DUKE POWER COMPANY

RESPONSE TO SUPPLEMENT 1 TO NUREG-0737,

EMERGENCY RESPONSE CAPABILITY

FOR

OCONEE NUCLEAR STATION

VOLUME 2

ONS
Revision 3

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4 SAFETY PARAMETER DISPLAY SYSTEM

4.0 INTRODUCTION

This document describes the implementation plans for the installation of Safety Parameter Display Systems at Oconee. The approaches taken by Duke Power Company in providing these systems are consistent with the long-standing practice of utilizing in-house capabilities. This includes the use of technical and operations expertise in formulating the design of the SPDS as well as integrating the SPDS into existing highly reliable and well-developed plant data systems.

The SPDS systems described in the following meets the intent of the guidance documents NUREG-0737, Supplement 1 and was developed considering the guidance of the NUTAC Guidelines for an effective SPDS implementation program, NSAC/39, NUREG-0696, and other related documents.

4.1 IMPLEMENTATION PLAN

4.1.1 GENERAL SCHEDULE CONSIDERATIONS

The Safety Parameter Display System is being developed in an integrated manner with other activities associated with the overall emergency response capabilities being developed in response to NUREG-0737, Supplement 1.

As in the case with other emergency response capabilities activities, the SPDS system will be developed within Duke Power Company. By utilizing this in-house capability, many years of design, operating, and maintenance experience will be incorporated into the SPDS design and implementation.

The SPDS design, development and implementation will be scheduled to take

advantage of knowledge gained from the various elements of the Control Room Review and the development of the symptom oriented emergency procedures.

Further, the design of the SPDS will be an interactive process with input from various disciplines in both the development and testing phases. The validation and verification as well as on-line testing will be performed prior to the final installation of the SPDS to ensure an effective SPDS is provided to the operating crew. Results from V&V, on-line testing, CRR Task Analysis, Human Factors Review, and related activities will be evaluated and incorporated as needed prior to finalizing the SPDS design.

4.1.2 TRAINING

Training will be developed for the operators in their use of the SPDS. This training will be performed in conjunction with the operator training on the new Symptom Oriented Emergency Procedures.

This training will include the SPDS logic and its relationship to the emergency procedures. The panel functions and methods of calling up and interpreting supporting displays will be covered. The verification of SPDS indications using hardwired and other control room indications will be provided. Invalid or indeterminate SPDS indications (due to failed plant inputs) will be identified to the operator where practical. Visual aids in the form of slides representing SPDS and supporting displays will be used.

The SPDS training will be administered by the Training Center located adjacent to the Oconee site. Control Room operators, shift supervisors, and shift technical advisors will receive training on the use of the SPDS. In addition,

appropriate instrument and electrical personnel at the station will receive training on the maintenance of the SPDS and field inputs. Training records will be maintained on those required to receive training.

4.1.2.1 Training Schedule Considerations

It is expected that the SPDS will be fully developed and tested prior to initiating training of operating crews and prior to final installation. Further, since the SPDS will provide the operator with information pertinent to the new symptom oriented emergency procedures, operator training for the SPDS will be performed in conjunction with training on the symptom oriented emergency procedures.

4.1.3 MANAGEMENT

The management of the SPDS project will be under the direction of the Control Room Review Steering Committee. Lead responsibility for the SPDS project was initially designated to be the Manager of Engineering Services of the Steam Production Department. After the initiation of this project, two major reorganizations occurred. This resulted in the Manager of Production Technical Services of the Production Support Department assuming lead responsibility for this project.

In this capacity, the SPDS Project Leader is responsible for the overall coordination and scheduling of the SPDS project. Under his direction, a number of other groups will design, review, and/or implement the SPDS systems.

A complete set of documentation related to the SPDS will be maintained by the

SPDS Project Leader.

Design documents, software codes, system descriptions, V&V documents, and user documentation will be reviewed and approved and controlled consistent with established procedures for these classes of documentation. Revisions to these documents will also be controlled, reviewed and approved prior to use.

4.1.4 ROLE AND MISSION SPECIFICATION

The role and mission of the SPDS is to aid the Control Room Operating Crew in monitoring the status of the critical safety functions. The primary objective of the SPDS is to provide the operating crew with an overview of the safety status of the plant.

The critical safety functions to be monitored have been selected to maintain consistency with the upgraded symptom oriented emergency procedures currently under development. The upgraded emergency procedures are based on the Oconee Emergency Procedure Guidelines, which originate from the Abnormal Transient Operating Guidelines (ATOG) developed by the B&W Owners Group.

A set of six critical safety functions have been specified:

- Subcriticality
- Inadequate Core Cooling
- Heat Sink
- RCS Integrity
- Containment Integrity
- RCS Inventory

4.1.5 LOCATION OF THE SPDS

The SPDS will enable the operator to quickly assess the safety status without taking any manual actions from his normal operating positions. Further, the SPDS will be readily viewable from a wide area in the Control Room to enable shift technical advisors and shift supervisors to readily determine the safety status of each of the critical safety functions. The SPDS displays will also be available to the Technical Support Center personnel. The SPDS will be integrated into the plant control room without adding clutter and confusion. Further, a new and different man-machine interface will be avoided.

4.1.6 SPDS AVAILABILITY

The SPDS will be reliable and readily available to the operator during normal operation and during emergency operating conditions. It is not required during stable shutdown conditions nor during refueling outages.

It is not essential that the SPDS be operational for plant operations personnel to determine the safety status of the plant or to execute any of the symptom oriented emergency procedures since adequate instrumentation, instructions and training will be provided independent of the SPDS.

The plant operating crew will be trained and procedures will be in place to enable them to monitor the critical safety function status both with and without the SPDS. Further, this training and these procedures will require the operating crew to verify SPDS indications using reliable control board indicators prior to taking any corrective actions.

4.1.7 VALIDATION AND VERIFICATION

A component (SPDS) level Validation and Verification Program will be developed considering the guidance contained in the NUTAC Guidelines and NSA/39. The V&V of the SPDS will be performed by the Design Engineering Department providing an independent review since the SPDS design will be developed by the Nuclear Production and Production Support Departments.

Further, a Human Factors Review and a Task Analysis will be performed of the SPDS and supporting displays by the Control Room Review Team to validate the SPDS as part of the total operating system.

4.2 SYSTEM DESCRIPTION

This section describes the design of the Safety Parameter Display System, Human Factors considerations and includes a description of the Operator Aid Computer (OAC) Systems.

4.2.1 HUMAN FACTORS CONSIDERATIONS

The Safety Parameter Display System will be designed with appropriate Human Engineering Factors incorporated.

4.2.1.1 Viewability

The SPDS will be implemented on the Operator Aid Computer System which has CRT's located on each unit's main control board. In this location, these CRT's are readily viewable from all normal operating positions. The six color blocks, one for each critical safety function will be continuously displayed on the bottom of the alarm video. The alarm video is centrally located on the main control board. The dimensions of the color blocks are such that they are

easily viewable from any position within the main control area of the Control Room. Since the color blocks will always be positioned in the same relative locations on the CRT, it will be easy for the operator, STA and shift supervisor to readily determine the status of any of the six critical safety functions.

The supporting displays for the SPDS will be available to the operator on demand on the videos located on the main control board. The man-machine interface used by the operators to call up the supporting displays is the same as he normally uses to call up system graphics, display menus, and other OAC programs. This man-machine interface is thoroughly familiar to the operators through their normal operation of the plant.

4.2.1.2 Information Hierarchy/Highlighting

4.2.1.3 SPDS

The Safety Parameter Display System will consist of logic developed from the symptom oriented emergency procedures. This logic drives the six CSF color blocks.

4.2.1.4 Other Information

The SPDS is described above, other supporting information is provided through a variety of normally available control room tools. Supporting displays will be provided which will allow the operator to call up a display screen which will indicate the status of primary functions which have resulted in an alarmed CSF block. These primary functions are high level in nature such as "Feedwater Not Available", "Reactor Coolant System Pressure High", etc.

Further, an additional level of detail will be available to the operator. He

can determine the plant field inputs which have caused the primary function such as "Emergency Feedwater Pump A Not In Service", "Reactor Coolant Pressure 2500 PSIG", etc.

In addition, the remaining OAC features such as input display lists, trend recording, alarms, etc., will be available for the operator's use as needed.

4.2.1.5 Man-Machine Interfaces

The Operator Aid Computer System Man Machine interfaces have been developed over the past 20 years and takes advantage of the feedback from operators over this period of time. Control panels are conveniently placed on the lower control board below each CRT. Panel functions are designed to minimize the number of key strokes required of the operator consistent with the urgency of his needs.

Response to the operator's commands by the OAC's is nearly instantaneous with displays completed within two seconds.

4.2.2 DESIGN CONTROL

The SPDS logic design is the responsibility of the Nuclear Production Department. This logic will provide the operator with the status of plant systems and equipment important for management of plant transients, as specified in the upgraded emergency procedures. Inputs will be selected to provide the information required to drive this logic.

An independent validation and verification program will be performed by the Design Engineering Department (see Section 4.1.7).

4.2.3 RELIABILITY AND AVAILABILITY

As can be seen on the chart below, availability of the OAC systems at McGuire and Oconee has exceeded 99% when OAC downtime during unit outages is excluded.

Each OAC is fed by a dedicated static inverter which normally receives its power from DC batteries. Upon inverter, DC batteries or charger failure, a static transfer switch provides regulated AC power from two independent sources.

ANNUAL AVERAGE ADJUSTED SYSTEM AVAILABILITY*

	1980	1981	1982	Average Adjusted Availability*
McGuire 1	N/A	99.27%	99.38%	99.3%
Oconee 1	99.20%	99.75%	99.83%	99.6%
Oconee 2	99.82%	99.54%	99.80%	99.7%
Oconee 3	99.43%	99.74%	99.67%	99.6%

* = DOWNTIME DURING GENERATING UNIT OUTAGE NOT INCLUDED

4.2.4 OPERATOR AID COMPUTER SYSTEM

The Operator Aid Computer Systems at Oconee are Model 4020 Honeywell Corporation with 32K CPU memory and a one million word bulk core memory system. Rotating and tape bulk systems are not used due to their relatively slow memory access times and susceptability to mechanical failures.

4.2.4.1 Videos

A compliment of four 17" black and white CRT's are driven by a Data Net 760 Video Display Generator. Three CRT's are located on the main control boards and have the following functions.

- o Alarm Video - Dedicated to displaying plant alarms. Digital inputs are scanned every 400 milliseconds and are alarmed immediately upon detection. Analog values are scanned every 30 seconds and checked for high and/or low alarms as well as rate of change as appropriate.

- o Utility Video - The utility video is also located on the main control board. An alpha/numeric keyboard is provided to enable the operator to select any display or program available in the OAC. Twelve chart recorder pens are operator assignable from the utility and monitor videos. These 12 pens are located on the main control board in four-three pen recorders. Operator can select high and low ranges for any of the inputs available in the OAC.

- o Monitor Video - Same function as utility video above and includes its own keyboard similar to that described above. Panel buttons are also provided to allow the utility and monitor videos to display the contents of the alarm video in case of a failure of the alarm video.

A performance video is located in the Computer Room and serves several different users to avoid interfering with plant operators in the Control Room. It is used for plant records and performance, reactor engineering, programmers console, field input calibrations, etc. All OAC displays, programs and functions are available at this console including the capability to display the contents of

the alarm video.

The performance video also doubles as the Technical Support video and has the same capabilities as the utility and monitor videos thereby making available the SPDS, supporting displays, alarm video information as well as access to all plant inputs to the OAC.

4.2.4.2 Typers and Printers

The following printers/typers are provided. An alarm typer is located in the Control Room which provides a hard copy of all alarms which appear on the alarm video. Also printed are status change messages such as pumps, motors, valves on/off, open/closed, etc.

A utility typer is also provided in the Control Room. This typer allows the operator to print the output of a number of programs as well as any OAC input desired. Generation and plant logs are also typed out automatically each hour. The utility typer doubles as a backup to the alarm typer in case of failure.

A performance typer is located at the performance console in the Computer Room. Also, a high speed line printer is available to type out large volumes of data from the OAC as needed.

4.2.4.3 Floppy Disc Drives

Magnetic floppy disc drives are also provided in the Computer Room for dumping copies of all OAC programs on a weekly basis in case of OAC program loss or damage. This allows the OAC to be restored to the latest version of

system programs rapidly.

4.2.5 INSTALLATION AND TESTING

The SPDS will be thoroughly tested prior to being made available to the operator. This testing will include actual operation of the SPDS logic on the OAC for several weeks during startup, shutdown and normal operation. This testing will be transparent to the operators as the displays are inhibited from operating. However, an alarm summary table will be used to capture SPDS alarm changes as well as SPDS input parameter changes. This testing has been completed on the original version of McGuire's SPDS logic and was very useful in verifying the proper functioning of the SPDS as well as revealing some discrepancies primarily resulting to dynamic plant conditions. The results from these tests will be incorporated into a revision of the SPDS logic.

4.2.6 ENHANCEMENT PLANNING

The Operator Aid Computer Systems presently installed at Oconee will not support graphical presentations on the CRT videos.

Discussions are underway at this time exploring the upgrading of the OAC's as follows:

- o Color CRT's to replace the present black and white CRT's.
- o A color-graphic video Display Generator.
- o The addition of central processing units to perform SPDS logic, supporting displays and ATOG displays.

A tentative schedule for these upgrades has been established. The above

upgrades are of an evolutionary nature and will present minimal impact to the functions presently performed on the OAC Systems. Previously implemented OAC upgrades have included the replacement of the original rotating bulk memory systems with bulk magnetic core memory storage systems which were installed to allow the plant data base to be accessed by more than one central processor.

These and numerous other enhancements have been made to improve the efficiency and reliability of these systems. Further, existing programs will be phased from the old CPU's to the new CPU's in an orderly fashion with minimal impact to the operator's use of the OAC as well as reliability of the OAC.

Every effort will be made to install the above OAC upgrades in conjunction with refueling outages starting with Oconee Unit 2 now scheduled for October, 1983. The other units are presently scheduled as follows:

Unit 3 - March, 1984
Unit 1 - December, 1984.

The operational date for each Oconee unit's SPDS will be the later date of the following: Refueling outage or symptom oriented emergency procedure implementation date.

4.2.7 MAINTENANCE

Since the SPDS is being installed in the existing OAC Systems, the maintenance functions are already well defined and organized and demonstrated by the high availability of these computers.

4.2.7.1 Central Process Computer Group

Briefly, a Central Process Computer Group is responsible for generating and maintaining all application software. Further, this group provides hardware support and maintains a central set of spare parts for the OAC's. This group is responsible for the overall functioning of these systems including the implementation of factory recommended alterations and enhancements. Vendor support is also available when needed.

4.2.7.2 Station Maintenance Personnel

The Instrument and Electrical Section at the station is responsible for day to day hardware maintenance and preventative maintenance of the OAC Systems. Back up maintenance and spare parts support is generally available in less than four hours from the Central Process Computer Group located in Charlotte. The station also maintains a supply of normally required spare parts.

4.2.7.3 Availability Reports

Availability of the OAC's is monitored routinely. Additionally, procedures will be implemented to monitor SPDS logic and input performance to assure high availability of this function with periodic reviews of alarm summary tables.

4.3 SAFETY ANALYSIS

4.3.1 INTRODUCTION

A safety analysis review has been performed in order to verify the technical correctness and completeness of the SPDS design. This independent review consisted of a series of detailed comment summaries which were provided to the SPDS designers at each phase of the design process. As a result of the review, the content of the SPDS has been improved. This review provides a

summary of the SPDS design and the bases of the design. The selection of critical safety functions and the parameter set to be monitored for each critical safety function are justified.

4.3.2 OVERVIEW AND BASES

The SPDS is structured around the monitoring of six critical safety functions. In order of decreasing severity these functions are: Subcriticality, Inadequate Core Cooling, Heat Sink, RCS Integrity, Containment Integrity, and RCS Inventory. These six functions monitor pertinent indications of system and component conditions and performance in order to detect off-normal or degraded symptoms. The various degraded indications are assigned a level of severity and generate an alarm to alert the operator. The operator responds to multiple alarms in a prioritized manner based on the level of severity of the alarm and the relative severity of the critical safety function.

The set of critical safety functions was selected based on a review of the set developed for the Westinghouse Owners Group along with consideration of the Emergency Procedure Guidelines developed for Oconee. The set selected has been determined to provide a comprehensive overview of the safety status of the plant. The SPDS has been designed to not only identify existing degraded conditions, but also to provide anticipatory alarms of imminent degraded conditions based on the status of equipment and systems. This approach enables the operator to respond and prevent degraded conditions, rather than simply respond to and mitigate already existing degraded conditions.

4.3.3 DETAILED SUMMARY OF SPDS

4.3.3.1 Subcriticality

The Subcriticality critical safety function logic monitors the following instrumentation and indications:

- o Nuclear flux channels
- o Control rod position
- o Reactor trip signal
- o Control rod drive breaker position

The logic is designed to alert the operator to the following degraded conditions:

- o Reactor fails to trip (ATWS)
- o Control rods out of insertion limits
- o Control rods out of alignment
- o Excessive startup rate
- o Inadequate subcritical margin

The logic design has been determined to provide comprehensive monitoring of the status of the subcriticality of the reactor. The alarms generated will alert the operator to any degraded or abnormal condition.

4.3.3.2 Inadequate Core Cooling

The Inadequate Core Cooling critical safety function logic monitors the following instrumentation and indications:

- o Loss of subcooling in hot legs
- o Loss of subcooling at core exit
- o Core exit thermocouple temperature

The logic is designed for consistency with the Emergency Procedure Guidelines for operator response to loss of subcooling and inadequate core cooling.

These indications provide comprehensive monitoring of the approach to and the severity of inadequate core cooling. The logic will be revised to include indications of reactor vessel and hot leg level, as appropriate, following installation of these systems.

4.3.3.3 Heat Sink

The Heat Sink critical safety function logic monitors an extensive set of equipment and system indications including the following:

- o Steam generator pressure
- o Steam generator level
- o High Pressure Injection System (HPIS)
- o Low Pressure Injection System (LPIS)
- o Main Feedwater System (MFW)
- o Condensate System (CS)
- o Emergency Feedwater System (EFW)
- o Turbine Bypass System (TBS)
- o Low Pressure Service Water System (LPSW)
- o Condenser Circulating Water System (CCW)

The logic is designed to alert the operator to the following high level degraded conditions:

- o Loss of normal HPI
- o Loss of normal LPI cooling
- o Loss of MFW or CS
- o Loss of EFW
- o Loss of emergency LPI cooling
- o Loss of emergency HPI cooling

- o Loss of steam dump (TBS) capability
- o Loss of ultimate heat sink

The above high level degraded indications are systematically derived from lower level degraded indications such as low steam generator level, low LPSW cooling water flow to equipment, low reactor coolant pump seal injection, and inadequate CCW valve alignment.

The logic design has been determined to provide comprehensive monitoring of both indications of degraded heat sink and of the status of equipment and systems, including support systems. The alarms generated enable operator response to occur prior to any significant degradation of the heat sink.

