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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

OFFICE OF THE
GENERAL COUNSEL

September 11, 1998

Charles Bechhoefer, Presiding Officer
Administrative Judge
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. Richard F. Cole
Administrative Judge
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

In the Matter of
Randall L. Herring
(Denial of Operator License for Catawba Nuclear Station)
ASLBP No. 98-745-01-SP
Docket No. 55-22234-SP

Dear Administrative Judges:

Pursuant 10 C.F.R. § 2.1231(c), the staff of the Nuclear Regulatory Commission hereby submits the attached update to the Hearing File and table of contents.

The update consists of an additional section of NUREG-1021(ES-301) and general documents recently forwarded to the Staff by Catawba Nuclear Station, as specified in the attached document entitled "TRAINING DOCUMENTS". The items are numbered as follows:

34. NUREG-1021, Interim Rev. 8, January 1997, section ES-301, Preparing Initial Operating Tests

35. NUREG-1122, Rev. 1, August 1995, Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors, Abstract, Sections 2.2.18 through 2.2.27, and Sections 2.4.37 through 2.4.46

36. Catawba Operations Training Documents, Week 1 - Technical Specifications (TS)
    - 36A. HLP 97-1 schedule, Week 1, revision 21 and Classroom attendance, Test 1
    - 36B. LPSO Objectives (SRO), revision 15
    - 36C. OP-CN-ADM-TS, revision 15, TS lesson plan

37. Training Documents, Week 6 - Nuclear Service Water System (RN)
    - 37A. HLP Schedule, Week 6 and Classroom attendance, Test 5
    - 37B. LPSO Objectives (SRO), revision 25 (to replace Hearing File Item 7, LPSO Training Objectives, revision 26)
    - 37C. OP-CN-PSS-RN, revision 27, RN lesson plan
    - 37D. Change summary form, OP-CN-ER-RN, revisions 26 and 27

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38. Training documents, Week 11 - Emergency Plan (EP)
    - 38A. HLP schedule, Week 11, revision 21 and Classroom attendance, Test 9
    - 38B. LPSO Objectives (SRO), EP lesson plan, revision 15
    - 38C. OP-CN-EP-SEP, revision 16, TS lesson plan
    - 38D. Change summary form, OP-CN-EP-SEP, revision 16

39. Employee Qualification Printout, EP-S0026, revision 07, Senior Reactor Operator T&Q, TASK: Assess Plant problems and declare emergencies per approved procedures.

This update also contains corrected Items 11 and 12 of the hearing file.

A copy of this letter and attachments are being forwarded to Mr. Herring. Pursuant to 10 C.F.R. § 2.1231, a copy of the update to the Hearing File is being filed in the docket and being sent to the NRC Public Document Room.

Sincerely,

Susan Uttal
Counsel for NRC Staff

Enclosures: As Stated

cc w/enclosures:
Randall L. Herring
SECY (2)
OCAA
PDR

cc w/o encls:
ASLB
Adjudicatory File

TRAINING DOCUMENTS

The attached documents are the record of training attendance and qualification for Randall L. Herring during the Hot License Preparatory course. The documents include copies of the course schedule by test week, classroom lecture attendance, senior reactor operator (SRO)lesson plan objectives, lesson plan, change summaries for lesson plans currently in later revision, and training and qualification documentation. Copies of revised lesson plans are not routinely retained in their entirety and therefore are not available. The attached change summaries provide a list of the changes made for any latter revisions The attachments are as follows:

Week 1 - Technical Specifications:

HLP Schedule, Week 1, revision 21
Classroom Attendance as of 1/6-10/98, Test 1
LPSO Objectives (SRO), Technical Specification lesson plan, revision 15
OP-CN-ADM-TS, revision 15, Technical Specification lesson plan

Week 6 - Nuclear Service Water System (RN):

HLP Schedule, Week 6, revision 21
Classroom Attendance as of 2/10-18/98, Test 5
LPSO Objectives (SRO), Nuclear Service Water System lesson plan, revision 25
OP-CN-PSS-RN, revision 27, Nuclear Service Water System lesson plan
Change Summary Form, OP-CN-EP-RN, revision 26
Change Summary Form, OP-CN-EP-RN, revision 27

Week 11 - Emergency Plan:

HLP Schedule, Week 11, revision 21
Classroom Attendance as of 3/18-24/98, Test 9
LPSO Objectives (SRO), Emergency Plan lesson plan, revision 15
OP-CN-EP-RN, revision 16, Technical Specification lesson plan
Change Summary Form, OP-CN-EP-SEP, revision 16

