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**APPROVED 12/15/98**

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## 1.0 OBJECTIVE

To establish guidelines for the control of modifications to the Arkansas Nuclear One Unit I and Unit II simulators to ensure fidelity.

## 2.0 DEFINITIONS

- 2.1 **Design Change Package (DCP)**: A collection of documentation providing the specifics of a plant modification.
- 2.2 **Design Data Base (DDB)**: A collection of data consisting of reference plant drawings, manuals, performance data and other documents that defines the plant being simulated.
- 2.3 **Discrepancy**: A difference between observed performance and the current data base.
- 2.4 **Discrepancy Report (DR)**: A computer based form used to identify discrepancies (problems), needed corrections, upgrading of the simulator hardware and/or software and initiates the review and correction process.
- 2.5 **Engineering Request (ER)**: A formal request for engineering technical support by which Engineering personnel resolve and disposition such requests. The ER process provides a single mechanism to request engineering technical support, suggest a solution to satisfy the request, and to develop a documentation package with an engineering solution appropriate to the resolution of the request. This process will eventually replace the design change package (DCP), limited change package (LCP), and plant change (PC) processes.
- 2.6 **Hardware Coordinator**: An individual appointed by the Simulator Supervisor to direct hardware work flow and ensure proper simulator maintenance is performed.
- 2.7 **Hardware Technician**: An individual qualified to perform hardware modification and repair on the simulators. These individuals are typically matrixed from the Computer Support Group.
- 2.8 **Limited Change Package (LCP)**: A design package that does not result in a design basis or a technical specification revision.
- 2.9 **Plant Change (PC)**: A design package that does not alter system/component function, interaction, operation or failure mode outside existing design analysis limits. A plant change does not result in a design basis or a technical specification revision.

- 2.10 **Plant Modification (PM)**: Term used to describe one or all of the following - PC, DCP, TA, or LCP.
- 2.11 **Simulator Engineer (SE)**: An individual responsible for changes in the performance of the simulators.
- 2.12 **Simulator Enhancement**: A simulator modification which will increase the capability, maintainability, performance or operability of the simulator or results in elimination of simulation design simplifications.
- 2.13 **Simulator Instructor (SI)**: An instructor currently certified by the NRC to conduct simulator training and appointed by the Simulator Supervisor as the interface between the Operations Training group and the Simulator Support group.
- 2.14 **Simulator Modification (SM)**: A change in the simulation software or hardware.
- 2.15 **Simulator Training Supervisor**: Individual responsible for simulator training programs and the completion of performance/operability test as well as compliance with established regulations. Additional responsibilities include hardware and software maintenance of the simulators and peripheral equipment.
- 2.16 **Software Module**: A unit of software whose source code is contained in one file.
- 2.17 **Software Simulation System**: The simulation system consists of the software necessary to execute and control the simulation. This shall include the job streams necessary to load, save, restore and unload the simulation system.
- 2.18 **Software Specialist**: An individual responsible for performing modifications on the software simulation system.
- 2.19 **Temporary Alteration (TA)**: Modifications to the reference plant that are not intended to be permanent.
- 2.20 **Photo Survey**: Photo Survey conducted after plant modifications are completed. Photo Surveys will normally be conducted at the completion of each outage or as the need for documentation of plant changes is required.
- 2.21 **Software Change Request (SCR)**: A request to change software used in specific computer systems involved in real time nuclear power plant monitoring as required by the Technical specifications or other regulatory requirements.

### **3.0 Configuration Management System (CMS)**

#### **3.1 Functions**

##### **3.1.1 The CMS provides the following functions:**

- a. Establishes a baseline record (DDB);**
- b. Maintains a current data base of simulator design (DDB) ;**
- c. Tracks plant changes affecting simulator design and operation (PM);**
- d. Controls the paperless DR process;**
- e. Tracks differences between the simulator and the simulator design bases (DR);**
- f. Tracks identified improvements needed in simulator design (DR);**
- g. Maintains additional databases used by Simulator Support which includes availability.**

#### **3.2 Design Data Base (DDB)**

**3.2.1 The DDB includes all the baseline documents used during procurement and installation as well as current information such as technical manuals, and any plant modifications or resolved discrepancies that have been made to the simulator.**

**3.2.2. The maintenance of the DDB aids in compliance with ANS 3.5-1985 and provides a mechanism for maintaining simulator fidelity.**

#### **3.3 Plant Modifications**

**3.3.1. The PM field of the DR record provides documentation for the implementation of plant modifications into the simulator.**