4.3.3.4 RCS Integrity

The RCS Integrity critical safety function logic monitors the following instrumentation and indications:

- o RCS pressure
- o RCS temperature
- o Pressurizer level
- o Steam generator level
- o Steam generator pressure
- o Reactor Building radiation
- o Steam line radiation
- o Condenser air ejector off gas radiation

The logic is designed to alert the operator to the following degraded conditions:

- o LOCA as indicated by containment radiation
- o SGTR as indicated by secondary radiation

- o Approaching water solid RCS
- o High RCS pressure
- o Approaching PTS conditions
- o Approaching NDT limits
- o Cold overpressure protection not enabled.

The logic design has been determined to provide comprehensive monitoring for failure of RCS integrity and of challenges to RCS integrity. The alarms generated will alert the operator to any degraded or abnormal condition.

4.3.3.5 Containment Integrity

The Containment Integrity critical safety function logic monitors the following Reactor Building systems, instrumentation, and indications:

- o Pressure
- o Radiation
- o Hydrogen concentration
- o Isolation System (RBIS)
- o Cooling System (RBCS)
- o Spray System (RBSS)
- o Low Pressure Service Water (LPSW)

The logic is designed to alert the operator to the following degraded conditions:

- o High RB pressure
- o High RB radiation
- o High RB hydrogen concentration
- o Failure of RB isolation
- o Failure of RBCS
- o Failure of RBSS

The logic design has been determined to provide comprehensive monitoring for failures in containment systems and of challenges to containment integrity.

4.3.3.6 RCS Inventory

The RCS Inventory critical safety function logic monitors the following instrumentation and indications:

- o Pressurizer level
- o Letdown storage tank (LDST) level
- o Borated water storage tank (BWST) level
- o Reactor Building (RB) sump level

The logic is designed to alert the operator to the following degraded conditions:

- o Low pressurizer level
- o Low LDST level
- o Low BWST level
- o Low RB sump level

The logic design has been determined to provide comprehensive monitoring of RCS inventory and of makeup supplies being utilized for RCS inventory control. The logic will be revised to include indications of reactor vessel and hot leg level following installation of these systems.

4.3.4 CONCLUSIONS

The SPDS design has been subjected to a thorough and independent review which resulted in improvements to the original design. The scope and approach of the SPDS has been determined to be similar to other designs under development in the industry. The set of critical safety functions provides comprehensive monitoring for indications of degraded plant conditions. The logic has been

verified to be technically correct. Information generated by the SPDS is consistent with the station emergency procedures and will enhance operator response to transient events.

This review was completed pursuant to 10CFR50.59 and has been determined not to result in an unreviewed safety question. The proposed SPDS meets or exceeds the existing design criteria as described in the Final Safety Analysis Report.

4.4 OCONEE SPDS STATUS

The development of the Oconee SPDS was initiated in August, 1982 using concepts established for the McGuire SPDS. In October, 1982, an attempt was made to define the hardware requirements for the Oconee SPDS. At that time, it was determined that additional information would be required in order to proceed with hardware purchases. The major information unavailable at that time included (1) the results of the Control Room Review, (2) the roles and needs of the Control Room Operating Crew - especially the Shift Technical Advisor - were not available, and (3) the upgraded emergency procedures and supporting displays had not been well defined.

March, 1983, saw the initiation of the detailed design of the Oconee SPDS as well as the development of tentative hardware requirements and preliminary installation schedules. The roles of the Shift Technical Advisors and other Control Room personnel were proposed and approved. This indicates that a new CRT and keyboard will be required on the operator's desk to allow the person fulfilling the Shift Technical Advisor function to have access to the SPDS, Supporting Displays, and all other information available in the OAC. This

location will minimize the interference caused by the STA performing his duty upon the incorporation of the pressure/temperature displays used in conjunction with the upgraded emergency procedures.

Management approved the purchase of replacement OAC computers for Oconee in July of 1983 with delivery to Duke Power by June 1984. These new computers will enable the implementation of the SPDS on new CRT's capable of color/graphic displays.

The SPDS alarm logic design was completed in December 1983. Display alternatives have been developed and a final design will be selected in March 1984.

5 REGULATORY GUIDE 1.97, REVISION 2 - REVIEW PLAN FOR OCONEE NUCLEAR STATION

5.1 INTRODUCTION

The process for addressing Regulatory Guide 1.97, Revision 2 has been integrated into the overall plan for addressing Supplement 1 to NUREG-0737, Requirements for Emergency Response Capability (NRC Generic Letter No. 82-33), as indicated in Section 2 of this submittal. The specific Regulatory Guide 1.97 effort will include the same phases as the Control Room Review (i.e., Review, Assessment, and Implementation). These phases will be comprised of the following activities:

5.2 REVIEW

This phase consists of the establishment of plant specific accident monitoring instrumentation requirements and a review of existing instrumentation versus these requirements.

The accident monitoring instrumentation described in Section 7.5 of the Oconee FSAR plus additional instrumentation installed in the aftermath of TMI provides a broad base of accident monitoring instrumentation.

Emergency procedures and SPDS parameters will serve as an input for variable selection. Emergency procedures will provide lead guidance for selection of type A variables, i.e., those variables which provide the primary information required to permit the control room operator to take specific manually controlled actions for which no primary automatic control of the safety function is provided. The SPDS "critical safety functions" and Regulatory Guide 1.97, Revision 2 type B and C variables are intended to assist the control room operators in rapidly and reliably monitoring the critical safety functions.

Type B and C variables will therefore be considered jointly and selection will be based on monitoring requirements of SPDS critical safety functions; i.e., subcriticality, inadequate core cooling, reactor coolant system integrity, OTSG tube leakage, containment integrity, and heat sink. Types D and E variables will be selected on a plant specific basis.

Design and qualification criteria will be selected to assure essential instrumentation availability and reliability for emergency responses.

Duke Power Company is an active participant in the Nuclear Utility Task Action Committee on Emergency Response Capability and the resultant NUTAC guidance will be considered in our review.

A B&W Owners Group Task Force on RG 1.97 Revision 2 has been established. Duke Power is an active participant. The results from this Task Force will be considered in the appropriate phases of our effort.

The results of the Review Phase will be a listing of discrepancies of installed instrumentation versus requirements.

5.3 ASSESSMENT

The Assessment Phase will utilize the input from the review phase and will consist of an evaluation of identified discrepancies to determine what further action is merited. Control room interface will be coordinated with the Control Room Review. The result of this phase will be a report to the NRC, as required in Supplement 1 to NUREG-0737, describing Duke Power Company's position on Regulatory Guide 1.97, Revision 2.

5.4 IMPLEMENTATION

Those items which are determined by the Assessment phase to merit modifications would be incorporated during this phase. This would be an integrated effort to insure effective, orderly implementation of all Control Room Review, SPDS, and RG 1.97 required modifications or additions.

In summary, the Regulatory Guide 1.97, Revision 2 review plan process will provide a basis for plant specific accident monitoring systems. It will identify any changes or upgrades necessary along with an integrated schedule for implementation.

5.5 STATUS THROUGH APRIL 1, 1983

Duke Power Company has performed a preliminary internal study of the existing accident instrumentation as it pertains to Revision 2 of RG 1.97. This study was completed in November, 1981. Development then began of a formal review plan to address the Regulatory Guide. The planning and development of this program began in January, 1982 and was completed in June, 1982. The Review phase of the plan began on this latter date and consisted of the establishment of Oconee Nuclear Station specific accident monitoring instrumentation requirements as well as review of this instrumentation versus the requirements. This phase is ongoing at the present time and will be completed by May, 1983 at which time the Assessment phase will begin.

6.1 INTRODUCTION

6.1.1 PURPOSE

The purpose of this Procedures Generation Package is to describe the Emergency Procedures (EP's) development process at Oconee Nuclear Station.

6.1.2 SCOPE

The Procedures Generation Package was developed to provide a response to the U.S. Nuclear Regulatory Commission Generic Letter Number 82-33, Item 7.2b, page 15, of Supplement 1 to NUREG-0737.

6.1.3 CONTENTS

The Procedures Generation Package consists of the following seven parts:

- o Introduction
- o Plant-Specific Technical Guidelines and Emergency Procedure Development Process Description
- o Oconee Nuclear Station Writer's Guide for Emergency and Abnormal Procedures
- o EP Verification Program
- o EP Validation Program
- o EP Training Program
- o EP Upgrade Program Current Status

Each of the above parts describe the approach taken for meeting the individual requirements of the overall EP development and implementation plan for Oconee Nuclear Station.

6.2 PLANT-SPECIFIC TECHNICAL GUIDELINES AND EMERGENCY PROCEDURE DEVELOPMENT PROCESS

6.2.1 GENERAL

The program for converting the Babcock & Wilcox Abnormal Transient Operating Guidelines (ATOG's) into Oconee specific EP's by Duke Power Company is described in the following paragraphs:

The B&W ATOG's, Revision dated March 23, 1982, will be used for the initial development of the Oconee specific EP's. Information contained in latter revisions will be incorporated as necessary in accordance with the Oconee EP development process.

The B&W ATOG's for Oconee have previously been submitted to the NRC. Reference is made to the following correspondence:

- William O. Parker, Jr. letter to Mr. Harold R. Denton Dated April 3, 1981
- Through the auspices of the B&W Owners Group Operation Support Committee (Mr. Warren J. Hall letter dated March 31, 1982)

6.2.2 Preparation of Oconee Emergency Procedures

The EP writing team will obtain and review the following Oconee technical information.

- B&W ATOG's
- Oconee Nuclear Station Writer's Guide for Emergency and Abnormal Procedures
- Technical Specifications
- Existing EP's
- Other Plant-Specific Procedures (Operating Procedures, Abnormal Procedures, etc.)

6.2.3 Writing Emergency Procedures

The B&W ATOG's for Oconee are utilized by the station EP writing team as general guidelines for developing Oconee plant-specific procedures. This process involves writing the procedure in the format and style as specified in the Oconee Writer's Guide. The process also involves entering plant-specific details required from an operations standpoint. These details include entering plant-specific steps, valve lineups, component identifications, and referencing other plant specific procedures.

6.3 WRITERS GUIDE FOR EMERGENCY AND ABNORMAL PROCEDURES

6.3.1 GENERAL

A writer's guide for Emergency Procedures (EP's) and Abnormal Procedures (AP's) is a plant-specific document that provides instructions on writing EP's and AP's, emphasizing the incorporation of accepted human factors engineering principles.

The writer's guide will be continually improved, based on experience gained from the EP verification and validation programs and from the operator training program to be conducted for plant specific EP's. The plant-specific writer's guide addresses both EP's and AP's, however, the remaining parts of the Procedures Generation Package addresses only the EP's as required by Section 7.2b of Supplement 1 to NUREG-0737.

6.3.2 DOCUMENT DESCRIPTION

The following major topics are included in the plant-specific writer's guide for EP's and AP's.

- o Procedure Format Principles
- o Procedure Style and Content
- o EP Example
- o AP Outline
- o Plant Specific Listing of Acronyms and Abbreviations
- o Plant Specific Constrained Language Listing
- o Punctuation and Usage Handbook
- o Guidelines for Word Processing

The Oconee Nuclear Station Writer's Guide for Emergency and Abnormal Procedures is provided as an additional attachment within this submittal.

6.4 EMERGENCY PROCEDURE VERIFICATION PROGRAM

6.4.1 GENERAL

EP verification is the administrative process performed to confirm the written correctness and technical accuracy of the plant-specific EP's. The verification program ensures that all generic and plant-specific technical requirements have been included in the procedure. This evaluation also ensures that the human factors principles defined in the writer's guide for EP's have been considered within the procedure.

6.4.2 PROGRAM DESCRIPTION

The EP verification program establishes administrative procedures defining the verification process as an integral part of the overall EP upgrade effort. Included in these procedures are:

- o Detailed instructions for performing the verification process on each Oconee EP
- o Documentation and approval of the verification process

- The process for identifying discrepancies
- The process for resolving discrepancies

In the development of the Oconee Nuclear Station EP verification program the industry guidance document, Emergency Operating Procedures Verification Guideline, was used as a reference source. This document was written by the Emergency Operating Procedures Implementation Assistance (EOPIA) Review Group and Published by INPO. Duke Power was an active participant in this industry working group.

The Oconee Nuclear Station EP Verification Program will be defined by the following:

- Oconee Nuclear Station Procedure for the Verification Process for Emergency Procedures
- Reactor Safety Procedure RS-003, Technical Verification of Nuclear Station Emergency Procedures and Guidelines

These proposed procedures are included as attachments within this submittal.

6.5 EMERGENCY PROCEDURE VALIDATION PROGRAM

6.5.1 GENERAL

The EP validation program is the administrative process for ensuring that a trained operating shift can manage emergency conditions using the plant-specific EP's. The EP validation process will measure the adequacy of the operator/procedure interface in handling emergency situations.

6.5.2 PROGRAM DESCRIPTION

The EP validation program establishes administrative procedures defining the validation process to be used as an integral part of the overall EP upgrade effort. Included in these procedures are:

- o Detailed instructions for performing the validation process for Oconee EP's
- o Documentation and approval of the validation process
- o The process of identifying discrepancies
- o The process for resolving discrepancies

In the development of the Oconee Nuclear Station EP validation program the industry guidance document Emergency Operating Procedures Validation Guidelines, was used as a reference source. This document was written by the Emergency Operating Procedures Implementation Assistance (EOPIA) Review Group and published by INPO. Duke Power was an active participant in this industry working group.

The proposed Oconee Nuclear Station Procedure for Validation of Emergency Procedures is included as an attachment within this submittal.

6.6 EMERGENCY PROCEDURE TRAINING PROGRAM DESCRIPTION

A training program will be developed for implementation in mid-1984 to train the operators at Oconee Nuclear Station in the use of the new EP's. This program will integrate three forms of training. Lecture and group discussion will be followed by demonstration on the site specific simulator. Following the demonstration phase, shift operators will be split up into teams to perform their normal on-shift duties. At this time, hands-on, real time training will be conducted utilizing the site specific simulator. This sequence will be repeated for each of the four major EP cases. Written and performance evaluations will be utilized to determine the effectiveness of the training. The training will be conducted by Duke Power Company, Production Support Department, Technical Training Group at the Oconee Training Center.

6.7 EMERGENCY PROCEDURE UPGRADE PROGRAM CURRENT STATUS

Three ATOG Based EP's are to be written for use at Oconee Nuclear Station and 105 existing EP's are to be converted to new AP's. The status of the major activities associated with the EP development process is tabulated below as of April 1, 1983.

Activity	Number of EP's/AP's Completed
Initial EP's Typed	1
Initial AP's Typed	105
Initial Verification	0
Initial Validation	0

Finalization of the station procedures for the Verification and Validation Program is now in progress.

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

WRITER'S GUIDE FOR EMERGENCY AND ABNORMAL PROCEDURES

TABLE OF CONTENTS

TABLE OF CONTENTS (cont.)

1.0 INTRODUCTION

The Writer's Guide for Emergency and Abnormal Procedures was prepared for use at Oconee Nuclear Station, Duke Power Company. Much of the information contained in the guide is applicable to procedures in general. However, the guide is intended for use specifically in the preparation of emergency and abnormal procedures. Whenever the word "procedure" is used alone, it should be assumed to refer to emergency and abnormal procedures.

Information was taken from the following sources:

- Current Duke Power Company administrative procedures and practices concerning emergency and abnormal procedures
- Duke Power Company review input
- NUREG-0899 and other NRC guidelines
- The Institute of Nuclear Power Operations Guidance for Emergency Operating Procedure Writing
- Other applicable research documents
- Accepted principles of human factors engineering relative to user documentation.

1.1 Statement of Purpose

The writer's guide provides specific guidance in the preparation of emergency and abnormal procedures. Readability and accessibility of information are of major concern. The purpose of the writer's guide is to ensure that writers produce procedures that are readable, complete, convenient, accurate, and acceptable to control room personnel.

1.2 User Information

Before attempting to produce procedures, it is important that the writer become thoroughly familiar with the information in the guide. This section introduces some ideas for the use of the guidebook and its different sections.

1.2.1 Structure of the Guide

The guide is written so that general principles and guidelines are placed in the main body of the document. Examples of procedures are located in appendices, as are several other aids, including:

- Dictionary of Acronyms and Abbreviations
- Constrained Language List and Index
- Punctuation and Usage Handbook
- Checklists for Development and Validation
- Guidelines for Word Processing.

1.2.2 Guidebook Use

The best way to use the guidebook is to start by becoming familiar with the topics covered and the general approach. This is best accomplished by reading through the guide, starting with the Table of Contents, and by glancing at the appendices.

The writer's guide is intended as a reference for the writer when writing emergency or abnormal procedures. It is equipped with tabs to aid in quickly accessing required information. The Table of Contents may also aid in identifying the section containing information being sought.

While organizing the procedure and beginning to write, the format section, Section 2.0, will probably be most helpful. For constructing sentences and developing notes and cautions, the style and content section, Section 3.0, is the appropriate reference. In selecting acceptable abbreviations, refer to the Dictionary of Acronyms and Abbreviations in Appendix 3. Refer to the Constrained Language List and Index, Appendix 4, when selecting appropriate terms. The information in the appendices is generally covered in more detail in the body of the guidebook.

Much information in the guide is contained in more than one section. For example, methods of emphasis are discussed in the format section, and again in the style and content section. This was done in order to prevent the need for cross-referencing within the document when trying to answer a specific question with regard to procedure writing.

1.3 Procedure Development Process

This section is intended to help the writer prepare to write. It is important that the appropriate references, including the writer's guide, be readily available.

1.3.1 Procedure Development Basis

There are certain requirements of procedures to be used by control room operators during emergency and abnormal operating conditions. Operators must first of all trust that the information contained within their procedures is technically accurate and

complete. Operators must also find that the information presented is easily accessed, read, and understood.

- Technical Accuracy: Since procedures must be technically complete and accurate, their content is to be based on generic and plant-specific technical guidelines, when applicable.
- Information Presentation: The writer's guide provides information for translating the technical information into procedures. The suggested presentation ensures readability and understanding. It also ensures that procedures will be consistent in organization, format, style, and nontechnical content.

1.3.2 Procedure Writing Process

The technical accuracy of procedures is ensured by using the correct references. Validated generic technical guidelines are available in the Abnormal Transient Operating Guidelines (ATOG). The writer should have the appropriate generic procedure available for referencing before beginning to write, and other references should be available as needed.

This writer's guide was developed to ensure readability of the procedure. By adhering to the principles and guidelines presented herein, procedures will be consistently written and easily read and understood. A copy of the writer's guide should be available for referencing when writing procedures. While writing procedure steps, refer to the appropriate sections of the writer's guide for guidelines on format or sentence development. When the procedure is complete, submit it to the validation process for review to ensure accuracy, adequacy, and usability. Following validation, the procedure may be returned for revisions. In writing revisions, the same principles and guidelines outlined in the guidebook apply.

While writing a procedure, make a list of all other procedures referenced so that they can be updated as appropriate.

1.3.3 Procedure Review Process

Refer to APM 4.2, ADMINISTRATIVE INSTRUCTIONS FOR PERMANENT STATION PROCEDURES for administrative requirements. By following APM 4.2, it is ensured that the appropriate people review and approve the procedure throughout the development process.

