. If a special test is required, it is performed using a special test procedure which is prepared and evaluated under provisions of 10 CFR 50.59.

1.3.5 Document Updates

Design document changes may be required either because of a deficiency, such as a deviation between a document and the as-built configuration of the plant, or because of a design change. The Document Change Request (DCR) (Section 1.14) process is used to control design document changes. Processes are also in place for updating the UFSAR (Section 1.9), Station procedures (Section 2.0), vendor manuals (Section 1.13), and Design Basis Documents (Section 1.17).

New or revised calculations may be required at various stages of different processes. Calculations are prepared as described in Appendix II, Process 17.

Configuration control, accessibility, and retrievability of design bases information and change documents have been enhanced through the use of the Electronic Work Control System (EWCS). EWCS is an on-line workflow and database tool used to communicate information within the plant. Information in EWCS includes such things as Engineering Change Notices, DCRs, the calculation index, databases, and plant record drawings.

The document change and update processes provide assurance that the plant configuration and plant documentation are consistent.

1.4 Work Control Process

The work control or work request process at Zion Station is designed to allow the plant to be operated and maintained while controlling and maintaining compliance with the design bases. A combination of Station and corporate procedures are in place to control the work process.

The Action Request (AR) is the mechanism used to initiate most work processed through the work control process. The AR is used to document problems with structures, systems and components (SSC) in the plant. ARs are processed using the Electronic Work Control System (EWCS).

Operators and others identify problems with plant equipment while performing tests and making rounds in the plant. ARs are initiated to resolve these problems and a licensed SRO determines whether the identified problem results in an operability or reportability concern and whether immediate action is required.

Some identified problems, which are degraded equipment conditions, may be classified as "operator workarounds." If a problem is identified as an operator workaround by operating personnel, Engineering is notified and given the responsibility for investigation and resolution. The closing of operator workarounds has been a weakness at Zion. Senior management has placed additional attention on the closure of these workarounds and has raised the priority of this work. The number of open operator workarounds is now trending down.

Action Requests are reviewed by a screening committee (Appendix II, Process 1). The responsibility of this committee is to prioritize and assign work and identify any design bases issues.

Any work identified by the committee as affecting the design bases is processed by a work analyst through initiation of an Engineering Request (ER) to describe the problem and obtain Engineering input. The resolution of these ERs by Engineering could result, for example, in issuing a modification or exempt change, a temporary alteration, a setpoint/scaling request, or it could be a simple clarification response. The work analyst uses this information in the preparation of the work package for the problem resolution.

Work packages go through a review process to provide assurance that work, including testing, is complete. Special reviewers are included for areas such as ISI, IST, or Equipment Qualification.

1.5 Design Change Process

The Design Change Process at Zion Station is controlled through a Modification Process and an Exempt Change Process. The Exempt Change Process can be used for a design change that does not affect nuclear safety. These two processes are described in Appendix II, Process 4.

The Exempt Change process and the Modification process utilize the Engineering Change Notice procedure and the Calculation procedure with all of the commensurate reviews. These processes are described in Appendix II, Processes 12 and 17.

Zion also uses a Design Change Checklist and an Operability and Close-out Checklist to improve the quality of the design changes and aid in their closure.

1.6 Temporary Alteration Process

A Temporary Alteration (TA) is an interim change to the approved design configuration of an SSC. The TA process at Zion Station is controlled by a Station procedure structured after and implementing the corporate process described in Appendix II, Process 6.

Periodic reviews of TAs to determine the continuing need, applicability, and status with respect to the current plant configuration have not always been performed. Additionally, the establishment of plans to close TAs and the timeliness of their closure had been identified as weaknesses. To counter this, Zion management established specific goals in 1996 to reduce the TA backlog to acceptable levels. As a result, Zion has significantly reduced the quantity of open TAs for Unit 2 and has plans to significantly reduce those for Unit 1 during the upcoming refueling outage in 1997.

1.7 Procedure Preparation/Revision Process

The Procedure Preparation/Revision Process is described in detail in Section 2.0 of this response.

1.8 Safety Evaluation Process

The Safety Evaluation Process at Zion is controlled by a Station procedure that implements the requirements of 10 CFR 50.59. The procedure is described in Appendix II, Process 13. This procedure was revised in October, 1996 to improve the process effectiveness.

Safety evaluations are reviewed by an on-site review team, the Safety Evaluation Review Committee (SERC). This committee review is an improvement initiative recently implemented at Zion Station. The committee is composed of a lead reviewer, appointed by the Engineering Manager, and individuals with appropriate expertise. The lead reviewer selects the number of members and expertise for each safety evaluation review. The reviewers meet and collegially review the evaluation. A quorum of at least two is required.

The Zion procedure has also been revised to technically strengthen the process. The procedure revision incorporated a more detailed step-by-step process and forms that provide more probing questions to raise the quality of the final documents.

To provide added assurance that the revised administrative procedure has addressed our weaknesses, an on-site Engineering Assurance Team has been implemented. This team provides

an assessment of the safety evaluation and supporting documents to provide feedback to the preparers to improve the quality of the safety evaluations. (This assessment is not shown on the Appendix II, Process 13 Flowchart.)

To assure previously prepared safety evaluations were of sufficient quality to identify potential Unreviewed Safety Questions or Technical Specification changes, an independent self-assessment was initiated. This self-assessment is described in detail in Section 3.7.

1.9 UFSAR Change Review Process

Zion Station uses the UFSAR change process described in Appendix II, Process 19 as controlled through a Station procedure.

In late 1996, Zion Station internally identified that controlled copies of the UFSAR index did not always include the correct page reference. The effect of this error was analyzed and it was confirmed that the use of these documents did not compromise the design bases. Copies have been brought up-to-date and corrective actions are being implemented to provide assurance the situation does not recur.

The availability and accessibility of the pending revisions to the UFSAR has also been improved. An electronic log has been developed to identify pending revisions, with a brief description of the subject matter. The controlled pending revision is still maintained as a hard copy by Regulatory Assurance.

1.10 Parts and Material Replacement Process

The procurement of safety related parts and materials at Zion Station is in accordance with the process described in Appendix II, Process 8.

The procurement of non-safety related parts and materials is controlled through Station procedures which are structured after the process described in Appendix II, Process 8.

1.11 Setpoint/Scaling Change Control Process

The Setpoint/Scaling Change process at Zion is controlled by a Station procedure corresponding to Appendix II, Process 9.

A recent internal audit of the Station procedure identified a weakness in the current process concerning the close-out of Setpoint/Scaling Change Requests (SSCR). Setpoint changes could be installed without the appropriate update to the design bases documents. An extensive review was completed of SSCRs processed over the last three years to determine the extent of the condition. Of the 583 SSCRs issued over that time period, only five were identified for which configuration documents were not properly updated. Document change requests have been initiated to update the identified documents. In addition, the SSCR log book has been revised to

provide more detail to better control the process and assure proper document closure. In no case was an installed setpoint found to be outside the design bases.

The instrument database information was recently migrated into the Electronic Work Control System (EWCS). Refer to Appendix II, Process 15. This migration along with implementation of the Revision Tracking and Control Module in EWCS provides better control and availability of instrument setpoint and other design information.

1.12 Out Of Service Process

The Out of Service (OOS) Process used at Zion Station is described in Appendix II, Process 20. Zion Station is participating in the six station ComEd standardization of the OOS process. This new process is being designed to eliminate administrative weaknesses common to all of the ComEd sites. It will include an enhancement of the new Electronic Out of Service (EOOS) Program.

1.13 Vendor Manual Process

The Vendor Manual Process, otherwise known as the Vendor Equipment Technical Information Program (VETIP), is controlled at Zion Station by a procedure described in Appendix II, Process 14.

The timeliness of processing incoming vendor information has been a weakness at Zion Station. Resources have been added to resolve this weakness. The process has been revised to implement a Vendor Document Comparison Report to reduce the time to process a vendor manual change. A Subject Matter Expert (SME) will be using this comparison report to improve the effectiveness of the document review process.

Presently, Zion Station has a backlog of approximately 830 vendor manual inserts. The SMEs have been identified and workdown curves have been established. The goal is to reduce the backlog to approximately fifty unprocessed vendor manual inserts by August 1997.

1.14 Document Change Request (DCR) Process

The Document Change Process at Zion Station is controlled by a procedure described in Appendix II, Process 7.

Zion Station management established and met specific drawing change control goals in 1996 for the Critical Control Room Drawings (CCRD). These goals addressed a historical weakness in the timely replacement of the temporary red-line drawings with the permanent drawings in the CCRD sets. More details on the process and the goals are in Section 3.6.1.

Zion Station has converted the drawings which are critical to control room operation and are essential to design into an electronic format. This system enhances the ability of the plant

personnel to track pending changes and process drawing changes. A greater efficiency in the incorporation of information onto the design documents is realized.

1.15 Operability Determination Process

Zion Station performs operability assessments in accordance with the guidance provided in NRC Generic Letter 91-18 using the Zion Operability Determination Manual (ZODM). The ZODM provides a method for 1) identifying safety functions of the equipment, 2) evaluating degraded or deficient equipment, and 3) documenting and maintaining Operability Assessments. The operability determination process is described in Appendix II, Process 18.

The operability determination process has recently been audited by SQV. The audit group focused on procedural adherence. They identified a weakness in the control and monitoring of the operability assessments and the lack of consistent follow-up to the operability assessments. Increased management attention has been placed on these findings to tighten the control of operability assessments by assigning a single control point for operability assessments. A follow-up to the audit included an Engineering review of the operability assessments performed since the ZODM was implemented. Problems identified were corrected and none were safety concerns. The identified weaknesses in the ZODM process are being addressed with enhancements to the procedure.

1.16 Engineering Software Development and Revision Process

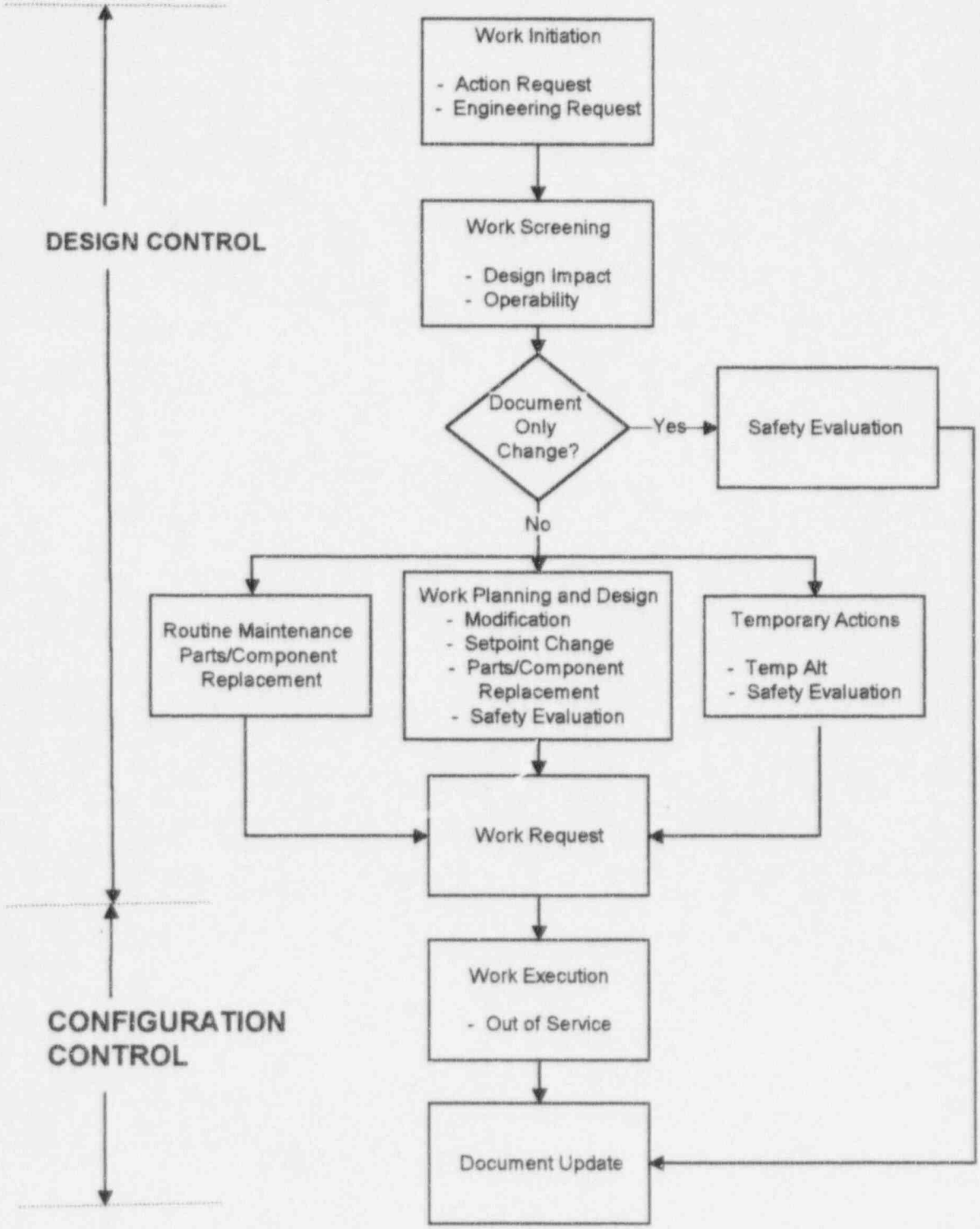
Software developed for use at Zion Station is prepared and maintained as described in Appendix II, Process 11.

1.17 Design Basis Document Preparation and Update Process

Zion Station prepares Design Basis Documents (DBD) in accordance with the process described in Appendix II, Process 16. Appendix II, Process 10 describes the process for updating DBDs. Additional information regarding DBDs is provided in Section 5.4.

Typical Flow of Design and Configuration Control Processes

Figure 1 - 1



2.0 ACTION (b): RATIONALE FOR CONCLUDING THAT DESIGN BASES REQUIREMENTS ARE TRANSLATED INTO OPERATING, MAINTENANCE, AND TESTING PROCEDURES

2.1 Introduction

Zion Station implements a comprehensive procedure preparation and revision process, in accordance with applicable license and Quality Assurance (QA) requirements, that translates applicable design bases requirements into operating (normal, abnormal, emergency, and annunciator response), maintenance, and testing procedures.

- Original Station procedures were developed using the combined construction and operating knowledge of the NSSS vendor, Architect Engineer, and ComEd. Many of these procedures were used on Station hardware prior to and during startup.

- Subsequent to startup, procedures have been revised and new procedures have been prepared in accordance with applicable Zion Administrative Procedures that implement QA requirements. Station Procedures are reviewed in a multi-level/multi-discipline process, including technical and onsite reviews, to assure that applicable design bases requirements are maintained prior to the approval of each procedure revision or new procedure.

- The consistency between expected and actual Station responses when using operating, maintenance, and testing procedures for many years indicates that design bases information has been translated into these procedures accurately.

- Several operating, maintenance, and testing procedure reviews and enhancements have been completed and have resulted in corroboration of the translation of design bases information and in the enhancement of procedures.

- Certain programs and assessments included consistency checks of design requirements against operating, maintenance, or testing procedures.

- Audits and inspections by both ComEd and external agencies have indicated that the procedure control and revision processes are structured to incorporate design bases information accurately into operating, maintenance, and testing procedures.

2.2 Consistency of Original Station Procedures with Plant Design Bases

Original Station, operating, maintenance, and testing procedures were prepared prior to startup using the combined construction and operating knowledge of the NSSS vendor, Architect Engineer, and ComEd. Operating experience at other stations, vendor equipment requirements, and design bases were used in the preparation of these procedures. Many of these procedures

were implemented during testing and other pre-startup activities, such as instrument and control system calibration, prerequisite/pre-op/system acceptance testing, power ascension, and plant transient testing, demonstrating plant performance as designed.

2.3 Procedure Preparation and Revision Process

The procedure preparation and revision process incorporates several elements that are designed to assure that the applicable design bases requirements are identified and are correctly translated into operating, maintenance, and testing procedures. This process is represented in a flowchart (Figure 2-1) at the end of this section. The procedure preparation, review, and approval process was established in accordance with the original Station Technical Specifications. These requirements and administrative procedures remain part of the current procedure process.

Procedures are prepared by qualified individuals who have access to design bases and other source documents. Through training and experience, these individuals are cognizant of design bases information required for procedure development. Procedures are reviewed by qualified personnel in a multi-level/multi-discipline review process.

As described in more detail below, the procedure preparation and revision process includes provisions for the following steps that provide the checks and balances to assure that design bases information is accurately translated into operating, maintenance and testing procedures:

- 10 CFR 50.59 Screening and Safety Evaluation
- Technical Review
- Onsite Review (OSR)
- Station Manager Review
- Verification
- Commitment Preservation
- Validation and other reviews

2.3.1 10 CFR 50.59 Screening and Safety Evaluation

A 10 CFR 50.59 screening is performed on new and revised operating, maintenance, and testing procedures to determine whether the provisions of 10 CFR 50.59 apply. If so, a safety evaluation is performed to determine whether the proposed change could involve an Unreviewed Safety Question or a change to the Technical Specifications. This screening process checks the procedure change against license requirements and the design bases. Personnel who perform this screening meet the qualification requirements specified in Station procedures regarding the minimum education, training, and power plant experience required to function in this role. These requirements provide assurance that procedure preparers and reviewers have the necessary knowledge to determine whether the proposed procedure/change affects the design bases and involves an Unreviewed Safety Question or requires a change to the Technical Specifications.

2.3.2 Technical Review

Technical reviews are performed on new and revised operating, maintenance, and testing procedures to confirm technical adequacy and compatibility with existing Station design and operation. Technical reviews are performed by personnel knowledgeable in the subject matter and who meet the applicable experience requirements of ANSI N18.1-1971. More than one technical reviewer may be assigned to a technical review; however, at least one reviewer must be a member of the department for which the procedure is intended. Detailed review guidelines are available for use by the technical reviewers. The guidelines include: (1) review of applicable Station drawings; (2) determination whether the procedure or revision addresses lessons learned and Station commitments; (3) review of the UFSAR and Technical Specifications; and (4) impacts on systems, other procedures, other programs (e.g., Environmental Qualification, Inservice Inspection, and Inservice Testing), other departments, personnel safety, commitments, safety-related equipment, and Station or control room operations. These guidelines provide assurance that reviewers utilize design bases information in performing the reviews.

2.3.3 Onsite Review (OSR)

A subset of plant procedures require Onsite Review based on NRC Regulatory Guide 1.33, Revision 2. This requirement is formalized in the ComEd QA Program. Procedures requiring Onsite Review include Emergency Operating Procedures, Special Procedures, and procedures listed in the Station "Procedure Review Requirements" database requiring Onsite Review. Procedural guidance is specified for Onsite Review, and particular attention is paid to the following:

- Fulfillment of Technical Specification requirements,
- Fulfillment of UFSAR requirements and commitments,
- Identification and resolution of safety issues, and
- Fulfillment of Station commitments to NRC, and other agencies.

Onsite reviewers are qualified per ANSI N18.1 as described above for technical reviewers.

2.3.4 Station Manager Review

In accordance with the requirements of the ComEd QA Manual, those procedures that require Onsite Review are also reviewed and approved by the Station Manager. In providing approval, the Station Manager confirms that appropriate participants were selected for the Onsite Review, that the review was of sufficient depth, and that the findings and recommendations are reasonable.

2.3.5 Verification

New procedures and procedure revisions require verification. Verification consists of reviewing the prepared or revised procedure to ensure it:

- Conforms to the Zion Administrative Procedure, "Procedure Content and Format";
- Meets its stated purpose;
- Provides acceptance criteria or alert/action ranges in test/calibration procedures;
- Includes adequate steps and information to perform the intended function;
- Includes equipment numbers that are identical to labels in the field;
- Specifies the required equipment, test equipment, personnel support, and prerequisites;
- Includes the appropriate sequencing of actions; and
- Is in agreement with expected plant/equipment response.

2.3.6 Commitment Preservation

Commitments are required to be identified in the procedure by annotation (footnote), or a statement that the entire procedure satisfies a commitment. Before the procedure is revised, the commitment is reviewed to provide assurance it will not be compromised.

2.3.7 Validation and Other Reviews

Many procedures are also subject to validation by "Table Top," "Walk Through," or by using the plant simulator. The Procedure Validation Process consists of an evaluation of a procedure or procedure change to provide assurance that it is usable and operationally correct. The need for validation is considered during procedure review and is dependent upon the type of procedure or change, safety significance, and/or management direction.

An additional tool used to assist in maintaining design bases configuration at Zion is the Technical Specification Matrix, which lists Technical Specification Surveillance Requirements and the corresponding implementing procedure identifiers. This matrix is maintained by Regulatory Assurance and is updated, as part of the procedure verification process, when new Technical Specification related procedures are generated or existing ones are revised. The overall benefit of this matrix approach is to provide a readily accessible cross-reference tool for procedure writers, as an aid in maintaining Technical Specification conformance.

2.3.8 Review by Plant Operations Review Committee (PORC)

Establishment of a Zion Plant Operations Review Committee (PORC) is under development. PORC will consist of senior station managers who will provide multiple perspectives on the adequacy of the procedure under review. This review will provide an opportunity for knowledgeable senior station managers to identify any concerns regarding the accurate translation of design bases information.

2.4 Experience with Procedures

Procedures have been implemented at Zion since initial plant licensing and have proven their effectiveness through many years of operating experience. Some examples of plant evolutions which confirm the adequacy of procedures include routine startup, shutdown, and refueling operations, and surveillance testing. In addition, the successful response of the plant to abnormal events and transients, such as reactor trips, provides further assurance of the continued adequacy of plant procedures and their consistency with the design bases. For example, Zion has experienced the following unplanned events which demonstrated that the corresponding safety systems generally responded appropriately, and, through which, procedures were effectively utilized to respond to the events:

- Low Reactor Coolant Loop Flow
- Low-Low Steam Generator Level
- Main Generator Fire and Isolated Phase Bus Duct Fault
- Isolated Phase Bus Duct Fire
- Loop Stop Isolation Valve Closure Signal
- Loss of Instrument Inverter
- De-energization of Process Protection Racks

2.5 Procedure Upgrade Programs

2.5.1 Operating Procedures

Four Operating Procedure Upgrade Programs have been completed at Zion Station. The first is the Zion Operability Determination Manual (ZODM), which developed a ready source of information to help operators ensure that proper actions are taken when a safety related component is degraded, deficient, or nonconforming, by providing guidance in determining operability of components or systems based on the condition of a specific component. The ZODM identifies equipment safety functions and cross-references to appropriate Technical Specifications, surveillance procedures, System Operating Instructions, and other safety systems. The project to establish the ZODM was begun in January 1991 in response to NRC DET findings, and was completed in December 1992. Zion received an Industry Good Practice in March 1993 based on the determination that the operability of safety related and important to safety equipment is enhanced by the use of the ZODM. Additional information on the ZODM is in Appendix II of this response.

The second Operating Procedure Upgrade was the preparation of approximately 2000 alarm response manual (ARM) procedure window revisions. Each ARM window includes the following sections:

- Setpoint
- Origin
- Inputs
- Reflash Capability
- Probable Cause
- Automatic Action
- Initial Operator Action
- Supplementary Action
- Inoperable Annunciator Action
- References

This project was undertaken to upgrade the alarm response procedures to provide consistency in format, provide proper referencing to other procedures and Technical Specifications, and incorporate outstanding review comments from operators. This upgrade project was self-initiated in January 1993, completed in December 1993, and now provides a better, more user-friendly, set of procedures for the operators. This ARM upgrade provides assurance that the proper procedures and Technical Specifications were referenced and that the actions specified could be performed by the operators consistent with the design bases.

The third Operating Procedure Upgrade was a self-initiated rewriting of System Operating Instructions (SOIs) between 1989 and 1992. A specific writer's guide was developed and the SOIs were rewritten to be more user-friendly and to provide improved direction to the operators on the operation of plant equipment. The upgraded SOIs provide a mechanism to ensure that operations are being performed in accordance with design bases.

The fourth Operating Procedure Upgrade was to provide a set of event- and symptom-based Emergency Operating Procedures (EOPs), which would:

- meet the requirements of NUREG-0737, Item I.C.1;
- be in accordance with the Westinghouse Owners' Group (WOG) Emergency Response Guidelines (ERGs); and
- take into account Zion's unique capabilities and features.

Zion's EOPs were originally completed in December 1985 and were based on Revision 1 of the Westinghouse Owners' Group ERGs. The first EOP upgrade was completed in February 1990 to Revision 1A of the ERGs. The second EOP upgrade to Revision 1B of the ERGs was completed in December 1991. These EOPs provide for operator response to potential plant events involving multiple failures and beyond-design-basis-events. They include symptom-based procedures to ensure the monitoring and maintenance of plant critical safety functions. Design bases compliance was improved since deviations of the Zion EOPs from the Westinghouse Owners' Group Emergency Response Guidelines are now documented and approved in accordance with a Zion Administrative Procedure.

2.5.2 Maintenance Procedures

Two Maintenance Procedure Upgrade Programs have been performed. The scope of the first included the development of mechanical maintenance procedures for major component, pump and valve types in the plant, and was done between January 1991 and August 1995. This program was undertaken due to procedural weaknesses identified in a self-assessment audit. It was deemed necessary to move away from work analyst-written travelers and work instructions toward reviewed-and-approved procedures that contain a sufficient level of vendor and design information and detail. The program provided validated, user-friendly procedures using state-of-the-art graphics and appropriate input from the Original Equipment Manufacturer (OEM) and design documents. This provides assurance that maintenance to plant components is performed consistently and to design specifications.

In the process of writing these procedures, the vendors were contacted for original and current technical manuals and information (which was used to update controlled vendor manuals), vendor drawings and Station drawings were researched and verified, and acceptance criteria source documents were researched and validated, resulting in maintenance consistently performed to design documents.

A second maintenance procedure upgrade program was self-initiated in 1992 to reduce the number of instrument maintenance procedures and increase the level of detail, to facilitate two-year periodic review and to aid in configuration control. This provided a reduced number of human-factored, user-friendly procedures capable of maintaining plant configuration control. When procedures are revised, they are upgraded to the current standards. The new format further assures configuration control of valve/switch manipulations and wiring determinations and reterminations.

2.5.3 Testing Procedures

In 1991, a procedure upgrade program was initiated to identify untested safety related contacts, prepare new procedures, and make changes to existing procedures to provide testing for the previously untested contacts. This upgrade program was in response to NRC Inspection Report Numbers 50-295/89004 and 50-304/89004 and was completed in 1992. These Inspection Report items were closed by the NRC Inspection conducted July 15-19, 1991, which verified that procedures for testing all relay contacts have been developed and implemented. This provided further assurance that safety related contacts function properly through verification by testing.

2.6 Other Programs That Verify Procedure Consistency

2.6.1 Improved Technical Specifications

In addition to the procedure upgrade programs described above, Zion Station is nearing completion of a major effort to implement the Improved Technical Specifications (ITS) utilizing the selection criteria contained in 10 CFR 50.36 and NUREG 1431. This program is discussed in

Section 3.6.1. Procedures were reviewed against ITS to determine if they were potentially affected. The identified procedures were reviewed further and, if required, revised accordingly. Procedures that included items that were more restrictive than the current Technical Specifications were placed into the books for performance along with those procedures satisfying the current Technical Specifications. Procedures that include items that are less restrictive have been put into a hold file for implementation after approval of the ITS. After the changes were completed, an audit (referenced in Section 5.5) was performed to ensure that ITS were properly incorporated into procedures. As a result of the audit, additional changes were made to some procedures. This program provides assurance that procedures accurately reflect the Improved Technical Specifications.

2.6.2 UFSAR Review

In 1996, Zion performed an independent assessment of two systems and one accident analysis section of the UFSAR to validate that the UFSAR was properly maintained and was consistent with the plant operating procedures and surveillance testing requirements. A summary of this review is in Section 3.6.1.

2.6.3 Inservice Testing (IST) Program Review Against Design Bases

As a result of problems identified at another ComEd station, management initiated self assessments of each station's Inservice Testing (IST) program to verify that it satisfies the regulatory requirements and properly tests the included components relative to the plant's design bases. The assessment of the IST program at Zion was performed by a five person team over a two week period, and was completed in November 1996.

The self-assessment concluded that the Zion IST program is being effectively implemented and provides adequate control over the testing and evaluation of results. No significant weaknesses were noted in any of the areas examined. Surveillance procedures provide sufficient detail and information, the tests reviewed were adequately performed, and the results meet the acceptance criteria.

Based on recent identification of deficiencies in implementation of testing requirements for certain components in the program (e.g., service water check valves to the containment spray diesel generator coolers), Zion Station management has initiated a review of the IST database to provide assurance of identification of required testing. In addition, examples of recent Station activities to strengthen the program include the development of an IST Design Basis Document and a surveillance and post-maintenance test matrix, to assist in ensuring required testing is performed.

2.7 PIF Trends and Data Analysis

For this response, to verify there were no adverse trends, specific reviews were performed of the following documents to determine if problems associated with maintenance procedures exhibited any trends of deviation from the Station's design bases:

- Nuclear Tracking System Report 1990 through November 18, 1996; and
- Problem Identification Form Report June 1, 1996 through November 18, 1996.

Review of these listed documents revealed no trends of deviation from design requirements associated with maintenance procedures.

2.8 Audit and Inspection Results

Procedure adequacy with respect to the accurate translation of design basis information has been reviewed both directly and indirectly through the conduct of a large number of audits and inspections by both ComEd and external agencies (reference the matrix in Section 5.0). These audits and inspections have confirmed on a sampling basis that design information has been translated accurately into operating, maintenance and testing procedures. A brief summary of audit and inspection scopes and results since 1990, in the area of procedures, is provided below.

2.8.1 ComEd Site Quality Verification Audits

There have been fourteen SQV audits and seven Field Monitoring Reports since 1990 relating to procedures. Following are some examples of the audit scopes and results.

SQV Audit Technical Specifications & Licensing Compliance (May 1994): Service water and auxiliary feedwater pump testing procedures and completed test data were reviewed and verified to conform to Station Technical Specifications and the UFSAR.

SQV Audit of Engineering and Technical Support (November 1994): With the exception of one missed/incomplete surveillance, the Station's IST program implementation was found to be acceptable.

SQV Audit of Technical Specifications & Licensing Compliance (June 1995): The following areas were verified during this audit and found to be acceptable:

- Seven Technical Specification amendments from the year preceding the audit were assessed to be properly implemented using approved procedures with one exception, which has been corrected.
- Post-Accident Monitoring (PAM) instrumentation surveillances were verified to comply with Zion Technical Specification Section 3.8.9 which was established and written in accordance with Regulatory Guide 1.97.

- Technical Specification surveillance requirements for mechanical and hydraulic snubbers were acceptably implemented using approved procedures and in accordance with the frequency established in Zion Technical Specifications.
- Technical Specification surveillances related to the seven amendments assessed were verified to comply with Technical Specification requirements.

2.8.2 NRC Inspections

The NRC has also conducted inspections whose scopes included verification of accurate translation of design bases information into procedures. Following are the results of two such inspections.

NRC Inspection - Electrical Distribution System Functional Inspection (EDSFI) in 1992: This inspection reviewed the Station electrical distribution system (EDS) testing and associated procedures. One deficiency that was found and corrected was that safety related time delay relays had not been calibrated, although the operation of their associated systems was verified. Strengths identified included the DC ground detection program and the thermography program. Additional information is provided in Section 3.6.3.

NRC Inspection - Close-Out of Generic Letter 89-10 conducted May 6-10, 1996: This inspection evaluated the process for verifying and maintaining the design basis capability of MOVs. The inspectors reviewed Station procedures and processes for MOV sizing, switch setting, valve factor calculations, margin assessment, periodic verification of design basis capability, MOV failures, tracking and trending, self assessment, post maintenance testing requirements, and test evaluations.

A deficiency was noted, and is being corrected, regarding the absence of a caution in Zion's dynamic test evaluation procedure that could prevent a non-conservative valve factor from being calculated. However, the inspectors did not identify any non-conservative valve factors.

The NRC concluded that closure of their review of the Generic Letter 89-10 program is contingent upon Zion's validating assumptions for the 6 inch, 600 pound Powell gate valves and for the Enertech butterfly valve group. The inspectors determined that the program documentation and test data provided an adequate basis to conclude that the remaining program MOVs will perform their intended safety functions under design basis conditions. They also concluded that, with the exceptions of these two valve groups, the valve factors applied to the non-testable MOVs are adequately supported, and overall the switch settings and MOV thrust margins are acceptable.

