Pacific Gas and Electric Company

David H. Oatley
Vice President
Diablo Canyon Operations

Diablo Canyon Power Plant
P.O. Box 56
Avila Beach, CA 93424

805.545.4350
Fax: 805.545.4234

December 14, 2001

PG&E Letter DCL-01-134

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

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Power Plant Units 1 and 2
Simulator Certification – Four-Year Certification Report 2001

Dear Commissioners and Staff:

In accordance with 10 CFR 55.45(b)(5)(ii), enclosed is the Four Year Certification Report 2001 for the Diablo Canyon Units 1 and 2 Simulator Facility. Simulator performance testing was satisfactorily completed with no uncorrected performance test failures identified during the last four years.

During the next four-year interval PG&E will comply with the functional requirements identified in the American National Standard Institute/American Nuclear Society (ANSI/ANS) 3.5-1998, "Nuclear Power Plant Simulators for Use in Operator Training and Examination," in lieu of the previously committed ANSI/ANS-3.5-1985. PG&E personnel qualification requirements will continue to be in accordance with Proposed Revision 2* to Regulatory Guide 1.8, "Personnel Selection and Training," dated February 1979, and ANSI/ANS3.1, "Personnel Selection and Training," dated 1978 with exceptions as noted in the Final Safety Analysis Report Update Chapter 17. PG&E's established personnel qualification program is not incompatible with ANSI/ANS 3.5-1998 requirements.

If you have any questions regarding this report, please contact Roger Jett, at (805) 545-3439.

Sincerely,

David H. Oatley
Enclosure

A001

cc: J. Frank Collins (w/enc.)
Ann P. Hodgdon
Ellis W. Merschoff
David L. Proulx
Girija S. Shukla
Diablo Distribution

DDM/1753

NRC FORM 474 (8-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0138 EXPIRES: 08/31/2001

Estimated burden per response to comply with this mandatory information collection request: 120 hours. This information is used to certify a simulation facility. Forward comments regarding burden estimate to the Records Management Branch (T-8 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0138), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

SIMULATION FACILITY CERTIFICATION

INSTRUCTIONS: This form is to be filed for initial certification, recertification (if required), and for any change to a simulation facility performance testing plan made after initial submittal of such a plan. Provide the following information and check the appropriate box to indicate reason for submittal.

FACILITY	DOCKET NUMBER
Diablo Canyon Power Plant Units 1 and 2	50—275/323
LICENSEE	**DATE**
Pacific Gas and Electric Company	12/14/2001

This is to certify that:

1. The above named facility licensee is using a simulation facility consisting solely of a plant-referenced simulator that meets the requirements of 10 CFR 55.45.
2. Documentation is available for NRC review in accordance with 10 CFR 55.45(b).
3. This simulation facility meets the guidance contained in ANSI/ANS 3.5-1985 or ANSI/ANS 3.5-1993, as endorsed by NRC Regulatory Guide 1.149.

If there are any EXCEPTIONS to the certification of this item, CHECK HERE [ ] and describe fully on additional pages as necessary.

NAME *(or other identification)* AND LOCATION OF SIMULATION FACILITY.

Diablo Canyon Power Plant - Avila Beach, California

[ ] SIMULATION FACILITY PERFORMANCE TEST ABSTRACTS ATTACHED. *(For performance tests conducted in the period ending with the date of this certification.)*

DESCRIPTION OF PERFORMANCE TESTING COMPLETED. *(Attach additional pages as necessary and identify the item description being continued.)*

See attached description.

[ ] SIMULATION FACILITY PERFORMANCE TESTING SCHEDULE ATTACHED. *(For the conduct of approximately 25 percent of performance tests per year for the four-year period commencing with the date of this certification.)*

DESCRIPTION OF PERFORMANCE TESTING TO BE CONDUCTED. *(Attach additional pages as necessary and identify the item description being continued.)*

See attached description.

[ ] PERFORMANCE TESTING PLAN CHANGE. *(For any modification to a performance testing plan submitted on a previous certification.)*

DESCRIPTION OF PERFORMANCE TESTING PLAN CHANGE *(Attach additional pages as necessary and identify the item description being continued.)*

See attached description.

[ ] RECERTIFICATION *(Describe corrective actions taken, attach results of completed performance testing in accordance with 10 CFR 55.45(b)(5)(v). (Attach additional pages as necessary and identify the item description being continued.)*

Any false statement or omission in this document, including attachments, may be subject to civil and criminal sanctions. I certify under penalty of perjury that the information in this document and attachments is true and correct.

SIGNATURE — AUTHORIZED REPRESENTATIVE	TITLE	DATE
	Vice President Diablo Canyon Operations	12/14/2001

In accordance with 10 CFR 55.5, Communications, this form shall be submitted to the NRC as follows:

BY MAIL ADDRESSED TO: DIRECTOR, OFFICE OF NUCLEAR REACTOR REGULATION
U.S. NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001

BY DELIVERY IN PERSON TO THE NRC OFFICE AT: ONE WHITE FLINT NORTH
11555 ROCKVILLE PIKE
ROCKVILLE, MD

Description of Performance Testing

This is to certify that:

Diablo Canyon Power Plant is using a simulation facility consisting solely of a plant-referenced simulator that meets the requirements of 10 CFR 55.45.

Item 1 (Description of Performance Testing Completed) has not been changed of modified.

No exceptions or exemptions are being taken to 10 CFR 55.45.

Documentation is available for NRC review in accordance with 10 CFR 55.45(b).

Item 2 (Description of Performance Testing to be Conducted) has been changed.

This simulation facility currently meets the guidance contained in ANSI/ANS 3.5-1985, as shown by completion of the appropriate four years of testing. The next four years of testing will be in accordance with ANSI/ANS 3.5-1998.

Item 3 (Description of Performance Testing Plan Change) has been changed.

The only exception being taken is to commit to the latest ANSI/ANS Standard and the applicable Regulatory Guide that points to this standard. This allows simulator performance testing to be coupled with scenario-based testing in the training and examination preparation processes, providing improved assurance of acceptable simulator performance over that provided by previous simulator capabilities-based, stand-alone testing programs.

Description of performance testing completed.

Refer to previous submitted four-year reports:

1993 Four-Year Report submitted via DCL-93-274, dated December 3, 1993, and DCL-90-227, dated September 18, 1990.

1997 Four-Report submitted via DCL-97-204 dated December 8, 1997, and DCL-98-155, dated November 2, 1998.

Description of Performance Testing

Description of Performance Testing to be conducted.

Testing will be conducted as described in the ANSI/ANS 3.5-1998 Standard Section 4.4 Simulator Testing. This includes Verification Testing per section 4.4.1, Validation testing per Section 4.4.2, Simulator Performance testing per Section 4.4.3, Simulator Performance Testing per Section 4.4.3, Simulator Operability Testing per Section 4.4.3.1 and Simulator Scenario-Based Testing per Section 4.4.3.2

Simulator performance testing will be coupled with scenario-based testing in the training and examination preparation processes, providing improved assurance of acceptable simulator performance over that provided by previous simulator capabilities-based, stand-alone testing programs. A documentation record will be used to track the scenario-based testing process. Any items identified, that may need correction or modification, will be placed into the on going simulator configuration management process.

There is no change to the configuration control verification and validation testing used in the software development process.

Description of Performance Testing Plan Change.

Performance tests will include pre-testing of all licensed operator simulator scenarios used for examination and training. A documentation record will be used to track the pre-testing of the scenarios. These performance tests will include not only malfunctions but also review any of the instructor interface items used in the course of the simulator scenario. This replaces the twenty-five percent per year stand-alone testing of malfunctions, as required per the previous standard.

The scheduling and evaluation of the simulation facility testing under ANSI/ANS 3.5-1998 is a function of the accredited training programs. The licensed operator training program simulator schedule will be used as guidance for the sequence in which the simulator scenarios will be tested.

There is no change to the configuration control verification and validation testing used in the software development process.

Diablo Canyon Simulator Four-Year Certifiction Report 2001

I. Introduction

The Diablo Canyon Simulator Four Year Certification Report briefly provides a description of the simulator, description and dates completed of the previous four year testing program, a schedule for the subsequent four years of testing, and a current status of simulator modifications since the 1997 Certification Report. Additional information is available upon request. The anniversary date of certification is December 1989.

II. Simulator Information

Simulator Type:	Reference Plant Simulator
Manufacturer:	Westinghouse Electric Corp.
Owner/Operator:	Pacific Gas & Electric Corp.
Reference Plant:	Diablo Canyon Unit 1
Plant Location:	7 miles NW of Avila Beach, CA
Plant Type:	Westinghouse 4-Loop PWR
Plant Rating:	3411 MWT
Available for Training:	September 1984
Type of Report:	4 Year Certification Report

III. Major Simulator Changes Since the 1997 Certification Report

Simulator facility environment changes:

- Flat Screen cathode ray tubes (CRTs or computer monitors) were replaced in the plant control room and in the simulator.
- Added another instructor station on the simulator floor for use by the Initial License class instructors.

Diablo Canyon Simulator Four-Year Certifiction Report 2001

Significant Simulator Modeling Changes:

- Unit 1 Uprate was incorporated on the simulator to replicate the increased Megawatt rating change of Unit 1.
- Instructor System was significantly rewritten to include feedback from instructors to make the system interface more flexible and easier to use.
- Reactor Vessel Level Indication System was upgraded in the plant and on the simulator.
- Incore Thermocouple Temperature Monitoring System was upgraded in the plant and on the simulator.
- Turbine Extraction Steam System was enhanced to match the Westinghouse turbine curves.
- Main Condenser model was re-written to balance mass flows and match the enthalpy changes that occur in the plant.
- Electrical System Disconnects were added to allow instructor control over devices that are smaller than 480 volts.
- Main Feed Pump Woodward Governors were incorporated in the plant and on the simulator.
- Hydrogen Recombiners were modeled to allow remote operator actions.
- Nuclear Instrumentation Thermal Shielding was enhanced to duplicate an actual plant transient response.
- Feedwater Trains Transport times were enhanced to include a water energy transport delay in response to actual plant transient data.
- Feedwater Heater Controller and Condenser Level Controllers were rewritten from proportional to proportional plus integral controllers.
- Steam Generator Blowdown Flash Tank was added to match plant heat balances more accurately.
- Hagan Controllers were rewritten to more accurately match plant response.

Diablo Canyon Simulator Four-Year Certifiction Report 2001

- Incore Thermocouple Model was worked on to improve degraded core response.

- Vantage 5 Fuel and various core reloads have been completed to accurately model core and Nuclear Instrumentation responses.

IV. Certification Testing

Attachment 1, indicates the performance tests completed to certify the Simulator. These are broken down into the Annual Transient Performance Tests and the 25% per year tests. Completion dates and specific test descriptions are included. Specific data is available upon request.

Attachment 2, contains the Simulator testing plan schedules for the next four years covering January 2002 - December 2005.

V. Database Changes

Attachment 3, contains the plant Design Change Notices (DCNs,) and Action Requests that have been completed since the 1997 Simulator Certification Report.

Attachment 4, contains the Simulator Change Requests (SCRs) that have been completed since the 1997 Simulator Certification Report.

VI. Instructor System

Attachment 5, contains a copy of the Instructor's Manual since the Simulator instructor system has had numerous changes since the 1997 Simulator Certification Report.

VII. References

Title 10, Code of Federal Regulations, Part 55, "Operators' Licenses."

ANSI/ANS-3.5-1985 and 1998 American Nuclear Society "Nuclear Power Plant Simulators for Use in Operator Training."

U.S. Nuclear Regulatory Commission Regulatory Guide 1.149, April 1987 "Nuclear Power Plant Simulation Facilities for use in Operator License Examinations."

Completed Four-Year Testing Schedule for the DCPP Simulator

FIRST YEAR (1998)

TEST NO	COMPLETION DATE	DESCRIPTION
3.1.1(1)	11/23/98	Plant startup - Cold Shutdown to Hot Standby.
3.1.1(2)	11/8/98	Nuclear Startup - Hot Standby to Rated Power.
3.1.1(3)	11/8/98	Turbine startup and Generator synchronization.
3.1.1(8)	11/23/98	Plant Shutdown - Rated Power to Cold Shutdown.
3.1.2(1)(a)	8/18/98	Loss of coolant: significant PWR steam generator leaks.
3.1.2(2)	8/26/98	Loss of instrument air.
3.1.2(6)	8/18/98	Loss of service water or cooling to individual components.
3.1.2(10)	11/2/98	Loss of all feedwater (normal and emergency cooling).
3.1.2(14)	8/18/98	Fuel cladding failure resulting in high activity reactor coolant or off gas and the associated high radiation alarms.
3.1.2(18)(a)	8/18/98	Failure of reactor coolant pressure and
3.1.2(18)(b)	8/18/98	volume control systems (PWR).
3.1.2(22)	8/18/98	Process instrumentation, alarms, and control system failures.

Completed Four-Year Testing Schedule for the DCPP Simulator

ANNUAL TRANSIENT PERFORMANCE (1998)

TEST NO	COMPLETION DATE	DESCRIPTION
A.3.1	7/29/98	Computer Real Time Test.
B.2.1 (1)	7/6/98	Simulator Stability at 100% power.
B.2.1 (2)	7/6/98	Simulator Stability at 75% power.
B.2.1 (3)	11/23/98	Simulator Stability at 50% power.
B.2.2 (1)	7/28/98	Manual reactor trip.
B.2.2 (2)	8/11/98	Simultaneous trip of all feedwater pumps.
B.2.2 (3)	7/29/98	Simultaneous closure of all Main Steam Isolation Valves.
B.2.2 (4)	7/28/98	Simultaneous trip of all reactor coolant pumps
B.2.2 (5)	11/23/98	Trip of any single reactor coolant pump.
B.2.2 (6)	7/30/98	Main turbine trip (maximum power level which does not result in immediate reactor trip).
B.2.2 (7)	7/30/98	Maximum rate power ramp (100%, down to approx. 75%, and back up to 100%).
B.2.2 (8)	7/30/98	Maximum size reactor coolant system rupture combined with loss of all offsite power.
B.2.2 (9)	7/28/98	Maximum size unisolable main steam line rupture
B.2.2 (10)	7/29/98	Slow primary system depressurization to saturated conditions using pressurizer relief or safety valve stuck open. (Inhibit activation of high pressure Emergency Core Cooling Systems.)

Completed Four-Year Testing Schedule for the DCPP Simulator

SECOND YEAR (1999)

TEST NO	COMPLETION DATE	DESCRIPTION
3.1.1(4)	3/3/99	Reactor Trip followed by recovery to Rated Power.
3.1.1(5)	11/10/99	Operations at Hot Standby. (Trip and restart of a Reactor Coolant Pump.)
3.1.1(6)	11/10/99	Load changes.
		Loss of coolant:
3.1.2(1)(b)-1	11/10/99	inside primary containment
3.1.2(1)(b)-2	3/3/99	and outside primary containment.
3.1.2(3)(a)-1	2/24/99	Loss or degraded electrical power
3.1.2(3)(a)-2	11/10/99	to the station:
3.1.2(3)(b)	11/16/99	a. loss of offsite power
3.1.2(3)(c)	11/16/99	b. loss of emergency power
3.1.2(3)(d)-1	11/22/99	c. loss of emergency generators
3.1.2(3)(d)-2	11/22/99	d. loss of power to the plant's
3.1.2(3)(d)-3	3/3/99	electrical distribution buses
3.1.2(3)(e)-1	11/22/99	e. loss of power to the individual
3.1.2(3)(e)-2	3/10/99	instrument buses (AC as well as DC).
3.1.2(7)	11/22/99	Loss of shutdown cooling.
3.1.2(11)	11/22/99	Loss of protective system channel.
3.1.2(15)	11/22/99	Turbine trip.
3.1.2(19)	11/22/99	Reactor trip.
		Passive malfunctions in systems, such as:
3.1.2(23)(a)	2/10/99	a. engineered safety features
3.1.2(23)(b)	11/22/99	b. emergency feedwater systems.

Completed Four-Year Testing Schedule for the DCPP Simulator

ANNUAL TRANSIENT PERFORMANCE (1999)

TEST NO	COMPLETION DATE	DESCRIPTION
A.3.1	11/29/99	Computer Real Time Test.
B.2.1 (1)	6/21/99	Simulator Stability at 100% power.
B.2.1 (2)	7/6/99	Simulator Stability at 75% power.
B.2.1 (3)	7/12/99	Simulator Stability at 50% power.
B.2.2 (1)	9/8/99	Manual reactor trip.
B.2.2 (2)	11/22/99	Simultaneous trip of all feedwater pumps.
B.2.2 (3)	11/29/99	Simultaneous closure of all Main Steam Isolation Valves.
B.2.2 (4)	7/13/99	Simultaneous trip of all reactor coolant pumps
B.2.2 (5)	11/10/99	Trip of any single reactor coolant pump.
B.2.2 (6)	11/22/99	Main turbine trip (maximum power level which does not result in immediate reactor trip).
B.2.2 (7)	11/29/99	Maximum rate power ramp (100%, down to approx. 75%, and back up to 100%).
B.2.2 (8)	6/29/99	Maximum size reactor coolant system rupture combined with loss of all offsite power.
B.2.2 (9)	6/29/99	Maximum size unisolable main steam line rupture.
B.2.2 (10)	12/2/99	Slow primary system depressurization to saturated conditions using pressurizer relief or safety valve stuck open. (Inhibit activation of high pressure Emergency Core Cooling Systems.)