2.0 FORMAT PRINCIPLES

2.1 Organization of Procedures

2.1.1 Emergency Procedure Organization

As specified in the Abnormal Transient Operating Guidelines, there will be only one emergency procedure. Organize the procedure into the following elements (see Appendix 1):

- Cover Page
- Table of Contents
- 1.0 Purpose
- 2.0 Symptoms
- 3.0 Automatic Systems Actions
- 4.0 Immediate Manual Actions
- 5.0 Subsequent Actions
- 6.0 Cooldown Procedures (CP)
- 7.0 Inadequate Core Cooling (ICC)
- 8.0 Enclosures.

2.1.2 Abnormal Procedure Organization

Organize abnormal procedures into the following elements (see Appendix 2):

- Cover Page
- Table of Contents
- If needed, Section (subprocedure)
- 1.0 Purpose
- 2.0 Symptoms
- 3.0 Automatic Systems Actions
- 4.0 Immediate Manual Actions
- 5.0 Subsequent Actions
- 6.0 Enclosures.

2.1.3 Cover Page

Use the Procedure Preparation Process Record (Form 34731) as a cover page and include the following information (see example in Appendix 1):

- Procedure number
- Unit number
- Procedure document code
- Changes incorporated
- Station name
- Procedure title
- Procedure preparer and the date of preparation
- Signature and date of a qualified reviewer
- Appropriate approval signatures and approval dates
- Other review/approval signatures and dates as necessary.

2.1.4 Table of Contents

Prepare a Table of Contents, if required, identifying the title and page number of major elements within the procedure (see Appendix 1, page i).

2.1.5 Purpose

Provide a brief statement describing what the procedure is intended to accomplish (see Appendix 1, page 1).

2.1.6 Symptoms

List the plant conditions, alarms, and other pertinent entry conditions that would cause the procedure to be used. Symptoms should be listed so that the most important one is mentioned first. The importance of a symptom is especially related to its ability to identify a particular condition. Symptoms which are found in several abnormal conditions should be listed last. If such a list can be established, use numbers (1.1, 1.2, 1.3, etc.) to indicate the sequence. If a sequence cannot be established, use bullets (•) to list the symptoms (see Appendix 1, page 1).

2.1.7 Automatic Systems Actions

List the automatic actions which occur as a result of the entry conditions into the procedures. Use bullets to list the action. Where a sequence is important, use the standard numbering system to indicate the sequence (see Appendix 1, page 1).

2.1.8 Immediate Manual Actions

Specify the immediate operator actions to be taken for the procedure in the single-column, brief-sentence format described in Section 2.2.1 (see Appendix 1, page 3). Limit immediate manual actions to those positive steps which must be performed before there is opportunity to refer to the appropriate procedure.

2.1.9 Subsequent Actions

Specify the operator actions necessary to return the plant to a normal, stable, or safe, steady-state condition. To specify subsequent actions in the emergency procedure, use separate sections (subprocedures). Reference the sections in immediate actions. Divide each section into several cases (subsections), as required. For abnormal procedures, arrange subsequent actions as steps within division 5.0. For further information concerning the format structure, see Section 2.2 (see also Appendix 1, pages i and 5).

2.1.10 Cooldown Procedures

Only the emergency procedure will contain a division for cooldown procedures. Specify the actions necessary to continue plant cooldown once conditions have stabilized. Use separate sections and cases as necessary (see Appendix 1, page i).

2.1.11 Inadequate Core Cooling

Only the emergency procedure will contain a division titled "Inadequate Core Cooling." In this division, detail the steps necessary to restore adequate core cooling should the Reactor Coolant System become superheated during cooldown (see Appendix 1, page i).

2.1.12 Enclosures

Append any materials (e.g., graphics or operator aids) which are neither included in the body of the procedure nor immediately available in the control room, but which are essential to carrying out the procedure. Appended materials are to be called "enclosures" and are to be located at the end of the procedure. Arrange the enclosures in numerical order (see Appendix 1, page 8).

2.2 General Structure

Prepare procedures by using the guidelines given below for general format structure. Specify all immediate and subsequent operator actions in the single-column, brief-

sentence format exhibited in Appendix 1. Leave adequate margins for binding at the left side. Divide the bound procedures by using tabs which identify the procedure and section by number. Number sections, divisions, and steps in accordance with instructions to ensure easy access for operators.

2.2.1 Sections

If needed, include sections as subprocedures. Start each section on a separate page. Provide the page number for the location of the start of each section in the Table of Contents.

2.2.1.1 In the emergency procedure, designate sections according to the division in which they are included (see Appendix 1, page 6).

- Sections included within 5.0 Subsequent Actions should be designated Section 501, Section 502, etc.

  For example:

  Section 501, Lack of Adequate Subcooling Margin

- Sections included within 6.0 Cooldown Procedures should be designated CP 601, CP 602, etc.

2.2.1.2 If sections are needed in an abnormal procedure, they should contain divisions 1.0-5.0 described previously in 2.1.2 (enclosures for all sections should be included at the end of the procedure).

- Designate sections with uppercase letters, e.g., Section A, Section B, Section C, etc. For an example, see Appendix 2, pages 1-6.
- Write END, in all uppercase letters, underlined, and centered under the last step in each section.

2.2.2 Cases

Each section within the emergency procedure may contain several cases as subsections (see Appendix 1, page 7).

- Since cases will not be referenced within the procedure, do not number cases. For referencing, use either the section number or the step number. Steps are to be numbered continuously throughout a section, so that a given case might start, for example, at 3.0 or 7.0.
- Abnormal procedures should not require the case level.

2.2.3 Divisions

Organize the body of the procedure into numbered divisions.

2.2.3.1 For the emergency procedure, use the following:

- 1.0 Purpose
- 2.0 Symptoms
- 3.0 Automatic Systems Actions
- 4.0 Immediate Manual Actions
- 5.0 Subsequent Actions
- 6.0 Cooldown Procedures (CP)
- 7.0 Inadequate Core Cooling (ICC)
- 8.0 Enclosures.

Provide the page numbers for the location of the start of each division in the Table of Contents. Start 4.0, Immediate Manual Actions, on a separate page. Start each section and case within Sections 5.0 - 7.0 on separate pages.

2.2.3.2 For abnormal procedures, use the following:

- 1.0 Purpose
- 2.0 Symptoms
- 3.0 Automatic Systems Actions
- 4.0 Immediate Manual Actions
- 5.0 Subsequent Actions
- 6.0 Enclosures.

Provide the page numbers for the location of the start of each division in the Table of Contents. Start 4.0, Immediate Manual Actions, on a separate page.

2.2.4 Steps

Describe action steps in simple declarative sentences. Use indented substep sentences to specify details of step performance.

- Designate steps by number: 1.1, 1.2, 1.3, etc.

  For example:

  4.2 Verify neutron level decreasing.

- Designate the detailed substeps by number (1.1.1, 1.1.2, etc.) when sequence of performance is important. When sequence is not important, designate the substeps with bullets (•).
- List all steps in the order in which they are to be performed or verified to have occurred.
- Do not split steps or substeps between pages.
- If actions involve dependencies, use logic statements employing <u>IF</u>...<u>THEN</u>, or <u>IF NOT</u>...<u>THEN</u>, as appropriate.

- Arrange conditional statements (IF...THEN) and transition steps (go to) so that the user moves forward in the same procedure or exits the procedure altogether.

2.2.5 Component Identification

If possible, use exact nomenclature.

- To identify components, put the component number first, followed by the nomenclature in parentheses. Capitalize the first letter of each word in nomenclature.
- Generic names can be used to identify well-known components. However, component identification numbers should be used as well.

2.3 Page Headings

As defined in the substeps enumerated below, include the following at the head of each page:

- Name of station (on page 1 only, directly above title)
- Title of procedure
- Procedure document code (for example, EP/1/A/1800/1A)
- Section number (501, 502, 601), if needed
- Section or case title, if needed
- Procedure number
- Unit number
- Page number.

2.3.1 Title of the Procedure

Provide a short but descriptive title to allow the operator to easily identify the procedure and the conditions under which the procedure should be used. Put the title on each page, except the cover page, as shown in the example in Appendix 1, page 1. On the cover page, locate the title in the space provided. Capitalize all letters in the title.

2.3.2 Procedure Document Code

For purposes of administration, provide a unique identification for the procedure in accordance with APM 4.2. Locate the code directly below the procedure title.

2.3.3 Title of Subprocedure (Section or Case)

If there are subprocedures (sections or cases) within a procedure, provide a section number (do not number cases) and a subtitle directly below the procedure title and document code on the appropriate pages. Use separate pages for each section or case (see Appendix 1, pages 6 and 7).

2.3.4 Procedure Number

Identify each procedure with a unique number.

For example:

```
EP-1
│ └ Unique consecutive number
└── Type of procedure
```

Locate the number in the upper right corner of each page of the procedure (see example in Appendix 1).

2.3.5 Unit Number

Identify the unit with the appropriate number, for example, Unit 3. Locate the number in the upper right corner of each page in the procedure (see example in Appendix 1).

2.4 Page Numbers

For procedures with a Table of Contents, identify the page with an "i" in the upper right corner. If necessary, use "ii," etc., to identify any succeeding pages of the Table of Contents and any other pages prior to the main body of the procedure.

Number the pages in consecutive order beginning with the page containing the "Purpose." Place the page number in the upper right-hand corner. As shown below, the first digit represents the sequential page number and the second digit indicates the total number of pages (see example in Appendix 1).

For example:

Page 1 of 24

2.5 Page Breaks

In general, start separate pages for the following:

- Title page
- Table of Contents

- Each section
- Each case
- 1.0 Purpose
- 4.0 Immediate Manual Actions
- Each enclosure.

2.6 Cautions and Notes

Provide precautionary and critical information in caution statements and advisory information in notes. Do not provide action steps in cautions and notes. Designate cautions and notes as follows:

- Capitalize and underline all letters of the word <u>CAUTION</u>. Follow the word "caution" with the number of the step to which the statement applies. However, if a caution applies to more than one step, do not put in step numbers. Extend the caution statement across the page (see example in Appendix 1).
- Capitalize and underline all letters of the word <u>NOTE</u>. Follow the word "note" with the number of the step to which the statement applies. However, if a note applies to more than one step, do not put in step numbers. Extend the statement across the page (see example in Appendix 1).

Cautions shall be located prior to the action step with which they are associated. Notes should be located prior to the action step with which they are associated, unless the note content dictates placement following the step. Cautions and notes are to be single-spaced. Do not use the Section 2.8 emphasis techniques in cautions and notes.

2.7 Place-Keeping Aids

Place a single line for all numbered major steps to the left and adjacent to the step number to provide a place-keeping aid for the operator.

2.8 Emphasis

Emphasize important aspects of the procedure in the following manner (see example in Appendix 1):

- Capitalize the entire procedure title.
- Initially capitalize (i.e., capitalize the first letter of each word) and underline section and case titles.
- Initially capitalize and underline division titles.
- Capitalize procedure names and numbers listed in transition actions.

- Initially capitalize and underline subprocedure names and numbers listed in transition actions.
- Capitalize all words in an alarm, if wording exactly matches that used on the alarm window.
- Capitalize and underline the conditional IF ... THEN, and IF NOT ... THEN. Do not start a conditional statement in the middle of a line. Instead, locate the IF at the beginning of the column on the next line down. Leave two spaces between the comma and the word THEN in a conditional statement.

  For example:

  Verify adequate subcooling margin.

  IF NOT adequate, THEN go to...
- Capitalize and underline connectives such as OR and AND. When a connective separates clauses, put the connective on a line by itself at the left margin of the column.

  For example,

  Reactor Recirculating Pumps shifting to slow speed

  OR

  Reactor recirculating pumps trip.
- If a conditional statement (IF...THEN) contains a connective (OR, AND) between clauses, structure the sentence as follows:

  IF SI flow is established

  AND pressure $\leq$ 1500 PSIG

  THEN stop all RCPs.
- Capitalize and underline negatives, such as NOT, NEITHER, or NOR.
- Capitalize and underline END, signifying the end of a section in an abnormal procedure.

2.9 Document References

Referring within and between procedures should be kept to a minimum. It is better to reproduce small sections than reference them.

- Use "go to" when the operator will discontinue use of the first procedure and stay in the referenced procedure.
- Use "refer to" when the operator will be returning to the first procedure.
- List the procedure or subprocedure number first. Follow this by the procedure title in all capital letters or the subprocedure title in initial capital letters and underlined.

- If possible, identify the specific place of entry into the document referenced.

  For example:

  Go to EP-1A, ABNORMAL TRANSIENT, step 4.1.

- To set off document titles in references, leave two spaces after the comma which separates the document number from the title.

2.10 Enclosures

Provide graphics (charts, tables, sketches, illustrations, photos, etc.) which supply pertinent information for the performance of actions. Number the page on which the graphic appears in the previously specified "Page ___ of ___" manner. Include the procedure number and the titles as specified previously. Refer to all graphics as "enclosures" and number them consecutively within a procedure as follows:

Enclosure 1 Title
└─ Unique consecutive number

Provide a short title describing the information. Locate all enclosures at the end of the procedure and arrange them in numerical order.

3.0 STYLE AND CONTENT OF PROCEDURES

The following approach to style and content emphasizes the use of concise performance steps. Information should be presented in a simple, familiar, and unambiguous manner. Consistency in style and sentence structure will improve the readability and comprehensibility of the procedure. By applying the following guidelines, style and content will remain consistent from procedure to procedure.

3.1 Vocabulary

The vocabulary used in procedures should be easily read and understood by control room operators.

3.1.1 Use specific control board nomenclature and terminology which operators and other plant personnel understand.

3.1.2 Use short, commonly found words. Common words of not more than two syllables are preferred. However, this does not apply to industry terms which are commonly used or technical words which are required to define or clarify the subject.

3.1.3 Avoid the use of synonyms. Always use the identical word or term for a given subject or action. Accepted terms and their meanings are in the constrained language list and index in Appendix 4.

3.1.4 Use specific words that precisely describe the task or action of the operator. Avoid ambiguous instructions such as "check frequently" or "throttle slowly." Where possible, use specific intervals or guidelines.

3.1.5 Do not use contractions such as "don't" or "can't." Instead, use "do not" or "cannot."

3.2 Abbreviations, Acronyms, and Symbols

Only those abbreviations, acronyms, or symbols which are unambiguously recognized by operators should be used.

3.2.1 Generally, avoid abbreviating words, phrases, or names unless the system or component is frequently and commonly referred to by an abbreviated form. Use only accepted abbreviations or acronyms, found in Appendix 3.

3.2.2 When referring to specific nomenclature, use the precise labeling, including abbreviations, acronyms, or symbols.

3.2.3 The following symbols may be used:

- Equal to =
- Approximately ~

- Greater than >
- Less than <
- Greater than or equal to ≥
- Less than or equal to ≤
- Percent %
- Delta Δ
- Degrees Fahrenheit °F
- Degrees Celsius °C
- Plus +
- Minus -
- Inches "
- Feet '
- Number #

3.3 Sentence Structure

Sentence structure affects the rate at which a sentence is read and understood. The following guidelines will aid in developing sentences which are quickly read and easily understood.

3.3.1 Use short sentences. More than 20 words is too long; approximately ten words is preferred.

3.3.2 Write action steps as simple command statements. Use the structure which follows:

ACTION VERB OBJECT
- OBJECT MODIFIER

For example:

Verify Reactor Trip:
- All rod bottom lights lit
- Neutron flux decreasing.

3.3.3 Use the same sentence style for main steps as well as substeps.

3.3.4 Write instructional or procedural steps as imperative statements, i.e., as direct command statements. (Passive statements may be used for emphasis in precautions, cautions, or notes. See below.)

For example:

This — Open Valve AB.

Not this — Valve AB is opened.

3.3.5 Write instructional or procedural steps as positive statements.

Generally, positively stated sentences are more readily comprehended.

For example:

This — Cover container when not in use.

Not this — Do not leave container uncovered when not in use.

3.3.6 Use only one main thought per sentence. Do not combine unrelated actions or thoughts into a compound sentence. However, a compound sentence which combines related actions or thoughts is acceptable.

For example:

Direct Rad Chem to take a chemical sample AND verify that Tech Specs are not violated.

3.3.7 Rewrite complex sentences with two or more coordinate clauses as several shorter, simpler sentences.

For example:

This — Open AB Valve.

Increase tank pressure to 1500 PSIG.

Close XY Header Valve.

Not this — Open AB Valve, increase tank pressure to 1500 PSIG, AND close XY Header Valve.

3.3.8 For instructional or procedural steps, use the understood "you" as the subject of each sentence. When a step is written, such as "check steam generator levels," the understood subject is the control room operator reading the procedure.

Where actions stated in the procedure are to be performed by someone other than the control room operator, identify the performer of the action.

For example:

Direct Rad Chem to take a chemical sample.

3.3.9 When the verb, or action, has two or more objects, list them separately.

For example:

Close the following block valves:

- 3RC-169 (Loop 3A Hi Point Vent Block)
- 3RC-19 (Loop A High Point Vent)
- 3RC-138 (Loop 3B Hi Point Vent Block)
- 3RC-38 (Loop B High Point Vent).

3.3.10 Refer to specific nomenclature by giving component number, followed by nomenclature in parentheses.

For example:

3N-174 (RB Primary Header Block).

Refer to a specific annunciator nomenclature by placing it in all capital letters.

3.3.11 Write caution statements to provide information used to prevent actions which could result in damage to equipment, loss of plant stability, or hazards to personnel or public. (See also Section 3.19.)

Write note statements to provide brief information essential to performance of an action or sequence of steps. Avoid making references to other documents when possible. (See also Section 3.20.)

Use a passive sentence structure (usually using "shall," "should," or "may") for emphasis in cautions and notes.

For example:

CAUTION This pump should not be operated with valve closed.

NOTE The conditions below should be monitored during the remainder of this procedure.

Select "shall," "should," or "may" as follows:

- "Shall" implies a mandatory requirement.
- "Should" implies a nonmandatory, preferred, or desired method.
- "May" implies an operation which is possible but perhaps is not necessary.

3.4 Punctuation

Generally, standard American English rules for grammar and punctuation should be used. However, some special uses of punctuation are specific to Oconee procedures. Refer to Appendix 5 for additional guidelines on correct punctuation.

3.4.1 Avoid using semicolons, since they lead to long sentences. Also, do not use contractions as they are often sources of confusion.

3.4.2 Place periods after the following:

- Sentences
- Major steps which are not followed by substeps
- Substeps
- The last item on a list.

3.4.3 Place colons after the following:

- Major steps which are followed by substeps

- Statements which are followed by lists, such as symptom statements followed by lists of symptoms.

3.4.4 Place parentheses around component nomenclature which follows a component number.

3.5 Capitalization

Capitalization may be used for emphasis or attention. Use capitalization as described below.

3.5.1 Initially capitalize (i.e., capitalize the first letter of) the following:

- Each word in section titles
- Each word in case titles
- Each word in division headings
- First word in a sentence
- First word in a phrase used in a list
- Each word in component nomenclature
- Each word in a system or component reference
- Proper nouns, such as system names.