2.9 Summary

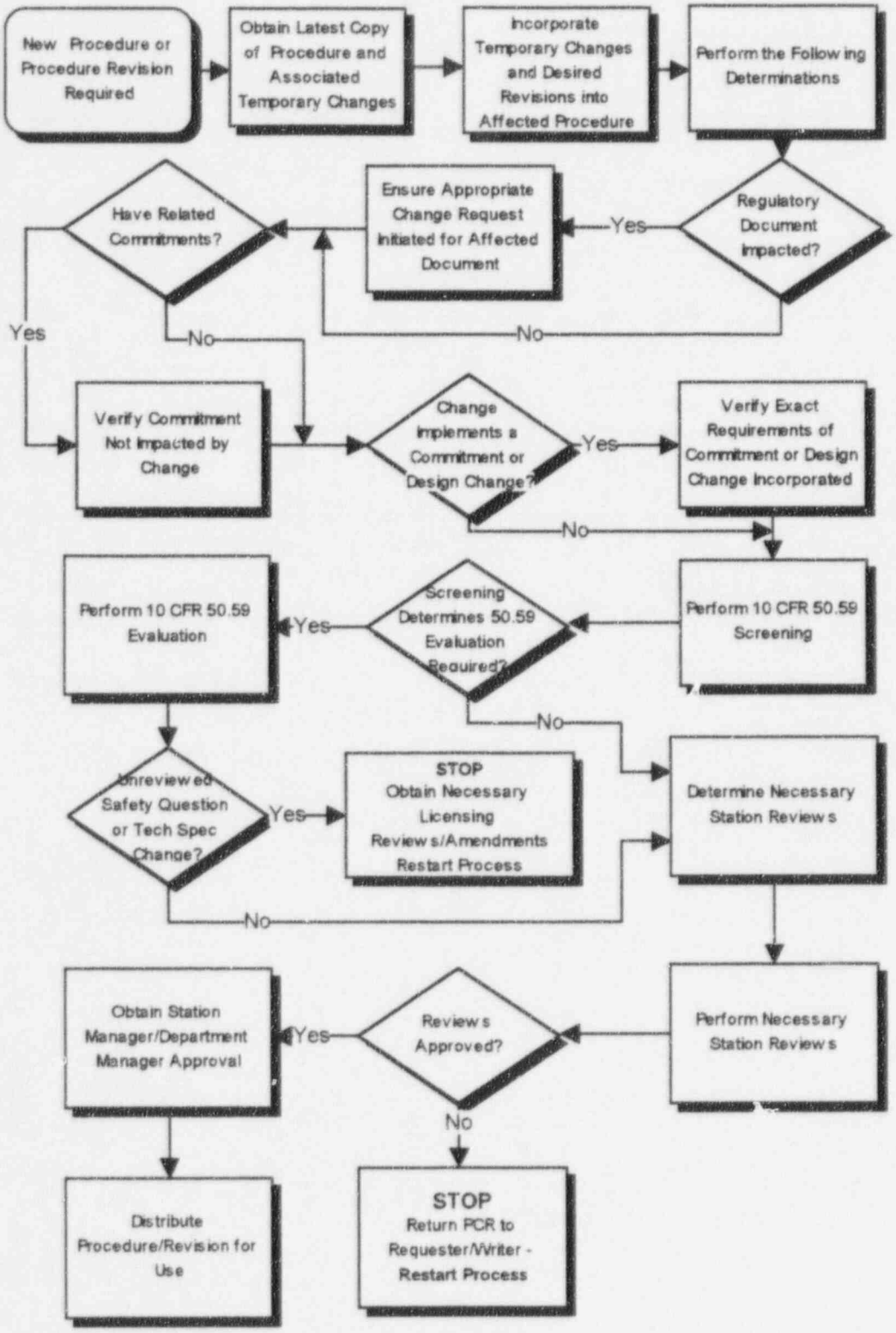
We have assessed our processes for translating design bases requirements into operating, maintenance, and testing procedures. Our rationale for concluding that there is reasonable assurance that procedures are consistent with design bases requirements includes the following:

(1) The original Station procedures were written based on input from the designers.
(2) The process for revising procedures is controlled and has appropriate levels of technical and on-site review to address design basis requirements.
(3) Plant operation and transient response has confirmed that the procedures reflect the design bases correctly.
(4) Procedure improvement and upgrade programs have resulted in or corroborated the translation of design requirements into the procedures.
(5) Separate assessments and programs have provided additional assurance that the design requirements have been correctly incorporated into procedures.
(6) Audits and inspections have confirmed the effectiveness of the processes to incorporate requirements into the procedures.

Zion Station has found procedural deficiencies that were identified during plant operation and have been resolved through our corrective action program. For example, as a result of a review of the Inservice Test Program (IST), we identified deficiencies in implementation of testing requirements for certain components in the program. We have reviewed the scope of this problem and are taking actions to correct it.

Even though we have had deficiencies with our procedures, our continuing efforts in identifying and correcting them support our rationale for concluding that there is reasonable assurance that design bases requirements have been translated into our operating, maintenance, and testing procedures.

FIGURE 2-1
NEW PROCEDURE / REVISION PROCESS



3.0 ACTION (c): RATIONALE FOR CONCLUDING THAT SYSTEM, STRUCTURE, AND COMPONENT CONFIGURATION AND PERFORMANCE ARE CONSISTENT WITH THE DESIGN BASES

3.1 Introduction

The principal bases for Zion Station's conclusion that the configuration and performance of its structures, systems and components (SSCs) are consistent with their design bases can be summarized as follows. When Zion was licensed to operate, that license was supported, in part, by ComEd and NRC findings that Zion's SSCs are configured in accordance with the plant's design bases. Since then, Zion has modified the physical configuration, and on a routine but controlled basis the operational configuration of some of its SSCs, and has conducted regular maintenance. Those changes and maintenance have been conducted in accordance with processes and procedures designed to preserve the configuration and performance of the SSCs consistent with their design bases. These processes and procedures have been described in Sections 1.0 and 2.0 of this response.

Corroboration that SSCs are configured and perform consistent with their design bases is provided in several ways. Normal operation of the plant as expected, and responses to abnormal conditions as designed, demonstrate that the SSCs perform, when required, in accordance with their design bases. The configuration of SSCs has been confirmed to be substantially consistent with the design bases over the years as various SSCs are reviewed for modification or maintenance, subjected to surveillances and ongoing monitoring related to operation, and inspected by plant personnel, the NRC, and third parties. In those cases where SSCs are found to deviate from their design bases, corrective actions are taken.

3.2 Initial Determination That Configuration and Performance of the SSCs Were Consistent With Design Bases

Performance and configuration of SSCs were initially determined to be consistent with design bases as part of required preoperational licensing activities. These activities included preoperational and startup testing calculations and studies, plant walkdowns, and other verification efforts. Assurance that these requirements were met in the design and installation was provided by ComEd oversight of the installation activities.

3.3 Preservation of the Station Configuration and Performance Consistent with the Design Bases

SSC configuration and performance since initial plant startup have been maintained consistent with their design bases through the implementation of programs, processes, and procedures that control physical and operational changes to the Station. Plant configuration and performance can be modified through the design change process, plant maintenance, and operator manipulation of station equipment.

The design change and plant maintenance processes are procedurally controlled as described in Section 1.0 of this response. As was discussed, these processes include numerous reviews, tests, and other checks to ensure the desired result is obtained, i.e., maintenance of station configuration and performance consistent with the design bases. Plant operations are performed in accordance with operating procedures and lineup checklists that are maintained consistent with the design documents through adherence to the procedure preparation and revision process described in Section 2.0 of this response. Ongoing plant performance is monitored through operator and other plant personnel actions as described in more detail below.

3.4 Ongoing Verification of Configuration and Performance of SSCs

SSC performance and configuration are monitored on a routine basis to assure that results consistent with design bases are obtained. Some of the routine performance monitoring activities include surveillance testing, operator rounds, system engineering program, post maintenance testing, and post modification testing. Each of these activities is described in more detail below.

3.4.1 Surveillance Testing

Periodic surveillance testing is performed in accordance with Technical Specification requirements. The test procedures verify equipment operability to satisfy Technical Specification and safety analysis requirements. Testing discrepancies require evaluation for operability, and conditions adversely impacting system operability are evaluated for cause and corrective action determination via the Station problem identification and corrective action program (described in Section 4.0).

In 1995, Zion performed a review of the Technical Specification Surveillance requirements against the Station's procedures to ensure the procedures were clear and consistent with the Technical Specification requirements. As a result of this review, Station procedures, surveillance requirements and test procedures have been revised to improve the ability to implement the surveillance program effectively.

The overall plant testing program includes the Inservice Inspection (ISI) and Inservice Testing (IST) programs required by ASME Section XI and 10 CFR 50.55a. The requirements for Inservice Testing of pumps and valves in accordance with the 1989 Edition of ASME Section XI have been incorporated into plant procedures. The third Ten Year Interval Program has been reviewed by the NRC with an SER issued in May 1994. Several audits performed since the SER was issued have identified specific issues which have been or are being addressed individually. A recent self-assessment of the program concluded that the Zion IST program is being effectively implemented, providing adequate control over the testing and evaluation of results. No significant weaknesses were noted in any of the areas examined. Surveillance procedures provide sufficient detail and information, and the tests reviewed were adequately performed, with the results meeting the acceptance criteria. Although some specific component deficiencies have been identified, audits of the IST program have also identified strengths in the areas of component evaluations, trending, design basis interactions, and post maintenance testing.

3.4.2 Operator Rounds

The configuration of SSCs is maintained in part by plant personnel during performance of regular duties. Operating procedures require plant rounds to be performed on a regular basis, during which Operating Department personnel record parameters that indicate whether SSCs are operating within the envelop of design bases. SSCs operating parameters such as pressures, flows, temperatures, vibration, and oil levels are routinely monitored. SSC problems are identified during these walkdowns and are documented on Action Requests (ARs) for equipment deficiencies or on Problem Identification Forms (PIFs) for other types of problems. Issues potentially impacting equipment operability are brought to the attention of plant management and processed in accordance with plant procedures for assessment.

3.4.3 System Engineering Program

The System Engineering Program contains elements that are significant contributors to assuring that SSC's configuration and performance are consistent with the design bases. System Engineers are assigned specific systems and are responsible to monitor configuration and performance to assess the SSC's ability to perform their design function. This charge is accomplished by maintaining cognizance of pending and in process design changes, temporary alterations, and equipment performance and physical condition.

The system engineers receive training in SSC's design, as appropriate, and they have access to the documents and databases that establish and implement the design bases. SSC's physical condition is monitored by inspection of key equipment and periodic in-depth system inspection. Inspections and inspection results are documented and ARs and PIFs are issued when required. Detailed inspections are also performed at the close of maintenance and refueling outages to assess system readiness for operation.

System engineers sponsor design changes, and prepare and supervise post-modification testing to demonstrate compliance to design based on requirements established by Design Engineering.

These activities coupled with monitoring and trending of key system parameters and knowledge of outstanding maintenance tasks and other issues allow the system engineer to assess the system's compliance with design and performance requirements.

3.4.4 Post Maintenance Testing (PMT) and Modification Testing

The plant work control process described in Section 1.0 of this response provides for review of work packages prior to issue for work, and specification of PMT required to demonstrate that the plant continues to comply with the design bases. This process ensures that SSC performance is maintained in accordance with design bases requirements following plant maintenance work.

The plant modification process described in Section 1.0 requires Engineering to identify Construction Tests, Modification Tests, and Operability Test requirements and acceptance criteria where needed. Construction tests are performed to ensure installation work is performed correctly prior to integrating with the plant systems. Modification Testing ensures the plant change performs as expected when connected to the plant systems, and Operability Testing is performed to ensure the modified equipment will meet the surveillance requirements in the Technical Specifications. The testing requirements are implemented either in the work package for basic testing, use of an existing test procedure or by special tests prepared by System Engineering for more complex tests. This testing provides added assurance that the modification is tested properly.

3.5 Operating Experience

Performance of the plant substantially as expected and successful completion of surveillance tests provide additional verification that the configuration and performance of SSCs are consistent with the design bases. Zion Station has over twenty years of operating experience on each of the operating Units.

The Zion units each have approximately 134,000 hours with the generators on line and have produced a combined output of approximately 270 million Mwhr of electricity. During this period the units have also been taken through twenty eight refueling cycles providing the opportunity to exercise the plant systems through various modes of operation including at power, hot and cold shutdown, refueling, and defueled states. In addition to normal operation, unit operation has also been exercised through various abnormal operating conditions some of which are outlined in Section 2.4 of this submittal.

Through these many years of operation and successful completion of surveillance testing, a wide array of plant conditions have provided opportunity to thoroughly demonstrate systems, structures, and components to be consistent with the design bases in an ongoing manner.

3.6 Special Verifications and Improvement Initiatives

A number of special verification activities and improvement initiatives have been undertaken for the purposes of (1) examining specific aspects of the plant's conformance with its design bases, and (2) enhancing the ability to maintain conformance on an ongoing basis. These initiatives have included one or more of the following types of activities:

- Assembling design and licensing information and improving its accessibility,
- Revising or establishing more specific calculations that implement the design bases (which facilitates verification on an ongoing basis),
- Verifying that plant configuration and performance is consistent with design information, and
- Establishing monitoring programs to confirm conformance with specific aspects of design on an ongoing basis.

Significant examples are discussed in the following sections.

3.6.1 Assembling Design and Licensing Information and Improving Accessibility

The improved accessibility of design and licensing information, and many of the supporting calculations which implement the design bases, further enhances Zion's ability to maintain plant configuration and performance on an ongoing basis. Specific efforts to assemble design and licensing information and to improve its accessibility are discussed below.

Design Calculation Turnover, Indexing, and Control

As described in Appendix I to this response, ComEd has implemented a program which transitioned the design control function from the NSSS supplier and architect engineer to ComEd in-house engineering. As part of this effort, ComEd acquired the calculations prepared by the architect engineer and some of the NSSS supplier calculations used in the design of many of the SSCs important to safety. Approximately 10,000 calculations have been acquired. These have been indexed and are controlled in ComEd's Electronic Work Control System (EWCS) and are available at the Station. Direct control and responsibility for maintenance of these calculations increases Zion Station's access to and knowledge of the design bases.

UFSAR Conformance Review Project

As a result of recent NRC inspections at another utility, Zion initiated an independent assessment of two systems and one accident analysis section of the Zion UFSAR to validate that it was properly maintained and that it was consistent with the plant operating procedures and surveillance testing requirements. The scope and extent of the reviews were consistent with that of NEI Initiative 96-05, Section 3.1.1. Specifically, the UFSAR sections were reviewed to identify descriptive phrases regarding frequencies for tests, calibrations, etc.; configuration descriptions; descriptions of system operation in different modes (e.g., normal, abnormal, emergency); operating limits; and descriptive functional performance statements. The highlighted UFSAR statements were compared with current plant configuration and operational practices, as implemented in plant specific procedures, administrative controls, design analyses, and/or Technical Specifications. This review identified fifty-nine (59) UFSAR discrepancies, which were resolved in accordance with established mechanisms for assessment of operability, reporting, and restoration of conformance. None of the UFSAR discrepancies were safety significant, as defined by the NUMARC 90-12 criteria:

1. Does the difference appear to adversely impact a system or component explicitly listed in the Technical Specifications?
2. Does the item appear to compromise the capability of a system or component to perform as described in the UFSAR?
3. Does the difference appear to adversely impact any applicable licensing commitments?

During the review, two operability issues were identified; one issue involved a test showing pump performance less than expected and the other issue involved failure to properly test a check valve in the IST program. Both of these issues are being resolved using established mechanisms for assessment of operability, reporting, and restoration of compliance. This review also identified 73 UFSAR, drawing and procedure enhancements. Changes have been initiated to resolve these and the above 59 discrepancies. Due to the discrepancies identified, ComEd and Zion Station are committed (Reference letter from T.J. Maiman (ComEd) to A.B. Beach (NRC Region III), dated November 12, 1996) to performing an expanded review of the Zion UFSAR. Although Zion's delay in promptly initiating resolution of these deficiencies was a concern, this validation effort was identified as a thorough, in-depth technical effort by the NRC during their audit in August, 1996. This effort, along with the Improved Technical Specification effort discussed below, resulted in improvements in the level of conformance between the UFSAR, Technical Specifications, Station operating and surveillance test procedures and the design bases, thereby providing assurance that Zion's configuration and performance are maintained consistent with the design bases.

Improved Technical Specifications Project

Zion Station is nearing completion of a major effort to re-write the Technical Specifications utilizing the selection criteria contained in 10 CFR 50.36 and NUREG 1431. This effort was needed to address technical shortcomings and human factor weaknesses with the current Technical Specifications. During this effort, several design basis issues were identified, which were then elevated to appropriate levels, and resolved. The design basis issues resolved include the number of Reactor Containment Fan Coolers required and the Service Water and Component Cooling System allowable configurations. This experience resulted in more widespread knowledge and understanding of the plant design and licensing bases, and included design basis reconstitution for several systems or portions of systems. Examples of the short term measures taken include amendments to existing Technical Specifications and, where appropriate, use of temporary administrative controls. This effort is also causing changes to the plant operating and testing procedures as well as the UFSAR and the Zion Operability Determination Manual (ZODM) based on the clarification of the design bases. A specific element of conversion to ITS, a re-validation of the plant operating and test procedures with the Technical Specifications, has occurred. The Improved Technical Specifications are expected to be implemented in the first quarter of 1997.

Equipment Data Base Improvements

Zion has combined equipment data bases for the Instrument Data System, the Equipment List, the Valve List, and the Fuse List into the Electronic Work Control System (EWCS). Because the EWCS is an on-line system, the change allows Zion personnel ready access to these data bases. This improves accessibility and availability of the design basis information to the Zion operating, maintenance, and support personnel.

Control Room Drawing Improvements

The control room operators are reliant upon the Critical Control Room Drawings (CCRD) which are maintained current with plant changes by red-line mark-ups. Prior to 1996, there were numerous markings on these drawings making them difficult to read, increasing the probability of operator error. In late 1995, the CCRDs were transferred to electronic media (CAD) and revised to incorporate installed changes. Changes to these drawings are performed prior to the plant changes becoming operational. These changes are typically prepared using CAD and final plant record drawing revisions are in the control room within thirty days of the modification being authorized for operation. Maintaining the CCRD current reduces the potential for misinterpretation and supports operation in accordance with the design bases.

Record Drawing Update

The Zion Station drawing control process includes provisions for identification of pending changes to plant personnel. This system is adequate to assure proper design information is utilized to perform work at the Station. However, in 1995 the backlog of drawings with pending changes had reached over 2500 drawings. While the drawing control system properly controlled this information, this volume of pending changes increased potential for error and for operation outside of design bases.

A major effort, recently completed, reduced the backlog of drawings with pending revisions to less than 260 in February 1996. The drawings included schematic diagrams, instrument loop schematics, wiring drawings, support drawings, cable tabulations, and others. The completion of this effort increases the availability of as-built information to station personnel reducing the potential for error and for operation outside the design bases.

3.6.2 Revising or Establishing More Specific Calculations Which Implement the Design Bases

Instrument Setpoint and Loop Accuracy Calculation Program

The Instrument Setpoint & Loop Accuracy Calculation Program was developed to ensure consistency between plant design bases and instrument setpoints. Significant efforts have been undertaken to determine and document setpoint and instrument loop accuracy to provide assurance that plant setpoints and operating procedures/surveillances account for instrument errors and are consistent with the plant design bases. Zion has performed setpoint and/or loop accuracy calculations for all Reactor Protection System and Engineered Safety Features setpoints that are credited in the Safety Analyses. In addition, a number of calculations have been prepared to support Technical Specifications, Emergency Operating Procedures, and Regulatory Guide 1.97 Post Accident Monitoring Instrumentation. The program is an ongoing effort to maintain the existing calculations as changes are made in the plant and to prepare additional calculations for instrumentation as deemed necessary.

Motor Operated Valves (MOVs) Program

To provide assurance that safety related motor operated valves would function in accordance with their design bases, the NRC issued Generic Letter (GL) 89-10 and supplements requesting industry evaluation and testing of MOVs. To meet the requirements of GL 89-10, ComEd documented the design bases for safety related MOVs, reconstituted calculations, established performance requirements, performed comprehensive static and dynamic testing of MOVs against the performance requirements and has adjusted MOV setpoints, modified equipment, and revised operating and maintenance practices as necessary to provide assurance that safety related MOVs will reliably perform their intended function under design basis conditions. Ongoing implementation of the program including performance monitoring and trending was established through procedural controls. A program coordinator was established in Engineering to oversee and evaluate MOV test results and ensure ongoing actions are taken as needed to continually validate and assure acceptable valve performance consistent with design bases.

A close-out inspection of GL 89-10 was conducted at Zion in early 1996. This inspection was previously discussed in Section 2.8.2. Except for test results for two groups of valves, the Zion Station program is complete. The existing program documentation and test data provide an adequate basis to conclude that the MOVs will perform their intended safety functions under design bases conditions.

Electrical Load List Control and Voltage Setpoint Calculations

Prior to the late 1980s, Zion Station used a manual load list to control loads on the plant auxiliary power system. Although the manual list was adequate for the original plant design, additional loads have been added and system capacities are more closely approached. In 1988, an automated Electrical Load Monitoring System for Alternating Current Loads (ELMS-AC) was put in place to control and track load and system changes and to provide a better tool for analyzing the AC electrical system. Many of the plant loads were walked down to provide more accurate nameplate data or, in some cases, actual test data was used. This system now serves as the basis from which plant design changes are evaluated. A similar effort was completed for the plant's DC power system in 1987. The ELMS-DC computer program is used to track loading on each safety related stationary battery. Use of the ELMS-AC and DC systems provides added assurance that the electrical distribution system in the plant is in accordance with its design basis.

3.6.3 Assessments and Inspections that have Verified that Plant Configuration and Performance are Consistent with Design Information

Special verifications and resulting programmatic control and/or data improvement initiatives have been implemented over the years as a result of industry lessons learned. Some of the more significant initiatives and the results are presented below. These efforts provide added assurance that the plant configuration and performance are consistent with the design bases.

Electrical Distribution System Functional Inspection (EDSFI)

In early 1992, the NRC conducted an Electrical Distribution System Functional Inspection (EDSFI) at Zion Station to assess the capability of the electrical distribution system to perform its intended function. The inspection included a review to verify that the design of the EDS conforms with regulatory and licensing requirements, that design modifications have been properly controlled, and that the installed configuration of the EDS conforms with design requirements. During this inspection the NRC reviewed the electrical and mechanical support systems of the EDS, examined installed EDS equipment, reviewed EDS testing and associated procedures, and interviewed corporate and site personnel. Although there were some deficiencies identified, the NRC team found the design and operation of the EDS at Zion to be acceptable and identified several strengths, such as the corporate Lessons Learned Program, the DC ground detection program, and the thermography program. In addition, improvements were noted in the material condition of the EDS, electrical maintenance practices and reliability centered maintenance reviews.

Fuse Control Program and Fuse List

Internal and external audits identified weaknesses in the fuse control process at several nuclear stations, including Zion. In the early 1990s, safety related fuses were walked down to ensure the installed fuse was consistent with the design. Where discrepancies were identified, it was determined that they did not challenge equipment operability. We are in the final stages of completing the required documentation to resolve these discrepancies. Similar to the instrument database, Zion developed a standard fuse database, along with a standard engineering process and plant procedures for fuse control. This program provides assurance that the control of fuses is in accordance with the design bases.

NRC IE Bulletin 79-01B Environmental Qualification

Zion Station has implemented a program to provide assurance electrical equipment is capable of performing its function when subjected to design basis accident conditions (temperature, radiation, humidity, and submergence) as required by NRC IE Bulletin 79-01B and 10 CFR 50.49. These requirements specify testing and analysis techniques to demonstrate equipment that falls within the program scope will function for the required duration post accident and thus assure safe shutdown. Electrical equipment required to function in an accident environment was identified, its required function(s) determined, and calculations prepared and tests performed, as needed, to determine accident environment conditions and demonstrate that this equipment would perform its intended function. Program controls have been implemented through plant procedures to control the replacement and maintenance of environmentally qualified equipment. Information for environmentally qualified equipment is identified in controlled Environmental Qualification binders which are readily available to Station personnel as an aid to provide assurance that the design bases is maintained.

NRC Inspection and Enforcement Bulletin 79-02 "Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts"

Inspection and Enforcement Bulletin 79-02 required utilities to evaluate the adequacy of concrete expansion anchor bolts and base plate design used in pipe supports. In response, Zion conducted extensive walkdowns of pipe support expansion anchors and base plates for safety systems. Zion's reviews, evaluations and tests showed that some changes were needed to ensure the requirements of IE Bulletin 79-02 were met. The requirements of IE Bulletin 79-02 were then incorporated into engineering standards and installation processes to ensure continued compliance.

Consistency with the design bases is now maintained by compliance with the Nuclear Station Work Procedures which provide controls for the installation of expansion anchors providing minimum embedment depth, spacing, angularity, and torque requirements. Expansion anchor installations performed in accordance with the NSWPs are Quality Control verified and documented on installation checklists.

NRC Inspection and Enforcement Bulletin 79-14 "Seismic Analyses for As-Built Safety-Related Piping Systems"

Inspection and Enforcement Bulletin 79-14 required review of safety related piping systems to verify that the seismic analysis matched the as-built condition. In response, Zion conducted extensive walkdowns and inspections to verify and record the as-built configuration and compare it to the as-designed configuration. Safety related piping systems of 2 1/2 inches and larger were inspected and evaluated. System operability was evaluated, differences between as-built and as-designed were reconciled, and systems were restored to meet allowable design limits where needed. Consistency with the design bases is now maintained by adherence to design and work control processes, discussed in Section 1.0, that control the installation of piping and pipe supports.

NRC Inspection and Enforcement Bulletin 80-11

In response to Inspection and Enforcement Bulletin 80-11, ComEd reviewed the adequacy of Class I masonry walls and specific non-Class I walls where structural failure may affect Class I equipment or components. Extensive field walkdowns were performed to determine the as-built configuration of the walls and attachments from equipment or components to these walls. Minor modifications were made to sixteen walls as a result of this effort.

A continuing effort to monitor the design configuration of masonry walls is in place. Attachments or modifications to masonry walls are reviewed by Engineering. Additionally, work package analysts preparing work instructions obtain an engineering evaluation when any work process requires the drilling and boring of holes into structures. This effort provides assurance the masonry walls and attachments to them are maintained consistent with the design bases.

NRC Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors, Unresolved Safety Issue (USI) A-46"

Active mechanical and electrical equipment of older plants, in general, may not be designed using the current, more sophisticated seismic testing and analysis techniques applied to newer installed equipment or to the newer licensed stations. To evaluate this situation, the NRC issued Generic Letter 87-02 requesting verification that equipment would withstand a postulated seismic event and function as required. In response to Generic Letter 87-02, a seismic review was initiated in accordance with the Seismic Qualification Utility Group's (SQUG) Generic Implementation Procedure (GIP).

The purpose of this review was to identify, walkdown, document and evaluate safe shutdown equipment, following industry guidance, for its capability to withstand a seismic event considering anchorage capacity and possible interaction between the subject equipment and adjacent SSCs.

Equipment has been identified and walked down. Outliers not meeting the SQUG criteria have been identified. These outliers require resolution through analysis, test or modification. Actions for resolution have been taken or identified to resolve the small number of outliers identified. The SQUG criteria will be incorporated into the design bases for Zion Station, thereby augmenting the basis for seismic qualification of the installations.

3.6.4 Additional Programs that Assure Design Basis Conformance

In addition to routine monitoring activities previously discussed, special programs have been implemented and/or diagnostic tools used to provide enhanced monitoring of key system components to provide added assurance that performance remains consistent with design bases.

Emergency Diesel Generator (EDG) Reliability Program

ComEd implemented an EDG Reliability Program in 1993. The EDG Reliability Program requirements are based on the Station Blackout Rule, Regulatory Guide 1.155, Regulatory Guide 1.9, Revision 3 and NUMARC 87-00. The Program supports EDG c[illegible]e with the design and licensing bases and the postulated Station Blackout event by mai[illegible] monitoring EDG reliability over time for assurance that the selected targets are being achieved.

The EDG Reliability Program includes: monitoring EDG reliability against target values, comprehensive condition monitoring, surveillance testing, maintenance, root cause analysis, problem close-out and information services, and actions to be taken if EDG reliability falls outside target values.

NRC Generic Letter 89-13

NRC Generic Letter 89-13 required Zion Station to confirm the service water system would perform its intended functions in accordance with applicable design bases. System design, testing,

operation, and preventive maintenance activities were reviewed and programs were implemented or revised to monitor overall system performance on an ongoing basis. Extensive Service Water system upgrades were performed in the early 1990s replacing several valves, adding valves for improved maintenance capability, and rebuilding Service Water pumps to improve performance. Implementation of this program provides added assurance that the service water system can function in accordance with the design bases.

Flow Accelerated Corrosion (FAC) Inspection Program

To meet the requirements of NRC Generic Letter 89-80, Zion has implemented a comprehensive program to predict and inspect highly FAC susceptible single phase and two phase high energy carbon steel piping. This effort contributes to plant safety and improves design bases conformance by ensuring that piping systems meet design allowables.

3.7 Audits and Inspections of Configuration and Performance

Engineering and Technical Support (E&TS) Audit

The Engineering and Technical Support Audit conducted by the NRC in August 1996 identified significant problems in the 50.59 Safety Evaluations for procedure and plant design changes, control of design changes partially installed in the plant, Operability Assessments, and post-modification testing and package closure. The NRC also noted a general lack of procedural adherence with specific emphasis on the use of Interpretations of Technical Specifications that deviate or potentially deviate from the plant Technical Specifications. The problems in the 50.59 Safety Evaluations and Operability Assessments, and the lack of procedural adherence were also identified by Zion's SQV audit in July of 1996.

As a result of these audits, an independent assessment team of ComEd Corporate and outside experts was established. The team reviewed approximately 200 previously performed safety evaluations for Unreviewed Safety Questions (USQ) and changes to Technical Specifications. The results of this review identified no USQs, one procedure change which violated the Technical Specifications (an LER was submitted), minor UFSAR changes and several safety evaluations which required clarification to properly describe the change.

Also, during and following the E&TS audit, an extensive review of all of the Technical Specification Interpretations was performed. This review resulted in deletion of seven Interpretations, revision of eight Interpretations, the submittal of three requests for amendments to the Technical Specifications, and preparation of 50.59 Safety Evaluations for the remaining Interpretations. Operator training has also emphasized the Technical Specification Interpretation changes and the importance of following literal requirements of the Technical Specifications. The existing Interpretations will be deleted with implementation of the Improved Technical Specifications, scheduled for the first quarter of 1997.

Those design changes identified during the E&TS audit as being open and in some state of installation or testing, but were not clearly identified as being out of service in the plant, have been either turned over to Operations or tagged out of service or confirmed to be abandoned in place with no adverse impact on plant license requirements or safety. Procedural changes defining specific ownership for each step in the design change process have been implemented to preclude recurrence and to continue improvement in this area.

Zion has also conducted a review of the existing Operability Assessments to confirm their adequacy. Operability Assessments are now approved by the cognizant Department Head prior to issue. On an interim basis, the EAT will also review Operability Assessments until sufficient evidence is in place to discontinue their review.

The E&TS audit also identified that modification related electrical calculations were well organized, complete, and technically adequate and were better than the industry average. The mechanical modification related calculations were found to be adequate and technically sound, with the exception of an error repeated in several calculations which did not impact the conclusion.

To improve the quality of engineering deliverables, Zion Station has implemented a Safety Evaluation Review Committee (SERC) and an Engineering Assurance Team (EAT). In addition, establishment of a Zion Station Plant Operations Review Committee (PORC) is under development as previously described in Section 2.3.8. The SERC and EAT are discussed in Section 1.8.

Diagnostic Evaluation Team (DET) and Service Water System Operational Performance Inspection (SWSOPI)

In June of 1990, a Diagnostic Evaluation Team (DET) performed an in-depth audit of Zion's Service Water system. The DET Report identified several deficiencies. In response to the DET and follow-up developments, an intensive self-assessment audit of the Service Water system (Service Water System Operational Performance Inspection - SWSOPI) was performed in accordance with NRC Instruction 2515/118. The inspection team concluded that although there is need for improvement in several areas, the system is capable of meeting the requirements of the various design basis scenarios. A follow-up by the NRC on this self-assessment identified it as a strong effort. The report also identified strengths in the inservice testing program computer trending database, the service water system flow model, and the service water system maintenance program.

This effort in conjunction with the Technical Specification improvement effort, has resulted in extensive revision to the Technical Specification Interpretation for the Service Water system, clarifying minimum SW system requirements for various plant configurations and revising training for plant operations personnel regarding design and license requirements for the Service Water system .

Safety System Outage Modification Inspection

In April of 1988, the NRC conducted a Safety System Outage Modification Inspection (SSOMI) at Zion. The purpose of the inspection was to verify that Zion has appropriate programmatic controls for modifications, that completed modifications are properly designed, installed, and tested, and that the design margins have not been reduced. The results of this audit identified several issues including: 1) inadequate control of temporary alterations, 2) ineffective quality oversight, 3) lack of attention to detail in using procedures, and 4) failure to implement corrective actions for installation and testing issues previously identified in the Dresden SSOMI.

In response to these findings, Station procedures governing Temporary Alterations, modification testing, work package preparation, and Zion's Quality Control procedures were reviewed and revised where needed. Also, in response to a specific issue of cable separation criteria violations, a 100% inspection of safety related cable trays was performed. This effort resulted in several potential deficiencies (hardware, housekeeping, and separation issues). Evaluation at the time of identification indicated there were no operability concerns. Deficiencies in fourteen of the twenty-one areas have been resolved and a plan for the remaining areas is in place. Evaluations for the cases of reduced separation have been prepared. The remaining hardware and housekeeping deficiencies are being systematically addressed in accordance with their relative priority.

3.8 Recent Events

The new management team at Zion is placing significant emphasis on identifying problems and taking prompt corrective action. As a result, configuration control deficiencies have been identified. For example, configuration issues regarding the containment recirculation sump vents and the Fuel Building ventilation system have been identified. The containment recirculation sump vent configuration has been corrected. Procedures have been established to control the Fuel Building ventilation configuration and modifications have been initiated to resolve the issue. Although the existence of these deficiencies is not acceptable, the identification, evaluation, and prompt corrective action is desirable and is being actively pursued.