Completed Four-Year Testing Schedule for the DCPP Simulator

THIRD YEAR (2000)

TEST NO	COMPLETION DATE	DESCRIPTION
3.1.1(7)	12/13/00	Startup, shutdown and power operations with less than full reactor coolant flow.
3.1.1(8)	done in 98	Plant shutdown from Rated Power to Hot Standby and cooldown to Cold Shutdown conditions.
3.1.2(1)(c)-1	12/13/00	Loss of coolant: large and small reactor coolant breaks including demonstration of saturation condition.
3.1.2(1)(c)-2	11/1/00	
3.1.2(4)	10/19/00	Loss of forced core coolant flow due to single or multiple pump failure.
3.1.2(8)	10/19/00	Loss of component cooling system or cooling to individual components.
		Control rod failure including:
3.1.2(12)(a)	10/19/00	a. stuck rods, misaligned rods
3.1.2(12)(b)	10/31/00	b. rod drops, uncoupled rods
3.1.2(12)(c)	11/1/00	c. drifting rods.
3.1.2 (16)	12/12/00	Generator trip.
3.1.2(20)(a)	12/12/00	Main steam line as well as main feed line break (both inside and outside containment).
3.1.2(20)(b)	12/12/00	
3.1.2(20)(c)	12/12/00	
3.1.2(20)(d)	12/13/00	
3.1.2(24)	12/13/00	Failure of the automatic reactor trip system.

Completed Four-Year Testing Schedule for the DCPP Simulator

ANNUAL TRANSIENT PERFORMANCE (2000)

TEST NO	COMPLETION DATE	DESCRIPTION
A.3.1	10/31/00	Computer Real Time Test.
B.2.1 (1)	5/23/00	Simulator Stability at 100% power.
B.2.1 (2)	5/23/00	Simulator Stability at 75% power.
B.2.1 (3)	5/23/00	Simulator Stability at 50% power.
B.2.2 (1)	12/14/00	Manual reactor trip.
B.2.2 (2)	12/14/00	Simultaneous trip of all feedwater pumps.
B.2.2 (3)	12/13/00	Simultaneous closure of all Main Steam Isolation Valves.
B.2.2 (4)	12/13/00	Simultaneous trip of all reactor coolant pumps
B.2.2 (5)	12/13/00	Trip of any single reactor coolant pump.
B.2.2 (6)	12/14/00	Main turbine trip (maximum power level which does not result in immediate reactor trip).
B.2.2 (7)	12/13/00	Maximum rate power ramp (100%, down to approximately 75%, and back up to 100%).
B.2.2 (8)	12/14/00	Maximum size reactor coolant system rupture combined with loss of all offsite power.
B.2.2 (9)	12/14/00	Maximum size unisolable main steam line rupture.
B.2.2 (10)	12/12/00	Slow primary system depressurization to saturated conditions using pressurizer relief or safety valve stuck open. (Inhibit activation of high pressure Emergency Core Cooling Systems.)

Completed Four-Year Testing Schedule for the DCPP Simulator

FOURTH YEAR (2001)

TEST NO	COMPLETION DATE	DESCRIPTION
		Core performance testing such as:
3.1.1(9)(a)	8/30/01	a. plant Heat Balance
3.1.1(9)(b)	10/11/01	b. determination of Shutdown Margin
3.1.1(9)(c)	10/29/01	c. measurement of Reactivity Coefficients
3.1.1(9)(d)	8/23/01	d. measurement of Control Rod worth.
		Operator conducted surveillance testing on safety related equipment or systems such as:
3.1.1(10)(a)	10/9/01	a. on Diesel Generator 1-1
3.1.1(10)(b)	10/9/01	b. on Safety Injection Pump 1-1
3.1.1(10)(c)	10/9/01	c. on Intermediate Range NR-35
3.1.1(10)(d)	10/29/01	d. on Turbine Driven Aux FW Pump 1-1.
3.1.2(1)(d)-1	10/15/01	Loss of coolant: failure of safety and
3.1.2(1)(d)-2	10/11/01	relief valves.
3.1.2(5)(a)	10/29/01	Loss of condenser vacuum including loss
3.1.2(5)(b)	10/22/01	of condenser level control.
3.1.2(9)	10/29/01	Loss of normal feedwater or normal feedwater system failure.
3.1.2(13)	10/18/01	Inability to drive control rods.
3.1.2(17)(a)	10/22/01	Failure in automatic control system(s)
3.1.2(17)(b)	10/22/01	that affect reactivity and core heat removal.
3.1.2(21)	10/22/01	Nuclear instrumentation failures.

Completed Four-Year Testing Schedule for the DCPP Simulator

ANNUAL TRANSIENT PERFORMANCE (2001)

TEST NO	COMPLETION DATE	DESCRIPTION
A.3.1	10/22/01	Computer Real Time Test.
B.2.1 (1)	8/20/01	Simulator Stability at 100% power.
B.2.1 (2)	10/11/01	Simulator Stability at 75% power.
B.2.1 (3)	10/11/01	Simulator Stability at 50% power.
B.2.2 (1)	10/22/01	Manual reactor trip.
B.2.2 (2)	10/22/01	Simultaneous trip of all feedwater pumps.
B.2.2 (3)	10/17/01	Simultaneous closure of all Main Steam Isolation Valves.
B.2.2 (4)	10/16/01	Simultaneous trip of all reactor coolant pumps
B.2.2 (5)	10/16/01	Trip of any single reactor coolant pump.
B.2.2 (6)	10/22/01	Main turbine trip (maximum power level which does not result in immediate reactor trip).
B.2.2 (7)	10/22/01	Maximum rate power ramp (100%, down to approximately 75%, and back up to 100%).
B.2.2 (8)	10/22/01	Maximum size reactor coolant system rupture combined with loss of all offsite power.
B.2.2 (9)	10/17/01	Maximum size unisolable main steam line rupture.
B.2.2 (10)	10/16/01	Slow primary system depressurization to saturated conditions using pressurizer relief or safety valve stuck open. (Inhibit activation of high pressure Emergency Core Cooling Systems.)

Proposed Four-Year Testing Schedule for the DCPP Simulator

ANNUAL TRANSIENT PERFORMANCE (2002)

TEST NO	COMPLETION DATE	DESCRIPTION
A.3.1	_____	Computer Real Time Test.
B.2.1 (1)	_____	Simulator Stability at 100% power.
B.2.1 (2)	_____	Simulator Stability at 75% power.
B.2.1 (3)	_____	Simulator Stability at 50% power.
B.2.2 (1)	_____	Manual reactor trip.
B.2.2 (2)	_____	Simultaneous trip of all feedwater pumps.
B.2.2 (3)	_____	Simultaneous closure of all Main Steam Isolation Valves.
B.2.2 (4)	_____	Simultaneous trip of all reactor coolant pumps.
B.2.2 (5)	_____	Trip of any single reactor coolant pump.
B.2.2 (6)	_____	Main turbine trip (maximum power level which does not result in immediate reactor trip).
B.2.2 (7)	_____	Maximum rate power ramp (100%, down to approximately 75%, and back up to 100%).
B.2.2 (8)	_____	Maximum size reactor coolant system rupture combined with loss of all offsite power.
B.2.2 (9)	_____	Maximum size unisolable main steam line rupture.
B.2.2 (10)	_____	Slow primary system depressurization to saturated conditions using pressurizer relief or safety valve stuck open. (Inhibit activation of high pressure Emergency Core Cooling Systems.)

Proposed Four-Year Testing Schedule for the DCPP Simulator

ANNUAL TRANSIENT PERFORMANCE (2003)

TEST NO	COMPLETION DATE	DESCRIPTION
A.3.1	_____	Computer Real Time Test.
B.2.1 (1)	_____	Simulator Stability at 100% power.
B.2.1 (2)	_____	Simulator Stability at 75% power.
B.2.1 (3)	_____	Simulator Stability at 50% power.
B.2.2 (1)	_____	Manual reactor trip.
B.2.2 (2)	_____	Simultaneous trip of all feedwater pumps.
B.2.2 (3)	_____	Simultaneous closure of all Main Steam Isolation Valves.
B.2.2 (4)	_____	Simultaneous trip of all reactor coolant pumps.
B.2.2 (5)	_____	Trip of any single reactor coolant pp.
B.2.2 (6)	_____	Main turbine trip (maximum power level which does not result in immediate reactor trip).
B.2.2 (7)	_____	Maximum rate power ramp (100%, down to approximately 75%, and back up to 100%).
B.2.2 (8)	_____	Maximum size reactor coolant system rupture combined with loss of all offsite power.
B.2.2 (9)	_____	Maximum size unisolable main steam line rupture.
B.2.2 (10)	_____	Slow primary system depressurization to saturated conditions using pressurizer relief or safety valve stuck open. (Inhibit activation of high pressure Emergency Core Cooling Systems.)

Proposed Four-Year Testing Schedule for the DCPP Simulator

ANNUAL TRANSIENT PERFORMANCE (2004)

TEST NO	COMPLETION DATE	DESCRIPTION
A.3.1	_____	Computer Real Time Test.
B.2.1 (1)	_____	Simulator Stability at 100% power.
B.2.1 (2)	_____	Simulator Stability at 75% power.
B.2.1 (3)	_____	Simulator Stability at 50% power.
B.2.2 (1)	_____	Manual reactor trip.
B.2.2 (2)	_____	Simultaneous trip of all feedwater pumps.
B.2.2 (3)	_____	Simultaneous closure of all Main Steam Isolation Valves.
B.2.2 (4)	_____	Simultaneous trip of all reactor coolant pumps.
B.2.2 (5)	_____	Trip of any single reactor coolant pump.
B.2.2 (6)	_____	Main turbine trip (maximum power level which does not result in immediate reactor trip).
B.2.2 (7)	_____	Maximum rate power ramp (100%, down to approximately 75%, and back up to 100%).
B.2.2 (8)	_____	Maximum size reactor coolant system rupture combined with loss of all offsite power.
B.2.2 (9)	_____	Maximum size unisolable main steam line rupture.
B.2.2 (10)	_____	Slow primary system depressurization to saturated conditions using pressurizer relief or safety valve stuck open. (Inhibit activation of high pressure Emergency Core Cooling Systems.)

Proposed Four-Year Testing Schedule for the DCPP Simulator

ANNUAL TRANSIENT PERFORMANCE (2005)

TEST NO	COMPLETION DATE	DESCRIPTION
A.3.1	_____	Computer Real Time Test.
B.2.1 (1)	_____	Simulator Stability at 100% power.
B.2.1 (2)	_____	Simulator Stability at 75% power.
B.2.1 (3)	_____	Simulator Stability at 50% power.
B.2.2 (1)	_____	Manual reactor trip.
B.2.2 (2)	_____	Simultaneous trip of all feedwater pumps.
B.2.2 (3)	_____	Simultaneous closure of all Main Steam Isolation Valves.
B.2.2 (4)	_____	Simultaneous trip of all reactor coolant pumps.
B.2.2 (5)	_____	Trip of any single reactor coolant pump.
B.2.2 (6)	_____	Main turbine trip (maximum power level which does not result in immediate reactor trip).
B.2.2 (7)	_____	Maximum rate power ramp (100%, down to approximately 75%, and back up to 100%).
B.2.2 (8)	_____	Maximum size reactor coolant system rupture combined with loss of all offsite power.
B.2.2 (9)	_____	Maximum size unisolable main steam line rupture.
B.2.2 (10)	_____	Slow primary system depressurization to aturated sconditions using pressurizer relief or safety valve stuck open. (Inhibit activation of high pressure Emergency Core Cooling Systems.)

Design Changes, Action Requests and Plant Changes Incorporated Since December 1997

1. A0362583 UPDATE RM-14 SKID SOFTWARE
2. A0384571 CHANGE MN GEN EXCITER LIMITER SETTINGS
3. A0379270 CHANGE FOR R-14R SOFTWARE
4. A0186339 DC 49193 REPLACE RM-29
5. A0318743 DC 47963 ASW SETPOINT CHANGES
6. A0416844 TURNING GEAR DISENGAGE FROM 5 TO 20#
7. A0416845 DC 49301 REPOWER CIV MONITOR LITES FROM PY14 TO PY12
8. A0449237 ABANDON CIRC TUNNEL LEV IND
9. AR 438559 DC 49400 ADD DESCRIPTOR TAGS FOR FR-81
10. A0381360 VERIFY SCALING AND CHART PAPER FOR TR-26
11. A0456551 CHANGE PZR LEVEL TRIP SETPOINT TO 90%
12. A0139836 DC 43154 LCV 8 AND 12 BACKUP AIR
13. A0462620 ADD CCW/RHR HX PPC TEMP INPUTS
14. A0465126 REMOVE ALARM INPUTS 702 AND 903
15. A0459995 CHANGE COND/COND BSTR PUMP AUTO LOGICS
16. A0421182 DC 49378 INSTALL GEN OUT OF STEP TOGGLE
17. A0407162 DC 49374 INSTALL NEW FCO TOGGLE
18. A0472644 CHANGE RCP THERMAL BARRIER HI FLW ALARM
19. A0477192 REMOVE VLPM INPUTS 14-16 FROM BISTABLES
20. A0479429 INPUT FOR PPC CIRC WATER DELTA T
21. A0464875 CHANGE SLUR SETPOINTS
22. A0481305 ADD RCP SEAL LEAKOFF FLOWS TO PPC
23. A0480648 CHANGE DRPI INDICATION FOR TEMP JUMPER
24. A0488596 CHANGE ROD CONTROL LEAD/LAG
25. A0483194 PS-129 SETPOINT TO 97 PSIG
26. A0496200 CHANGE DFWCS SETPOINTS
27. A0488707 ADD DISCONNECTS FOR BACKUP PWR SUPPLIES
28. A0483194 RHR OVERCURRENT SETTINGS CHANGED
29. A0498803 AND A0485993 SFP TEMP RATE ALARM TO PK1104
30. A0498961 REMOVE TR-84
31. A0500402 ADD SECOND SETPOINT AND LOA FOR RM 23
32. A0492580 REMOVE SWITCH FOR SW EVAP FCV 724 VB4
33. A0490337 COMPETE CHANGES FOR UNIT 1 UPRATE PROJECT
34. A0499700 REMOVE CWP LOW COOLING WATER PRESSURE TRIP
35. A0506604 500KV PROTECT DEVICE PWR SUPPLY CHANGE
36. A0487345 REPLACE RCP SEAL RECORDERS
37. A0510439 CHANGE RM 23 HIGH ALARM SETPOINT
38. A0509894 CHANGE P9 SETPOINT
39. A0503984 REVIEW/CHANGE VCT SUPPLY PRESS OF 28 LBS
40. A0500048 DRIVE PPC POINT F0650A

Simulator Software Changes Completed Since December 1997

1. A0362583 UPDATE RM-14 SKID SOFTWARE
2. POLISHER EFFLUENT DO2 ALARM DOESN'T MATCH RECORDER VALUE
3. MORE REALISTIC PUMP CURRENT CALCS AND STARTING
4. A0384571 CHANGE MAINN GENERATOR EXCITER LIMITER SETTINGS
5. A0379270 CHANGE FOR R-14R SOFTWARE
6. SNAP CHANGES FROM OPERATOR FEEDBACK
7. DRIVE DIGITAL SEISMIC METERS
8. SIMULATOR FREEZE FOR 30-90 SECONDS ON IT'S OWN
9. PLANT ONLY RUNS 3 CRDM FANS NORMALLY
10. CHECK BORON LOOP TRANSIENT TIME
11. KINEMETRICS METERS READ HALF OF MALFUNCTION VALUES
12. FAIL/ACKNOWLEGE LITE DOESN'T COME ON WHEN RDU IN OVERRANGE
13. CONTROL BOARD COMPARISONS
14. MODEL FIRE COMPUTER TO ACTIVATE SINGLE ALARM POINT
15. CHANGE SIMULATOR RAD MONITORS BACKGROUNDS TO MATCH PLAN
16. A0186339 DC 49193 REPLACE RM-29
17. DIESEL GENERATOR OVERSHOOT OF SPEED AND VOLTAGE ON START
18. A0318743 DC 47963 ASW SETPOINT CHANGES
19. NEED TEMPORARY RECORDER FOR MID LOOP SCENARIOS
20. RONAN LIMIT MODE FEATURE NOT SUPPORTED
21. CHANGE SNAP 17 TITLE
22. MICROPHONE FOR PAGING LOUDER THAN CONTROL ROOM
23. RE 58 HI ALARM DOESN'T CAUSE SWAP TO IR
24. MAIN FEEDWATER PUMP CAVITATION TOO MILD
25. FCV 128 SHOULD BE SLUGGISH FOR FIRST 20% OF STROKE
26. A0416844 TURNING GEAR DISENGAGE FROM 5 TO 20#
27. PK 8,23 INPUT 28 DOES NOT COME IN ON LOW PRESS SI
28. DC 49301 REPOWER CIV MONITOR LITES FROM PY14 TO PY12
29. GEN SEAL OIL MODEL NOT BASED ON GEN HYDROGEN PRESS
30. DRIVE RE 25, 26 AND 51-54 OFF OUTPPUT OF CONTROL ROOM VENT
31. S/U UV ALARM SHOULD BE DRIVEN FROM 27HXU
32. FCV-128 CONTROL AT HOT SHUTDOWN PANEL
33. SIM SPEED SCALE DOESN'T WORK AFTER SLEEP
34. CHANGE PDP TO REQUIRE GOING TO RAISE ON SPEED
35. NO UNIT 2 AUXILIARY STEAM
36. NEED DISCONNECTS FOR BKRS 72-1241 ETC.
37. TURBINE OVERSPEED ALARM 704 IS INCORRECT
38. P/A CONVERTERS WRONG ON SIMULATOR
39. PDP TRIPS ON UNIT TRIP
40. PDP HI STATOR TEMP ALARM OCCURS ON INIT 28
41. REHEATER PURGE FUSES ON BACK OF VB-3 DON'T WORK
42. MAL SYD3 RESPONSE AT 56 HERTZ
43. REWRITE SNAPS 24 AND 34
44. TURB VIBRATION XMTRS DON'T DRIVE ALARMS

