UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
245 PEACHTREE CENTER AVENUE NE, SUITE 1200
ATLANTA, GEORGIA 30303-1257

November 14, 2013

Mr. Michael D. Skaggs
Senior Vice President
Tennessee Valley Authority
Nuclear Generation Development
and Construction
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 UNIT DIFFERENCES AND TRAINING PLAN REPORT, SEPTEMBER 2013

Dear Skaggs:

In a letter dated September 19, 2013, the Tennessee Valley Authority (TVA) provided changes to its initial approach for ensuring that a sufficient number of licensed operators will be available to operate Watts Bar Nuclear Plant (WBN), Units 1 and 2, prior to Unit 2 initial fuel load. The changes to the proposed initial training and certification program submittal also addressed comments that members of your staff received from Region II Operations Branch during a meeting on September 3, 2013. The reviewed training plan from TVA dated September 19, 2013 is enclosed.

The Region II Operator Licensing staff reviewed the proposed changes to the training plan, including:

- Unit 1 and Unit 2 differences;

- The "differences" training provided to operators who are licensed on Unit 1, to determine whether the proposed training meets the requirements of 10 CFR 55.47 (a)(3) in that each applicant "has learned the operating procedures for and is qualified to operate Watts Bar Unit 2 competently and safely" and the proposed methods for evaluating this training, which include comprehensive "differences" written examinations and Job Performance Measures (JPMs); and

- The adequacy of the Unit 1 simulator for administering operating tests to initial operator applicants, in accordance with 10CFR 55.46, during the same time frame that the simulator will be used to train licensed operators on the Unit-2 modifications.

Region II Operator Licensing reviewed the Unit 1 and Unit 2 differences and determined that the differences are not so significant that they would affect the operator's ability to operate each unit safely and competently. The final determination of whether the operators who are currently licensed on Unit 1 meet the written and operating test waiver requirements for Unit 2, in accordance with 10CFR55.47 and NUREG 1021, Revision 9, Supplement 1, ES-204, Section D.2, is contingent upon the following items.

- The operators currently licensed on Unit 1, who will be requesting Watts Bar Unit 2 (dual) licenses, have sufficient "operating experience at a comparable facility" as required by 10 CFR 55.47 (a)(1), that is, on Watts Bar Unit 1, and that this operating experience has occurred "within two years prior to the date of application."

- The facility "differences training," including the comprehensive "differences" written examination, JPM operating test, and simulator modifications, support the finding required by 10 CFR 55.47 (a)(3) that each applicant "has learned the operating procedures for and is qualified to operate competently and safely" Watts Bar Unit 2. This includes startup training using Unit 2 initial criticality procedures on the plant reference simulator using a simulator model that reflects Unit 2 core design.

- All of the applicants issued Watts Bar Unit 2 licenses per 10 CFR 55.33 (a)(2), based on waivers of the requisite written examinations and operating tests, satisfactorily complete the facility licensee's Watts Bar Unit 2 "differences" Training and Certification Program and pass the program's comprehensive "differences" written examination and JPM operating test.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice, " a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. (The Public Electronic Reading Room).

Thank you for your cooperation in this matter. If you have any questions regarding this letter or planned inspections please contact me at (404) 997- 4550, (Internet E-mail: Malcolm.Widmann@nrc.gov).

Sincerely,

/RA/

Malcolm T. Widmann, Chief
Operations Branch 1
Division of Reactor Safety

Docket No(s).: 50-390, 50-391
License No(s).: NPF-90, CPPR-92

Enclosure: As stated

cc: See page 3

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September 19, 2013

10 CFR 55.5

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Attn: Mr. Malcom T. Widmann

Watts Bar Nuclear Plant, Units 1 and 2
Facility Operating License No. NPF-90
Facility Construction Permit No. CPPR-92
NRC Docket No. 50-390 and 50-391

Subject: **WATTS BAR NUCLEAR PLANT, UNITS 1 AND 2, MULTI-UNIT OPERATOR TRAINING AND CERTIFICATION PROGRAM AND REQUEST FOR REVIEW**

References:
1) Tennessee Valley Authority (TVA) letter to NRC, "Watts Bar Nuclear Plant, Units 1 and 2 Multi-Unit Operator Training and Certification Program and Request for Review," dated August 27, 2010
2) TVA letter to NRC, "Watts Bar Nuclear Plant, Units 1 and 2 Multi-Unit Operator Training and Certification Program, Revision 1," dated November 18, 2010
3) NRC letter to TVA, "Watts Bar Nuclear Plant Units 1 and 2 Multi-Unit Operator Training and Certification Program, Revision 1," dated April 11, 2011

By letter dated August 27, 2010, (Reference 1), the Tennessee Valley Authority (TVA) submitted the "Watts Bar Nuclear Plant, Units 1 and 2 Multi-Unit Operator Training and Certification Program and Request for Review" (the Plan). By letter dated November 18, 2010, TVA submitted Revision 1 to the Plan. The Plan described the approach for ensuring that a sufficient number of licensed operators will be available to operate Watts Bar Nuclear Plant (WBN), Units 1 and 2 prior to Unit 2 initial fuel load. TVA described the plan to seek dual-unit operator licenses for prospective WBN Unit 2 operators using a training program that was based on a rigorous analysis of the differences between Unit 1 and 2. In these submittals, TVA included a summary of its conclusions regarding the nearly identical design and operation of Unit 1 and Unit 2. In addition, TVA included a detailed report on WBN Units 1 and 2 differences and a differences training plan.

SEP 24 2013

In reference 3, the NRC acknowledged the TVA Multi-Unit Operator Training and Certification Program and preliminarily concluded the proposed differences between Unit 1 and Unit 2 are not so significant that they would affect the operator's ability to operate each unit safely and competently.

Subsequent to the NRC's initial review, TVA has continued to assess the dual-unit operator training plan and has updated the Watts Bar Unit Differences and Training Plan Report to incorporate facility changes that have reconciled previously described plant differences. Specifically of note, a digital control system has now been installed in Unit 1 which reconciles approximately 50 percent of the differences identified in the previous Multi-Unit Operator Training and Certification Program. Accordingly, TVA has revised the Multi-Unit Operator Training and Certification Program to the extent that the enclosed version supersedes the previous version in its entirety.

Enclosure 1 provides the Watts Bar Unit Differences and Training Plan Report. This report confirms the criteria of NUREG 1021 Section ES 204 and provides analysis required by NRC Regulatory Guide 1.149, C.2 - Use of Simulation Facility for Multiple Plants. Enclosure 2 provides the Watts Bar Unit 1 and Simulator Differences. Consistent with the approach described in Reference 1 and 2, TVA plans to submit 'dual unit' license applications with waivers of NRC administered written and operating examinations where appropriate.

There are no new regulatory commitments in this letter. Should you have questions regarding this request for review, please contact D. J. Hostetter, Unit Integration Manager, at (423) 365-2308.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosures

1. Watts Bar Unit Differences and Training Plan Report, September 2013
2. Watts Bar Nuclear Plant Simulator Physical Differences List

cc (Enclosures)

NRC Senior Resident Inspector - Watts Bar Nuclear Plant, Unit 1
NRC Senior Resident Inspector - Watts Bar Nuclear Plant, Unit 2

Enclosure 1

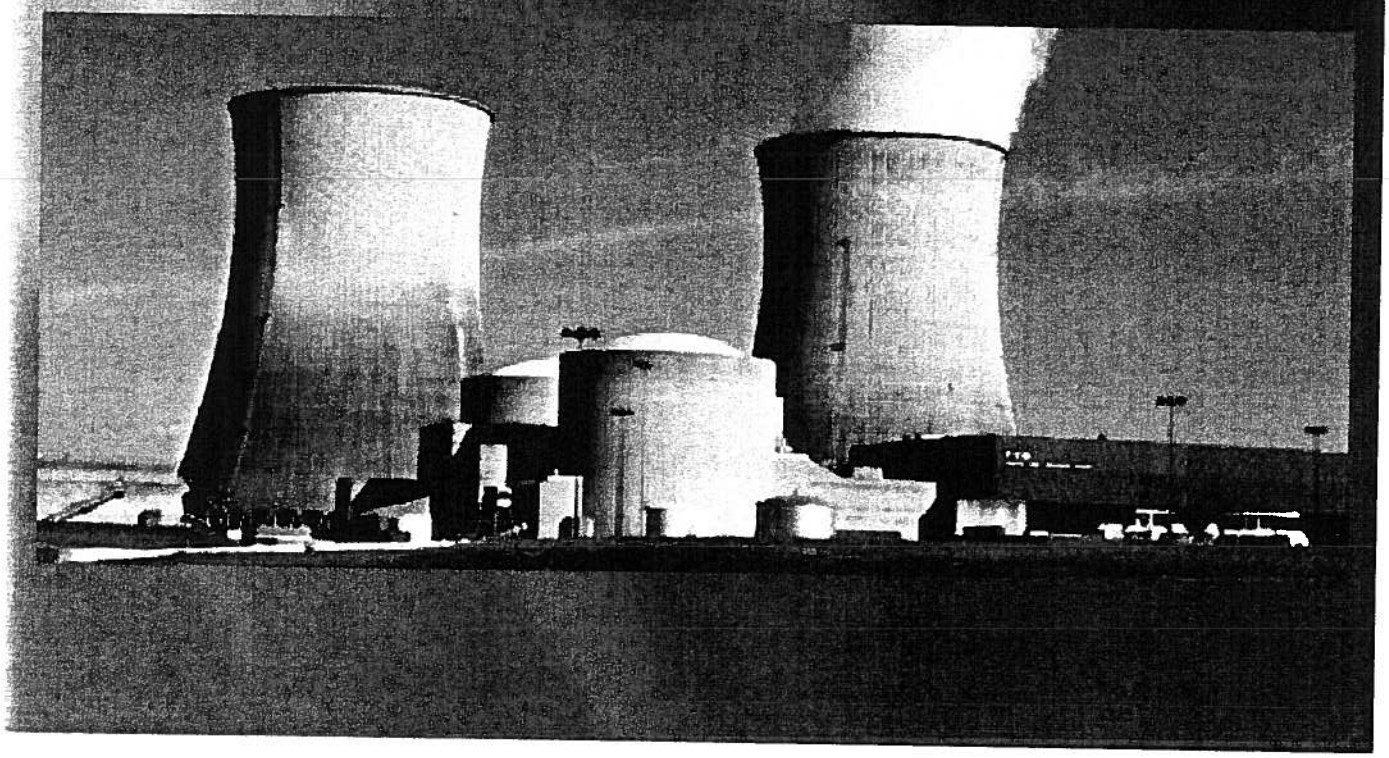
Watts Bar Unit Differences and Training Plan Report, September 2013

Watts Bar

Unit Differences and Training Plan

Report

September 2013



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1. Executive Summary

This report confirms the criteria of NUREG 1021; section ES 204 which defines utility requests for dual unit licenses for the licensed operators of the facility. Part of that request is to justify why the utility believes the two units are "nearly identical" and to describe the training plan for operators to inform them of any existing unit differences. In addition this report provides the analysis required by Regulatory Guide 1.149, C.2 - Use of Simulation Facility for Multiple Plants. Watts Bar intends to use its plant-referenced simulator (unit 1) to train and or examine operators and senior operators for more than one nuclear power plant (other than the reference plant), in this case WBN 2 in support of a dual unit license.

In 2007 Tennessee Valley Authority (TVA) decided to recommence construction on Watts Bar unit 2. During the lead up to this decision and continuing into construction activities, TVA management put in place expectations that the design and construction groups would maintain fidelity between Unit 1 and Unit 2. This expectation was enforced through memorandum, procedures and processes, which required all parties to ensure that Unit 2 would match Unit 1 to every extent possible.

This report justifies the TVA conclusion that the two units at Watts Bar are "nearly identical" and details a comprehensive dual unit license training plan for Unit 1 licensed operators and operators currently in training for a license. This report provides assurance that the simulator maintains fidelity with its plant-referenced unit. Therefore, TVA requests NRC review and approval of the included training plan and based on this approval, TVA plans to submit 'dual unit' license applications (Multi Unit Amended to Include Additional Unit) with waivers of NRC administered written and operating examinations where appropriate.

1.1.1 Regulatory Consideration

This plan provides the outline and approach to obtaining dual-unit operator licenses to support the loading of fuel at the Watts Bar Unit 2 nuclear station.

This is a two-step process as outlined in NUREG 1021, ES-204 which states, in part, that:

1. Facilities may request dual licensing for their operators.
2. Facilities may request a waiver of the examination requirement for the second unit.

In either case the facility must justify that the units are "nearly identical" including:

- facility design and systems relevant to control room personnel (ES-204, RG 1.149)
- technical specifications (ES-204, RG 1.149)
- procedures (mainly abnormal and emergency procedures) (ES-204, RG 1.149)
- control room design and instrument location (ES-204, RG 1.149)
- operational characteristics (ES-204, RG 1.149)

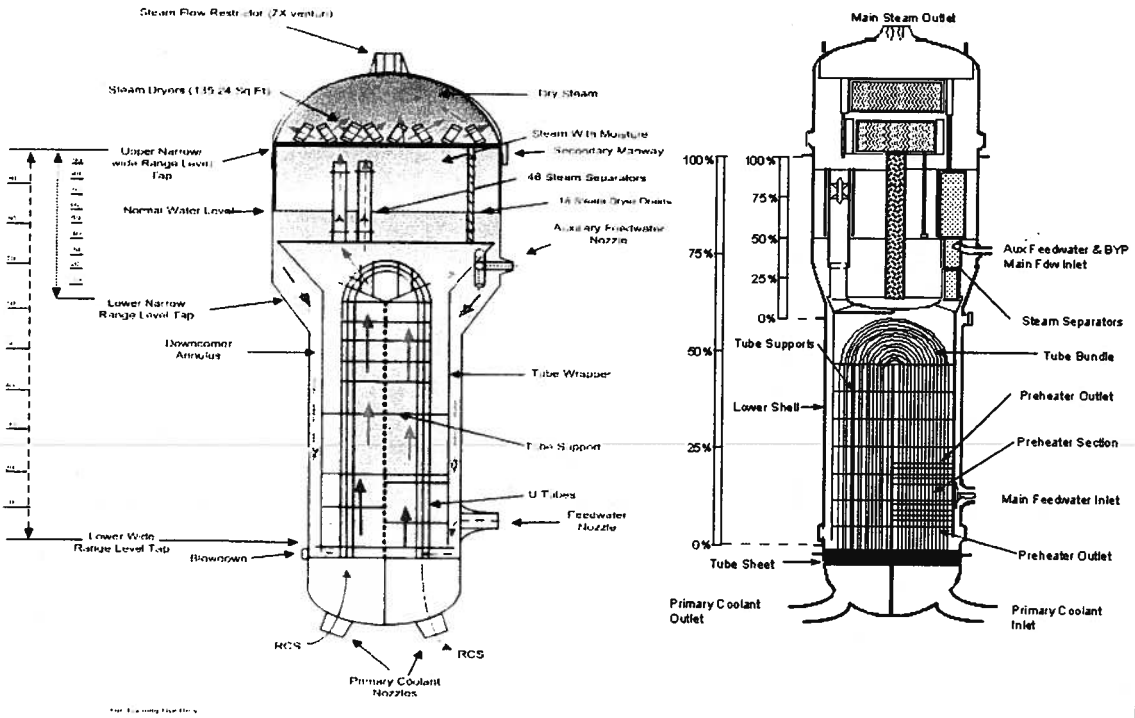
- administrative procedures related to conduct of operations for a multi-unit site (ES-204)
- expected method of rotating personnel between units and re-familiarization training to be conducted before assuming duty on the new unit (ES-204)