Training and Qualification Guide - Emergency Plan:

Employee Qualification Printout
EP-S0026, revision 07, Senior Reactor Operator T&Q, TASK: Assess plant problems and declare emergencies per approved procedures

HERRING HEARING FILE		Page 1
Number	Document	
1	NRC Form 398, Personal Qualifications Statement -Licensee, for Randall L. Herring	
2	Form ES-303-1, Operator Licensing Examination Report for Randall L. Herring	
3	Operating test question - Administrative Set 4.A.2, Question 1, applicant's copy	
4	Operating test question - Administrative Set 4.A.2, Question 2, applicant's copy	
5	Examiner's answer key - Administrative Set 4.A.2, Questions 1 and 2	
6	Examiner's answer key with examiner's rough notes - Administrative Set 4.A.2	
7	Catawba Training Objectives for RN system	
8	Duke Power Co. Procedure Process Record, Nuclear Service Water System, Revision 216, 11/20/97	
9	Catawba Nuclear Station, Unit 1, Technical Specifications 3/4.7.4, Nuclear Service Water System and 3/4.7.5, Standby Nuclear Service Water Pond	
10	Nuclear Service Water System (RN) Design Basis Specification, Revision 12, Section 20.4.2.1, Power Operated Valves	
11	Operating test question - Administrative Set 4 [A.4] Questions 1-3, applicant's copy (corrected)	
12	Examiner's answer key - Administrative Set 4 (A.4), Questions 1-3 (corrected)	
13	Examiner's answer key with examiner's rough notes - Administrative Set 4 (A.4), Questions 1-3	
14	Applicant's handwritten answers - Administrative Set 4 (A.4), Questions 1-3	
15	Duke Power Co. Procedure Process Record, General Emergency, Revision 032, 11/18/97	
16	Duke Power Co. Procedure Process Record, Conducting a Site Assembly or Preparing the Site for an Evacuation, Revision 10, 1/21/97	
17	NUREG-1021, Interim Rev. 8, January 1997, Appendix E, Policies and Guidelines for Taking NRC Examinations	
18	NUREG-1021, Interim Rev. 8, January 1997, ES-302, Administering Operating Tests to Initial License Applicants	
19	NUREG-1021, Interim Rev. 8, January 1997, ES-303, Documenting and Grading Initial Operating Tests (attachments and forms omitted)	
20	NUREG-1021, Interim Rev. 8, January 1997, ES-501, Initial Post-Examination Activities (attachments and forms omitted)	

Number	Document
21	NUREG-1021, Interim Rev. 8, January 1997, ES-502, Processing Requests for Administrative Reviews and Hearings After Initial License Denial (attachments and forms omitted)
22	January 27, 1998 letter from NRC, Region II, to Randall L. Herring, regarding proposed denial of license application
23	February 11, 1998 letter from applicant to NRC requesting informal staff review of the grading of the examination, with Attachments and Sub-attachments 4 and 5. A. Attachment 4 - Response to comments on A.4, and subattachments B. Attachment 5 - Response to comments on A.2, and subattachments
24	February 18, 1998 letter from NRC to applicant acknowledging February 11, 1998 submittal
25	March 2, 1998 internal NRC memorandum from Thomas A. Peebles, NRC Region II to Robert M. Gallo, Headquarters, re: Informal NRC Staff Review of the Grading of Randall L. Herring, Docket No. 55-22234, Catawba Nuclear Facility, with attachment
26	March 13, 1998 e-mail, with attachments, from D. Charles Payne (Region II) to Robert M. Gallo, supplementing March 2, 1998 memorandum
27	Internal NRC note, Region II Response to NRC Appeal Panel Review of Contentions from Randall L. Herring, Catawba, undated
28	April 10, 1998 internal NRC memorandum from Melvin Leach, Region III, to Robert M. Gallo, re: Catawba Panel, with attached proposed findings
29	May 15, 1998 internal NRC memorandum from Charles L. Miller to Robert M. Gallo, re: Review of Catawba Emergency Preparedness Questions, Responses, and Contentions
30	May 16, 1998 internal NRC memorandum from Robert M. Gallo to R. Lee Spessard, re: Herring (Catawba) Informal Review Results
31	May 18, 1998 letter from NRC to Randall L. Herring sustaining the proposed denial of the application
32	June 7, 1998 letter from Randall L. Herring to NRC requesting hearing as to Contentions 3 and 4