Simulator Software Changes Completed Since December 1997

45. TCV-23 DRIFTS WHEN PLACED IN MANUAL
46. CFCU 13 WON'T START IN HIGH SPEED
47. CLOSING CST SUCTION TO AFW12 CAUSES BOTH MAINFW TO CAV
48. LOAD TAP CHANGER NUMBERS SHOULD COUNT UP
49. MAIN STM ISOL SIGNAL MUST BE IN FOR 1 SECOND
50. REWRITE SNAPS WITH MSR CONTROLLER AT 10 TURNS
51. A0446266 AMSAC SETPOINT TO 32 PERCENT
52. ADD VALVE NUMBERS TO AIR LOA DESCRIPTIONS
53. INVESTIGATE CAUSE OF FNISPR DATA ON RX TRIP
54. PK1121 HIGH RAD ALARM ON RESTORE OF PY 13A
55. NANERS WHEN DOING SMALL LOCA FROM SNAP 10
56. MODE 6 CVI NOT CUT IN SNAPS
57. CVI MONITOR LITE FOR FCV 681 NOT DRIVEN
58. ADD WAVE ACTION TO OCEAN PARAMETERS
59. ADD LOA'S FOR RADWASTE ISO VALVES
60. RADWASTE ISO VALVES TRAIN B NOT OPEN IN SNAPS 1 AND 2
61. RHR PUMP FLOW TO RCS WITH SI-1 CLOSED
62. MAIN TURBINE BEARING OIL PUMP SETPOINTS
63. INCORE T/C TRAIN B DISPLAY IS BAD
64. OVERLOAD CHG PP AUX LUBE OIL, STILL ABLE TO START PP
65. PI-44 CONDENSER PRESSURE METER NOT READING CORRECTLY
66. PRT DRAIN TO RCDT
67. CAN'T RESTORE U-2 S/U POWER AFTER OCD 212 IS OPENED
68. CHANGE 230KV SWYD UNDERVOLTAGE RELAY SETTINGS
69. #2 HTR DRN TANK LEVEL SHOULD BE 56%
70. MSR HOT REHEAT RECORDER POINTS WRONG
71. UPGRADE INCORE TC TEMP TO MATCH PLANT
72. NO FUEL DAMAGE ON DBA LOCA
73. PCV-128 MANUAL OUTPUT AT HSDP IS STUCK
74. SUBCOOL MARGIN IS DIFF ON SCM AND PPC/SPDS
75. SCALE HC-455F PER SCL7201C
76. A0449237 ABANDON CIRC TUNNEL LEV IND
77. MAKE RVRLIS LEVEL TRANSMITTERS
78. A0438559 DC 49400, ADDD DESCR TAGS FOR FR-81
79. DRIVE ALL DDR10 RECORDER POINTS IN XMT DECK
80. SAME ALARM INPUT NUMBER STUFFS RONAN ALARM BUFFER
81. VACUUM SWINGS ON SHUTDOWN
82. PUT NON-VITAL BUSES ON VB'S INTO DSC
83. ADD INSTRUMENT OR PROCESS NOISE TO XMT
84. MAL AIR1A BREAK SIZE TOO SMALL
85. TEXT SWITCH CHECK INCONSISTENT
86. A0381360 VERIFY SCALING AND CHART PAPER FOR TR-26
87. DEH VALVE TEST DOES NOT RESPOND PER PROCEDURE
88. AUX FEEDWATER PUMP AMPS NOT OSCILLATING ON CAVITATION

Simulator Software Changes Completed Since December 1997

89. NO DILUTION WHEN CVCS 8441 OPENED
90. ADD FW TEMP CHANNEL TO XMT AND DIGITAL FW CONTROL
91. DEH PANEL OPC TEST AND MAINTENANCE TEST LEDS NOT WORK
92. DEH PANEL OPC TEST PERMISSIVE SWITCH WIRED BACKWARDS
93. MAKE LOA FOR TURBINE GOV VLV LEAKAGE
94. A0456551 CHANGE PZR LEVEL TRIP SETPOINT TO 90%
95. CREATE METHOD OF REMOVING PPC WITHOUT STOPPING TASK
96. CORE EXIT T/C'S STAY UP TOO HIGH ON DBA LOCA
97. TUNE CORE EXIT RESPONSE TO VANTAGE 5
98. PPC POINTS Y0721A,723A,P2238A IN ALRM AT 100%
99. LOA TO PLACE COMM ROOM PWR ON B/U DOESN'T WORK
100. CONTROL BANK B2 STEP COUNTER IMPROPER
101. DETERMINE TDAFW PUMP PERFORMANCE AT LOW S/G PRESS
102. DEG RELAYS TO DEFEAT AUTO START ON LOSS OF S/U WRONG
103. COUNTER SCALER MODE SWITCH MISALIGNED
104. MFW PUMP LATCH TIME IS GREATER THAN 60 SECONDS
105. HAVE A TUNABLE CONSTANT FOR HSDP AFW CONTROLLER T/W
106. U-2 STARTUP POWER GOES AWAY AFTER RUN
107. RHR FLOW NOT CORRECT DURING DBA LOCA RECIRC
108. TDAFW PK09-18 INPUT 1165
109. AFWPP TRIPS ON OC WHEN STARTING AFTER UNIT TRIP
110. DC 43154 LCV 8 AND 12 BACKUP AIR
111. A0462620 ADD CCW/RHR HX PPC TEMP INPUTS
112. PPC DEH CONSTANTS OVERWRITTEN FROM SIM
113. LOSS OF PY-15 SHOULD CAUSE MSR CONTROLLER TO RESET
114. RE 25, 26, 51, 52 GO TO MID SCALE ON LOSS OF POWER
115. GOT NANO'S ON FW HTR MODEL DURING PLANT SHUTDOWN
116. RVRLIS WR LEVEL DOESN'T MATCH PZR COLD CAL LEVEL
117. ROD GROUP SEQUENCING IS WRONG
118. CFCU THERMAL OL SHOULD NOT ALARM ON 480 V BUS MTRS
119. PZR HEATERS 12, 13, 14 DON'T TRIP
120. GCF PMP CWS5 FOR SCREEN WASH LABELED WRONG
121. GCF PMP OPTIONS FOR ROD DRIVE MG SETS ARE N/A
122. GCF PMP TUR4 OPTION 4 FOR DC BRG OIL DOESN'T WORK
123. INTAKE AIR RECEIVER CHECK VALVE NOT MODELED
124. ADD WOODWARD CONTROLS TO SIM PER DCN
125. DRIVE WOODWARD CONTROLS AND SIMULATOR CONTROLLER
126. UPDATE ALARM TYPEWRITER LEGENDS
127. ENGLISH DESCRIPITIONS FOR SOME EPS BKRS
128. SUN STATUS SUM SCREEN BLINKS ODDLY
129. A0465126 REMOVE ALARM INPUTS 702 AND 903
130. ADD ABILITY TO SEND BAD QUALITY CODES TO PPC
131. A0459995 CHANGE COND/COND BSTR PUMP AUTO LOGICS
132. RUNNING DEVSIM ON SGIT CAUSES INTERFERENCE WITH ALARMS

Simulator Software Changes Completed Since December 1997

133. RM14, 14R CHECKSOURCE SHOULD READ 10 CPM
134. CHANGE RE-87 XMTTR RANGE
135. DID NOT GET AMSAC GEN WARNING ON PT-505 LOSS OF LWR
136. A0421182 DC 49378 INSTALL GEN OUT OF STEP TOGGLE
137. PZR HTR 12 AND 13 DON'T TRIP ON VITAL POWER
138. CONDUCTIVITY MODEL GETS NANS
139. AFW BLOWS UP WHEN SUCTION IS ISOLATED
140. SCW PROBLEMS ON LSIM023
141. REVERSE FLOW THRU RCP HIGHER THAN RETRAN
142. CHARGING PUMP AMPS LOW COMPARED TO PLANT
143. SCREEN WASH PUMP STATUS NOT SENT TO PPC
144. HI RAD ON RE-25 DOESN'T CAUSE ALARM ON PK1506
145. WRITNG A SNAP USING SNAP FUNCTION ON SUN HAS PROB
146. TURB ROLLS AT 350 RPM, NO VAC, MSIV'S CLOSED
147. RVRLIS PROBLEM ON HALF LOOP JPM
148. ADD LOA FOR RM 15 15R SELECT SWITCH
149. TUNE FCV-128 TO MATCH PLANT
150. TUNE DFWCS FEED PUMP CONTRTOLS TO MATCH PLANT
151. TUNE CONDERSER SPEC CONDUCTIVITY TO MATCH PLANT
152. TUNE TURB CASING EXPANSION POINTS TO MATCH PLANT
153. SNAP 12 LOOP 4 NOT DRAINED
154. A0407162, DC 49374 INSTALL NEW FCO TOGGLE
155. RVRLIS DYNAMIC HEAD READS 5% HIGHER THAN PLANT
156. READJUST RAD MON HI ALARM POTS TO MATCH PLANT
157. TUNE MFW LUBE OIL TO MATCH PLANT
158. MN TURB BRG LIFT OIL PRESS SHOULD READ 0
159. TUNE CONDENSER OFF GAS FLOW TO 50 SCFM
160. ADD LOAS TO SELECT GAS DECAY TANK ON FILL
161. INCREASE LOA,GCF,ETC, FAILURE LIMITS ABOVE 50
162. AFW PUMP AMPS SHOULD BE 38 AMPS ON RECIRC
163. OVERRIDE FOR FUSE FOR PCV-456 DOESN'T WORK
164. CONT RECIRC SUMP BORON NEVER CHANGES
165. MAL EPS6 BATTERY AMPS NEVER GO TO ZERO
166. OPENING 72-1217 SHOULD CAUSE FW REG AND B/P TO CLOSE
167. WITH 72-1121 OPEN LTDN ORIF STILL HAVE POWER
168. FWPUMP 12 CONTROL AND IND ON LOSS OF 72-1151
169. FWPUMP 11 CONTROL AND IND ON LOSS OF 72-1240
170. A/C NOT TIED TO 72-1411
171. PPC POINTS FOR RVRLIS NOT DRIVEN FROM XMTTR
172. WRITE SNAPS WITH RVRLIS IN SERVICE ALMS C/O
173. MSR CONTROL VALVES GO CLOSED AFTER UNIT TRIP
174. DRPI DATA A AND B FAILURE LED'S DON'T FLASH
175. TDAFW PUMP OVERSPEED WITH HIGH STMLINE PRESSURE
176. S/U POTENTIAL LITE TO 4KV VITAL BUS F/G/H POWER

Simulator Software Changes Completed Since December 1997

177. OVR SER W/ALARM IN ON INIT CAUSES RONAN OVERFLOW
178. SIM CROSS FROM DRILL FILE 1701 MAL
179. A0472644 CHANGE RCP THERMAL BARRIER HI FLW ALARM
180. TUNE SIM TO PLANT DATA FROM RHR CLEANUP EVOL
181. TAKES TOO LONG TO SWAP FROM SEQ TO SINGLE VALVE
182. MODEL HAGAN CONTROLLERS TO HAVE LARGE PROP GAIN
183. LARGE SPIKE IN SI PP FLOW ON ANSI TEST
184. SIM GETS NAN'S ON LARGE LOCA
185. CORE EXIT T/CS EXCEED FSAR ON DBA
186. PI 153 DOESN'T LOSE POWER ON LOSS OF PY12
187. GET ALARM AND BLDN ISO ON LOSS OF PY12
188. VALVES DON'T LOSE POWER ON LOSS OF DC BUS 11
189. DON'T GET MN ANNUN PWR SUPPLY FAILURE ALARMS
190. ALARM 826 IS NOW A SPARE INPUT
191. A0477192 REMOVE VLPM INPUTS 14-16 FROM BISTABLES
192. RHR PUMP DISCHARGE TEMP RAPIDLY DECREASES
193. REWRITE SNAPS WITH RODS AT 225
194. MFWPP COASTDOWN ON INITIAL INIT
195. SPDS POINTS KSISTRNAD AND BD INVERTED
196. XMT PZR 12 PT 472 SCALED WRONG
197. A0479429 INPUT FOR PPC CIRC WATER DELTA T
198. A0464875 CHANGE SLUR SETPOINTS
199. AFW PUMP WITH SUCTION VALVE CLOSED
200. CHANGE AIR PRESS FOR CLOSURE OF FWRV'S
201. MEGAWATT FLUCTUATION ON 100MW/MIN RAMP
202. CHANGE #2 HTR DRN TNK DUMP CONTROL TO 75%
203. MSR'S RESET ON INIT AFTER LOSS OF PY 15
204. A0481305 ADD RCP SEAL LEAKOFF FLOWS TO PPC
205. UNKOWN STEAM FLOW OUT RUPTURED S/G WHEN ISOLATED
206. CHANGE DESCRIPTION FOR BST CND 25 TO FW SUCTION
207. A0480648 CHANGE DRPI INDICATION FOR TEMP JUMPER
208. CLAD DAMAGE ON DBA LOCA
209. TEAMFILE DID NOT CAPTURE AN ALARM
210. CHANGE MODEL FOR LCV 8 AND 12 TO BETTER MATCH PLANT
211. FAILING FT 128 HAS NO EFFECT
212. LETDOWN LINE FLASHES TOO FAST
213. MAL MFW5C DOESN'T ADD ENERGY TO THE CONTAINMENT
214. SIS FLOW STARTS AT SLIGHTLY LOW PRESSURE
215. A0488596 CHANGE ROD CONTROL LEAD/LAG
216. AC BRG OIL PUMP RED LITE PROBLEM
217. EVALUATE PLANT VARIABLE HEATER INPUT
218. EVALUATE SIM RESPONSE VS PLANT RESPONSE ON HAGANS
219. CST LO LO LEVEL ALARM SETPOINTS WRONG
220. SWAPPING PZR LEVEL CONTROL CHANNELS

Simulator Software Changes Completed Since December 1997

221. RCP 12 AND 14 NO 3 SEAL LEAKOFF TO CONT STRUCT SUMPS
222. REWRITE SNAPS WITH RHR DISCH PRESS GREATER THAN 100 LB
223. FR 81 SCALED WRONG
224. RHR DISCH PRESS HANGS UP AFTER PUMP STOP
225. FW PUMP TURB VAC ALARMS CYCLE ON HEATUP
226. GEN GAS TEMP VERY HIGH ON HEATUP
227. FCV 95 OPENS ON LOSS OF 12KV D AND E
228. DSC FOR 72- 1237 AND 1339 DON'T AFFECT ROD DRIVE MG
229. CAN STILL OPERATE FCV 662 ON LOSS OF 72-1117
230. SHOULD NOT GET RM 11 LOW FLOW WITH FCV-678 CLOSED
231. MAL CWS3 DOESN'T CHANGE SCREEN DP
232. SINGLE DROPPED ROD CAUSES RX TRIP
233. 12 KV BUSSES ALWAYS GET A FAST TRANSFER
234. REWRITE APPLICABLE S/D SNAPS WITH MSIV'S CLOSED
235. VALVE 8880 WON'T CLOSE ON PHASE A
236. PPC MSR POINTS NOW KLBM/HR- Y0721A,8A
237. ANALOG EARTHQUAKE FORCE MON WON'T RESET WITH KEY
238. ADD NEW AFW PUMP SUCTION LOA'S
239. DRPI SHOULD INDICATE 222 WHEN RODS AT 225
240. A0483194 PS-129 SETPOINT TO 97 PSIG
241. LOAD TAP CHANGER LOCKED UP
242. MAL RCS3D SCALING IS WRONG
243. A0496200 CHANGE DFWCS SETPOINTS
244. UNEXPLAINED FILL OF FAULTED STEAM GENERATOR
245. MAKE DSC FOR A/C 01 AND 02
246. NEED LOA'S TO BYPASS EACH RWST LOW LEVEL LOCKOUT
247. MODEL TCV-23 FAILING OPEN TO MATCH PLANT DATA
248. INVESTIGATE FLOW ANOMALY ON RCP PUMP TRIP ANSI
249. CHANGE HTR 2 DRIP PUMP CAVITATION TRIP LOGIC
250. PK 14-20 IS NOW A BLANK WINDOW
251. SUBCOOLED MARGIN TOO HIGH COMPARED TO PLANT
252. REWRITE SNAPS WITH RMS POTS MATCHING PLANT
253. RM-13 AUX SAMPLE LIGHTS
254. PAMS 3 AND 4 RVLIS FULL RANGE GOES TO 130%
255. T/C MONITOR TRAIN A HAS POINT N09 DELETED
256. CONDENSOR SPECIFIC CONDUCTIVITY POINTS READ TOO LOW
257. RE-11 LOW FLOW ALARM SHOULD OCCUR IF 678 CLOSES
258. SPARE CW DISCH TUNNEL LEVELS
259. LAMICOID DIFFERENCES ON LOOSE PARTS MONITOR
260. RCS BORON CHANGES WHEN 8703 OPENED
261. A0488707 ADD DISCONNECTS FOR BACKUP PWR SUPPLIES
262. A0483194 RHR OVERCURRENT SETTINGS CHANGED
263. SIMULATOR BLOWS UP WHEN SI 1 VALVE CLOSED
264. CONT SPRAY PUMP PPC POINTS IND WRONG