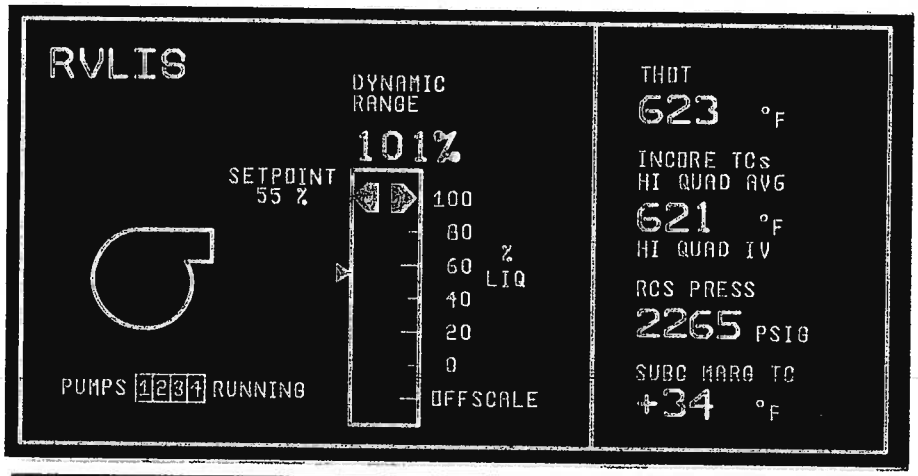
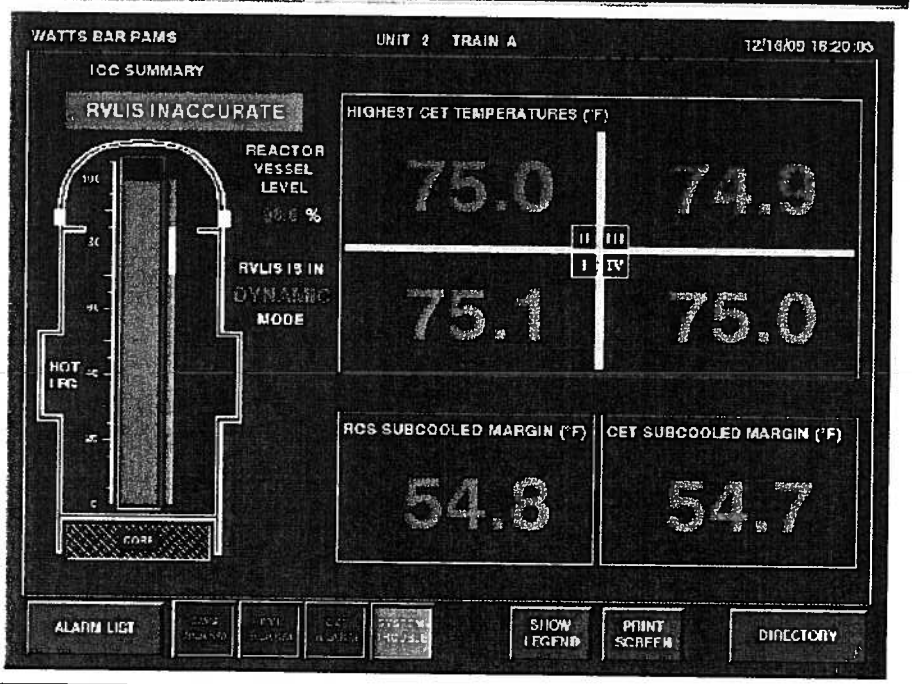
1.1.2 Unit 2 Differences Overview

The design of Unit 2 was conducted with the constraint of maintaining unit differences at a minimum. Accordingly, every effort was made to minimize differences between the units when installing new components on Unit 2, due to obsolescence of those components on Unit 1. With Unit 2 design established, a thorough analysis of the unit differences has shown that the units remain nearly identical. Some of the differences are listed here and are discussed in more detail in Section 2.

Table 1 provides an executive summary of the main differences between Units 1 and 2.

Table 1: Unit 1 / Unit 2 Differences Overview

Steam Generators	Unit 1 has the 68AXP Replacement Steam Generator. Unit 2 has the D-3 Original Steam Generator. (Photos not to scale) Steam Generator Cross Section  Unit 1 68AXP Unit 2 D-3
Main Turbine	The Unit 2 turbine has been upgraded to improve efficiency and power output and is more tolerant to condenser backpressure. The Unit 2 turbine has no impulse chamber. A tap and pressure transmitter will be added to each of the four inlet lines from the control valves. For the purpose of input to rod control, steam dumps and turbine runback, the

	control signal will be the median of four signals.
Moisture Separator Reheaters	The secondary side Moisture Separator/Reheaters (MSR) for Unit 2 are an upgraded design to support the new Main Turbine.
Reactor Vessel Level Indication System (RVLIS) and Inadequate Core Cooling Monitor (ICCM - 86) Common Q Core Exit Thermo - couples, RVLIS, and Core Saturation Monitor	Unit 1 uses the RVLIS ICCM-86 system. Unit 2 will use the upgraded Common Qualified (Common Q) Post Accident Monitoring System (PAMS).  
Reactor Fuel	Unit 1 will have a steady state fuel load. Unit 2 will have a new core. Unit 1 will have Tritium Producing Burnable Absorbers and Unit 2 will not.
Incore Probes	Unit 1 uses Westinghouse movable probes. Unit 2 will use the Westinghouse In-Core Information Surveillance & Engineering (WINCISE) system (Incore fixed sensors).

1.1.3 Training Plan Summary

- Plant and training staff used a systematic analysis to identify the knowledge and skills for presentation in differences training for Unit 2. Licensed Operator Requalification (LOR) training covers operations of dual unit common systems, unit differences, Unit 2 procedures and Technical Specifications. The training will consist of classroom lectures, simulator demonstration and skill practice, Job Familiarization Guides and Task-Performance-Evaluation. This training will take place from January 2014 through August 2014 including the submittal for dual unit licenses for Unit 1 licensed operators. Additional training will continue through Unit 2 hot functional testing, fuel load, initial criticality and start up testing, but will not be credited towards the request for dual unit licenses, since it occurs after the license application submittal.
- Watts Bar staff, with NRC approval of the Training Plan, will conduct comprehensive operator testing, both written and performance, for Unit 2 in lieu of NRC administered license exams in meeting 10CFR55.
- TVA has evaluated the ability to provide simulation capabilities for plant differences that will exist at the startup of Unit 2 using the Watts Bar simulator.
    - The simulator has the capability of using temporary computer models for the original (D-3) steam generators which will be used for training the operators prior to Unit 2 fuel load.
    - The simulator has the capability of using temporary computer models for the initial core load which will be used for training the operators prior to Unit 2 fuel load.
- The Watts Bar simulator was initially upgraded to Distributed Control System (DCS) in January 2012. Subsequently, the Unit 1 plant was upgraded to DCS for the Steam Generator Level Control System in October 2012. The simulator will install additional DCS control in December 2013 and the Unit 1 plant will install these additional DCS controls in April 2014 during RFO 12. The timing of the simulator upgrades allowed for a continuation of training on digital distributed controls prior to Unit 2 hot functional testing, fuel load, start-up testing, power-ascension and prior to implementation of DCS on Unit 1 plant. This upgrade schedule provided additional reinforcement and proficiency on the DCS system.

    Note: Initial license classes are numbered with the year and month the class is scheduled to take the NRC exam when the class starts, i.e., class 11-06 originally scheduled to take the NRC exam in June of 2011.

- Initial License Training (ILT) Class 13-10 is scheduled for their NRC Examinations in October 2013 which is prior to Unit 2 early fuel load of December 2014. This class will train and examine on the Unit 1 referenced simulator and their license applications will request a Unit 1 License. After receipt of their NRC licenses, these individuals will complete the LOR Unit Differences Training and examination described in section 3.0 of this report.

- ILT Class 15-06 is scheduled for their NRC Examinations in 2015 which is after Unit 2 fuel load in December 2014. These students will be trained on Unit 1 and Unit 2 differences, during the course of their ILT class. This class will submit License Applications for a Dual Unit License.

Note: The Site Training Director shall document deviations from this training plan in the Corrective Action Program until Initial License Training Class 15-06 receives dual unit licenses from NRC.

2. Watts Bar Analysis of Unit 1 and Unit 2 Design Differences

2.1.1 Control of Design Differences

TVA suspended construction of Watts Bar Nuclear (WBN) Unit 2 in 1985, placed the unit in construction layup status, and formally deferred WBN Unit 2 in 2000. In 2007 TVA decided to recommence construction on Watts Bar Unit 2. During the lead up to this decision and continuing into construction activities, TVA management put in place expectations that the design and construction groups would maintain fidelity between Unit 1 and Unit 2. This expectation was enforced through memorandum, procedures and processes, which required all parties to ensure that Unit 2 would match Unit 1 to every extent possible. The intent to maintain fidelity between units is spelled out in communications internal to TVA and also in communications to the NRC as demonstrated by the following;

In a letter dated April 3, 2007 (L44 070403 001) TVA asked for feedback from the NRC on certain assumptions TVA was making in the time leading up to a final decision to recommence construction on Unit 2. TVA describes one assumption as being able to resume construction and "...use the existing Part 50 construction permit and the largely completed and well documented operating license review framework. This is the first key regulatory assumption. This first key regulatory assumption is grounded on the fact that WBN 2 is of the same vintage and will be virtually identical to WBN Unit 1. From a regulatory perspective, this means that the WBN Unit 2 licensing and design basis will be essentially the same as what presently exists for WBN Unit 1."

In a letter from the NRC to TVA dated July 25, 2007 (Staff Requirements-SECY-07-0096-Possible Reactivation of Construction and Licensing Activities for the Watts Bar Nuclear Plant Unit 2), the NRC stated:

> "The Commission supports a licensing review approach that employs the current licensing basis for Unit 1as the reference basis for the review and licensing of Unit 2."

In a letter from TVA to the NRC dated August 3, 2007, titled "Watts Bar Nuclear Plant (WBN) – Unit 2 – Reactivation of Construction Activities" the following excerpts demonstrate TVA's intent to keep the two units similar:

> "As background, on October 4, 1976, TVA submitted a dual unit WBN Operating License (OL) for both WBN Unit 1 and Unit 2. WBN Unit 1 received a full power OL on February 7, 1996. WBN Unit 2 which was placed on deferred status would be operationally the same as Unit 1 at startup. TVA believes that, from regulatory, safety and plant operational perspectives, significant benefit is gained from aligning the licensing and design bases of WBN Units 1 and 2 to the fullest extent practicable. The commission recognized these benefits in Reference 2."

(Reference 2 in this letter is referring to the NRC letter discussed above dated July 25, 2007)

"In furtherance of this objective, TVA will complete WBN Unit 2 in compliance with applicable regulations promulgated prior to and after the issuance of the WBN Unit 1 OL. In addition, the WBN Unit 2 licensing and design bases will incorporate modifications made to WBN Unit 1, and those modifications currently captured in the WBN Unit 1 five-year plan. This alignment of the WBN Unit 1 and 2 licensing and design bases will ensure that there is operational fidelity between units and at the same time demonstrate and ensure that WBN Unit 2 complies with applicable NRC regulatory requirements."

The Watts Bar Detailed Scoping, Estimating, and Planning (DSEP) study dated 06/18/07, provided guidance for the continuation of construction of Watts Bar Unit 2 as follows:

"The Engineering Baseline and Modification organizations will prepare design criteria, design calculations, procurement and installation specifications, develop drawings and specifications, and issue procurement documents that provide detailed design for construction as required for completing WBN2. While Engineering work will be performed to the A/E's procedures, calculations and DCNs will conform to TVA's Engineering Change Control and Plant Modification procedures with **an emphasis on ensuring fidelity with Unit 1."** *(bolded emphasis was added)*

The Watts Bar Unit 1 and 2 Memorandum of Understanding, which defines the division of responsibilities between unit 1 and unit 2, under the Design Engineering Interface, states:

"One of the goals of the Unit 2 completion is to maintain as much consistency in configuration and processes with unit 1 as possible. Unit 2 will develop requirements and a means for tracking differences that exist or are created between the two units. Part of the Unit 2 scoping process will be to evaluate the as-constructed Unit 1 configuration against the Unit 2 as-designed configuration and Unit 2 walkdown results to determine what physical changes are required to Unit 2 to maintain configuration consistency. Differences between the two units will be reviewed and agreed upon by the two units."

The following provides an example of the management processes in place during Unit 2 construction; the construction contractor had an Engineering procedure (25402-3DP-G04G-00081) which required any differences between the units to be documented and reviewed by Operations, Maintenance and Engineering organizations. Part of this review process also included analysis of the differences for inclusion into the operator differences training.

Unit 1 modifications were reviewed and a Unit 2 scope work list was developed from this review. For each Corrective Action Program (CAP) and Special Program (SP) a plan for Unit 2 was developed to implement the changes associated with each program based upon a review of Problem Evaluation Reports (PER), Nuclear Central Office Tracking items (NCO), Corrective Action Tracking Documents (CATD), and Unit 1 corrective actions. Engineering Document Construction Releases (EDCR) were issued for the CAPs and SPs based on this review.

Due to equipment obsolescence some new designs for Unit 2 were needed (e.g., Foxboro Distributed Control System (DCS), Unit 2 Annunciator, Rosemount Transmitters).

Unit 2 designs were evaluated for any unit differences with Unit 1. These differences were reviewed and approved by TVA operations, maintenance, and engineering groups.

As documented in the examples given above, during design and construction activities, every effort was made to minimize differences between the units. When installing new components on Unit 2 due to obsolescence of those components on Unit 1, similar controller type and sizes were used, wherever possible, to keep the control and indication locations the same on the Unit 2 Main Control Panels.

2.1.2 Nearly Identical Summary

This section will provide a brief overview of how the two units at Watts Bar have been determined to be "nearly identical", as the terminology in NUREG 1021 states. More detail follows in section 2.3.

- The units consist of identical nuclear steam supply system (NSSS) vendor designs and secondary plant designs. Unit 2 will include the original D-3 steam generators. Unit 1 has installed 68AXP replacement steam generators.
- Initially, the units will have different core operating characteristics with Unit 1 being in a normal first/second/third burn assembly fuel cycle. Unit 2 will consist of all first burn assemblies.
- Unit 1 uses Westinghouse movable incore probes. Unit 2 will use WINCISE fixed sensors, which also house the Core Exit Thermocouples (CET).
- Unit 1 uses the RVLIS (ICCM-86) system for Reactor vessel level and subcooling monitoring. Unit 2 will use the Common Q system. The Common Q system has slightly different mimics but the same information is displayed.
- The Technical Specifications and structure of the Emergency Operating Procedures (EOP) developed for Unit 2 will be nearly identical to those already in use for Unit 1.

2.1.3 Nearly Identical Justification

This section includes the analysis and the nearly identical justification performed by Watts Bar to meet NUREG 1021, ES-204 / Regulatory Guide 1.149 guidance as listed below and will follow the format of the bulleted items listed in the NUREG.

2.1.4 Facility Design and Systems Relevant to Control Room Personnel

Watts Bar has thoroughly reviewed the Unit 1 and Unit 2 Facility Design and Systems Relevant to Control Room Personnel and has determined that they are nearly identical based on the following nominal differences.

2.1.4.a The WBN Unit 1 steam generators were replaced. Unit 1 Steam Generators have a larger heat transfer area. The Unit 1 Heat transfer coefficient is slightly less than that of Unit 2, however, the higher tube volume and more surface area results in a higher Steam pressure and temperature at the same power level.

2.1.4.a.1 The Unit 2 generators are the original D-3 model, which has some operationally different setpoints.

2.1.4.a.2 There are differences between the units in their operational response to a Steam Generator Tube Rupture (SGTR) with regard to event milestone times and due to the elevation difference of the U tube bundle. Emergency Operating Procedures adequately mitigate the difference in response between the units. See section 2.3.3 and 2.3.5.c.5 for more detail.

2.1.4.b The Unit 2 main turbine has been upgraded to improve efficiency and power output and is more tolerant to condenser backpressure. This turbine has no impulse chamber. A pressure transmitter will be added to each of the four inlet lines from the control valves to monitor the High Pressure Turbine Inlet Pressure which varies similarly to 1st stage impulse pressure. For the purpose of input to rod control, steam dumps and turbine runback, the control signal will be the higher median of four signals.

2.1.4.c The Unit 1 turbine has an impulse chamber and utilizes three pressure transmitters for generating control signals.

2.1.4.d The Unit 2 MSRs are an upgraded design to support the new Main Turbine. The Unit 2 Main Feedwater Pump Turbines are connected to MSRs A-2 and B-2 as opposed to MSRs A-1 and B-1 on Unit 1.