3.5.2 Write the following items in all capital letters:

- Procedure titles
- Acronyms
- Annunciator nomenclature
- Other words or phrases which are uniquely significant in determining or classifying operator actions (not necessary).

  For example:

  > Determine whether transient is a REACTOR TRIP <u>OR</u> a S/G TUBE RUPTURE.

3.5.3 Capitalize and underline the following:

- <u>IF</u>
- <u>THEN</u>
- <u>AND</u>
- <u>OR</u>
- <u>UNLESS</u>
- Any negative such as <u>NOT</u>, <u>NEITHER</u>, or <u>NOR</u>
- <u>NOTE</u>

- CAUTION
- END, signifying end of abnormal procedure section.

3.6 Underlining

Avoid underlining for attention or emphasis except in the cases described below.

3.6.1 Use underlining in combination with capitalization of the words listed above in 3.5.3.

3.6.2 Use underlining to make section and case titles stand out.

For example:

Lack of Adequate Subcooling Margin

3.6.3 Use underlining to make division headings stand out.

For example:

Purpose

Symptoms

3.7 Units and Numerals

3.7.1 Use the units of measurement which actually appear on the instruments specified.

3.7.2 Use units of measurement familiar to the operator.

3.7.3 Use Arabic numerals unless specific nomenclature dictates otherwise.

3.8 Tolerances

3.8.1 Tolerances should be provided where possible. Give ranges in immediately understood terms, avoiding the need for interpretation.

For example:

Maintain tank level between 47 feet and 52 feet.

3.8.2 Use the same units of measurement that appear on meters and gauges.

3.9 Formulas and Calculations

Avoid the use of formulas and calculations where possible. Where calculations are necessary, provide space for notations.

3.10 Conditional Statements

In writing conditional statements, write the condition (the "IF" statement) as the first clause, and the contingency (the "THEN" statement) as the second clause. Structure conditional statements (IF ... THEN ...) as shown in the examples in Appendix 1.

3.11 Sequencing

Technical necessity and instrument arrangement should be considered in sequencing tasks and action steps. In general, the following guidelines apply.

3.11.1 Write action steps in the order in which they are to be performed or verified to have occurred.

3.11.2 Some series of steps must be performed in an exact sequence. Indicate these by the previously designated alphanumeric system.

Indicate nonsequential steps by placing a bullet (•) prior to each step.

3.11.3 Consider control room layout when sequencing steps. If sequence is not important, order steps so that a left-to-right or right-to-left flow can be followed along the control board.

3.12 Verification Steps

Include steps to cue the operator to verify whether equipment responses or operator actions are occurring and are correct.

For example:

Verify all rods on bottom.

3.13 Nonsequential Steps

Some operator actions may be required during performance of a task, but not at a specific point in the sequence of steps. For example, some steps may be performed when a certain temperature or level is reached, but not before.

3.13.1 Locate nonsequential steps at the first possible point at which they may be required.

3.13.2 Write nonsequential steps so that the operator clearly understands when the action is to be performed.

For example:

When tank level reaches 62 feet, close isolation valve.

Or:

Monitor every five minutes until temperature stabilizes.

3.14 Equally Preferable Steps

Where any one of several alternatives is acceptable, describe the action to be taken, listing the alternatives below.

For example:

Close one of the following valves:

- 3RC-79 (CRD Vent Header Hose Isolation)
- 3RC-80 (CRD Vent Header Hose Isolation)
- 3RC-81 (CRD Vent Header Hose Isolation).

Or:

9.2.2 Fill the RC System by aligning valves as follows, depending on the Bleed Holdup Tank to be used.

9.2.2.1 For Bleed Holdup Tank 3B:

- Open 3CS-56 (Bleed Transfer Pump 3B Discharge).

9.2.2.2 For Bleed Holdup Tank 3A:

- Open 3CS-46 (Bleed Transfer Pump 3A Discharge).

3.15 Recurrent Steps

Some operator actions may need to be repeated at various intervals. If the intervals are easily specified (for example, following specified steps), repeat the step at each point at which it is to be performed. If the intervals are not specific, describe conditions which require repeating the step.

3.16 Time-Dependent Steps

Some operator actions are required at specified time intervals, or some time after an action has taken place. In writing time-dependent steps, specify the time intervals as precisely as possible. Give the operator information about the time interval involved and the action to be taken.

For example:

After five minutes, reinitiate boration.

3.17 Concurrent Steps

3.17.1 Indicate steps which are performed concurrently by listing related steps under a general step.

For example:

Maintain Pressurizer pressure at 2155 PSIG by the following:

- Operate Backup Heaters
- Adjust Pressurizer Pressure Controller.

3.17.2 In some instances, parameters must be monitored or checked while the operator performs a particular task. Describe the relationship of the actions.

For example:

Monitor Steam Generator Pressure while adjusting Steam Flow Controller.

3.18 Diagnostic Steps

To aid operators in verifying that they are in the correct procedure, and to direct them to the correct procedure when necessary, diagnostic steps should be included in emergency procedures.

For diagnostic steps, first instruct the operator to verify or check for a condition. Follow this with a conditional statement.

For example:

Verify maximum HPI flow.

IF HPI flow CANNOT be verified in both loops, THEN...

3.19 Caution Statements

Determine the need for caution statements from Emergency Procedure Technical Information Guides. When cautionary information is identified as necessary, it should be written in such a manner as to surely gain the operator's attention.

3.19.1 Place cautions immediately before the steps to which they apply.

3.19.2 Write cautions across the page, from margin to margin (for exact margin setting, see Appendix 7).

3.19.3 If a caution applies to only one step, include the step number.

For example:

CAUTION 2.3

If a caution applies to more than one step, do not include step numbers.

3.19.4 Do not write action steps in cautionary statements. If an action is required, write a step, not a caution.

3.19.5 Passive sentences (usually using "shall," "should," or "may") may be used to provide emphasis to cautionary statements, and to clearly separate them from steps.

For example:

CAUTION 5.1 If SI flow cannot be verified, symptoms should be monitored for inadequate core cooling.

Refer to Section 3.3.11 or Appendix 4 for meanings of "shall," "should," or "may."

3.19.6 Make caution statements as brief as possible, still including essential information.

3.19.7 Do not use the methods described in Section 2.8 for emphasis within cautions. For example, do not capitalize and underline the words "if," "then," "not," etc. Do capitalize procedure titles and capitalize the first letter of each word in specific nomenclature, system names, etc.

3.20 Note Statements

Note statements are included to provide information to the operator concerning specific steps or specific sequences of steps. Notes generally should contain information which is of most use to the inexperienced operator to aid in interpreting step information or making a decision. Notes must be brief and easily understood. Notes should not contain lengthy information which is available in control room reference documents, such as Technical Specifications.

3.20.1 Place notes immediately before the steps to which they apply, unless they should more logically follow.

3.20.2 Write notes across the page, from margin to margin (for exact margin setting, see Appendix 7).

3.20.3 If a note applies to only one step, include the step number.

For example:

NOTE 5.2

If a note applies to more than one step, do not include step numbers.

3.20.4 Do not write action steps in notes. If an action is required, write a step, not a note.

3.20.5 Passive sentences (usually using "shall," "should," or "may") may be used to provide emphasis to notes, and to clearly separate them from steps.

For example:

<u>NOTE</u> 4.5 B Emergency Injection Header must not be used unless PZR level cannot be maintained with A Header alone.

Refer to Section 3.3.11 or Appendix 4 for meanings for "shall," "should," or "may."

3.20.6 Make notes as brief as possible, still including essential information.

3.20.7 Do not use the previously described methods for emphasis within notes (see 3.19.7).

3.21 Location Information

Assume that the action occurs in the control room for most steps in emergency procedures. Only identify the location of actions or components which are located outside the control room, unless a very infrequently used component is involved.

3.21.1 Identify local, in-plant activities as follows:

Locally open valve number 2HP-31.

3.21.2 Identify the location of infrequently used components.

(1) EP-1
Unit 3

ID No: EP/3/A/1800/1A
Change(s) 0 to
0 Incorporated

DUKE POWER COMPANY
PROCEDURE PREPARATION
PROCESS RECORD

(2) STATION: Oconee Nuclear

(3) PROCEDURE TITLE: ABNORMAL TRANSIENT

(4) PREPARED BY: ______ DATE: 4-27-82

(5) REVIEWED BY: ______ DATE: ______

Cross-Disciplinary Review By: ______ N/R: ______

(6) TEMPORARY APPROVAL (IF NECESSARY):

By: ______ (SRO) Date: ______

By: ______ Date: ______

(7) APPROVED BY: ______ Date: ______

(8) MISCELLANEOUS:

Reviewed/Approved By: ______ Date: ______

Reviewed/Approved By: ______ Date: ______

APPENDIX 1

EMERGENCY PROCEDURE EXAMPLE

An attempt has been made to make the procedure which follows technically accurate. However, in some instances, the text has been modified to provide examples of points previously mentioned in the guide.

TABLE OF CONTENTS

ABNORMAL TRANSIENT
EP/3/A/1800/1A

1.0 Purpose

This procedure provides the immediate actions necessary to shut down the reactor following an initiating condition. It also provides diagnostic steps to determine a subsequent course of action.

2.0 Symptoms

2.1 A reactor trip is indicated by:

- Channel trip alarm on two OR more reactor protective channels
- Groups 1-7 control rod IN LIMIT light lit
- NIs indicating a rapid decrease in neutron power
- ICS runback in progress.

2.2 A S/G tube rupture is indicated by:

- LOW RC PRESSURE alarm
- LOW PRESSURIZER LEVEL alarm
- LDST level low OR decreasing more than normal
- Excessive RC makeup flow
- R1A-16 OR R1A-17 high radiation alarm
- R1A-40 high radiation alarm.

3.0 Automatic Systems Actions

3.1 Automatic actions for reactor trip include:

- Control rod groups 1-7 drop into the core
- Turbine generator trip
- Unit auxiliary load transfers to startup transformer

- Turbine bypass valves open at setpoint AND 125 PSI
- Feedwater runback to minimum level in OTSGs.

3.2 Automatic actions for a S/G tube rupture include:

- Possible reactor trip.

4.0 Immediate Manual Actions

_____ 4.1 Determine whether transient is a REACTOR TRIP OR a S/G TUBE RUPTURE.

4.1.1 IF transient is a REACTOR TRIP, THEN:

4.1.1.1 Manually trip reactor.

4.1.1.2 Manually trip turbine.

4.1.1.3 Go to Step 4.2.

4.1.2 IF a S/G tube rupture has occurred, THEN go to Section 504, Steam Generator Tube Rupture.

_____ 4.2 Verify neutron level decreasing.

_____ 4.3 Verify all rods on bottom.

_____ 4.4 Close HP-5 (Exact Nomenclature).

NOTE 4.5 B Emergency Injection Header must not be used unless PZR level cannot be maintained with A Header alone. If used, record in RO Log.

_____ 4.5 Maintain LDST level by adding water with boron concentration $\geq$ RCS boron concentration:

4.5.1 IF LDST level CANNOT be maintained, THEN:

- Open HP-24 (Exact Nomenclature).

4.5.2 IF PZR level CANNOT be maintained, THEN:

- Open HP-26 (Exact Nomenclature).

4.5.3 IF additional makeup is required, THEN:

- Open HP-24 (Exact Nomenclature).
- Start the Standby HPI Pump.

_______ 4.6 Verify feedwater has runback.

_______ 4.7 Verify all Turbine Stop Valves shut.

_______ 4.8 Verify auxiliaries on CT Transformer.

_______ 4.9 Verify NO ES alarms.

_______ 4.10 Verify NNI power on.

_______ 4.11 Verify ICS power on.

_______ 4.12 Verify adequate subcooling margin.

- IF NOT adequate, THEN go to Section 501, Lack Of Adequate Subcooling Margin.

_______ 4.13 Verify adequate primary to secondary heat transfer exists.

- IF NOT adequate, THEN go to Section 502, Lack Of Primary To Secondary Heat Transfer.

_______ 4.14 Verify primary to secondary heat transfer is NOT excessive.

- IF excessive, THEN go to Section 503, Excessive Primary To Secondary Heat Transfer.

_______ 4.15 Verify NO main steam lines or condenser air ejector radiation monitor alarms.

- IF alarms received, THEN go to Section 504, Steam Generator Tube Rupture.

CAUTION 5.0 Ensure plant conditions are stabilized prior to entering the following section.

5.0 Subsequent Operator Actions

Subsequent actions are contained in Sections 501-504. Section 501 starts on the next page.

Section 501

Lack Of Adequate Subcooling Margin*

1.0 Trip all RCPs.

2.0 Raise S/G levels....

3.0 IF ES 1 AND 2....

4.0 Compare....

5.0 Close RC-3 (Exact Nomenclature).

6.0 Close RC-4 (Exact Nomenclature).

7.0 IF adequate subcooling margin has been established, THEN go to step 8.1.

8.0 IF adequate subcooling margin has NOT been established, THEN go to step 8.7.

---

*This is an example of a section within 5.0, Subsequent Actions. A section within 6.0 would be structured similarly, except for the heading: CP-601, CP-602, etc. Most steps have been abbreviated, and substeps have been omitted.

Adequate Subcooling Margin Has Been Established*

8.1 Throttle HPI to maintain adequate subcooling margin.

8.2 Restart RCPs....

8.3 Do NOT exceed....

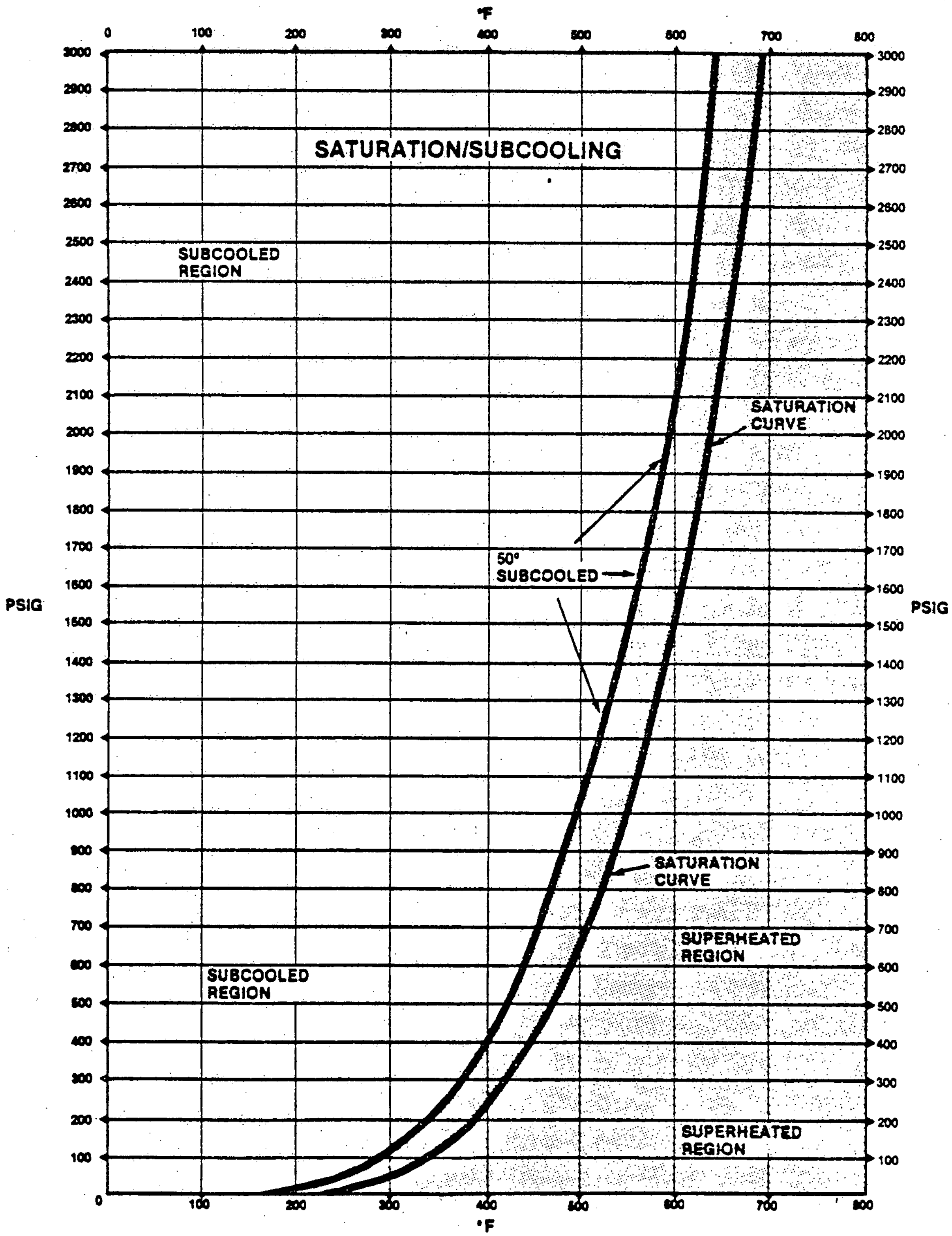
8.4 IF....

8.5 IF primary to secondary heat transfer is excessive, THEN go to Section 503, Excessive Primary to Secondary Heat Transfer, otherwise continue.

8.6 IF primary to secondary heat transfer is being controlled properly, THEN go to CP-605, Title.

*This is an example of a case within Section 501. Notice that the case starts with step 8.1. The numbering within a section should be continuous, and therefore should not start with 1.0 for each case.

ENCLOSURE 1. SATURATION/SUBCOOLING CURVE



APPENDIX 2

ABNORMAL PROCEDURE OUTLINE

TABLE OF CONTENTS

PROCEDURE TITLE
AP/1/A/1800/30

Section A

Title of Section

1.0 Purpose

Describe the purpose of the first section of the procedure.

2.0 Symptoms

2.1 First symptom

2.2 Second symptom

2.3 Third symptom

2.4 Fourth symptom

3.0 Automatic Systems Actions

3.1 First action

3.2 Second action

3.3 Third action

3.4 Fourth action

Section A

Title of Section

4.0 Immediate Manual Actions

_______ 4.1 First step

4.1.1 Substep

4.1.2 Substep

_______ 4.2 Second step

4.2.1 Substep

_______ 4.3 Third step

- Substep
- Substep

5.0 Subsequent Actions

_______ 5.1 First step

5.1.1 Substep

5.1.2 Substep

_______ 5.2 Second step

5.2.1 Substep

_______ 5.3 Third step

- Substep
- Substep
- Substep

_______ 5.4 Fourth step

5.4.1 Substep

Section A

Title of Section

______ 5.5 Fifth step

5.5.1 Substep

5.5.2 Substep

______ 5.6 Sixth step

- Substep
- Substep
- Substep

______ 5.7 Seventh step

5.7.1 Substep

END

Section B

Title of Section

1.0 Purpose

Describe the purpose of the second section of the procedures.