Simulator Software Changes Completed Since December 1997

265. MODEL THE CONTAINMENT HYDROGEN MONITORS
266. MATCH PLANT CONTAINMENT PURGE RATE
267. PRT GAS SPACE DOESNT GO TO VENT HEADER
268. CORE EIT T/C'S EXCEED 3500 DEGREES ON 25% DBA LOCA
269. NI RESPONSE ON LTB ACTION
270. TURB/GEN RESPONSE NEEDS TUNING ON LTB
271. LOSS OF DC BUS POWER DOESN'T CAUSE ALARM 841 AND 842
272. SHOULD NOT GET PK 1411 #813 ALRM WHEN OPEN DSC GEN3
273. RESTORATION OF DG OVERVOLTAGE KNIFE SWITCHES
274. ADD LOA TO RESET TERRA TECH ALARM
275. A0498803 AND 485993 SFP TEMP RATE ALARM TO PK1104
276. ASW DELTAP DID NOT DECREASE WHEN 602 CLOSED
277. SSPS DEMOUX OUTPUTS FOR K602,K618,K643
278. SPDS POINT NOT DRIVEN BY XMT PZR12
279. A0498961 REMOVE TR-84
280. A0500402 ADD SECOND SETPOINT AND LOA FOR RM 23
281. A0492580 REMOVE SWITCH FOR SW EVAP FCV 724 VB4
282. XMT TUR14 SEVERITY VALUE IS WRONG
283. XMT CND 42 AND 43 SCALE SHOULD BE SAME AS LT 1 & 2
284. PPC ROD POSITION SHOULD BE FROM DRPI
285. A0490337 COMPETE CHANGES FOR UNIT 1 UPRATE PROJECT
286. STEAM DUMP TRIP OPEN BISTABLES DIFF FROM PLANT
287. A0506604 500KV PROTECT DEVICE PWR SUPPLY CHANGE
288. FC 424 & PC 425 BRING IN WRONG ALARM INPUTS
289. MSR HOT REHEAT TEMP TOO LOW ON RAMP DOWN
290. PZR LEVEL CHANGE WITH HEATER INPUT
291. CHANGE CST TO HOTWELL FLOW RATE TO PRECLUDE DROP
292. A0487345 REPLACE RCP SEAL RECORDERS
293. SG TUBE PLUGGING AND MSIV LOOP ADMITTANCES
294. PROVIDE SEAL IN FOR DSG OS TRIPS
295. RHR FLOW OSCILLATIONS ON EP DRILL
296. HYDROGEN ANALYZER LOA'S HAVE PROBLEMS
297. TUNE PZR TO MATCH PLANT RESPONSE WHEN 2 B/U GROUPS ENER
298. DO NOT GET FWHTR HI LEV ALARM ON LTB
299. ADD LOA'S FOR WOODWARD CONTROLLED S/D
300. SET MAL LOWER LIMIT ON SYD3 TO 56 HZ
301. LOA FOR H2 REGULATOR LOW LIMIT SHOULD BE 14.7
302. RCP BEARINGS SHOULD SEIZE IN ABOUT 20 MIN W/O CCW
303. MAKE 1 S/G SAFETY LIFT AT 1054 PSIG TO MATCH PLANT
304. REVISE CONT SUMP FLOWS AFTER RHR SUMP CHANGES
305. MODEL MFW PUMP HP OIL ACCUM
306. A0510439 CHANGE RM 23 HIGH ALARM SETPOINT
307. TUNE PZR SPRAY VALVE FLOW TO MATCH PLANT TEST
308. A0509894 CHANGE P9 SETPOINT

Simulator Software Changes Completed Since December 1997

309. CHANGE CORE DATA TO MATCH RELOAD
310. WLDSLPRL IS NOT DRIVEN WHEN RV 8124 IS LIFTING
311. GEN REGULATOR BASE ADJUSTER UNSTABLE
312. APPEARS THAT HP STM FLOW NOT ENOUGH WHEN 420 OPEN
313. 10% STM DUMP COOLDOWN RATE TOO BIG
314. DIGITAL VACCUM GAUGE GOES TO 29.80 IN PLANT
315. NO CLAD FAILURE ON HOT LEG LOCA, ANSI TEST
316. RVLIS LEVEL SEEMS CLIPPED ON HOT LEG LOCA, ANSI
317. NO CLAD FAILURE ON COLD LEG DBA LOCA ANSI
318. TURBINE SPEED OSCILLATION AT 1800 RPM
319. ADD LOA FOR MS-1-5103, S/G BLDN DEMIN OUTLET
320. BEARING LIFT OIL PRESS SHOULD BE IN GREEN BAND
321. XMT CNM19 SCALED WRONG
322. CHECK MSIV CLOSURE TIMES ON MAL MSS4
323. CHECK DIFF IN TFWHHDR BETWEEN 1996 AND 2000 ANSI
324. CHECK PZR PRESS RESPONSE DIFF ON ANSI TESTS
325. CHECK PCNM RESPONSE ON DBA LOCA
326. CHECK PSGNS RESPONSE ON DBA LOCA
327. CORRECT PWR RANGE NI SPIKE ON DBA LOCA
328. PORV TAILPIPE TEMP DOESN'T FOLLOW STEAM TABLES
329. PROBLEMS WITH DIESEL SPEED CONTROL LIMITS
330. CHANGE ROD SENSITIVITY FOR IN/OUT MOTIONS
331. AFTER EXAMS MATCH RCS ACTIVITY WITH PLANT
332. ADD SOME OFFSET TO THE PZR LEVEL CHANNELS
333. ADD LOA FOR CWP SCREENS AND DRIVE AMPS
334. PZR SPRAY LINE LO TEMP ALARMS BACKWARDS
335. WITH DC CONTROL POWER OFF, ROD DRIVE MG SETS NO TRIP
336. ALARM 0168 ASW TO CCW HX LOW PRESS ALARM
337. PUMP WHITE LIGHT SHOULD GO OUT WHEN PUMP CONTROL SWAP
338. A0503984 REVIEW/CHANGE VCT SUPPLY PRESS OF 28 LBS
339. FAILING PT-508 DOES NOT CAUSE DFC TO FAIL TO MANUAL
340. INCREASE NEUTRON SOURCE STRENGTH
341. OPENING FCV-663 DOESN'T SHOW ON POV PANEL
342. A0500048 DRIVE PPC POINT F0650A
343. PORV DISCHARGE TEMP READS TOO HIGH ON PORV
344. SI PUMP DISCH PRESS DECAYS TOO FAST
345. ANSI FEED FLOW SPIKE AFTER MISV CLOSURE
346. ANSI AFW PP11 TAKES 10 MINUTES TO COAST DOWN

PG&E DCPP Simulator Handbooks 13.2

Instructor System User's Guide

Revision 9 – Dated July 22, 1999

60 Pages

PACIFIC GAS AND ELECTRIC COMPANY

DIABLO CANYON POWER PLANT SIMULATOR

HANDBOOKS

13.2

INSTRUCTOR SYSTEM USER'S GUIDE

REV	DATE	AUTHORED BY	REASON FOR ISSUE/REVISION
0	02/27/89	Roman/Cross	Functional Design Spec.
1	06/15/89	J. W. Cross	Final Draft
2	09/23/92	D. Bearden	Post Delivery Update
3	10/13/92	D. Bearden	Redline Copy Incorporation's
4	03/05/92	D. Bearden	Redline Update.
5	11/12/93	D. Bearden	Redline Update.
6	01/20/95	G. Hutchison	SGI Update
6A	06/21/95	G. Hutchison	Init Revision
7	11/06/97	G. Hutchison	Redline Update
8	09/02/98	G. Hutchison	Redline Update
9	07/22/99	G. Hutchison	New Interface from Xterm on a PC.

INTRODUCTION

The Instructor System Handbook User's Guide provides detailed step by step instructions for each of the instructor system features. The format for each section is identical, consisting of:

1. Introduction
2. Detailed procedures
3. Key list with explanation
4. Expert command syntax

Instructor Aids - this symbol denotes useful instructor expert commands

TABLE OF CONTENTS

	Page
1.0 SIMULATOR STARTUP	5
2.0 SYSTEM RECOVERY -	6
3.0 INITIALIZATION	7
4.0 SNAPSHOT - WRITING SNAPS	10
5.0 BACKTRACK	12
6.0 ANNUNCIATOR	15
7.0 RUN/FREEZE	16
8.0 EXPERT MODE	17
9.0 MALFUNCTIONS (MAL)	21
10.0 LOCAL OPERATOR ACTIONS (LOA)	26
11.0 PLANT PARAMETERS (PLP)	29
12.0 GLOBAL COMPONENT FAILURES (GLB)	31
13.0 OVERRIDES (OVR)	36
14.0 DISCONNECTS (DSCS)	40
15.0 STATUS SUMMARY	42
16.0 SIMULATOR VARIABLE SCALES	43
17.0 SOUND GENERATOR	45
18.0 REMOTE CONTROL UNIT - NOT IMPLEMENTED	47

19.0 DRILL LIBRARY 48

20. MON SIM 53

21.0 MENU 56

22.0 SLEEP 57

23.0 REPLAY 59

1.0 Simulator Startup

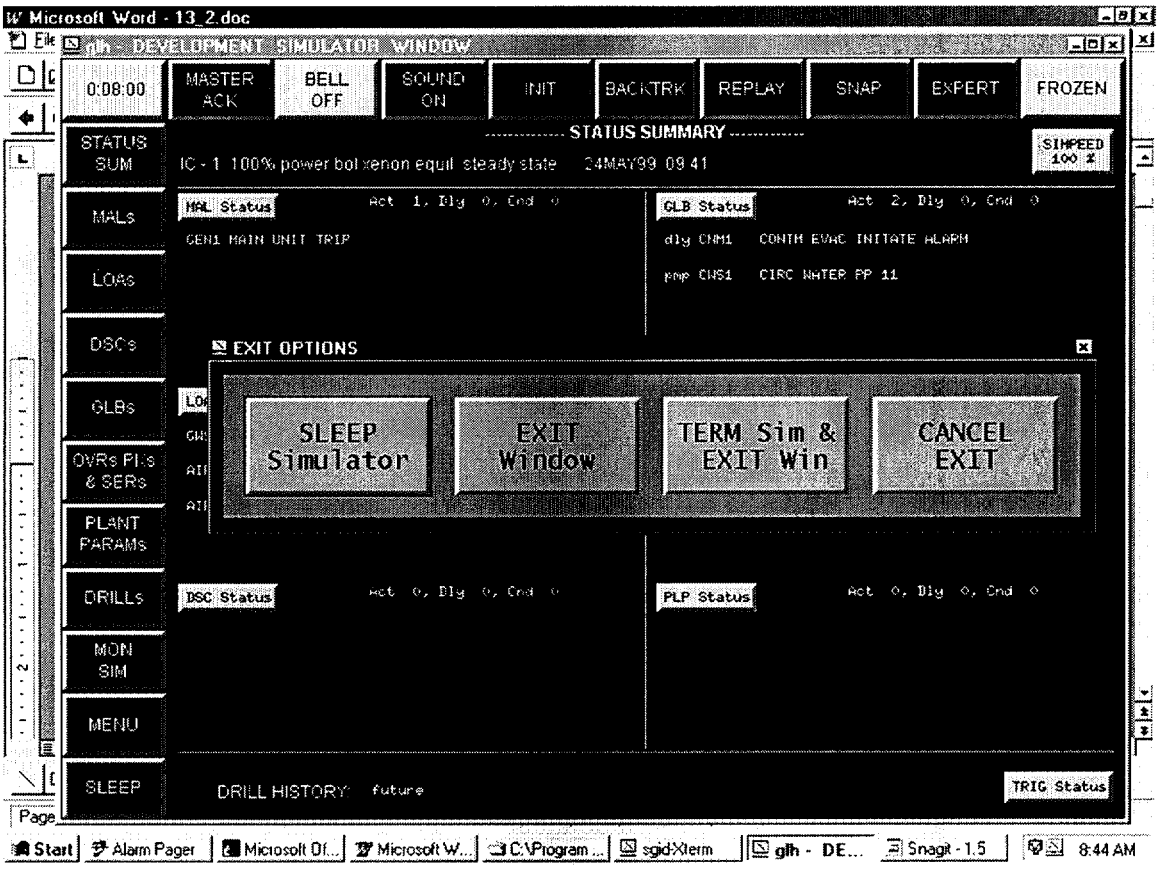
Starting Double click the icon on the desktop. More than one copy can be started at a time. Note that this does not start another simulator task, the new copy attaches itself to the existing sim task.

2.0 System Recovery -

Problems with control window

Click the **SLEEP** button. The **Exit Window** button will just close this Instructor Menu Window. The simulator will still be running normally.

If you have a problem with the Instructor Menu Window then use the Exit Window button and then restart the Instructor Menu Window by double clicking the icon again. This window will just attach to the running simulator task. This will be transparent to the operators on the floor



Still have problems

If this doesn't work then refer to Simulator Troubleshooting Manual

3.0 Initialization

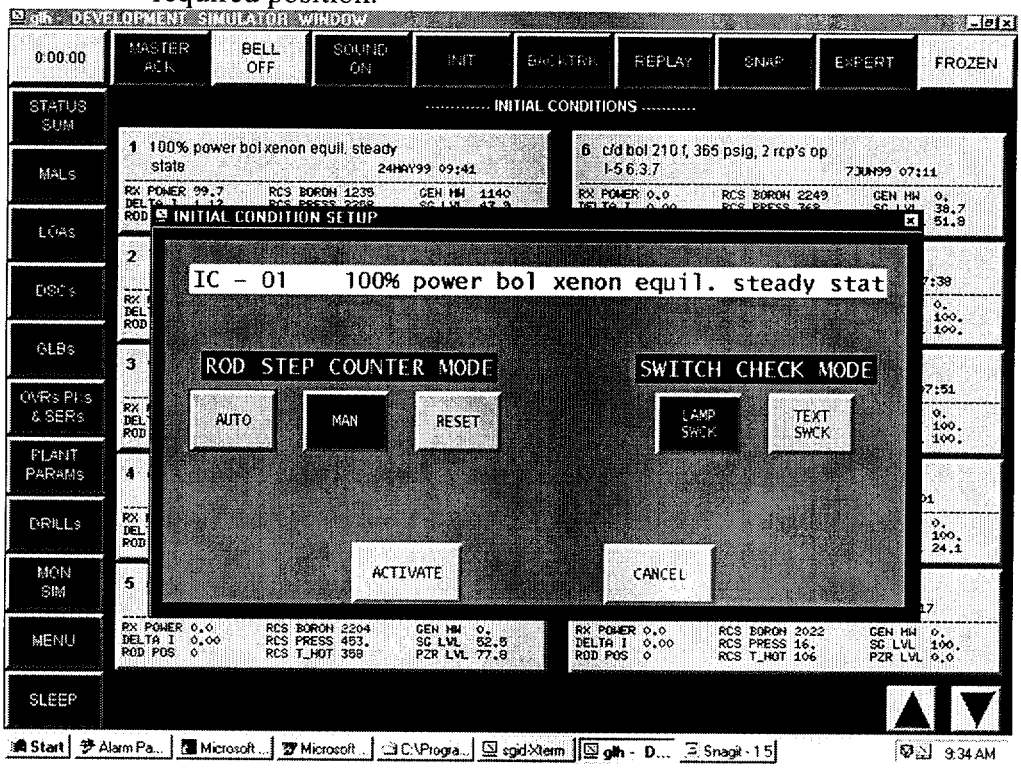
The INIT key provides access to the simulator initialization feature. This feature provides access to 94 initial conditions (ICs) which are grouped together as follows:

- o ICs 1-77 are a mixture of permanent and temporary IC sets for instructor and programmer usage. ICs 1-50 are permanent snaps, while ICs 51-77 are temporary snaps for instructor usage.
- o ICs 78-81 are temporary storage locations for the SNAPSHOT function.
- o IC 82 is written whenever a replay, backtrack, hardware diagnostic, or initial condition command is executed.
- o ICs 83-94 are backtrack IC sets.