2.1.4.e The Unit 1 Inadequate Core Cooling Monitoring System (ICCM 86) for will be replaced with the Common Q platform for Unit 2. Parameters present in the ICCM 86 will be replicated in the Common Q Post Accident Monitoring System (PAM) including Core Exit Thermocouple (CET) temperature, RVLIS, and Core Saturation Monitor.

2.1.4.f The Unit 2 incore probes will be WINCISE fixed probes as opposed to the Unit 1 Westinghouse movable probes. The WINCISE probes will also house the CETs. The WINCISE CET location will cause the forced flow at power indicated temperature to be slightly lower than Unit 1but will not impact post accident temperatures or EOP setpoints.

2.1.4.g Unit 1 will complete the installation of DCS during Refuel Outage 12 in 2014. The Unit 1 DCS upgrade eliminates many operational differences, addresses obsolescent equipment issues, and deletes as many single points of failure as practical. Post outage the operational difference between the units will be DCS hotwell level control Unit 2 only, a few annunciator windows, and the MCR Center Work Desk Area Displays. See Attachment 1 for detail referenced to EDCR 52378.

2.1.4.h Unit 2 will eliminate the Post Accident Sampling System (PASS) and physically remove the associated equipment. Unit 1 has abandoned the PASS system in place.

2.1.4.i There will be only one Hydrogen Analyzer for Unit 2 and it will be non-safety related.

2.1.4.j The hydrogen recombiners on Unit 1 have been removed from Technical Specifications. The recombiner handswitches for Unit 1 are still on the control room panel 1-M-10. The hydrogen recombiners on Unit 2 will be abandoned in place and the handswitches in the control room have been removed from panel 2-M-10.

2.1.5 Technical Specifications

Watts Bar Unit 1 and Unit 2 have separate Technical Specification(s) (TS) and Technical Requirements Manual (TRM). TVA used the WBN Unit 1 TS and TRM to develop the proposed WBN Unit 2 TS and TRM. The numbers, setpoints, and parameters provided have been validated through the design phase of the construction completion project. All Nuclear Steam Supply System (NSSS) setpoints are identical; therefore TS related setpoints will be identical between the units. Final verification will be provided as part of the "as-built" phase of construction completion of WBN Unit 2.

Watts Bar has thoroughly reviewed the Technical Specifications differences and determined that they are nearly identical based on minimal differences. Attachment 2 provides a detailed discussion for each of the identified technical specification differences.

2.1.6 Procedures (Abnormal and Emergency Procedures)

Watts Bar has thoroughly reviewed the Unit 1 abnormal and emergency procedures against the intended structure and content of the Unit 2 procedures and has determined that they are nearly identical.

The Unit 2 Emergency Operating Instructions (EOIs) were developed to the same revision level and the exact format as the suite of Unit 1 EOIs currently in use today. The EOIs are symptom-based procedures and there is no change in logic for implementation as a result of any differences in design and control.

In the case of a narrow range of SGTRs on unit 1, with reactor coolant pumps running, the isolated steam generator may depressurize during subsequent cool down and require a transition from the optimal EOI to a contingency EOI. This does not occur on Unit 2. However, the EOIs adequately mitigate the difference in response between the Units.

The majority of the setpoint calculations pertaining to EOI actions have been completed at this time. As remaining setpoint data is received, any differences will be rolled into the scheduled operator training. Based on completed calculations, these setpoint differences are not significant. Unit specific EOIs were developed to prevent human errors related to combining Unit procedure steps.

The Unit 2 Abnormal Operating Instructions (AOIs) were developed to the same revision level and two-column format as the suite of AOIs utilized to operate Unit 1. A numbering system is in place to allow for Unit specific AOIs, where needed, to prevent human errors related to combining Unit procedure steps. The majority of the AOIs have been written and entry conditions and symptoms described in the AOIs are the same for Unit 2 as for Unit 1.

2.1.7 Control Room Design and Instrument Location

Watts Bar has thoroughly reviewed the control room design and instrument locations and determined that they are nearly identical.

The Unit 2 Main Control Board layout is a rotated image of the Unit 1 Main Control Boards. On panels M-1 through M-6, the left-right relationship for controls and indications is nearly identical.

The DCN and EDCR processes both require a Human Factors Engineering evaluation and a Unit Differences evaluation which are directed at minimizing the impact of operational differences between the units.

The following provides an overview of the identified control room design and instrument location differences. Attachment 1 provides specific panel details.

2.1.7.a Main Control Board Panel 2-M-1 "Auxiliary Power"

2.1.7.a.1 Main Control Room panel 2-M-1 has an ICS display monitor 2-MON-47-120. This monitor duplicates the functionality of obsolete recorders 2-TR-47-1 and 2-TR-47-2. On Unit 1 these recorders (1-TR-47-1 and 1-TR-47-2) were abandoned and the inputs to these recorders were provided to the plant integrated computer system (ICS).

2.1.7.b Main Control Board Panel 2-M-3 "Feedwater and Condensate"

2.1.7.b.1 Hand switch 2-HS-3-45 is a 4-position switch to warm the main feedwater lines through forward and back flush operations. The Unit 1 STEAM GENERATORS were replaced, which eliminated the need for back flush operations: 1-HS-3-45 is a two-position switch, without the back flush operation mode. Status light box 2-XX-3-235 retains additional lights related to back flushing operations for the Unit 2 steam generators.

2.1.7.c Main Control Board Panel 2-M-4, "Reactor Controls"

2.1.7.c.1 Core Exit Temperature recorder 2-TR-94-101, switch 2-XS-68-101, and RVLIS indicator 2-XI-68-100 will not be installed on 2-M-4. The new COMMON Q display 2-MON-68-100 will perform these functions for Unit 2.

2.1.7.d Main Control Board Panel 2-M-5, "Reactor Coolant System"

2.1.7.d.1 No operationally significant differences.

2.1.7.e Main Control Board Panel 2-M-6 "Engineered Safeguards" (2-M-6 Right Half) (2-M-6 Left Half)

2.1.7.e.1 The Cold Leg Accumulators group of indicators (LI-63-129, -119, -109, -99, -89, -81, -82, and -60 and PI-63-128, -126, -108, -106, -88, 86, -61, and -61) are located below the new COMMON Q driver RVLIS – ICCM monitor (2-MON-68-110) on panel 2-M-6. On Unit, 1 these indicators are located above RVLIS display (1-XI-68-110) on 1-M-6. This was done to fit the new 15-inch COMMON Q display.

2.1.7.c.2 Incore flux / temperature recorder TR-94-102 is not installed on panel 2-M-6. This instrumentation will be handled through COMMON Q monitor 2-MON-68-110 on 2-M-6 which replaces the functions supported by XI-68-110, XS-68-111, and TR-94-102 on 1-M-6.

2.1.7.f Main Control Board Panel 2-M-10 Temperature Monitoring

2.1.7.f.1 One of the Hydrogen Analyzers is being eliminated.

2.1.7.g Main Control Board Panel 2-M-11 Spare (Generator Core Condition Monitor – Unit 1)

2.1.7.g.1 The Hydrogen Purity Meter will be eliminated and placed on ICS.

2.1.7.h Main Control Board Panel 0-M-12 (Common Panel)

2.1.7.h.1 The following Radiation Monitors replaced with Digital Units:

- 2- RM-90-002 Personal Access Area Monitor (Personnel Airlock)
- 2- RM-90-059 Upper Cntmt Area Monitor (Hatch)
- 2- RM-90-060 Upper Cntmt Area Monitor (Airlock)
- 2- RM-90-061 Incore Instrumentation Room
- 2- RM-90-106 Lower Cntmt Air
- 2- RM-90-112 Upper Cntmt Air
- 2- RM-90-119 Condenser Vacuum Exhaust
- 2- RM-90-120 Steam Generator Building Effluent
- 2- RM-90-121 Steam Generator Building Effluent

2.1.7.i Main Control Board Panel 2-M-13 Excore Neutron Instrumentation

2.1.7.i.1 The Source and Intermediate Range Detectors will be replaced with upgraded instruments that contain digital indications in place of the Unit 1 analog meters.

2.1.7.j Main Control Board Panel 2-M-18 Westinghouse Incore Instrumentation

2.1.7.j.1 The movable Incore Probes have been replaced with WINCISE and removed from 2-M-18.

2.1.7.k Main Control Board Panel 2-M-23A Appendix R

2.1.7.k.1 No operationally significant differences.

2.1.7.l Main Control Board Panel 2-M-30 Post Accident and SG (Radiation) Monitoring

2.1.7.l.1 The following Radiation Monitors replaced with Digital Units

2-RM-90-255 Condenser Vacuum Exhaust Low Range

2-RM-90-256 Condenser Vacuum Exhaust High Range

2-RM-90-271 Upper Cntmt High Range

2-RM-90-272 Upper Cntmt High Range

2-RM-90-273 Lower Cntmt High Range

2-RM-90-274 Lower Cntmt High Range

2-RM-90-421 Main Steam Line Post Accident Monitor

2-RM-90-422 Main Steam Line Post Accident Monitor

2-RM-90-423 Main Steam Line Post Accident Monitor

2-RM-90-424 Main Steam Line Post Accident Monitor

2.1.7.m Auxiliary Control Room Panels 2-L-11A/B and L-10

2.1.7.m.1 Corresponding controllers on the ACR panels will be changed out to include the same type of Foxboro I/A & Spec 200 controllers that are used on the Main Control Room panels.

2.1.7.m.2 Switches on Unit 2 L-11A/B panels are located in different locations than the Unit 1 Counterparts.

2.1.8 Operational Characteristics

Watts Bar has thoroughly reviewed the operational characteristics of both units and determined that they are nearly identical. The following provides an analysis of the identified operational characteristics differences.

2.1.8.a Unit 2 Reactor Core

2.1.8.a.1 Unit 2 will start up with a "clean" core and without Tritium Producing Burnable Absorbers. Initially, the units will have different core operating characteristics requiring different boron concentrations: Unit 1 in a normal first/second/third burn assembly fuel cycle, Unit 2 with all first burn assemblies.

2.1.8.a.2 Unit 2 Core Thermal Power will be limited to 3411 vs. 3459 MW for Unit 1, until the Leading Edge Flow Monitor system is commissioned.

2.1.8.b Unit 2 Turbine Upgrade

2.1.8.b.1 The Unit 2 turbine has been updated to improve efficiency and power output by installing a new HP Turbine (Rotor, Inner Cylinder, Blade Rings) and two LP Turbines (Rotors and Inner Casings). The HP turbine has no impulse chamber. Turbine Impulse Pressure control will be different between the units.

The Unit 1 turbine has an impulse chamber and utilizes three pressure transmitters for generating control signals. On Unit 2 there will be a higher median select of four HP turbine inlet pressure transmitters. Unit 2 will have a different configuration for the turbine load signal (inlet pressure).

2.1.8.b.2 The Turbine Supervisory Instrumentation (TSI) system for Unit 2 is physically smaller than the Unit 1 TSI system. The Unit 2 system is more compact because the technology has decreased the size of the components needed to serve the same function and become more reliable.

2.1.8.c Unit 2 Steam Generator Response and Preheat Operations

2.1.8.c.1 Unit 2 has the original D-3 steam generators and Unit 1 has installed 68AXP replacement steam generators.

2.1.8.c.2 Unit 1 Steam Generators have a larger heat transfer area (20,000 ft^2 more) and a heat transfer performance characteristic of 28.8 ~MW/F. The Unit 2 Steam generator has a characteristic of 22.81 ~MW/F. The Unit 1 Heat transfer coefficient is slightly less than Unit 2, however, the Unit 1 higher tube volume and more surface area results in a higher steam pressure and temperature at the same power level.

2.1.8.c.3 The differences in steam generator design result in slightly different response characteristics. The Unit 1 Steam Generators have a higher recirculation ratio, resulting in greater indicated level changes in response to transient/upset conditions. This has been tempered to some extent by increasing the span of the level instrumentation. The Unit 2 Steam Generator indicated level response is slightly slower. This slight difference in steam generator operations and response is similar to that experienced at other two unit sites after upgrading their steam generators. These upgrades are typically done at different times on opposite units, resulting in the two units having different steam generators for some period of time.

2.1.8.c.4 The Unit 1 Steam Generators use a forward flush to warm the Main FW lines to the steam generators, but no longer require a back flush. The Unit 2 Steam Generators require a back flush for warming the Main FW lines to the steam generators. This is accomplished by using an additional position added to the Unit 2 switch that controls the forward and back flush operation.

2.1.8.c.5 There is a difference between the units in their operational response to a Steam Generator Tube Rupture (SGTR) due to the higher elevation of the Unit 1 U tube bundle. Emergency Operating Instructions adequately mitigate the difference in response between the units.

FSAR SGTR Time Response calculations identify the following minor variations:

- Time to identify/isolate (Units 1&2 = 15 mins)
- Time to start C/D and start Depress (Unit 2 = 33 mins/55 mins, Unit 1 = 33 mins/51.6 mins
- Time to Terminate SI after Depress Stopped Unit 2 = 4.1 mins, Unit 1 = 4.0 mins)
- Break flow terminated (Unit 2 = 83.8 mins, Unit 1 = 77.8 mins

In summary even though the times for Unit 2 response changed, most of the Key times for operator actions are essentially the same.

2.1.8.d Unit 2 Moisture Separator Reheaters

2.1.8.d.1 The Unit 2 MSRs are higher capacity reheaters. Along with the Main Turbine difference, the MSR will operate at a slightly lower steam pressure (about 45 psi lower). This will cause slightly different flows throughout the system (extraction steam, heater drain flows) that will require different alarm setpoints.

2.1.8.d.2 Mass flow rates to all MSR drain tanks increase because of improvements to the high pressure turbine and the new MSRs. Mass flow rates through the MSR operating vents decrease because of improved MSR design. Mass flows from the MSR low pressure operating vents will be directed to the low pressure reheater drain header instead of the Number 2 extraction steam lines as on Unit 1.

2.1.8.d.3 The Unit 2 Main Feedwater Pump Turbines are connected to MSRs A-2 and B-2 as opposed to MSRs A-1 and B-1 on Unit 1.

2.1.8.d.4 Controls in the MCR are the same for both units.

2.1.9 Administrative Procedures related to Conduct of Operations for a Multi-Unit Site

The administrative procedures related to conduct of operations at a multi-unit Watts Bar Site will be the same as those used for the Sequoyah Site and are contained in TVA NPG Standard Department Procedure (OPDP-1). Requirements for shift manning are summarized below:

2.1.9.a A SM with an active SRO license, who is also a member of the Operations shift crew, shall be on site at all times when fuel is in the reactor.

2.1.9.b In addition to the SM on site, a second active licensed SRO shall be in the control room at all times. The SM may, from time to time, act as relief Operator for the licensed SRO assigned to the control room.

2.1.9.c In addition to the staffing requirements stated above, shift crew assignments during periods of core alterations shall include a licensed SRO to supervise the core alterations. This SRO shall not have any other concurrent operational duties.

2.1.9.d Additional personnel may be required on shift because of unusual plant conditions or operational needs. The SM, or designee shall obtain the additional personnel as necessary.

2.1.9.e Deviations in shift complement may be made, provided minimum manning and license requirements of TS are met.

2.1.9.f Operations personnel should not be shifted from one unit to another unit without sufficient time for the individual to become familiar with its conditions.

2.1.9.g The following table summarizes minimum staffing requirements:

Shift Manager (SRO)	1
Unit Supervisor (SRO)	3
Unit Operator (RO)	4
Non-licensed (AUO)	8
STA	1

The SM, a US or the WCC may be the STA and one US will be the Incident Commander. The STA need not be licensed. Two active-licensed SROs are required for Unit Supervisor positions and a third active licensed SRO is required as Shift Manager.

2.1.10 Expected Method of Rotating Personnel between Units and Re-Familiarization Training To Be Conducted Before Assuming Duty on the New Unit

Watts Bar Nuclear Plant Operations Shift Schedule is a continuous five-week rotation for each crew—including four weeks in Plant and one week in Training. Each crew will consist of sub-crews (for example, Crew 1A, Crew 1B, Crew 2A, Crew 2B etc.). Management expectation is that each sub-crew will assume the shift on the opposite Unit after every training week. "Crew 1A" would assume the shift for Unit 1 for four weeks, attend training week, assume the shift for Unit 2 for four weeks, attend training week, assume the shift for Unit 1 for four weeks, etc. while "Crew 1B" would assume the shift on the opposite Unit.

3. Training and Qualification Plan

This training plan provides a best estimate outline of the expected scope, duration, and delivery schedule based on the analysis of the unit differences, the Unit 2 testing and startup schedule, and initial license needs. Certain assumptions have been made to develop this plan and those are discussed in section 3.2. It is expected that the training schedule and duration discussed will be sufficient to accommodate the results of any further training needs analysis resulting from any differences not already identified.

The training plan must be flexible in nature while still maintaining the integrity of the overall concept of the design. As Unit 2 fuel load approaches, it is recognized that additional differences may be identified or some design changes may occur. The procedures and processes are in place and functioning that force any new plant changes (Unit 1 or Unit 2) to be reviewed by training personnel for impact on operator training programs. This is also true for changes to setpoints, procedures, technical specifications and other changes that may occur.

The training plan can accommodate any future training needs identified over and above those currently known. The approximate number of hours is flexible, as well as the specified hours per topic described in the plan.

Unit 2 fuel load and startup have been carefully coordinated with Unit 1 refuel outages, Unit 1 upgrade to digital controls, Simulator upgrade to digital controls, LOR differences training for startup and the licensing dates for initial license classes. Furthermore, if there are any issues with meeting the scheduled Unit 2 fuel load and startup date, there will be no impact on this training plan.

3.1.1 Training Analysis

The Training and Qualification Plan was developed in accordance with the systems approach to training. Accordingly, Watts bar performed a Training Needs Analysis (TNA) for each DCN/EDCR issued that identified unit differences. TNAs were reviewed by an expert panel of dedicated operations resources to determine required unit differences training for Operators. This panel ensured that a consistent review was performed and minimized the potential that a change might be missed and not covered in training. Unit differences with operational impact that required new or modified tasks with regard to the Licensed Operator/Senior Operator Jobs were determined.

As of 6/6/13, 100% of issued Unit 1 DCNs and Unit 2 EDCRs have been reviewed. Approximately 15% of DCNs/EDCRs have been screened as requiring operator training and have a completed training needs analysis. Approximately 90% of the DCNs/EDCRs screened as requiring some level of operator training are relatively minor. The other 10% of differences will require a more comprehensive level of operator training.

Four tasks were identified as unique to Unit 2. Seven tasks were modified (Unit 1 only or Unit 1 and 2) due to unique unit 2 skills and/or knowledge's. Lastly, Unit differences

l. TS 3.4.7.b, SR 3.4.5.2, SR 3.4.6.3, and SR 3.4.7.2 – SG secondary side water level value changed to ≥ 6% narrow range. Unit 1 value is ≥ 32% narrow range.

m. SR 3.4.12.1 and 3.4.12.2 – frequency uses RCS cold legs decreasing below 225 °F. Unit 1 uses RCS cold legs decreasing below 325 °F.

n. TS 3.4.17, 5.7.2.12, 5.9.9, and SR 3.4.17.2 – steam generator tube integrity uses tube plugging or repair criteria and tubes shall be plugged or repaired. Unit 1 uses tube repair criteria and tubes shall be plugged

o. SR 3.5.1.4 and 3.5.4.3 – Unit 1 includes "Notes" discussing TPBARs. Unit 2 does not have TPBARs. All other requirements in the Technical Specification and surveillance are identical.

p. TS 3.7.1 Action for one or more steam generators with one MSSV inoperable. Unit 2 reduce Thermal Power to ≤ 59% RTP. Unit 1 reduce Thermal Power to ≤ 58% RTP. Additionally, TS Table 3.7.1-1 Allowable rated thermal power for Main Steam Safety Valves:

# of Operable MSSV	Unit 1 Rated Thermal Power	Unit 2 Rated Thermal Power
3	≤41%	≤42%
2	≤25%	≤26%

q. TS 5.7.2.12.b.2 – accident induced leakage performance criteria includes "Leakage is not to exceed 1 gpm per SG, except for specific types of degradation at specific locations as described in paragraph c. of the Steam Generation Program." Unit 1 includes "For design basis accidents that have a faulted steam generator, accident induced leakage is not to exceed 1.0 gallon per minute (gpm) for the faulted steam generator and 150 gallons per day (gpd) for the non-faulted steam generators. For design basis accidents that do not have a faulted steam generator, accident induced leakage is not to exceed 150 gpd per steam generator."

r. * TS 3.8.1, 3.8.2, 3.8.4, and 3.8.5 – Removed the note referencing the C-S DG.

s. * TS 3.8.1 – Unit 2 has Condition "B" for one or more DG(s) in Train A or B inoperable with changes in Completion Times. Unit 1 has Condition "B" for one required DG inoperable and Condition "C" for two required DGs in Train A or B inoperable.

t. TS 4.2 and 4.2.2 – Removed reference to Tritium Producing Burnable Absorber Rods (TPBARs).

u. TS 5.7.2.12 – SG program differences associated with inspection frequency requirements.

v. TS 5.9.5.b – Core Operating Limits Report (COLR):

   i. Removed clarifying information and an analytical method associated with the use of the LEFM.

ii. Analytical method listed as 2a updated with newer method for Heat Flux Hot Channel Factor (HCF) and Enthalpy Rise HCF.

w. TS 5.9.6 – Reactor Coolant System (RCS) Pressure and Temperature Limits Report (PTLR):

i. Added additional information related to the COMS.

ii. Differences in the listed analytical methods used for the PTLR.

TRM Differences:

a. TRM Definitions: Rated Thermal Power, Unit 1 3459 MWt, Unit 2 3411 MWt Unit 1 TS approved Power Uprate using Leading Edge Flow Meter (LEFM).

b. TRM 3.3.3: Unit 1 has movable incore detectors. Unit 2 used fixed incore detectors referred to as Power Distribution Monitoring System (PDMS).

c. TRM 3.3.6: Unit 1 has a six sensor Loose Parts Detection System. Unit 2 has a twelve sensor Loose Parts Detection System.

d. TRM 3.3.7: Unit 1 has a technical requirement in support of leading edge flow meters (LEFMs). Unit 2 will not implement LEFM associated power uprate until NRC licensing review and approval of the LEFM uprate is completed.

e. TRM 3.3.8: Unit 1 has two Hydrogen Monitors. Unit 2 has one Hydrogen monitor.

f. TRM 3.3.9: Unit 1 TR for Power Distribution Monitoring System (PDMS). Not used for Unit 2.

*= These sections will be changed in Unit 1 Technical Specifications to match Unit 2. Upon completion of the Unit 1 changes these differences will be eliminated.

ATTACHMENT 3 - NRC Guidance

NUREG-1021, ES-204, C.1.c, PROCESSING WAIVERS REQUESTED BY REACTOR OPERATOR AND SENIOR REACTOR OPERATOR APPLICANTS:

Facility licensees having units designed by the same nuclear steam supply system vendor and operated at approximately the same power level may request dual licensing for their operators. Similarly, if the units of a multi-unit facility are **nearly identical**, the facility licensee may request a waiver of the examination requirements for the second and subsequent units.

In either case, the facility licensee must justify to the NRC that the differences between the units are not so significant that they could affect the operator's ability to operate each unit safely and competently. Further, the facility licensee must submit for NRC review the details of the training and certification program. The analysis and summary of the differences on which the applicants must be trained will include the following, as applicable:

- facility design and systems relevant to control room personnel
- technical specifications
- procedures (primarily abnormal and emergency operating)
- control room design and instrument location
- operational characteristics
- administrative procedures related to conduct of operations at a multi-unit site (e.g., shift manning and response to accidents and fires)
- the expected method of rotating personnel between units and the re-familiarization training to be conducted before an operator assumes responsibility on a new unit

7.2 Regulatory Guide 1.149, C.2, USE OF A SIMULATOR FOR MULTIPLE PLANTS

If a licensee wishes to use a simulation facility to train or examine operators for more than one nuclear power plant, it must be able to demonstrate to the NRC that the differences between the plants are not so significant that they will result in negative training. This demonstration should include an analysis and summary of the differences between each plant, including:

1. Facility design and systems relevant to control room personnel,
2. Technical specifications,
3. Procedures, primarily abnormal and emergency operating procedures,
4. Control room design and instrument/control location, and
5. Operational characteristics.

7.3 10CFR55.46 Simulation facilities.

(a) *General.* This section addresses the use of a simulation facility for the administration of the operating test and plant-referenced simulators to meet experience requirements for applicants for operator and senior operator licenses.

(b) *Commission-approved simulation facilities and Commission approval of use of the plant in the administration of the operating test.*

(1) **Facility licensees that propose to use a simulation facility, other than a plant-referenced simulator, or the plant in the administration of the operating test under §§ 55.45(b)(1) or 55.45(b)(3), shall request approval from the Commission.** This request must include:

(i) A description of the components of the simulation facility intended to be used, or the way the plant would be used for each part of the operating test, unless previously approved; and

(ii) A description of the performance tests for the simulation facility as part of the request, and the results of these tests; and (iii) A description of the procedures for maintaining examination and test integrity consistent with the requirements of § 55.49.

(2) The Commission will approve a simulation facility or use of the plant for administration of operating tests if it finds that the simulation facility and its proposed use, or the proposed use of the plant, are suitable for the conduct of operating tests for the facility licensee's reference plant under § 55.45(a).

(c) *Plant-referenced simulators.*

(1) A plant-referenced simulator used for the administration of the operating test or to meet experience requirements in § 55.31(a)(5) must demonstrate expected plant response to operator input and to normal, transient, and accident conditions to which the simulator has been designed to respond. The plant-referenced simulator must be designed and implemented so that it:

(i) Is sufficient in scope and fidelity to allow conduct of the evolutions listed in §§ 55.45(a)(1) through (13), and 55.59(c)(3)(i)(A) through (AA), as applicable to the design of the reference plant.

(ii) Allows for the completion of control manipulations for operator license applicants.

(2) Facility licensees that propose to use a plant-referenced simulator to meet the control manipulation requirements in § 55.31(a)(5) must ensure that:

(i) The plant-referenced simulator utilizes models relating to nuclear and thermal-hydraulic characteristics that replicate the most recent core load in the nuclear power reference plant for which a license is being sought; and

(ii) Simulator fidelity has been demonstrated so that significant control manipulations are completed without procedural exceptions, simulator performance exceptions, or deviation from the approved training scenario sequence.

(3) A simulation facility consisting solely of a plant-referenced simulator must meet the requirements of paragraph (c)(1) of this section and the criteria in paragraphs (d)(1) and (4) of this section for the Commission to accept the plant-referenced simulator for conducting operating tests as described in § 55.45(a) of this part, requalification training as described in § 55.59(c)(3) of this part, or for performing control manipulations that affect reactivity to establish eligibility for an operator's license as described in § 55.31(a)(5).

7.4 10CFR50.120 Training And Qualification Of Nuclear Power Plant Personnel and 10CFR55 Operators' Licenses specify the systems approach to training (SAT) by which applicants and licensees shall develop, implement, and evaluate personnel training programs. Consistent with the SAT process, each applicant and licensee is required to include the following key elements in its training programs: (1) analysis of job performance requirements and training needs, (2) derivation of learning objectives based upon the preceding analysis, (3) design and implementation of the training program based upon the learning objectives, (4) trainee evaluation, and (5) program evaluation and revision based upon the preceding evaluations.

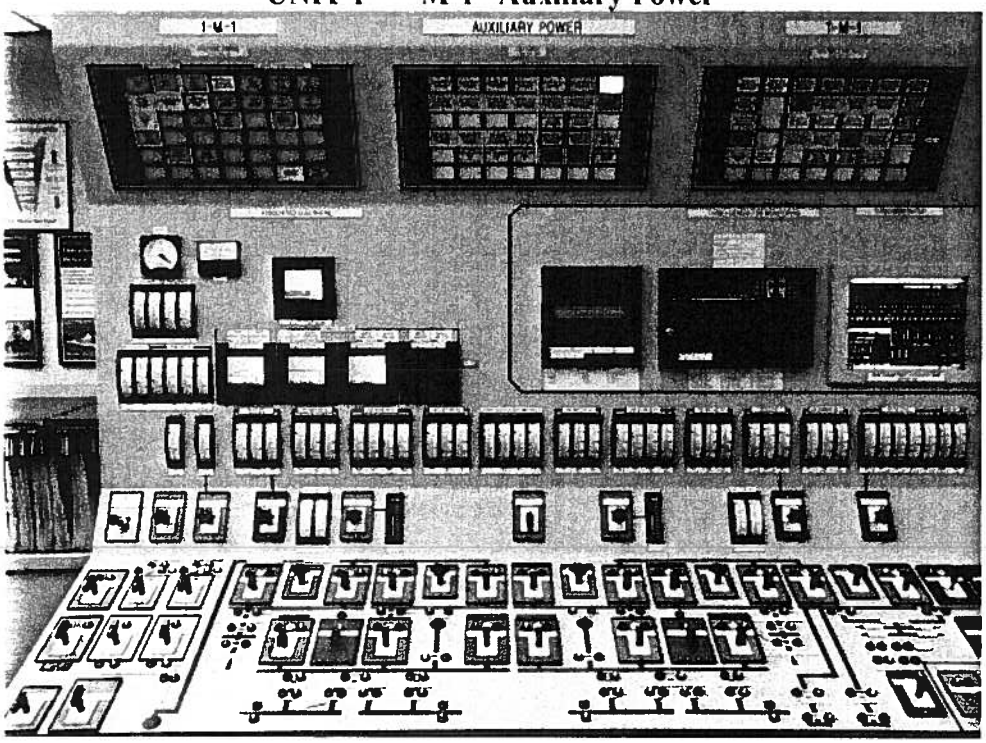
ATTACHMENT 4 - Acronyms

A/E	Architecture Engineer
AEH	Analog Electro-Hydraulic
AMSAC	(ATWS) Mitigating System Actuating Circuitry
AOI	Abnormal Operating Instructions
ATWS	Anticipated Transient Without SCRAM
AUO	Non-Licensed Operator
BEACON	Best Estimate Analysis of Core Operations
BOP	Balance of Plant
CAP	Corrective Action Program
CATD	Corrective Action Tracking Documents
COMS	Cold Overpressure Mitigation System
DCS	Distributed Control System
DCN	Design Change Notice
DSEP	Detailed Scoping Estimating and Planning
EDCR	Engineering Document Construction Release
EOI	Emergency Operating Instructions
EP	Emergency Preparedness
FSAR	Final Safety Analysis Report
GO	General Operating Procedures
GPM	Gallons per Minute
HFE	Human Factors Engineering
I/A	Intelligent Automation
ICCM	Inadequate Core Cooling Monitoring System
ICS	Integrated Computer System
ILT	Initial License Training
JFG	Job Familiarization Guide
JPM	Job Performance Measure
LEFM	Leading Edge Flow Meter
LOR	Licensed Operator Requalification Training
MCR	Main Control Room
MFP/MFPT	Main Feedwater Pump / Main Feedwater Pump Turbine
MFW	Main Feedwater
MCR	Main Control Room
NCO	Nuclear Central Office Tracking Items
NIS	Nuclear Instrumentation System
NSSS	Nuclear Steam Supply System
OJT	On-the-Job Training
OL	Operating License
PAMS	Post Accident Monitoring System
PASS	Post Accident Sampling System
PDMS	Power Distribution Monitoring System
PER	Problem Evaluation Report
PORV	Power Operated Relief Valve
PPM	Parts per Million
RO	Reactor Operator
RVLIS	Reactor Vessel Level Indication System
SM	Shift Manager
SOI	Standard Operating Instructions