3.9 Summary

Our assessment addressed the rationale for concluding that system, structure and component configuration and performance are consistent with the design bases. Our rationale is based on:

(1) The original construction completion process, preoperational testing program and system walkdowns confirmed design basis consistency as part of the initial licensing process.

(2) Zion has procedural control of configuration changes, maintenance actions and operational changes to maintain consistency with the design bases.

(3) System, structure and component configuration are continuously reviewed during plant operations as a result of our system engineering program, our surveillance

testing program, operator rounds and our control of plant operational configuration by the Operating Department.

(4) We have implemented special programs that have confirmed the capability of equipment to function during design basis seismic or accident conditions.

(5) Zion has been subject to internal and external audits and inspections of design and configuration control. These audits and inspections have identified documentation and plant deficiencies that are addressed by our corrective action program.

The new management team at Zion is placing significant emphasis on identifying problems and taking prompt corrective actions. For example, we found and corrected configuration control deficiencies with our containment recirculation sump vents and our fuel building ventilation system. The results of our assessment and our continuing focus on finding and correcting problems allows us to conclude that there is reasonable assurance that Zion Station systems, structures and components are maintained consistent with the design bases.

4.0 ACTION (d) : PROCESSES FOR IDENTIFICATION OF PROBLEMS AND IMPLEMENTATION OF CORRECTIVE ACTIONS, INCLUDING ACTIONS TO DETERMINE THE EXTENT OF PROBLEMS, ACTION TO PREVENT RECURRENCE, AND REPORTING TO NRC.

4.1 Introduction

This section describes the processes used by Zion Station to identify problems, determine the extent and root cause of identified problems, and report problems to the NRC. It also describes the processes used to resolve problems through implementation of appropriate corrective actions, including actions to prevent recurrence and the process utilized to verify the effectiveness of corrective actions. In addition to the Problem Identification and Corrective Action Process, this section describes special programs, audits and inspections that have led to the identification and correction of problems.

4.2 Problem Identification And Corrective Action Program

The Zion Station Problem Identification and Corrective Action Program provides a consistent method for identifying problems, investigating such problems through a controlled process, controlling and tracking corrective actions, and reporting problems to the NRC. It also includes requirements for trending of problems to address programmatic concerns and identify improvements where necessary.

The program applies to conditions adverse to quality including those related to design bases conformance. It provides assurance that design related and other types of concerns are formally documented and evaluated. Identified conditions adverse to quality are assessed to determine their impact upon operability in accordance with NRC Generic Letter 91-18. After they are evaluated, identified conditions adverse to quality are assigned a priority for timely corrective action based upon their significance to safety. Those conditions determined to be "Significant" are subjected to root cause analysis and corrective action is taken to prevent recurrence. Problems are tracked through completion of corrective action and trended to identify those that recur.

The Zion Station Administrative Procedure for the "Problem Identification Process," provides instructions for identification, reporting, documenting, controlling, and tracking conditions adverse to quality. It also establishes measures to identify equipment, administrative, or personnel related events that, individually, may be of minor consequence, yet when trended will require preventive action to ensure that a more significant event does not occur. This procedure uses a Problem Identification Form (PIF) for reporting problems. It is available to all Station personnel, including contractors, for identification of any problem, condition adverse to quality, or concern. Station management encourages all site personnel, via continuing training and through reinforcement of expectations, to document concerns through the PIF process.

The threshold for creating a PIF is established at a low level to assure that conditions which may or may not be adverse to quality are captured for further evaluation. PIFs are easily generated. They can be created electronically in the computer using the PIF database or by completing a PIF paper form. The Station procedure provides guidance regarding the types of problems to be reported through the PIF process. PIF originators notify or hand-carry the PIF to their supervisor who then reviews the PIF for completeness and accuracy, documents the immediate corrective actions taken, determines if the PIF is a non-conforming condition, and approves the PIF.

The PIF process includes prompt determination of any need for evaluations of either operability or reportability. PIFs are reviewed by the Operating Department on a daily basis to determine whether they present a reportability or operability concern. If such a concern exists, appropriate action is taken to place the plant in a safe condition. If additional input from Engineering is required to demonstrate operability, then Engineering is contacted for preparation of an Operability Assessment. Station procedures specify time constraints for completing operability assessments.

PIFs are also reviewed by the Event Screening Committee (ESC) to evaluate the adequacy of immediate corrective actions taken prior to their review, determine if follow-up actions are required, and classify each PIF as a "Significant Condition Adverse to Quality," a "Condition Adverse to Quality," or a "Condition Not Adverse to Quality." The ESC consists of representatives from Operating, Engineering, Quality Control, Maintenance, Site Quality Verification, and Regulatory Assurance. It relies on its combined group knowledge to understand the importance of plant problems, determine which PIFs might be subject to NRC reportability requirements, and assist in focusing management's attention on significant issues.

The ESC assigns either a root cause investigation or a departmental investigation depending on the severity of the issue as part of the screening/review process. Root cause analyses are performed to understand how a significant incident or degradation occurred and to provide insight on how to prevent its recurrence. Station root cause determination procedures require that the impact of the cause of the event on the other unit/train be addressed. Root cause analysis techniques, checklists, and report format are specified in station procedures.

Corrective actions for PIFs that undergo root cause investigations (e.g., Significant Conditions Adverse to Quality, Licensee Event Reports) are recommended by the investigator, reviewed by other root cause investigators, receive the concurrence of the affected department(s) and the appropriate Senior Manager(s), and approved by the Station Manager. Corrective actions for other PIFs (i.e. "Conditions Adverse to Quality" and "Conditions Not Adverse to Quality") are implemented by the respective department.

Corrective actions implemented to prevent recurrence as a result of root cause analyses are reviewed for effectiveness in accordance with station procedures. The purpose of this review is to prevent significant events from recurring by performing a review of corrective actions taken to resolve a problem associated with a given event or operating experience. Regulatory Assurance is responsible for scheduling and tracking effectiveness reviews. The review is normally conducted

within twelve months of corrective action implementation. A PIF is initiated if the corrective action is found to be ineffective. As-needed effectiveness reviews are also considered anytime an in-house event occurs that could have been prevented by previous corrective actions.

4.3 Other Processes That Identify Problems

Other Station processes that identify problems are described below.

4.3.1 Action Request (AR)

Action Requests and/or a PIF may be used by anyone in the Station to identify deficient equipment. ARs are the primary vehicles used to effect repairs and other work on plant equipment. The Operating Department reviews ARs for operability and reportability. A multi-disciplinary screening committee, consisting of experienced individuals with knowledge of plant licensing and design bases, also reviews ARs on a daily basis. The committee assigns a work priority to ARs consistent with their safety significance and assures Engineering involvement on issues that may affect compliance with the design bases. If an AR involves a significant equipment failure or a design modification, a PIF and/or an Engineering Request (ER) is generated and assigned to Engineering for processing under the controls of the modification process. These features of the process assure the preservation of the plant's design bases.

4.3.2 Engineering Request (ER)

ERs are used as the primary means to request and document Engineering assistance. The Zion Administrative Procedure for Engineering Requests provides guidelines on how plant personnel may submit technical inquiries, as well as design evaluation and design change requests to the Engineering Department. This procedure also provides requirements for processing and dispositioning of ERs. The ER process provides a vehicle for identifying, documenting, and prioritizing design bases issues based on their significance.

4.3.3 As-Built Document Change Request (DCR)

The Zion Administrative Procedure for the "As-Built Document Change Request Program" provides instructions for the control and distribution of changes to Station design documents. It ensures that as-found conditions and administrative changes are documented and processed to reflect the current plant configuration. An As-Built DCR is the mechanism for making an administrative document change based on an existing condition involving no field work. Before making the document change, the existing physical plant configuration is evaluated for conformance with the design bases.

As-Built DCRs receive a 10 CFR 50.59 screening to determine if a safety evaluation is required. The process also uses a check list for reviewing possible changes to the UFSAR, Technical Specifications, DBDs, and other design bases information.

4.3.4 Operating Experience (OPEX) Program

The Zion Administrative Procedure for this program outlines the method for evaluating operating experience information. This procedure applies to any source of industry operating experience information, for example, NRC Information Notices, Bulletins and Generic Letters, and vendor information. If an OPEX issue is determined to be applicable to Zion Station, it is assigned a priority commensurate with its significance, and commitments issued to applicable personnel are tracked by Regulatory Assurance.

4.3.5 Technical Alerts

The Technical Alert program is a special ComEd program that captures operating experience feedback related to engineering issues at one station and makes it available to the other stations. Technical Alerts provide sufficiently detailed information on emerging engineering issues for use at other potentially affected sites. In addition, Technical Alerts provide information regarding lessons learned, resolutions, and actions necessary to address the issue at other locations. This program is run by the Corporate Engineering staff.

4.3.6 Nuclear Operations Notifications (NON)

Nuclear Operations Notifications notify ComEd nuclear sites of problems or events that occur at other ComEd stations so that all stations can review their applicability. NONs summarize the nature, impact, and significance of the event and are generally published before completion of the event investigation. If a NON appears to be applicable to Zion Station, then it is forwarded to the appropriate station department for information and/or applicability review. At Zion, the Event Screening Committee (ESC) selects NON subjects from the PIFs they evaluate daily.

4.3.7 Audits and Evaluations

Design-related issues at Zion Station are also identified through formal audits and evaluations. Corrective actions are taken as appropriate. The following are examples of established significant audits:

Site Quality Verification (SQV) Audits: Since 1990, the SQV organization has conducted performance-based audits to enhance and strengthen the compliance-based audit approach used prior to 1990. These audits are conducted in accordance with Nuclear Oversight procedures and SQV instructions.

Significant deficiencies found during an SQV audit are documented on a Corrective Action Record (CAR). A CAR is a stand-alone document used to identify concerns or strengths developed during audits and field monitoring activities. The CAR is used for documentation, reporting, follow-up, condition close-out, and trending of conditions adverse to quality.

Independent Safety Engineering Group (ISEG): The ISEG examines unit operating characteristics, NRC issuances, industry advisories, and other operating experience information from plants of similar design that may indicate areas for improving unit safety. ISEG personnel also conduct surveillances of unit activities to provide independent verification that they are performed correctly and that human errors are minimized. Based on its findings, ISEG makes recommendations for improving unit safety. In addition, ISEG personnel perform independent reviews of shutdown risk for plant outages and periodically monitor shutdown status to assure that risk is maintained within industry and ComEd standards. ISEG performs reviews in accordance with Nuclear Oversight procedures and SQV instructions. Deficiencies identified during ISEG reviews are documented on a CAR.

Safety Review Board: The Safety Review Board meets periodically to review overall site performance. The Board consists of industry experts with prior industry, NRC and utility senior management experience. Past Board meetings have reviewed corrective action process and engineering process weaknesses. Recommendations are issued to the site for implementation.

Field Monitoring Program: The SQV organization also conducts field monitoring activities designed to focus on areas of adverse or declining performance. Field monitoring involves such activities as routine tours of the control room and witnessing field implementation of operating, testing, or maintenance procedures or sequences. Deficiencies are documented on a Field Monitoring Report and/or a CAR.

4.3.8 Quality First Program

The Quality First Program is a program through which ComEd employees and contractors are able to raise concerns. Employees and contractors are encouraged and expected to voluntarily raise any concerns they may have in the performance of their jobs through this program. In general, individuals who wish to raise potential deficiencies or problems work through their supervisors. All supervisors receive guidance in the process and are expected to be sensitive to potential concerns, clarify communications to assure mutual understanding, and act upon potential concerns in a timely manner.

The individual raising a concern may request confidentiality. Feedback will be provided to the individual raising the concern. If the individual does not agree with the resolution, the issue may be escalated to a higher level.

4.4 Processes For Reporting Problems To The NRC

Station procedures require that identified conditions adverse to quality be evaluated for reportability to the NRC. For example, ARs and issues that become PIFs are required by procedure to be reviewed for reportability. In addition to NRC regulations, guidance on reportability is provided in the ComEd "Reportability Manual." This controlled manual provides an event-driven system of decision trees to aid in reportability determinations and addresses notifications and reporting in accordance with 10 CFR 50.72, 50.73, 50.9 and Part 21, as well as other regulations. The Summary Tables contained in the Manual provide a concise encapsulation of the various reportability requirements.

4.5 Process Effectiveness

Some of the specific process elements described are relatively new (e.g., Technical Alerts), and the roll-up of several predecessor processes into the Problem Identification and Corrective Action Program occurred in 1992. However, in general, equivalent processes have been in place throughout the plant's history.

Audits and assessments of the Problem Identification and Corrective Action Program have been conducted by ComEd and by external agencies, including the NRC. These audits and assessments have identified weaknesses in the implementation of the Corrective Action Program, and several significant improvement initiatives have been undertaken to address these weaknesses. For example, ComEd has engaged a six station peer group to develop a more common, improved corrective action process. At the site level, a formal Corrective Action Program Improvement Plan was developed in 1996 to make sustained visible improvement in Zion's Problem Identification and Corrective Action processes. The four strategies of the plan are: strengthening Department Head ownership in the corrective action process; focusing root cause investigations on significant or more complex events; simplifying and clarifying the corrective action process and acting on trends; and improving departmental assessments. The Site Vice President monitors progress on this plan.

In November 1995, the Zion SQV organization identified multiple examples of weaknesses in various elements of the Corrective Action Program. The examples included:

- lack of program ownership
- untrained root cause investigators
- completion of investigations not timely
- completion of corrective actions not timely
- corrective actions not effective in preventing recurrence/effectiveness not verified

Extensive corrective actions were implemented, which included the following:

- The Regulatory Assurance Manager was established as the program owner for the Problem Identification and Corrective Action Programs.
- A dedicated multi-disciplinary Root Cause Team was established and all members were provided with formal root cause investigation training.
- Completion of investigations and corrective actions are tracked on the daily commitment status report. Overdue items are highlighted to Senior Management for timely resolution.
- Effectiveness reviews of corrective actions from root cause team investigations are now being performed.

These actions have been effective in improving the quality of root cause analyses, but have not thus far achieved the desired results in terms of the timeliness of implementing corrective actions and the effectiveness of the corrective actions in preventing problem recurrence. An example of lack of timeliness in implementing corrective actions is completion of the items resulting from the 1988 SSOMI (refer to Section 3.7). The Corrective Action Program Improvement Plan mentioned above is addressing further improvements and has recently established performance indicators to measure effectiveness of problem identification, timeliness and quality of investigations, timeliness and effectiveness of corrective actions, and trends in the number of repeat significant events.

4.6 Summary

We have reviewed our processes for identifying problems and implementing corrective actions at Zion Station, including actions to determine the extent of problems, action to prevent recurrence, and reporting to NRC. Zion's problem identification and corrective action processes are capable of identifying, correcting and preventing the recurrence of any significant nonconformances with the plant design bases. However, external and internal audits have identified deficiencies, primarily in our ability to consistently implement timely and effective corrective action as evidenced by the slow closure of issues identified in the 1988 SSOMI. Zion Station management considers the identification and effective resolution of problems to be a fundamental part of configuration management. We are not satisfied with our current performance in this area and are taking aggressive action to improve this performance.

5.0 ACTION (e): THE OVERALL EFFECTIVENESS OF CURRENT PROCESSES AND PROGRAMS IN CONCLUDING THAT THE CONFIGURATION OF THE PLANT IS CONSISTENT WITH THE DESIGN BASIS

5.1 Introduction

Zion Station has current processes and programs in place that are properly managed to provide assurance that the configuration of the plant is maintained consistent with the design bases. As detailed in Section 1.0, Zion's processes and programs implement regulatory requirements for maintaining the design configuration of the plant. Additionally, as described in Sections 2.0 and 3.0, the Station has operating, maintenance and testing procedures that accurately reflect the plant's design bases, and also control changes to the plant's structures, systems, and components to provide assurance they remain consistent with their design bases. Finally, as discussed in Section 4.0, our corrective action program identifies deficiencies, determines their causes and extent of occurrence, implements corrective actions and determines the effectiveness of those corrective actions. Taken together, these programs and processes establish the basis for concluding that the plant's design bases configuration can be properly maintained.

These programs and processes have been effective in managing the plant configuration consistent with the design bases. This conclusion is corroborated by considering information that shows the following five elements of an effective program are satisfied: (1) consistency with the design bases at the time of licensing; (2) controls in programs and processes that have been implemented since licensing to assure that consistency with the design bases is maintained; (3) improvements to the availability and adequacy of documentation and improvements to programs and processes to control changes to them as a result of the operating experience factored into program and process enhancements from the corrective action program; (4) verification of consistency between plant configuration and design bases through self-assessments, NRC inspections and third-party reviews; and (5) continuation of activities that improve the Station's ability to maintain consistency between the plant and its design bases. Each of these five elements is discussed in detail below.

5.2 Consistency with the Design Bases at the Time of Licensing

When Zion Station was licensed, the NRC found that the Station was consistent with its design bases and that the Station's processes and procedures should enable the plant to be operated and maintained consistent with its design bases. The design bases information was prepared and retained by the Architect Engineer and the Nuclear Steam Supply System (NSSS) vendor.

The original plant startup testing, maintenance, and operating procedures were prepared using input from the NSSS vendor and the Architect Engineer. The startup testing demonstrated that the plant performed in accordance with the design and licensing bases.

5.3 Control Implemented Since Licensing to Assure Ongoing Consistency with the Design Bases

Configuration control processes used at Zion Station have been described in Section 1.0. The rationale for their effectiveness has been explained in Sections 2.0 and 3.0. These processes and programs have evolved in effectiveness over time to meet changing regulatory requirements and industry standards. Additionally, enhancements were identified and implemented through application of the corrective action program, described in Section 4.0. The corrective action program resulted in continual improvement in the control of the Station's design bases information and to the programs and processes that maintain the configuration of the plant.

The effectiveness of these programs and processes has been evaluated repeatedly by ComEd audits, reviews and assessments, NRC inspections and SALP reports, and third party assessments. Zion Station has had findings and deficiencies identified from these reviews and assessments. These findings have related to the effectiveness of the implementation of programs and processes that maintain the plant's configuration consistent with the design bases. The corrective action program has provided the vehicle to address and correct identified deficiencies. The weaknesses in the corrective action program are being addressed by the Corrective Actions Improvement Plan as identified in Section 4.5. Implementation of this plan assures that appropriate resources and management attention are being applied to realize the desired results of quality, timeliness, and effectiveness of corrective actions on a consistent basis.

5.4 Enhancements to Documentation Availability and Adequacy and to Configuration Control Programs and Processes

As a result of industry initiatives and improvements identified from the corrective action program, Zion Station has taken several actions to improve the programs and processes that implement effective configuration management. Specific improvements are described in Section 1.0 for enhancing the programs and processes that control plant consistency with its design bases. Zion has also taken steps to perform more design activities "in-house", acquire original design bases information from the Architect Engineer and the NSSS vendor to improve the availability of that information to the site, and implement technical and procedural training initiatives.

These actions have substantially improved the availability and adequacy of documentation and the configuration control programs and procedures by improving document accessibility and utilizing Engineering personnel at the Station.

In addition to this change in focus regarding plant configuration and control, Sections 2.0 and 3.0 identified plant verification and improvement initiatives that are complete or in progress to ensure further consistency of the design bases with the plant configuration and the operating, maintenance, and testing procedures.

In the late 1980s, SSFI and other inspection findings demonstrated to the industry the need to improve the documentation of the design bases and the access to this information. To address this concern, ComEd assessed the quality and accessibility of the design bases. This assessment concluded that the plant design bases needed to be further formalized by preparation of system and topical specific Design Basis Documents (DBDs), using NUMARC 90-12 as a guidance document.

The DBDs for Zion were written by NSSS and AE design engineers with overview by ComEd personnel. Topic selection criteria included risk significance, nuclear safety, nuclear steam supply systems, and systems which had undergone changes. During the period 1991-1996, the following twenty-one (21) system and three (3) topical DBDs were prepared and approved for Zion Station:

System:
1) Component Cooling
2) Chemical & Volume Control
3) NSSS Controls
4) Reactor Coolant System
5) Containment Spray
6) DC Power
7) Residual Heat Removal
8) Diesel Generator
9) Main Steam
10) Main Feedwater
11) Reactor Protection
12) Control Rod Drive
13) Service Water
14) Auxiliary Power
15) Main Power
16) Instrument Power
17) Nuclear Sample System
18) Instrument Air
19) Control Room HVAC & Habitability
20) Fuel Pool and Spent Fuel Pit Cooling and Cleanup
21) Auxiliary Feedwater

Topical:
1) Radiation, Ventilation, Flood, and Fire Barriers
2) Electrical Separation
3) Seismic Design and Analysis

The following five (5) DBDs are being prepared:

System:
1) ECCS & Safety Injection
2) Fuel Handling
3) Core Exit Thermocouple/Incore Detector

Topical:
1) Station Blackout
2) Inservice Testing Program

Calculations used in the development of the DBDs were acquired by ComEd as part of the DBD program with the exception of those which existed as individual computer runs of proprietary NSSS vendor codes. However, ComEd did not systematically recreate or develop calculations not already performed as part of the original design process. In recognition of the need to further strengthen the ability to use calculations and other design bases information at Zion, we have completed a comprehensive plan to improve the quality and access to design information. The plan addresses three broad categories of design information: Design Basis Document Manuals,

critical calculation information, and UFSAR validation, and is summarized in a letter from T. J. Maiman (ComEd) to A. Bill Beach (NRC-Region III), dated January 30, 1997.

Additionally, to improve the ability to quickly locate design bases information which has been transferred to the Electronic Work Control System (EWCS), a review and enhancement of the indexing information with design bases records will be performed.

These DBD Program changes, coupled with preparation of additional system and topical DBDs, will provide a valuable tool to assure that the plant configuration is consistent with the design bases. A further description of specific actions for this plan in will be provided in separate correspondence.

5.5 Verification of Design Bases Conformance by Audits, Assessments, and Inspections

Zion Station has been continually subject to verification of the consistency of the plant's configuration with its design bases. These verifications have included the following: (1) quality of maintenance actions by workers and first line supervisors in the field who use controlled maintenance procedures and work packages; (2) control of plant configuration by operations personnel based on controlled documentation traceable to design documents, including valve, switch, breaker and damper lineup checklists and procedures that control changing the plant's operational configuration; (3) QC inspections of safety related maintenance and modifications; (4) conduct of a Technical Specification surveillance test program and an ISI/IST program that verifies equipment operability and conformance to design requirements; (5) SQV audits of the effectiveness of programs and processes and their implementation; (6) industry and other third-party assessments of the effectiveness of implementing configuration management programs; and (7) NRC inspections of the effectiveness of configuration controls.

Summaries of relevant audits and their findings are contained in Sections 2.0, 3.0 and 4.0. Audits can be divided into three major categories:

- **Site Initiatives**
  - Site Quality Verification
  - Independent Safety Engineering Group (ISEG)
  - Service Water System Operational Performance Inspection
- **Corporate Initiatives**
  - Nuclear Oversight Group
  - Corporate SSFIs
  - Design Control Audits
  - Independent Self Assessments
- **Third Party Initiatives**
  - NRC Routine Inspections
  - NRC Augmented and Team Inspections
  - Safety System Outage Modifications Inspection (SSOMI)
  - Electrical Distribution System Functional Inspection (EDSFI)
  - SALP
  - Diagnostic Evaluation Team (DET)

A matrix of the coverage of selected audits and assessments is provided at the end of this section (Figure 5-1). This matrix demonstrates the considerable breadth and depth of the review of our configuration control programs and processes. These audits, inspections, and reviews have identified both strengths and weaknesses in the areas of configuration control and procedural implementation that have been addressed in individual corrective actions and programmatic changes. We also recognize that Zion has received several Notices of Violation (NOV) in the areas of configuration control, UFSAR maintenance, and procedure inadequacies. It is recognized that corrective actions have not always been effective in preventing recurrence.

A recent assessment was an Independent Self Assessment performed in late 1996 by an independent team of industry experts. The deficiencies identified are being corrected and do not impact the conclusion that programs and processes have effectively maintained the configuration of the plant.

Another recent inspection is the Zion SQV audit conducted from July 8 through August 9, 1996. This inspection identified deficiencies in areas dealing with safety evaluations, effectiveness of corrective actions, and procedural adherence. Actions are being taken to correct these deficiencies, which, while significant, do not imply that the plant configuration is inconsistent with the design bases.

An NRC Engineering and Technical Support (E&TS) Inspection conducted from July 22 through August 22, 1996 identified similar deficiencies. In response to these recent E&TS and SQV findings, additional management oversight has been initiated in critical processes such as the

Operability Assessment Process, the Safety Evaluation Process, the Corrective Action Process, and the Onsite Review Process. Zion has recently re-reviewed existing safety evaluations and screenings for correctness. An Engineering Assurance Team has been established to oversee the quality of the engineering deliverables. In addition, the following are key initiatives in our 1997 Operations Plan:

- Screening and validation of Action Requests
- Upgrading Procedures
- Improving Effectiveness of the Onsite Review program
- Improving the quality of safety evaluations
- Improving the quality of operability determinations
- Upgrading the Training Program
- Managing the Design Bases

5.6 Continuation of Design Conformance Activities

Improvement in the implementation of the Station's corrective action program provides additional assurance that these programs and processes will be continuously improved. Feedback on the effectiveness of these actions will be provided by self-assessments, QA assessments, NRC inspections and third party reviews of the Station's activities that are designed to maintain the plant's configuration consistent with the design bases.

The new management team at Zion is placing significant emphasis on identifying problems and taking prompt corrective action. As a result, configuration control deficiencies have been identified as discussed in Section 3.8. Although the existence of these deficiencies is not acceptable, the identification, evaluation, and prompt corrective action is desirable and is being actively pursued.

Several initiatives are being undertaken and planned at Zion to improve consistency with the design bases. These initiatives are intended to enhance programs that currently provide reasonable assurance of consistency between the plant and its design bases. These initiatives are:

- Improvements in the quality of, and access to, design basis information, including:
  - Review of the UFSAR, Technical Specifications, Station Procedures, and supporting design basis calculations and documentation to ensure consistency
  - Determination of the need for and generation of up to seven additional topical Design Basis Documents
  - Mapping and improvement of the process and procedures to ensure the traceability and retrieveability of design basis information meets the needs of Zion Station
  - Mapping and improvement of the process and procedures to ensure the integrity and consistency of the design basis calculations, Technical Specifications, UFSAR and Station Procedures is maintained in real time

    - Ensuring understanding of the maintenance and control of the design basis program through communication and training
    - Resolving design basis discrepancies
    - Conducting periodic self-assessments to demonstrate that process and procedure changes are achieving the desired results
- Improvements in the 10 CFR 50.59 screening and evaluation process (refer to Section 1.0)
    - Implementation of an independent on-site review by the Safety Evaluation Review Committee (SERC)
    - Strengthening of the forms to provide a more probing procedure to improve quality
- Improvements in the corrective action process (refer to Section 4.0)
- Implementation of the Zion Station 1997 Operational Plan

Taken together, the momentum already established by these programs and processes and management's commitment to improvement demonstrate that the Station will continue to apply and improve its ability to maintain the plant consistent with its design bases.

5.7 Summary

We have assessed the overall effectiveness of current processes and programs and conclude that there is reasonable assurance that the configuration of Zion Station is consistent with its design bases. Although there have been deficiencies identified during Zion's operating history associated with the implementation of the design and configuration control processes and programs, we have implemented corrective actions that have resulted in upgraded configuration controls. Recent audits and assessments continue to reinforce the need to improve the implementation of Station processes and to improve the timeliness and effectiveness of specific corrective actions taken. However, based on our review of the processes and programs in place to ensure consistency with the plant design bases, we believe that Zion Station's processes and programs have been effective overall in maintaining the plant consistent with its design bases. Major program improvements, such as the DBD validation and the implementation of the Technical Specification Improvement Program, will further support the long-term effectiveness of the configuration management program.

ZION AUDITS, INSPECTIONS, AND REVIEWS

Audit Name	Date Comp.	Site Section No.	By Whom?	System	Functional	SAR=TS	SAR/TS = Proced.	DB = Proced.	Equip. Specs. & Vendor Data = Proced.	SAR/TS = Config. Docs.	DB = Config Docs.	Equip. Specs. & Vendor Data = Config. Docs.	Physical Plant = Config. Docs.	Plant Performance = DB
UFSAR Review	1996	2.6.2 3.6.1	ComEd	CVCS, Rad Monitoring, SG tube rupture	Yes	X	X			X				
IST Self Assess	11/96	3.4.1 2.6.3	ComEd Contractor	Broad	Yes	X	X	X		X				
SQV	8/96	3.7 5.5	ComEd	Broad	Yes			X		X				
E&TS	8/96	3.7 5.5	NRC	Broad	Yes	X	X	X		X	X		X	X
TS Surv Review against Prcd	1995	3.4.1	ComEd	Broad	Yes		X							
SWSOPI	1995	3.7	ComEd	SSW	Yes	X	X	X	X	X	X	X	X	X
Maint Prcd Upgrade	8/95	2.5.2	ComEd	Broad	Yes	X	X	X	X	X		X	X	
SQV	6/95	2.8.1	ComEd	Broad	Yes		X							
SQV	5/94	2.8.1	ComEd	AFW, SW	Yes		X						X	
Op. Prcd Upgrade	12/93	2.5.1	ComEd	Broad	Yes		X	X	X					
EDSFI	3/92	2.8.2 3.6.3	NRC	Elec Distr	Yes	X	X	X	X	X	X	X	X	X
DET	1990	3.7	NRC	SSW	Yes		X	X		X			X	X
SSOMI	7/88	3.7	NRC	Broad	Yes		X	X			X		X	

Note: As an example to interpreting this table, "SA[illegible]TS" means the Safety Analysis was reviewed against the Technical Specifications.

Appendix I ComEd Organizational Restructuring to Improve Zion Station's Ownership and Control of the Design Bases

1.0 Role of ComEd Engineering in Design Bases Management

The Station Engineering Organization plays a significant role in controlling, maintaining, and assuring conformance with design bases. The role Engineering has had in support of Station activities has transitioned over time as stations moved from construction to operation. Self assessments conducted in the early 1990s pointed to a need to further transition the role of Engineering to one with a more active focus directly at the station. Transition of major responsibilities to ComEd Engineering and the role of Corporate versus Site Engineering in assuring design bases conformance are described below.

1.1 Transition of Design Control and Engineering In-House Development

ComEd's historical approach to design had been the use of a combined engineering and construction team with Engineering producing design and analysis by predominantly managing architect engineering (AE) contracts from the General Office (essentially a Category 3 organization as described in Section 2.2.3 of NUREG 1397). Problem solving and system engineering functions were organized under a technical staff that reported on site to the Station Manager. In 1990 small engineering groups were established on-site to provide a more immediate presence. In late 1992, the nuclear organization was changed to establish authority and accountability on-site under a Site Vice President.

Multiple architect engineers were used with a common approach assured by use of an AE guidebook. This guidebook formalized the interface requirements and communication channels between ComEd and the AE. Responsibility for design of the reactor core was centralized at the General Office. Initially the NSSS supplier performed reactor core design. In 1990, a transition of this work to ComEd began.

In late 1993 ComEd conducted a self-assessment of the engineering organization utilizing senior individuals from an outside engineering organization. This was done at a time when Site Engineering relied on AE firms for most designs. The AE's also retained the majority of the design bases information. This assessment identified eleven strategic issues and provided recommendations to deal with those issues. Key amongst them was the understanding and "owning" of the design. ComEd clearly had to become more knowledgeable in the design, license, and operating bases of the plants. A stronger position was needed to control the design configuration and to be proactive and effective in problem resolution requiring knowledge of the design bases. The assessment report provided recommendations regarding access to and control of design information, and suggested that the first priority should be assigned to efforts required to take ownership of the design and develop in-house capability. It also included a recommendation for development and implementation of a plan for consolidation of design information under ComEd control.

In response to this report, a significant engineering transition began in 1994 to move ComEd into a Category 2 engineering organization (NUREG 1397) by January 1997. An Engineering Vice President position was established. ComEd established a vision that assigned to the engineering organization the primary responsibility to be accountable to prevent and solve problems. It had to be a capable design authority; and it had to hold itself accountable, establish high expectations, and be highly self critical. The organization that existed at that time lacked many of those attributes because of the high reliance on architect engineers.

A Chief Engineering organization was established in the Corporate Office that was responsible for the establishment of standards, transfer of lessons learned from site to site, oversight of site engineering functions, and the education of the organization as the design authority. The onsite organization was fully integrated into the existing accredited training program to ensure that the engineers onsite had a common foundation in engineering fundamentals, plant systems, and site processes.

While Category 2 status has essentially been achieved, the current goal is to reach Category 1. Success lies in qualified people, common and controlled processes (including Corrective Action), and being highly self critical. Commitment to conducting rigorous safety system functional inspections and resolving any discrepancies provides assurance that the design bases is appropriately maintained.

1.2 Relative Roles of Corporate and Site Engineering

As indicated above, the corporate office evolved from being the principle focus for the production of design through architect engineers to an organization that teaches, coaches, mentors, establishes policy, and provides oversight of the design control functions of the site engineering organizations. Dual accountability is established between the sites and Corporate, with Corporate responsible for technical methods and policy, and the sites responsible for production and the establishment of priorities. The corporate office does limited production work, primarily in the area of fuel design, PRA, and common multisite projects, e.g., power uprate and steam generator replacement.

In establishing commonality among the sites in the area of tools and standards, the corporate office procured and implemented the AE design standards. Common Nuclear Engineering Procedures are being established and implemented; computer codes are likewise being standardized.