The instructor may select any one of these IC sets for simulator initialization.

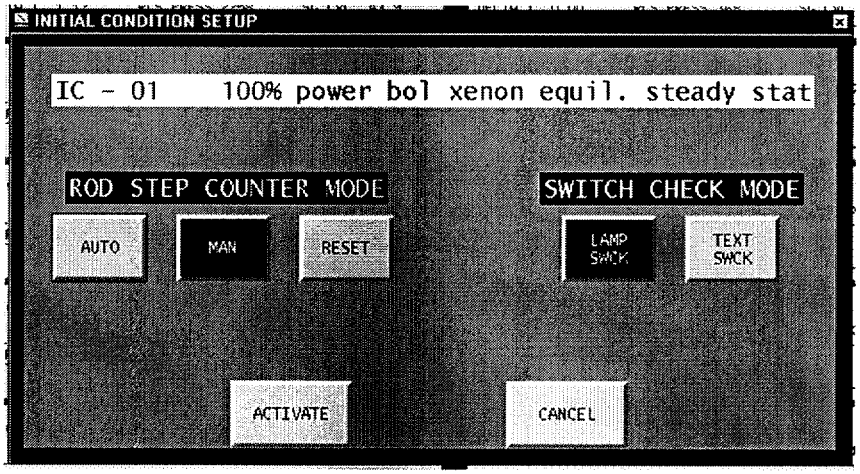
The mode of step counter initialization can be altered from the option menu prior to resetting. The three modes of initialization include:

- AUTOMATIC -- the step counters will increment only as necessary to arrive at their required positions.
- MANUAL -- the step counters do not move during initialization.
- FULL RESET -- the step counters reset to zero and step forward to their required position.



Continued on next page

1. Select INIT from the control menu .
2. Select an IC set from the activity window or by manual entry in the option menu.
3. If it is desired to change the step counter mode of initialization, select the desired mode prior to resetting the simulator



4. Select the desired SWITCH CHECK MODE.
   - LAMP SWCK is the normal mode, and any switches out of position for the IC set will blink on and off.
   - TEXT SWCK will display a list of misaligned components on the expert screen, vice blinking lites on the control boards. If more than one page of misaligned components, or to repeat the listing of misaligned components after alignment has been made, type MORE on the expert cmd prompt.
5. Select ACTIVATE from the menu.
6. Align the control boards.
   - Misaligned digital inputs are located by flashing lights on the control board.
   - Misaligned analog inputs are located by flashing lights and an associated meter indication. The associated meter indicates mid-scale when aligned, low when the analog input value is too low, and high when the analog input value is too high.
   - In text mode the IC value for the switch and the present control board value are displayed on the expert screen for pots and switches that are not aligned per the IC set.
7. Select END SWCK when the control boards are aligned.
   NOTE: After the control board alignment is complete and END SWCK is selected, the STATUS SUM feature is automatically entered.
8. Select FROZEN from the control menu to start the simulation RUNNING.

Continued on next page

EXPERT COMMAND SYNTAX

INIT XXX -- Selects and resets the simulator to IC XXX.

BYPSWCK -- Bypasses the switch check feature.

4.0 Snapshot - writing snaps

The SNAP key selects the Snapshot feature. This feature allows the instructor to write an initial condition or snapshot of current power plant status and conditions including malfunctions, local operator actions, global component failures, plant parameters, overrides, and remote control unit assignments by storing the necessary information in a circular buffer of four snapshots (ICs 78 - 81). The contents of any snapshot (IC 78 - 81) can be moved to other initial conditions (ICs 44 - 77).

SNAP button Selecting the SNAP button does **NOT** write a snap immediately. Instead you get to select which snap (78-81) you wish to write with the next one in rotation highlighted.

PROCEDURE 1 of 2 -- WRITE A SNAPSHOT

1. Freeze the simulator, ensure that the annunciator horn is enabled and all alarms are acknowledged, and then select the SNAP key from the action window on the control CRT .
2. Select a destination IC set by clicking the desired snap number (78-81).
3. Select WRITE SNAP XX.

PROCEDURE 2 of 2 – MOVE A SNAP

To write a snap to another snap number, use the MOVE SNAP button.
You can only move snaps to 44-77 numbers

Step	Action
1	You would write the snap in 78 - 81
2	select it
3	click MOVE SNAP XX button
4	select the new snap number
5	type in the title
6	click continue and confirm on the popup

Continued on next page

WRSNAPID title -- Changes the title of the simulator status in memory.

WRSNAP n -- Write the current simulator status in memory to IC n.

Example of how to write a snap from the expert screen:

1. **To write the current snap, first find a clear snap number using the INIT menu, for example snap 54 is titled clear.**
2. **On the expert line type:**

wrsnapid requal snap for r971, save till 1/1/98

3. **On the expert line type:**
   wrsnap 54

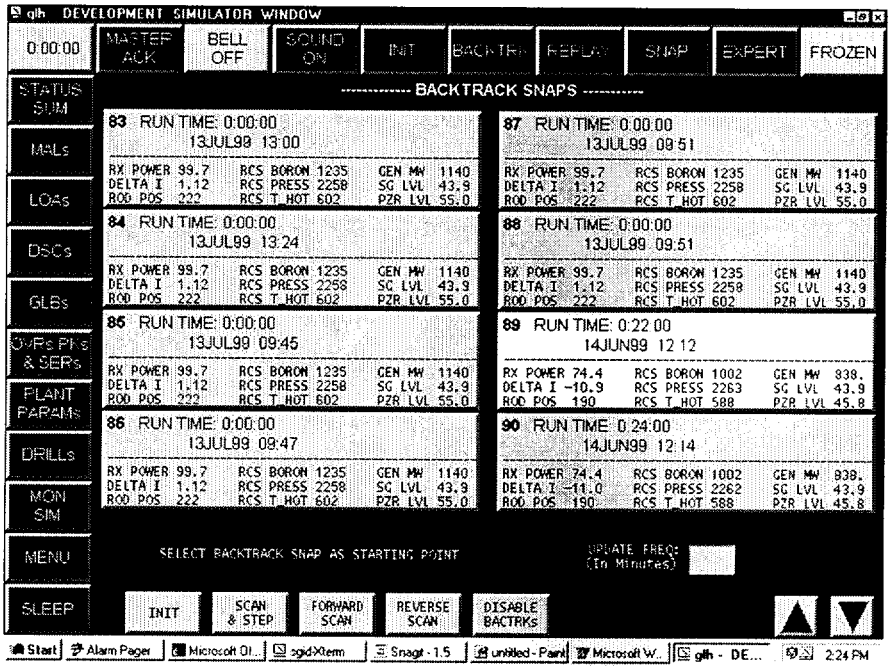
5.0 Backtrack

The BACKTRK key selects the Backtrack feature. This feature allows the instructor to back up during the training session and restart the simulator from a previous time. Backtrack ICs (ICs 83-94) are being written periodically, normally at five minute intervals in a stacked buffer, the most recent in IC-83 and the oldest in IC-94. The oldest backtrack IC is dropped out the bottom of the stack as each new backtrack is written to the top of the stack. The time interval at which backtracks are being written may be changed by an expert command (SNAPFREQ n). This backtrack writing can be enabled or disabled from the options menu or by toggling the F6 function key.

Manual and Automatic scan are available to preview the backtrack ICs on the simulator control boards. The simulator condition which exists before previewing or resetting to a backtrack is saved in snapshot 82; therefore, it can be returned to after completion of the backtrack sequence.

PROCEDURE 1 of 5 -- SELECTING A BACKTRACK

1. Select the BACKTRK key from the action window on the control CRT.
2. Select a backtrack IC by selecting from the activity window by elapsed time or by run time.
3. Select the INIT button. Backtrack initialization is identical to normal initialization.



Continued on next page

PROCEDURE 2 of 5 -- MANUAL SCANNING

1. Select the backtrack IC to be scanned.

2. Select the scan direction by selecting the REVERSE/FORWARD toggle key (selection of this key will have no affect on the current execution of manual scanning; however, this indicates the next backtrack IC to be scanned, forward or backward, when SCAN STEP is selected subsequently).

3. Select the SCAN STEP key (manual and automatic scanning cannot be active concurrently; if automatic scanning is active when manual scanning is selected, an error message will appear on the screen and automatic scanning will need to be disabled before manual scanning can be initiated). The simulator will be frozen, if it is running, and preview that IC.

4. To continue scanning, select the SCAN STEP key again. The next IC will be scanned according to the scan direction.

PROCEDURE 3 of 5 -- AUTOMATIC SCANNING

1. Select the first backtrack IC to be scanned.

2. Select the scan direction by selecting the REVERSE/FORWARD toggle key.

3. Select the AUTO SCAN START/STOP key. The simulator will be frozen, if it is running, and preview the selected IC for five seconds. After five seconds, the simulator will preview the next IC, according to the scan direction.

4. To stop automatic scanning, select the AUTO SCAN START/STOP key again.

PROCEDURE 4 of 5 -- DISABLING/ENABLING BACKTRACK WRITING

1. Select the BACKTRK DISABLED/ENABLED key to toggle between writing and not writing backtracks

.

PROCEDURE 5 of 5 – CHANGING BACKTRACK WRITING FREQUENCY

1. Enter the new writing frequency in minutes into the UPDATE FREQ text box and hit the enter key.

Continued on next page

EXPERT COMMAND SYNTAX

INIT n -- Initialize to IC n.

SNAPFREQ 0 -- Disable backtrack writing.

SNAPFREQ n -- Set the frequency at which backtracks are being written to n seconds.

6.0 Annunciator

The annunciator control feature consists of three keys providing the following functions:

- o Master acknowledge for all SER and main control board alarms
- o Audible alarm enable/disable

PROCEDURE 1 of 2 -- ALARM ACKNOWLEDGE

1. Select MASTER ACK in the control menu of the control CRT.

PROCEDURE 2 of 2 -- AUDIBLE ALARM CONTROL

1. When the audible alarm is enabled, select BELL ON /off .
   NOTE: In this condition, no audible alarm will be received when new alarms are activated.
2. When the audible alarm is disabled, select BELL OFF/on.

EXPERT COMMAND SYNTAX

ANACK -- Acknowledge all alarms.

ANHORN -- Toggle audible alarm.

7.0 Run/Freeze

The RUNNING/FROZEN key is a toggle key for stopping and starting the simulation..

The key is highlighted in blue when the simulator is in the running mode, and in gray when in the frozen mode.

PROCEDURE 1 of 1 -- START/STOP SIMULATION

NOTE: The simulator must have been initialized to a particular IC set or placed into the diagnostic mode prior to using the RUNNING/FROZEN key.

1. To start the simulator when frozen, select the FROZEN key .

2. To stop the simulator when running, select the RUNNING key

.

EXPERT COMMAND SYNTAX

RUN XXX -- Run for XXX seconds and then to freeze.

RUN -- Starts the simulation and continues to run until otherwise stopped.

FRZ -- Freeze the simulation.

FRZ WHEN trigger--Freezes simulator when the stated trigger is set.
ex: **frz when fnispr.lt.5.0** This will freeze the simulator when any power range NI channel gets less than 5.0 % power.

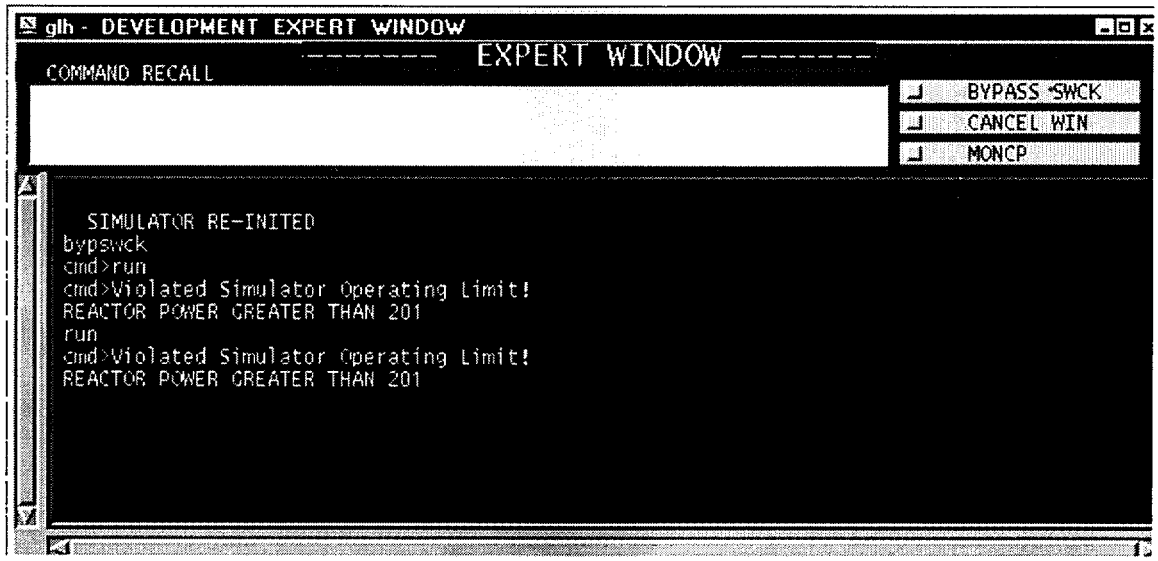
8.0 Expert Mode

The EXPERT key selects the Expert Mode feature which allows the instructor to enter expert commands at the command prompt. The reply to these commands will appear in the EXPERT WINDOW on the screen. The expert commands provide a quick interface for simulator control. Commands exist for most control features. Some examples are IDA activation and clearing, time scaling, snapshot control, and software debugging. The Instructor System Handbook User's Guide (Section 13.2) describes all available expert commands.

PROCEDURE 1 of 4 -- SELECT EXPERT MODE

1. Select the EXPERT key from the control window on the control CRT

2. Type in the desired command(s).



NOTE: You **must** use the proper expert command sequence when typing expert commands. Reasonable values must be put in for each selection, and zero fills put in for time delays and ramp times. Some examples are as follows:

MAL AFW3A ACT,100,20,30,C,JPPLRT,40
MAL PPL3A ACT,2,0,0,C,FNISPR(1).LT.95,0
MAL PPL3B ACT,1,1,30,D,0

LOA AFW8 100,20,30,D,0
LOA EPS6 T,0,30,D,0
LOA PPL4 F,0,0,D,0

Continued on next page

BST CND1 1,0,0,30,D,5
BST CND2 2,0,0,0,C,JPPLRT,0

HTX CCW1 1,.5,20,30,D,0
HTX CCW2 1,.5,0,0,C,FNISPR.GT.95,0

XMT MSS1 3,100,20,30,D,0
XMT RHR6 3,100,0,0,C,JPPLRT,0

SER 1127 ACT,1,0,0,D,300
SER 99 ACT,2,0,20,C,JPPLRT,0

OVR XV4D088M ACT,100,20,30,D,0
OVR XV3I188O ACT,1,0,0,C,JPPLRT,5

DLY CCW1 1,0,0,30,D,0
DLY CCW1 4,100,20,30,D,0

PLP AUX1 65,20,30,C,JPPLRT
PLP AUX3 15.7,20,30,D

PROCEDURE 2 of 4 -- SELECTING CONTROL PANEL MONITORING
Control panel monitoring enabled means that any switch, pot, etc.. that is operated will print out on the expert screen.

1. Select Expert Mode.

2. Select MONCP to enable control panel monitoring.
NOTE: MONCP and MONV are mutually exclusive. If MONCP is enabled, MONV will be stopped.

3. Select MONCP to toggle control panel monitoring off..

PROCEDURE 3 of 4 – CANCEL WIN

This terminates the expert window. The window can be restarted by pressing the EXPERT button again.

1. Select Expert Mode.

2. Select CANCEL WIN.

Continued on next page

PROCEDURE 4 of 4 -- USING BYPASS SWITCH CHECK

1. Select Expert Mode.

2. Initialize the simulator to an IC (i.e., INIT 16).

3. When the control panels alignment is satisfactory, select BYPASS SWCK.

EXPERT COMMAND SYNTAX

MONCP -- Toggles the control panel monitoring mode.

PRTCOM -- Enables command printing to a file on the sgi.

XPRTCOM -- Disables command printing.

BYPSWCK -- Bypass switch check.

Other Commands: Many times the instructor will want to vary a parameter to enhance training.There are two ways of changing variables, the SET or SW command and the RAMP command.

SET/SW -- Each variable is defined within the computer as a word or bit/real or integer. A specific command such as SW will only work on a single word variable. Since it may be difficult to tell in what form a variable has been defined, the SET command is used most often. The SET command has the advantage of working on any type of variable. One disadvantage is its ability to change every word in an array if used carelessly.

Example:

SET JCRFDIS=1 will cause the rod control system to think all the lift coil disconnect switches are open.
SW JCRFDIS=1 won't work because JCRFDIS is a bit array not a word array.