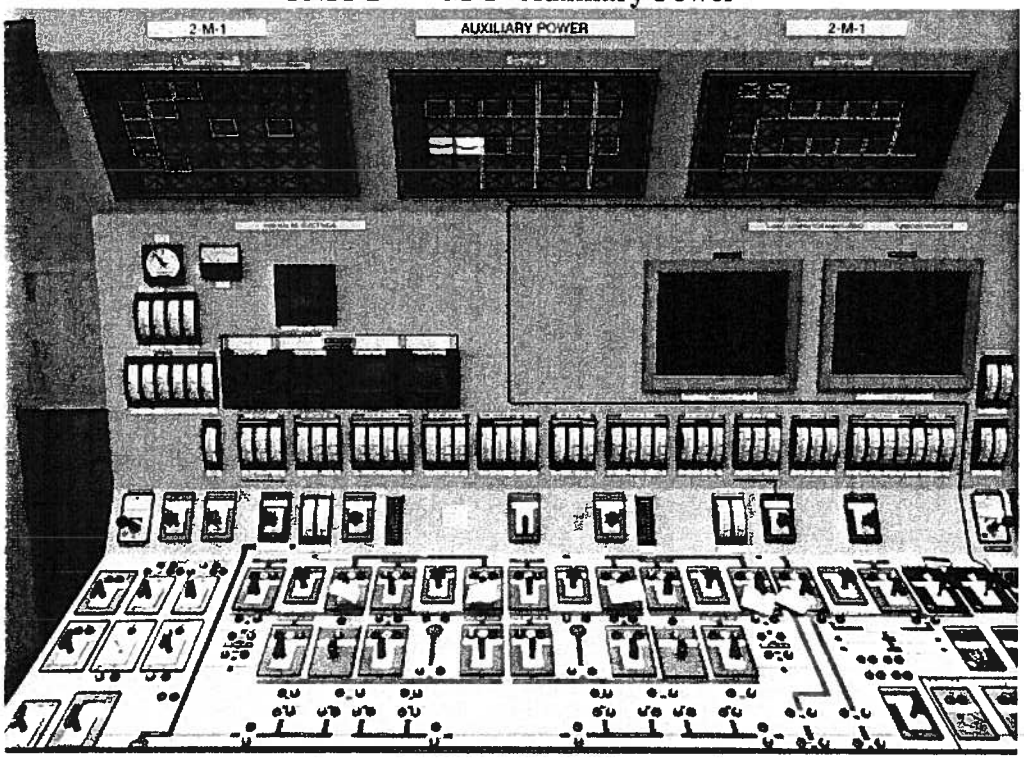
SP	Special Programs
SQN	Sequoyah Nuclear Plant
SR	Surveillance Requirements, also Service Report
SRO	Senior Reactor Operator
STA	Shift Technical Advisor
TNA	Training Needs Analysis
TPBARs	Tritium Producing Burnable Absorber Rods
TPE	Training Performance Evaluation
TRM	Technical Requirements Manual
TSM	Technical Specification Monitor
TVA	Tennessee Valley Authority
UPS	Uninterruptible Power Supply
WBN	Watts Bar Nuclear Plant
WINCISE	Westinghouse In-Core Information Surveillance & Engineering

ATTACHMENT 5 – Unit Comparison Control Room Photos

UNIT 1 M-1 Auxiliary Power



UNIT 2 M-1 Auxiliary Power



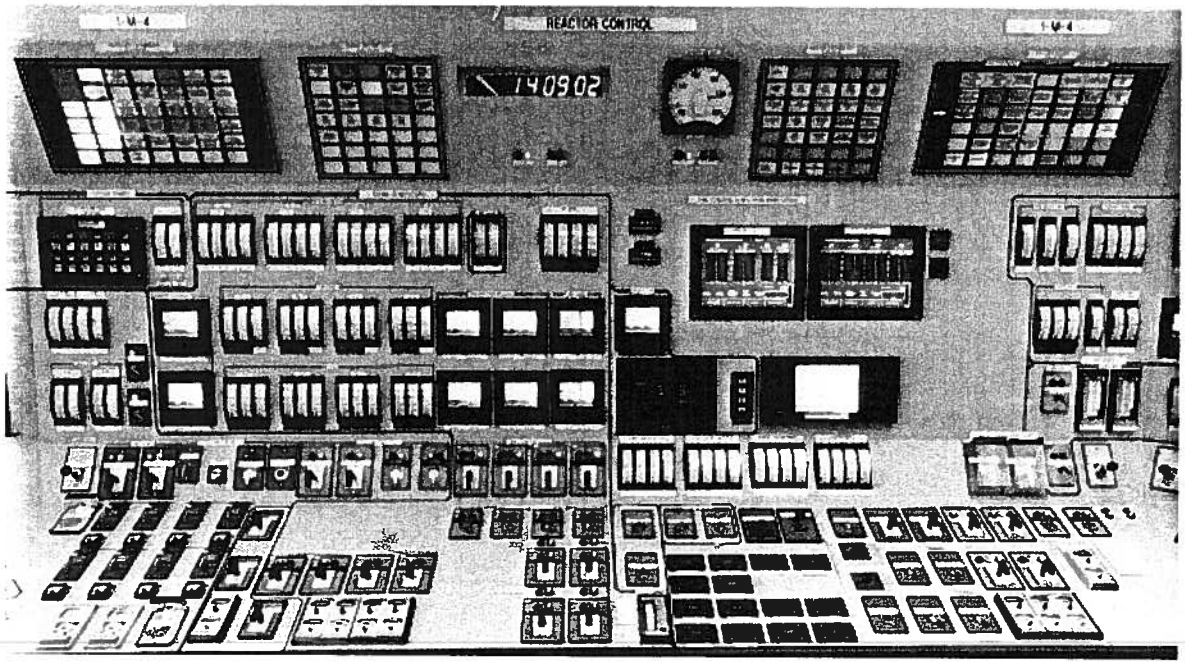
UNIT 1 M-2 Turbine Generator Control

UNIT 2 M-2 Turbine Generator Control

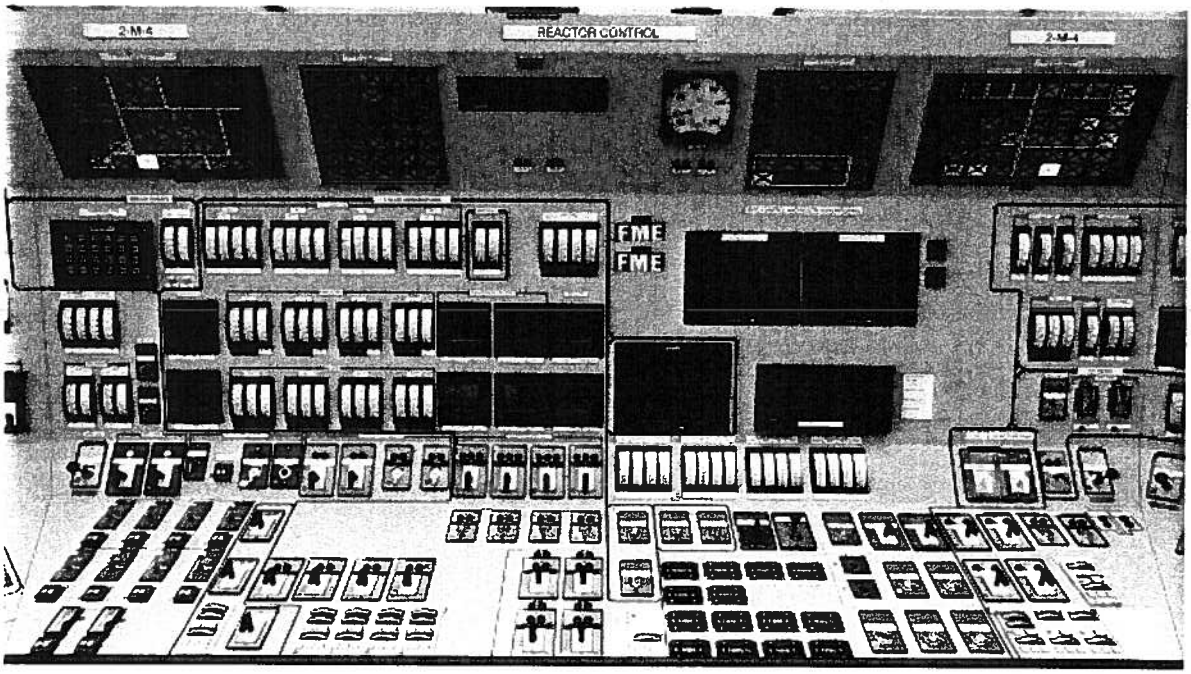
UNIT 1 M-3 Feedwater & Condensate

UNIT 2 M-3 Feedwater & Condensate

UNIT 1 M-4 Reactor Control

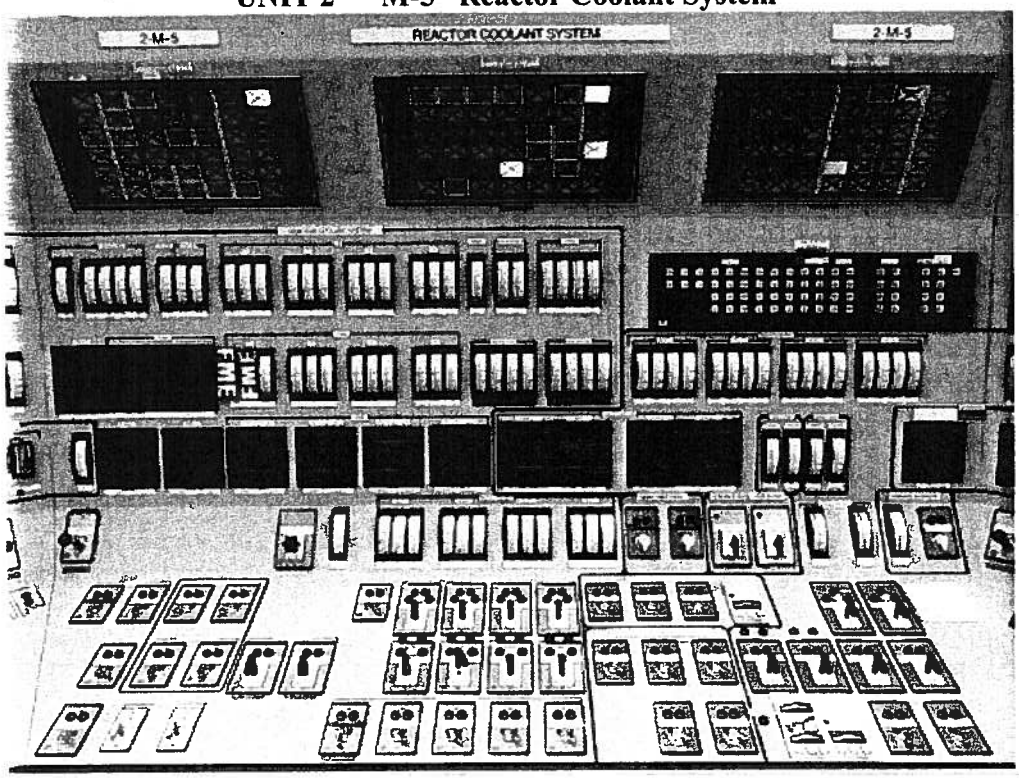


UNIT 2 M-4 Reactor Control

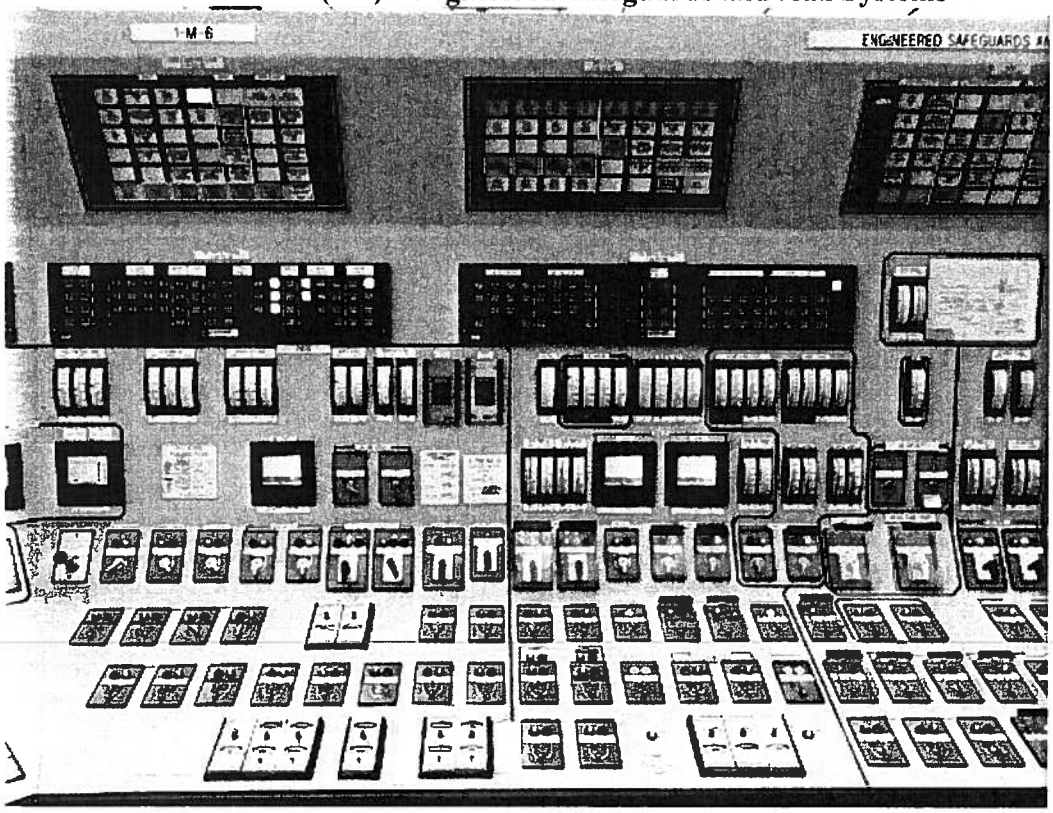


UNIT 1 M-5 Reactor Coolant System

UNIT 2 M-5 Reactor Coolant System

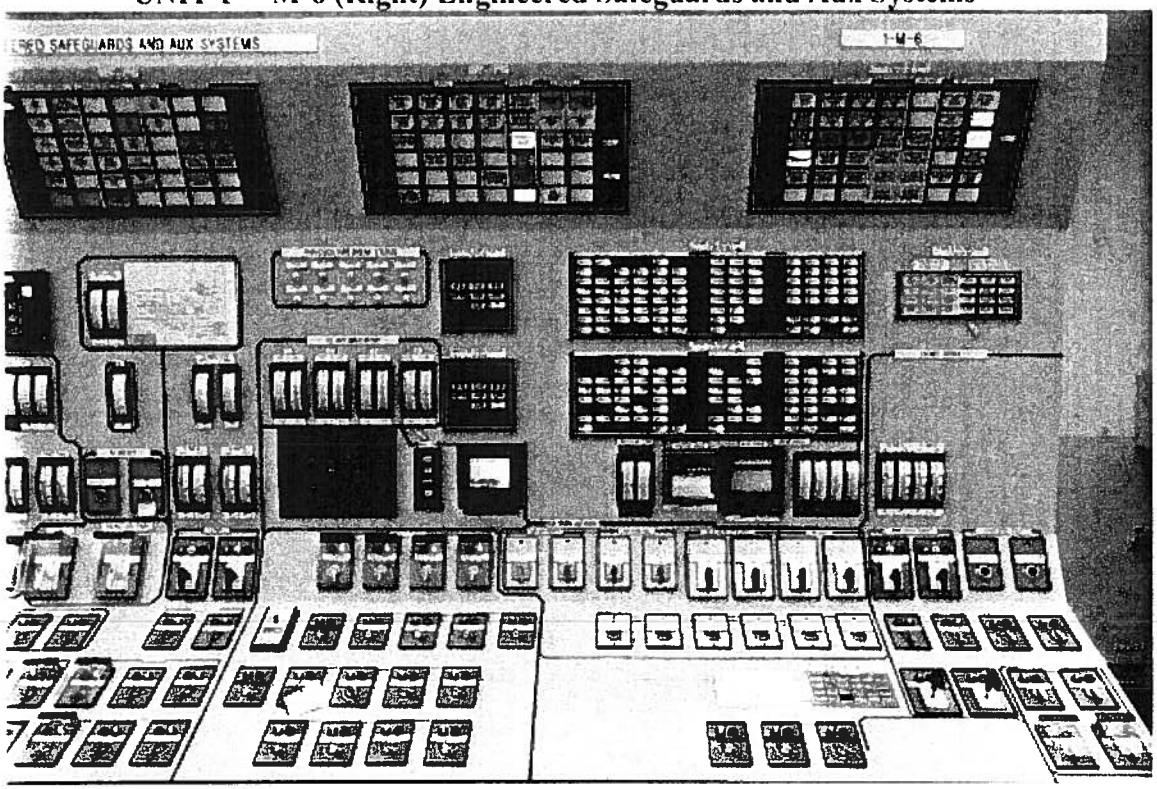


UNIT 1 M-6 (left) Engineered Safeguards and Aux Systems



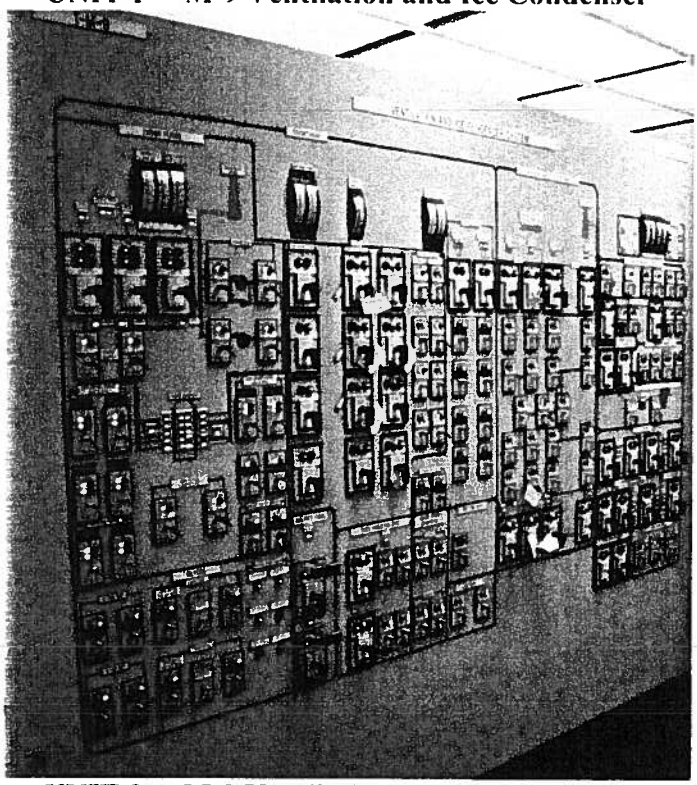
UNIT 2 M-6 (left) Engineered Safeguards and Aux Systems

UNIT 1 M-6 (Right) Engineered Safeguards and Aux Systems



UNIT 2 M-6 (Right) Engineered Safeguards and Aux Systems

UNIT 1 M-9 Ventilation and Ice Condenser



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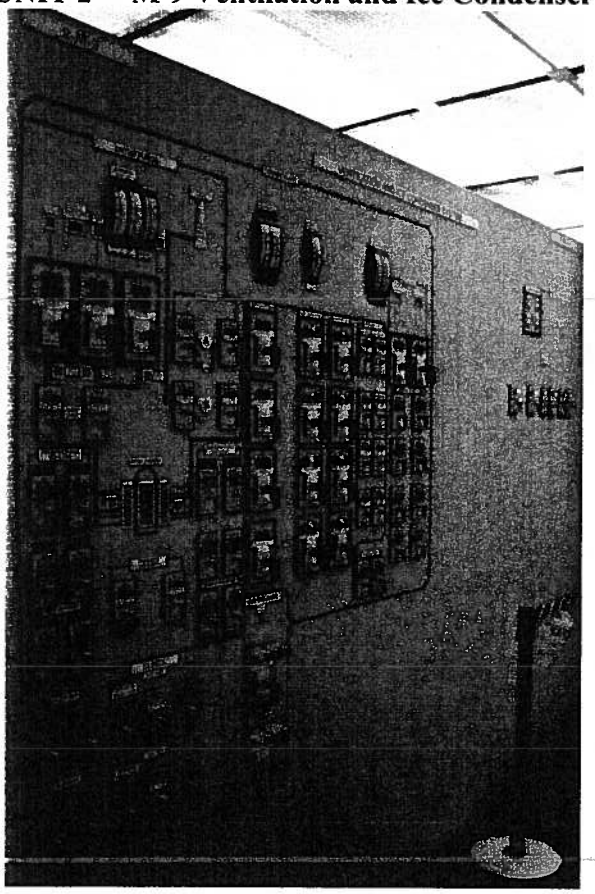
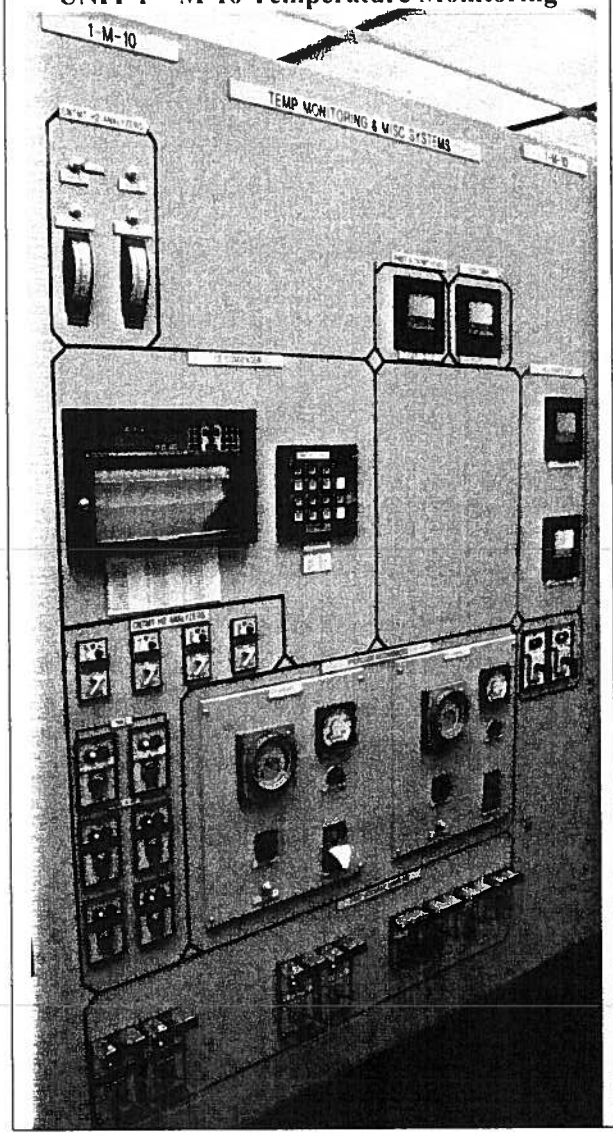
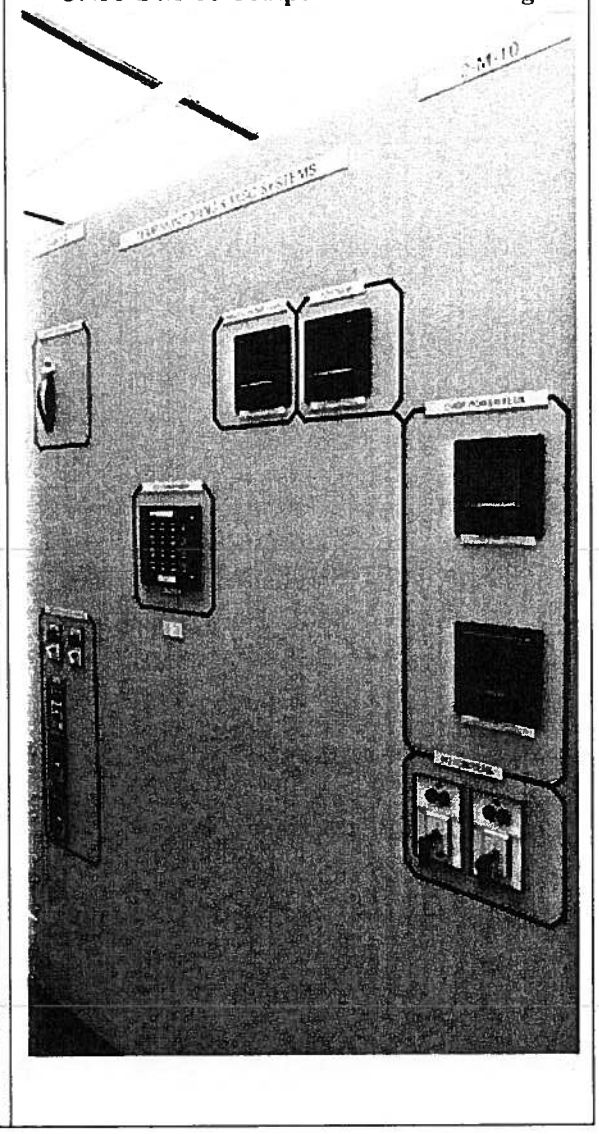


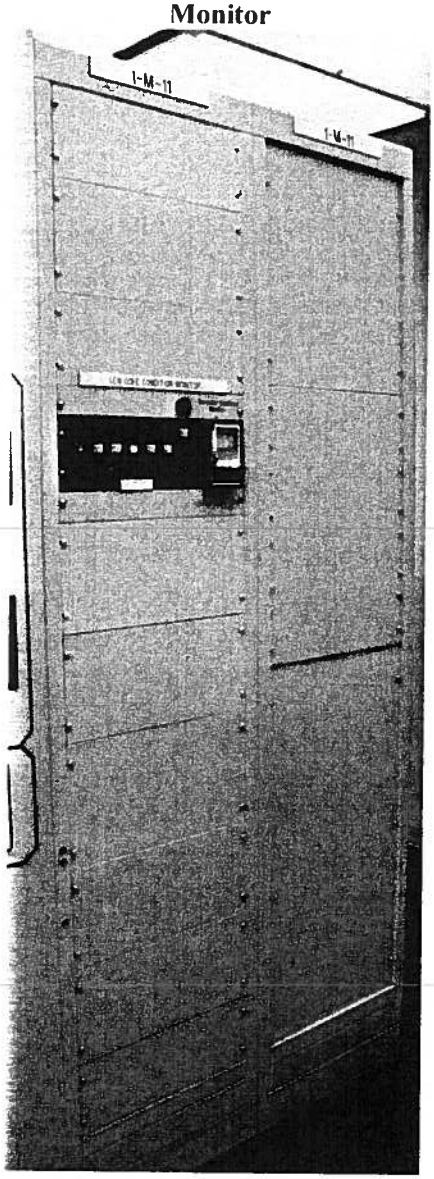
UNIT 1 M-10 Temperature Monitoring



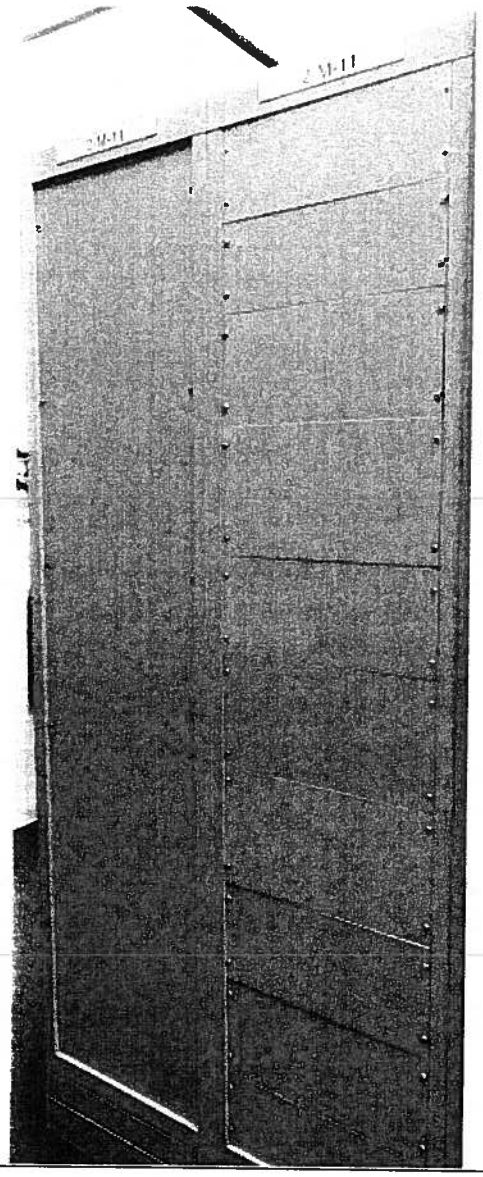
UNIT 2 M-10 Temperature Monitoring

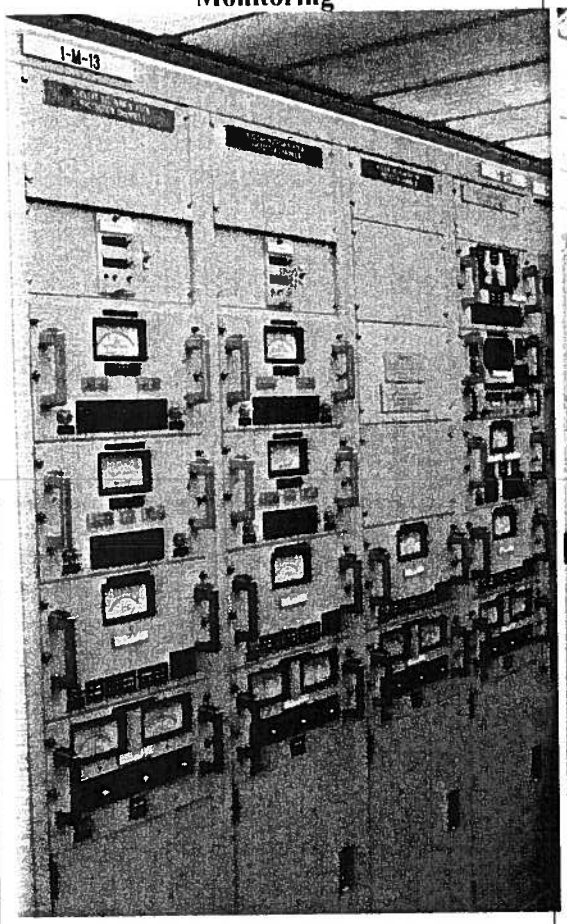
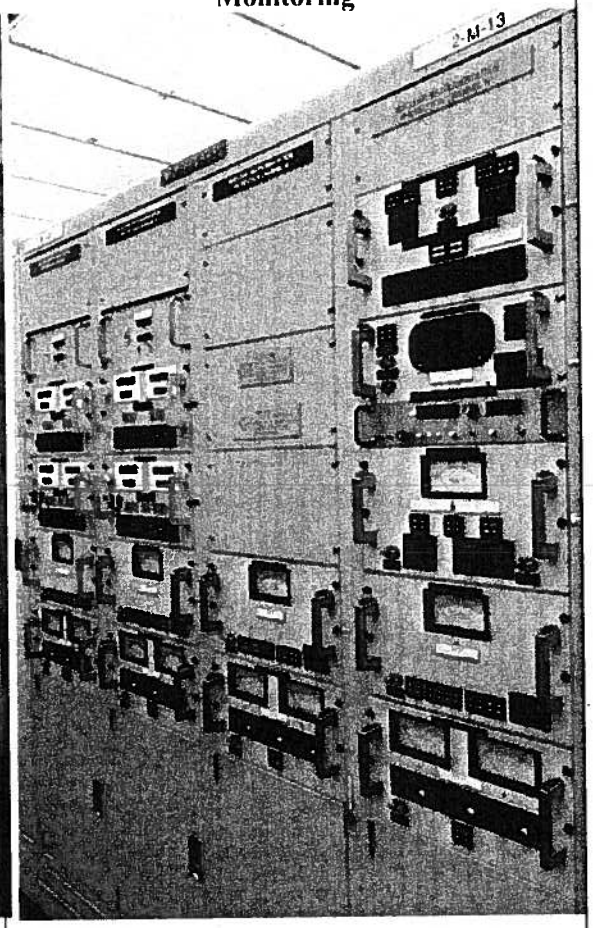


UNIT 1 M-11 Generator Core Condition Monitor

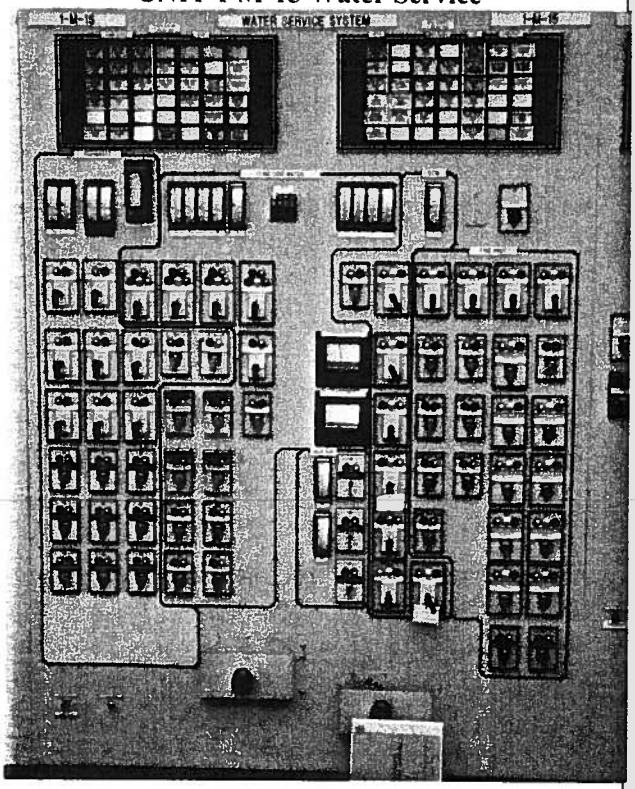


UNIT 2 M-11 (Spare)

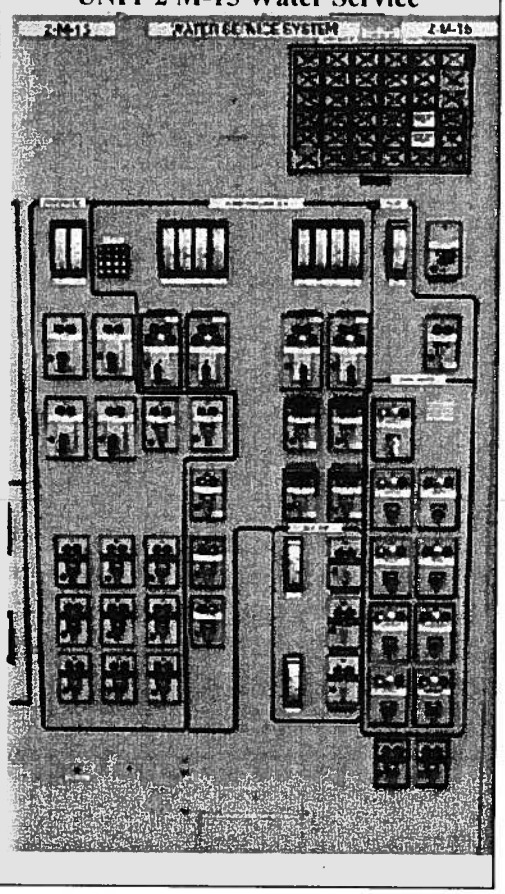


UNIT 1 M-13 Excore Neutron Monitoring	UNIT 2 M-13 Excore Neutron Monitoring
	

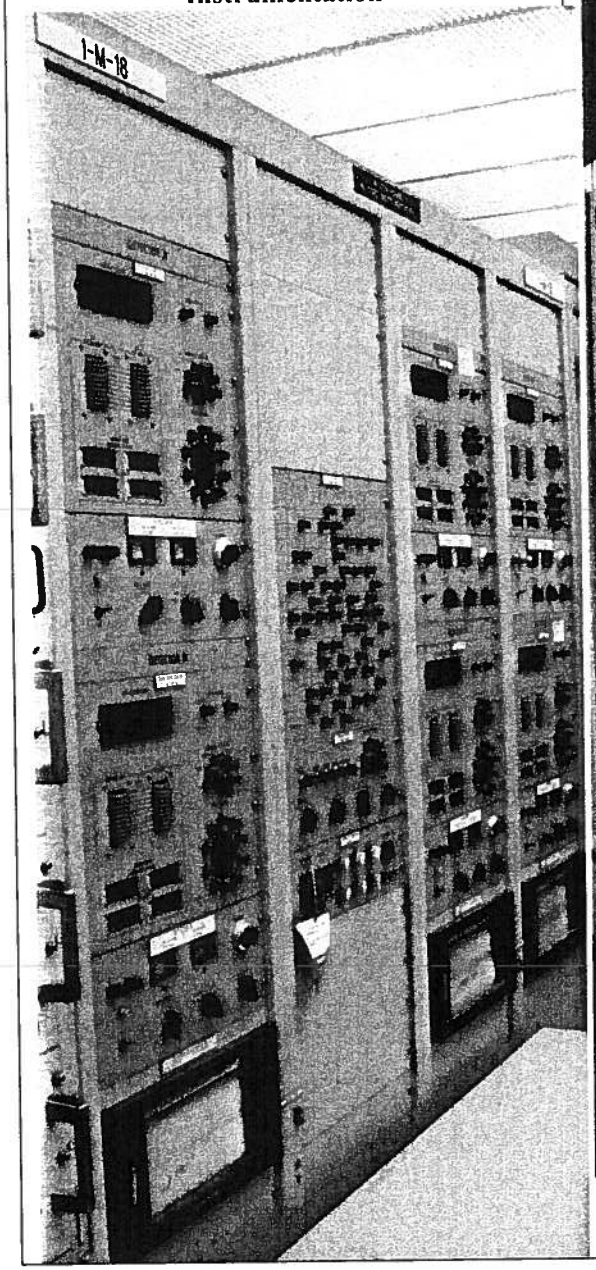
UNIT 1 M-15 Water Service



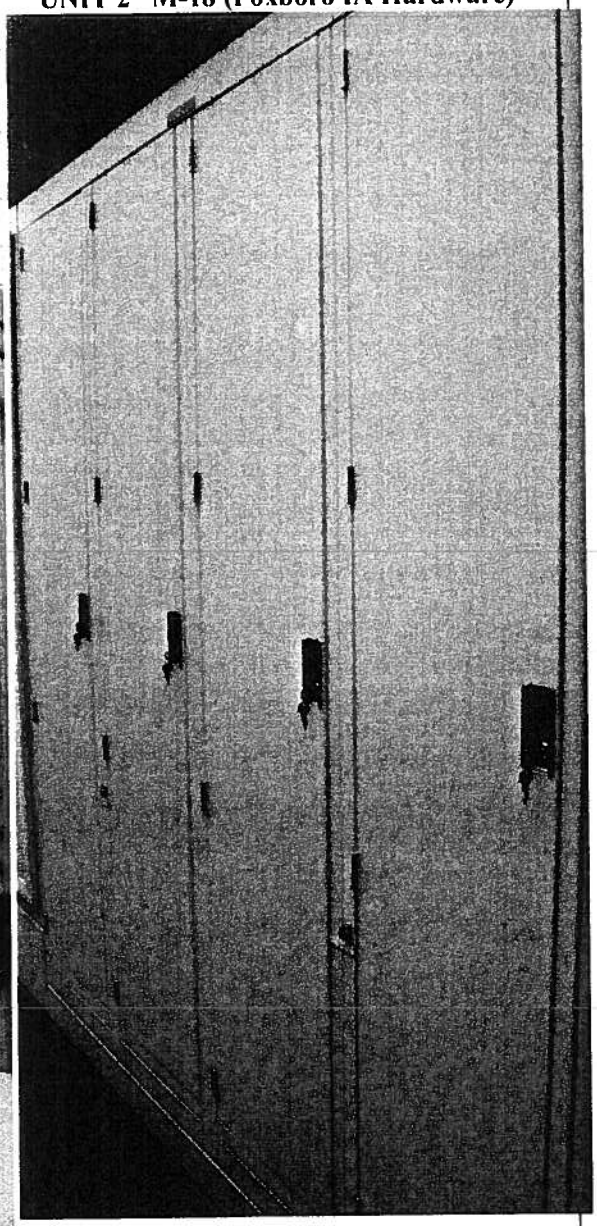
UNIT 2 M-15 Water Service



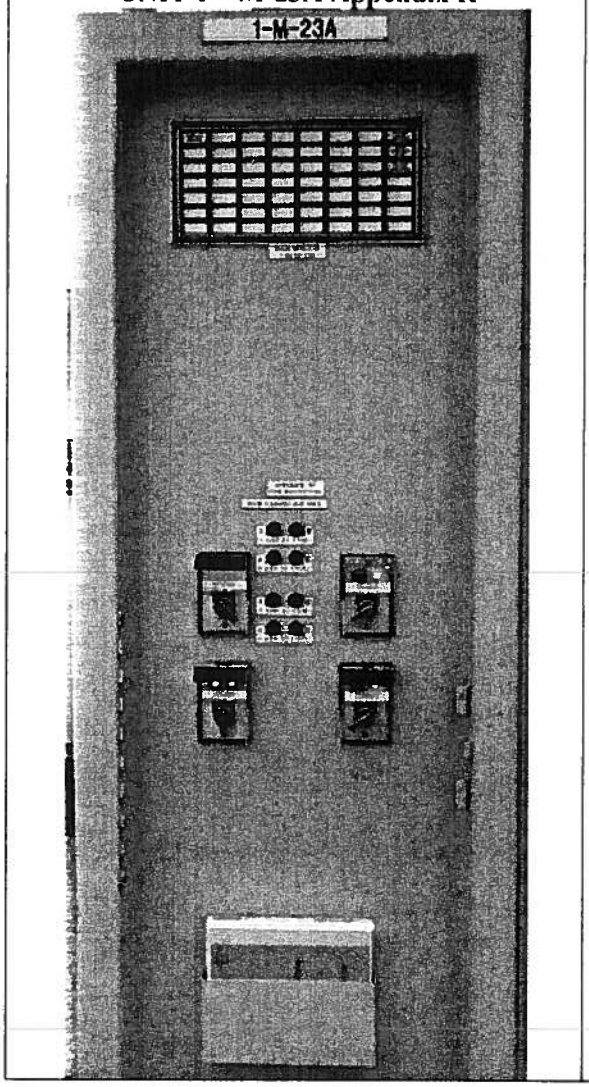
UNIT 1 M-18 Westinghouse In-Core Instrumentation



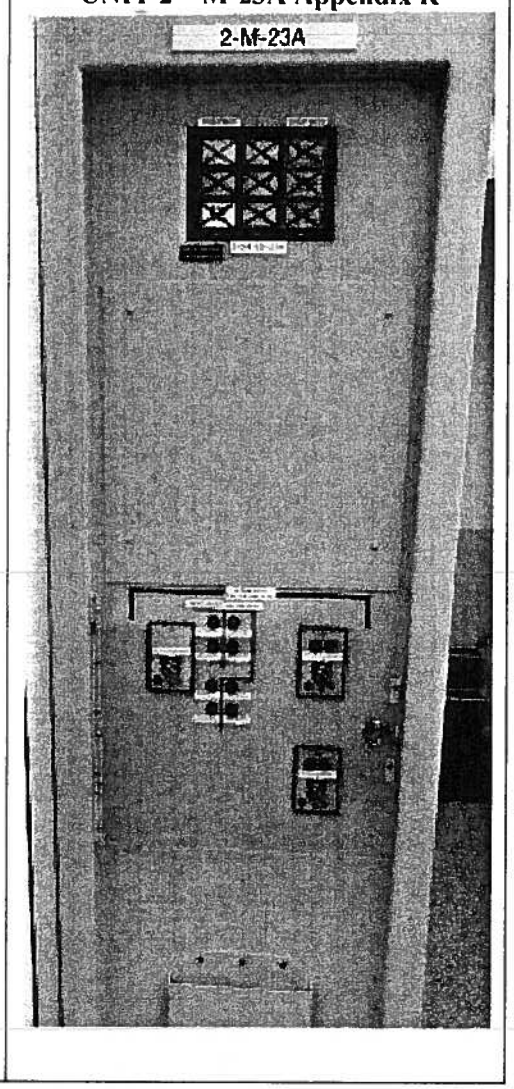
UNIT 2 M-18 (Foxboro IA Hardware)