2.0 Symptoms

- Symptom
- Symptom
- Symptom

3.0 Automatic Systems Actions

3.1 First action

3.2 Second action

3.3 Third action

3.4 Fourth action

3.5 Fifth action

Section B

Title of Section

4.0 Immediate Manual Actions

______ 4.1 First step

4.1.1 Substep

______ 4.2 Second step

- Substep
- Substep
- Substep

______ 4.3 Third step

5.0 Subsequent Actions

______ 5.1 First step

- Substep

______ 5.2 Second step

5.2.1 Substep

5.2.2 Substep

5.2.3 Substep

5.2.4 Substep

______ 5.3 Third step

- Substep
- Substep

______ 5.4 Fourth step

Section B

Title of Section

______ 5.5 Fifth step

5.5.1 Substep

5.5.2 Substep

5.5.3 Substep

5.5.4 Substep

END

APPENDIX 3

DICTIONARY OF
ACRONYMS AND ABBREVIATIONS

OCONEE NUCLEAR STATION
DICTIONARY OF ACRONYMS AND ABBREVIATIONS

Absolute	ABS
Accumulator	Accum
Acknowledge	Ack
Administration	Admin
Air circuit breaker	ACB
Air compressor	Air Comp
Air conditioner (ing)	A/C
Air handling unit	AHU
Alarm	Alm
Alternate	Alt
Alternating current	AC
Approximate	Approx
Atmosphere	Atmos
Automatic	Auto
Auxiliary	Aux
Auxiliary service water	ASW
*Auxiliary steam system	AS
Auxiliary transformer	Aux fmr
Average	Avg
Average temperature	T_{avg} (T_{ave})

Barometer	Barom
Basement	BSMT
Battery	Batt
Battery charger	Batt chgr
Bearing	Brng
Bleed holdup tank	BHUT
Block	BLK
Block valve	BLK VLV

*Valve designator for that system

Blower	BLWR
Borated water storage tank	BWST
Boric acid mix tank	BAMT
Boron 10	B_{10}
Breaker	BKR
*Breathing air system	BA
British thermal unit	BTU
Building	Bldg
*Building spray system	BS
Bypass	Byp

Cabinet	CAB
Carbon dioxide	CO_2
Center line	℄
Change	Chng or chg
Charge (ing)	chag
Check valve	CHK VLV
Chemical	Chem
*Chemical addition system	CA
Chloride	CL
Circuit	CKT
Circulating	Circ
Closed	CLSD
Column	COL
*Component cooling system	CC
Compressor	Comp
Computer	Comptr
Concentrate	Conc
Concentrated boric acid storage tank	CBAST
Condensate booster pump	CBP

*Valve designator for that system

Condensate monitor tank	CMT
Condensate steam air ejector	CSAE
Condensate storage tank	CST
*Condensate system	C
Condensate test tank	CTT
*Condenser circulating water system	CCW
Control	CTRL
Control rod drive	CRD
Control valve	CV
*Coolant storage system	CS
*Coolant treatment system	CT
Cooler	CLR
Cooling	CLNG
*Core flood system	CF
Core flood tank	CFT
Counts per minute	CPM
Counts per second	CPS
Cubic feet	CUFT
Current transformer	CT

Damper	Dmpr
Deborating (ate)	Debor
Deborating ion exchanger	Debor IX
Decades per minute	DPM
Decay heat removal	DHR
Decontamination (ate)	Decon
Degree	Deg
Degrees Centigrade	Deg C (°C)
Degrees Fahrenheit	Deg F (°F)
Dehumidifier	Dehum
*Demineralized water system	DW
Demineralizer	Demin
Desuperheater	Desuphtr

*Valve designator for that system

Detector	Det
Diameter	Dia
Diesel generator	DG or D/G
Direct current	DC
Discharge	Disc. or Disch
Double pole double throw	DPDT
Double pole single throw	DPST
Down	DWN
Downcomer	DNCMR
Drain valve	DRN VLV
Drawing	DWNG or DWG
Electrical	ELEC
Electro hydraulic control	EHC
*Electro hydraulic control system	HO
Elevated water storage tank	EWST
Elevation	ELEV
Emergency	EMER
Emergency bearing oil pump	EBOP
Emergency core cooling system	ECCS
Emergency feedwater pump	EFWP
Emergency oil pump	EOP
Emergency power switching logic	EPSL
Emergency seal oil pump	ESOP
Engineering safeguards	ES
Engineering safety feature actuation system	ESFAS or ES
Equipment	Equip
Evacuation/ate	EVAC
Evaporator	EVAP
Exhaust	Exh
Expansion joint	EXPJT

*Valve designator for that system

Feedwater pump	FDWP or FWP
Feedwater pump turbine	FWPT
*Feedwater system	FDW
Feet	FT
Feet per second	FPS
*Fire hydrant system	FH
First, second, third	1st, 2nd, 3rd, etc.
First stage reheater	FSRH
Flow transmitter	FT
Forced draft fan	FD FAN
Forward	FWD
Frequency	FREQ
*Fuel oil system	FO
Gallon	GAL
Gallons per hour	GPH
Gallons per minute	GPM
*Gaseous waste disposal system	GWD
Gaseous waste disposal tank	GWD TNK
Gaseous waste release	GWR
Generator	GEN
Governor	GOV
Governor valve	GOV VLV
Ground	GND
Header	HDR
Health physics	HP
Heater	HTR
Heater drain pump	HDP
*Heater drains system	HD
*Heater vent system	HV

*Valve designator for that system

Heating, ventilation and air conditioning	HVAC
High	HI
High activity water tank	HAWT
High efficiency particulate air	HEPA
*High pressure extraction system	HPE
High pressure injection pump	HPIP
High pressure injection system	HPI
*High pressure injection system	HP
*High pressure service water system	HPSW
Hot well	HW
Hot well pump	HWP
Hydrazine	NH_4
Hydrogen	H_2
Hydrogen ion concentration	pH
*Hydrogen system	H

Inboard	I/B
Inch	IN
Inches of mercury	IN HG
Incorporated	INC
Injection	INJ
Instrument	INST
*Instrument air system	IA
Insulation	INSUL
Integrated control system	ICS
Interim rad waste	IRW
Inverter	INVTR
Ion exchanger	IX
Isolation (ate) (ed)	ISOC

*Valve designator for that system

Junction	JCT
Kilovolt	KV
Kilovolt-ampere	KVA
Kilovolt-ampere reactive	KVAR
Kilowatt	KW
Laundry and hot shower tank	LHST
Lead	Pb
Letdown	L/D
Letdown storage tank	LDST
Level transmitter	LT
Liquid	LIQ
*Liquid waste disposal	LWD
Liquid waste release	LWR
Lithium hydroxide	LiOH
Load center	LDCTR
Load frequency control	LFC
Locked closed	L.C.
Locked open	L.O.
Low	Lo
Low activity waste tank	LAWT
*Low pressure extraction system	LPE
Low pressure injection	LPI
Low pressure injection pump	LPIP
*Low pressure injection system	LP
Low pressure service water	LPSW
Lube oil purifier	LOP

*Valve designator for that system

Main feeder bus	MFB
Main seal oil pump	MSOP
*Main steam	MS
Main steam control valve	MSCV
Main steam isolation valve	MSIV
Main steam stop valve	MSSV
Main turbine oil tank	MTOT
Make up	M/U
Manual	MAN
Maximum	MAX
Mechanical	MECH
Megavolt ampere reactive	MVAR
Megawatt	MW
Megawatt electrical	MWE
Megawatt thermal	MWT
Mezzanine	MEZZ
Minimum	MIN
Miscellaneous	Misc
Miscellaneous waste holdup tank	MWHUT
Moisture separator reheater	MSRH
Motor	MTR
Motor control center	MCC
Motor driven emergency feedwater pump	MDEFWP
Motor operated disconnect	MOD

Narrow range	NR
Negative	Neg
Net positive suction head	NPSH
Neutral	NEUT
Nil ductility temperature	NDT
Nitrogen	N_2
*Nitrogen system	N
Normally	Norm

*Valve designator for that system

Normally closed	NC
Normally open	NO
Nuclear instruments	NI
Oconee Nuclear Station	ONS
Oil circuit breaker	OCB
Operate (tions)	Oper
Outboard	O/B
Overflow	OVF
Overhead	OVHD
Oxygen	O_2
Package	PKG
Panel	PNL
Panel board	PNLBD
Particulate, absolute, charcoal filter	PAC filter
Parts per billion	PPB
Parts per million	PPM
Penetration	PENT
Penetration room	Pen. Rm
Penetration room ventilation	PRV
*Penetration room ventilation system	PR
Phase	PH or Ø
*Plant heating steam system	PH
Pneumatic	PNEU
Pneumatic circuit breaker	PCB
Polishing demineralizer system	POWDEX
Positive	POS
Pounds per hour	LB/HR

*Valve designator for that system

Pounds per square inch	PSI
Pounds per square inch absolute	PSIA
Pounds per square inch differential	PSID
Pounds per square inch gauge	PSIG
Power	PWR
Power factor	PF
Power operated relief valve	PORV
Power range	PR
Pressure	Press
Pressure gauge	PG
Pressure transmitter	PT
Pressurizer	PZR
Primary	PRI
Public address system	PA
Pump	Pmp
Purifier (cation)	Purif
Quality assurance	QA
Quantity	QTY
Quench tank	QT
Radiation	RADN
Radiation monitor	RIA
Reactor	RX
Reactor building	RB
Reactor building cooling unit	RBCU
Reactor building normal sump	RBNS
Reactor coolant average temperature	T_{ave} (T_{avg})
Reactor coolant bleed holdup tank	RC BHUT
Reactor coolant cold leg temperature	T_c
Reactor coolant hot leg temperature	T_h
Reactor coolant pump	RCP

*Valve designator for that system

*Reactor coolant system	RC
Reactor protective system	RPS
Reactor vessel	RV
Recirculating (ate)	Recirc
*Recirculating cooling water system	RCW
Recirculating seal oil pump	RSOP
Recorder	RCDR
Rectifier	Rect
Refrigeration	Refrig
Regenerative	REGEN
Reheat stop valve	RSV
Reheater	RHTR
Relief valve	RLF VLV or RV
Required	REQD
Resistance temperature detector	RTD
Return	RTN
Revision	REV
Revolutions per minute	RPM
Room	Rm

Sample	SMPL
Schematic	SCHEM
*Seal oil system	SO
Seal oil vacuum pump	SOVP
Second stage reheater	SSRH
Secondary	SEC
Section	SECT
Sequence	SEQ
*Service air system	SA
Shield wall	SH

*Valve designator for that system

Shielding	SHLD
Shut down	SD
Single pole double throw	SPDT
Single pole single throw	SPST
Spent fuel cooling pool	SFP
*Spent fuel cooling system	SF
Spent resin storage tank	SRST
Standard cubic feet per minute	SCFM
Standard cubic feet per second	SCFS
Standby	Stby
Start up	SU
Station	STA
*Stator coolant system	SC
Steam	Stm
*Steam drain system	SD
Steam generator	S/G or SG
Steam packing exhausts	SPE
*Steam seal system	SSH
Stop valve	SV
Strainer	STRNR
Suction	SUCT
Superheater	Suphtr
Switch board	SWBD
Switch gear	SWGR
Switch yard	SWYD
Synchronize	SYNC
System	SYS
Tank	TNK
Temperature	Temp
Temperature transmitter	TT
Transfer	Xfer

*Valve designator for that system

Transformer	Xformer
Transmitter	Xmitter
Tritium	H_3
Turbine	Turb
Turbine building	Turb Bldg
Turbine building sump	TBS
Turbine driven EFWP	TDEFWP
Turbine generator	Turb Gen
*Turbine lube oil system	TO
Turning gear	TG
Turning gear oil pump	TGOP
Under voltage	UV
Upper surge tank	UST
Vacuum	Vac
*Vacuum system	V
Valve	VLV
Ventilation	Vent
Vibration	Vib
Volt	v
Volt ampere	VA
Volt ampere reactive	VAR
Voltage alternating current	VAC
Voltage direct current	VDC
Voltage regulator	VREG
Waste disposal	WD
Waste gas filter	WG filter
Water	WTR
Wide range	WR

*Valve designator for that system

APPENDIX 4

CONSTRAINED LANGUAGE LIST
AND INDEX

CONSTRAINED LANGUAGE LIST

Align	Place systems or components, for example, valves and breakers, in proper positions for accomplishing specified function.
Can	Refers to possible response of equipment.
Check	Determine present status.
Close	For valves, generally involves completely stopping flow, e.g., Close 1NC-31 (PZR PWR Relief). For electrical devices, such as breakers, refers to making an electrical connection to supply power.
Complete	To accomplish specific procedural requirements.
De-energize	Remove power supply.
Depress	Refers to pushbutton operation.
Determine	Implies technical knowledge. Make a decision based on operational knowledge.
Drive	Movement of reactor control rods, either in or out.
Energize	Supply power.
Ensure	Take necessary/appropriate actions to guarantee component, reading, etc., is as specified.
Establish	Perform actions necessary to meet stated condition.
Evaluate	Appraise the situation. Implies technical knowledge.
Faulted	The piece of equipment which has currently become inoperable.
Go	Proceed to and remain where specified. In the case of procedures, discontinue use of present procedure and perform actions of cited procedure.
If	Establishing a prerequisite which must be met before performing step. Provides starting statement of optional actions.
Implement	Commence a required program or series of procedures.
Initiate	Take actions to begin a process.
Inspect	Examine or review present condition.
Isolate	Remove from service.

Locally	Take action outside the control room.
Maintain	Take appropriate actions to prevent fluctuation/changing.
Manually Initiate	Operator action which activates a function which is normally initiated automatically due to plant conditions.
Manually Trip	Operator action to activate a Reactor Trip or stop an operating piece of equipment such as a pump.
May	Refers to an operation which is possible, but perhaps is not necessary.
Modulate	Position a valve to a required position by use of controller to establish a required parameter.
Monitor	Periodically check status. Observe current trend.
Nonfaulted	An operational component which is redundant to one which has malfunctioned.
Notify	Inform specified personnel.
Open	For valves, generally involves removing barrier to allow flow, e.g., Open 1NC-31 (PZR PWR Relief). For electrical devices, such as breakers, refers to breaking an electrical connection which removes a power supply.
Per	As specified in or by named procedure. Implies that referencing the document is optional.
Place	Physically position a switch to the specified location.
Rack in	Place an electrical breaker in place by physically connecting it to its associated power source.
Rack out	Remove an electrical breaker from service by physically disconnecting it from its associated power source.
Record	Document requested information on form provided.
Refer	Use as a supplement. Perform applicable actions of cited procedure and return to the controlling procedure.
Regulate	Control or restrict.
Restore	Return to service.
Rotate	Turn a rotary multiposition switch to the required position. In reference to pump, hand-rotate before energizing.
Secure	Remove from service. Take appropriate action to prevent return.

Shall	Implies mandatory requirement.
Shift	Specifies changing mode of operation.
Should	Implies nonmandatory, preferred, or desired method.
Start	Institute activity/function. To place into operation.
Stop	To end activity/function. Halt operation.
Survey	Inspect, examine. Complete survey form.
Suspend	Stop actions at that point. Leave system as it stands at that time.
Throttle	Place a valve in an intermediate position to restrict flow to the required amount. Implies that an automatic controller has been placed in a manual mode of operation.
Trip	Effect a complete and total immediate shutdown.
Verify	Determine if in proper condition/status.

CONSTRAINED LANGUAGE INDEX

<u>Valve Actions</u>

Align

Close

Open

Shift

Throttle

Transfer

Vent

<u>Technical Knowledge Actions</u>

See Mental Actions

APPENDIX 5

PUNCTUATION AND USAGE HANDBOOK

PUNCTUATION AND USAGE HANDBOOK

1.0 SPELLING

Spelling should be accurate.

2.0 PUNCTUATION

2.1 Apostrophe

- Use an apostrophe to indicate possession.

  For example:

  Foreman's desk.

- An apostrophe is used to indicate a contraction. Do not use contractions, such as "can't" or "it's."
- Avoid the use of apostrophes to indicate plurals, especially with acronyms. For example, use RCPs as the plural of RCP.

2.2 Brackets

- Do not use brackets.

2.3 Colon

- Use a colon to indicate a series or list.

  For example:

  Ensure the following valves are open:

  a. 3RC-169 (Loop 3A Hi Point Vent Block)

  b. 3RC-19 (Loop A High Point Vent)

  c. 3RC-138 (Loop 3B Hi Point Vent B)

  d. 3RC-38 (Loop B High Point Vent).

- Use a colon to indicate ratios or proportions. Avoid the use of ratios, if possible.

2.4 Comma

- Use a comma to set off an introductory clause or phrase.

  For example:

  IF RCS subcooling margin is less than 50°F, THEN initiate cooldown by dumping steam from the nonfaulted Steam Generator.

- Use a comma to separate elements for clarity or emphasis. Leave two spaces after the comma when commas are used in this manner.

For example:

... THEN go to Section 5.4, Steam Generator Tube Rupture.

- Use a comma to separate items in a series.

  For example:

  Open breakers # 6, 8, 10, 12, locally.

- Use a comma to separate four or more digits.

  For example:

  10,000 ppm.

2.5 Dash (—)

- Do not use the dash.

2.6 Ellipsis (. . .)

- Do not use the ellipsis.

2.7 Exclamation point

- Do not use the exclamation point.

2.8 Hyphens (-)

- Avoid using hyphens in words. Use a dictionary as a guide for determining those words which must appear hyphenated.
- Use hyphens to indicate syllable breaks where a word must be carried over from one line to another. Wherever possible, avoid breaking words.

  For example:

  Check FW pump in-

  dicators for flow.

- Use a hyphen when it appears in component numbers.

  For example:

  3RC-79 (CRD Vent Header Hose Isolation).

2.9 Italics

- Do not use italics.

2.10 Parentheses

- Enclose component nomenclature in parentheses.
- Use parentheses to set off explanatory or supplementary information.

  For example:

  Sodium hydroxide (NaOH)

2.11 Periods

- Use a period to indicate the end of a sentence.

  For example:

  Verify Containment Pressure is below 3.0 PSIG.

- Use a period after initials.

  For example:

  L. Flagg

- Follow numbers or letters in a list with a period.

  For example:

  1. or a.

- Use a period after major steps which are not followed by substeps.

  For example:

  Go to EP/O/A/5000/5, NOTIFICATION OF UNUSUAL EVENTS.

- Use a period after the last item in a list.

  For example:

  a. 3CS-56 (Bleed Transfer Pump 3B Discharge)

  b. 3CS-56 (Bleed Transfer Pump 3A Discharge).

2.12 Question Mark

- Do not use the question mark.

2.13 Quotation Mark

- Use a quotation mark to acknowledge specifically reproduced material.

  For example:

  10 CFR 50, Appendix B, states, "Instructions, procedures or drawings shall include appropriate qualitative or quantitative acceptance criteria for determining that important activities have been satisfactorily accomplished."

2.14 Semicolon

- Avoid the use of semicolons, since they encourage long sentences.

2.15 Slants

- Use slants with document codes.

  For example:

  EP/1/A/500/2

- Use slants with units of measure.

  For example:

  lbs./hr.