Continued on next page

RAMP -- Sometimes you may want to change a variable slowly. For example, you might want to decrease the water inventory in the VCT.

The RAMP command has the following form:

RAMP name, final value, ramp time, time delay, direct or conditional, conditional trigger, time or condition to clear
All the spaces next to the commas must be filled in and all times must be in seconds.

Example:

RAMP ACVCVCTW,5000,1200,60,c,smss.lt.1100,0

The water inventory in the VCT will change from its present value to 5000 pounds over a 1200 second interval starting 60 seconds after generator megawatts go less than 1100.

RAMP ACVCVCTW,5000,1200,60,C,SMSS.LT.1100,BPRSVS.LT.53

The water inventory in the VCT will change from its present value to 5000 pounds over a 1200 second interval starting 60 seconds after generator megawatts go less than 1100 and return to its pre-ramp value when pzr level goes less than 53%.

9.0 Malfunctions (MAL)

The MALs key selects the malfunction control feature. This feature allows the instructor to compose, activate, or terminate malfunctions simulated in the system. Normally, protected initial conditions are stored with no active or time delayed malfunctions. It is possible, however, for the instructor to store an initial condition with malfunctions activated or in time delay.
Malfunctions tend to be pipe breaks, leaks, rod ejections, seismic events, etc... In other words events that don't effect a single component. A pump trip, for example, would be found under global component failures, pump failures.

PROCEDURE 1 of 4 -- ACTIVATE MALFUNCTION USING MALFUNCTION MENU

1. Select the MAL key on the control CRT.

2. Select one of the malfunction systems on the control CRT .

3. Select one of the malfunctions.

4. Select one of the subsystems of selected malfunction, if applicable.

5. Set up the FINAL VALUE, if applicable.

6. Select a malfunction box, if applicable, to set FINAL VALUE.
   OR
   Select the sliding bar, if applicable, to set FINAL VALUE.

7. Set up RAMP TIME, if applicable.

8. Set up DELAY TIME , if applicable.

9. Select the CONDITION key to set up conditional activation mode if desired.
   Then set ACT TRIG and CLR TRIG as applicable.
   OR
   Select the DIRECT key to set up direct activation mode.

Continued on next page

9.1 Trigger String Setup

Set up a trigger string, if applicable (only 16 triggers can be used at once)

a. To set up a trigger the instructor must first determine a datapool variable name that he/she wishes to use to trigger the malfunction. A condensed listing of datapool variable names can be found in the datapool listings book, or use the datapool lookup program on the Instructors booth PC.

b. The selected datapool name is then compared to either a value or another datapool name. The comparison is constructed using Fortran like logical operators (please note the leading and following periods around the logical operators). Avoid the use of leading and trailing blanks in the conditional expression. You should also be cautioned against using the .EQ. expression as the comparison would have to be exact down to the last decimal place if you are dealing with real numbers (e.g., levels, flow rates, temperatures, and pressures).:

.GT. (greater than),
.EQ. (equal),
.LT. (less than),
.NE. (not equal),
.LE. (less than or equal),
.GE. (greater than or equal),
.OR. (or),
.AND. (and)
.NOT. (not) - activates when variable goes false

Examples of conditional triggers:

- FNISPR(1).GT.90 (PR channel 41 > 90 % power)
- BPRSVS(1).LT.25 (Pzr level transmitter less than 25 %)
- **JMLRCS6 (Logical variable for the status of malfunction RCS6. Triggering a malfunction from the status of another malfunction allows you to daisy chain malfunctions to one another. Note that all malfunctions have the following syntax: JMLXXXX, where XXXX is the malfunction name, so malfunction GEN4 variable for activation would be JMLGEN4. If the malfunction has an A,B,C selection then the name would end in (1) (2) or (3). EXAMPLE: MAL RCS3B variable would be JMLRCS3(2))**

10. Select the ACTIVATE key to activate selected malfunction.

Continued on next page

PROCEDURE 2 of 4 -- CLEAR SPECIFIC MALFUNCTION USING MALFUNCTION MENU

1. Select MAL STAT from any failure menu.

2. Select the desired malfunction.

3 Select the CLEAR key to terminate this specific malfunction.

PROCEDURE 4 of 4 -- CHECK THE MALFUNCTIONS STATUS

1. Select the MAL key on the control CRT.

2. Select the MALF STAT key to show up current malfunctions status.

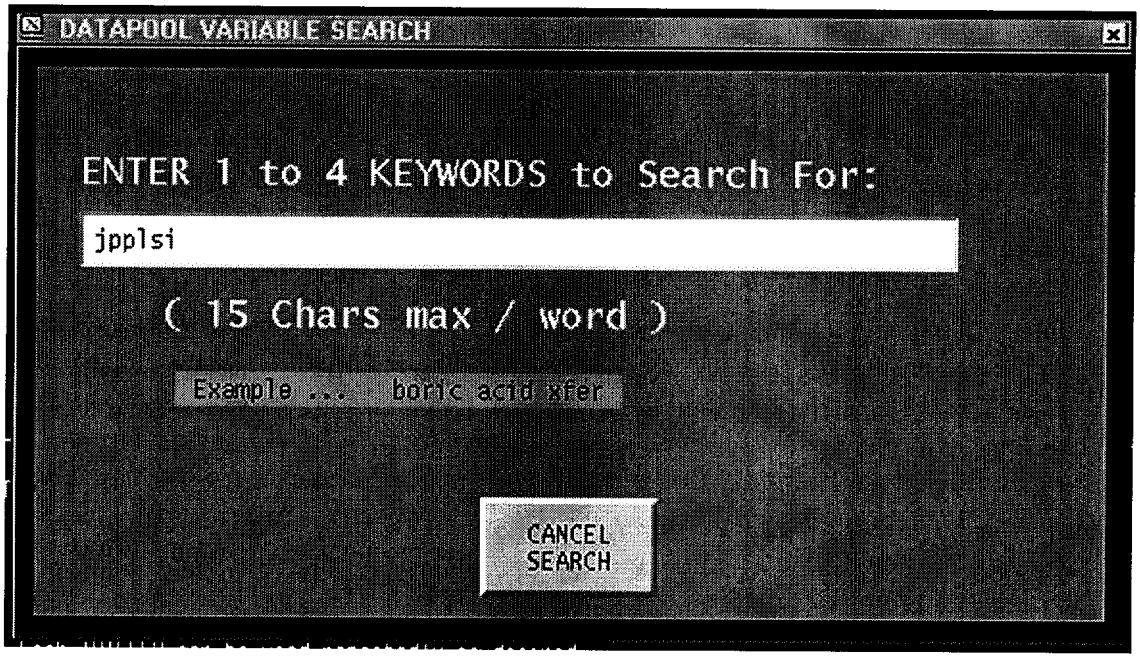
OTHER KEYS

TRIG STAT

Goes to a screen that shows all trigger expressions waiting to activate (in green) or activated (in red).

NAME SEARCH

Name Search - allows a search of datapool (all simulator variables) for the entered expression. For example to find out what the trigger jpplsi means use the name search



Continued on next page

Similar to Name Search but, this searches only Malfunctions for a given expression.

9.2 Malfunction Expert Command Sequence

To execute a specific malfunction use the following sequence:

MAL malname ACT[,value1,value2,value3,value4,value5,value6]

which activates the specified malfunction; the arguments in [ ] can be appended to the command to compose and directly activate the malfunction with one step, where:

All parameters within brackets [ ] are optional. Default values are selected for any of these parameters if not specified.

MAL - sets up the malfunction mode.

malname - is the alphanumeric name of the malfunction.

Value1 is the selected severity value.

Value2 is the RAMP TIME in seconds (use a 0 if a ramp is not applicable, ie..breaker trip has no ramp, so a 0 would go in the value 2 spot.).

Value3 is the DELAY TIME in seconds.

Value4 is the method of activation;

D for direct,

C for conditional expression,

Value5 is the conditional Boolean expression (if value4 is C) or the TIME TO CLEAR in seconds if value4 is D.

Value6 is the TIME TO CLEAR in seconds or the Condition To Clear (trigger to clear failure, can not be same conditional expression that activates malfunction) , or is not used if value 4 is D.

Continued on next page

For example:

MAL NIS6A ACT,120,1,10,D,900

Would cause power range channel 41 to fail to 120% power with a one second ramp time 10 seconds after activation, and to automatically clear 900 seconds after activation.

MAL NIS6A ACT,120,1,10,C,FNISPR(2).LT.10,900

Would cause power range channel 41 to fail to 120% power with a one second ramp time 10 seconds after power range channel 42 dropped below 10% power, and to automatically clear 900 seconds after activation.

MAL NIS6A ACT,120,1,10,c,jmlsei1,fnispr(4).lt.5

Would cause power range channel 41 to fail to 120% power with a one second ramp time 10 seconds after the seismic malfunction is activated, and to automatically clear when power range channel 44 goes less than 5 %

MAL malname CLR - clears the specified malfunction.

10.0 Local Operator Actions (LOA)

The LOA key selects the Local Operator Action (LOA) Control feature. This feature includes such auxiliary functions as valve manipulation, remote electrical operation, and other normal operation of equipment accomplished outside the control room. These LOAs are included for two purposes: to allow the operator to follow plant operating procedures which have visible effects in the control room, and to permit the operator to recover from malfunctions. This feature allows the instructor to change the status of the selected LOA.

PROCEDURE 1 of 2 -- ACTIVATE LOA USING LOA MENU

1. Select the LOA key on the control CRT

2. Select one of the LOA systems on the control CRT

3. Select one of the LOAs.

4. Set up the FINAL VALUE, if applicable.

5. Select an LOA box, if applicable, to set FINAL VALUE.

6. Select the sliding bar, if applicable, to set FINAL VALUE.

7. Set up RAMP TIME, if applicable.

8. Set up DELAY TIME, if applicable.

9. Select the DIRECT key to set up direct activation mode.

10. Select the CONDITION key to set up conditional activation mode.

11. Set up a TRIGGER string, if applicable.
(only 16 triggers can be used at once) .

12. Set up TO CLEAR if applicable with a time to reset LOA or a trigger string to reset LOA after ramp is finished

13. Select the ACTIVATE key to activate selected LOA.

Continued on next page

PROCEDURE 2 of 2 -- CHECK THE LOA STATUS

1. Select the LOA key on the control CRT.
2. Select the LOA STATUS key to show up current LOA's status.

OTHER KEYS

Goes to a screen that shows all trigger expressions waiting to activate (in green) or activated (in red).
SEE **Malfunctions** section for more information.

Searches only LOA descriptions for a given expression.

EXPERT COMMAND SYNTAX

LOA IDA string -- Execute specific LOA.

LOA name value1[,value2,value3,value4,value5] [#variable name]

All parameters within brackets [ ] are optional. Default values are selected for any of these parameters if not specified.

Value1 is the selected value.

Value2 is the ramp time in seconds

Value3 is the delay time in seconds.

Value4 is the optional method of activation;

D for direct,

C for conditional expression,

Value 5 is the conditional Boolean expression (if value4 is C). or the TIME TO STOP RAMP in seconds if value4 is D.

Value6 is the TIME TO STOP RAMP in seconds or the Condition To Clear (trigger to clear failure, can not be same conditional expression that activates LOA), or is not used if value 4 is D. Note that if a time or trigger is used (something other than 0) the LOA will reset to its original value prior to activation.

Continued on next page

#variable name the name of the variable that the loa controls, ie loa afw2 controls the variable rmsf152. This is useful to include in drill files because this variable name is the reference used to update drill files if the loa listing is renumbered. With this reference the drill file can automatically change the loa number to the correct one for that variable. This way your drill file will always perform the correct action, ie.. fcv-152 will always change whether it was originally afw2 and was then changed to afw15 in the loa listing

-.

EXAMPLES:

LOA AFW5 0 - Activates AFW9 local operator action immediately.

LOA AFW5 0,8,30 - Activates AFW9 local operator action with an 8 second ramp after a 30 second delay.

LOA AFW5 0,8,0,C,JPPLFWIS - Activates LOA AFW5 when the logical variable JPPLFWIS (Low Tavg-Rx Trip feedwater isolation) is true. The valve (FW-121) will ramp closed over a 8 second interval as soon as a reactor trip related feedwater isolation occurs.

drill file syntax In a drill file the above commands would be written:

LOA AFW5 0 #rafv121

LOA AFW5 0,8,30 #rafv121

LOA AFW5 0,8,0,C,JPPLFWIS #rafv121

11.0 Plant Parameters (PLP)

The PLANT PARAM key selects the Plant Parameter (PLP) Control feature. This feature allows the instructor to change external and internal plant parameters. External plant parameters are those which are outside the control of the plant, but which have dynamic effects on the plant simulation.

PROCEDURE 1 of 1 -- ACTIVATE PLANT PARAM USING PLANT PARAM MENU

1. Select the PLANT PARAM key on the control CRT.

2. Select one of the PLANT PARAM systems on the control CRT
   NOTE: AUX is currently the only system with PLANT PARAMs.

3. Select one of the PLANT PARAMs.

4. Set up the FINAL VALUE, if applicable.

5. Select the sliding bar, if applicable, to set FINAL VALUE.

6. Set up RAMP TIME, if applicable.

7. Set up DELAY TIME, if applicable.

8. Select the DIRECT key to set up direct activation mode.

9. Select the CONDITION key to set up conditional activation mode.

10. Set up a TRIGGER string, if applicable.
    (only 16 triggers can be used at once) .

11. Set up TO CLEAR if applicable with a time to reset PLP or a trigger string to reset PLP after ramp is finished

12. Select the ACTIVATE key to activate selected PLANT PARAM.

Continued on next page

OTHER KEYS

Goes to a screen that shows all trigger expressions waiting to activate (in green) or activated (in red).
SEE **Malfunctions** section for more information.

Searches only PLP descriptions for a given expression.

EXPERT COMMAND SYNTAX

PLP IDA string -- Execute specific PLANT PARAM.

PLP name value1,value2,value3,value4,value5 - adjust external parameter

where

name = alpha numeric name for the plant parameter

value1 = new parameter VALUE

value2 = RAMP TIME

value3 = DELAY TIME

Value4 is the optional method of activation;
D for direct,

C for conditional expression,

Value 5 is the conditional Boolean expression (if value4 is C) or Time or Condition to Clear if value 4 is D

Value6 is the TIME TO CLEAR in seconds or the Condition To Clear (trigger to clear failure, can not be same conditional expression that activates PLP), or is not used if value 4 is D. Note that if a time or trigger is used (something other than 0) the PLP will reset to its original value prior to activation.

For example:

PLP AUX1 60,3600,300,C,SMSS.LT.100 - five minutes after main generator megawatts go less than 100, the instructor system ramps ocean temperature for the next hour to a final value of 60 degF.

12.0 Global Component Failures (GLB)

The GLB key selects the Global Component Failure (GLB) Menu. This feature allows the instructor to fail heat exchangers, transmitters and bistables. The common modes of failure are:

Bistables (BST):

1. Trip
2. Reset
3. Fail as is
4. Loss of power

Controllers (CNH):

1. Fail as is
2. Fail to value (this fails both auto & manual control)
3. Fail power
4. Adjust gain
5. Adjust reset
6. fail auto mode
7. Max hi limit
8. Max low limit

Delay timers (DLY):

1. Fail true (SET)
2. Fail false (RST)RL
3. Fail as is
4. Fail timer

Heat exchangers (HTX):

1. Fail to value

Pumps (PMP):

1. Block auto start
2. Block man start
3. Block A/M start
4. Oc trip dev fail (simulates overcurrent device failure)
5. Cl spg mtr fail (closing sring motor doesn't charge closing springs)
6. Mtr current fault (actually add s a fault to the motor, effects bus loading)
7. Block auto trip
8. Block manual trip

Continued on next page

Transmitters (XMT):

1. Fail as is
2. Loss of power
3. Fail to value
4. Slow response
5. Set upper limit
6. Set lower limit

Control valves (CNV):

1. Fail as is
2. Fail to position

Non control valves (VLV):

1. Fail as is
2. Fail to position

Relays (RLY):

1. Closed
2. Open
3. Fail as is

PROCEDURE 1 of 3 -- ACTIVATE GLB USING GLB MENU

1. Select GLB key on the control CRT.

2. Select one of GLB systems on the control CRT

3. Select one of GLB types (i.e., BST, CNH, DLY, HTX, PMP, XMT, CNV, RLY, or VLV).

4. Select one of the components to fail.

5. Set up FINAL VALUE.

6. Select common mode failure box, if applicable, to set FINAL VALUE (i.e., loss of power).

7. Select sliding bar, if applicable, to set FINAL VALUE.

8. Set up RAMP TIME, if applicable.

9. Set up DELAY TIME, if applicable.

Continued on next page

10. Set up ANALOG VALUE, if applicable.

11. Select DIRECT key to set up direct activation mode.

12. Select CONDITION key to set up conditional activation mode.

13. Set up TRIGGER string, if applicable.
(only 16 triggers can be used at once) .

14. Set up TO CLEAR if applicable with a time to reset or a trigger string to reset after ramp is finished

15. Select ACTIVATE key to activate selected GLB function.

PROCEDURE 2 of 3 -- CLEAR GLB USING GLB MENU

1. Repeat steps 1 to 4 of Procedure 1 to compose the specific GLB function.

2. Select CLEAR key to terminate this specific GLB function.

PROCEDURE 3 of 3 -- CHECK THE COMPONENT FAILURE STATUS

1. Select GLB key on the control CRT.

2. Select COMP FAIL STATUS key to show up current GLB status.

OTHER KEYS

Goes to a screen that shows all trigger expressions waiting to activate (in green) or activated (in red).
SEE **Malfunctions** section for more information.