One key role of the corporate office is information transfer. Information transfer prevents problems by sharing information, assists in problem solving, provides clear knowledge of the design bases, shares information for design modifications of similar components or for similar systems from site to site, and shares the results of assessment and oversight activities. The key information transfer vehicles that have been used are a daily engineering phone call, a Tech Alert program, Corporate Engineering oversight of station activities, the Engineering Managers Team meeting, and Engineering Peer Groups.

Tech Alerts - Tech Alerts are prepared and issued by the Corporate Office to provide information on lessons-learned, solutions identified, and actions needed to address emerging engineering issues.

Corporate Engineering Oversight Role - The Chief's staff periodically review design products developed by the Site Engineering organizations. The objective of the reviews is to assure that the design is adequate and is in compliance with all procedures.

Peer Groups - The Peer Groups provide a mechanism to share lessons-learned, champion consistency on common issues, focus actions on key issues, prioritize activities, and elevate larger issues to the Engineering Management Team. Over 50 groups are active in the areas of management, components, generic programs, general design, and special projects.

1.3 Configuration Management Philosophy

Configuration Management is highly visible at the ComEd corporate office and at the Zion Station.

At the corporate level, there is a Configuration Management Chief Engineer reporting to the Engineering Vice President. The Chief is accountable for setting policy for configuration management and implementing the policy through a series of common processes and procedures. These common processes are documented in a set of Nuclear Engineering Procedures (NEPs) used commonly across the six nuclear stations.

Various station departments share responsibility in maintaining Configuration Management. Engineering is accountable for ensuring the design bases is in conformance with the physical plant; Operations is accountable for ensuring the operational configuration is maintained and that operations procedures comply with the design bases; and Maintenance is accountable for ensuring work control processes are conducted in accordance with the design bases.

At Zion the Engineering Manager is accountable for configuration control. The Manager and the Engineering Supervisors oversee the design change processes discussed in Section 1.0, and supervises the close-out of the design changes to ensure all controlled documentation (with the exception of procedures) and databases are updated in a timely manner. Procedure update is the accountability of the procedures group, which is part of the Operations Department.

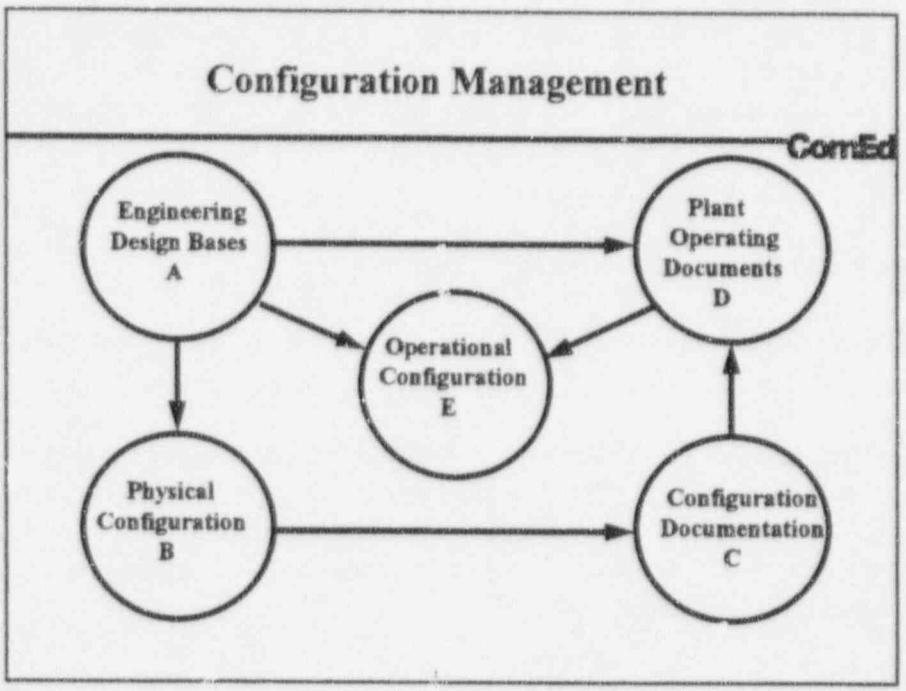
1.4 Configuration Management Model

The following "five ball" model illustrates ComEd's approach to Configuration Management:

Actions (a), (b), and (c) of the 50.54(f) letter can be directly related to this model. Action (a) is the description of configuration control processes. These are the processes that maintain the design bases in "configuration" with the plant operating documents (A to D link) and the physical configuration (A-B link), as well as with configuration documentation (B-C/and C-D links), i.e., drawings, databases, and reports. Action (b) is conformance of procedures to the design bases (as

described in 10 CFR 50.2) (A-D link). And, Action (c) is conformance of the physical configuration and plant performance to the design bases (A-B and A-E links).

Action (d) is also addressed in the above model. When one of the five ball "links" is identified as being in non conformance, ComEd's Corrective Action Programs described in Section 4.0 documents the non conformance and initiates corrective action to fix the immediate problem, investigate the cause of the problem, and, if significant, fix the root cause of the problem.



2.0 Self Assessment Organizations And Departments

ComEd implements many programs to provide assurance plant actions are in accordance with design bases. Some of these are required by regulation, such as the quality verification function. Others, such as corporate and site engineering assurance, are self initiated. A description of key organizations and departments and a highlight of their role in providing assurance of design bases conformance is provided below.

This section summarizes the role of Corporate Engineering Assurance, Offsite Reviews, and Quality Verification Services. It also discusses a new function established in January 1997 at all six stations: Site Engineering Assurance. Some of these roles, in particular the Engineering Assurance role, were established to provide an extra level of review of products prepared by the Site Engineering Organizations in recognition of their new and expanded role onsite.

2.1 Corporate Engineering Assurance

The Corporate Engineering Assurance Function is part of the Configuration Management organization. The role of this group is to provide technical assurance that the work performed by Architect Engineers and other contractors is in conformance with ComEd's Nuclear Engineering

Procedures and the QA Manual. This is accomplished through periodic audits of the AEs, generally in a teaming arrangement with the Quality Assurance Department.

The Corporate Engineering Assurance Group will also lead a peer group of the site Engineering Assurance group leaders to provide self assessment and cross-station evaluations of findings.

Finally, the Corporate Engineering Assurance Group coordinates the generation and reporting of performance metrics for the Engineering Department.

2.2 Site Engineering Assurance

Based on the NRC Independent Safety Inspection at Dresden in November 1996, which pointed out weaknesses in the oversight of the site engineering activities, an onsite Engineering Assurance organization reporting directly to the Site Engineering Manager has been established. This added assurance function provides independent oversight of the expanded accountabilities of the Zion engineering organization since assuming design change authority from the Architect Engineering firms.

The Onsite Engineering Assurance group will oversee the following activities, giving priority to the most risk significant systems:

1. Design Change Activities
2. Operability Evaluations
3. Safety Evaluations
4. Engineering Evaluations
5. Calculations
6. Surveillance Trending
7. Special Test Procedures
8. Performance Improvement Process
9. Licensee Event Reports

The Engineering Assurance Group will focus on the following for the above activities:

1. Verify that the design inputs and assumptions are validated, and if necessary, reconstituted.
2. Verify that the activity is enveloped by the Station's licensing and design bases.
3. Review for any operability concerns.

This activity is not a substitute for reviews currently implemented in the existing design control processes, but is intended to be real-time and concurrent with the engineering activity being evaluated. The oversight function will foster a questioning attitude with regard to the licensing and design bases of the station.

2.3 Offsite Review

Offsite review and investigation is a Corporate Office function of the Nuclear Division in the Nuclear Oversight Department's Safety Review Group. Each Site submits documents to Offsite Review in accordance with Section 20 of the Quality Assurance Topical Report (QATR) including operability assessments, Safety Evaluations, and Licensing Event Reports. The Offsite Review for each document requires two participants and an approval signature. As reviews are completed, they are transmitted to the Sites. Reviews may result in comments and recommendations or additional actions.

In 1996 there were four audits of Offsite Review by the Site Quality Verification personnel and one evaluation conducted by the NRC Region III inspectors. In all cases, Offsite Review personnel were determined to be properly qualified and records were maintained for these individuals. Additionally, the audit teams reviewed specific Offsite Reviews with no findings or comments. The NRC inspection had no findings.

The Safety Review Group conducts quarterly self-assessments of its activities. These assessments have helped Offsite Review provide a more in-depth questioning attitude toward Site documents which, in turn, has increased the expectation for greater document quality from the Sites. Offsite Review performs a trend analysis on each Site's submittal and Offsite Review's responses. This information is provided to the Site management team. The assessment process has also helped Offsite Review understand the need to increase interface at the Sites and attend the OnSite Review/Plant Operations Review Committee meetings.

2.4 Role of Nuclear Oversite Division

The corporate Nuclear Oversight Manager is responsible for the Quality Assurance Program and Safety Review. This position reports directly to the Chief Nuclear Officer. This Manager develops, maintains, and interprets the Company's quality assurance and nuclear safety policies, procedures, and implementing directives. He is responsible for the vendor audit program and for ensuring that audits of Corporate support functions are conducted. He is also responsible for conducting a periodic review of the site audit program to assure that oversight of QA Program implementation is effective.

The Site Quality Verification (SQV) Director is responsible for conducting internal audits, surveillances, and assessments of station line and Corporate activities to ensure compliance with quality assurance and nuclear safety requirements. This position reports to the Site Vice President. He monitors the day-to-day station activities involving operating, modification, maintenance, in-service inspection, refueling and stores through onsite audits, field monitoring, and safety reviews.

Appendix II Design Control and Configuration Control Processes

Background

This appendix summarizes the major, common processes used at all ComEd nuclear stations and a few that are unique to Zion Station. These processes are used to control the plant's design bases and configuration, i.e., maintaining the physical plant consistent with the design bases. These processes ensure the design bases of the plant are maintained or modified as changes are made to the plant through modifications, repairs, or equipment lineup changes. This Appendix supports the description of design and configuration control processes as required for Action (a) of the 10 CFR 50.54(f) response. Those processes which are addressed through a corporate procedure (identified as an NSWP or NEP) are in place essentially in the same manner at all six nuclear stations, either by use of the corporate procedure or by station procedures that implement those procedures.

The matrix provided illustrates how the following processes relate to the configuration management model previously discussed in Appendix I.

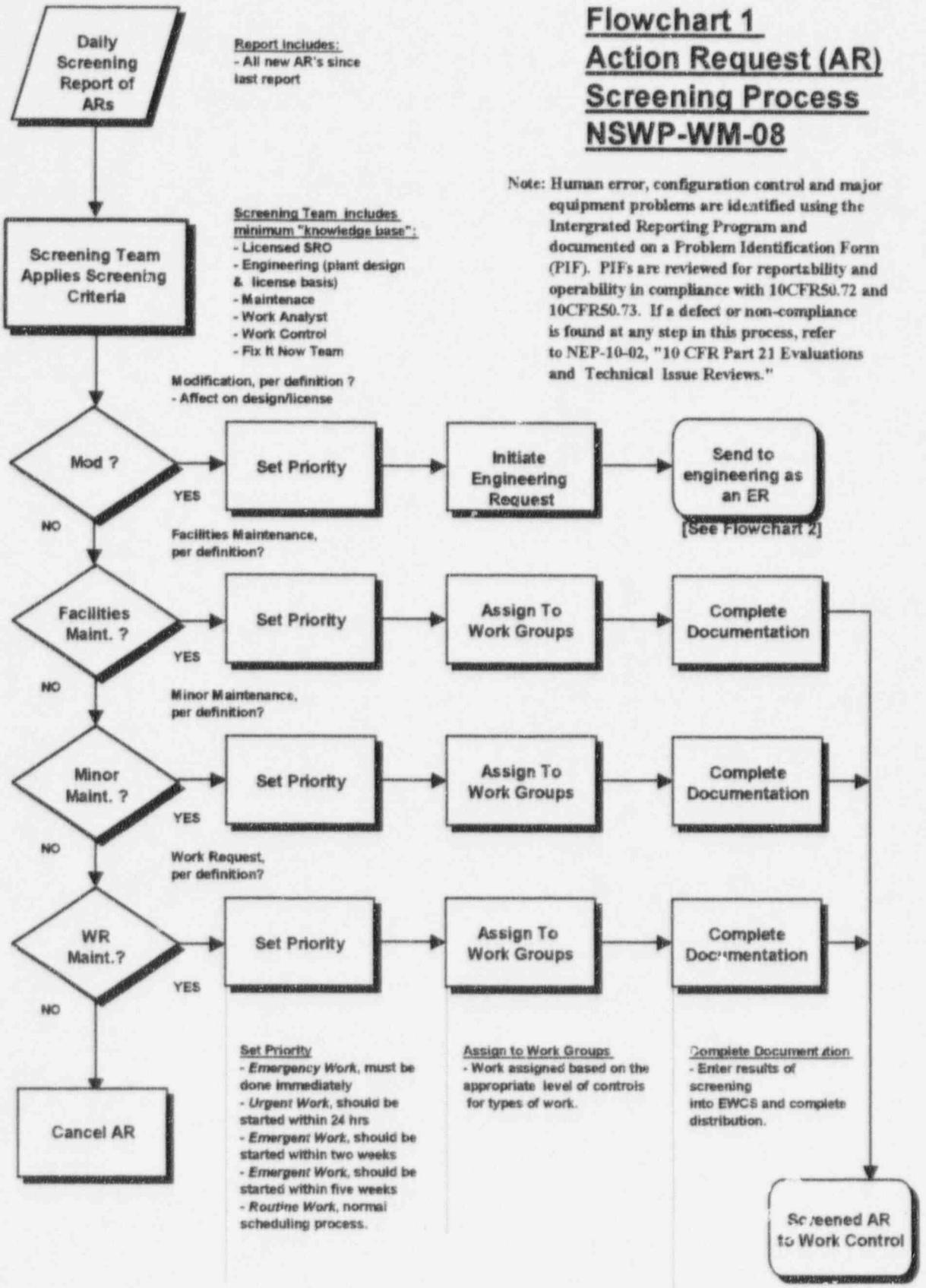
Matrix of Appendix II Processes

Process Number	Process Description	Procedure Reference	Implements Regulatory Requirement		Configuration Management Model Linkages (note 1)						
			50.59	50.71(e)	A/A	A/B	B/C	C/D	A/D	A/E	D/E
1	Action Request (AR) Screen Process	NSWP-WM-08				X	X			X	X
2	Roadmap to Design Control Process				X	X	X	X	X		
3	Design/Document Change Process Roadmap	NEP-04-00			X	X	X	X	X		
4	Engineering Design Change Process	NEP-04-01	X	X	X	X	X	X	X		
5	Modification Work Control Process	NSWP G-01 (note 2)	X	X		X	X				
6	Temporary Alterations (Temp Alts)	NEP-04-08	X			X	X	X	X		
7	Document Change Requests (DCRs)	NEP-08-03	X	X		X	X	X			
8	Like-for-Like or Alternate Replacement Evaluation Process	NEP-11-(Series)	X	X		X	X	X			
9	Setpoint Change Request	ZAP 400-08A	X	X	X	X	X	X			
10	Design Basis Document (DBD) Update Process	NEP 17.01				X	X				
11	Engineering Software Development and Revision Process (note 3)	NEP-20-01	X	X	X						
12	Engineering Change Notices (ECNs)	NEP-08-01				X	X	X			
13	Safety Evaluation Process	ZAP 100-06	X	X	X						
14	VETIP Processing	NEP-07-04				X	X	X			
15	Configuration Control Using EWCS	NEP-14-01				X	X				
16	DBD Development Process	NEP 17.01				X	X		X		
17	Calculation Process	NEP-12-02			X	X					
18	Operability Determination Process	ZODM			X	X			X		
19	UFSAR Update Process	ZAP 700-01	X	X	X	X	X	X	X		
20	Out of Service/Return to Service Process	ZAP 300-06								X	X

NOTES:

1. A/A Link are processes that affect the design bases only.
2. Applies to Field Change Request when needed.
3. The 50.59 and 50.71 (e) requirements are limited to those as required .

Flowchart 1
Action Request (AR) Screening Process
NSWP-WM-08



Note: Human error, configuration control and major equipment problems are identified using the Intergrated Reporting Program and documented on a Problem Identification Form (PIF). PIFs are reviewed for reportability and operability in compliance with 10CFR50.72 and 10CFR50.73. If a defect or non-compliance is found at any step in this process, refer to NEP-10-02, "10 CFR Part 21 Evaluations and Technical Issue Reviews."

Action Request (AR) Screening Process

NSWP-WM-08

PURPOSE

Work to be done at ComEd's nuclear stations, is initially identified and documented on an Action Request (AR) which is initiated using the Electronic Work Control System (EWCS) The AR process provides all site personnel with a simple and readily accessible process to identify work to be performed. The AR is "screened" to determine the safety classification of the involved equipment, the priority of the work, the work group to whom it will be assigned, and the "type" of work to be performed.

PROCESS DESCRIPTION

The AR screening process begins with a review of a daily Screening Report that captures all of the newly generated ARs. This report summarizes the initial information provided by the initiator of the AR, identifies if the AR is related to a Problem Identification Form (PIF) and determines the appropriate level of controls that are needed to implement the work. ARs can include repairs, maintenance activities, and plant modifications.

A "Screening Committee" determines the appropriate level of controls that need to be applied to the work. The committee brings a required "Knowledge Base" to the table to be used in a consensus determination. This "Knowledge Base" includes:

- Operations - has a current SRO license
- Engineering - is knowledgeable in engineering design and plant design and license basis.
- Maintenance (IM, EM, MM) - is knowledgeable in the division and scope of work among the three maintenance departments.
- Work Analyst - is knowledgeable in work requirements and package preparation.
- Work Control (Scheduling) - is knowledgeable in work scheduling.
- Fix It Now (FIN) - is knowledgeable in FIN Team capabilities.

In addition to the knowledge of the team, the ARs are also screened against the definitions of the work and/or work groups where the work will eventually be performed. The definitions or "types of work" are as follows:

- Modification - A planned change in plant design or operation and accomplished in accordance with requirements and limitations of applicable codes, standards, specifications, licenses, and predetermined safety restrictions. A change to an item made necessary by, or resulting in, a change in design requirements.
- Facilities Maintenance - A minor work activity conducted only on non power plant boundary or equipment. The work will not affect plant or power block structures, systems or components.

- Minor Maintenance - A work activity on Power Plant Boundary Equipment, considered routine and repetitive and within the "skill of the craft" of the maintenance work force. Additionally, minor maintenance requires an initiating work document, does not require detailed instructions, and may be performed without plant scheduling.
- Work Request Maintenance - A work activity requiring detailed instructions and an approval process.

Once the appropriate controls have been determined, the Screening Committee will establish priorities for when the work will be completed. Priority codes and descriptions are as follows:

A **Emergency work** having an immediate and direct impact on the health and safety of the general public or plant personnel, poses a significant industrial hazard, or requires immediate attention to prevent the deterioration of plant condition to a possible unsafe or unstable level. This work must be done immediately.

B1 **Urgent work** that should be scheduled and started within 24 hours.

B2 **Emergent work** that should be scheduled and started within two weeks.

B3 **Emergent work** that should be scheduled and started within five weeks.

C **Routine work** that follows the normal scheduling process.

After the priority has been determined for all work except for modifications, the AR is assigned to the appropriate work group, the documentation is completed by updating EWCS, and the AR is submitted to Work Control/Work Analyst. For modifications, an Engineering Request (ER) is generated and assigned to Engineering for processing under the controls of a modification.

CHECKS AND BALANCES

The first line of defense against potentially performing work with an inappropriate or inadequate level of control is the AR Screening Committee. The "Knowledge Base" requirements of the Screening Committee have provided an additional level of confidence to the screening process. By having Engineering participate, it provides a design and licensing basis understanding from people who often reference and interpret the appropriate source documents.

The second line of defense in ensuring that work is performed with appropriate control is the Work Analyst. Once the initial determination of "type of work" is made by the screening committee, the AR's identified as Work Request Maintenance are sent to a work analyst for further planning and preparation of work instructions. The review and approval of these instructions provides an additional opportunity (the third line of defense) for knowledgeable personnel to evaluate the requested work against the licensing/design basis of the plant and to ensure that no unrecognized design changes are being made.

Additionally, with recent industry and ComEd events (especially the LaSalle Service Water event) that deal with design/licensing basis issues, an increased awareness of the effects changes may have has occurred. Corporate direction was issued to all sites, directing them to strengthen their evaluation of changes against the definition of a modification and for their potential effect on the

design basis of the plant. This was formalized with the recent issue of NSWP-WM-08, Action Request Screening.

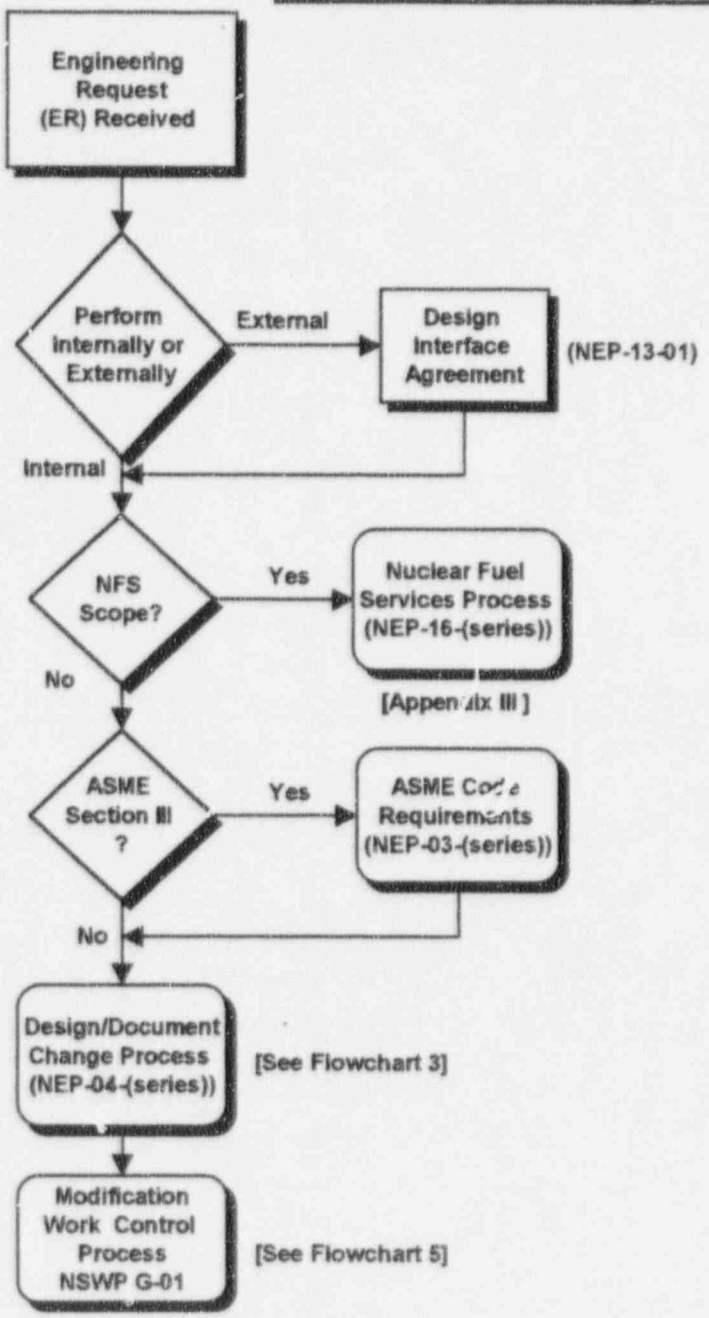
Increased emphasis has also been placed on the definition of Facility Maintenance, Minor Maintenance, and Work Request Maintenance. In each of these types of work, clear boundaries have been provided to maintain the appropriate level of controls. If during the process something requires work to fall outside the predetermined boundaries, the work scope changes or the work scope increases, the work is reevaluated per the initial screening criteria. At that time, the appropriate controls (new or different controls, if applicable) are applied.

RECENT PLANNED IMPROVEMENTS

Prior to the implementation of EWCS (Electronic Work Control System) in 1994 & 1995, these key screening decisions were made by an Operating Engineer, an experienced Senior Manager with an SRO license. Once safety classification and other decisions were made, including whether the work involved maintenance or modification, the work request was forwarded to the working department for planning, work instruction preparation, inclusion of procedures, etc. This Operating Engineer review was a key control step to ensure identification of work that had the potential to alter the original design. Working department review and approval during the planning phase provided a secondary control function to ensure that work to be performed did not deviate from plant design.

Since the introduction of EWCS, the methodology has changed somewhat but the intent of the process is unchanged. Decisions on safety classification are now only required on an exception basis as the classification of components has typically been captured in the data base supporting the process. Additionally, organization changes have taken place with the creation of Work Control Centers and the screening function was typically reassigned to the Lead Unit Planners and Lead Maintenance Planners. While this has worked well in most cases, inadequate sensitivity to Action Requests with the potential to introduce changes to the design has occasionally been observed. Further, Mi Maintenance teams and Fix It Now teams have also been created which have predefined boundaries in which they perform specific types of work. The net result has been a subtle deterioration of the screening function as an effective barrier to inadvertent design changes. In response to this identified weakness, changes have been recently implemented to strengthen the screening process. These changes include the addition of an Engineering participant to the Screening Team and the strengthening of the evaluations performed in accordance with the recently issued Nuclear Station Work Procedure, "Action Request Screening," NSWP-WM-08.

Flowchart 2
Roadmap To Design Control Process



Note: Human error, configuration control and major equipment problems are identified using the Integrated Reporting Program and documented on a Problem Identification Form (PIF). PIFs are reviewed for reportability and operability in compliance with 10CFR50.72 and 10CFR50.73. If a defect or noncompliance is found at any step in this process, refer to NEP-10-02, "10 CFR Part 21 Evaluations and Technical Issue Reviews."

Roadmap to Design Control Process

PURPOSE

This flowchart serves as an overview of the design control process. It links the major design processes and indicates decision points that determine whether these design processes are required.

PROCESS DESCRIPTION

After the need for a design activity has been identified and an Engineering Request (ER) has been forwarded to Engineering, the first thing that needs to be determined is whether or not the work will be performed internally. If the decision is made to perform the work with an external organization and to delegate design authority to that organization, a Design Interface Agreement (DIA) is required. This DIA establishes procedures among the participating design organizations involving design bases interfaces. External design organizations are required to meet the ComEd procedures for modifications in order to maintain design and configuration control.

If the scope of work to be performed involves Nuclear Fuel Services (NFS), they are included in the design process. Since the design authority assigned to NFS is retained in the Corporate office, their processes, although similar to those described here, are separate and are addressed in Appendix III.

If the design involves ASME Section III systems or components, a parallel series of design requirements and processes are required to be performed in addition to the design change process described here. Because these requirements pertain only to ensuring Code compliance, they are not described in more detail.

The Design Change Process and the Modification Work Control Process are described separately in the detailed process descriptions that follow.

Throughout all of these processes is the process of identifying and reporting defects and noncompliances. This process applies to any of the processes identified here and can be invoked at any stage in the process. This process is described separately in Action (d).

CHECKS AND BALANCES

The checks and balances applicable to the processes represented here will be described separately in the detailed process descriptions. Human error, configuration control and major equipment problems are identified using the Integrated Reporting Program and documented on a Problem Identification Form (PIF). PIFs are reviewed for reportability and operability in compliance with 10CFR50.72 and 10CFR50.73. If a design defect or noncompliance is identified, it is evaluated in accordance with NEP-10-02, "10CFR Part 21 Evaluations and Technical Issue Reviews."

RECENT/PLANNED IMPROVEMENTS

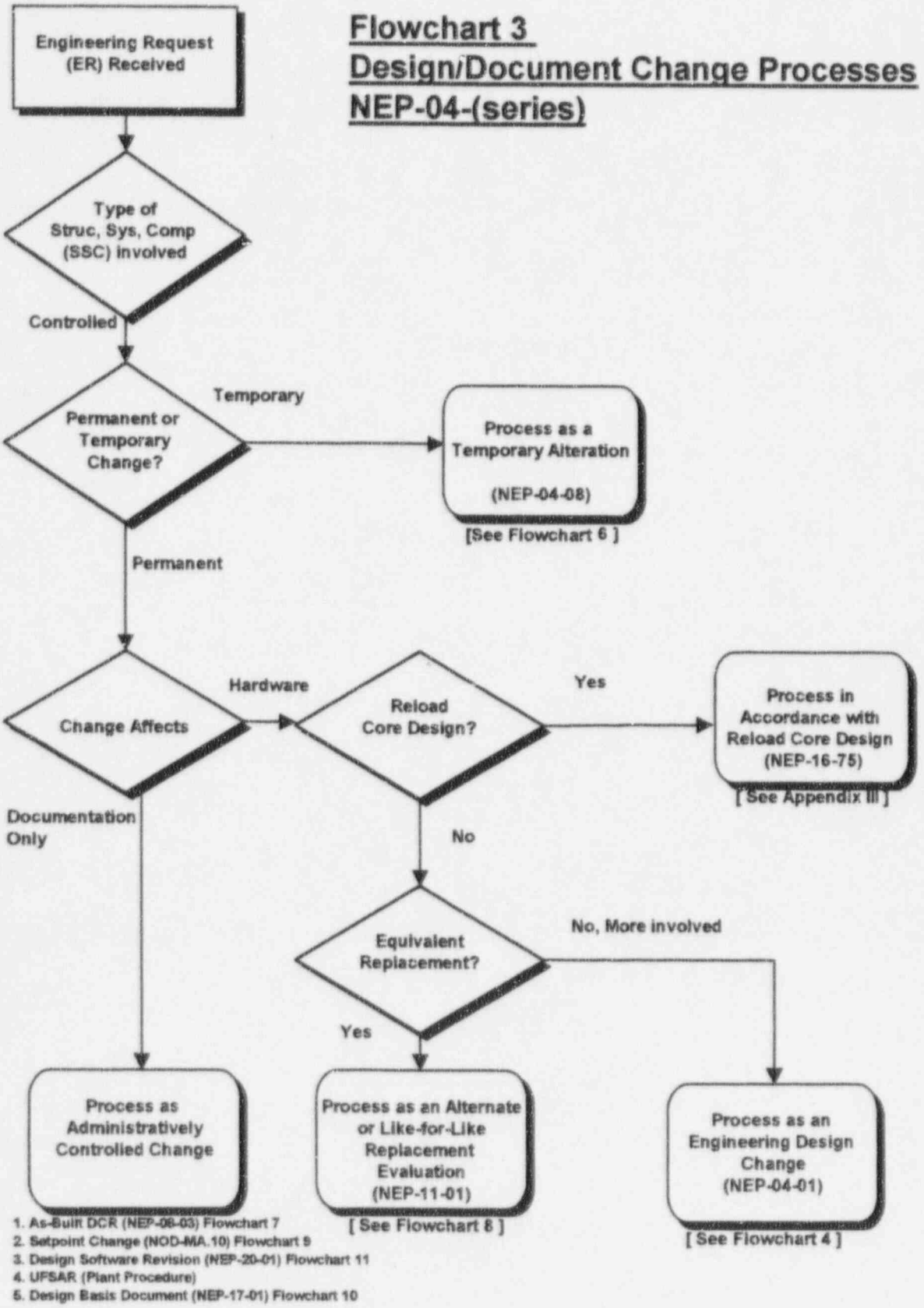
Improvements to the processes represented here are discussed in the detailed process descriptions that follow. As stated in the November 12, 1996 letter from T. Maiman to A. Bill Beach, ComEd has established an Engineering Assurance Group to provide oversight of key engineering activities. This organization will remain in place until engineering performance has improved to the point where these reviews are no longer required.

As stated in the November 12, 1996 letter from T.J. Maiman to A. Bill Beach, ComEd will expand the SQV audits of major design contractors with focus on:

(1) Interfaces with ComEd,
(2) Design control processes, and
(3) Corrective action notification

An action plan will be developed that includes the principal architect-engineers, fuel suppliers, and NSSS vendors.

Flowchart 3
Design/Document Change Processes
NEP-04-(series)



1. As-Built DCR (NEP-06-03) Flowchart 7
2. Setpoint Change (NOD-MA.10) Flowchart 9
3. Design Software Revision (NEP-20-01) Flowchart 11
4. UFSAR (Plant Procedure)
5. Design Basis Document (NEP-17-01) Flowchart 10

Design/Document Change Processes

NEP-04-(Series)

PURPOSE

This flowchart serves as a roadmap to the appropriate process to be used in implementing design changes to the plant. At each decision point, a specific process that applies the appropriate level of controls to the change, is chosen. Each decision may be determined through the use of specific definitions, screening questions, and/or lists.

PROCESS DESCRIPTION

Temporary Alterations (Temp Alts) - The second decision point determines if the proposed change is permanent or temporary. Temp Alts are defined as a planned temporary change to the fit, form or function, of any controlled operable SSC, or circuit that does not conform to approved design drawings or other approved design documents. This process is described separately.

Hardware / Documentation Changes - A decision is made to determine the type of permanent change being made. Documentation changes that are clearly administrative in nature, are processed through the As-Built Document Change Requests (DCRs), Setpoint Changes, Computer Software Revisions, UFSAR Revisions or Design Basis Document Changes. Each of these processes is described separately.

If hardware changes involve a reload core design, they are processed in accordance with Nuclear Fuel Services (NFS) procedure, "Reload Core Design" (NEP-16-75). This process is described separately.