3.0 WRITING STYLE

3.1 Vocabulary

- Use the simplest words available to state an idea.
- Use short, well-known words.
- Use words familiar to the operator.
- Use words standard to the industry.
- Use specific words that precisely describe an action.
- If possible, avoid ambiguous adverbs such as "frequently" or "slowly."
- Define the acceptable criteria.

  For example:

  This—Check every 10 minutes.

  Not this—Check frequently.

- Do not use contractions, especially negative ones, since negative words are to be underlined for emphasis.

3.2 Sentence Structure

- Use short sentences (20 words or less).
- Use simple sentences. Avoid more than one main idea per sentence. If possible, break a lengthy sentence into two or more sentences.
- Use direct command statements.

  For example:

  Open Valve AB.

- Begin action steps with action verbs. Objects should follow verbs where possible.

  For example:

  Verify Reactor Trip.

- Use the same sentence structure for all statements. Use an action verb followed by an object.
- Use positive statements.

  For example:

  This—Cover container when NOT in use.

  Not this—Do NOT leave container uncovered when NOT in use.

- State prerequisites prior to an action.

  For example:

  Verify lube oil pressure is normal, then start pump.

- Be concise. Avoid words not necessary for clear meaning of sentence.

- Eliminate unnecessary information.

- Avoid complex sentences with two or more coordinate clauses. If possible, break into simpler sentences.

  For example:

  This—Open AB Valve.
  Increase tank pressure to 1500 PSIG.
  Close XY Header Valve.

  Not this—Open AB Valve, increase tank pressure to 1500 PSIG AND close XY Header Valve.

- Avoid Latin phrases. Use the similar English version.

- Use command rather than instructional statements.

  For example:

  This—Remove # 3 bolt.

  Not this—The # 3 bolt must be removed.

APPENDIX 6
GUIDELINES FOR WORD PROCESSING

GUIDELINES FOR WORD PROCESSING

1.0 COVER PAGE

1.1 Use Duke Power Company Procedure Preparation Process Record (Form 34731).

1.2 In the upper right-hand corner, type the following:

- Procedure number
- Unit number
- Document code
- Change information.

1.3 Place station name in initial capital letters on line provided.

1.4 Place procedure title in capital letters on line provided.

2.0 TABLE OF CONTENTS

2.1 Place the following in the right-hand corner:

- Procedure number
- Unit number
- Page number.

2.2 Center the following at the top of the page:

- Procedure title
- Document code
- The words "TABLE OF CONTENTS."

2.3 Place the page heading over the right-hand column.

2.4 For abnormal procedures, organize and type table as follows:

A. Section

1.0 Purpose

2.0 Symptoms

3.0 Automatic Systems Actions

4.0 Immediate Manual Actions

5.0 Subsequent Actions

B. Section

1.0 Purpose

2.0 Symptoms

3.0 Automatic Systems Actions

4.0 Immediate Manual Actions

5.0 Subsequent Actions

6.0 Enclosures

2.5 Number pages i, ii, iii, iv, etc.

2.6 Modify the above as necessary for other procedures.

3.0 DIVISION HEADINGS

3.1 Place division headings at left margin.

3.2 Type headings as follows:

1.0 Purpose

2.0 Symptoms

3.0 Automatic Systems Actions

4.0 Immediate Actions

5.0 Subsequent Actions

6.0 Cooldown Procedures

7.0 Inadequate Core Cooling

8.0 (or 6.0) Enclosures

4.0 PAGE BREAKS

4.1 Place Table of Contents on a separate page.

4.2 Start 4.0 (Immediate Actions) on a new page.

4.3 Place each enclosure on a separate page.

4.4 Keep a step and its associated substeps on one page if possible. If page break occurs in the middle of a step, place the complete step on the second page.

4.5 Cautions and notes appear on the same page as the step to which they apply.

5.0 SPACING - TABLE OF CONTENTS

5.1 Single-space after the following:

- Procedure number
- Unit number
- Procedure title.

5.2 Double-space after the following:

- Section title
- Division headings.

5.3 Triple-space the following:

- After document code
- After Table of Contents header
- Between sections.

6.0 SPACING - PROCEDURE BODY

6.1 Single-space within the following:

- Notes
- Cautions
- Procedure name-document code block.

6.2 If possible, use one and one-half spaces within the following:

- Steps
- Substeps.

6.3 Double-space the following:

- After Oconee Nuclear Station header (appears on page 1 only)
- Between steps
- Between substeps
- After division heading
- After notes
- After cautions.

6.4 Triple-space the following:

- After procedure name-document code block
- After section number
- After section or case title
- Before division heading
- Before notes
- Before cautions
- Before END in abnormal procedure sections.

6.5 Place two spaces after the comma separating document numbers and titles in reference statements.

6.6 Place two spaces after the comma separating an IF statement from a THEN statement.

7.0 MARGINS

7.1 Use the following margins:

- Top - 1 1/2 inches
- Left - 1 1/4 inches, elite - 15
- Right - 1 inch, elite - 96
- Bottom - 1 inch.

8.0 CAUTIONS

8.1 Type the word CAUTION in capital letters and underline it.

8.2 When a caution refers to one step, number the caution with the same number as the step.

8.3 Triple-space preceding and double-space following the caution.

8.4 Type a caution and its associated step on the same page.

CAUTION 4.12 If SI flow cannot be verified, symptoms should be monitored for AP/1/A/5500/05, INADEQUATE CORE COOLING.

9.0 NOTES

9.1 Type the word NOTE in capital letters and underline it.

9.2 When a note refers to one step, number with the same number as the step to which it refers.

9.3 Triple-space preceding and double-space following the note.

9.4 Type a note and its associated step on the same page.

9.5 Type notes as follows:

NOTE 4.9 The following action will cause the Pressurizer Relief Tank Rupture Disk to break.

10.0 <u>CAPITALIZATION</u>

10.1 Use capital letters for the following:

- Procedure title
- Procedure number (EP, AP)
- Annunciator legends
- System designators of two or three letters
- Engineering/equipment prefixes
- Referenced procedure titles

10.2 Use initial capital letters for the following:

- First word in a sentence
- First word in a phrase used in a list
- Major system names
- Major equipment
- Proper nouns
- Plant conditions
- "Tavg," "Reactor Trip," "Turbine Trip"
- Exact control board nomenclature.

10.3 Use capital letters and underlining for the following:

- <u>IF</u>
- <u>THEN</u>
- <u>AND</u>
- <u>OR</u>
- <u>UNLESS</u>
- Any negative such as <u>NOT</u>, <u>NEITHER</u>, or <u>NOR</u>
- <u>NOTE</u>
- <u>CAUTION</u>
- <u>END</u> signifying the end of an abnormal procedure section.

10.4 Use initial capital letters and underlining for the following:

- Section titles
- Case titles
- Division headings
- Referenced subprocedure titles.

11.0 PAGE NUMBERING AND HEADINGS

11.1 Place the following information in upper right corner:

- Procedure number
- Unit number
- Page ______ of ______.

12.0 CHECK-OFF/OPERATOR INITIAL LINES

12.1 Place check-off/operator initial lines in the left margin.

12.2 Provide check-off/operator initial lines for each immediate action and subsequent action step.

13.0 STEP BREAKDOWN

13.1 In each division:

- Number steps using section number followed by consecutive numbers (e.g., 4.1, 4.2, 4.3).
- Where actions do not have to be performed in a specific sequence, use bullets with substeps.
- Where substeps must be performed in a specific sequence, number the substep by steps within sections using consecutive numbers (e.g., 5.6.1, 5.6.2, 5.6.3).

14.0 FONT

14.1 Use elite type (12 characters per inch).

14.2 Use unadorned font (no serifs). Letter Gothic (shown below) is the acceptable font.

LETTER GOTHIC (12 Pitch)   ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
!@#$%¢&*()_+,.'"?/.,

DUKE POWER COMPANY

OCONEE NUCLEAR STATION

PROPOSED VERIFICATION PROCESS FOR

EMERGENCY PROCEDURES

1.0 Purpose

1.1 The purpose of this procedure is to define the administrative process to be used in the verification of Operations Emergency Procedures.

2.0 References

2.1 EMERGENCY OPERATING PROCEDURES VERIFICATION GUIDELINE - by INPO, December, 1982.

2.2 NUREG - 0899

2.3 ONS WRITER'S GUIDE FOR EMERGENCY AND ABNORMAL PROCEDURES

3.0 Description

3.1 The verification process will consist of two phases:

A. Written Correctness - To ensure procedures conform to the format and principles specified in the Writer's Guide.

B. Technical Accuracy - To ensure procedures are technically accurate, consistent with the plant specific operating guidelines based on Vendor Guides, and include all appropriate licensing commitments.

3.2 Both phases of verification must be completed prior to implementation of all Emergency Procedures and changes to Emergency Procedures. Since the two phases are independent, they will be performed as required to minimize impact on Emergency Procedure implementation.

4.0 Responsibilities

4.1 Superintendent of Operations

A. Shall have overall responsibility for the verification process.

B. Shall have the ultimate responsibility to resolve any conflicts arising during the resolution of discrepancies in the verification process.

5.0 Reporting Requirements

None

6.0 Verification of Written Correctness

6.1 Designation of Personnel

The Superintendent of Operations shall designate personnel as required to perform the verification for written correctness. The verifier(s) should have an adequate knowledge of the procedures and be familiar with the Writer's Guide. The verifier(s) shall be other than the procedure developers or procedure reviewers.

6.2 Written Correctness Verification Phase

A. Overall Procedure Review

The verifier(s) will make a general review of the Emergency Procedure completing the Overall procedure Evaluation Criteria (Attachment 1).

The verifier(s) will record his comments for criteria not met on the copy of the procedure marked as the "VERIFICATION COPY". If no discrepancies are noted, Attachment 1 will document that the review did take place.

B. The verifier(s) will then make a Step-by-Step review of the Emergency Procedure using the Step-Specific Evaluation Criteria For Written Correctness (Attachment 2). He shall document the review of each step, note, and caution against the evaluation criteria.

C. Resolution

The verifier(s) shall forward the "Verification Copy" of the procedure with his comments to the procedure writer for resolution. The procedure writer will document his response(s) to the verifier(s) comments on the "Verification Copy" of the procedure. The procedure writer may be able to resolve comments by justifying remarks or changing the procedure and documenting either path on the "Verification Copy" of the procedure.

If resolution of the comment cannot be reached between the verifier(s) and the procedure writer, the Superintendent of Operations will resolve the discrepancy.

D. The procedure writer will generate a "procedure package", which will include the verifier(s) original comments and the resolutions of the comments, the "Verification Copy" of the procedure. This "procedure package" will be sent to the Superintendent of Operations for Approval of the emergency procedure. The "procedure package" will then be maintained as a part of the procedure process record.

7.0 Verification of Technical Accuracy

7.1 Designation of Personnel

The Manager of Nuclear Engineering shall designate a Technical Verification Engineer (TVE) for performing the technical verification.

7.2 Determination of Need for Technical Verification for Revisions

The Superintendent of Operations shall determine the need for technical verification for each Emergency Procedure revision. Technical verification is required unless the revision consists of editorial changes only.

7.3 Technical Verification Process

Technical Verification will be completed by one of the following procedures:

A. Normal Procedure

The procedure writer shall transmit to the TVE a copy of the revised Emergency Procedure. The copy will clearly indicate the revised sections. A description of the objective of the revision will be attached. A requested date for the technical verification will be included.

B. Expedited Procedure

For situations warranting an expedited technical verification, the Superintendent of Operations shall initiate a request for verification to the TVE by phone. The information necessary for the technical verification process will then be transmitted orally or by telecopy. The results of the technical verification will then be returned by phone and constitute the necessary approval for implementation of the revision. Formal documentation shall be undertaken shortly thereafter and completed according to the normal procedure.

7.4 Resolution

The TVE shall forward the reviewed procedure with his comments and Attachment II to the procedure writer for resolution. The procedure writer will document his response(s) to the reviewer's comments on the reviewed procedure copy. The procedure writer may be able to resolve comments by justifying remarks or changing the procedure and documenting either path on the procedure. If a resolution cannot be reached by the reviewer and procedure writer, the Superintendent of Operations will resolve the comment.

7.5 Documentation

The content of the technical verification for each Emergency Procedure revision shall be maintained permanently by the TVE.

7.6 Contacts

Station	Ext.	Home Phone
Procedure writer - Dennis Gordon	1451	
First alternate - W. M. McClain	1468	
Second alternate - J. N. Pope	1210	

Nuclear Engineering - General Office

TVE - All Stations	G.O. Ext.	Home Phone
G. B. Swindlehurst (Gregg)	5176	366-1403
TVE - First Alternate - Oconee		
J. M. Boone (Jim)	8868	536-8211
TVE - Second Alternate - All Stations		
P. M. Abraham (P.M)	4520	366-2898
TVE - Management - All Stations		
K. S. Canady (Ken)	4712	847-8336
G. O. Telecopy 17th floor Wachovia	8033	(Confirmation 5280)
11th floor Wachovia	4508	(Confirmation 5427)

ATTACHMENT 1

WRITTEN CORRECTNESS EVALUATION CRITERIA

OVERALL PROCEDURE

Procedure Number: __________

Procedure Title: __________

Change Number: __________

Reviewer(s): __________

Date(s): __________

In performing the Overall Procedure portion of the Verification of Written Correctness, initial and date each evaluation criteria (Attachment 1) when it can be answered "yes" for the entire procedure.

If an evaluation criteria is not met, then mark the discrepancy's in the "Verification Copy" of the procedure and include in the comments the number of the evaluation criteria not satisfied.

ATTACHMENT 1

WRITTEN CORRECTNESS EVALUATION CRITERIA

1.0 Format

_____1.1 The cover page includes the following correct information:

a. Procedure title
b. Procedure number and changes incorporated
c. Station name

_____1.2 The Table of Contents includes the following correct information:

a. Procedure title
b. Procedure name
c. Case Titles (where applicable)
d. Case page numbers (where applicable)
e. Section headings
f. Section page numbers

_____1.3 Each page contains the following correct information:

a. Procedure title
b. Page number
c. Procedure number and station designation
d. Case title, if needed

_____1.4 All pages of the procedure are present.

_____1.5 Section headings standout from the text.

_____1.6 Printed material contains outer margins of at least 1/2 inch. (i.e. printed borders are visible on all pages)

_____1.7 Inner margins are large enough to prevent information from being obscured by the binding.

_____1.8 All graphs, tables and charts in the test are legible.

_____1.9 Caution statements are emphasized to standout from the text.

_____1.10 Enclosures are easy to discriminate from text information.

_____1.11 Enclosures are properly labeled.

_____1.12 The general format of the Emergency Procedure is consistent with the Writer's Guide.

2.0 Style and Content

_____2.1 Short words (of less than 10-12 characters) are used.

_____2.2 Ambiguous words and phrases are avoided.

_____2.3 Positive or affirmative sentences are used rather than negative ones, whenever possible.

_____2.4 The text stipulates precisely what actions or decisions are required.

_____2.5 The text is compatible with the operator's viewpoint and training.

_____2.6 Only abbreviations, acronyms and symbols appearing in the Writer's Guide dictionary are used.

3.0 Technical Decisions

_____3.1 The procedure has a unique and permanently assigned number.

_____3.2 The procedure has a descriptive title.

_____3.3 The purpose statement clearly specifies the function of the procedure.

_____3.4 The procedure provides major symptoms of the emergency without being excessive.

_____3.5 The use of referencing other procedures is used appropriately only to eliminate excessive detail.

_____3.6 Precautions which must be observed are written in caution statements.

_____3.7 Enclosures contain only information needed to accomplish the procedure.

_____3.8 Informational material is written in note statements.

_____3.9 The sequence of steps is logical and accurate.

_____3.10 A list of all procedures referenced within this procedure was made.

4.0 Procedure

_____4.1 All steps of this procedure have been evaluated and meet the evaluation criteria of Attachment 2.

ATTACHMENT 2

WRITTEN CORRECTNESS EVALUATION CRITERIA

STEP - SPECIFIC

In performing the Step-Specific portion of the Verification of Written Correctness, initial and date and put "SAT" next to each step of the "Verification Copy" of the procedure when the step meets all of the evaluation criteria of Attachment 2.

If an evaluation criteria is not met, then mark the discrepancy in the step and include in the comments the initials/date of the reviewer and the number of the evaluation criteria not satisfied.

1.0 Format

_____1.1 Steps are numbered correctly.

_____1.2 Caution and note statements do not contain action steps.

ATTACHMENT 2

_____1.3 Caution statements precede the applicable step.

_____1.4 Note statements preced the applicable step, when appropriate.

_____1.5 Valve references include component number and nomenclature where necessary for clarity.

_____1.6 Referenced procedures are identified by both title and number.

_____1.7 Check-off or initial sign-offs are provided.

2.0 Style and Content

_____2.1 Sentences are short (20 words or less).

_____2.2 Steps appear as short concise statements (not paragraphs) and deal with only one idea.

_____2.3 The action to be taken is specifically identified (open, close, rack in, etc.).

_____2.4 Statements are written as follows: Action Verb ----- object.

_____2.5 If there are more than three objects, they are listed.

_____2.6 In conditional statements (IF ... THEN), the IF statements are listed first.

_____2.7 Limits and tolerances are expressed quantitatively (930-940 PSIG, etc.) whenever possible.

3.0 Technical Decisions

_____3.1 The instructions to "REFER TO" and "GO TO" other procedures are used correctly.

_____3.2 The entry and exit conditions as listed in the procedure direct the operator to the correct step of the correct procedure.

REACTOR SAFETY

PROCEDURES

RS - 003

TECHNICAL VERIFICATION OF NUCLEAR STATION
EMERGENCY PROCEDURES AND GUIDELINES

Implementation Date

February 21, 1983

Approved By: Greg R. Swindlehurst Date Feb 21, 1983

Title: Associate Engineer

Approved By: P. M. Abraham Date Feb. 21, 1983

Title: System Engineer, Reactor Safety

RS - 003

TECHNICAL VERIFICATION OF NUCLEAR STATION EMERGENCY PROCEDURES AND GUIDELINES

Purpose

This procedure outlines an appropriate method for performing the technical verification of nuclear station emergency procedures, plant specific emergency procedure guidelines, and NSSS vendor guidelines. The procedure is applicable to both the initial verification and the long term maintenance of the plant specific guidelines and emergency procedure revisions.

RS - 003

TECHNICAL VERIFICATION OF NUCLEAR STATION EMERGENCY PROCEDURES AND GUIDELINES

1.0 INTRODUCTION

NUREG-0737, "Clarification of TMI Action Plan Requirements," I.C.1, "Guidance for the Evaluation and Development of Procedures for Transients and Accidents," outlined requirements for upgrading nuclear station emergency procedures. This was followed by SECY-82-111B/Supplement 1, "Requirements for Emergency Response Capability," which provides further clarification for upgrading emergency procedures. A major area for concern is the requirements for a verification and validation (V&V) program to be performed and maintained prior to implementation of the upgraded procedures and future revisions to the procedures.

The verification program consists of two activities. First, a verification to assure written correctness is performed. A subsequent verification is concerned with technical content and accuracy. The validation program determines that the procedures will work in a control room environment in real time. This procedure is concerned only with the verification for technical content and accuracy.