Searches only GLB descriptions for a given expression.

Continued on next page

BST IDA string -- Execute bistable GLB function.

CNH IDA string -- Execute controller GLB function.

DLY IDA string -- Execute timer GLB function.

HTX IDA string -- Execute heat exchanger GLB function.

PMP IDA string -- Execute pump GLB function.

XMT IDA string -- Execute transmitter GLB function.

CNV IDA string -- Execute control valve GLB function.

VLV IDA string -- Execute non-control valve GLB function.

Note: IDA string is a string that begins with XXXZ where XXX is one of the valid 3-character systems (i.e., AFW, CVC, RCS, ...) and Z is the numerical designator within the character system. What follows is dependent on the specific IDA.

Global component failure commands are of the following syntax:

XXX name option No [,value1,value2,value3,MAC,COND EXPR,CLEAR]

where

XXX is a three-letter component type (eg. BST, CNH, DLY, HTX, PMP, XMT, CNV, or VLV.)

Name is a valid (up to eight characters) component name.
Option No is a valid failure option number for the selected component.

Value1 is the selected component VALUE.

Value2 is the RAMP TIME in seconds (value1 and value2 are needed only for analog (real number representing level, temperature, boron concentration, et al) values).

Continued on next page

Value3 is the DELAY TIME in seconds.

MAC is a single-character method of activation designator (D and C are valid designators).

COND EXPR is a valid logical expression used as a trigger to activate the global component failure when the conditional method of activation is specified.

CLEAR is the time delay or conditional expression to clear component failure after it is activated

All parameters within brackets [ ] are optional.

Default values are selected for any of these parameters if not specified.

A comma or space are valid delimiters for the parameters.

XXX name CLR - Clears previously activated global component failure.

Some examples of global component failure activation commands are:

BST CCW1 1 - Activates CCW1 bistable trip (option 1) immediately.

BST CCW1 4,0,0,30 - Activates CCW1 bistable loss of power(option 4) after a 30-second delay. (Note: this is a logical option, but ramp value and ramp time are filled in with 0.)

XMT AFW1 3, 50, 15, C, PCNM.GT. 20 - Activates AFW1 fail to value (option 3) when expression "PCNM.GT. 60" is true. At this time the component value is ramped for 15 seconds to reach a final value of 50 percent.

GLB or CLF commands - gives status of initiated global component failures.

ex: PMP CVC1 4,0,0,30,D,0
GLB
The following glb/clf's have been initiated:
MHF11 CHARGING PP 11 (CENT.) with option 4

13.0 Overrides (OVR)

The OVERRIDE key selects the Override (OVR) System Menu. A number of override features will be provided to simulate simple plant failures in control room equipment. These overrides include the following generic types:

- o SWITCHES , PUSHBUTTONS , METERS, STATUS LIGHTS (OVR)
  - Permanent failure of switches to a selectable position
  - Permanent failure of pushbuttons in the open or closed contact state
  - Simulates permanent failure of any METER, freezing the METER in the current value, or drifting to a specified value with a specified ramp time
  - Simulates failure of any on/off light in its current status or to cause the light to be permanently on or off
- o ALARM INPUTS (SER)
  - to simulate failure of any annunciator input, freezing the input its current position, or causing the alarm input to be failed on or off.
  - to simulate failure of any control board annunciator window, freezing in its current state or causing the window to be failed on or off

Exclusions from the override feature include the PPC, SPDS, digital displays, relay outputs, and DRPI front panel displays. The instructor may select any number of these overrides up to a maximum of 50 at one time.

Continued on next page

PROCEDURE 1 of 3 -- ACTIVATE OVERRIDE USING OVERRIDE MENU

1. Select OVERRIDE on the control CRT.

2. Select one of the override panels on the control CRT

3. Select one of the components for override.
Note: the first 3 letters of the override description refer to the system name of the component within that override panel.

4. Select one of the subsystems of selected override, if applicable.

5. Set up the FINAL VALUE, if applicable.

6. Select an override status box, if applicable, to set FINAL VALUE.

7. Select the sliding bar, if applicable, to set FINAL VALUE.

8. Set up RAMP TIME, if applicable.

9. Set up DELAY TIME, if applicable.

10. Select the DIRECT key to set up direct activation mode.

11. Select the CONDITION key to set up conditional activation mode. (only 16 triggers can be used at once) .

12. Set up a TRIGGER string, if applicable.

13. Set up TO CLEAR if applicable with a time to reset or a trigger string to reset after ramp is finished

14. Select the ACTIVATE key to activate selected override.

PROCEDURE 2 of 3 -- CLEAR OVERRIDE USING OVERRIDE MENU

1. Repeat steps 1 to 5 of Procedure 1 to compose the specific override.

2. Select CLEAR key to terminate this specific override.

Continued on next page

PROCEDURE 3 of 3 -- CHECK THE OVERRIDE STATUS

1. Select OVERRIDE on the control CRT

2. Select the OVERRIDE STATUS key to show up current override status.

OTHER KEYS

Goes to a screen that shows all trigger expressions waiting to activate (in green) or activated (in red).
SEE **Malfunctions** section for more information.

Searches only OVR descriptions for a given expression.

EXPERT COMMAND SYNTAX

XXX name ACT value1, value2, value3, value4, value5 - composes and activates override; argument list is described below:

where XXX is the override type (OVR or SER)
OVR - overrrides control switches, pots, meters, lites
SER - overrides annunciator alarm inputs

XXX name ACT[,value1,value2,value3,value4,value5] - activates the specified override; the arguments in [ ] can be appended to the command to compose and directly activate the override with one step, where:

All parameters within brackets [ ] are optional. Default values are selected for any of these parameters if not specified.

Value1 is the selected severity VALUE.

Value2 is the RAMP TIME in seconds (value1 and value2 are needed only for analog options).

Value3 is the DELAY TIME in seconds.

Continued on next page

Value4 is the optional method of activation;

C for conditional expression,

Value 5 is the conditional Boolean expression (if value4 is C) or Time or Condition to Clear if value 4 is D

Value6 is the TIME TO CLEAR in seconds or the Condition To Clear (trigger to clear failure, can not be same conditional expression that activates OVR), or is not used if value 4 is D.

For example:

OVR XV1D063M ACT 40,0,1,C,JPPLRT

Would cause containment pressure indicator PI-934 to fail to a 40% value one second after an automatic reactor trip signal was received.

SER 0502 ACT,1,0,0,C,XV4O186G,XV2O260G

Brings in alarm input 0502 RCP 11 fdr grd when the green lite for CWP 12 turns on, and clears alarm when the green lite for RCP 11 turns on

XXX name CLR - clears the specified override.

14.0 Disconnects (DSCs)

The DSCs key selects the Disconnects (DSC) Control feature. This feature allows the instructor to change operate breakers or other switches at the 480V level and below. **4KV Pump DC knife switches are still found under LOA's. 12 & 4KV feeder breaker DC knife switches are found under DSC (EPS subsystem).**

PROCEDURE 1 of 1 -- ACTIVATE DISCONNECTS USING THE DSCs MENU

1. Select the DSCs key on the control CRT .

2. Select one of the DSCs systems on the control CRT .

3. Select one of the DSCSs.

4. Set up the FINAL VALUE, if applicable.

5. Select the sliding bar, if applicable, to set FINAL VALUE.

6. RAMP TIME is not used with Disconnects, they are either opened or closed.

7. Set up DELAY TIME, if applicable.

8. Select the DIRECT key to set up direct activation mode.

9. Select the CONDITION key to set up conditional activation mode.

10. Set up a TRIGGER string, if applicable. (only 16 triggers can be used at once)

11. Set up TO CLEAR if applicable with a time to reset DSC or a trigger string to reset DSC. Note that the state of the disconnect will not change after it is cleared, ie... if the DSC is closed, it will stay closed when the DSC clears.

12. Select the ACTIVATE key to activate selected DSCS.

Continued on next page

OTHER KEYS

Goes to a screen that shows all trigger expressions waiting to activate (in green) or activated (in red).
SEE **Malfunctions** section for more information.

Searches only DSC descriptions for a given expression.

EXPERT COMMAND SYNTAX

DSC IDA string -- Execute specific DSCS.

DSC name value1,value2,value3,value4,value5 - adjust external parameter

where

name = alpha numeric name for the plant parameter

value1 = new parameter VALUE

value2 = RAMP TIME (always 0 for DSC's)

value3 = DELAY TIME

Value4 is the optional method of activation;

D for direct,

C for conditional expression,

Value 5 is the conditional Boolean expression (if value4 is C) or Time or Condition to Clear if value 4 is D

Value6 is the TIME TO CLEAR in seconds or the Condition To Clear (trigger to clear failure, can not be same conditional expression that activates DSC), or is not used if value 4 is D.

15.0 Status Summary

The STATUS SUMMARY key selects the Instructor Directed Action Status Display feature. This feature allows the instructor to view the current status of the simulator and to access a more detailed display of specific types of Instructor Actions

PROCEDURE 1 of 1 -- VIEW A MORE DETAILED STATUS DISPLAY

1. Select the STATUS SUMMARY key from the action window on the first page of the control CRT

2. Select the key which corresponds to the Status display of interest. Selection of this key will transfer control to the specified feature.

KEY SUMMARY

MAL STATUS Select the malfunction status screen.

LOA STATUS Select the LOA status screen.

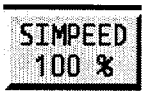
OVERRIDE STATUS Select the override status screen.

GLB STATUS Select the global component failure status screen.

DSCS STATUS Select the disconnect status screen.

PARAM STATUS Select the plant parameters status screen.

TRIG STATUS Goes to a screen that shows all trigger expressions waiting to activate (in green) or activated (in red).
SEE **Malfunctions** section for more information.



Goes to the Simulator Variable Scales menu, see next section for information. .

EXPERT COMMAND SYNTAX
None.

16.0 Simulator Variable Scales

The SIMSPEED key on the STATUS SUM menu selects the Time Scaling feature. This feature allows the instructor to slow all plant dynamics or accelerate specific plant dynamics.

The following Variables can be scaled from the Simulator Variable Scales menu.

- SIMSPEED - Set the percent of real time speed of the simulator (0 - 150%)
- SPEEDCY - Set the decay heat rate to operate at the selected factor of real time (1 - 50).
- SPEEDXE - Set the xenon concentration to operate at the selected factor of real time (1 - 50).
- SPEEDSM - Set the samarium concentration to operate at the selected factor of real time (1 - 50).

THESE VARIABLES ARE NOT IMPLEMENTED ON THE SGI

- FSTHTUP - Set the secondary side heatup rate to operate at the selected factor of real time.
- FSTCLDN - Set the secondary side cooldown rate to operate at the selected factor of real time.

EXAMPLE PROCEDURE - SELECT SIMULATOR SPEED

1. Select SIMSPEED key on the STATUS SUM menu on the control CRT.

2. Select percent of real time by slider or by manual entry.

3. Select ACTIVATE key.

EXPERT COMMAND SYNTAX

SIMSPEED # -- Set the simulator to operate at selected integer percent of real time.

example: **simspeed 50** sets simspeed to 50% of normal.
caution: **do not** set simspeed above 200%

SW SPEEDCY = # -- Set the decay heat rate to operate at the selected factor of real time.

SW SPEEDXE = # -- Set the xenon concentration to operate at the selected factor of real time.

Continued on next page

SW SPEEDSM = # -- Set the samarium concentration to operate at the selected factor of real time.

THESE COMMANDS ARE NOT IMPLEMENTED ON THE SGI

SW FSTHTUP = # -- Set the secondary side heatup rate to operate at the selected factor of real time.

SW FSTCLDN = # -- Set the secondary side cooldown rate to operate at the selected factor of real time.

17.0 Sound Generator

The SOUND ON/OFF toggle key on the top menu bar on the control CRT brings up a menu to allow control of an artificial noise generator. This artificial noise generator consists of speakers and associated electronics to produce sounds which are intended to simulate various background noises that might be heard in the control room.

PROCEDURE 1 of 2 -- SOUND ON/OFF

1. Select SOUND ON/OFF to bring up the sound generator menu.

2. Select the SOUND GEN ON key to turn the sound generator on,
   OR
   select SOUND GEN OFF key to stop the sound generator.

PROCEDURE 2 of 2 – PLAY A SOUND FILE

1. Select SOUND ON/OFF to bring up the sound generator menu.

2. Select the desired sound file to play.

3. Slide the VOLUME bar to adjust the sound level.

4. Use the PLAY COUNT arrow keys to determine the number of times the file will play.

5. Click the PLAY key to start the sound file.
   NOTE: the file can be paused or stopped at any time during play by clicking the PAUSE or STOP keys.

Continued on next page

AUDIO -- Toggles the artificial sound generator on/off.

AUDIO soundfile,%volume,repeats,time delay,cond or direct,conditional trigger

Example: audio piledrv.ssf,100,1,0,c,jpplsi

- soundfile - name of soundfile on sound generator PC. This can be obtained from the SUN XWINS Menu (blue screen). In the above example piledrv.ssf is the soundfile name.
- %volume - 0 - 100% volume of sound, where 100% is full volume output from sound card. Actual volume is still dependent on the amplifier settings in the Sound generator cabinent. (DFWCS cab.)
- repeats - number of times the sound will repeat itself
- time delay - delay in seconds before sound starts
- cond or direct - **d** starts time delay countdown immediately, **c** time delay countdown starts when conditional expression is true.
- conditional expression - in example when SI occurs sound will activate.

18.0 Remote Control Unit - NOT IMPLEMENTED

The REMOTE CONTROL key on the control monitor selects the remote control feature. This feature permits the instructor to program the keys of the remote control unit. To access these keys from the remote select #3 from page 1 of the remote menu, then enter the key number you wish to activate. The remote will display the expert command from this menu in the remote window (always displays key #1 when first selected). If this is the failure you want retype the key number and press enter to activate from the remote.

PROCEDURE 1 of 1 -- ASSIGNING A FUNCTION TO A REMOTE CONTROL KEY

1. Select the REMOTE CONTROL key from the action window on the control CRT (page2) or press the L7 function key.

2. Manually enter the expert command string for the selected remote control key.

KEY SUMMARY

There are no keys in this feature.

EXPERT COMMAND SYNTAX

RFKn=string -- Program remote control function key number n to execute string.

You could setup a drill file using this command to program the remote keys for the failures in your scenario.

Example: RFK1=mal rcs1 act,3,1,0,d,0
This would program remote function key #1 to activate a DBA LOCA (mal rcs1) when selected from the remote.

19.0 Drill Library

The DRILLS key provides access to the Drill Library feature. This feature allows the instructor to select exercises from a library of preprogrammed lesson drills or exercises which will automatically step the simulator through a set of predefined operations and controls. The library can contain up to 9999 drills with up to 200 lines of actions and/or comments in each drill. Titles and comments can be included in drill files. A menu is provided that lists all the different exercises that have been composed to facilitate the selection of an exercise. These exercises can operate in two different modes; a fully automatic mode using the time stamp feature to control the execution of instructions, and a manual initiation mode where each instruction executes only on instructor command.

Each exercise program contains comments, time stamps and expert commands and must contain, at most, 200 statements. A text editor may be used for the simple and convenient offline composition and modification of exercise programs. In addition, exercise programs may be created during normal operation of the simulator by entering drill creation mode. In this mode, expert commands transmitted to the simulator are captured and given time stamps and then stored in a file to be executed later. The first line of each drill must be a comment and is displayed as the drill title on the drill menu.

PROCEDURE 1 of 6 -- REVIEW OF A DRILL

1. Select the DRILLS key from the action window on the control CRT. The drill menu will be displayed.

2. Choose the drill you wish to peruse (if necessary, use the paging keys to see all the drill titles) and then select it with the cursor
OR
enter the drill number in the ENTER DRILL NUMBER box.

3. The contents of the drill will be displayed in a window of the main menu.

4. At this point, you may choose to execute a drill (see procedures 2 or 3).

PROCEDURE 2 of 6 -- EXECUTE A DRILL IN MANUAL MODE

1. If you are reviewing a drill or have selected a drill on the drill menu, then enter the manual mode using the MAN RUN key.
A separate window will now appear displaying the drill file with the first line of the file highlighted.

Continued on next page

2. In this mode, time stamps are not executed and are skipped as are all comments

(lines beginning with an *).
Start the drill by selecting the EXEC key on the drill window. The highlighted line will move to the first executable line in the drill file.

3. You may choose to execute commands at any time using the EXEC key. The next command to be executed will be highlighted.
OR
You may choose to skip commands by using the SKIP key. As above, the next command to be executed will be highlighted.

4. The drill can be terminated at any time by selecting the CANCEL key
OR
Click the X in the upper right hand corner to close the window and stop the drill.