Number	Document
33	A. Revision copy of Duke Power Company Procedure Process Record,RP/O/A/5000/005, General Emergency B. Internal memo, from Steve Christopher, Emergency Planning, Duke Power Co. to Rodger Ellingwood, Duke Power, 2/5/98, Re: revision to RP/O/A/5000/005 C. Revision 33 of Duke Power Company Procedure Process Record, RP/O/A/5000/005, 2/4/98
34	NUREG-1021, Interim Rev. 8, January 1997, ES-301, Preparing Initial Operating Tests (Attachments/Forms omitted)
35	NUREG-1122, Rev. 1, August 1995, Abstract, Sections 2.2.18 - 2.2.27, and Sections 2.4.37 - 2.4.46
36	Catawba Operations Training Documents, Week 1 - Technical Specifications (TS) A. HLP 97-1schedule, Week 1, revision 21 and Classroom attendance, Test 1 B. LPSO Objectives (SRO), revision 15 C. OP-CN-ADM-TS, revision 15, TS lesson plan
37	Catawba Training Documents, Week 6 -Nuclear Service Water System (RN) A. HLP Schedule, Week 6 and Classroom attendance, Test 5 B. LPSO Objectives (SRO), revision 25 (to replace Hearing File Item 7, LPSO Training Objectives, revision 26) C. OP-CN-PSS-RN, revision 27, RN lesson plan D. Change summary form, OP-CN-ER-RN, revisions 26 and 27

Number	Document
38	Catawba Training documents, Week 11 - Emergency Plan (EP) A. HLP schedule, Week 11, revision 21 and Classroom attendance, Test 9 B. LPSO Objectives (SRO), EP lesson plan, revision 15 C. OP-CN-EP-SEP, revision 16, TS lesson plan D. Change summary form, OP-CN-EP-SEP, revision 16
39	Employee Qualification Printout, EP-S0026, revision 07, Senior Reactor Operator T&Q, TASK: Assess Plant problems and declare emergencies per approved procedures

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FINAL VERSION A.4
APPLICANT COPY

Admin Set 4

Initial Conditions

1. At 1100 EP/1/A/5500/E-0 Reactor Trip/Safety Injection procedure was entered due to a uncontrolled depressurization of the 1D steam generator.
2. At 1120 E-2, Faulted Steam Generator Isolation was entered. It was determined that the steamline break was unisolable. Containment conditions are normal.
3. At 1125 while in E-2 there are indications of a tube rupture in the 1D steam generator and EP/1/A/5500/E-3 is entered.
4. At 1300 dose assessment crews project a dose at the site boundary of 1.2 rem TEDE.
5. At 1301 the OSM declares a General Emergency.

Question 1(reference allowed)

It is now 1305 and the Operations Shift Manager directs you to evaluate the Protective Action Recommendations for the initial notification based on current plant conditions. Currently, winds are 8 mph, and Upper wind direction indicates 380 degrees. What, if any are your recommendations.

Question 2(reference allowed)

It is now 1330 and a thunderstorm has moved across the site with winds in excess of 20 mph and Upper wind direction indicates 200 degrees. What, if any does the change in weather affect the above decision.

Question 3(reference allowed)

It is now 1400 a site assembly has been conducted and the Operations Shift Manager informs you that non-essential personnel must be evacuated from the site. Based on the conditions at 1330 what recommendations, if any would you provide the OSM.

FINAL VERSION H.4
EXAMINER COPY

Admin Set 4

Initial Conditions

1. At 1100 EP/1/A/5500/E-0 Reactor Trip/Safety Injection procedure was entered due to a uncontrolled depressurization of the 1D steam generator.
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5. At 1301 the OSM declares a General Emergency.

Question 1(reference allowed)

It is now 1305 and the Operations Shift Manager directs you to evaluate the Protective Action Recommendations for the initial notification based on current plant conditions. Currently, winds are 8 mph, and Upper wind direction indicates 380 degrees. What, if any are your recommendations.

Answer

Recommends evacuation of zones A0, C1, D1
Recommends in-place shelter for zones A1, A2, A3, B1, B2, C2, D2, E1, E2, F1, F2, F3

Question 2(reference allowed)

It is now 1330 and a thunderstorm has moved across the site with winds in excess of 20 mph and Upper wind direction indicates 200 degrees. What, if any does the change in weather affect the above decision.