Other hardware changes and documentation changes that are technical in nature, are reviewed against the definition of equivalent replacements. These include like-for-like replacements or replacements of parts, components, subcomponents, and materials that meet current interface, interchangeability, safety, fit and functional requirements of the original components. This process is described separately.

Changes that are more involved, will be processed as Engineering Design Changes. These include changes to SSCs that are safety-related, subject to NRC regulatory requirements, or are necessary for electric power generation. This process is described separately.

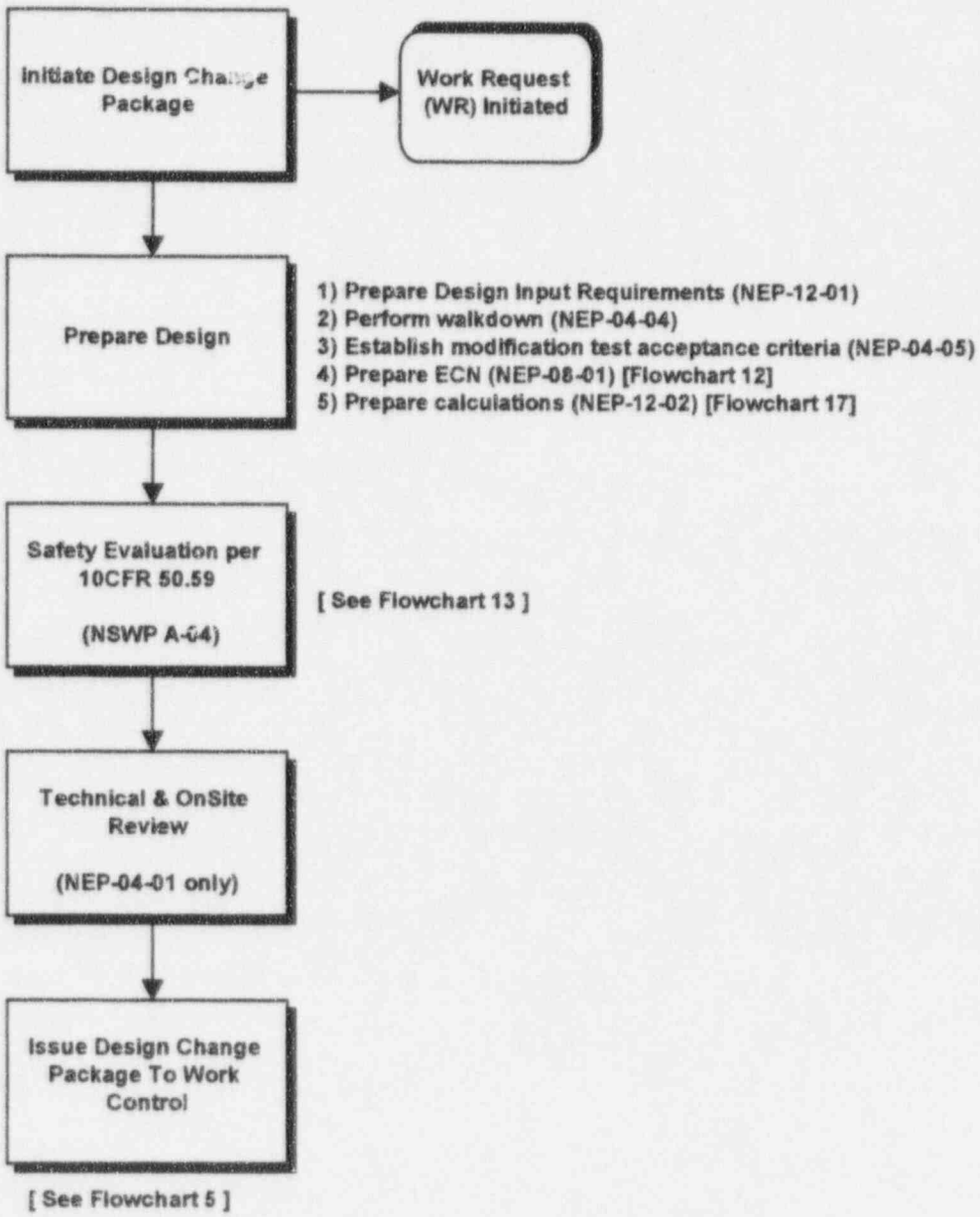
CHECKS AND BALANCES

The checks and balances that apply to the processes represented here will be discussed separately in the individual process descriptions.

RECENT/PLANNED IMPROVEMENTS

Improvements in other areas represented on this flowchart will be discussed separately in the individual process descriptions.

Flowchart 4
Engineering Design Change Process
NEP-04-01 and NEP-04-02



Engineering Design Change Process

NEP-04-01 and NEP-04-02

PURPOSE

This is the process used to implement "Controlled Design Changes" to the plant. These changes include changes to Structures, Systems, and Components (SSCs) that are safety-related, subject to NRC regulatory requirements, or are necessary for electric power generation. This process provides the requirements for implementing changes that could potentially affect the design basis of the plant.

PROCESS DESCRIPTION

Prior to initiating a planned change to the plant design or operation, ComEd management requires the following prerequisites to be performed before significant resources are expended:

- Approval of technical objectives and proposed conceptual design, including an assessment of compliance with the design and licensing basis,
- Approval of the budget and source of the funding,
- Assignment and approval of the selected design organization, and
- Assignment and approval of the installer(s) and a proposed installation schedule.

After the above prerequisites are met, a Modification Scope Meeting is held. This meeting brings together appropriate Engineering, Operations, Maintenance and Support personnel to review the scope and schedule for the modification, define responsibilities, determine deliverables, review the preliminary design, identify and confirm design inputs, perform a pre-design walkdown and resolve or identify any potential concerns or problems. If the design does not affect nuclear safety, it is categorized as an "Exempt Change" and is processed in accordance with NEP-04-02. If the ER is approved as a Controlled Design Change, it is processed in accordance with NEP-04-01. A Design Change Package is created through Electronic Work Control System (EWCS). A Work Request (WR) is initiated that will be used to implement the required work.

The design is then processed through a series of individual steps that include a scoping activity, field walkdowns, preparing Design Input Requirements (DIRs), engineering calculations, documents, and 50.59 safety evaluations. The DIR defines the major technical objectives, constraints and regulatory requirements that govern the development of the design. It addresses design input categories and serves as a common reference point for the preparation of the more detailed design related documents such as drawings, specifications, calculations, analysis and test specifications. Once the Design Change Package is completed, a final Technical and Onsite Review is initiated that provides for interdepartmental reviews. This final review is not required for Exempt Changes.

After the reviews have been completed, the Design Change Package is issued for Work Instruction preparation as the first step in the Modification Work Control Process. This process is described separately.

In all cases, the design and engineering activities described in these processes are implemented at ComEd by individuals who have been trained and are qualified to perform these functions. These individuals are trained and their qualifications are documented in accordance with the NEP-15-XX series of procedures. These procedures address and comply with the requirements of ACAD 91-017, "Guidelines for Training and Qualification of Engineering Support Personnel," Rev. 1 and ANSI/ANS 3.1, "Selection, Qualification and Training of Personnel for Nuclear Power Plants."

CHECKS AND BALANCES

Although there are areas within the process that provide overall reviews of the design, several specific areas provide for independent reviews against the design basis. The first area is initiated through Engineering Change Notices (ECNs), which are used to develop the detailed design. Each ECN goes through an interfacing review process, an independent reviewer, and an approver. Engineering calculations in support of the indicated design on ECN goes through a similar independent review and approval. A 50.59 safety evaluation or screening is also part of the design process and provides an additional level of review. The ECN, calculation and safety evaluation processes are described separately in more detail.

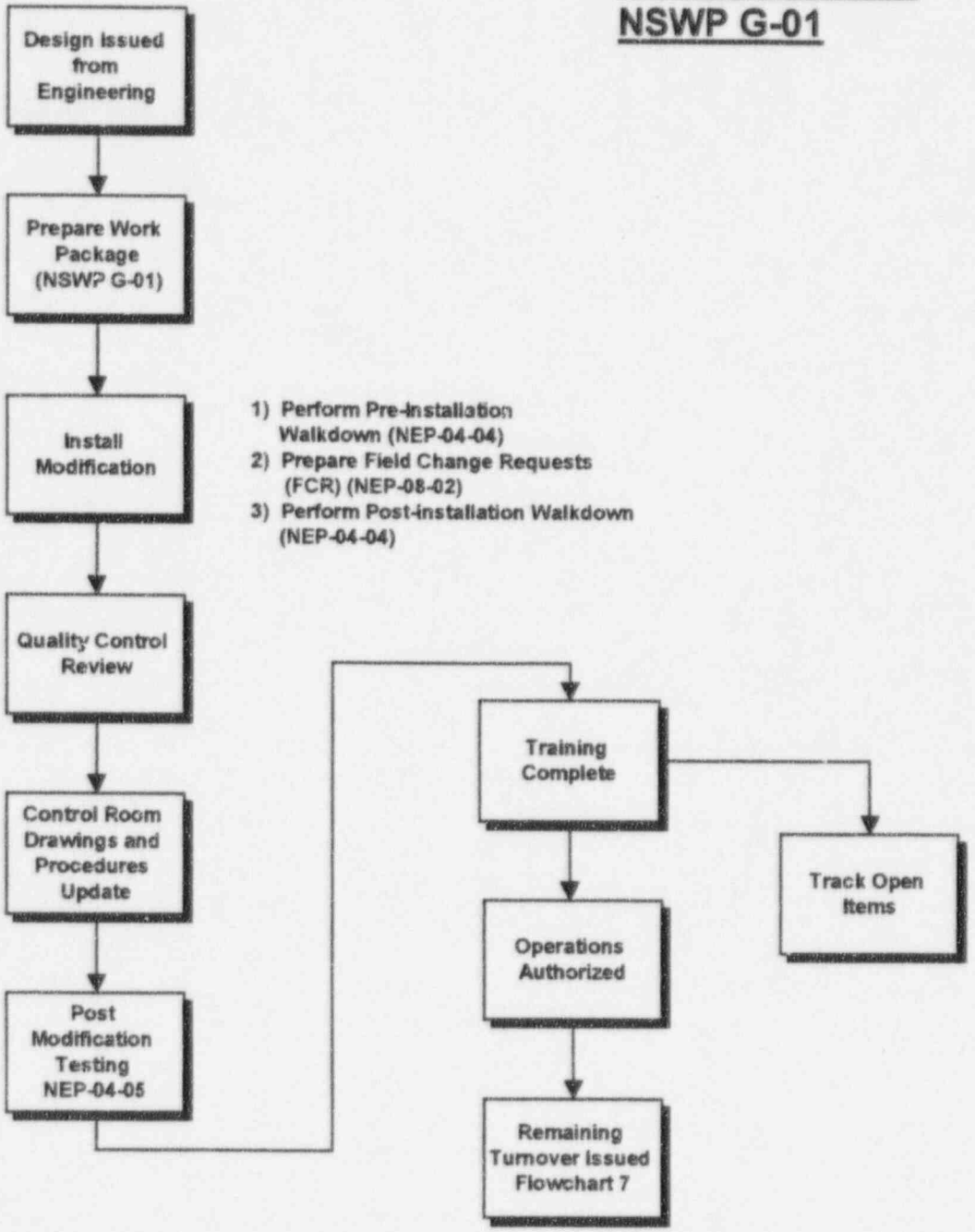
Walkdowns performed after installation, as described in the Modification Work Control Process, also provide another area where the design is evaluated to ensure that it has met the original design requirements. When the design is installed "out of tolerance" or an alternate design configuration is required, a Field Change Request (FCR) is generated to evaluate the differences. FCRs are processed through engineering in a similar manner as the original design. Additional engineering calculations and 50.59 safety evaluations may be required.

Post Modification Testing, as discussed in the Modification Work Control Process, is the last area where the design is evaluated to ensure that it has met the original design requirements.

RECENT/PLANNED IMPROVEMENTS

As stated in the November 12, 1996 letter from T.J. Maiman to A. Bill Beach, ComEd recently completed a review of partially implemented modifications. The modifications identified have been assigned to responsible engineers to develop and implement action plans for closure.

Flowchart 5
Modification Work Control Process
NSWP G-01



Modification Work Control Process

NSWP G-01

PURPOSE

The purpose of this process is to provide the necessary controls for the development of work packages that include installation instructions, quality control review expectations, and post modification testing requirements prior to Operations Authorization of the modification.

PROCESS DESCRIPTION

Once the Design Change Package (DCP) is issued, a Work Package is prepared that provides the necessary instructions for installation, QC reviews, and testing. During the installation phase, a pre-installation walkdown is performed, Field Change Requests (FCRs) are generated for variations to installation requirements (if required), and post-installation walkdowns are performed to ensure that the modifications are installed per the construction documents.

After installation, a QC review is completed, post modification testing is performed, associated training is completed, and all configuration control issues are addressed. As identified in the design change documents required for Operation Authorization, training will be complete, procedures revised, and Critical Control Room Drawings (CCRD) in place. Any open items that are not required for Operation Authorization, are identified and tracked separately for future closure.

The modification is then "Operations Authorized" and a "Turnover" is issued incorporating changes to the affected design documents.

CHECKS AND BALANCES

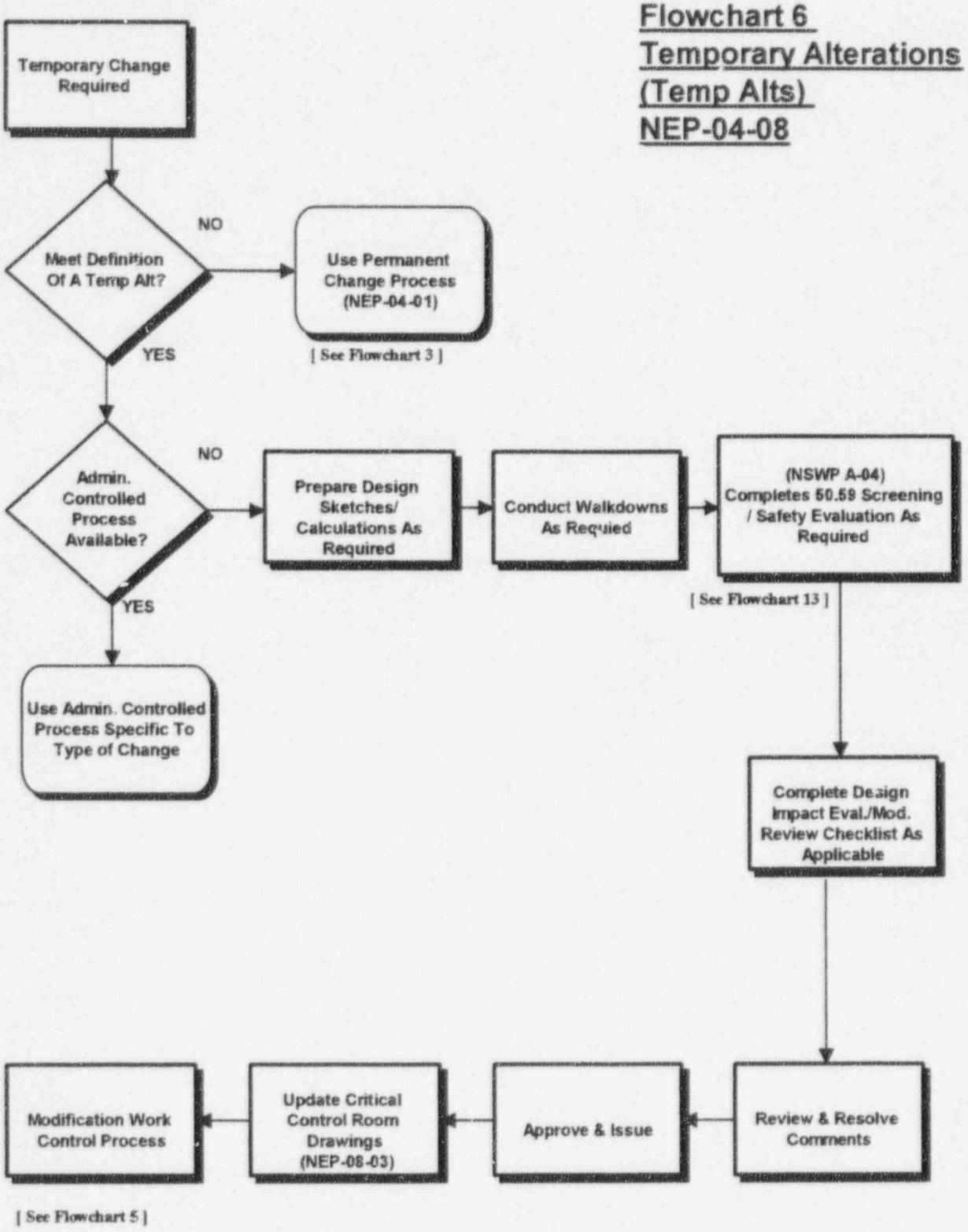
The pre-installation walkdowns provide an opportunity to evaluate the modification against the physical attributes and design considerations of other components located in same area. Any changes required during this evaluation and others required during the installation, are evaluated through the Field Change Requests (FCRs). FCRs are evaluated against the same criteria used for the original design. This includes independent reviews and 50.59 safety evaluations, if applicable.

Post-installation walkdowns and testing are performed to ensure that the modification is installed as designed and that it functions as intended.

RECENT/PLANNED IMPROVEMENTS

A Corporate-wide initiative is currently underway to improve "getting work done" within ComEd. This initiative includes the Work Control Process as an important element of the overall objective.

Flowchart 6
Temporary Alterations
(Temp Alts)
NEP-04-08



Temporary Alterations (Temp Alts) Process

NEP-04-08

PURPOSE

The Temporary Alteration (Temp Alt) process is intended to provide assurance that a Temp Alt made to plant equipment does not degrade plant safety/reliability or unacceptably alter the approved design configuration.

PROCESS DESCRIPTION

The first step is to determine if the proposed change meets the definition of a Temp Alt. If not, the change must be processed using one of the permanent design change processes. If it does meet the definition, it can be processed as a Temp Alt or using an Administrative Controlled process that is specific to the type of change being considered.

With the Temp Alt process, design sketches and calculations are prepared, as required. When needed, walkdowns are performed and a 50.59 screening/safety evaluation is completed, as appropriate.

A Design Impact Evaluation and Modification Review Checklist are completed. The design goes through an independent review process and the Temp Alt is approved and issued.

CHECKS AND BALANCES

The first checkpoint involves the control to ensure that permanent changes are not processed as a Temp Alt. Permanent change processes are available that provide the appropriate level of controls. A 50.59 screening/safety evaluation is required for each Temp Alt. This process is described separately.

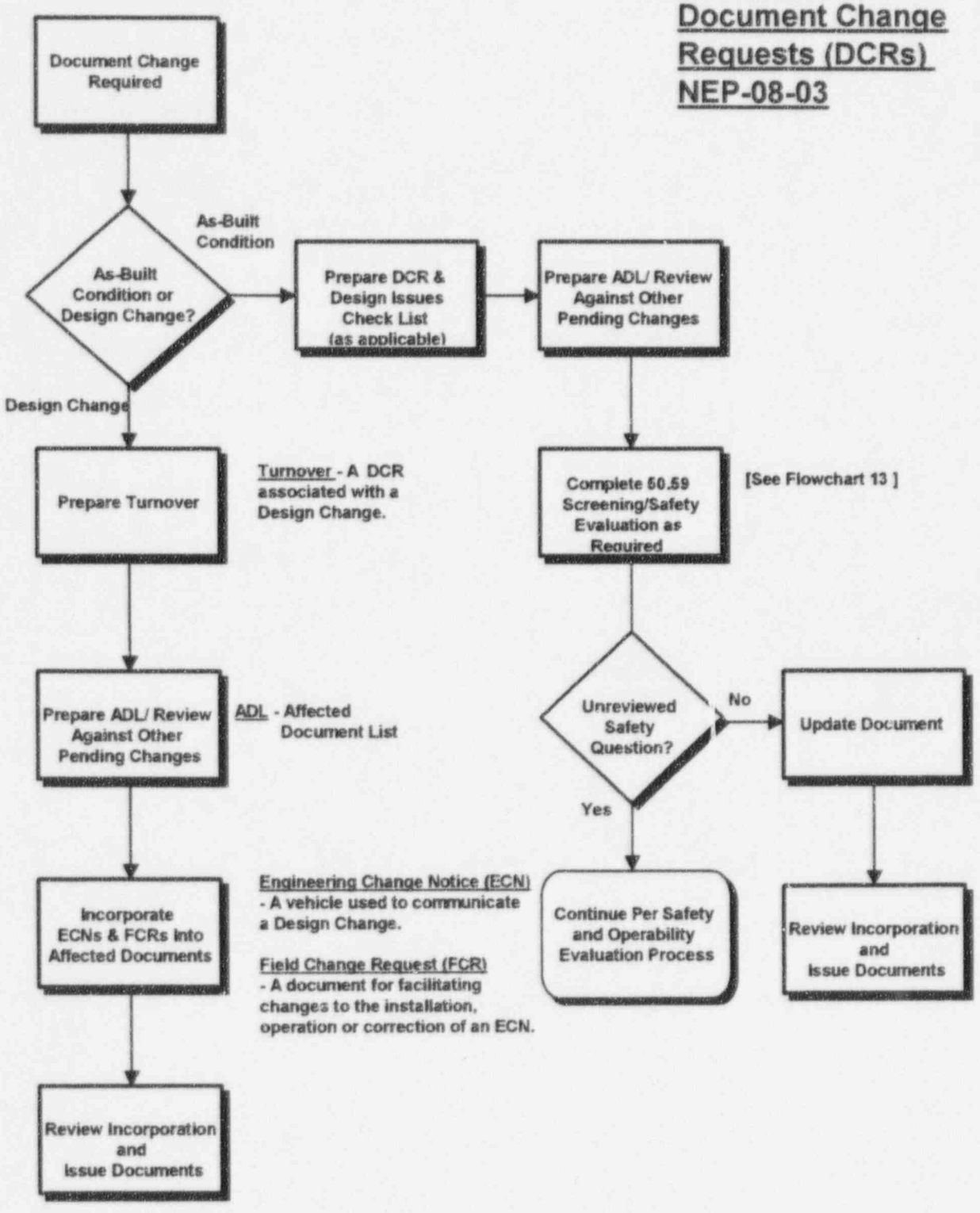
A Design Impact Evaluation/Modification Review Checklist is used to ensure that plant safety and reliability are not adversely affected, proper design control is maintained through a verification that appropriate drawings and procedures are revised to reflect the temporary configuration, and that testing considerations are addressed.

Temporary Alterations are required to be included on the Critical Control Room Drawings (CCRD) so that they are maintained to reflect the plant configuration at all times.

RECENT/PLANNED IMPROVEMENTS

Currently a six site evaluation team has been formed to review Temp Alt issues that were identified through Nuclear Regulatory Commission, Site Quality Verification, and Chief Design Review. This team has established root causes and solutions that are now being included in a new NSWP. This new NSWP is intended to simplify the process, improve the understanding of what is considered a Temp Alt and standardize the process at all six sites.

Flowchart 7
Document Change Requests (DCRs)
NEP-08-03



Document Change Requests (DCRs)

NEP-08-03

PURPOSE

The Document Change Request (DCR) process is used to control incorporation of design changes or as-built information into design documents. The request is initiated through the Electronic Work Control System (EWCS).

PROCESS DESCRIPTION

When a document change is required, two separate paths are provided depending on the source of the change. If the required change is the result of a Design Change, then an Affected Document List (ADL) is prepared and reviewed against other pending changes. Engineering Change Notices (ECNs) and Field Change Requests (FCRs) are incorporated, and the documents are reviewed, approved, and issued.

If the required change is the result of an as-built condition, then an ADL is prepared, it is reviewed against other pending changes, and a 50.59 Screening/Safety Evaluation is prepared. If no Unreviewed Safety Question has been identified, the documents are updated, reviewed, approved, and issued.

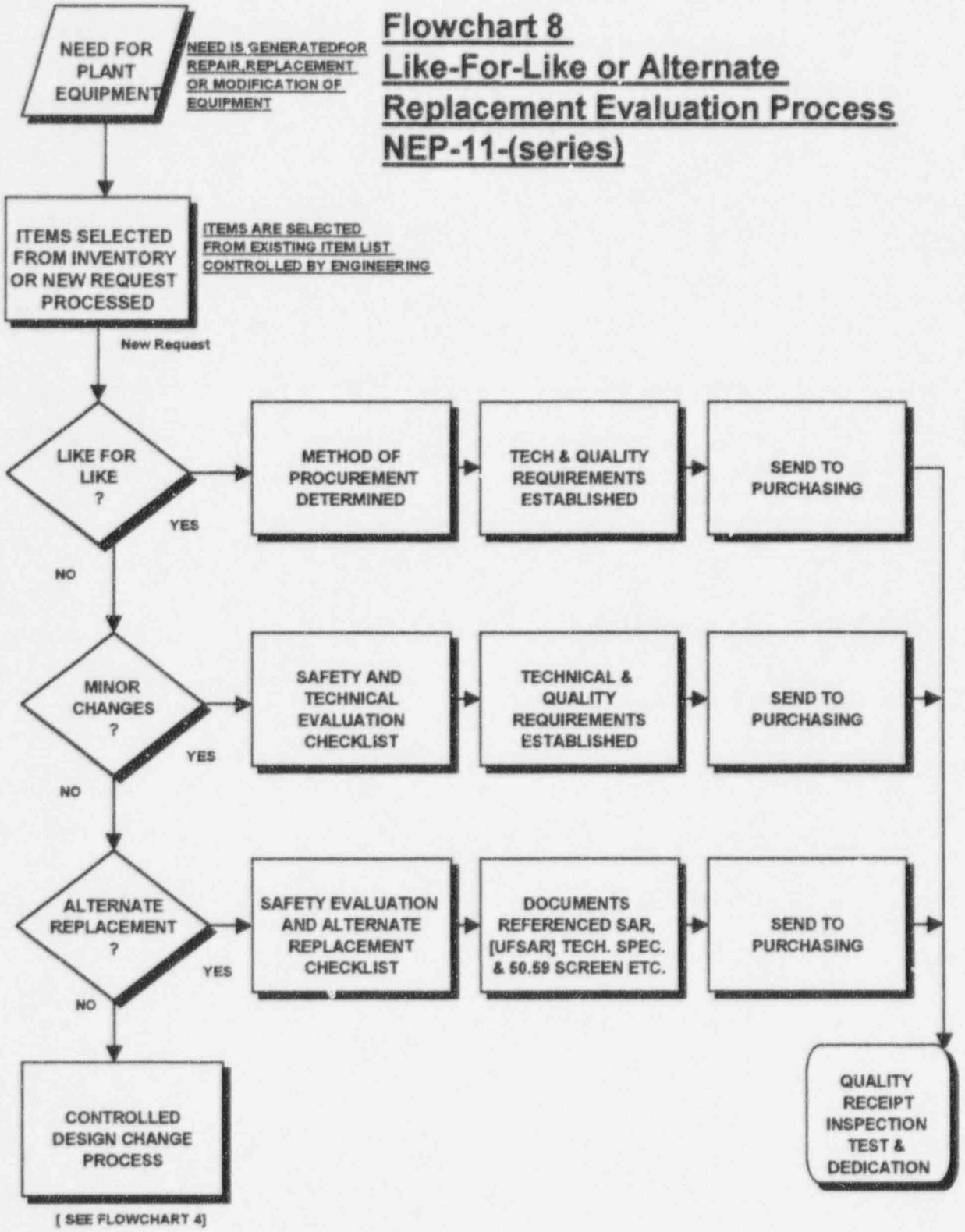
CHECKS AND BALANCES

There are several areas within this process that provide additional checks for reviewing the proposed change against other pending changes and design issues. Several of these checks are accomplished through the main elements of EWCS, that are described separately.

When preparing the ADL, EWCS is used to identify all outstanding changes that exist against the current revision of the document. This aids in determining the full impact of the proposed change for as-built evaluations and for combining information for document updates. A Turnover/DCR Design Issues Checklist is also provided for use in determining the impact of as-built changes in reference to several design issues.

The 50.59 Screening/Safety Evaluation process, which is described separately, is tied to processing all as-built changes. When a document and physical plant mismatch is discovered, a design engineer reviews the design to ensure it is physically correct.

Flowchart 8
Like-For-Like or Alternate Replacement Evaluation Process NEP-11-(series)



Like-For-Like or Alternate Replacement Evaluation Process

NEP-11-(Series)

PURPOSE

The purpose of the Material Procurement Process is to establish uniform criteria for procurement and qualification of items and services that will be used for operation, maintenance, and modification of ComEd nuclear units with the following objectives:

- Ensure installed items comply with the plant design basis and requirements
- Ensure the configuration is properly documented
- Minimize cost
- Maximize the use of existing inventory
- Minimize inventory
- Minimize procurement effort
- Maximize the use of technically acceptable alternates

The scope of the process includes new and replacement items for quality related applications. The process also describes the relationship between design, qualification, procurement, dedication, and supply.

PROCESS DESCRIPTION

Once the need for an item is identified, a determination is made whether an item has previously been identified for use in the specific application. If the answer is no, the design requirements for the item are established. The design requirements may apply to current design and/or those required for a design change. Design requirements are identified through: review of design documents, equipment walkdown, safety classification data, technical data on form, fit and function, and design qualification documentation.

Should a replacement other than like-for-like [identical] design be required, the process directs the user to procedures for continuation of the process depending on the complexity: Technical Evaluation [NEP-11-01], Alternate Replacement [NEP-11-01], or Modification [NEP-04-01]. The process includes a 50.59 evaluation and independent engineering review and approval. When qualification of design is required for new or replacement items, the process directs the user to the appropriate design qualification methods. Once the design, qualification and description of the items are completed, the process directs the establishment of requirements for the procurement of items. Verification that items specified are those that are procured is provided by the Quality Receipt Inspection process.

The process requires the use of the following forms and checklists from NEP-11:

- Component Information Form-14
- Dedication Checklist Form-22
- Technical Evaluation Checklist Form-23
- Alternate Replacement Checklist Form-24

The checklists contain reference to design and license documents. They are derived from the following EPRI Guidelines.

> EPRI NP-5652, "Guidelines for the Utilization of Commercial Grade Items in Nuclear Safety Related Applications [NCIG-07]"
>
> EPRI NP-6406, "Guidelines for the Technical Evaluation of Replacement Items in Nuclear Power Plants [NCIG-11]"

CHECKS AND BALANCES

A number of checks and balances exist in the current process. Safety related material purchase orders are quality records and provide a link to the original equipment design specifications. The technical and quality requirements imposed on the purchase of material that reflect the design of the item are a result of the Material Engineering procedures NEP-11. The process requires an independent engineer review and approval of completed work. The verification that purchase order requirements have been met is accomplished through a combination of receipt inspections, dedication testing and engineering review of test results. The receipt process includes independent quality control overview. ASME code items undergo additional verification by Hartford Authorized Nuclear Inspectors and this process is periodically audited to ASME 626 criteria.

The process is audited annually by ComEd Quality Verification to the appropriate requirements of 10 CFR 50 Appendix B. Corrective actions are identified and program revisions are made. The process has undergone independent review and self-assessment a number of times since 1990 with corrective actions made based on the weaknesses identified.

Strengths and Weaknesses

Strengths include:

> A process and program recognized by industry peer evaluation as a Good Practice supported by standardized procedures, and significant resource with state of the art inspection and testing tools.

The process includes reverse engineering criteria, which has evolved for similar applications in other military, aerospace, programs where maintaining design of items are critical and a suitable replacement is available in the supply chain.

Weaknesses include:

Prior to 1990, procedures governing the process were not standardized across the six stations. Common problems existed. The industry had fraudulent material concerns that were noted by the NRC in 1988.

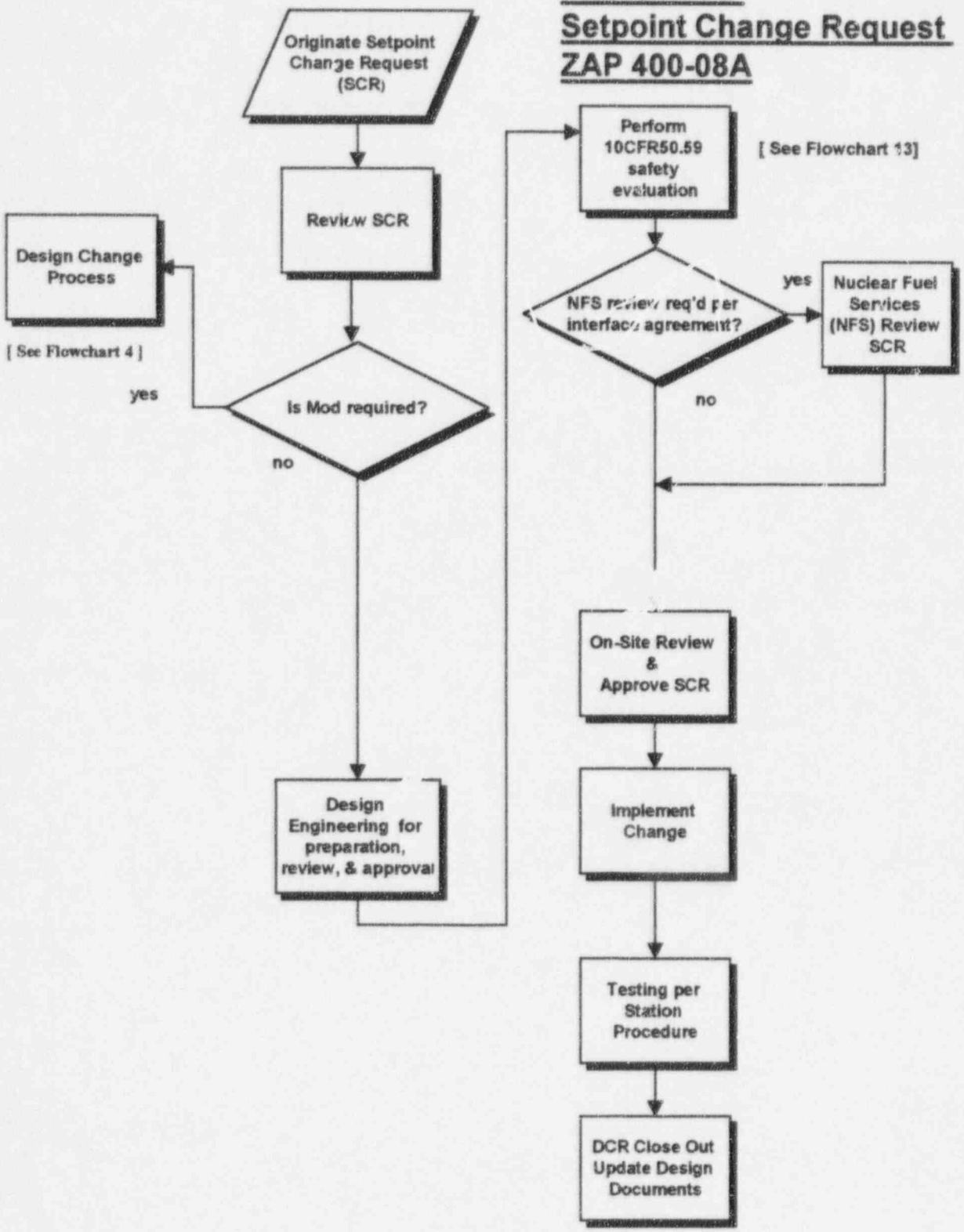
Application of parts engineering procedures, and process was mandatory for safety related and regulatory related equipment only. Use of procedures and process was optional for non safety equipment.

RECENT/PLANNED IMPROVEMENTS

Corrective actions for current program weaknesses have been established. Implementation of current corrective actions began in October 1996. Parts Engineering procedures are applicable to systems and components referenced in the plants UFSAR.

Qualification and training of parts engineers was originally under site specific programs. Current training of parts engineers is accomplished through a combination of EPRI sponsored and managed programs combined with ComEd specific criteria. The program contains two levels of qualification. The parts engineers are being incorporated into the accredited engineering training program.

Flowchart 9
Setpoint Change Request
ZAP 400-08A



Setpoint/Scaling Change Request Process

ZAP 400-08A

PURPOSE

This process establishes and implements setpoints consistent with the design bases utilizing a standardized, computerized Instrument Database, with supporting documentation and a single point of control.

PROCESS DESCRIPTION

The Requester completes the initiation section of the station Setpoint/Scaling Change Request Form.

Engineering Supervisor reviews the Setpoint/Scaling Change Request (SSCR) to validate the safety classification, to recommend training, procedural and design document changes, and to determine whether a modification is required.

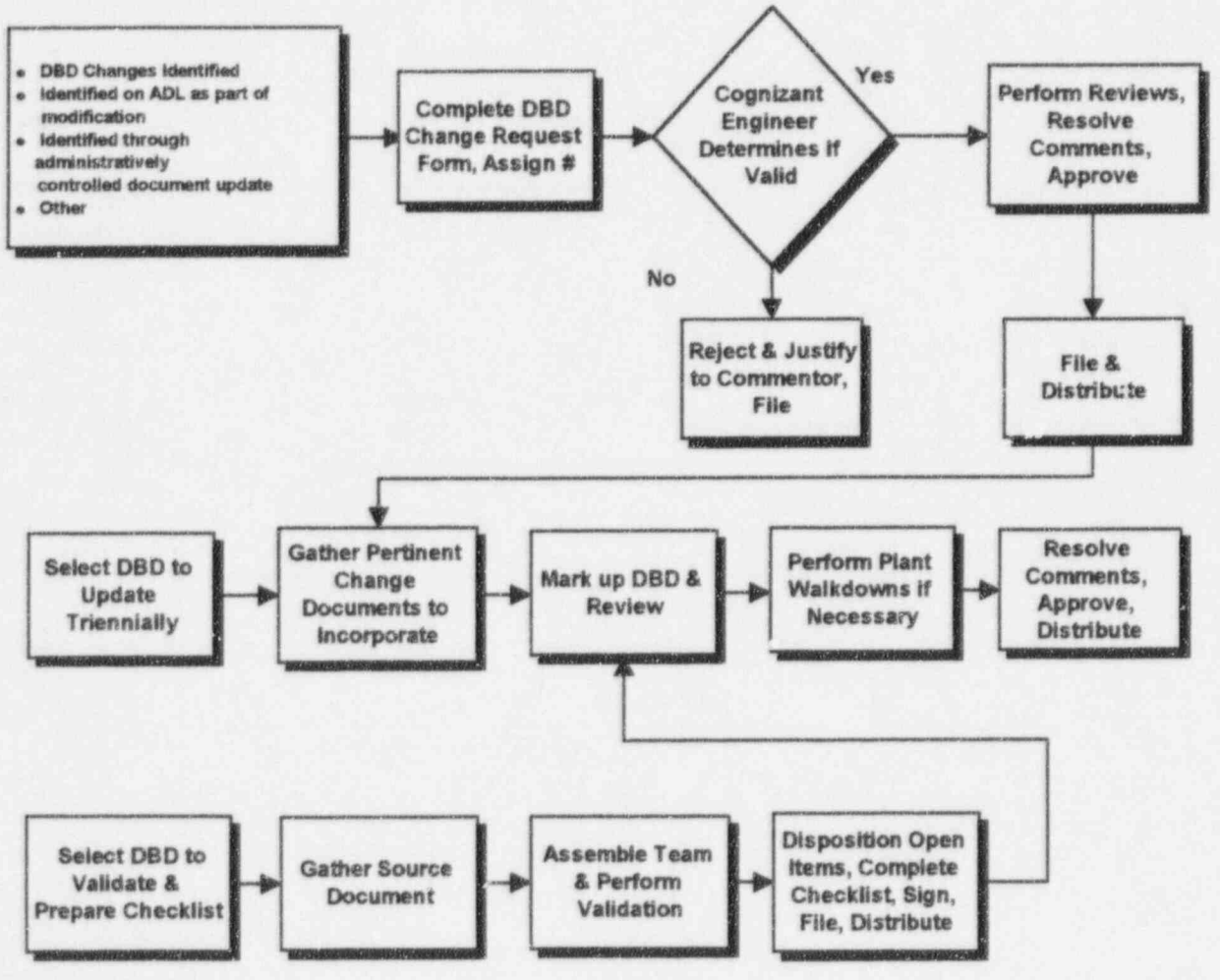
If the Setpoint/Scaling Change Request is classified as safety or regulatory related, Engineering performs a technical review and approval.

The Engineering Technical Review shall address the following items:

1. Performance of a safety review including a 10 CFR 50.59 safety evaluation.
2. Determination of need for Nuclear Fuel Services (NFS) review. If the change affects Reactor Protection and Control setpoints or a setpoint used as an input to the safety analysis, NFS must be notified.
3. Confirmation of compliance with applicable regulatory guidelines and Industry Standards.
4. Performance of a document review to ensure that the proposed Setpoint/Scaling Change is in accordance with the design bases.
5. Confirmation of recommended training or recommending additional training.
6. Identification of QA/QC related items and audit or inspection points.
7. Completion of human factors review, as applicable.
8. Preparation/review of instrument set point and loop accuracy calculations.
9. Engineering Supervisor reviews the SSCR and assigns appropriate onsite review requirements (e.g. Operations, Maintenance, Radiation Protection). The SSCR is forwarded to the appropriate onsite review discipline for review/approval.

The setpoint/scaling change and testing is implemented per the appropriate station procedures. Close-out of a Setpoint/Scaling Change Request is accomplished in accordance with the Setpoint/Scaling Change Request, and Document Change Request Procedures. A DCR is initiated to update the appropriate design documents and/or data-bases. A completed copy of the SSCR is forwarded to training for implementation of training and simulator changes.

FLOWCHART 10
Design Basis Document (DBD) Update Process
NEP 17.01



Design Basis Document (DBD) Update Process

NEP 17.01

PURPOSE

The DBD update process is used to evaluate DBD changes and incorporate approved changes. This process provides the controls to ensure that the change is appropriately reviewed, prior to updating the DBD.

PROCESS DESCRIPTION

A DBD change can result from a modification or it can be identified through the revision process associated with an administratively controlled document (such as an UFSAR change, setpoint change, etc.) or it can be self-initiated as part of the normal work process or as a result of a regulatory inspection or self-assessment.

Once an evaluation of a design change has determined that a DBD is affected, the DBD is indicated on the Affected Documents List (ADL) and the change is processed for an update evaluation. A DBD Change Request Form is initiated and placed into the review process. The process from this point on applies regardless of the reason for the originating change to the DBD.

The review will determine if the change is valid for incorporation. Once accepted, this change will be compared with all other outstanding changes and incorporated accordingly. Plant walkdowns will also be performed, as necessary.

A final review and approval process will be completed and then it will be issued.

CHECKS AND BALANCES

The initial review by the Cognizant Engineer is used as the main determination for the validity of the change to the DBD. Additionally, a review of all other outstanding changes to ensure that this proposed change is compatible with others, is provided.

Plant walkdowns to determine the affects of these changes on other plant components are also performed. A triennial update will also be performed on selected DBDs to ensure that they are current.

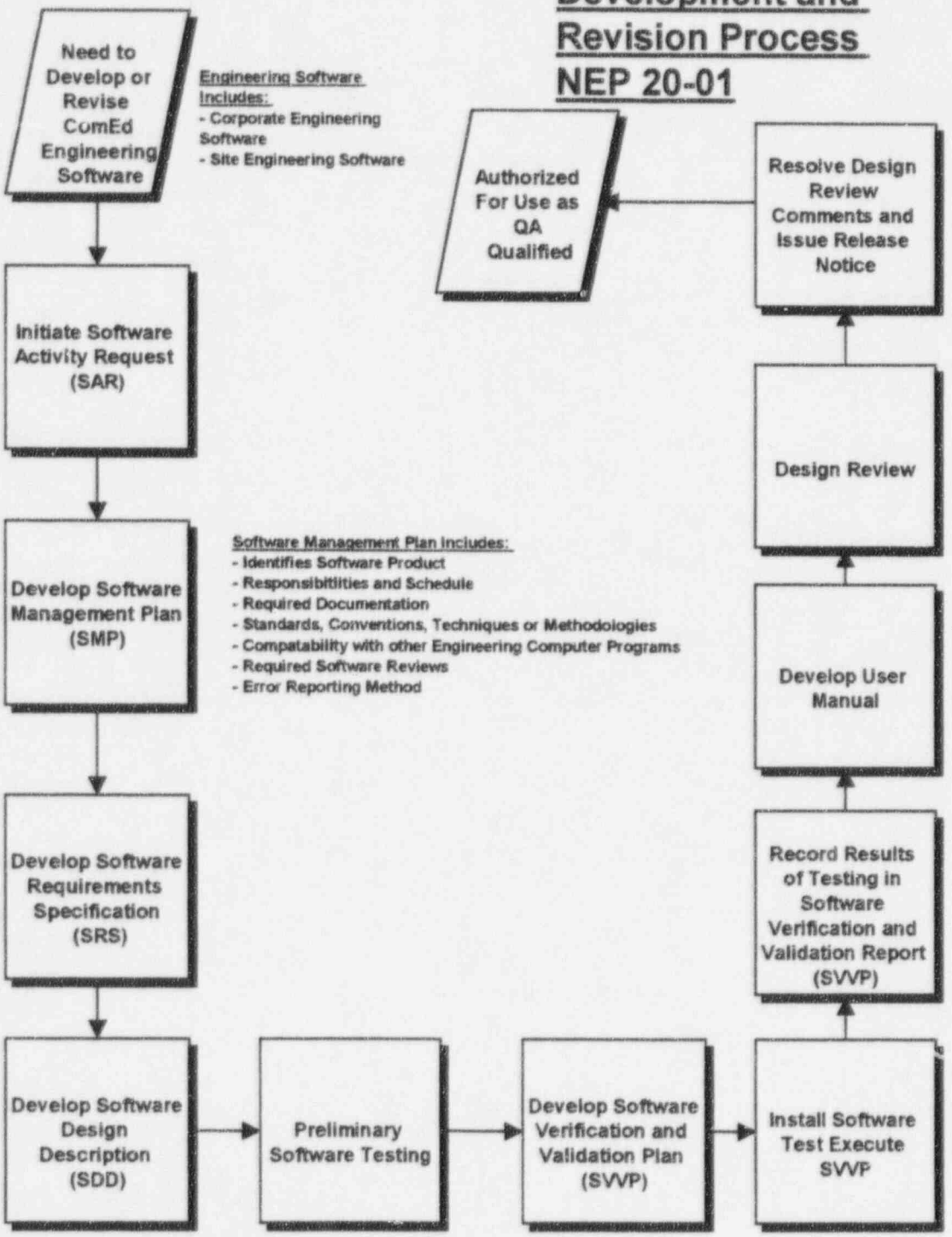
An optional DBD Validation process which is performed by a separate team is available for select DBDs. The results of this process are tied back to the update process described above.

RECENT/PLANNED IMPROVEMENTS

ComEd is developing and assembling design basis information in a common format for the top 20-25 risk significant systems and topical subjects for Dresden, Quad Cities, LaSalle and Zion Stations.

As stated in the November 12, 1996 letter from T.J. Maiman to A. Bill Beach, the NEPs will be revised to provide specific direction to engineers on steps to be followed whenever a potential Design Bases discrepancy is identified.

Flowchart 11
Engineering Software Development and Revision Process
NEP 20-01



Engineering Software Development and Revision Process

NEP-20-00

PURPOSE

The Engineering Software Program applies to software that is safety related, used to perform controlled work, used to verify Station Technical Specification compliance or used to comply with regulatory requirements not contained in the Technical Specification. This process specifically describes the steps used to control revisions to Engineering Software.

PROCESS DESCRIPTION

Once a need to develop or revise Engineering Software has been identified, a Software Activity Request is filled out to describe the situation and identify the activities that need to be performed.

A Software Management Plan (SMP) is generated that includes:

- Identification of the Software Product.
- Responsibilities and schedules.
- Required documentation.
- Standard, conventions, techniques or methodologies.
- Compatibility with other engineering computer programs.
- Required reviews.
- Error reporting method.

A Software Requirements Specification (SRS) is then developed to describe:

- The functions the software is to perform.
- The software performance.
- Design constraints.
- Attributes.
- External interfaces.

The programming change will then be based on the documents generated above, in preparation of software testing. A preliminary test case shall be used to validate the Engineering Computer Program (ECP) to assure that the software produces correct results for the test case.

CHECKS AND BALANCES

Software Verification and Validation (SVV) activities shall begin with the development of a SVV Plan which shall describe:

- Tasks and criteria for accomplishing the Verification of the ECP.
- Hardware and software configurations pertinent to SVV.
- Tracability to both the software requirements and the software design.

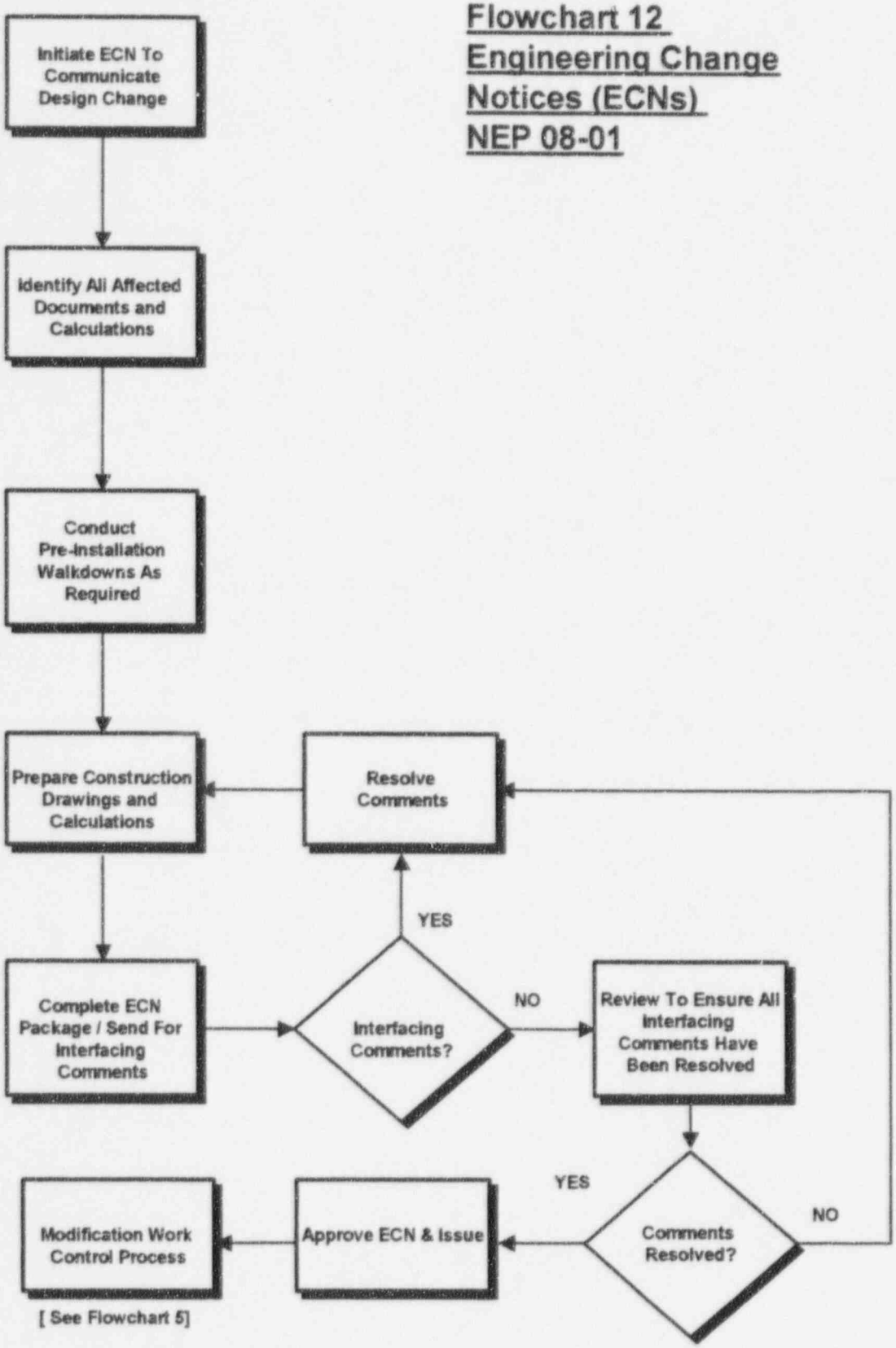
The software shall then be installed, tested and the results documented for review in a Software Verification and Validation Report. A user manual is then prepared for review.

A Design Review, as defined in NEP-20-01, is required prior to designating the software as qualified for controlled work. This review ensures that the requirements of the engineering software have been fully met and documented.

The results of the Design Review are documented through a release notice and the software is authorized for use.

Software Procurement and Software Error Identification and Reporting is controlled in NEP-20-02 and NEP 20-03 respectively.

Flowchart 12
Engineering Change Notices (ECNs)
NEP 08-01



Engineering Change Notices (ECNs)

NEP-08-01

PURPOSE

Engineering Change Notices (ECNs) are used to communicate design changes that are included in a Design Change Package. They are initiated through the Engineering Work Control System (EWCS) and provide for a systematic approach to support the preparation, review and approval process.

PROCESS DESCRIPTION

Once the ECN is initiated, all affected documents and required calculations are identified on the Affected Documents List (ADL). Initial configuration changes/additions are prepared and pre-installation plant walkdowns are performed, as required. Detailed designs and engineering calculations are then prepared and a package is sent for interfacing comments.

After interfacing comments have been resolved, the ECN goes through an independent review process, and is then approved and ready to be included in the Design Change Package for forwarding to the Modification Work Control Process.

CHECKS AND BALANCES

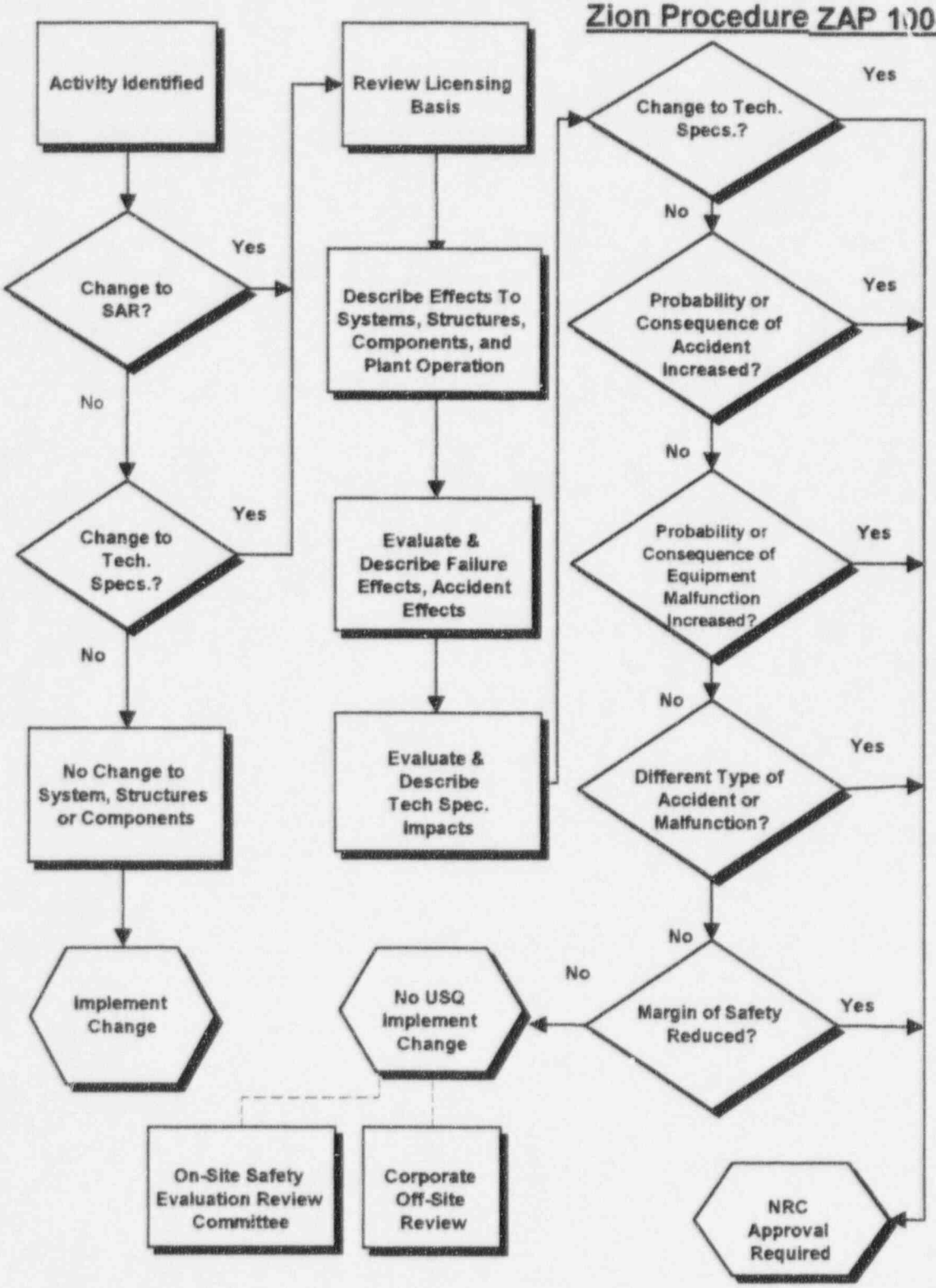
As the ADL is prepared through EWCS, all pending changes are identified and evaluated for their impact to the new change/addition. This allows for an additional evaluation of all previously planned changes and those which are currently underway.

The interfacing comment step provides for a technical evaluation in specific related areas that interface with all the aspects of the design. The evaluation is performed by those with expertise in the specific areas and are performed independently.

RECENT/PLANNED IMPROVEMENTS

The list of potentially affected design documents to be included in the ADL was recently revised to provide more detailed guidance to the preparer. This will improve the accuracy of the initial ADL.

Flowchart 13
Safety Evaluation Process
Zion Procedure ZAP 100-06



Safety Evaluation Process

ZAP 100-06

PURPOSE

To determine and provide a documented basis for concluding if an Unreviewed Safety Question exists for a change, test, or experiment.

PROCESS DESCRIPTION

Reviewers and preparers must be trained and qualified to perform Screenings and Safety Evaluations.

A Screening may be performed to determine if the change can directly or indirectly affect any of the requirements of the UFSAR, Technical Specification, and other licensing basis information.

If any affects are determined, a Safety Evaluation must be performed to determine if the change could result in an Unreviewed Safety Question.

The Reviewer reviews the UFSAR, pending UFSAR changes, and other Licensing Basis documents.

Describe how the proposed activity will affect plant operations.

Describe how the proposed activity will affect equipment failures.

Identify accidents/transients the proposed activity could affect.

Determine if new or revised Tech Specs are needed.

For each accident affected, discuss the probability of the accident being increased.

For each accident affected, discuss the effect on the consequences of the accident.

Discuss how the activity affects the probability of a malfunction of equipment important to safety.

Discuss how the activity affects the consequences of a malfunction of equipment important to safety.

Discuss the possibility of a new accident or malfunction of a type different than those previously evaluated in the SAR.

For each Tech Spec involved with the activity determine affects on acceptance limits and margins.

Determine if the margin of safety that forms the basis for a Technical Specification is reduced.

Identify if changes to the SAR are needed to complete the activity.

Completed 50.59 reviews are to be independently reviewed by the Corporate Offsite Review Group for the following:

- Confirm the conclusion of no USQ
- All questions are properly answered
- Supporting documentation justifies conclusion
- Technical Specification change needed.

CHECKS AND BALANCES

Overviews of the safety evaluations are performed by the onsite review team known as the Safety Evaluation Review Committee (SERC) and the Corporate Offsite Review Group. In addition, an onsite engineering assurance review is providing a third level of independent assessment.

RECENT/PLANNED IMPROVEMENTS

Zion Station has recently revised the procedure to upgrade the technical content of the Safety Evaluations by enhancing the step-by-step process in the procedure and also add an in-house SERC review.

As stated in the November 12, 1996 letter from T.J. Maiman to A. Bill Beach, ComEd has established Engineering Assurance teams to review operability and safety evaluations.

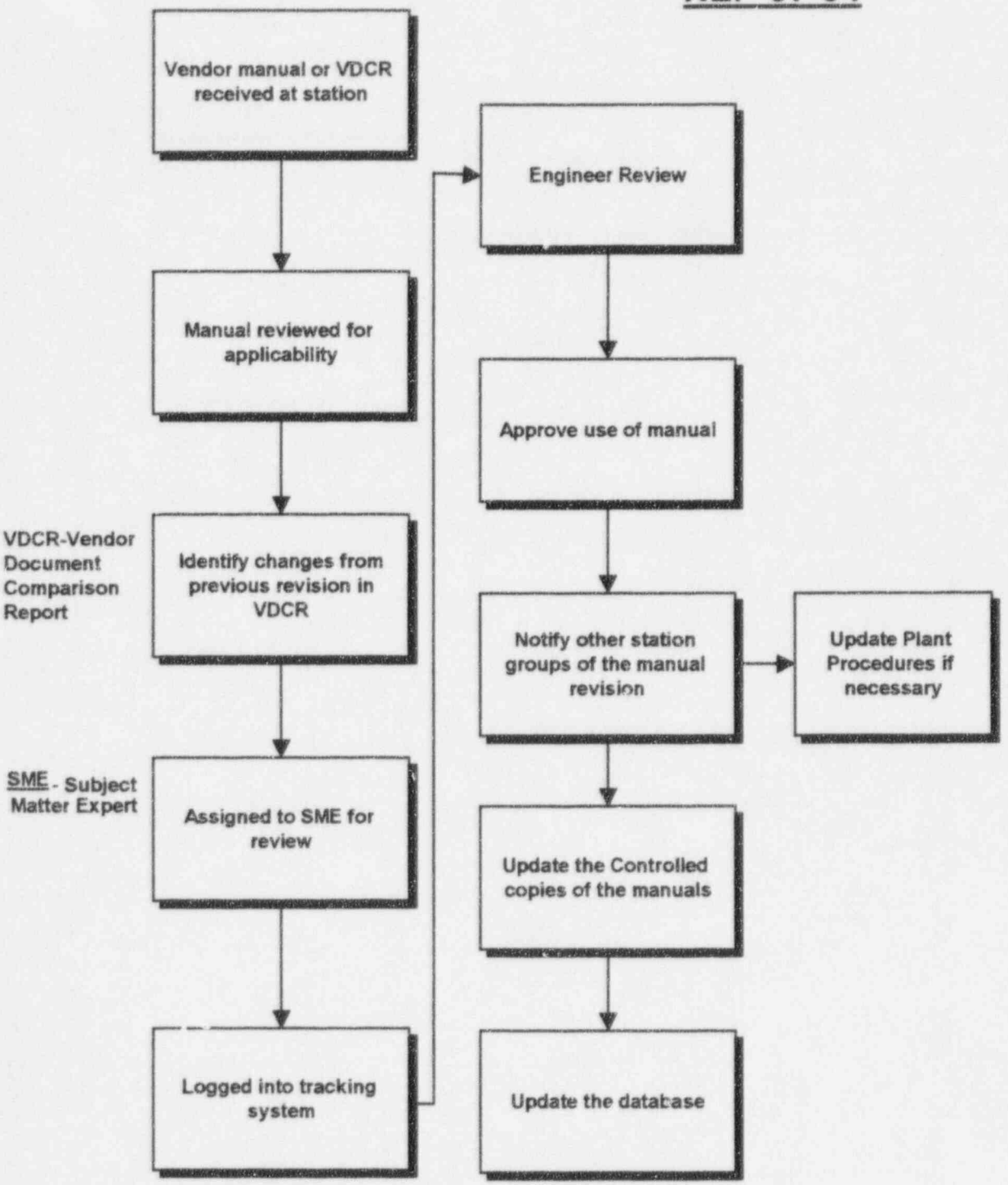
Zion Station is presently performing an informal onsite engineering assurance of the Safety Evaluations and the supporting documents. Their concerns are resolved with the preparer prior to the evaluation being approved.

A Corporate procedure is being developed for use by all departments at, all stations. Presently, each station has different procedures and, in some cases, different procedures for different departments.

Corporate Nuclear Oversight performs the Offsite review of Safety Evaluations determined to be safety significant.

A Chief Engineer in charge of regulatory programs has been assigned responsibility to teach and mentor the Site Safety Evaluation effort. Training and certification is required of individuals assigned responsibility for Safety Evaluations.

Flowchart 14
VETIP Processing
NEP-07-04



VETIP Process

NEP-07-04

PURPOSE

This process provides a methodology for the control of vendor technical information used for the installation, maintenance, operation, testing, calibration, troubleshooting, and storage of equipment. In compliance with ComEd's commitment to NRC Generic Letter 90-03, all vendors supplying critical safety related components are contacted every three years to ensure the latest appropriate manual revision and information is in the VETIP system.

PROCESS DESCRIPTION

All vendor manual information will be received and processed through the VETIP Coordinator at the station. The following activities will be performed for each vendor manual:

A review for applicability will be done by the VETIP Coordinator. This step also includes a review to see if the document is already in use at the station.

If the vendor manual is a revision to an existing manual, a review to classify the document as an administrative or technical change is made.

If the vendor manual is a revision to an existing manual, a summary of revisions document, called a Vendor Document Comparison Report (VDCR), is prepared.

Review of the changes to the vendor manual by the Subject Matter Expert (SME).

SME approves the manual, as appropriate, and determines what other station groups should be notified of the manual change for their work. If station procedures are affected, the manual is sent to the procedure coordinator.

VETIP Coordinator processes the new vendor manual and updates hard copies and databases.

CHECKS AND BALANCES

The Subject Matter Expert Review concept is new and ensures the right person is reviewing the manual and no time is lost waiting for other reviews.