**3.3.2. All plant modifications are reviewed for impact to the simulators during the Training Center Need's Analysis Meeting. A Training Evaluation Action Request (TEAR) is initiated for all plant modifications suspected to impact the simulator. TEARs are initiated and closed for plant modifications that do not impact the simulator to document the review.**

**3.3.3 Existing Discrepancy Reports (DR) relating to plant modifications may be suspended by the Simulator Training Supervisor, or his designee, if the plant modification is delayed at the reference plant. Suspended discrepancy reports will be reviewed periodically and will be reinstated when the plant modification is scheduled to be implemented.**

### 3.4 Discrepancy Reports

- 3.4.1 Discrepancy Reports (see Figure 3) are the focal point of all simulator modifications. Modifications will not be implemented on the simulator without a DR.
- 3.4.2 Discrepancy Report data is entered into CMS during each phase of the DR process (see Section 4.1).

### 3.5 Availability

- 3.5.1 The availability database tracks the simulators availability as a percentage of time available to time scheduled.
- 3.5.2 Data is provided by Simulator Instructors at the beginning of each month for the previous month.

## 4.0 DISCREPANCY REPORT PROCESS

### 4.1 Discrepancy Report Flowpath

- 4.1.1 Identification of Discrepancy: It is the responsibility of all knowledgeable individuals to initiate a Discrepancy Report for all perceived discrepancies between the simulator and reference plant. DRs are originated within the Configuration Management System (see Figure 2). CMS will immediately forward new DRs to the Simulator Training Supervisor. DRs are expected to originate from the following sources:
  - a. Modifications to the Reference Plant: Modifications to a simulator's reference plant (i.e., ER, DCP, LCP, PC, or TA) may result in similar modifications to the simulator. The problem description should contain the noun name of the Plant Modification and the Plant Modification Number. The Plant Modification Number should also be entered in the PM field.
  - b. Simulator Discrepancy: Trainees, Simulator Instructors or other knowledgeable persons who observe a discrepancy shall initiate a DR. The problem description should contain the initial condition number where the discrepancy was observed and any malfunctions that may have been active.
  - c. Simulator Enhancements: It may become desirable to enhance the simulation beyond its current capabilities. The problem description should sufficiently document the requested enhancement and list any plant documents that may be helpful in completing the enhancement.

- 4.1.2 The Simulator Training Supervisor, or designee, shall review all new DRs. The following elements will be included in the review:
- a. Training value and accuracy; (DRs determined to be inaccurate or of extremely low training value will be closed during this review. The originator of the closed DR will be notified and provided an explanation for the closure.)
  - b. Modeling or hardware; (It should be noted that the individual originating the DR may make this determination, if knowledgeable; however, the SS may change the designation, if appropriate.)
  - c. Priority. (DRs shall be assigned priorities between one and twenty-two. A revolving Top Twenty list will be generated from these priorities to ensure that DRs with the most impact to training are corrected first. It should be noted that the priorities of DRs can be changed and an updated Top Twenty list can be generated at any time by the Simulator Training Supervisor or designee. Any DR not assigned in the Top Twenty will be assigned a priority of twenty-two.)

Upon completion of the review, the Simulator Training Supervisor or designee shall assign the DR to a responsible individual based upon expertise and workload. The CMS will automatically forward the DR to the assigned responsible individual.

- 4.1.3 Upon receipt of a DR, the responsible individual (Hardware Technician, Simulator Engineer, or Software Specialist) will perform a simulator modification/repair, as appropriate. Simulator modifications/repairs can be divided into three categories:
- a. DRs related to hardware;
  - b. DRs related to software;
  - c. DR related to both hardware and software.

Hardware related DRs refer to the installation of new components or the repair or replacement of existing components. The priority of hardware DRs is assigned by the Simulator Training Supervisor or designee based on the severity of the DR and scheduled simulator scenarios. The Hardware Coordinator will review the assigned priorities and simulator time available to make job assignments for the hardware technicians. Upon completion of a hardware DR, the responsible hardware technician will document the work completed in CMS. CMS will automatically forward the DR to be tested.