Although the objective is to verify the technical accuracy of the station emergency procedures, it also necessarily involves verification of the background and reference documents used by the procedure writer. The background and reference documents of interest are the NSSS vendor guidelines, and the plant specific emergency procedure guidelines.

This procedure specifies an appropriate method for verification of the background and reference documents used by the emergency procedure author, and also for the verification of the proposed emergency procedure. The procedure results in a format for a comprehensive and thorough technical review which is documented in an efficient and traceable manner. The procedure also provides for resolution of outstanding concerns.

2.0 SCOPE

This procedure is for implementation within Reactor Safety.

3.0 APPLICABILITY

This procedure is applicable to the initial technical verification of NSSS vendor guidelines, plant specific emergency procedure guidelines, and emergency procedures for all nuclear stations. It is also applicable to the long term maintenance of the plant specific guidelines, and to technical verification of emergency procedure revisions.

4.0 TECHNICAL VERIFICATION OF NSSS VENDOR GUIDELINES

4.1 Initial Verification

4.1.1 Objective

The objective of the initial verification of the vendor guidelines is to determine that the guidelines provide correct and achievable methods for mitigation of plant transients. The verification process shall also determine the completeness and the limits of applicability of the guidelines. The results of the initial verification are utilized for correcting and updating the plant specific guidelines.

4.1.2 Method

The vendor guidelines are based on an integration of analysis, operating experience, and engineering judgment. The verification process shall assess the correctness and reasonableness of the analytical bases, the interpretation of lessons learned from operating experience, and the logic and thought processes utilized to convert knowledge into procedures. The method for verification is detailed in the following sections.

4.1.2.1 Verifier Qualifications

The Lead Safety Analysis Engineer shall determine that the verifier is qualified to perform the technical verification of vendor guidelines.

4.1.2.2 Control of the Document

The version of the document undergoing verification shall be controlled and uniquely specified. Revisions and updates to the documents require subsequent verification.

4.1.2.3 Guideline Review

The verifier shall develop a list of review comments which record observations of errors, inconsistencies, omissions, etc., of any nature. The comments shall pertain directly to the guideline documentation but may also include any and all observations related to the guidelines regardless of the source. The verifier may include information from available sources related to the vendor guidelines in the verification process.

The review comments shall then be evaluated and insignificant comments shall be discarded. The remaining comments shall be formally documented per 4.1.3.1.

4.1.2.4 Evaluation of Guideline Review

Following formal documentation of the review comments, an evaluation shall be made for each comment. The evaluation shall result in a recommendation for resolution of the comment. The evaluation shall be documented per 4.1.3.2.

4.1.2.5 Verification

The verifier shall initiate verification documentation per 4.1.3.3. Each evaluation from 4.1.2.4 which resulted in a recommendation for resolution shall be documented. The document is verified when the following conditions are met:

1. Technical content and accuracy.
2. Consistent with FSAR licensing basis.
3. Based on sound operating principles and engineering judgment.

The document is verified when each evaluation item is addressed and resolved, or a program to provide resolution is documented. Evaluations which require a program to provide resolution must include documentation which justifies the acceptability of long term resolution. This documentation shall support the conclusion that no safety concern exists.

4.1.3 Documentation

4.1.3.1 Guideline Review Documentation

The guideline review comments shall be documented on Attachment 1. The comments shall be entered in the following format. General comments which do not pertain to a specific location in the document shall be entered first. Specific comments shall then be entered sequentially as they occur in the document.

4.1.3.2 Guideline Review Evaluation Documentation

For each guideline review comment documented on Attachment 1, and evaluation of each comment shall also be documented on Attachment 1.

4.1.3.3 Verification Documentation

The verification shall be documented on Attachment 2. Each evaluation shall be stamped and classified into one of the three following categories:

Category	Response
1. NO RESOLUTION REQUIRED	No response necessary.
2. RESOLVED___DATE_______	Short term resolution to be initiated. To be initialed and dated upon completion.
3. LONG TERM ITEM________	Long term effort required for resolution. Assign sequentially. (see 4.1.3.4)

Each verification shall be assigned an identifier per the following format:

WWWX-YY-ZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = document number (sequential)
ZZ = revision number (sequential)

4.1.3.4 Documentation of Outstanding Concerns

The Lead Safety Analysis Engineer shall submit for review a program for resolution of the Category 3 (see 4.1.3.3) comments to the System Engineer, Reactor Safety. A "List of Outstanding Concerns" shall be maintained for each nuclear station. This list shall reference the originating document. The System Engineer, Reactor Safety, shall approve a plan for resolution of the outstanding concern. The Lead Safety Analysis Engineer shall undertake to resolve the concern and delete it from the list.

4.2 Long Term Verification

4.2.1 Objective

The objective of the long term verification of the vendor guidelines is to maintain the validity of the initial verification by performing technical verification of revisions or updates to the vendor guidelines for revisions issued by the vendor.

4.2.2 Method

Revisions to the vendor guidelines issued by the vendor shall be documented per 4.2.3.1 upon receipt from the vendor. The revision shall be promptly assessed to determine if any changes in technical content significantly impact the existing guidelines and consequently the emergency procedures. If a significant impact is identified, then the Lead Safety Analysis Engineer shall notify the System Engineer, Reactor Safety. The System Engineer, Reactor Safety, shall approve a plan for timely resolution and revision of the emergency procedures. The Lead Safety Analysis Engineer shall undertake technical verification of the vendor guideline revisions per 4.2.3.2. The Lead Safety Analysis Engineer shall promptly notify the appropriate station contact of the scope of the vendor revisions and the schedule for the plant specific guideline revision.

4.2.3 Documentation

4.2.3.1 Guideline Revision Evaluation Documentation

On receipt from the vendor of a revision to the vendor guidelines, the revision shall be documented on Attachment 3. Each revision shall be assigned an identifier per the following format:

WWWX-YY-ZZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = calender year
ZZZ = sequentially assigned number for all guideline and EP revisions

4.2.3.2 Verification Documentation

The verification shall be documented on Attachment 2. Each evaluation shall be stamped and classified into one of the three following categories:

Category	Response
1. NO RESOLUTION REQUIRED	No response necessary.
2. RESOLVED___DATE_______	Short term resolution to be initiated. To be initialed and dated upon completion.
3. LONG TERM ITEM_______	Long term effort required for resolution. Assign sequentially. (see 4.1.3.4)

Each verification shall be assigned an identifier per the following format:

WWWX-YY-ZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = document number (sequential)
ZZ = revision number (sequential)

4.2.3.4 Documentation of Outstanding Concerns

The Lead Safety Analysis Engineer shall submit for review a program for resolution of the Category 3 (see 4.2.3.2) comments to the System Engineer, Reactor Safety. A "List of Outstanding Concerns" shall be maintained for each nuclear station. This list shall reference the originating document. The System Engineer, Reactor Safety, shall approve a plan for resolution of the outstanding concern. The Lead Safety Analysis Engineer shall undertake to resolve the concern and delete it from the list.

4.3 Control of the Document

The NSSS vendor guidelines and the revisions to the guidelines issued by the vendor shall not receive controlled document status. The plant specific guidelines shall be based on the vendor guidelines and verified to be consistent with the vendor guidelines where applicable. The plant specific guidelines shall receive controlled document status. Revisions to the NSSS vendor guidelines issued by the vendor shall be included as revisions to the plant specific guidelines where applicable, and the revised guidelines verified. The Lead Safety Analysis Engineer shall undertake measures to maintain cognizance of all vendor issued documentation related to the vendor guidelines.

5.0 TECHNICAL VERIFICATION OF PLANT SPECIFIC GUIDELINES

Plant specific emergency procedure guidelines are the reference documents used by the emergency procedure author for the development of emergency procedures and subsequent revisions. Plant specific guidelines provide the technical basis for the emergency procedures. The NSSS vendor guidelines are typically applicable to a generic plant. The plant specific guidelines are based on the generic vendor guidelines, but may include guidelines which have been developed apart from the NSSS vendor which improve and optimize the vendor guidelines. The plant specific guidelines reflect the operating experience acquired from industry experience and improvements in the understanding of plant response and techniques for mitigation of plant transients.

5.1 Initial Verification

5.1.1 Objective

The objective of the initial verification of the plant specific guidelines is to determine that the guidelines provide correct and achievable methods for mitigation of plant transients, and to ensure that the conversion of the generic NSSS vendor guidelines to plant specific design specifications is technically correct. The results of the verification of the vendor guidelines shall be incorporated into the plant specific guidelines.

5.1.2 Method

5.1.2.1 Verifier Qualifications

The Lead Safety Analysis Engineer shall determine that the verifier is qualified to perform the technical verification of plant specific guidelines.

5.1.2.2 Control of the Document

The version of the document undergoing verification shall be controlled and uniquely specified. Revisions and updates to the document require subsequent verification.

5.1.2.3 Verification

The verifier shall initiate verification documentation per 5.1.3.1. The results of the verification of the corresponding vendor guideline as documented in the latest revision to the Technical Verification Certificate, shall be addressed in the plant specific guidelines, or shall be included as outstanding items in the Technical Verification Certificate, Revison 0, of the plant specific guideline. Additional technical concerns identified during the verification of the plant specific guideline which are also applicable to the vendor guideline shall be documented per 5.1.3.1, but are not required to be documented in the vendor guideline documentation per 4.1.3.3. The document is verified when the following conditions are met:

1. Technical content and accuracy.
2. Consistent with applicable vendor guidelines.
3. Consistent with FSAR licensing basis.
4. Based on sound operating principles and engineering judgment.

The document is verified when each evaluation item is addressed and resolved, or a program to provide resolution is documented. Evaluations which require a program to provide resolution must include documentation which justifies the acceptability of long term resolution. This documentation shall support the conclusion that no safety concern exists.

5.1.3 Documentation

5.1.3.1 Verification Documentation

The verification shall be documented on Attachment 2. Each verification shall be assigned an identifier per the following format:

WWWX-YY-ZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = document number (sequential)
ZZ = revision number (sequential)

Each evaluation shall be stamped and classified into one of the three following categories:

Category	Response
1. NO RESOLUTION REQUIRED	No response necessary.
2. RESOLVED___DATE_______	Short term resolution to be initiated. To be initialed and dated upon completion.
3. LONG TERM ITEM________	Long term effort required for resolution. Assign sequentially. (see 5.1.3.2)

5.1.3.2 Documentation of Outstanding Concerns

The Lead Safety Analysis Engineer shall submit for review a program for resolution of the Category 3 (see 5.1.3.1) comments to the system Engineer, Reactor Safety. A "List of Outstanding Concerns" shall be maintained for each nuclear station. This list shall reference the originating document. The System Engineer, Reactor Safety, shall approve a plan for resolution of the outstanding concern. The Lead Safety Analysis Engineer shall undertake to resolve the concern and delete it from the list.

5.2 <u>Long Term Verification</u>

5.2.1 Objective

The objective of the long term verification of the plant specific guidelines is to maintain the validity of the initial verification by performing technical verification of revisions or updates to the plant specific guidelines.

Revisions or updates to the plant specific guidelines are expected to occur as a result of vendor initiated guideline revisions, inhouse optimization of emergency procedures, regulatory requirements, station modifications, and feedback from industry operating experience.

5.2.2 Method

Potential revisions to the plant specific guidelines shall be documented per 5.2.3.1 upon receipt from any source. The revision shall be promptly assessed to determine if any changes in technical content significantly impact the existing guidelines and consequently the emergency procedures. If a significant impact is identified, then the Lead Safety Analysis Engineer shall notify the System Engineer, Reactor Safety. The System Engineer, Reactor Safety, shall approve a plan for timely resolution and revision of the emergency procedures. The Lead Safety Analysis Engineer shall undertake technical verification of the plant specific guideline revisions per 5.2.3.2. The Lead Safety Analysis Engineer shall promptly notify the appropriate station contact of the scope of the guideline revisions and the schedule for the completion of the guideline revisions.

5.2.3 Documentation

5.2.3.1 Guideline Revision Evaluation Documentation

On receipt from any source of a potential revision to the plant specific guidelines, an evaluation of the potential revision shall be documented on Attachment 3. Each revision shall be assigned an identifier per the following format:

WWWX-YY-ZZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = calender year
ZZZ = sequentially assigned number for all guideline and EP revisions

5.2.3.2 Verification Documentation

The verification shall be documented on Attachment 2. Each verification shall be assigned an identifier per the following format:

WWWX-YY-ZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = document number (sequential)
ZZ = revision number (sequential)

Each evaluation shall be stamped and classified into one of the three following categories:

Category	Response
1. NO RESOLUTION REQUIRED	No response necessary.
2. RESOLVED___DATE_______	Short term resolution to be initiated. To be initialed and dated upon completion.
3. LONG TERM ITEM________	Long term effort required for resolution. Assign sequentially. (see 5.2.3.3)

5.2.3.3 Documentation of Outstanding Concerns

The Lead Safety Analysis Engineer shall submit for review a program for resolution of the Category 3 (see 5.2.3.2) comments to the System Engineer, Reactor Safety. A "List of Outstanding Concerns" shall be maintained for each nuclear station. This list shall reference the originating document. The System Engineer, Reactor Safety, shall approve a plan for resolution of the outstanding concern. The Lead Safety Analysis Engineer shall undertake to resolve the concern and delete it from the list.

5.3 <u>Control of the Document</u>

The plant specific guidelines shall be developed into a formally controlled document. "Emergency Procedure Guidelines" (EPG) shall be maintained by the Lead Safety Analysis Engineer for each nuclear station. The Lead Safety Analysis Engineer shall determine and control the distribution of the EPG's and be responsible for distribution of EPG revisions. Each individual on the EPG distribution list shall acknowledge receipt and implementation of revisions, and the Lead Safety Analysis Engineer shall record and maintain a record of acknowledgments.

6.0 TECHNICAL VERIFICATION OF EMERGENCY PROCEDURES

Nuclear station emergency procedures are developed by the station staff. The station staff is responsible for maintaining consistency with the plant specific guidelines. Technical verification of the emergency procedures and revisions is undertaken to provide an independent review for technical consistency with the guidelines.

6.1 Initial Verification

6.1.1 Objective

The objective of the initial verification of the emergency procedures is to determine that the procedures correctly interpret the technical content of the plant specific guidelines.

6.1.2 Method

6.1.2.1 Verifier Qualifications

The Lead Safety Analysis Engineer shall determine that the verifier is qualified to perform the technical verification of emergency procedures.

6.1.2.2 Control of Document

The version of the document undergoing verification shall be controlled and uniquely specified. Revisions and updates to the document require subsequent verification.

6.1.2.3 Verification

The verifier shall initiate verification documentation per 6.1.3.1. The document is verified when the following conditions are met:

1. Technical content and accuracy.
2. Consistent with applicable plant specific guidelines.
3. Consistent with FSAR licensing basis.
4. Based on sound operating principles and engineering judgment.
5. The applicable plant specific guideline verification is completed.

6.1.3 Documentation

6.1.3.1 Verification Documentation

The verification shall be documented on Attachment 2. Each verification shall be assigned an identifier per the following format:

WWWX-YY-ZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = document number (sequential)
ZZ = revision number (sequential)

Each evaluation shall be stamped and classified into one of the three following categories:

Category	Response
1. NO RESOLUTION REQUIRED	No response necessary.
2. RESOLVED___DATE_______	Short term resolution to be initiated. To be initialed and dated upon completion.
3. LONG TERM ITEM_______	Long term effort required for resolution. Assign sequentially. (see 6.1.3.2)

6.1.3.2 Resolution of Outstanding Concerns

The Lead Safety Analysis Engineer shall submit to the System Engineer, Reactor Safety, a description of any significant outstanding concerns which prevent prompt resolution and completion of the verification. The Safety Engineer, Reactor Safety, shall contribute to the resolution of the outstanding concern by contacting the appropriate management level at the impacted nuclear station.

6.2 Long Term Verification

6.2.1 Objective

The objective of the long term verification of the emergency procedures is to maintain the validity of the initial verification by performing technical verification of revisions or updates to the emergency procedures, and to facilitate expeditious implementation of revised procedures, as necessary.

6.2.2 Method

Proposed revisions to the emergency procedures shall be documented per 6.2.3.1 upon receipt from any source. The Lead Safety Analysis Engineer shall undertake technical verification of the emergency procedure revisions per 6.2.3.2. The Lead Safety Analysis Engineer shall promptly notify the appropriate station contact of the schedule for the completion of the technical verification. In the event of a situation warranting an expedited technical verification, the transmittal of the emergency procedure revision and the results of the technical verification shall be transmitted orally by phone with full documentation initiated shortly thereafter and completed per 6.2.3.2.

6.2.3 Documentation

6.2.3.1 Emergency Procedure Revision Evaluation Documentation

On receipt from any source of a proposed revision to an emergency procedure, an evaluation of the proposed revision shall be documented on Attachment 3. Each revision shall be assigned an identifier per the following format:

WWWX-YY-ZZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = calender year
ZZZ = sequentially assigned number for all guideline and EP revisions

6.2.3.2 Verification Documentation

The verification shall be documented on Attachment 2. Each verification shall be assigned an identifier per the following format:

WWWX-YY-ZZ

Where: WWW = nuclear station (ONS,MNS,CNS)
X = applicable unit (1,2,3,A(all))
YY = document number (sequential)
ZZ = revision number (sequentially)

Each evaluation shall be stamped and classified into one of the three following categories:

Category	Response
1. NO RESOLUTION REQUIRED	No response necessary.
2. RESOLVED___DATE______	Short term resolution to be initiated. To be initialed and dated upon completion.
3. LONG TERM ITEM_______	Long term effort required for resolution. Assign sequentially. (see 6.2.3.3)

6.2.3.3 Resolution of Outstanding Concerns

The Lead Safety Analysis Engineer shall submit to the System Engineer, Reactor Safety, a description of any significant outstanding concerns which prevent prompt resolution and completion of the verification. The System Engineer, Reactor Safety, shall contribute to the resolution of the outstanding concern by contacting the appropriate management level at the impacted nuclear station.