7. When the last executable command in the drill has been executed or skipped, the drill window will close.

PROCEDURE 3 of 6 -- EXECUTE A DRILL IN AUTO MODE

1. If you are reviewing a drill or have selected a drill on the drill menu, then enter auto mode using the AUTO RUN key.

2. Start the drill by selecting the RUN key on the menu. A separate window will appear displaying the drill file. The commands will be highlighted and executed sequentially. Comments will be skipped.

3. The drill can be terminated by selecting the CANCEL key.
OR
Click the X in the upper right hand corner to close the window and stop the drill.

4. When the last executable command in the drill has been executed or skipped, the drill window will close.

Continued on next page

PROCEDURE 4 of 6 -- AUTOMATICALLY CREATING A NEW DRILL

1. Select the CREATE DRILL key from the drill menu display on the control CRT.

2. Choose a new title (or description) for your drill and enter it in the interaction area. The title should include the lesson number or other relevant data.

3. Enter your name or initials so you can be contacted if someone has questions about your drill. The present date will be pre-appended to this line.

4. If desired an additional comment can be entered. This is optional.

5. Normally you will want comments added before the actions in a drill. The comments come from the description of the selected failure with an asterisk at the beginning of the comment. If comments are desired select the CREATE w/ COMMENTS key.

6. If comments are not desired select the CREATE w/o COMMENTS key.

   NOTE: if you do not enter a title or author, an error message will appear indicating you must do this to create the drill.

7. A separate window will appear with your title and author lines present.

8. All instructor actions that send expert commands to the simulator will be captured and will appear on the drill creation screen (if it is active). If you select another feature, the drills feature will remain in drill creation mode and if the DRILLS key is then selected, the DRILL CREATION screen will be redisplayed.

   NOTE: The DRILL CREATION window is an editable window. You can put the cursor at any point in the file and start typing or deleting. This can be done anytime the window is open and active.

9. If it is not desired to save the created drill file, select the ABORT CREATION key on the main drill menu.

10. When sufficient commands have been collected(the total should not exceed 200), select the SAVE CREATION key on the main drill menu. The DRILL LIBRARY menu will re-appear.

Continued on next page

11. Select a drill file into which the newly created commands are to be stored by

entering the drill number in the ENTER PERMANENT DRILL NUMBER box. If the drill file already exists a warning message will appear indicating that file already exists. To overwrite click cancel on the message window and re-enter the drill number.

12. The drill creation process is now complete.

PROCEDURE 5 of 6 – PRINT A DRILL FILE

1. Select the DRILLS key from the action window on the control CRT. The drill menu will be displayed.

2. Choose the drill you wish to peruse (if necessary, use the paging keys to see all the drill titles) and then select it with the cursor
OR
enter the drill number in the ENTER DRILL NUMBER box.

3. The contents of the drill will be displayed in a window of the main menu.

4. Select the PRINT DRILL key. The drill file will be printed to the HP printer in the Instructors Booth.

PROCEDURE 6 of 6 – DRILL MAINTENANCE

1. To modify a drill double click the Drill Maintenance icon on the computer desktop. A Drill Maintenance Menu window will appear.

2. Select the appropriate task from the Drill Maintenance Menu:
- Copy Drill file from the SGI to a Disk on A:
- Copy Drill file from Disk (A:) to SGI
- Edit a drill file (copies to PC, then back to SGI)

NOTE: The first line is the title of the file and should begin with an * . All other comment lines should begin with an *.

NOTE: All files must end with a command line and NOT A COMMENT LINE.

Continued on next page

DRILL MAINTENANCE MENU OPTIONS

Copy to A drive This allows you to copy a drill file from the sgi to the A: drive. You can use Notepad to edit the file or copy it into your document.

Copy from A drive to SGI You can select up to 7 files to copy from your floppy to the sgi. These will overwrite the files on the sgi.

Edit a drill file

1. You select the file to edit.
2. Notepad will be started and the drill file loaded. Make your changes and exit notepad.
3. Select OK to copy the edited file back to the SGI.

NOTE: multiple copies of drill maint. can be started at once, so you can have 2 or more files open for editing and cut and paste back and forth as needed.

EXPERT COMMAND SYNTAX

None.

20. MON SIM

Mon Sim key on main menu

Activates the MON SIM display and menu. Several buttons are on the bottom of the screen that are different options that can be displayed:

- **Mon Sim** button displays the variables selected to monitor
- **Mon Plant** displays the plant status menu (used to be on the Status Sum screen) that you can view VB & CC meters.
- **Mon Alm's** displays a one page screen of the most current annunciator alarms
- **Mon Pk's** diplays a PK window overview where you can get alarms window status.
  NOTE: For PK09-15 DFWCS trouble #0875 you can get a listing of which Eng console alarm brought in the PK window.
- **Clear** button clears all variables from the MON SIM display.
- **Options** allows you to select the MON SIM column format
- **Search** allows you to do a text search of all the simulator varibles. See Malfunctions for more information on the search feature.

Display details

The four main displays are explained in detail below.

MON SIM Feature

The MON SIM key selects the Monitor Simulator Variables feature. This feature allows the instructor to monitor up to 64 parameters per page (128 total) on the monitor CRT. The parameters will update on the CRT at an instructor selected frequency (default is once per second) whenever the simulator is in the RUN mode.

MON PLANT Feature

The MON PLANT feature allows the instructor to view status information for plant system variables. The instructor will be able to access 92 groups of up to twenty variables each. Eight additional variables will always appear no matter which group is selected. The groups are setup to allow viewing of the same variables that go to the control board meters and lights. Unit conversion to psig and gpm is also performed, so what you see on MON PLANT should match what the operator sees on the floor.

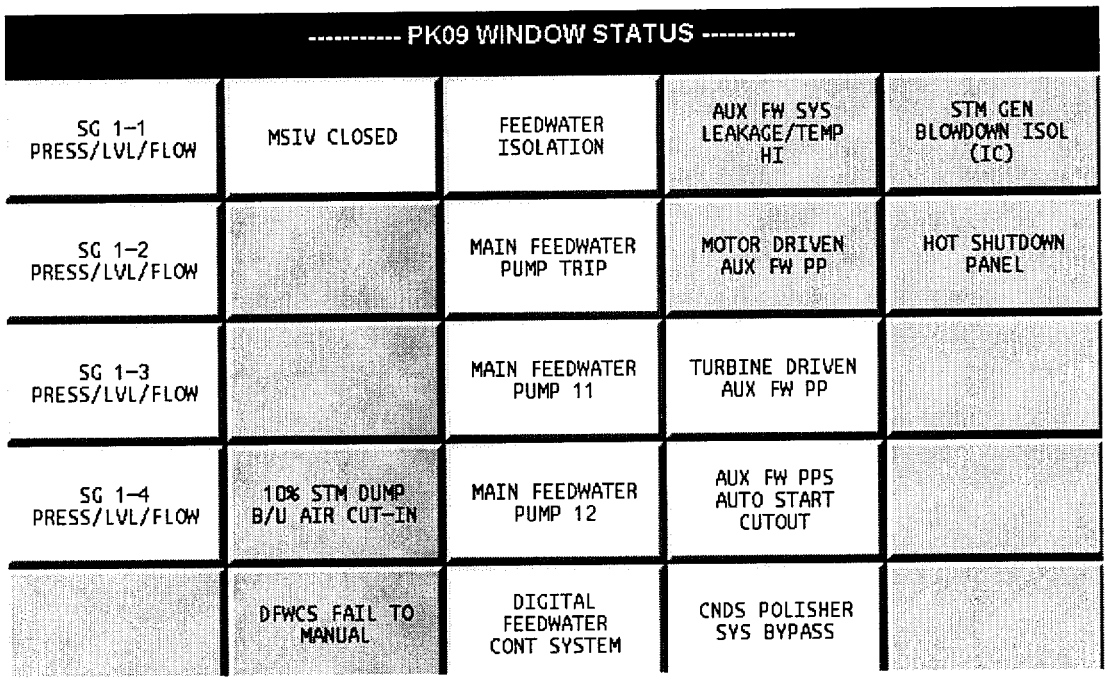
MON ALM's Feature

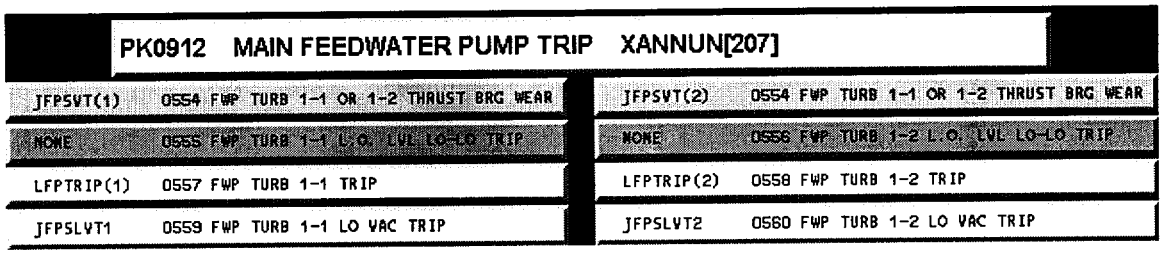
The MON ALM's feature displays the most current page of Annunciator alarms, just as they are displayed on the Ronan Alarm CRT.

Continued on next page

MON PK's Feature

The MON PK's feature displays the PK annunciator windows. You start from a top view of all 20 PK's, click on the window you want to view (ex: PK09). PK09 windows would then be displayed (see below). The highlighted windows show which ones are in alarm. To find out which inputs are in alarm on that window click on the window (ex: PK09-12 MAIN FEEDWATER PUMP TRIP).





PK window legend

The alarm inputs for PK09-12 is displayed above. The highlighted boxes show which inputs are in alarm. The legend of each input is given below:

- The leftmost word shows the simulator variable which drives the alarm input. If NONE is shown, no simulator variable is tied to that alarm input, so the only way to bring it into alarm would be to override it.
- The next four digit number is the alarm input number.
- The next series of words is the english description of the alarm as would be printed on the alarm typewriter.

Continued on next page

PRTMON filename-- Enable monitoring to designated file (file is written on sgit)

XPRTMON -- Disable line printer monitoring.

MCRT # -- Select CRT update rate (also enables monitoring).

MPRT # -- Select line printer update rate.

MONV varlist -- Selects one or more Datapool variables for monitoring.

DELM varlist -- Deletes one or more variables from monitoring.

SAVEM filename -- Saves the currently selected Datapool variables into the specified file name (the file must already exist).

USEM filename -- Retrieves a set of variables from the specified file.

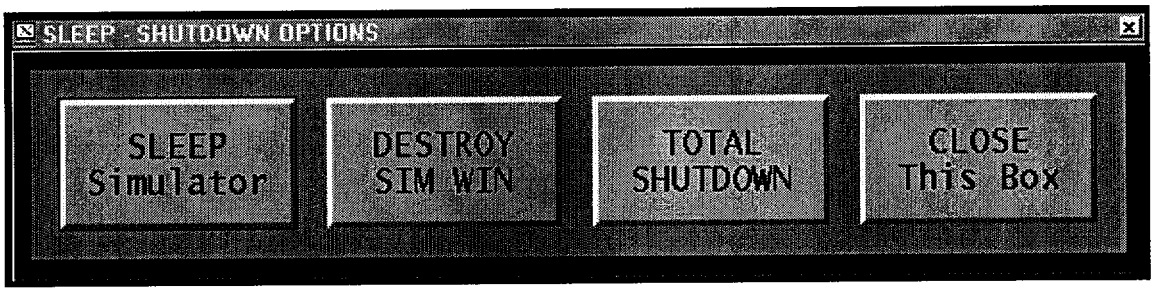
DELM ALL -- Sets the number of Datapool monitor points to zero. Same as the CLEAR key.

21.0 Menu

The MENU feature provides a display that you can find any screen that the instructor system has. Just click on the feature to go to that screen.

22.0 Sleep

The SLEEP key selects the Simulator Sleep feature. This feature allows the instructor to shutdown the simulator software, shutdown the control menu window, or remove I/O to the control boards. Once the simulator is shutdown, it can easily be restarted using the startup sequence. Either sleep mode will turn off all lights and meters. Recorder drives will remain OFF in the sleep mode.



PROCEDURE 1 of 3 -- SELECTING NORMAL SLEEP MODE

NOTE: This option removes I/O to the control boards. This will will turn off all lights and meters. Recorder drives will remain OFF in the sleep mode.

1. Select SLEEP from the Main Menu on the control CRT.

2. Select the SLEEP SIMULATOR key in the option window. This will place the simulator into the sleep mode which turns off all lites and meters. The simulator can be restarted just by re-initing to the desired IC set..

3. If TOTAL shutdown is selected, the tasks SUNSIM and HSDLINK are shutdown on the sgi. The Start Simulator line must be selected from the WINDOWS shell menu by clicking on the right mouse button on the blue windows screen

Continued on next page

PROCEDURE 2 of 3 -- CLOSING THE INSTRUCTOR CONTROL WINDOW

NOTE: This option will only close the Instructor control window, the simulator will still be running. You would normally only use this option if you have two control windows up, or you have a problem with the control window.

1. Select SLEEP from the Main Menu on the control CRT.

2. Select the DESTROY SIM WINDOW key in the option window. This control window will close (as will the expert window associated with it). Only the control window will shutdown, the simulator will continue running normally. This will be transparent to the operators on the floor

3. Restart the Instructor Control Window by double clicking Simulator icon on the windows desktop. The new Instructor Control Window will just attach to the running simulator task. Once again this will be transparent to the operators on the floor

PROCEDURE 3 of 3 -- TOTAL SHUTDOWN OF THE SIMULATOR

NOTE: This option shuts down both the simulator task and the Instructor Control Window. You would only do this if directed by a Troubleshooting procedure or by one of the Simulator Maintenance Group.

1. Select SLEEP from the Main Menu on the control CRT.

2. Select the TOTAL SHUTDOWN key in the option window. This will close the Instructor Control Window and the simulator task. This will turn off all control board lites, recorders, and meters.

3. Restart the simulator and the Instructor Control Window by double clicking Simulator icon on the windows desktop

EXPERT COMMAND SYNTAX

TERM -- Terminates the simulator.

QUIT -- Terminates the simulator

EXIT -- Terminates the simulator

23.0 Replay

The REPLAY key selects the Replay feature. This feature allows the instructor to freeze the simulator and replay a period of recent history, up to one hour, of simulator operation on all control panel readouts. Upon selection of replay, the current simulator condition is stored in IC 83 for return after replay completion. Manual and Automatic Scan of the available ICs are available to help the instructor select the starting point for the replay operation. The instructor will have the option of selecting an IC to be previewed by number, elapsed time, or run time.

The ICs are the only available starting points for the Replay feature. It is quite possible that you will only get one chance to Replay, so choose your starting point carefully.

When Replay ends, either at the end of the recorded time or manually, you must re-Init the Simulator to the desired conditions to continue.

PROCEDURE 1 of 4 -- SELECTING AN IC FOR REPLAY

1. Select the REPLAY key from the action window on the control CRT or press the R6 function key.

2. Select an IC by:
   - clicking on the IC from the activity window,
   - manual entry of an IC number in the option window at the "REPLAY FROM IC" prompt,elapsed time in the format HH:MM:SS at the "BY ELAPSED TIME" prompt or run time in the format HH:MM:SS at the "BY RUN TIME" prompt

3. Select the START REPLAY key. Upon selection of this key, the boards will "wink and blink" for the required setup.

4. After aligning the control boards, type BYPSWCK on the expert screen.

5. The RUN/FRZ key is available for simulation control.

6. To stop replay, select the STOP REPLAY key.

Continued on next page

PROCEDURE 2 of 4 -- PRINT REPLAY DATA

1. Select an IC by the above procedure.

2. Select START REPLAY to start the replay procedure.

3. At any time during replay, select the START PRINTER key. The entire replay file of data will be printed.

PROCEDURE 3 of 4 -- MANUAL SCANNING

1. Select the IC to be scanned.

2. Select the scan direction by selecting the REVERSE/FORWARD toggle key (selection of this key will have no affect on the current execution of manual scanning. However, this indicates the next IC to be scanned, forward or backward, when SCAN STEP is selected subsequently).

3. Select the SCAN STEP key (manual and automatic scanning cannot be active concurrently; if automatic scanning is active when manual scanning is selected, an error message will appear on the screen and automatic scanning will need to be disabled before manual scanning can be initiated). The simulator will be frozen, if it is running, and preview that IC.

4. To continue scanning, select the SCAN STEP key again. The next IC will be scanned according to the scan direction.

PROCEDURE 4 of 4 -- AUTOMATIC SCANNING

1. Select the first IC to be scanned.

2. Select the scan direction by selecting the REVERSE/FORWARD toggle key.

3. Select the START/STOP AUTO SCAN key. The simulator will be frozen, if it is running, and preview the selected IC for five seconds. After five seconds, the simulator will preview the next IC, according to the scan direction.

4. To stop automatic scanning, select the START/STOP AUTO SCAN key again.

EXPERT COMMAND SYNTAX

FRZ -- Freeze the simulator.

REPLAY n -- Replay IC n.