Software related DRs refer to modeling discrepancies, software simulation system errors or PMs requiring software changes only. Software DRs shall be worked based on priority when it is reasonable. Control of changes to all simulator software is required. The following method shall be used to control software changes:

- a. The software module header shall contain a program history section. The program history section shall contain an identifier (initials followed by a sequential number, i.e. DB01, RR02, etc.) and the date the revision was updated and placed in the training load. The program history section can also be used for any comments or descriptions of the change such as a plant modification number.
- b. Changes to individual lines of source code shall be identified with the identifier preceded by an exclamation point (FORTRAN comment syntax).
- c. Satisfactorily tested software module names shall begin with SM\_ followed by the name of the module. Changes to the module shall begin with T#\_ with the number being a sequential indicator of the number of changes from the tested model. Models are updated from T#\_ to SM\_ upon completion of testing.
- d. A Software Change Request (SCR) shall be submitted for requested software changes to the Plant Computer System, Safety Parameters Display System, or as required by the computer software change control procedure, 1082.004.

Upon completion of a software modification, the responsible individual will document the modification in CMS. CMS will automatically forward the DR to be tested.

DRs related to both hardware and software typically originate as a result from a plant modification. The responsible individual will determine the necessary hardware modification and initiate a corresponding hardware DR. The hardware DR will be of sufficient detail for the hardware technician to make all modifications and follow established conventions. Photo Surveys should be used, if available, to ensure that its installation is consistent with the plant. The hardware DR will be addressed as stated above. The remaining software modifications will be addressed as a software modification.



- 4.1.4 DRs ready for test are available in CMS (see Figure 2). Hardware DRs may be tested by any individual knowledgeable of the component and the component's interaction in the simulator. Software DRs shall be tested by a Simulator Instructor, preferably the originator of the discrepancy. The test will ensure that the modification meets the requirements specified by the DR. It is the responsibility of the individual performing the test to ensure that the modification has not created additional discrepancies.

Upon completion of the test, the individual performing the test will document the results in CMS. The individual's name and test date will be entered for DRs that satisfactorily meet all testing requirements. The CMS entry for DRs determined to be deficient will include the test performed and discrepancies observed during the test.

- 4.1.5 Hardware DRs may be closed by the responsible hardware technician upon satisfactory testing. The responsible individual for software DRs will ensure that the changes to the software have been controlled, as described above, and update the module(s) to SM\_. The updated module(s) shall be duplicated in the Training Load and all preliminary work on the Development Load will be scratched. The software DR may now be closed.
- 4.2 Situations may necessitate a modification to the simulator prior to initiation of a DR. In these cases, a DR will be initiated as soon as reasonably achievable. All modifications and testing performed will be documented as under normal situations.
- 4.3 DRs records will be maintained throughout the life of the simulator. They may be archived for space consideration, but will remain retrievable for history purposes.