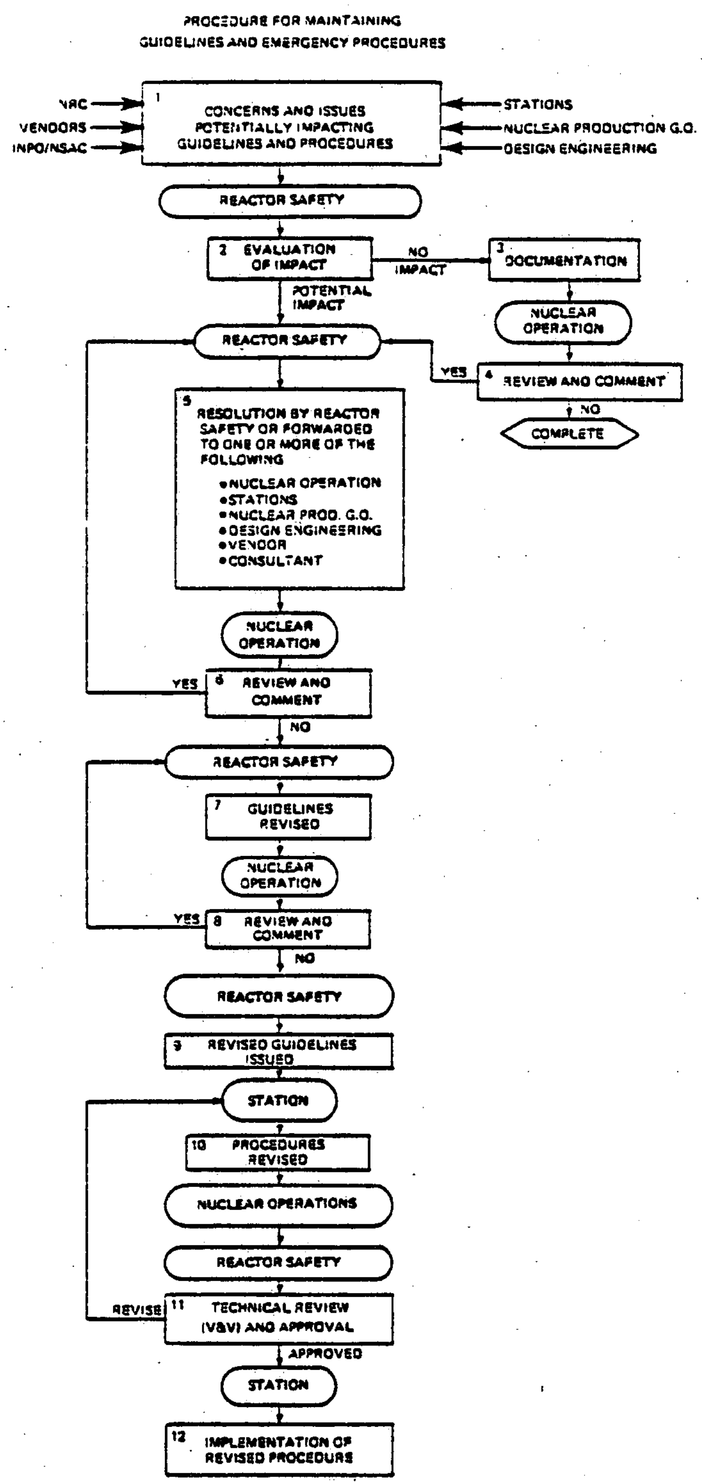
6.3 <u>Control of the Document</u>

The emergency procedures are under control of the nuclear stations. The Superintendent of Operations is responsible for assuring that the technical verification is completed prior to implementing an emergency procedure revision.

7.0 INTERFACES

The technical verification of the plant specific guidelines and the emergency procedures requires maintaining a number of interfaces at many steps in the verification process. These interfaces are shown in the attached Figure 1.

Figure 1


PROCEDURE FOR MAINTAINING
GUIDELINES AND EMERGENCY PROCEDURES
NRC
VENDORS
INPO/NSAC
1 CONCERNS AND ISSUES POTENTIALLY IMPACTING GUIDELINES AND PROCEDURES
STATIONS
NUCLEAR PRODUCTION G.O.
DESIGN ENGINEERING
REACTOR SAFETY
2 EVALUATION OF IMPACT
NO IMPACT
3 DOCUMENTATION
NUCLEAR OPERATION
POTENTIAL IMPACT
REACTOR SAFETY
YES
4 REVIEW AND COMMENT
NO
COMPLETE
5 RESOLUTION BY REACTOR SAFETY OR FORWARDED TO ONE OR MORE OF THE FOLLOWING
•NUCLEAR OPERATION
•STATIONS
•NUCLEAR PROD. G.O.
•DESIGN ENGINEERING
•VENDOR
•CONSULTANT
NUCLEAR OPERATION
YES
6 REVIEW AND COMMENT
NO
REACTOR SAFETY
7 GUIDELINES REVISED
NUCLEAR OPERATION
YES
8 REVIEW AND COMMENT
NO
REACTOR SAFETY
9 REVISED GUIDELINES ISSUED
STATION
10 PROCEDURES REVISED
NUCLEAR OPERATIONS
REACTOR SAFETY
REVISE
11 TECHNICAL REVIEW (V&V) AND APPROVAL
APPROVED
STATION
12 IMPLEMENTATION OF REVISED PROCEDURES

DUKE POWER COMPANY
NUCLEAR PRODUCTION DEPARTMENT

TECHNICAL DOCUMENT REVIEW

PAGES ______

DOCUMENT ____

____

____________________________________ DATED ______________

REVIEWED BY ______________________________ DATE ______________

TITLE ____

APPROVED BY ______________________________ DATE ______________

TITLE ____

ITEM	REVIEW COMMENTS	RESOLUTION

PAGE ____

TECHNICAL DOCUMENT REVIEW

ITEM	REVIEW COMMENTS	RESOLUTION

DUKE POWER COMPANY
NUCLEAR PRODUCTION DEPARTMENT

– –

NUCLEAR STATION
EMERGENCY PROCEDURE/GUIDELINE
TECHNICAL VERIFICATION CERTIFICATE

STATION ______________________ UNIT ______________________

DOCUMENT ____

____

______________________________________ DATED ____________

STATEMENT OF CERTIFICATION

☐ THIS DOCUMENT HAS BEEN VERIFIED IN ACCORDANCE WITH REACTOR SAFETY PROCEDURE RS-003, " TECHNICAL VERIFICATION OF NUCLEAR STATION EMERGENCY PROCEDURES AND GUIDELINES," AND MEETS ALL APPLICABLE CRITERIA AS FOLLOWS:

YES	NO	N/A	
___	___	___	Technical content and accuracy.
___	___	___	Consistent with applicable vendor guidelines.
___	___	___	Consistent with applicable plant specific guidelines.
___	___	___	Consistent with FSAR licensing basis.
___	___	___	Based on sound operating principles and engineering judgement.

☐ THIS DOCUMENT DOES NOT MEET THE CRITERIA REQUIRED FOR CERTIFICATION. THE ITEMS ON THE FOLLOWING PAGES REQUIRE FURTHER REVISION OR JUSTIFICATION.

VERIFIED BY ______________________________ DATE ____________

TITLE ____________________ ORGANIZATION ____________________

REVIEWED BY ______________________________ DATE ____________

TITLE ____________________ ORGANIZATION ____________________

NUCLEAR STATION

- -

EMERGENCY PROCEDURE/GUIDELINE

TECHNICAL VERIFICATION CERTIFICATE

Page ______ of ______

STATION ____________________ UNIT __________

DOCUMENT ____

____

____ DATED ____________________

THE FOLLOWING ITEMS REQUIRE FURTHER REVISION OR JUSTIFICATION:

RESPONSE: BY __________________________ DATE ____________________

DUKE POWER COMPANY
NUCLEAR PRODUCTION DEPARTMENT

- -

Attachment 3

NUCLEAR STATION

EMERGENCY PROCEDURE/GUIDELINE

REVISION EVALUATION

STATION ______________ DOCUMENT ______________

SUBMITTED BY ______________

DATE ______________ TITLE ______________

ORGANIZATION ______________

DESCRIPTION OF REVISION

OTHER AFFECTED DOCUMENTS

EVALUATION

RESPONSE TAKEN

EVALUATED BY ______________ DATE ______________

TITLE ______________ ORGANIZATION ______________

APPROVED BY ______________ DATE ______________

TITLE ______________ ORGANIZATION ______________

DUKE POWER COMPANY

INFORMATION ONLY

OCONEE NUCLEAR STATION

PROPOSED VALIDATION PROCESS FOR EMERGENCY PROCEDURES (EPs)

1.0 Purpose

The purpose of this procedure is to define the process to be used for validation of Operations Emergency Procedures (EPs) and changes to EPs.

2.0 References

2.1 EMERGENCY OPERATING PROCEDURES VALIDATION GUIDELINES - INPO, November, 1982

2.2 NUREG - 0899

3.0 Description

3.1 Validation is the process of ensuring that a trained operating shift can manage abnormal transients using the EPs.

The validation process will evaluate the EPs to determine usability and operationally correct where:

- An usable EP provides sufficient and understandable information to the operator.
- An operationally correct EP that is compatible with existing plant hardware, plant responses, and the minimum operating shift.

3.2 The validation of the EPs will be accomplished by:

- Step-by-step walk through.
- Real-time performance of EPs using selected scenarios.
- Feedback from actual performance of EPs during use in Abnormal Transients.

4.0 Responsibility

4.1 The Superintendent of Operations:

- Shall have overall responsibility for the validation process.
- Shall designate personnel to participate in the validation process.

- Shall resolve any unresolved discrepancies identified during the validation process.

5.0 Reporting Requirements

None

6.0 Validation By Step-by-Step Walk Through

6.1 The Superintendent of Operations will designate at least two (2) licensed Reactor Operators, who will:

- Be familiar with the Control Room and the EP.
- Be of different experience levels.
- Have no other duties other than to perform the Step-by-Step Walk Through Validation.

6.2 The Step-by-Step Walk Through Validation will be performed prior to the performance of the Real-Time Performance Validation.

6.3 Performing the Step-by-Step Walk Through Validation, the designated personnel will:

A. Be familiar with the validation process and the Checklist for Step-by-Step Walk Through Validation (Attachments 1 & 2).

B. Using a "Validation Copy" of the EP, the validator will ensure each step of the procedure meets the evaluation criteria of Attachment 1 and then so designates by initialing, dating, and "SAT" the step. If an evaluation criteria is not met for a step, the validator is not met for a step, the validator will so designate by initialing, dating, and "UNSAT" the step and identify both the evaluation criteria not met and the specific area of concern.

C. After the "Validation Copy" of the EP is evaluated against Attachment 1, the "Validation Copy" of the EP will be evaluated, using the same method as above, using the evaluation criteria of Attachment 2.

D. It is intended that the designated validators work independent of each other on separate "Validation Copy" of the EP.

E. When the "Validation Copy" of the EP has been evaluated against the evaluation criteria of Attachment 1, and Attachment 2, the "Validation Copy" of the EP, Attachment 2, and comments will be forwarded to the procedure writer.

6.3 The procedure writer will document his response(s) to the validator's comments on the "Validation Copy" of the Operation Emergency Procedure. The procedure writer may be able to resolve comments by justifying remarks or by changing the procedure. If a resolution of comments cannot be reached between the procedure writer and the procedure validator, the Superintendent of Operations will resolve the conflict.

6.4 The "Validation Copy" of the EP shall accompany the procedure for final approval, and will become part of the procedure process record.

7.0 <u>Validation By Real-Time Performance</u>

7.1 The Superintendent of Operations shall designate:

- The scenario(s) to be evaluated.
- The location (Control Room, Simulator, etc.) where the EP is to be validated.
- The Control Room operating team which will consist of the minimum number of personnel allowed by Technical Specifications 6.1.
- The observer team which will have:
  1) A lead observer from the Training Department,
  2) A minimum of two (2) other observers,
  3) The observer team shall be familiar with the EP, validation process, the control room, and be skilled in the art of observing.

7.2 Preparing for the Real-Time Performance Validation.

- The observer team shall complete Attachment 3 prior to the beginning of the scenario.
- Each scenario shall be run at least twice, with a different observer and operating teams.
- Both the observer and the operating teams shall be familiar with the Control Room and the validation process.

7.3 Conducting the Real-Time Performance Validation

A. The operating team will walk and talk through the EP while performing the required actions. The operating team will supply the following information to the observer team:

- Describe the action he is taking.
- Identify instruments used.
- Identify controls used.
- Identify expected system responses and how they are verified.
- Identify contingency actions taken.

B. If the operating team identifies a problem in using the EP, they should point it out to be observer team.

C. The observer team will identify problems the operating team is having in the performance of the EP, using the Validation Observation Form (Attachment 4).

The Lead Observer's duties:

- Direct the scenario.
- Ask questions.
- Note problems encountered by the operating team.

The other observers' duties:

- Observe movement patterns of operating team members.
- Ask questions.
- Note problems encountered by the operating team.

7.4 Conducting Debriefing

A. The observer and operating teams involved in the Real-Time Performance Validation shall meet immediately after the performance of the scenario to analyze and summarize data.

B. The Lead Observers with input from the others will complete the Real-Time Performance Validation Checklist (Attachment 5). In the process of completing the checklist, the problems encountered during the performance of the scenario that prevents an evaluation criteria from being met shall be documented on the Comment Resolution Form (Attachment 6) along with suggested solutions.

C. All documentation of the scenario performance shall then be forwarded to the procedure writer.

D. The procedure writer will document his responses to the Lead Observer's comments of the Comment Resolution Form (Attachment 6). The procedure writer may be able to resolve the comments by changing the procedure, having the training group provide additional training, or may require changes in the Control Room or plant equipment.

E. The documentation for the Real-Time Performance Validation shall accompany the procedure for final approval, and will become part of the procedure process record.

8.0 After implementation the EPs will be continually validated using Attachment 6.

A. After use in the plant by the Shift Supervisor involved in the abnormal transient.

B. After use in the simulator by the lead training instructor involved in the exercise.

If no problems were encountered with the EP during its use, Attachment 6 will still be turned in to the procedure writer with the comment "No Problems".

9.0 Validation of Changes to the EPs.

A. The Step-by-Step Walk Through Validation will be performed for all changes.

B. The Real-Time Performance Validation will be performed at the discretion of the Superintendent of Operations. If the Real-Time Performance Validation is not performed, Attachment 6 will be filled out and "Not Required for Change Number __________" added and signed by the Superintendent of Operations.

ATTACHMENT 1

CHECKLIST FOR STEP-BY-STEP WALK THROUGH VALIDATION

Using the real Control Room, review the Operations Emergency Procedure to ensure that each step, note, caution meets the validation criteria.

If the step, note, or caution meets all of the validation criteria, document by initialing, dating, and writing "SAT" on the "Validation Copy" of the procedure for the step, note, or caution.

If the step, note, or caution does not meet all of the validation criteria, document by initialing, dating, and writing "UNSAT" and identify both the validation criteria not met and any comments on the "Validation Copy" of the procedure for the step, note, or caution.

Validation criteria that do not apply to the step, note, or caution can be considered to have met the validation criteria for that step, note, or caution.

Adequate Guidance

_____1. Each step is necessary to the correct performance of the procedure.

_____2. Each step is written to the appropriate level of detail. There are no extra or missing substeps.

_____3. Each step is located approximately within the sequence of events.

_____4. Each step is concise, readable, and understandable.

_____5. There is no uncertainty or confusion as to which step to go to next.

Control Room Compatability

_____6. Nomenclature used in the step matches control room or local labeling.

_____7. Controls, displays, and other equipment mentioned are available and located where specified.

_____8. Controls, displays are accessible/visible to the operator when they are required to be used in the procedure.

_____9. Descriptions in the procedure match actual units of measurement, engineering parameters, and functions of controls and displays.

ATTACHMENT 2

CHECKLIST FOR STEP-BY-STEP WALK THROUGH VALIDATION

To be used after all step, notes, cautions of the "Validation Copy" of the procedure have been evaluated using Attachment 1.

Review the "Validation Copy" of the procedure for each of the following criteria.

If the "Validation Copy" of the procedure meets an evaluation criterion, then document with "SAT", initials, and date next to the criterion.

If the "Validation Copy" of the procedure does not meet an evaluation criterion, then document with "UNSAT", initials, and date. Identify the evaluation criterion not met and any comments on the "Validation Copy" of the procedure.

Administrative Adequacy

_____1. The procedure is bound and filed in such a manner to allow easy usage.

_____2. The procedure can be performed using available control room communications.

_____3. The organization of the procedure is clear and understandable to the operator:

a. Step numbering system

b. Divisions of text

c. Difference step levels

_____4. Figures and tables within the procedure can be easily and accurately read.

ATTACHMENT 3

SCENARIO

Procedure Number: ____________________

Procedure Title: ____________________

Change Number: ____________________

Date: ________________________________

Observers Team:

______________ (Lead Observer)

____

____

____

Operating Team:

______________ (SRO)

______________ (SRO)

______________ (RO)

______________ (RO)

Scenario Title: ____________________

Scenario flow path (ex. equip. failures, reading, initiating event)

ATTACHMENT 4

VALIDATION OBSERVATION FORM

PROCEDURE NUMBER:

START TIME:

CHANGE NUMBER:

FINISH TIME:

OBSERVER:

DATE:

STEP	COMMISSION				OMMISSION					UNCERTAINTY						OTHER COMMENTS
	C.R. HARDWARE/LAYOUT	ADDS STEP	GOES TO WRONG EP/OP	STEP SEQUENCE	OMMITS STEP	OMMITS RECURRENT STEP	OMMITS CAUTION	INSUFFICIENT TIME	STAFFING	DISAGREES WITH STEP	RE-READS (MEMORY)	READING TIME	UNAVAILABLE REFERANCES	INTERPOLATIONS	ACTION TIME	

ATTACHMENT 5

CHECKLIST FOR VALIDATION

B. REAL-TIME PERFORMANCE

Procedure Title:

Procedure Number:

Change Number:

Lead Observer:

Date:

Use the simulator, control room, or photo mockup as appropriate. The operator team is to walk and talk through the procedure explaining the sequence and identifying the instrumentation used. Observers should compare the procedure to the checklist criteria. If a criterion is met, a check should be placed on the line provided. If a criterion is not met, "no" should be written on the line. If a criterion does not apply, "N/A" (not applicable) should be written on the line.

Adequate Guidance

_____1. The procedure provides proper guidance for actions. Steps contain all information necessary to complete tasks.

_____2. No steps are missing.

_____3. There are no unnecessary steps.

_____4. There is no confusion or uncertainty concerning required actions.

_____5. Each step of the procedure achieves the desired objective.

_____6. The procedure achieves the desired objective without deviation from steps of the procedure.

_____7. Action steps are written in the order in which tasks are actually performed.

Control Room Compatability

_____8. Limits and tolerances within the procedure are consistent with control room scales and understandable.

_____9. Where sequence of steps is not important, steps have been ordered so that a left to right, or top to bottom, flow can be followed along the control board.

_____10. All necessary references and materials are available in the procedure or readily available in the control room.

Procedure Flow

_____11. Action steps are written in the order in which tasks are actually performed.

_____12. The procedure is easy to follow and a smooth flow through the procedure is possible.

_____13. The procedure can be read quickly and understood easily.

_____14. In time-dependent steps, the operator can obtain all necessary information and perform all necessary actions within the time allowed.

Personnel Compatability

_____15. Minimum shift staffing is sufficient to carry out all procedural tasks.

_____16. The procedure is in accordance with the leadership roles and divisions of responsibilities in the control room.

_____17. Procedures do not require decisions or actions which are inconsistent with control room personnel training and experience.

_____18. The procedure does not cause operators to be in one another's way due to concurrent actions in the same location.

Administrative Adequacy

_____19. The procedure is written to adequately handle recurrent checks and steps.

_____20. Place keeping aids provided in the procedure are adequate.

_____21. Adequate workspace within the procedure for operator use is provided when necessary.

_____22. Caution and note statements were noticed and observed.

ATTACHMENT 6

COMMENT RESOLUTION FORM

DATE:

PROCEDURE NUMBER:

FROM:

DISCREPANCY:

TO:

FROM:

RESOLUTION: