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SIMULATION FACILITY EVALUATION PROGRAM

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ABSTRACT

As a result of Section 306 of the Nuclear Waste Policy Act of 1982, the NRC developed a requirement for nuclear power plants licensed by the NRC to have a simulation facility appropriate for conducting operator licensing tests. Such simulation facilities would be required to be available by March, 1991. These requirements are included in the revised 10 CFR 55 effective May 1987. Other guidance is located in Reg. Guide 1.149, NUREG-1258 and ANS 3.5, 1985.

The evaluation program requires that a plant-referenced simulator be certified to the NRC as meeting the guidance of ANS 3.5, 1985, or that a plan be submitted for a simulation facility using alternative methods to meet the requirements of conducting an operating test.

In the case of certifications to ANS 3.5, 1985 the NRC may review these certifications and, if necessary, conduct on site inspections of the simulation facility. Plans for simulation facilities which are not in accordance with ANS 3.5 must be approved by the NRC. Once a facility has a certified or approved simulation facility and an accredited requalification program based on a systems approach to training, they would no longer be required to submit details of an operator licensing applicant's training, experience and education.

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REQUIREMENTS AND GUIDANCE

The requirement to have a simulation facility is found in 10 CFR 55.45(b). This regulation states that the operating test will include two portions, a plant walkthrough and an evaluation utilizing a simulation facility. The simulation facility may be an "approved" simulation facility or a "certified" plant-referenced simulator.

Guidance for compliance with the above requirement may be found in Regulatory Guide 1.149, ANSI/ANS-3.5-1985, NUREG-1258, and NUREG-1262. Regulatory Guide 1.149 describes one method acceptable to the NRC for meeting 10 CFR 55.45. That method is to comply with ANSI/ANS-3.5-1985 subject to the conditions given in the Regulatory Guide. ANSI/ANS-3.5-1985, hereafter called the Standard, provides the minimum requirements for a plant-referenced simulator. These requirements will also be applicable to "approved" simulation facilities to a large extent. NUREG-1258 describes the NRC's procedure for the review of "certified" simulators. Like the Standard, this procedure will be applied to "approved" simulation facilities to the extent possible. NUREG-1262 presents questions and answers from public meetings regarding the implementation of 10 CFR 55. Questions 155 through 237 deal specifically with simulation facilities.

OPTIONS

As stated above, the simulation facility may be "certified" or "approved." Certification means submittal of NRC Form 474 on which an authorized representative of the facility licensee attests that the requirements of 10 CFR 55.45 are met through the use of a plant-referenced simulator which meets the criteria of the Standard as endorsed by Regulatory Guide 1.149. Form 474 is due by March 26, 1991. It is worth noting that this Office of Management and Budget (OMB) approved form includes the following statements just above the signature block: "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." Approval means that, after the facility licensee submitted a plan by May 26, 1988, and subsequently submits an application by November 26, 1990, for use of the simulation facility in accordance with that plan, the Commission finds the simulation facility acceptable for use in the conduct of operating tests. This option is not available to those who did not submit a plan by May 26, 1988 unless they seek an exemption. Note that certification does not require NRC review or sanction prior to using the simulator for operating tests but approval does. After May 26, 1991, operating tests will only be conducted on a certified or an approved simulation facility.

BENEFITS

The most tangible benefit of certifying or receiving approval of a simulation facility comes in conjunction with the facility licensee's response to Generic Letter 87-07. If the facility licensee has a certified or approved simulation facility and has submitted a letter, in compliance with Generic Letter 87-07, indicating that it has an INPO Accredited Training Program and that its requalification program is based upon a Systems Approach to Training, then those license candidates who have completed such a program may omit documenting the specifics of their training, education and experience on their applications. Less tangible but perhaps more important benefits are better training, a more realistic and discriminating examination process, and ultimately, improved operator performance.

DESCRIPTION OF THE PROGRAM

The status of the industry as of January 30, 1989 with respect to simulation facilities is shown on Table 1. Table 2 shows only those plants which have submitted certifications, plans for application for approval, or Generic Letter 87-07 submittals as of January 30, 1989. At the time of this writing only Maine Yankee, Vogtle 1, 2 and Wolf Creek had met both requirements needed to omit documenting specifics of training, education and experience on license applications. Also, only

one on-site review of a simulation facility had been conducted and that was at Maine Yankee.

Nearly all facility licensees have chosen the certification route. A number of facilities have already submitted certification packages. A review of these packages has indicated a need for additional guidance for certification submittals.

Certification

First, NRC Form 474 itself should be discussed. On Form 474 the facility certifies three things:

1. It is using a simulation facility consisting solely of a plant-referenced simulator that meets the requirements of 10 CFR 55.45.
2. This simulation facility meets the guidance contained in ANSI/ANS-3.5-1985, as endorsed by NRC Regulatory Guide 1.149 (exceptions may be taken to this item).
3. Documentation is available for NRC review in accordance with 10 CFR 55.45(b).