Figure 1

Simulator Modification Process Diagram

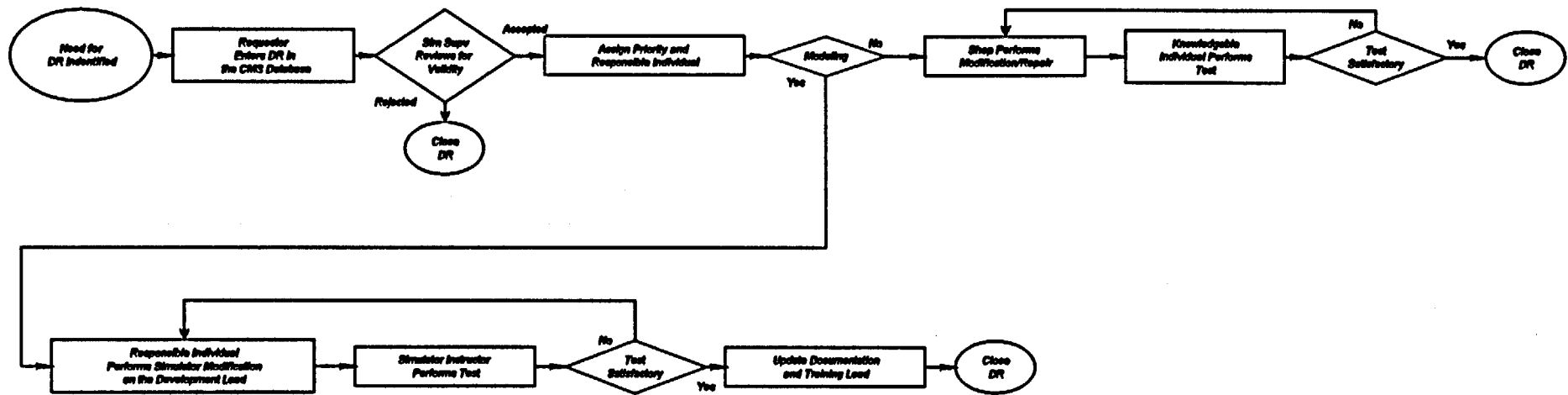


FIGURE 2  
CMS MAIN MENU

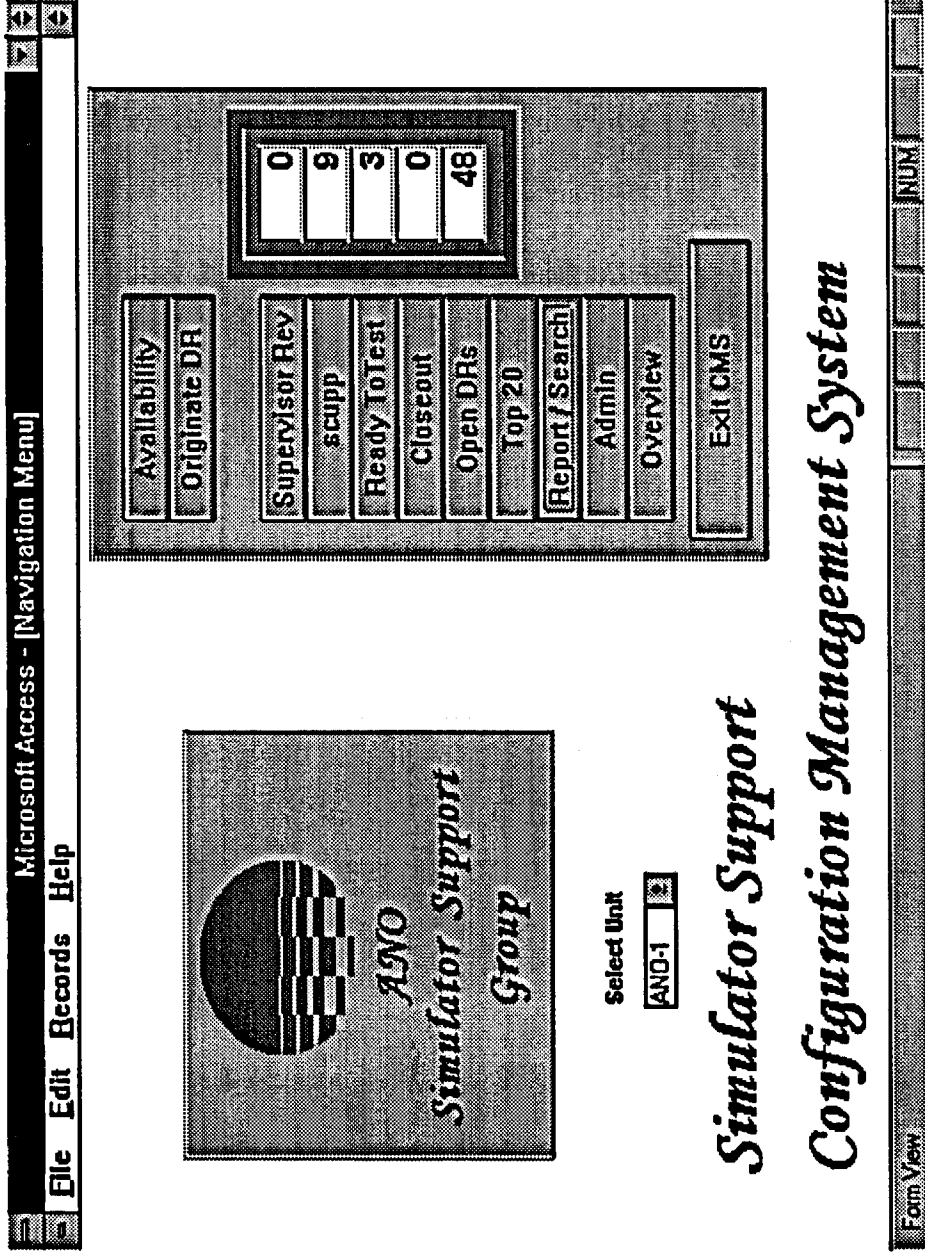


FIGURE 3  
DISCREPANCY REPORT

Microsoft Access - [Simulator Discrepancy Report]

File Edit View Records Help

### Simulator Discrepancy Report

Unit:  Originator:  Plant Mod Number:

DR #:  Date Initiated:  Priority:  Supporting Documents:

**Discrepancy:**

SW pump discharge pressure is high. The simulator does not model the ICW cooler bypass valves which the operators normally use to control SW pressure. These valves need to be modeled. SW4026A and SW4026B. These can be found on P&ID M210 area E3.