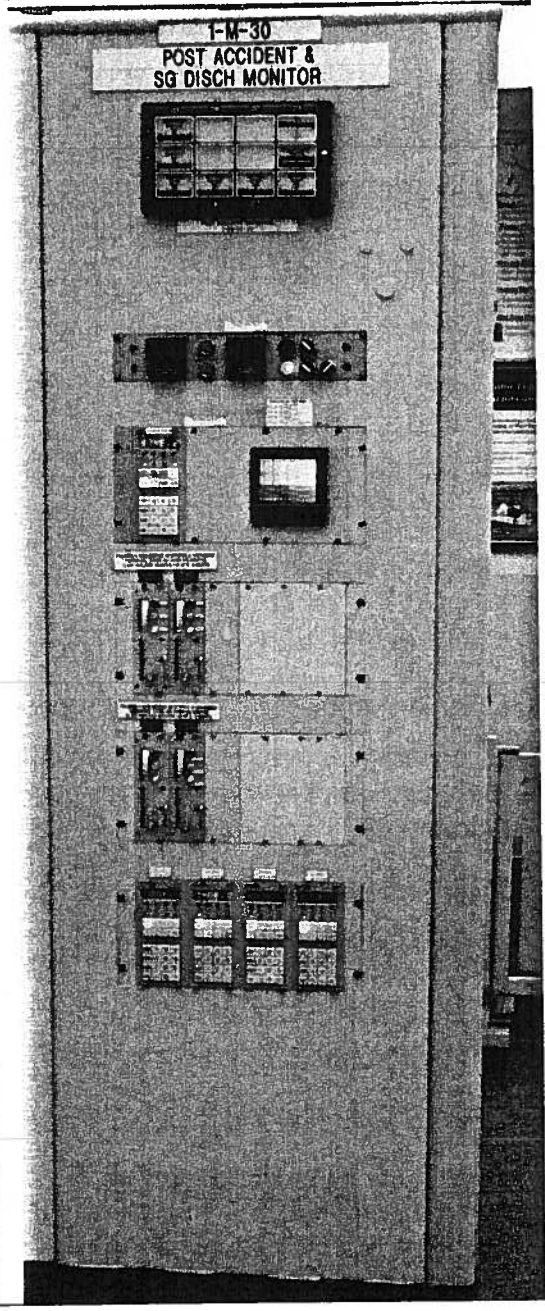
UNIT 1 M-23A Appendix R



UNIT 2 M-23A Appendix R



UNIT 1 M-30 Post Accident & SG Monitor



UNIT 2 M-30 Post Accident & SG Monitor

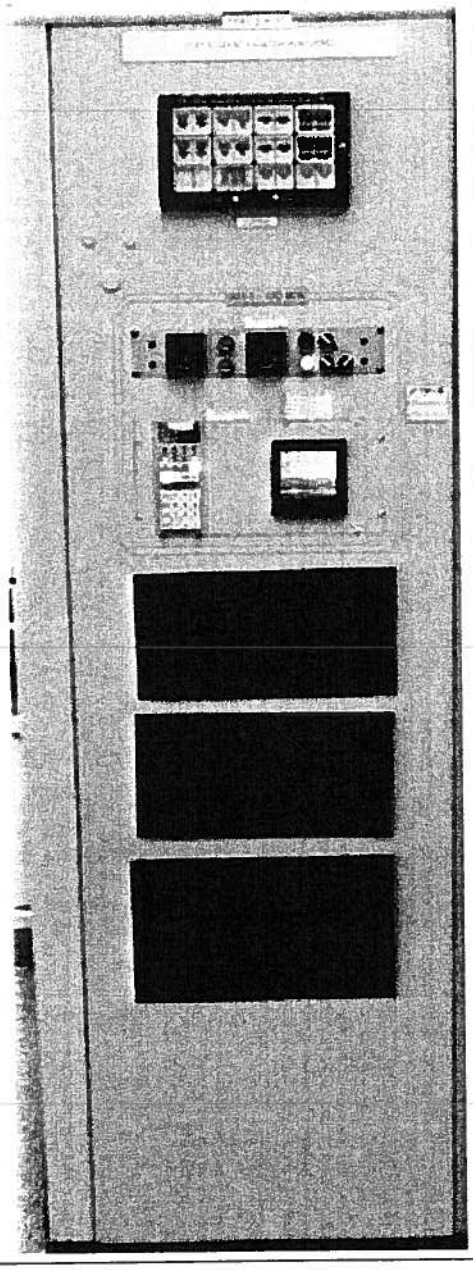


FIGURE 1 – Integrated Timeline

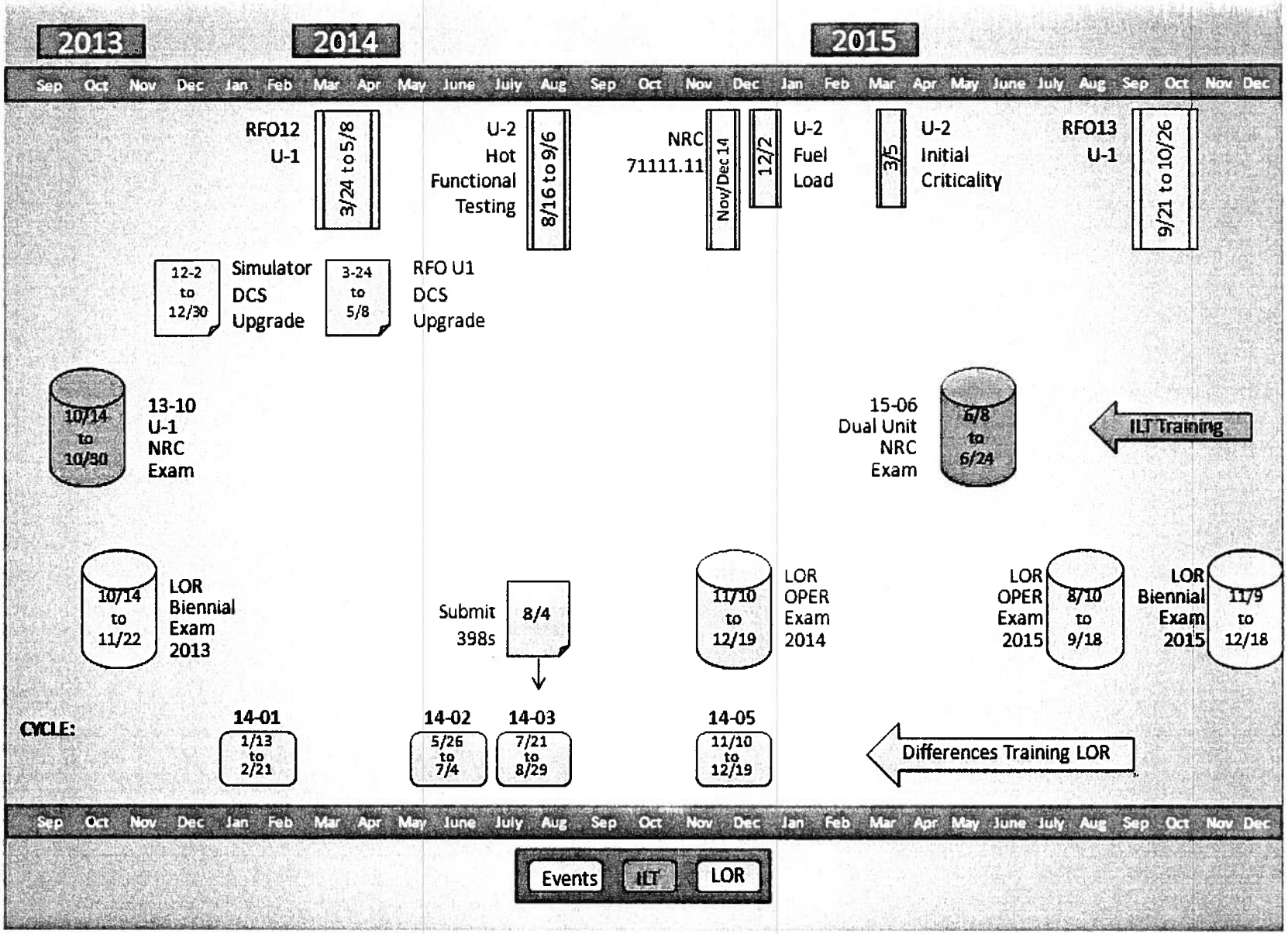
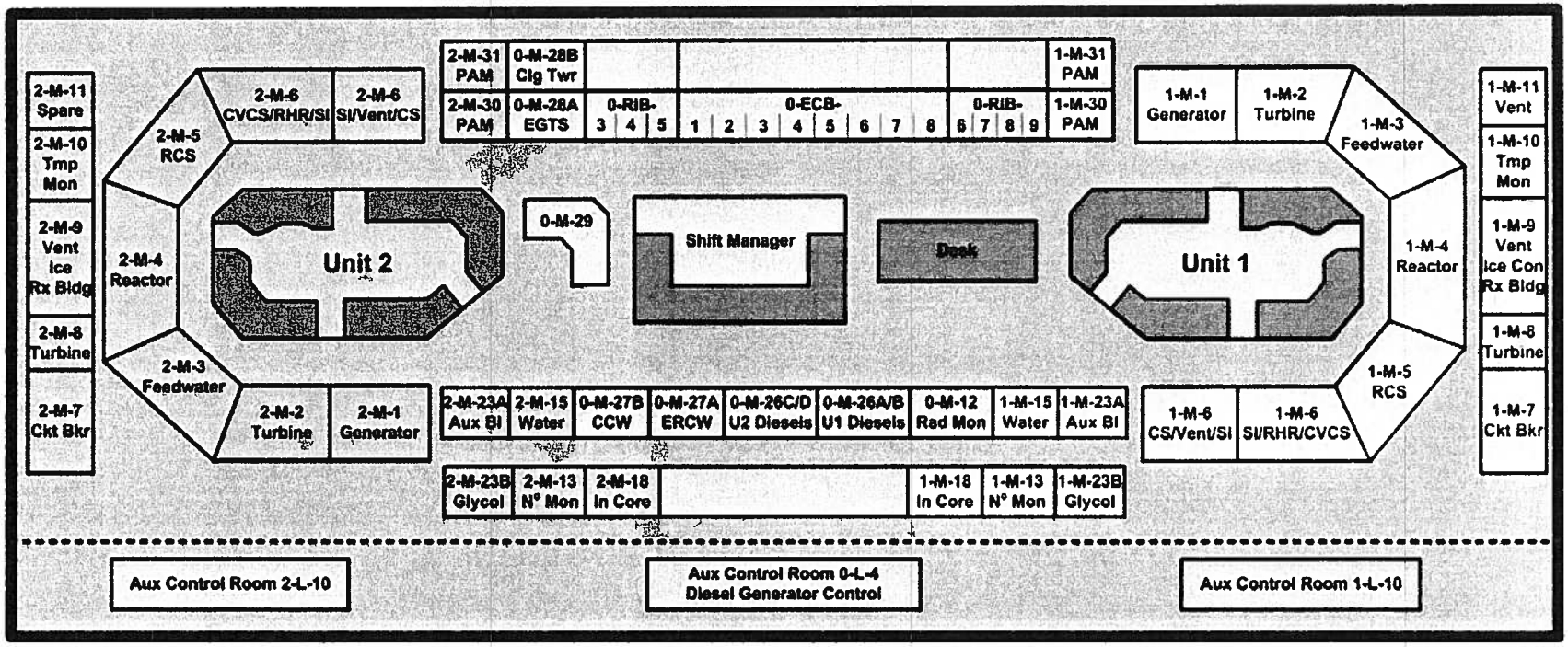


FIGURE 2 – Control Room Layout



Enclosure 2

Watts Bar Unit 1 and Simulator Differences

Watts Bar Nuclear Plant Simulator
Physical Differences List

1. Recorder LR-77-134 is a different model than the plant recorder due to unavailability. The recorder installed in the simulator is similar in form, function and physical appearance and displays the same information. See Simulator Initial Certification Exception Report ER-8 for more detail.

2. Panel M-11 houses the Generator Core Condition Monitor. Due to floor space limitations only the left half of this panel is physically simulated. The right half of the panel houses no instrumentation so its exclusion causes no adverse affect on training. See Simulator Initial Certification Exception Report ER-5.

3. There is no audio or video equipment installed in the reference plant. The Simulator has cameras and microphones installed to provide post training feedback on operator performance and communication skills. This equipment is located atop the panels or in the ceiling presenting no obtrusion to operator vision. See Simulator Initial Certification Exception Report ER-6.

4. Local control panels L-11A and L-11B are not included in the physical simulation. The controllers housed on these panels, LIC-3-148, 150, 164, 171, are installed on the side of panel L-10. Operation of these controllers in the reference plant is from local panels located in the field adjacent to each pump. In order to enhance simulation of these remote operations the controllers were added to the scope and located on this end panel. The layout on the simulated panel resembles their positions on the remote panel. To verify setpoints or control level with these instruments the operator will take identical actions to the reference plant controls, but must role play that he does not have both A and B train controls side by side. See Simulator Initial Certification Exception Report ER-7.

5. The MOV shunt trip switches used for fire protection (0-HS-13-204, 205) are located in a different position on the simulator than in the plant. These switches provide a shunt trip for various Unit 2 valves in the case of a fire emergency. The switches are located on the Unit 2 portion of panel M-27B in the reference plant. They have been relocated to a similar position on the Unit 1 portion of this panel for the training simulation. Since the location is in the same general area and requires the operator to walk to the same general board location as in the plant, this difference is considered to have no impact on training. See Simulator Initial Certification Exception Report ER-9.

6. Annunciator panel 1-XA-55-30 is a different model in the simulator than the plant. The simulator model has white test and acknowledge pushbuttons located slightly closer together than the plant. See Simulator Initial Certification Exception Report ER-10.

7. The Simulator does not have the standby lighting installed as in the plant. During operator training scenarios the lighting is normally left energized, PR-233 was used to evaluate the training impact of this difference, no negative training occurs. See Simulator Initial Certification Exception Report ER-12.

8. A number of tag and labeling differences which are considered to have no impact on training. These include such items as letter spacing, font, letter thickness, exact placement, etc. All of these differences are considered minor and present no false information to the operator.

Watts Bar Nuclear Plant Simulator
Physical Differences List

9. A number of recorder scales have minor differences in major and minor division height and width. These scales have the same range and number of divisions as the control room scales, thus displaying the same information and presenting no impact on training. A complete listing of the subject scales is available.

10. Electrical Control Board panel ECB-1 is not included in the scope of simulation. This panel houses the containment closed circuit television system and is not within the training scope of the simulator.

11. Portion of panel ECB-5 is not included in the scope of simulation. The Roane line was omitted due to lack of space.

12. ECB-5 and ECB-6 house six meters for displaying A, B, and C phase voltage for Bus 1 Section 1 and Bus 2 Section 3. Identical replacement meters could not be purchased. The simulator replacement meters do not have voltage buttons (which are not used by Operations personnel in the plant) but are the same size and shape with similar display digits. See Exception Report 15.

13. The right portion of ECB-7 and ECB-8 are not included in the scope of simulation. These panels represent approximately five feet of blank panel which was omitted from the simulation due to space limitations.

14. Panel ECB-4 is not included in the scope of simulation. At the time of simulator procurement this panel was a blank section approximately four feet in length. Due to space limitations this empty section of panel was deleted from the physical simulation. In January of 1993 plant modification DCN-19899 was implemented to relocate various alarms from a panel located on the operators desk to two annunciator boxes to be located on ECB-3 and ECB-4 with the annunciator acknowledge switch located on ECB-4. In the simulator the annunciator boxes have been located at ECB-2 and ECB-3 with the acknowledge switch at a vacant position between ECB-2 and ECB-3 due to the absence of panel ECB-4. This installation was evaluated as producing no negative training since the equipment is installed adjacent to its MCR location and the operator will perform identical actions as in the reference plant.

15. The Unit 2 portions of panels M-12, 26, 27A, and 27B are not included in the scope of the physical simulation. The reference plant for the Watts Bar Training Simulator is Unit 1, all plant equipment necessary for the operation and surveillance of Unit 1, including common equipment, is available in the simulation. The simulation scope of Unit 2 equipment in common systems is included to the degree necessary to support Unit 1 operation.

16. Eberline LCD display has characters shifted to the right. The information from the Eberline is readable and redundant display is provided on the ICS. See Exception Report ER-17.

17. Various incandescent lamps in the Simulator have been replaced by LED lamps that are slightly different from the replacement LEDs used the plant in order to be compatible with the simulator electronics. The only visible difference to the operator may be a slight change in intensity and/or color tone, however, intensity and/or color tone serves no identifying function on the MCB panels. No negative impact or adverse training will occur as a result of this change. See Exception Report ER-21.

18. Operator training 2-way radios are not the same model as used in the plant while their operation is the same. These simulator radios give an encrypted transmission to prevent interception of the signal during exams. Note that these radios' microphones are not as

sensitive as the plant models and must be spoken to directly in front of a user's mouth. The Simulator Review Board approved this difference; see 07-20-2012 SRB meeting minutes.

19. The stand-alone copier machine located in the main entrance hallway of the simulator is not in the same location as in the plant MCR. In the plant the copier is located near panel 1-M-31. In the simulator it is located behind panels 1-M-2 & 1-M-3.

20. The DCS configuration at the plant is different than the simulator. Specific differences include, but are not limited to different system monitoring applications and the absence of CPs from the block detail display in Foxselect.

21. Synchroscope meters on 1-M-1, 0-M-26, & ECB-7 do not match the plant. They fit the same form and function, but there are cosmetic differences.

Enclosure 2

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Watts Bar Nuclear Plant Simulator
Physical Differences List

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21. Synchroscope meters on 1-M-1, 0-M-26, & ECB-7 do not match the plant. They fit the same form and function, but there are cosmetic differences.

Region II Operator Licensing reviewed the Unit 1 and Unit 2 differences and determined that the differences are not so significant that they would affect the operator's ability to operate each unit safely and competently. The final determination of whether the operators who are currently licensed on Unit 1 meet the written and operating test waiver requirements for Unit 2, in accordance with 10CFR55.47 and NUREG 1021, Revision 9, Supplement 1, ES-204, Section D.2, is contingent upon the following items.

- The operators currently licensed on Unit 1, who will be requesting Watts Bar Unit 2 (dual) licenses, have sufficient "operating experience at a comparable facility" as required by 10 CFR 55.47 (a)(1), that is, on Watts Bar Unit 1, and that this operating experience has occurred "within two years prior to the date of application."

- The facility "differences training," including the comprehensive "differences" written examination, JPM operating test, and simulator modifications, support the finding required by 10 CFR 55.47 (a)(3) that each applicant "has learned the operating procedures for and is qualified to operate competently and safely" Watts Bar Unit 2. This includes startup training using Unit 2 initial criticality procedures on the plant reference simulator using a simulator model that reflects Unit 2 core design.

- All of the applicants issued Watts Bar Unit 2 licenses per 10 CFR 55.33 (a)(2), based on waivers of the requisite written examinations and operating tests, satisfactorily complete the facility licensee's Watts Bar Unit 2 "differences" Training and Certification Program and pass the program's comprehensive "differences" written examination and JPM operating test.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice, " a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. (The Public Electronic Reading Room).

Thank you for your cooperation in this matter. If you have any questions regarding this letter or planned inspections please contact me at (404) 997- 4550, (Internet E-mail: Malcolm.Widmann@nrc.gov).

Sincerely,

/RA/

Malcolm T. Widmann, Chief
Operations Branch 1
Division of Reactor Safety

Docket No(s).: 50-390, 50-391
License No(s).: NPF-90, CPPR-92

Enclosure: As stated

cc: See page 3

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Enclosure: As stated

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SIGNATURE	B. Caballero	nc4t					
NAME	CABALLERO	HAAG	WIDMANN				
DATE	11/13/2013	11/14/2013	11/14/2013	11/ /2013	11/ /2013	11/ /2013	11/ /2013
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

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