Along with the Form, the facility needs to submit performance test abstracts and a description of performance testing completed and scheduled.

What is the NRC's role in reviewing these certification submittals?

As previously stated, these submittals do not require NRC review and they are not approved by the NRC. It is emphasized here that by signing Form 474 the licensee certifies and accepts the responsibility for regulatory compliance. Actual reviews will be conducted as determined appropriate by the NRC Staff based on licensee performance.

Where reviews and inspections appear appropriate the first phase would be the desk-top audit or "off-site phase." For this phase the review would most likely be conducted by the simulation facility evaluation program administrator at NRC headquarters including consultation with a license examiner cognizant with the particular facility. The intent of this review would be to identify any major problems related to the conduct of operating tests. This will be done by reviewing examiner supplied Simulation Facility Reports and subjecting Form 474 and attachments to review against 10 CFR 55.45, Regulatory Guide 1.149 and the Standard.

The NRC Regional Office may be notified if major problems are identified. When numerous or complex major problems have been identified NRC Headquarters with concurrence from the Regional Office may determine that an on-site inspection is warranted. Otherwise the NRC Regional Office may simply follow-up on the identified problems in future operating tests. If the identified concerns are reinforced in these future tests then it may be determined that an on-site inspection is needed.

If an on-site inspection is to be conducted additional team members will be identified. Additional team members could include an Operations Specialist, a Human Factors Specialist, and an independent industry peer advisor. The licensee will be contacted as necessary to arrange scheduling. This inspection will be conducted essentially as described in NUREG-1258.

The key factor in determining whether an on-site review is necessary is examiner feedback. That is not to say that negative examiner feedback will automatically result in adverse actions taken against the utility. It is simply that since the regulation only addresses the ability of the simulation facility to be used for the conduct of operating tests, the only pragmatic trigger for an on-site review must come from the personnel conducting those tests. Decertification or other adverse consequences related to the simulation facility evaluation can only result from the outcome of an on-site review done by a multi-disciplinary review team. However, as stated on Form 474, the discovery, at any time, of any false statement or omission

in the certification submittal may be subject to civil and criminal sanctions.

The Maine Yankee review, as stated earlier, was the only on-site review conducted as of the writing of this report. This review was conducted during the week of August 29, 1988. The Maine Yankee review was not based on any particular problems identified at the facility but rather was performed more as a test of the certification process. Prior to arriving on-site the staff reviewed the materials which were submitted with Maine Yankee's certification, and evaluated information which Maine Yankee (MY) provided in response to staff questions as a result of their initial submission.

The review team consisted of a Team Leader, a Licensee, a Human Factors Specialist, a Peer Advisor and Operator, and an NRC observer. The review was conducted in accordance with the guidance in NUREG-1258. Four major areas were reviewed:

- A. Performance Testing
- B. Physical Fidelity
- C. Control Capabilities
- D. Configuration Management

The following describes the review of each area:

- A. Performance Testing

Eleven performance tests were run on the simulation facility. As discussed in NUREG-1258, these tests were chosen to represent a balance of normal, abnormal, and emergency events in the conduct of an operator licensing examination. Tests were selected to be operationally oriented to the greatest extent possible. Abnormal and emergency events were chosen to reflect actual operating experience at the plant wherever possible.

Documented events which have occurred at similar plants, and events with broad industry implications were also used, as applicable. The tests conducted at MY consisted of the following categories and events. The note in parenthesis after a test, where shown, identifies the source for the test, or the reason why it was chosen.

1. Normal Operating Events

- a) Main turbine latching and roll-up to 1800 RPM, phasing generator, synchronization to the grid, and matching reactor power.
- b) Power change using direct boron addition.

2. Abnormal Events

- a) Dropped Control Element Assembly (CEA) (Maine Yankee Unusual Occurrence Report No. 29-88).
- b) Turbine Valve Control Malfunction (Maine Yankee LER No. 85-19).
- c) Heater Drain Pump Trip (Maine Yankee LER No. 88-001).
- d) Excess Flow Check Valve Closure (Maine Yankee LER No. 86-003).
- e) Reactor Coolant Pump Trip (Maine Yankee Start-Up Test Data)
- f) Loss of Control Air (Shearon Harris LER No. 87-041).

3. Emergency Events

- a) Steam Generator Tube Rupture (North Anna LER No. 87-017).
- b) Loss of Off-Site Power with Natural Circulation (Maine Yankee LER No. 88-006).
- c) A test based on a natural circulation cooldown with upper head voids event was performed to evaluate the limitations of the simulation facility to fully model an event resulting in the formation of a head bubble. (St. Lucie, June 11, 1980 event resulting in multi-plant action MPA-B-66).

B. Physical Fidelity Evaluation

The segment of the inspection concerned with physical fidelity was performed in four parts: 1) a general human factors assessment of the simulation facility in accordance with the guidance given in ANSI/ANS 3.5, 1985 and in NUREG-1258; 2) a review and assessment of those differences between the plant and the simulation facility which had been identified by the facility licensee in its certification; 3) a review of a representative sample of simulation facility control board components to determine the degree of fidelity to the corresponding control room components; and 4) interviews with MY operators for the purpose of understanding how their concerns for physical and functional fidelity problems were dealt with by the facility licensee.

C. Control Capabilities

The capability of the simulation facility to freeze the simulation, and to alert the instructor when the simulation

progresses outside the known modeling limits, was verified to function as required.

D. Configuration Management

This phase of the evaluation consisted of a review of the facility licensee's configuration management system, with a spot check of the status of specific items. In addition, items identified in examiners' simulation facility reports were verified to have been included in the system. Facility documents were reviewed to verify that changes in the plant, or discrepancies identified in the simulation facility, were assessed and dispositioned within the required time as specified in ANSI/ANS 3.5, 1985, as endorsed by Regulatory Guide 1.149.

Maine Yankee On-Site Review Summary

The Maine Yankee simulation facility was found to be acceptable for use in the conduct of operator licensing examinations, and to meet the requirements for certification set forth in 10 CFR 55.45(b) of the Commission's regulations. Justification for exceptions to ANSI/ANS 3.5, 1985 were found to be acceptable.

As a result of the physical fidelity review, one item was found discrepant. Additionally, this item was shown in the facility licensee's tracking system as a discrepancy that had been resolved and closed. As a result of this finding, the facility licensee has reopened this item in its configuration management system.

A change to the RCP heat-up rate had been in an open status in the facility licensee's configuration management system for a longer period of time than permitted by the Standard. It was determined that this open item had little or no impact on an examiner's ability to conduct a licensing examination. This item was therefore resolved.

As a result of performance testing, it was determined that the simulation facility was unable to model a reactor head steam void during

natural circulation/low pressure conditions. This modeling limitation was determined to be neither a hindrance to the use of the applicable emergency operating procedures (EOPs), nor a constraint to the conduct of operator licensing examinations. Further, it was confirmed that there is a provision to alert the simulation facility operator/instructor when a testing or training scenario has progressed beyond the model limits of acceptability. Therefore, this item was resolved with no action by the facility licensee required. An analysis of the training value resulting from improving the simulation facility's ability to model this event, would be at the discretion of the facility licensee.

Regarding performance testing, the following information is provided as informal guidance resulting from the NRC's experience to date with the review of simulator certifications submitted under Part 55. This is provided for information only; it has no regulatory impact, and it is subject to change at any time based upon staff experience. It is meant to provide some helpful guidance to those facility licensees who are preparing to certify their plant-referenced simulators under Part 55, and who may have questions about the process.

- Before submitting an initial certification on NRC Form 474, complete (100%) performance testing in accordance with Section 5.4, "Simulator Testing," of ANSI/ANS 3.5, 1985 (the Standard) should be performed. This includes all tests that are required to meet the "Performance Criteria" of Section 4 of the Standard. This can be seen as equivalent to an Acceptance Test Procedure (ATP); and facility licensees may wish to utilize their ATP to satisfy this requirement. Please note that only submittal of the abstracts of performance tests are needed with Form 474 (see below). But the complete testing documentation should be available for NRC review.

- NRC Form 474 requires submittal of abstracts of performance tests. Submittal of the actual tests is not required. An abstract should be sufficient for an NRC reviewer to understand what was done, why and how it was done, what the results

were, and what corrections are planned if there were problems with the test. A performance test abstract should include the following:

1. Date test conducted
2. Name and description of test (including relationship to Section 3.1.2, "Plant Malfunctions," of the Standard, if applicable).
3. Available Options (e.g., range of rates or severity of which the simulation facility is capable)
4. Tested options (e.g., what was actually tested for certification)
5. Initial conditions (for each option tested)
6. Final conditions/duration of test (for each option tested)
7. Description of baseline data used to determine fidelity to the reference plant.
8. Deficiencies found as a result of the test, corrective action planned and dates by which corrections will be made.
9. Exceptions taken to ANSI/ANS 3.5 as a result of the test, with justification.

If the baseline data used was the judgement of a panel of experts then documentation of their review, sufficient for a third party to evaluate the adequacy of the test(s) and results, should be included. This documentation may include such items as the makeup and qualifications of the panel and any differing professional opinions as to the outcome of the test(s).

- The annual performance testing regimen should begin with the date of the initial certification, and should culminate in a report to the NRC which is due every four years, on the anniversary date of the certification. There is no requirement for an annual report.

- Annual performance testing should include:
 - Appendix B, "Simulator Operability Tests," of the Standard, in full, every year.

 - The malfunctions shown in Section 3.1.2, "Plant Malfunctions," of the Standard, at a rate of approximately 25% per year, such that all of the malfunctions that were certified are tested in their entirety over the course of the four year cycle. The certification submittal should show which malfunction tests apply to each of the identified scenarios/events in Section 3.1.2.

 - Those tests identified in Appendix A, under "A3. Simulator Tests," of the Standard which are applicable to the simulation facility, and which are not duplicative of tests already identified in Appendix B or in Section 3.1.2 are to be done at the rate of approximately 25% per year. A breakdown of performance testing should be as close to 25% per year as possible. (Figure that $25\% \pm 5\%$ is reasonable.) The facility licensee's judgement of the applicability of these tests should be made as part of the certification.

For example, the following testing should be considered:

- a. Section A.3.1, "Computer Real Time Test"

- b. Section A.3.2, "Steady State and Normal Operations Tests," to the extent that these tests do not duplicate those in Section B.1.1 (BWR) or B.2.1 (PWR), "Steady State Performance," and Section 5.4.2(2), "Simulator Operability Testing." Appendix B does not ask for testing simulator operation in accordance with plant procedures, whereas Appendix A (in Section A3.2(2)) does. Note that when testing simulator operation in accordance with plant procedures the NRC expects those procedures to be controlled copies. By this we mean up-to-date, unmarked copies of the same revision as actually being used in the control room. Allowances will be made for the fact that the Standard allows plant modifications to precede simulator modifications.
- c. Section A.3.3, "Transient Tests," should be performed for transients which have occurred in the reference plant and for which data is available (Appendix B does not require such testing). The Standard, in Section 5, "Simulator Design Control," requires the incorporation of actual plant data within certain time limits. Performance testing of actual plant transients should comply with these requirements. For those transients which have not occurred in the reference plant and which are characterized by the Standard as "accidents or major occurrences," you need not repeat such testing if you have already addressed it in testing performed to satisfy Appendix B.
- d. Section A.3.4, "Malfunction Tests." As the simulation facility may be capable of hundreds of malfunctions, not included in Section 3.1.2., "Plant

Malfunctions," prior to initial certification all certified malfunctions should be tested. It is not required to test them all as part of the annual performance testing. Rather, these tests should be performed in accordance with the schedule shown in Section 5.4, "Simulator Operability Tests," of the Standard.

Multiple Units

The question of multiple units is the last to be addressed with respect to certification. Regulatory Guide 1.149 discusses this issue and makes provision for a facility licensee to use a simulation facility for more than one plant. The guidance documentation for certification of multiple units is actually the same as for single units. That is, the facility licensee should include an analysis and summary of the differences between the simulation facility and each of the units for which it will be certified. Generally speaking, if a facility licensee meets the requirements for the operators to hold multiple licenses on the applicable units, then certification of one simulation facility for those units is anticipated to be acceptable.

Approval

Application for approval of a simulation facility which does not meet the guidance of the Standard is the final aspect of the simulation facility evaluation program to be discussed. As of May 26, 1988, the cutoff date for this option, five (5) facility licensees submitted plans for application for approval. Since that time one plant has decided to shut down permanently and another has decided to purchase a plant-referenced simulator. The NRC continues to work with the remaining three (3) plants. The NRC reviewed the plans for all five applicants and sent letters of response providing additional guidance. Some guidance was previously provided in NUREG-1262, specifically, in response to questions 176, 177 and 178. In short, guidance for approval is

similar to that for certification. A significant degree of fidelity is expected. Use of plant procedures is required. Finally, the evaluation and acceptance criteria are similar to those in ANSI/ANS-3.5-1985.

SUMMARY AND CONCLUSIONS

The Simulation Facility Evaluation Program is the NRC's program for the implementation of 10 CFR 55.45(b). Simulation facilities may be either certified by the facility licensee to meet the guidance of ANSI/ANS-3.5-1985 or approved by the NRC. For certification, while NRC review is not required, the Staff intends to perform a desk-top audits of selected submittals to identify major problems and to conduct on-site inspections when required based either on major problems identified in the desk top review or on fidelity problems identified in examiner feedback. Regarding approval of approaches different from ANSI/ANS-3.5-1985, the NRC continues to work on a case-by-case basis with those few utilities which submitted plans in accordance with 10 CFR 55.45(b)(2)(i).

The intent of the regulation requiring a certified or an approved simulation facility was to allow license candidates to be evaluated on their performance, as well as their knowledge, in a setting which was as realistic as possible. In addition to the obvious benefits gained by such an improvement in the examination process, the facility licensee will also be allowed to omit certain details of an operator license applicant's qualifications when the utility has a certified or approved simulation facility and an accredited training program including a requalification program based upon a systems approach to training.

REFERENCES

1. Code of Federal Regulations, Title 10 Part 55 (10 CFR 55), "Operator's Licenses"
2. Regulatory Guide 1.149, Nuclear Power Plant Simulation Facilities for Use in Operator License Examinations

3. NUREG-1258, Evaluation Procedure for Simulation Facilities Certified Under 10 CFR 55
4. ANSI/ANS-3.5-1985, Nuclear Power Plant Simulators for Use in Operator Training
5. NUREG-1262, Answers to Questions at Public Meetings Regarding Implementation of Title 10, Code of Federal Regulations Part 55 on Operators' Licenses
6. Generic Letter No. 87-07, Information Transmittal of Final Rule-making for Revisions to Operator Licensing - 10CFR55 and Conforming Amendments
7. Simulation Facility Inspection Report dated November 17, 1988, Docket No. 50-309, from P. M. Sears, Project Manager, Project Directorate I-3, Division of Reactor Projects I/II, Office of Nuclear Reactor Regulation to Mr. J. B. Randazza, President, Maine Yankee Atomic Power Company
8. Letter, K. E. Perkins, Jr., Chief Operator Licensing Branch, Division of Licensee Performance and Quality Evaluation, NRR to Mr. J. M. Black, Chairman, Utility Simulator Users Group, dated January 10, 1989.

TABLE 1 - SIMULATOR LIST - JANUARY 1989

UNIT	SIMULATOR STATUS	474 OR APPLICATION	GL 87-07 SUBMITTAL	DATE READY FOR TRAINING	SIMULATOR VENDOR	SIMULATOR LOCATION
AND-1	OP			1986	EAI	ON-SITE
AND-2	OP	474 - 12/7/87		1987	GOULD	ON-SITE
BEAVER VALLEY 1	OP			1984	W	ON-SITE
BEAVER VALLEY 2	IFB			TBD	TBD	TBD
BELLEFONTE 1, 2	OP			1982	SINGER	SEQUOYAH
BIG ROCK POINT	NON 3.5	PLAN - 5/26/88	5/26/87	NA	NA	NA
BRAIDWOOD 1, 2 (ML)	OP - ***	474 - 10/7/88		1983	EAI	ON-SITE
BROWNS FERRY 1, 2, 3 (ML)	OP - ****			1976	SINGER	ON-SITE
BRUNSWICK 1, 2 (ML)	OP			1983	EAI	ON-SITE
BYRON 1, 2 (ML)	OP - *	474 - 10/7/88		NA	NA	NA
CALLAWAY 1	OP	474 - 11/30/87		1981	W	ON-SITE
CALVERT CLIFFS 1, 2 (ML)	OP			1986	CE	ON-SITE
CATAWBA 1, 2 (ML)	OP	474 - 8/1/88	NR	1/88	W	ON-SITE
CLINTON 1	OP			1984	SINGER	ON-SITE
COMMANCHE PEAK 1, 2	OP			1984	SINGER	ON-SITE
COOK 1, 2 (ML)	OP			5/88	SINGER	ON-SITE
COOPER	UC		8/13/87	EST-5/90	SINGER	ON-SITE
CRYSTAL RIVER 3	UC		3/17/88	EST-8/89	CAE	ON-SITE
DAVIS BESSE	UC		3/29/88	EST-5/89	CAE	ON-SITE
DIABLO CANYON 1, 2 (ML)	OP		4/28/88	1984	W	ON-SITE
DRESDEN 2, 3 (ML)	OP			1968	GE	MORRIS, IL
DUANE ARNOLD	UC			EST -10/89	SINGER	ON-SITE
FARLEY 1, 2 (ML)	OP			1983	W	ON-SITE
FERMI 2	OP			1984	SINGER	ON-SITE
FITZPATRICK	OP			7/88	SINGER	ON-SITE
FORT CALHOUN 1	UC			EST - 1989	W	ON-SITE
FORT ST. VRAIN	NON 3.5	PLAN - 5/24/88		NA	NA	NA
GINHA	OP			1986	W	ON-SITE
GRAND GULF 1	OP			1982	SINGER	ON-SITE
HADDAM NECK (CONN YANKEE)	OP		2/9/88	1985	SINGER	MILLSTONE
HATCH 1, 2 (ML)	OP			1982	SINGER	ON-SITE
HOPE CREEK 1	OP			1984	SINGER	ON-SITE
INDIAN POINT 2	OP - ***			1973	SINGER	ON-SITE
INDIAN POINT 3	OP		12/30/88	1988	W	ON-SITE
KWAUNEE	OP			1984	SINGER	ON-SITE
LASALLE 1, 2 (ML)	OP - ***			1983	EAI	BRAIDWOOD
LIMERICK 1, 2	OP			1981	SINGER	ON-SITE
MAINE YANKEE	OP	474 - 8/17/87 +	6/26/87	1984	SINGER	ON-SITE
MCGUIRE 1, 2 (ML)	OP		NR	1988#	W#	ON-SITE
MILLSTONE 1	OP		2/9/88	1986	SINGER	ON-SITE
MILLSTONE 2	OP		2/9/88	1985	SINGER	ON-SITE
MILLSTONE 3	OP			1984	SINGER	ON-SITE
MONTICELLO	OP			1984	SINGER	ON-SITE
NINE MILE POINT 1	OP			1984	SINGER	ON-SITE
NINE MILE POINT 2	OP			1985	SINGER	ON-SITE
NORTH ANNA 1, 2 (ML)	OP	474 - 9/13/88		1984	SAI	ON-SITE
OCONEE 1, 2, 3 (ML)	OP - ****		NR	1983	EAI	ON-SITE

TABLE 1 - SIMULATOR LIST - JANUARY 1989

UNIT	SIMULATOR STATUS	474 OR APPLICATION	GL 87-07 SUBMITTAL	DATE READY FOR TRAINING	SIMULATOR VENDOR	SIMULATOR LOCATION
OYSIER CREEK	UC			EST-10/90	W	ON-SITE
PALISADES	OP		5/26/87	1983	SINGER	MIDLAND
PALO VERDE 1, 2, 3 (ML)	OP			1980	EAI	ON-SITE
PEACH BOTTOM 2, 3 (ML)	OP			1987	SINGER	SINGER
PERRY 1, 2	OP			1980	SINGER	ON-SITE
PILGRIM 1	OP			1987	CAE	ON-SITE
POINT BEACH 1, 2 (ML)	UC		6/10/87	EST - 1990	W	ON-SITE
PRAIRIE ISLAND 1, 2 (ML)	OP			1984	SINGER	ON-SITE
QUAD CITIES 1, 2 (ML)	UC			EST-7/90	SINGER	ON-SITE
RANCHO SECO	UC			EST-11/89	CAE	ON-SITE
RIVER BEND 1	OP		5/10/88	1983	SINGER	ON-SITE
ROBINSON 2	OP			1986	W	ON-SITE
ST. LUCIE 1 (ML)	NON 3.5	PLAN 5/24/88		NA	NA	NA
ST. LUCIE 2 (ML)	OP			1987	CAE	ON-SITE
SALEM 1, 2 (ML)	OP			1983	EAI	ON-SITE
SAN ONOFRE 1	NON 3.5	PLAN - 5/26/88		NA	NA	NA
SAN ONOFRE 2, 3 (ML)	OP			1983	SINGER	ON-SITE
SEABROOK 1, 2	OP			1980	SINGER	ON-SITE
SEQUOYAH 1, 2 (ML)	OP - ****			1977	SINGER	ON-SITE
SHEARON HARRIS 1, 2	OP		5/24/88	1986	W	ON-SITE
SHORTHAM	OP			1987	SINGER	ON-SITE
SOUTH TEXAS 1, 2	OP			1985	GOULD	ON-SITE
SUMMER 1	OP			1983	W	ON-SITE
SCRRY 1, 2 (ML)	OP	474 - 11/23/88		1978	EAI	ON-SITE
SUSQUEHANA 1, 2 (ML)	OP			1979	SINGER	ON-SITE
THREE MILE ISLAND 1	OP		5/19/88	1987	SINGER	ON-SITE
TROJAN	UC			EST - 3/89	W	ON-SITE
TURKEY POINT 3, 4 (ML)	OP			1987	CAE	ON-SITE
VERMONT YANKEE	OP		5/23/88	1986	SINGER	ON-SITE
VOGTLE 1, 2 (ML)	OP	474 - 10/25/88	11/16/88	1982	SINGER	ON-SITE
WNP 2	OP **			1983	GOULD	ON-SITE
WNP 3	UC			NA	GOULD	IN STORAGE
WATERFORD 3	OP			1987	SINGER	ON-SITE
WATTS BAR 1, 2 (ML)	OP			5/88	SINGER	ON-SITE
WOLF CREEK	OP	474 - 1/10/89	8/26/87	1983	W	ON-SITE
YANKEE ROWE	IFB	PLAN - 5/26/88	7/23/87	TBD	TBD	TBD
ZION 1, 2 (ML)	OP *			1972	W	ON-SITE

(UNITS = 123) (OP = 67) (UC = 11) (IFB = 2) (NON 3.5 = 4)

TABLE 1 - SIMULATOR LIST - JANUARY 1989

UNIT	OTHER SIMULATORS USED	NSSS TYPE	TURBINE/CONTROL TYPE
ANO-1	X	B&W	W
ANO-2	X	CE	GE
BEAVER VALLEY 1	X	W - 3 LOOP	W
BEAVER VALLEY 2	BEAVER VALLEY 1	W - 3 LOOP	W
BELLEFONTE 1, 2	X	B&W	BB
BIG ROCK POINT	GE - MORRIS, IL	GE	GE
BRAIDWOOD 1, 2 (ML)	X	W - 4 LOOP	W
BROWNS FERRY 1, 2, 3 (ML)	X	GE - MK I	GE
BRUNSWICK 1, 2 (ML)	X	GE - MK I(C)	GE
BYRON 1, 2 (ML)	BRAIDWOOD	W - 4 LOOP	W
CALLAWAY 1	X	W - 4 LOOP	W
CALVERT CLIFFS 1, 2 (ML)	X	CE	GE/W
CATAWBA 1, 2 (ML)	X	W - 4 LOOP	GE
CLINTON 1	X	GE	GE
COMMANCHE PEAK 1, 2	X	W - 4 LOOP	AC
COOK 1, 2 (ML)	X	W - 4 LOOP	GE/BB
COOPER	GE - MORRIS, IL	GE - MK I	W
CRYSTAL RIVER 3	B&W - LYNCHBURG, VA	B&W	W
DAVIS BESSE	B&W - LYNCHBURG, VA	B&W	GE
DIABLO CANYON 1, 2 (ML)	X	W/W - 4 LOOP	W
DRESDEN 2, 3 (ML)	X	GE - MK I	GE
DUANE ARNOLD	VERMONT YANKEE	GE - MK I	GE
FARLEY 1, 2 (ML)	X	W - 3 LOOP	W
FERMI 2	X	GE - MK I	GE
FITZPATRICK	X	GE - MK I	GE
FORT CALHOUN 1	CE - WINDSOR, CT	W	GE
FORT ST. VRAIN	NONE	GA	GE
GINNA	X	W - 2 LOOP	W
GRAND GULF 1	X	GE - MK III	GE
HADDAM NECK (CONN YANKEE)	X	W - 4 LOOP	W
HATCH 1, 2 (ML)	X	GE - MK I	GE
HOPE CREEK 1	X	GE - MK I	GE
INDIAN POINT 2	X	W - 4 LOOP	W
INDIAN POINT 3	X	W - 4 LOOP	W
KEWAUNEE	X	W - 2 LOOP	W
LASALLE 1, 2 (ML)	X	GE - MK II(C)	CS
LIMERICK 1, 2	X	GE - MK II(C)	GE
MAINE YANKEE	Y	CE	W
MCGUIRE 1, 2 (ML)	X	W - 4 LOOP	W
MILLSTONE 1	X	GE - MK I	GE
MILLSTONE 2	X	CE	GE
MILLSTONE 3	X	W - 4 LOOP	GE
MONTICELLO	X	GE - MK I	GE
NINE MILE POINT 1	X	GE - MK I	GE
NINE MILE POINT 2	X	GE - MK II(C)	GE
NORTH ANNA 1, 2 (ML)	X	W - 3 LOOP	W
OCONEE 1, 2, 3 (ML)	X	B&W	GE

TABLE 1 - SIMULATOR LIST - JANUARY 1989

UNIT	OTHER SIMULATORS USED	NSSS TYPE	TURBINE/CONTROL TYPE
OYSTER CREEK	NINE MILE PT 1 - 3	GE - MK I	GE
PALISADES	X	CE	W
FALO VERDE 1, 2, 3 (ML)	X	CE	GE
PEACH BOTTOM 2, 3 (ML)	X	GE - MK I	GE
PERRY 1, 2	X	GE - MK III	GE
PILGRIM 1	X	GE - MK I	GE
POINT BEACH 1, 2 (ML)	KEWAUNEE	W - 2 LOOP	W
PRAIRIE ISLAND 1, 2 (ML)	X	W - 2 LOOP	W
QUAD CITIES 1, 2 (ML)	GE - MORRIS, IL	GE - MK I	GE
RANCHO SECO	B&W - LYNCHBURG, VA	B&W	W
RIVER BEND 1	X	GE	GE
ROBINSON 2	X	W - 3 LOOP	W
ST. LUCIE 1 (ML)	ST. LUCIE 2	CE	W
ST. LUCIE 2 (ML)	X	CE	W
SALEM 1, 2 (ML)	X	W - 4 LOOP	W
SAN ONOFRE 1	W - ZION, IL	W - 3 LOOP	W
SAN ONOFRE 2, 3 (ML)	X	CE	GE
SEABROOK 1, 2	X	W	GE
SEQUOYAH 1, 2 (ML)	X	W - 4 LOOP	W
SHEARON HARRIS 1, 2	X	W	W
SHOREHAM	X	GE - MK II(C)	GE
SOUTH TEXAS 1, 2	X	W - 4 LOOP	H
SUMMER 1	X	W - 3 LOOP	GE
SURRY 1, 2 (ML)	X	W - 3 LOOP	W
SUSQUEHANA 1, 2 (ML)	X	GE - MK II(C)	GE
THREE MILE ISLAND 1	X	B&W	GE
TROJAN	SNUPPS - PITTS., PA	W - 4 LOOP	GE
TURKEY POINT 3, 4 (ML)	X	W - 3 LOOP	W
VERMONT YANKEE	X	GE - MK I	GE
VOGTLE 1, 2 (ML)	X	W	GE
WNP 2	X	GE - MK II(C)	W
WNP 3	X	CE	W
WATERFORD 3	X	CE	W
WATTS BAR 1, 2 (ML)	SEQUOYAH	W - 4 LOOP	W
WOLF CREEK	X	W	GE
YANKEE ROWE	SNUPPS - ZION, IL	W - 4 LOOP	W
ZION 1, 2 (ML)	X	W - 4 LOOP	W

TABLE 1 - SIMULATOR LIST - JANUARY 1989

ABBREVIATIONS USED

OP - SIMULATOR OPERATIONAL
I/C - SIMULATOR UNDER CONSTRUCTION
NOW 3.5 - MAY NOT MEET ANS 3.5 DEFINITION OF FULL SCOPE SIMULATOR
IFB - SIMULATOR INVITATION FOR BID ISSUED
W - WESTINGHOUSE ELECTRIC COMPANY
GE - GENERAL ELECTRIC COMPANY
B&W - BABCOCK AND WILCOX COMPANY
BB - BROWN BOVERI COMPANY
AC - ALLIS CHALMERS COMPANY
GA - GENERAL ATOMIC COMPANY
CE - COMBUSTION ENGINEERING COMPANY
(PL) - OPERATORS ARE ISSUED MULTIPLE LICENSES
RFT - SIMULATOR ACCEPTED BY UTILITY AS "READY FOR TRAINING"
TBD - TO BE DETERMINED
NR - NOT RESPONSIVE
NA - NOT APPLICABLE
* - EXISTING SIMULATOR TO BE REPLACED - EST. 3/91
** - EXISTING SIMULATOR TO BE REPLACED - DATE TBD
*** - MAJOR SIMULATOR UPGRADE PLANNED - EST. 3/91
**** - MAJOR UPGRADE PLANNED - DATE TBD
+ - NRC SIMULATOR INSPECTION COMPLETED
- AFTER MAJOR UPGRADE OR REPLACEMENT
X - USES OWN SIMULATOR

NOTES

NOTE 1: Oconee Simulator being upgraded by Westinghouse.
Expected to be RFT 1/89

NOTE 2: Oyster Creek also uses a Basic Principles Trainer

NOTE 3: Peach Bottom simulator in operation at Singer.
Will be moved to site when building is ready.

NOTE 4: TMI also uses a Basic Principles Trainer.

TABLE 2 - CERTIFICATIONS, APPLICATIONS AND GL 87-07

UNIT	474 OR APPLICATION	GL 87-07 SUBMITTAL
ANO-2	474 - 12/7/87	
BIG ROCK POINT	PLAN - 5/26/88	5/26/87
BRAIDWOOD 1, 2 (ML)	474 - 10/7/88	
BYRON 1, 2 (ML)	474 - 10/7/88	
CALLAWAY 1	474 - 11/30/87	
CATAWBA 1, 2 (ML)	474 - 8/1/88	NR
COOPER		8/13/87
CRYSTAL RIVER 3		3/17/88
DAVIS BESSE		3/29/88
DIABLO CANYON 1, 2 (ML)		4/28/88
FORT ST. VRAIN	PLAN - 5/24/88	
HADDAM NECK (CONN YANKEE)		2/9/88
INDIAN POINT 3		12/30/88
MAINE YANKEE	474 - 8/17/87 +	6/26/87
MCGUIRE 1, 2 (ML)		NR
MILLSTONE 1		2/9/88
MILLSTONE 2		2/9/88
NORTH ANNA 1, 2 (ML)	474 - 9/13/88	
OCONEE 1, 2, 3 (ML)		NR
PALISADES		5/26/87
POINT BEACH 1, 2 (ML)		6/10/87
RIVER BEND 1		5/10/88
ST. LUCIE 1 (ML)	PLAN 5/24/88	
SAN ONOFRE 1	PLAN - 5/26/88	
SHEARON HARRIS 1, 2		5/24/88
SURRY 1, 2 (ML)	474 - 11/23/88	
THREE MILE ISLAND 1		5/19/88
VERMONT YANKEE		5/23/88
VOGTLE 1, 2 (ML)	474 - 10/25/88	11/16/88
WOLF CREEK	474 - 1/10/89	8/26/87
YANKEE ROWE	PLAN - 5/26/88	7/23/87