Assigned To:  Tested:  Failed:  Suspend:  Closed:

**Action Taken:**

Modified Source:	Update Complete:
<input type="text" value="T1_SWSY"/>	<input type="checkbox"/>
<input type="text" value="SWSYDB"/>	<input type="checkbox"/>

Form View

## **Section 2**

### **Attachment 1 to NRC Form 474**

#### **Exception 1**

**This Exception remains unchanged since the last submittal.**

#### **Exception 2**

**Deleted per 2CAN129501**

#### **Exception 3**

**This Exception remains unchanged since the last submittal.**

### Section 3

#### ANO2 Simulator Modifications Implemented Since 12/07/95

Plant Mod Number:	92-8074
Description:	2PIC-4626A/B Controller Programs
Date Implemented:	11-Jan-96
Plant Mod Number:	89-2017
Description:	Alternate AC Power
Date Implemented:	11-Jan-96
Plant Mod Number:	94-2008
Description:	Feedwater Control System Upgrade
Date Implemented:	16-Jan-96
Plant Mod Number:	92-2023
Description:	CAPS Migration to the Plant Computer
Date Implemented:	26-Jan-96
Plant Mod Number:	93-2013
Description:	2C69 Control Room Console Upgrade
Date Implemented:	26-Jan-96
Plant Mod Number:	95-8054
Description:	Fuel Handling Area Exhaust Fans
Date Implemented:	15-Mar-96
Plant Mod Number:	95-8067
Description:	Setpoint Changes For Containment Cooling Flow
Date Implemented:	12-Jun-96
Plant Mod Number:	96-8009
Description:	Group 'P' Selector Switch Modification
Date Implemented:	13-Sep-96
Plant Mod Number:	96-8002
Description:	2SV-0386 Power Source Separation.
Date Implemented:	19-Sep-96
Plant Mod Number:	92-2011 DCPR 18
Description:	Station Blackout Diesel Screen Modifications
Date Implemented:	21-May-97

### Section 3

<b>Plant Mod Number:</b>	<b>96-8013/9620</b>
<b>Description:</b>	<b>CCW Cross-Connect Valves and Pump Circuitry Modifications</b>
<b>Date Implemented:</b>	<b>28-May-97</b>
<b>Plant Mod Number:</b>	<b>96-8037</b>
<b>Description:</b>	<b>EFW Dual Dixon Installation (2C16/17)</b>
<b>Date Implemented:</b>	<b>29-May-97</b>
<b>Plant Mod Number:</b>	<b>96-8040</b>
<b>Description:</b>	<b>New Radiation Monitoring Recorder (Replace 2RR-1057, Delete 2RR1007)</b>
<b>Date Implemented:</b>	<b>11-Jun-97</b>
<b>Plant Mod Number:</b>	<b>95-8058</b>
<b>Description:</b>	<b>Circ Water Alarms, Revise Logic For 2K12A9</b>
<b>Date Implemented:</b>	<b>12-Jun-97</b>
<b>Plant Mod Number:</b>	<b>96-2027</b>
<b>Description:</b>	<b>Squeeze Valve 2CV-1460 Modifications (Fail As-Is)</b>
<b>Date Implemented:</b>	<b>12-Jun-97</b>
<b>Plant Mod Number:</b>	<b>96-6002</b>
<b>Description:</b>	<b>Instrument Air Compressor Replacement.</b>
<b>Date Implemented:</b>	<b>16-Dec-97</b>
<b>Plant Mod Number:</b>	<b>963228P201</b>
<b>Description:</b>	<b>SU3 Metering Change To Regulated Voltage Input</b>
<b>Date Implemented:</b>	<b>16-Dec-97</b>
<b>Plant Mod Number:</b>	<b>963543D201</b>
<b>Description:</b>	<b>Backup DC Source For Main Turbine Controls and EFW Alarm Modifications</b>
<b>Date Implemented:</b>	<b>16-Dec-97</b>
<b>Plant Mod Number:</b>	<b>958085P201</b>
<b>Description:</b>	<b>Pressurizer Level Controller Modifications</b>
<b>Date Implemented:</b>	<b>16-Dec-97</b>
<b>Plant Mod Number:</b>	<b>963062P201</b>
<b>Description:</b>	<b>Pressurizer Heater Control Modifications</b>
<b>Date Implemented:</b>	<b>16-Dec-97</b>
<b>Plant Mod Number:</b>	<b>95-8024</b>
<b>Description:</b>	<b>2P7A Steam Pressure Alarm</b>
<b>Date Implemented:</b>	<b>16-Dec-97</b>

### Section 3

Plant Mod Number: 963355L201  
Description: High Pressure Turbine Megawatt Recovery Effort  
Date Implemented: 16-Dec-97

Plant Mod Number: 973621L201  
Description: Containment Purge Valves 2CV-8289 and 2CV-8291 Stroke Times Change  
Date Implemented: 16-Dec-97

Plant Mod Number: 95-2004  
Description: CEDM Shroud Coolers Modification  
Date Implemented: 30-Dec-97

Plant Mod Number: 963477P201  
Description: Change Power Supply for Condensate Transfer Pump 2P9B to 2B21  
Date Implemented: 30-Dec-97

Plant Mod Number: 963523D202  
Description: Change EFW Valve Stroke Times  
Date Implemented: 30-Dec-97

Plant Mod Number: 958024P201  
Description: Dixon Indicator 2PIS-0340 Low Alarm Setpoint Revision  
Date Implemented: 03-Feb-98

Plant Mod Number: 963523D202  
Description: EFW MOV Modification  
(2CV-1026, 2CV-1036, 2CV-1037, 2CV-1038, 2CV-1039, 2CV-1076)  
Date Implemented: 24-Nov-98

Plant Mod Number: 973905P201  
Description: Remove Loss of Feed Pump Setback from Main Turbine  
Date Implemented: 22-Jan-99

Plant Mod Number: 980274P201  
Description: Changes SIT Discharge Valve Setpoint  
Date Implemented: 25-Jan-99

Plant Mod Number: 980669  
Description: Change Range of 2PT-0300 and 2PT-0301 from 750-1050 to 650-1050.  
Changes F&P software for 2PIC-0300. Null point for the pressurizer pressure bias to the SDBCS is changed from 2250 to 2200 psia.  
Date Implemented: 22-Jan-99



### Section 3

Plant Mod Number: 963242D202  
Description: Vital AC System Upgrade  
Date Implemented: 02-Feb-99

Plant Mod Number: 974999P201  
Description: 2D35 & 36 Battery Chargers  
Date Implemented: 02-Feb-99

Plant Mod Number: 98-1151  
Description: This ER changes the setpoint of the RPS 10-4 bistables to 10-3 % power. The bistable name is changed from "10-4 Bistable" to "Log Power Bistable".  
Date Implemented: 03-Feb-99

Plant Mod Number: 974062P201  
Description: Change 2CV-4810/4811 Electrical to Air-Operated  
Date Implemented: 08-Feb-99

Plant Mod Number: 962029P201  
Description: FW Recirc Valve Operator Upgrade  
Includes installation of three new F&P controllers on 2C02  
Date Implemented: 10-Feb-99

Plant Mod Number: 962034P201  
Description: Instrument Air Isolation Valves  
Date Implemented: 10-Feb-99

Plant Mod Number: 973786N201  
Description: MSR Replacement  
Date Implemented: 10-Feb-99

Plant Mod Number: 963242D201  
Description: Unit 2 Battery Charger Replacements  
Date Implemented: 10-Feb-99

Plant Mod Number: 974888P201  
Description: PZR Level Alarm Circuit  
Date Implemented: 12-Feb-99

Plant Mod Number: 980230N201  
Description: Feedwater Control System Modifications.  
Date Implemented: 12-Feb-99

### Section 3

**Plant Mod Number:** 974823P201  
**Description:** Remove part-length CEA's from PMS  
**Date Implemented:** 23-Feb-99

**Plant Mod Number:** 963230D01  
**Description:** 2E11A & B Main Condenser Tube Bundle Replacement  
**Date Implemented:** 04-Mar-99

**Plant Mod Number:** 973950P201  
**Description:** NaOH System Replacement  
**Date Implemented:** 04-Mar-99

**Plant Mod Number:** 991545N201  
**Description:** Removes H2 Purge air flow indicators 2FI-8229-1 and 2FI-8277-1 from 2C33.  
**Date Implemented:** 15-Jul-99

**Plant Mod Number:** 980912N201  
**Description:** Change 2A1/2/3/4 undervoltage relay setpoints.  
**Date Implemented:** 30-Jul-99

**Section 4**

**Operability Test for 2000 – 2004**