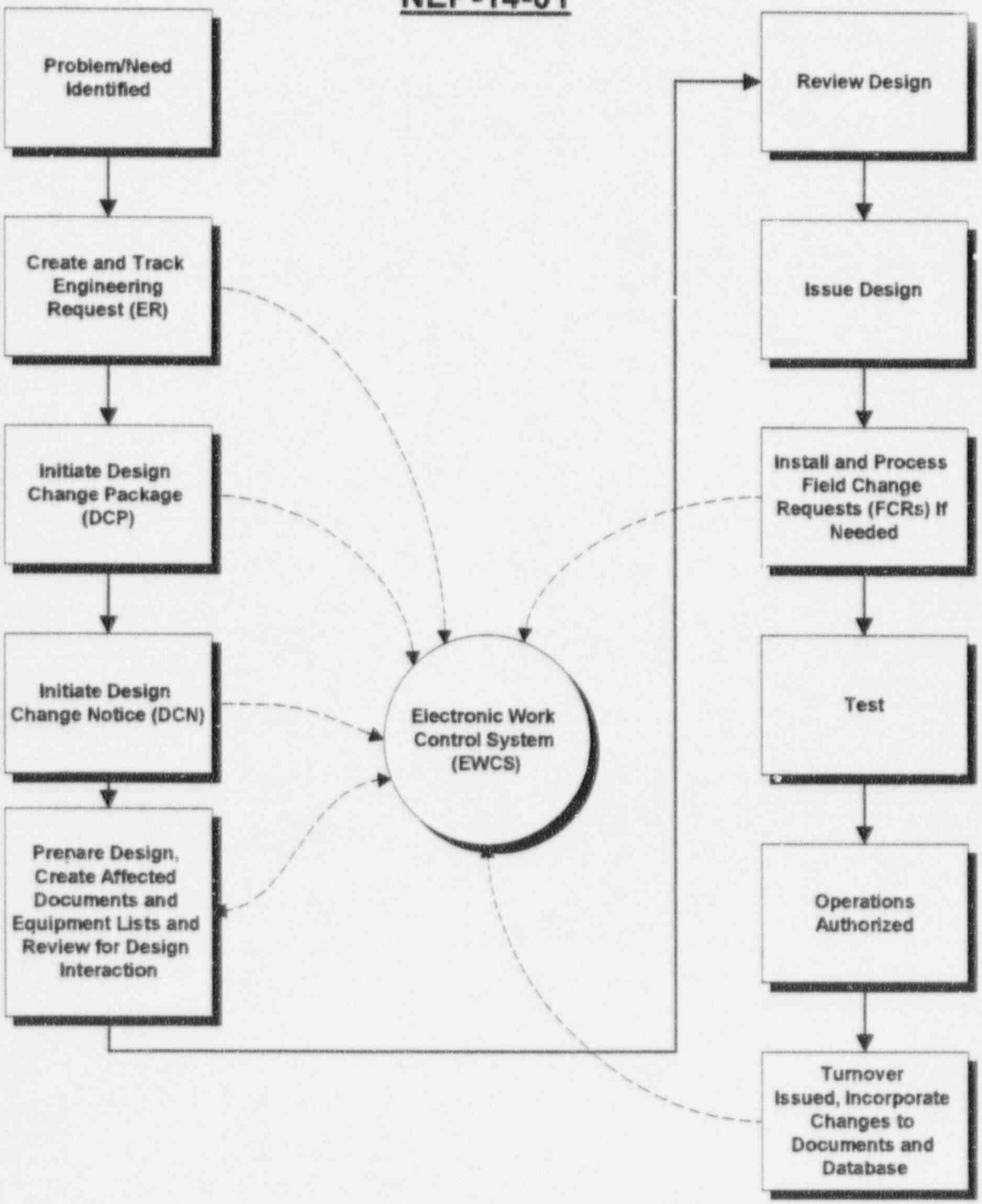
Processing of VETIP manuals is common at each station for better control and a more consistent review and documentation of VETIP information.

RECENT/PLANNED IMPROVEMENTS

Procedural requirements for processing incoming vendor manuals within a 90 day period has not always been met because of emergent work. The stations are adding resources to eliminate the backlog of old documents and to bring the program current.

Process for changing the vendor manuals to the current status based on incoming OPEX documents, is not well proceduralized. The procedure governing the VETIP is being revised by the VETIP Coordinators peer group to account for those changes.

Flowchart 15
Configuration Control Using EWCS
NEP-14-01



Configuration Control Using EWCS

NEP-14-01

PURPOSE

The Electronic Work Control System (EWCS) is an on-line workflow and database tool used at the six ComEd nuclear sites and the corporate offices. The elements of EWCS used to support configuration control are:

- Engineering Design Change Module (EDCM)
- Revision Tracking and Control
- Controlled Documents (CD)
- Equipment Database

These modules and their configuration control functions are outlined below.

PROCESS DESCRIPTION

Engineering Design Change Module

This module provides for assignment and status monitoring of 5 types of change documents. These are:

Engineering Requests (ERs) - Used to solicit assistance from engineering. ERs which may be closed by issuing a design change (only a small fraction of ERs become design changes) can be used to track the status of the change through the business review and technical review process.

Design Change Packages (DCPs) - Used as the over all tracking package for a collection of other change documents (DCNs, FCRs) or as the primary package for minor changes. When used for minor changes (simple, non-safety related), DCPs require an Affected Document List (ADL) and Affected Equipment List (AEL) to track the status of impacted controlled documents and equipment data records through the change process.

Design Change Notices (DCNs) - Primary vehicle for issuing and tracking design changes. DCNs use ADLs and AELs to identify and track the status of impacted documents and equipment data records through the change process. DCNs must be associated with an overall DCP.

Field Change Requests (FCRs) - Used to issue and status field requested changes to support installation of issued DCPs. FCRs use ADLs and AELs to identify and track the status of impacted documents and equipment data records through the change process. FCRs must be associated with an overall DCP.

Document Change Requests (DCRs) - Used to document as found changes and discrepancies to design documents. DCRs use ADLs and AELs to identify and track the status of impacted

documents and equipment data records through the change process. Note that a Turnover, not a DCR, is the vehicle used to track closure of document and equipment data changes associated with DCPs and DCNs and is part of those respective processes.

EDCM is the primary tool for tracking design and document changes from request to closure. Design interaction is readily identified through the use of the ADL and AEL.

Revision Tracking & Control (RT&C)

RT&C is technically a part of EDCM since it is initiated from the AEL. RT&C provides the ability to change equipment data associated with an EDCM change object through an on-line process. Anyone in the plant can initiate a data change request with this process. RT&C creates a temporary revision of each data record flagged as affected and allows this temporary change to be prepared, reviewed and approved on-line. When the design change is installed in the plant, the approved temporary revision is electronically issued into the EWCS equipment database.

Controlled Documents (CD)

CD is used as the controlled index to important plant documents including drawings, calculations, procedures, and vendor information. The search features of CD are used by engineers and others to find and retrieve (from central files or through on-line viewing for some types of documents) these documents.

Equipment Database

The Equipment Database in EWCS is a common database used by engineering, maintenance and operations at each site. Users can search this database for equipment data such as safety classification, ASME code class, or electrical class. This data feeds into the on-line maintenance work requests and out-of-service requests to control quality requirements. Engineering controls critical equipment data in this database using RT&C. Multiple databases are being migrated into this database to provide access to data for:

- Master Equipment List/ Quality List Data
- Valve Data
- Instrument Data
- Fuse Data

The Approved Model List is also an available feature of this database which can be used to effectively communicate evaluated alternate replacement components for a given application to maintenance. The Bill of Material feature is beginning to be used to provide detailed parts list for equipment in the system to greatly facilitate maintenance activities.

CHECKS AND BALANCES

When a document is identified as affected by the change and is placed on the ADL, application of the Engineering Design Change Module (EDCM) searches the document database for any other open change against the document and immediately notifies the user if found. This feature is also in place for equipment records placed on the AEL.

Revision Tracking and Control (RT&C) also notifies all users of the EWCS equipment database when pending changes exist against the data they are viewing.

Like RT&C, Controlled Documents (CD) readily identifies to the user when outstanding changes exist against the current revision of a document. When a document has been checked out for use in the field, CD automatically notifies the user when a new revision is issued.

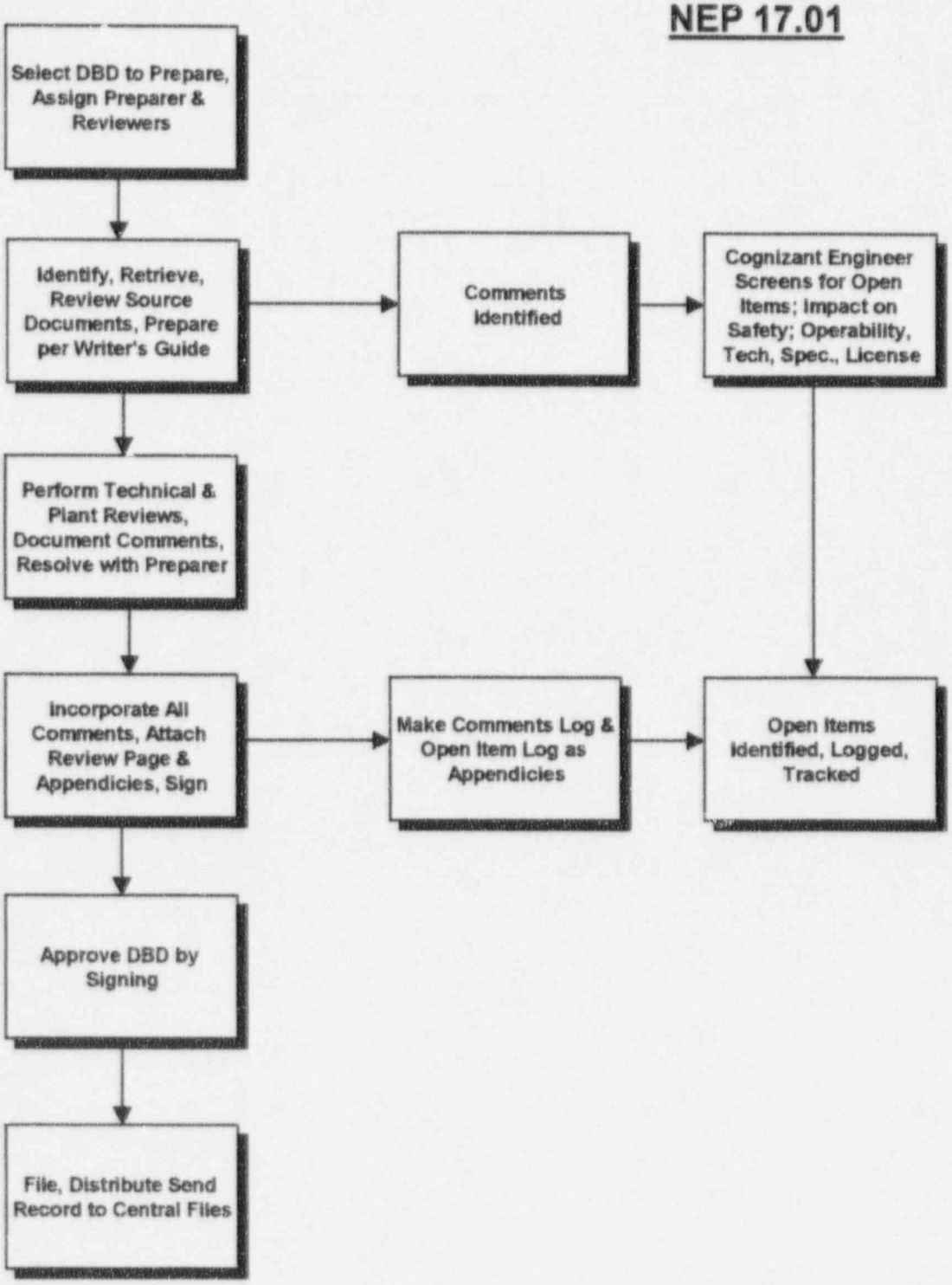
RECENT/PLANNED IMPROVEMENTS

Various databases from AE and ComEd records are being migrated into the Equipment Database in order to provide access to data associated with equipment lists, valve lists, instrument data and fuse data.

In addition, the Bill of Material feature of the Equipment Database is beginning to be used to provide detailed parts lists for equipment. This is expected to improve the consistency and significantly decrease the level of effort required to generate a Bill of Material.

Flowchart 16
DBD Development Process
NEP 17.01

DBD DEVELOPMENT PROCESS



DBD Development Process

NEP 17.01

PURPOSE

The Design Basis Document, DBD, development process is controlled by a Writer's Guide, which provides guidance for consistent format and content. The process includes identifying original plant design basis, incorporating changes resulting from modifications, reviewing existing design information, and resolving conflicts between documents.

PROCESS DESCRIPTION

Engineers from the NSSS suppliers and Balance of Plant AEs were utilized in the development of the current DBDs. The NSSS writers access their internal sources to identify the references used to support the original design. The AE writers access AE project files and ComEd databases. In addition, they review all modifications to identify any impact on the design basis.

Reviews are performed by ComEd organizations and other AEs that were involved in the design and operation of the station. These groups include Site Engineering, System Engineering, Corporate Engineering, Nuclear Fuel Services, Mechanical & Structural Design, Electrical/Instrumentation & Control Design, and the site Training Departments. This provides a check to ensure the latest design information is identified.

When the review of a draft DBD is complete, comments are compiled and a meeting is held between the NSSS writers, AE writers, the ComEd Engineers, and others that had significant technical input. Comments are discussed to identify discrepancies, assess their significance and determine a resolution. In some cases, where original studies or calculations are unavailable, system and component specifications as well as process flow diagrams are utilized to establish the original design basis. Where supporting calculations for modifications are incomplete, an open item is generated, evaluated for significance, and prioritized for resolution. References used in the DBDs to support the design basis are indexed and referenced in the DBD. When all comments have been addressed and the remaining open items logged and tracked, the DBD is issued.

To maintain the DBDs, a process is in place to ensure that any design changes are reviewed to determine their impact on the DBD. This process is addressed on Flowchart 10, DBD Update Process.

CHECKS AND BALANCES

Writers of DBD's are trained to recognize and report discrepancies during the writing process. DBD comments submitted by writers and reviewers are screened by the cognizant ComEd engineer to determine significance. Comments are either resolved and incorporated into the DBD or handled as discrepancies and prioritized for resolution. Evaluations to determine disposition of discrepancies are performed by the Cognizant Engineer.

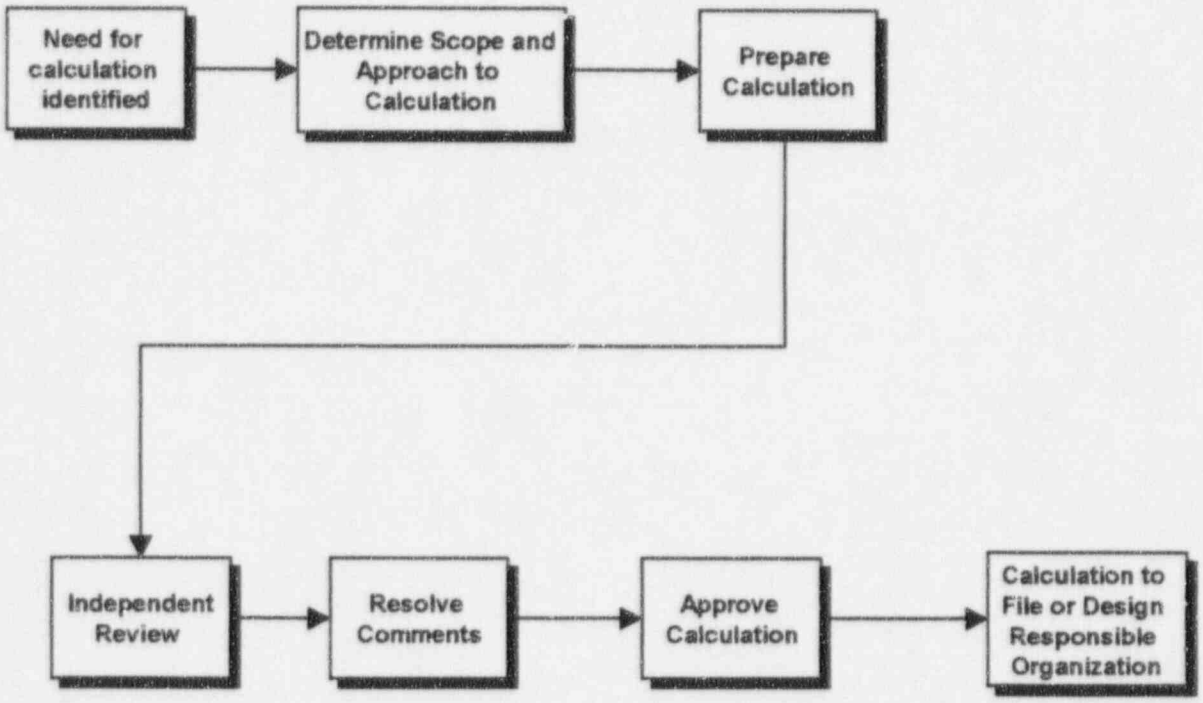
Cognizant DBD Engineers are responsible to track and resolve Open Items listed against their DBD. When appropriate actions are completed, the resolution is documented, any necessary DBD changes initiated, and the Open Item closed.

RECENT / PLANNED IMPROVEMENTS

Several process improvements have been made to the DBD program. Some are the result of assessment recommendations while others reflect lessons learned from experience. In May 1994 a detailed assessment effort resulted in the issuance of the Design Information Review Team Project Report. This report recommended the DBD Program be coordinated more closely with the sites to better meet their needs, generate key missing data, and make licensing and design bases documentation more available to the users. As a result of these recommendations, several DBD content and format changes were incorporated. In addition, the production of several topical DBD's was initiated.

The DBD Development activity is planned to continue through 1999. Enhancements and improvements to the DBD Development Process are expected as part of the overall ComEd response to the commitments outlined in T.J. Maiman's November 12, 1996 letter to A. Bill Beach.

Flowchart 17
Calculation Process
NEP-12-02



Calculation Process

NEP-12-02

PURPOSE

This process describes the preparation, review, and approval requirements for calculations that support Engineering Design and Analysis.

PROCESS DESCRIPTION

The scope and approach to the calculation shall be established and applied.

Preparers are responsible for compiling the information and preparing the calculation in a prescribed manner for the stated purpose. Preparers shall possess discipline qualifications related to the subject matter or a specialization in the area through work experience, education, training, etc. During preparation, the Preparer shall:

Be aware of documents related to the calculation such as,

Project files	Drawings
Meeting notes	Codes
Design criteria	Standards
Applicable previous calculations	Studies
System descriptions	Commitments to Regulatory Agencies

Adequately document Engineering Judgment, if applicable, to permit Reviewer to verify logic.

Once the calculation is completed, the calculation may be checked prior to being submitted for an independent review.

After all comments generated through the independent review have been resolved, the calculation is approved and issued.

CHECKS AND BALANCES

The Supervisor/Approver may check the calculation prior to formal review for:

Format	Attributes
Completeness	Reasonableness of results
Technical adequacy	

An "Independent Review" of calculations is performed by a qualified individual, using detailed guidance, assigned by the Supervisor based on training, experience, and level of skill. The

Reviewer shall have had no influence on approach utilized in the design development. The Reviewer is responsible to ensure the calculation's:

Completeness	Meets applicable codes
Technical adequacy	Meets applicable standards
Accuracy	Meets quality requirements
Appropriateness for stated purpose	Meets licensing commitments
Appropriateness of assumptions	Reasonableness of output data

Calculations are reviewed by one or more of the following methods:

Detailed Design Review Method

Review calculations against design input documents to verify:

Conformance with specified configurations

Dimensions

Materials

Correctness of input parameters

Alternate Calculation Method

After ensuring that assumptions are appropriate and mathematics, input data or other calculation methods are correct, a simplified or approximate method of calculation is performed.

Qualification Testing Method

Verifying the adequacy of the calculation via a test program which demonstrates adequate performance under the most adverse operating conditions.

Review of Repetitive Calculations

Review previously approved calculations in terms of purpose, methodology, assumptions, and design input. Verify that any differences will not affect the comparison and that the conclusions are consistent.

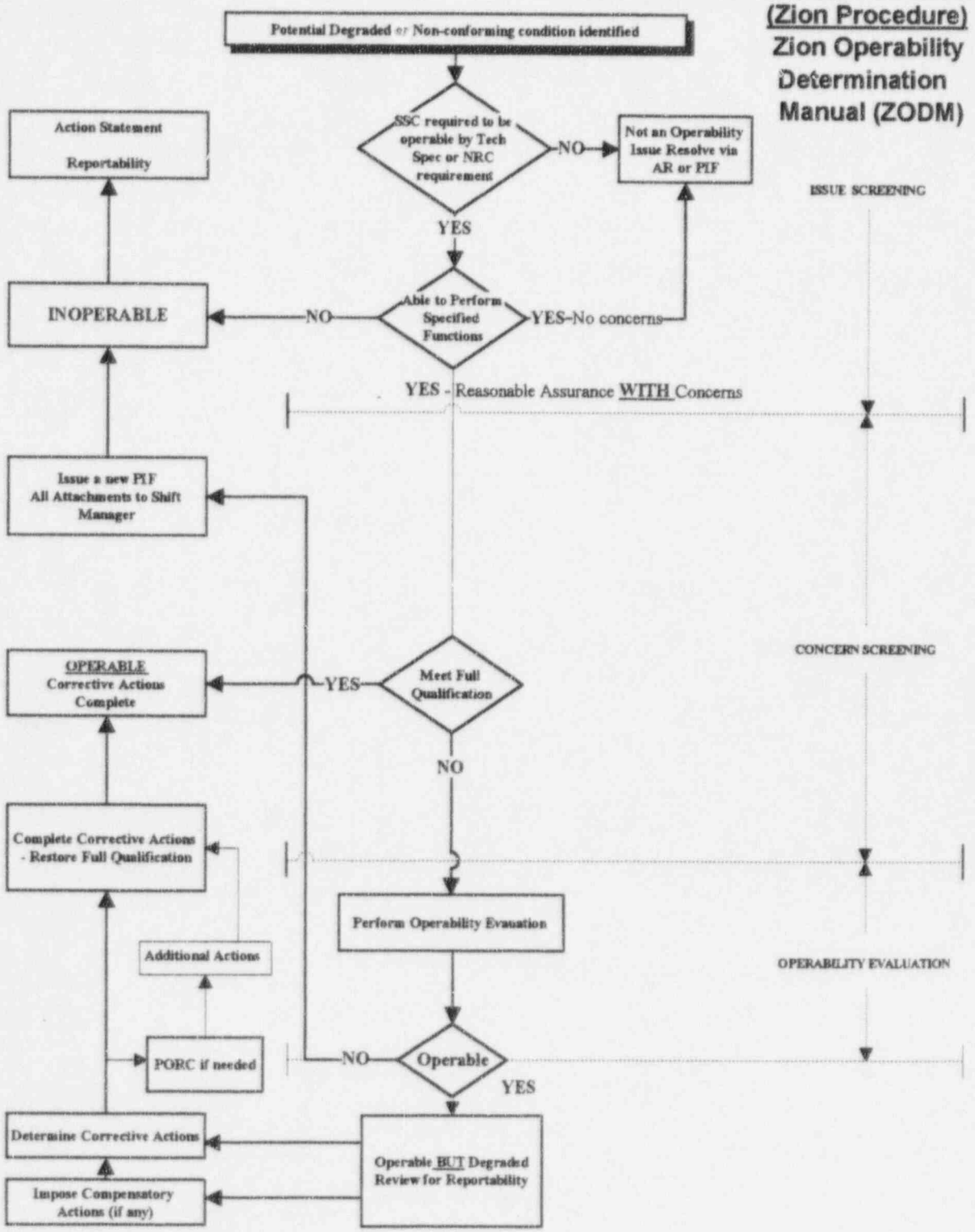
Calculations are approved by the Supervisor or an individual designated by the Supervisor based on their experience. The Approver is responsible for the overall quality of the calculation.

RECENT/PLANNED IMPROVEMENTS

Critical calculations are an important part of maintaining the Design Bases. As stated in the November 12, 1996 letter from T.J. Maiman to A. Bill Beach, ComEd will define the set of calculations that are critical to maintaining design control and reconstitute them when they do not exist. Until this long term program is completed, critical calculations will validated or reconstituted when needed to support ongoing operations or new modifications.

Flowchart 18
Operability Determination Process
(Zion Procedure)

Zion Operability Determination Manual (ZODM)



Operability Determination Process

Zion Procedure - Zion Operability Determination Manual (ZODM)

PURPOSE

Operability determinations are performed when the capability of a system, structure, or component (SSC) to perform its specified function(s) as required by the Technical Specifications or UFSAR is questioned. The Zion Operability Determination Manual (ZODM) has been prepared in accordance with guidance provided in NRC Generic Letter 91-18.

PROCESS DESCRIPTION

ISSUE SCREENING

When an operability issue is identified, Operations and Engineering personnel expeditiously perform an issue screening. Completion of the issue screening will determine if the SSC is:

- Operable with no concerns.
- Inoperable, review for reportability.
- Operable with potential concerns. This determination will require a Concern Screening to be performed by Engineering.

CONCERN SCREENING

Concern Screenings are performed by knowledgeable qualified Engineers to determine whether an operability concern exists. Screenings are performed using detailed guidance provided by the ZODM. Completion of the concern screening will determine:

- The safety significance of the degraded or non-conforming condition and identify the time requirements for performing the operability assessment.
- The actions required to prove operability.

OPERABILITY EVALUATION

Operability evaluations are performed by knowledgeable qualified Engineers using detailed guidance of the ZODM, the DBDs, and/or other design documents.

Completion of the Operability Evaluation will:

- Verify that the SSC can perform its specified safety function(s) in its current condition.
- Identify compensatory actions required to maintain functionality.
- Identify corrective actions required to restore full qualification.

REVIEWS

The Operability evaluation is reviewed by Engineering and Station Management.

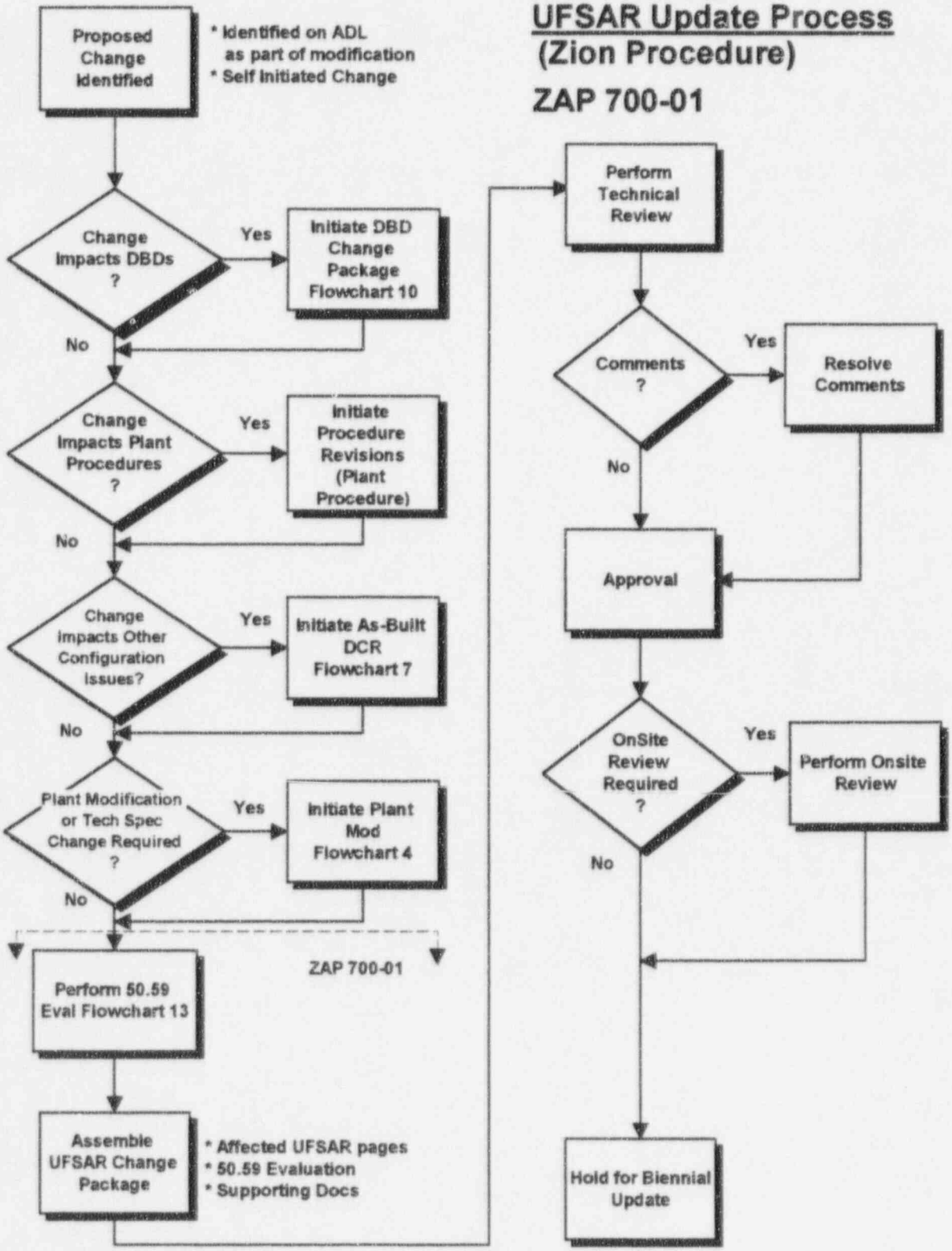
CLOSURE

An operability determination is open as long as the degraded or non-conforming condition exists. The operability can only be "closed" when it can be shown that the SSC has been repaired or modified to meet an acceptable level of qualification or the design basis has been changed via a modification and/or UFSAR changed so that the "as-found" condition now meets full qualification.

CHECKS AND BALANCES

An Operability Evaluation is reviewed by an on-site Engineering Assurance Team. (This review is not shown in the flowchart)

Flowchart 19
UFSAR Update Process
(Zion Procedure)
ZAP 700-01



UFSAR Update Review Process

Zion Procedure - ZAP 700-01

PURPOSE

Changes made to the facility, equipment, analysis, procedures, programs, or organizations which change the description included in the UFSAR, require a UFSAR Change to be initiated. The impact of UFSAR changes to the station Design Basis is controlled through detailed preparation and review processes described below.

PROCESS DESCRIPTION

Changes to the UFSAR can result from the design change process (where they are identified in the ADL), they can be self-generated as part of a general UFSAR update program, or they can be generated through UFSAR reviews associated with the normal work process as a result of regulatory assessments or self-assessments. A UFSAR change originating as part of a design change can use most of the document review processes of the design change for its review. A change originating by some other process as indicated above needs to have its review process as stand alone documents supporting the UFSAR change. The process addressed here describes the various reviews and documents required for a UFSAR change being originated from any source.

CHANGE PREPARATION

The initiator of a UFSAR change researches the change and, depending on the source of the change, needs to determine whether it:

- Impacts the Design Basis Documents.
- Impacts plant procedures.
- Impacts station commitments.
- Impacts system design
- Impacts administratively controlled documentation.
- Impacts the Technical Specifications.

10 CFR 50.59 SAFETY EVALUATION

A 10 CFR 50.59 Safety Evaluation is performed to determine if the UFSAR Change could involve an Unreviewed Safety Question or a change to the Technical Specifications.

A 10 CFR 50.59 Screening can be performed and reviewed by individuals meeting the qualification requirements of ANSI N18.1-1971, Standard for Selection and Training of Nuclear Power Plant Personnel.

TECHNICAL REVIEW

UFSAR Changes which are determined to be "Technical Changes" receive a Technical Review to verify that the proposed information is technically correct. Technical Reviews are performed by individuals knowledgeable in the subject matter.

If a procedure change is associated with the UFSAR change, a member of the cognizant department for which the procedure is intended must sign as one of the Technical Reviewers.

The Zion Technical Specifications require that Technical Reviewers meet the applicable experience requirements of Sections 4.2 and 4.4 of ANSI N18.1-1971, Standard for Selection and Training of Nuclear Power Plant Personnel.

Technical Changes include:

Procedure changes
Changes to Controlled programs, e.g., ISI/IST, EQ
NRC Correspondence, e.g., SERs, Bulletins, Generic Letters
Effects of tests or experiments not currently described in the UFSAR
Technical Specification changes

Onsite Review

UFSAR changes receive a critical and thorough Onsite Review. Onsite Reviews are performed by at least two individuals who collectively possess background and qualification in the subject matter.

The Zion Technical Specifications require that Onsite Review personnel meet the applicable experience requirements of Sections 4.2 and 4.4 of ANSI N18.1-1971, Standard for Selection and Training of Nuclear Power Plant Personnel.

CHECKS AND BALANCES

The safety evaluation performed at Zion Station for UFSAR changes provides an important checkpoint in the process to ensure regulatory compliance and maintain design control.

In addition, UFSAR changes are reviewed and approved by the cognizant Engineering Supervisor. This provides an important administrative and technical checkpoint in the process.

The On-Site Review also provides an important final checkpoint in the process.

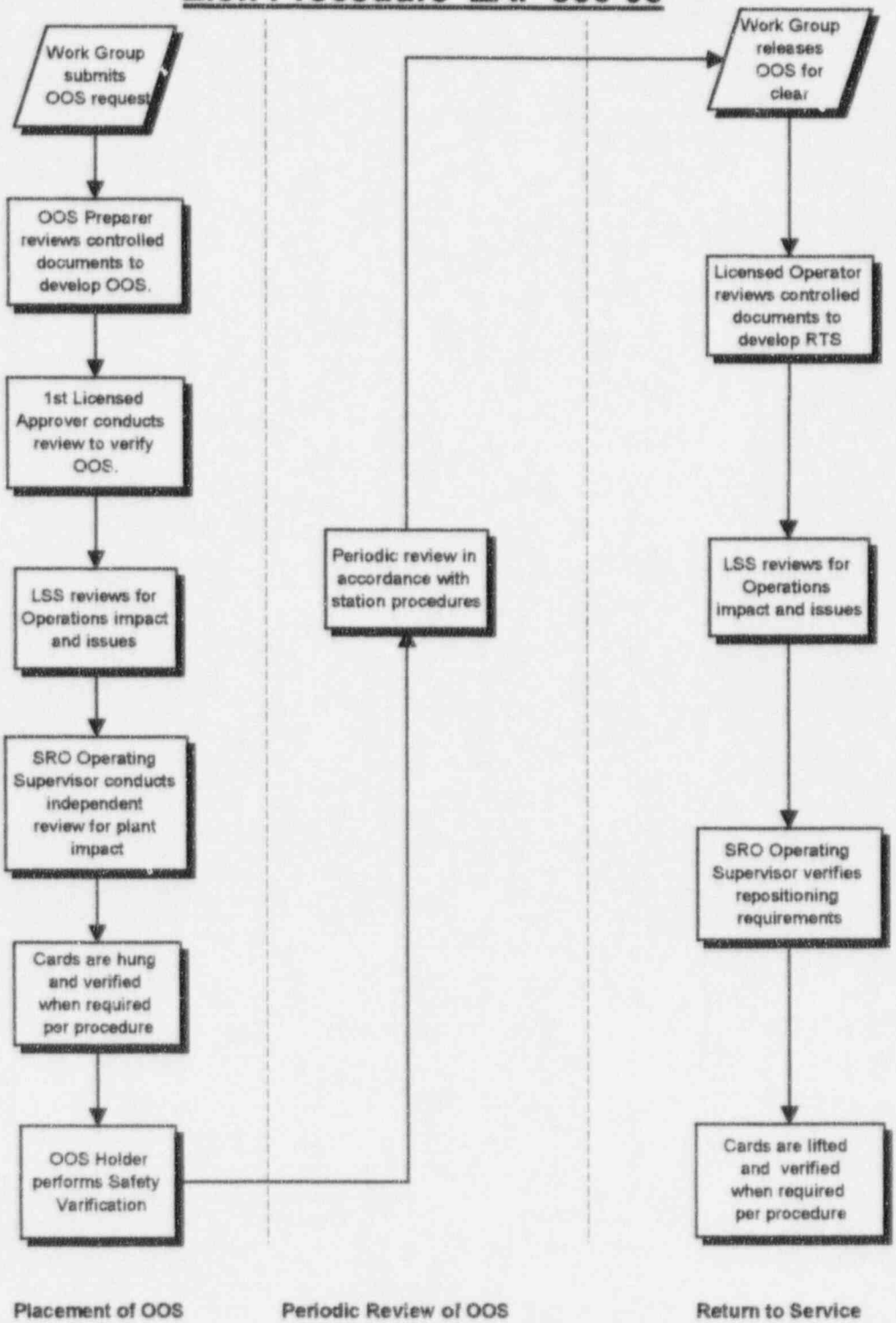
RECENT/PLANNED IMPROVEMENTS

Zion Station recently undertook a UFSAR Update Program. This program utilized outside resources and required almost two years to complete.

ComEd formed a UFSAR Process Improvement Team with members from Zion Station, each of the other ComEd stations, and the Corporate office. This team is examining how UFSAR changes are documented and will provide recommendations for UFSAR reviews. It is also pursuing the development of a standard process for all sites that will better ensure that plant changes are appropriately reflected in the UFSAR.

In addition, as stated in the November 12, 1996 letter from T.J. Maiman to A. Bill Beach, and as a result of recent inspections and events at Zion and LaSalle, ComEd self initiated a validation of UFSAR information for a minimum of two systems against the operating and surveillance procedures. The results of this validation have caused ComEd to evaluate an expanded review program which will be discussed in separate correspondence.

Flowchart 20
Out of Service/Return to Service Process
Zion Procedure ZAP 300-06



Out Of Service/Return To Service Process

Zion Procedure - ZAP 300-06

PURPOSE

This process provides a controlled means of removing and returning equipment to service.

PROCESS DESCRIPTION

The following is an outline of the equipment Out-Of-Service (OOS) and Return to Service (RTS) process. It is controlled via station procedures.

PLACEMENT OF OOS

Any station personnel may initiate an OOS Request to perform work safely on station equipment or to otherwise maintain and control abnormal configurations. This process is managed through ComEd's Electronic Work Control System (EWCS).

1. Work Groups requesting the OOS are responsible to sufficiently define the scope of the work to allow the Operations Department to develop an adequate OOS.
2. Work Planning and Scheduling includes the Operating Department input for Technical Specification (Tech Spec), Appendix R, and risk assessment in planning an OOS.
3. Controlled documents and drawings are used to ensure accuracy of prepared OOS. A licensed operator independently verifies the OOS as correct.
4. The OOS is reviewed by a Licensed Shift Supervisor (LSS) to identify Tech Spec and other issues.
5. An SRO Operating Supervisor conducts an independent review and weighs the impact of the OOS on the Unit.
6. Both licensed and non-licensed operators may place OOS cards. Cards are placed and verified when applicable per procedure.
7. The OOS Holder is responsible to verify the OOS has been correctly placed.

PERIODIC REVIEW OF OOS

While in place, OOSs are subjected to periodic reviews for required continuation in accordance with station procedural requirements.

RETURN TO SERVICE

When work is completed, a Release For Clear initiates removal of the OOS.

1. A licensed operator reviews controlled documents and drawings to prepare the RTS and determine repositioning requirements for equipment.
2. An LSS verifies the RTS is correct and reviews for potential Tech Spec issues.
3. RTS is verified by an SRO Operating Supervisor to ensure Tech Spec issues have been identified and that equipment repositioning requirements are appropriate.
4. Equipment is repositioned and OOS cards are removed with verification when applicable per procedure.

CHECKS AND BALANCES

Independent verification is used throughout the OOS program. There are multiple prepares/reviewers to independently review controlled documents and drawings to satisfy themselves that the points of isolation and special instructions are correct and that Tech Spec and other operation impact and issues are considered. When equipment is positioned and cards are placed during OOS or RTS, verification is performed when applicable per procedure. Review by an SRO Operating Supervisor considers potential impacts of the OOS or RTS on the current plant configuration. The Work Group Supervisor is responsible to ensure that the OOS cards are properly placed to ensure protection of the equipment as well as personnel safety. The periodic review of OOS ensures that OOS are still required and equipment is maintained in the correct OOS position.

RECENT/PLANNED IMPROVEMENTS

ComEd has initiated a corporate-wide standardization of the OOS process. Zion Station is participating in this effort. The new process is being designed to eliminate administrative weaknesses common to all sites, and is enhancing the Electronic OOS Program.

Appendix III - Nuclear Fuel Services' Design Processes

The Nuclear Fuel Services (NFS) Department is the major ComEd Corporate Engineering organization providing production services to the ComEd nuclear stations. In the past, its functions were performed by a separate service organization that was not part of corporate engineering and was under separate management. Consequently, when NFS was merged into the Nuclear Engineering Services Department under the direction of the Engineering Vice President, it already had unique processes and procedures. This Appendix addresses those unique NFS processes that impact design bases and configuration control.

In addition, in recent years, NFS has had an increasingly important role in establishing and maintaining the design bases. New reactor fuel designs, new fuel vendors, changes to the core configuration, changes to core components and changes to the refueling cycles can impact the thermal-hydraulic and transient analyses that form the bases of the safety analyses and evaluations. These important roles are discussed in this Appendix.

Organization and Responsibilities:

The NFS Department has lead responsibility for Core Reload Design and other reactor core components for all six nuclear stations. The NFS Chief Nuclear Engineer and the NFS Supervisors plan, direct and monitor all activities related to Core Reload Design. The NFS Chief Nuclear Engineer reports directly to the Engineering Vice President. Reporting to the NFS Chief Nuclear Engineer are Supervisors for the following areas (PWR and BWR): Support Services, Nuclear Design, and Safety Analysis.

The PWR and BWR Support Services Supervisors administer the technical projects involving the fuel, reactor core and core components in support of the Core Reload Design of the reactors. The PWR and BWR Nuclear Design Supervisors administer activities related to reactor neutronic analyses which are required for the Core Reload Design. The PWR and BWR Safety Analysis Supervisors administer the activities related to thermal-hydraulic and transient analysis for the reload safety evaluations of each of the operating nuclear reactors.

A Reload Licensing Engineer (RLE) provides oversight and input as needed for the licensing aspects of the reload process. A Fuel Reliability Engineer (FRE) provides oversight and input as needed in the area of fuel reliability. A FRE monitors fuel performance and provides recommendations to the stations on activities such as fuel inspections and reconstitution. A FRE also reviews significant changes to fuel designs and manufacturing processes prior to their implementation. Both, the RLE(s) and FRE(s) report directly to the Chief Nuclear Engineer.

The Site Vice President and Senior Station Management are responsible for providing oversight review and concurrence with the reactor core design. This includes significant changes in unit operation philosophy (such as 24 month cycles) and fuel design changes. Additionally, they supply corporate and station goals to be used in the design of the reload (such as the cycle startup/shutdown dates and anticipated operating capacity factor).

The Station Reactor Engineer administers the on-site Core Reload Design activities related to design input, fuel and component handling, core loading, startup testing and operations support. The Reactor Engineer takes functional direction from the NFS Chief Nuclear Engineer in matters related to Core Reload Design. The Site Engineering Manager is responsible for engineering activities at the station. Site Engineering provides input to the Core Reload Design process by identifying plant modifications or changes which may affect the Core Reload Design.

Onsite Review is responsible for performing a review of the Core Reload Design 50.59 package and/or any license amendments produced in the Core Reload Design process. Offsite Review is responsible for fulfilling the Offsite Review and Investigative Function, including the review of changes to procedures, equipment or systems as described in the Safety Analysis Report.

The Fuel Vendors are responsible for the mechanical design and fabrication of the fuel assemblies, LOCA Analysis of record and maintenance of the Core Reload Design capabilities required by the Fuel Contract and Vendor Interaction Procedures or Guidelines. Fuel Vendors must maintain approved Quality Assurance programs for their design work, which may include some or all of the nuclear design and safety analysis scope if requested.

Core Reload Design Control Process (Process 1):

Note: For the purposes of this discussion, the term "Fuel Vendor" is applied to the organization responsible for the fabrication of the fuel and delegated to perform the required core design and licensing analyses. ComEd currently performs the core design and is in the process of licensing the capability for performing the cycle specific transient analyses.

The planned completion date of the NFS Reload Design Safety Evaluation (including UFSAR changes and COLR) is dependent on whether a change to the Technical Specifications is required and, if so, its complexity. Requests for Technical Specification Amendments are made as early as practical with the objective of providing sufficient lead time for NRC review and approval.

Normally, the preliminary core design, including fuel bundle design, the goals for the operating cycle performance and the Reload Licensing Schedule are reviewed with Senior Station Management. This review permits Senior Station Management to participate in the review and approval of the reactor core design including significant changes in unit operation philosophy (such as 24 month cycles) and fuel design and/or core component changes. This review meeting is in the process of being enhanced as a result of recommendations from a recent industry (INPO) managers conference.

The Station Reactor Engineer, NFS Support Services and Safety Analysis Cognizant Engineers coordinate and review the transient and LOCA analyses parameters.

The Reload Design Initialization (RDI) process sets the scope and ground rules for the reload design. The RDI process is in two parts:

a) The RDI process identifies plant changes such as modifications, Technical Specification amendments and setpoint changes which could affect the design or schedule. The RDI also identifies fuel design changes or first-of-a-kind applications.

b) The RDI process also determines how the proposed reload design would affect the plant. The RDI process identifies any supporting activities which must occur for the reload design. Supporting activities include setpoint changes, license amendments, training, procedure changes, special tests and others. The RDI process tracks each of these changes to completion or resolution.

The assumptions and conditions identified in the RDI process are applied in the Core Reload Design process. The Reload Design Safety Evaluation (10CFR50.59 for the reload design) confirms that these inputs do not create an unreviewed safety question. The assumptions and conditions are again reviewed prior to criticality in the Reload Design Finalization (RDF) process (discussed below).

When the draft licensing documents are received from the "Fuel Vendor," the Station Reactor Engineer and the Support, Safety Analysis and Nuclear Design Cognizant Engineers perform a detailed review of the draft reload licensing documents. The first action taken when reviewing the results of the licensing analyses is to evaluate the trends by comparing the results to previous reload analyses.

NFS completes a separate evaluation for any new fuel or core component designs under the Nuclear Fuel and Component Design and Fabrication Control Process (see below). This evaluation typically is referenced by the NFS Reload Design Safety Evaluation.

The Nuclear Design Engineer verifies that the final Fuel Assembly Design Package and Nuclear Design Report properly reflects the fuel assembly neutronic designs established for the reload.

Once the reload licensing documents are finalized, they are transmitted to the station as a Nuclear Design Information Transmittal (NDIT).

The Cognizant Support Engineer, with the support of other review team members, develops the NFS Reload Design Safety Evaluation, including related documents such as UFSAR page mark-ups. The objective of the Safety Evaluation is to review and document the essential aspects of the reload, including fuel design or component changes, with sufficient detail to ensure no unreviewed safety questions exist in accordance with 10CFR50.59. An Independent Review of this package by another qualified Engineer is conducted in accordance with the Controlled Work process (see below).

The Reload Design Finalization (RDF) process is performed to confirm that the assumptions used for the design, analysis, and supporting activities are still appropriate considering the actual conditions and that the required supporting activities (identified during the RDI) are completed or will be completed as required.

A Station Onsite Review and Offsite Review are conducted on the Core Reload Design 50.59 package.

Upon completion of the core loading, the core configuration is verified by the performance of an as-loaded fuel assembly serial number surveillance. Typically, an underwater camera is used and the results are video taped. The Reload Licensing Loading Pattern, used for all licensing evaluations, is the acceptance criteria basis for this review. This surveillance is witnessed by a member of the NFS staff using an independently obtained copy of the Reload Licensing Loading Pattern.

During the latter stages of the refuel outage, the station performs an Onsite Review of the outage activities. A subsection of this review is a verification that the assumptions used for the design, analysis, and supporting activities are still appropriate considering the actual conditions and that the required supporting activities (identified during the RDI) are completed or will be completed as required.

Upon completion of the refuel outage. Various startup tests are performed in accordance with the station's Technical Specifications or other administrative controls. Additionally, tests are performed as required by the Core Reload Design process. The results of these tests are evaluated to provide assurance that the design is valid by comparing test results to design values for key parameters.

Nuclear Fuel and Component Design and Fabrication Control Process (Process 2):

The Fuel and Component Design and Fabrication Control Process involves the technical review of all significant changes to the design of the fuel assembly. This design review covers, as a minimum, the potential impact of the change on plant safety and transients, interfaces, reliability, and performance. A Fuel Reliability Engineer (FRE) has the primary responsibility for implementation of this process. Other areas of NFS have the responsibility to provide personnel to assist in or lead the review of nuclear fuel or core component design changes as agreed upon between the NFS Chief Nuclear Engineer, NFS Supervisors, and a FRE.

Uranium enrichment and burnable absorber content vary from cycle to cycle to accommodate cycle energy requirements. These parameters are specified by Nuclear Design and may be included under this process if their values are outside previously utilized ranges and there is a possible effect on safety or transient analysis, fuel rod performance, etc.

The significance of the change is determined by a FRE or designee by reviewing the drawing or specification changes provided by the vendor. Any questions or comments about the design changes are discussed with vendor personnel.

For Significant Design Changes, a more rigorous review process is required, as follows:

A Design Review Team is formed consisting of NFS personnel, appropriate station personnel and, when needed, appropriate technical experts from outside NFS. Documentation of the review is maintained including any notes or minutes from meetings and telecommunications with vendor personnel or expert consultants on the design change.

The Design Review Team thoroughly reviews the design change and all documentation provided by the vendor to support the change. In addition, the Design Review Team requests additional information from the vendor which it believes would assist in the review. Information such as design analyses, design bases, prototype testing, Lead Test Assembly (LTA) experience, the vendor's qualification of the design change and fuel fabrication process changes associated with the design change are typically requested to assist in the evaluation.

The following conditions typically require NRC approval prior to implementation of a fuel or component design change:

- Any hardware change that results in a design that is different than that described in the Technical Specifications (e.g. different clad material, fuel or absorber material).

- Any design change that results in an unreviewed safety question per the criteria of 10CFR50.59.

- Any hardware change that is not bounded by an applicable ComEd or Vendor topical report (e.g. a spacer grid design change that requires a new Departure from Nuclear Boiling (DNB) correlation).

After resolution of all technical issues related to the design change, the Design Review Team determines if the design change is technically acceptable for application at ComEd plants. In some cases the Design Review Team will also determine if the design change provides appropriate financial benefit to ComEd.

If the design change is acceptable to the Design Review Team, station concurrence with the change is obtained.

The Design Review Team prepares a report of their review of the design change. This report details all the technical issues associated with the design change and their resolution. The report is typically signed by all team members. The Design Review Report is considered Controlled Work.

The Design Review Team Leader prepares a memo to the ComEd Buyer for the NFS Chief Nuclear Engineer's signature which accepts or rejects the design change. The memo lists limitations or conditions which the team believes are needed to make the design change acceptable for use in ComEd plants or contains the reasoning for rejection of the design change, if necessary.

The FRE follows up to assure that all limitations and conditions agreed to between the vendor and the Design Review Team are followed both in the design and manufacture as well as the handling and use of the fuel or component at the plant.

Nuclear Fuel Services Controlled Work Process (Process 3):

Controlled Work is a calculation or analysis, or formal evaluation, review, response or recommendation, or change thereto, which is:

- Important to safety in the design or operation of a fuel rod, fuel assembly, or reactor core, or in the design or operation of a plant system, subsystem or component; or,
- Used to generate information which will be sent to the NRC in support of ComEd submittals; or,
- Used to support an NFS, Station or other ComEd department Safety Evaluation, Significant Hazards Evaluation, Technical Specification or FSAR change or interpretation thereof; or,
- Used in the generation of Special Nuclear Material accountability information.

All Controlled Work receives an Independent Review by a qualified Engineer.

A Controlled Analysis is any NFS calculation that meets one or more criteria of Controlled Work.

A Routine Controlled Analysis is a Controlled Analysis which is performed according to a procedure for a recurring application.

A Special Controlled Analysis is a Controlled Analysis for which no procedure has been written, or for which a procedure cannot be followed without alteration that affects the intent of the procedure or the margin of safety.

A Routine External Analysis is a standard, recurring analysis performed external to ComEd which meets one or more criteria of Controlled Work and which has been performed in accordance with the external organization's ComEd-approved Quality Assurance program.

A Special External Analysis is a non-routine, infrequently performed, or first of a kind analysis performed external to ComEd which meets one or more of the criteria for Controlled Work.

An Additional Review (AR) is required for all Special External Analyses, after completion of the initial Acceptance Review. For the other types of Controlled Work, the NFS Supervisor shall determine whether an Additional Review (AR) and/or a Special Review Team (SRT) is warranted and shall document this conclusion. Examples of Controlled Work that may require review by a SRT are:

- First-of-a-kind application of a substantially new methodology or design.
- First application of a Special Controlled Analysis or Special External Analysis that is particularly significant, or that has a direct and significant impact on a Technical Specification or that is required for NRC submittal.
- Special Analyses or safety reviews or recommendations that would result in a major change in station operation, Special Nuclear Material accountability, or reactivity management.

Review of Problem Identification Forms (PIFs)

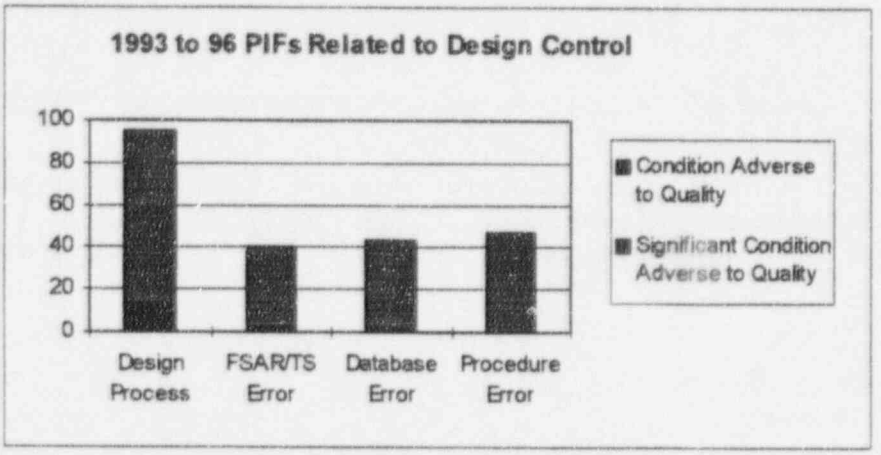
A review was performed of NFS generated PIFs from 1993 (the first year the PIF process was used in NFS) to present (November 8, 1996). As described in Action (d), the PIF process is common to all six nuclear stations and is also used by NFS to identify, document, assess, and correct design bases and other nonconformances. Nearly 50% of the NFS generated PIFs were associated with the reload design process (RDP). A review of each year's PIF log demonstrated that this trend is also prevalent on a yearly basis. Over the three and a half year period, nearly half of the design bases deficiencies were equally distributed in the areas of the licensing bases documents (UFSAR and Technical Specifications), databases (typically computer data files) and procedures. The remaining 50% are associated with the design bases process itself. Approximately 10% of the reload design process PIFs were categorized as significant and received a heightened level of investigation.

The RDP PIFs covered a spectrum of issues; from minor errors caught during the Independent Review process to significant process deficiencies that resulted in notable process enhancements. The age of the deficiencies also ranged widely; from inaccuracies in currently open evaluations to original licensing bases analyses.

Significant design bases process enhancements that resulted from RDP PIF investigations include:

- Created a transient input parameter list.
- Created a reload design initialization/control procedure.
- Developed reload interaction agreement with Fuel Vendor for pertinent fuel rod design information.

- Upgraded procedure for Controlled Work to improve required handling and review of all external documents including those classified as routine design.
- Changed the threshold for writing PIFs to require that any anomalies identified consistent with a "controlled work" review be documented through the PIF process.
- Developed a Quality Software Control Process. The various stages of testing, validation, operation, maintenance and upgrades were defined and a list of approved quality software developed, communicated and maintained.



Summary of Major Audit Findings and Corrective Action

Nuclear Fuel Services (NFS) and the Nuclear Engineering Groups at the stations, as the owners of the Reload Design Process, participate in an aggressive design control audit and technical review program. NFS and the Nuclear Engineering Groups participate in audits of the ComEd nuclear stations, fuel and core component vendors and licensing analyses Architect Engineers (A/Es). For ComEd internal audits, the Site Quality Verification (SQV) department is typically the coordinating organization. For external audits, the Supplier Evaluation Services (SES) department is typically the coordinating organization. Some of the external audits are conducted as a joint audit by a collection of utilities. Audits are undertaken periodically or as a special review as the result of an adverse trend.

Typically, members of NFS and/or the Station Nuclear Engineering Groups participate in internal and external audits as the audit team's Technical Expert(s). ComEd internal audits have included reviews of the reload design process and the Reactivity Management program. External audits have included issues from fuel and nuclear component fabrication (at the manufacturing facility) to licensing analyses. Findings and Recommendations are identified and conveyed to the group being audited. Some of the more significant findings (Level II) are listed as follows:

- Using an unapproved procedure to make changes to controlled documents without making a revision change to the document.

- Reference files used during testing of a revision to the Core Monitoring Software were not completely reviewed.
- The calculation notebook to support the application of Traversing Incore Probe (TIP) machine data substitution methodology was not completed.

The Reload Design Process has also received both internally and externally originated audits. These audits are initiated both periodically as well as when a trend is identified. Over the last few years, the Reload Design Process has been the subject of numerous internal and INPO audits as well as two NRC inspections. Overall, the Reload Design Process has been found by the NRC to be satisfactory. The 1992 inspection[1] found a strength in:

"Communications between the station personnel (PWR) and NFS was a strength and included:

- The weekly conference call with the three Lead Nuclear Engineers from the three PWR stations.
- A single NFS contact for each station contributed to effective and efficient communications.
- Direct access (using the paging system and home telephone numbers) and availability of Technical Staff (NFS) personnel during off-normal hours and weekends."

The 1994 inspection[2] also found the Reload Design Process to be satisfactory:

> "Overall, we found that the conduct of activities related to the development of core reload analysis for the ComEd stations were good. The Corporate Nuclear Fuel Services department was found to be a technically strong, interactive organization, providing good communications and support to the nuclear engineering groups at each of ComEd's nuclear power plants. We were encouraged by the depth and extent of the root cause investigation and corrective actions taken in response to the June, 1994 failure to install hafnium rod inserts event."

However, weaknesses were also identified such as:

> "Most communication for special circumstances and unique issues appear to be verbal"; "Training and qualification was identified as a contributing cause to the reactivity control problem"; and,

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[1] Inspection Reports No. 50-295 / 92012 (DRS); 50-304 / 92012 (DRS); 50-454 / 92010 (DRS); 50-455 / 92010 (DRS); 50-456 / 92010 (DRS); 50-457 / 92010 (DRS), April 27 through May 8, 1992, Routine Inspection of nuclear engineering related activities at both the three PWR plants and at the Nuclear Fuel Services Department.

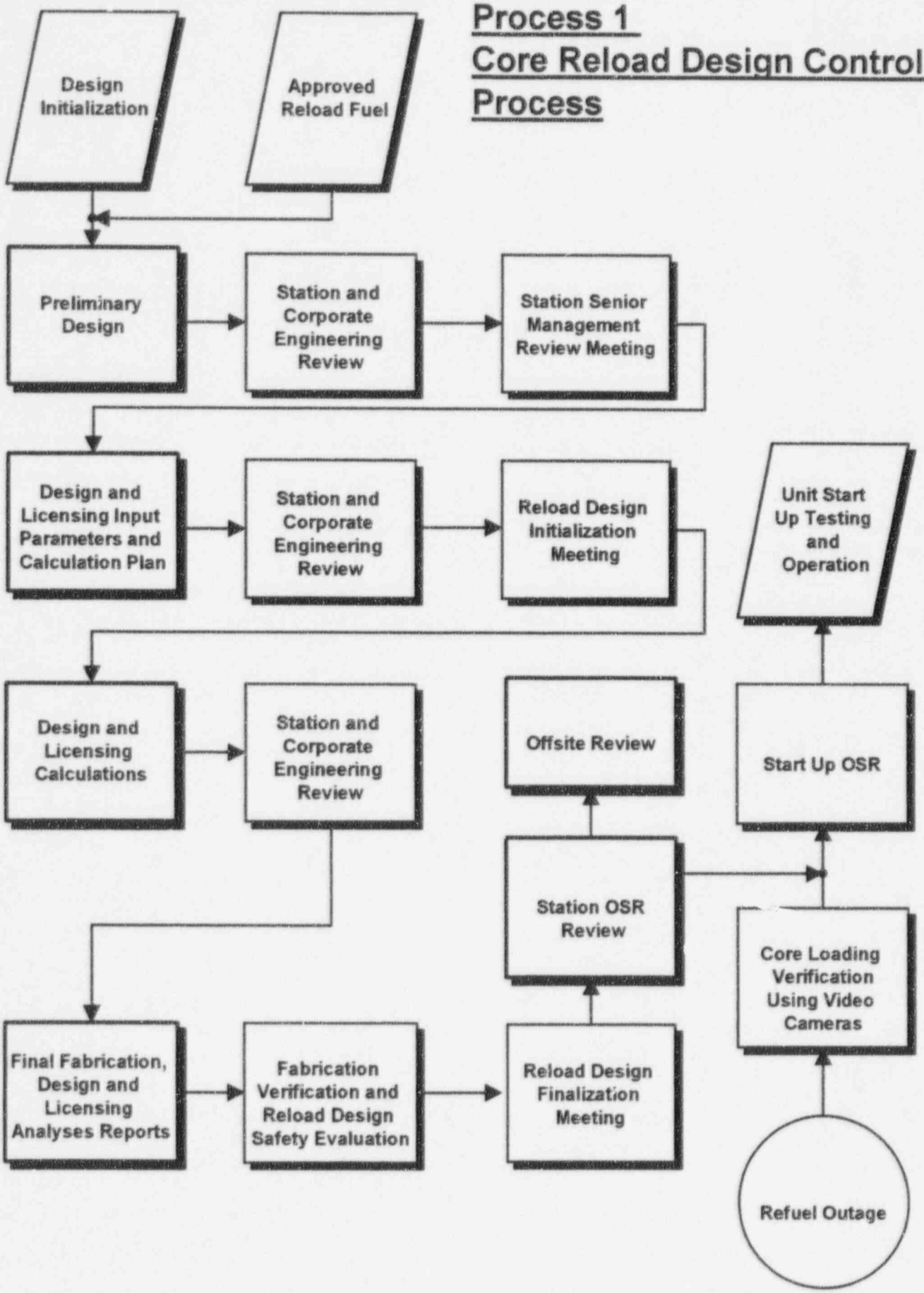
[2] Inspection Reports No. 50-295 / 94022 (DRS); 50-304 / 94022 (DRS), October 17 through October 21, 1994, "Special Inspection of the failure to include Hafnium rod inserts at the Zion Nuclear Power Station and a review of ComEd's Nuclear Fuel Services Organization".

"... deficiencies were identified in the areas of Qualified Nuclear Engineer (QNE) training and self-assessment. The QNE training deficiencies involved a lack of clear ownership of the QNE requirements. Additionally, the self-assessment process was of limited benefit to the NFS organization, primarily because this effort was still in the initial stages of development."

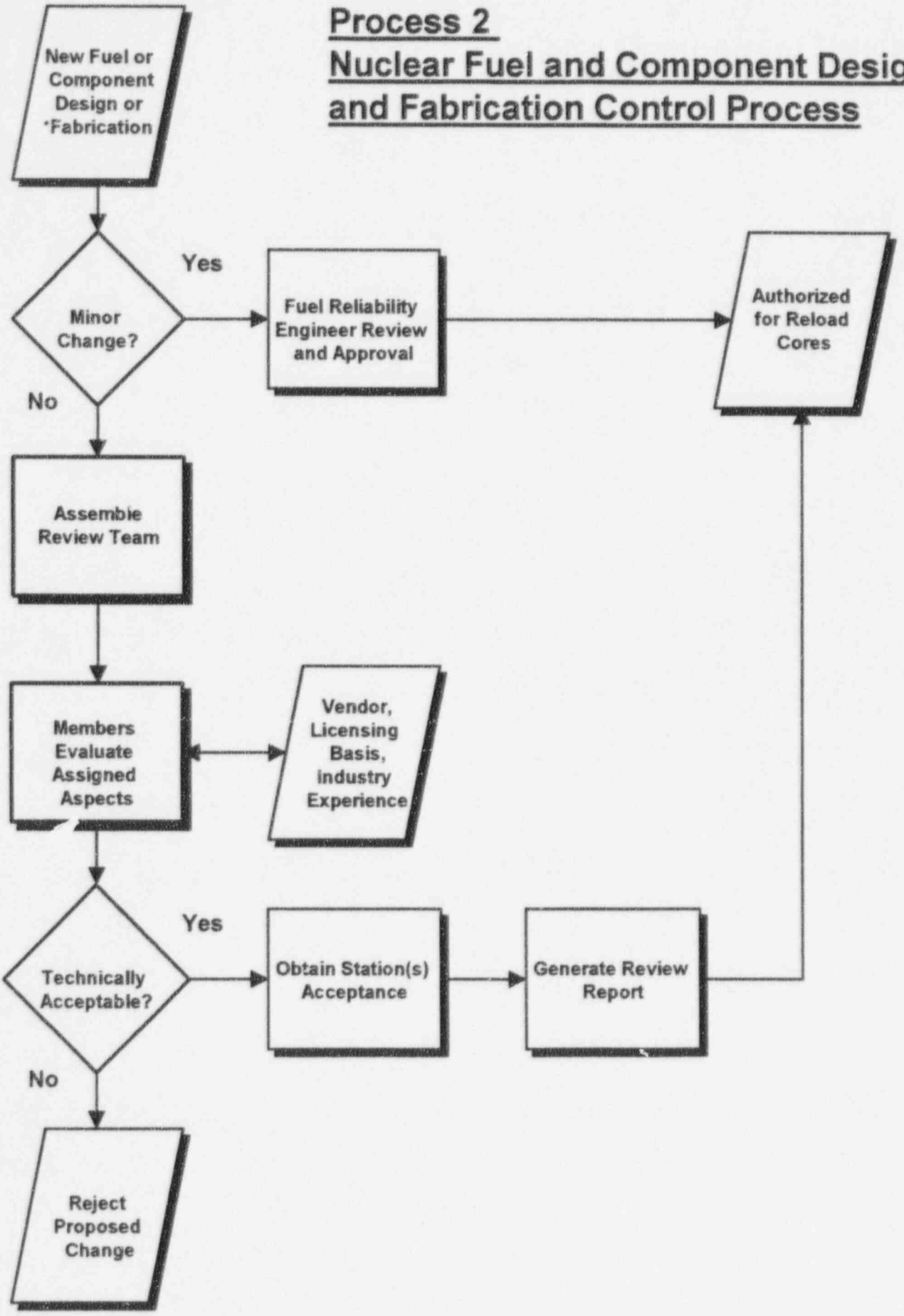
These weaknesses have been and are continuing to be addressed through enhancements to the reload design process and QNE training program.

In addition to corrective actions and process improvements undertaken in response to audits and regulatory findings, NFS is implementing a process improvement identified from recommendations made at an industry managers conference. A review meeting with Senior Station Management is being added to the Core Reload Design Process. This review meeting provides Senior Management oversight review and approval of the core reload design including significant changes in unit operation philosophy and fuel design changes.

Process 1
Core Reload Design Control Process



Process 2
Nuclear Fuel and Component Design and Fabrication Control Process



Process 3
Nuclear Fuel Services
Controlled Work Process