Answer

Reevaluates decision based on change in the weather.
Recommends evacuation of additional zones A1, B1, E1, F1
Recommends in-place shelter for additional zones C1, D1

Question 3(reference allowed)

It is now 1400. A site assembly has been conducted and the Operations Shift Manager informs you that non-essential personnel must be evacuated from the site. Based on the conditions at 1330 what recommendations, if any would you provide the OSM.

Answer

Recommends evacuation of non-essential site personnel to location ALPHA, which is the Duke Power, Power Delivery, Rock Hill Office.

ES-301
PREPARING INITIAL OPERATING TESTS

A. PURPOSE

All applicants for reactor operator (RO) and senior reactor operator (SRO) licenses at power reactor facilities are required to take an operating test, unless it has been waived in accordance with 10 CFR 55.47 (refer to ES-204). The specific content of the operating test depends on the type of license for which the applicant has applied.

This standard describes the procedure for developing operating tests that meet the requirements of 10 CFR 55.45, including the use of reactor plant simulation facilities and the conduct of multi-unit evaluations.

B. BACKGROUND

To the extent applicable, the operating test will require the applicant to demonstrate an understanding of, and the ability to perform, the actions necessary to accomplish a representative sampling from the 13 items identified in 10 CFR 55.45(a). In addition, the content of the operating test will be identified, in part, from learning objectives contained in the facility licensee's training program and from information in the final safety analysis report, system description manuals and operating procedures, the facility license and license amendments, licensee event reports, and other materials requested from the facility licensee by the Commission.

The structure of the operating test is dictated, in part by 10 CFR 55.45(b)(1). It states that the test will be administered in a plant walk-through and in either a simulation facility (as defined in 10 CFR 55.4) that the Commission has approved or a simulation facility consisting solely of a plant-referenced simulator (also as defined in 10 CFR 55.4) that has been certified to the Commission by the facility licensee.

The walk-through portion of the operating test consists of two categories, each focusing on specific knowledge and abilities (K/As) required for licensed operators to safely discharge their assigned duties and responsibilities. A third category of the operating test is administered on an NRC-approved or facility-certified simulation facility. Unless specifically waived in accordance with ES-204 and documented on the Examination Assignment Sheet (Form ES-201, Attachment 4), all three categories must be completed for every license applicant.

Each category of the operating test is briefly described below. Section D of this standard provides detailed instructions for developing each category. Procedures for administering and grading the operating test are contained in ES-302 and ES-303, respectively.

1. Category A, "Administrative Topics"

This category of the operating test covers K/As that are generally associated with the administrative control of the plant. It implements items 9 through 12 of 10 CFR 55.45(a) and is divided into four administrative topics, as described below. The depth of coverage required in each topic is based on the applicant's license level. The applicant's competence in each topic is evaluated by administering job performance measures (JPMs) or by asking specific questions.

Topic A.1, "Conduct of Operations," evaluates the applicant's knowledge of the daily operation of the facility. The following subjects are examples of the types of information that should be evaluated under this topic:

- shift turnover
- shift staffing requirements
- temporary modifications of procedures
- reactor plant startup requirements
- mode changes
- plant parameter verification (estimated critical position (ECP), heat balance, etc.)
- short-term information (e.g., night and standing orders)
- key control
- security (awareness and familiarity)
- fuel handling

Topic A.2, "Equipment Control," addresses the administrative requirements associated with managing and controlling plant systems and equipment. The following subjects exemplify the types of information that should be evaluated under this topic:

- surveillance testing
- maintenance
- tagging and clearances
- temporary modification of systems
- familiarity with and use of piping and instrument drawings

Topic A.3, "Radiation Control," evaluates the applicant's knowledge and abilities with respect to radiation hazards and protection (of plant personnel and the public). The following subjects exemplify the types of information that should be evaluated under this topic:

- use and function of portable radiation and contamination survey instruments and personnel monitoring equipment
- knowledge of significant radiation hazards
- the ability to perform procedures to reduce excessive levels of radiation and to guard against personnel exposure
- radiation exposure limits and contamination control, including permissible levels

in excess of those authorized
- radiation work permits
- control of radiation releases

Topic A.4 "Emergency Plan," evaluates the applicant's knowledge of the emergency plan for the facility, including, as appropriate, the responsibility of the RO or SRO to decide whether the plan should be executed and the duties assigned under the plan. The following subjects are examples of the types of information that should be evaluated under this topic:

- lines of authority during an emergency
- emergency action levels and classifications
- emergency facilities
- emergency communications
- emergency protective action recommendations

Category A is administered in a one-on-one, walk-through format and the four topic areas are graded collectively (refer to ES-302 and ES-303).

2. Category B, "Control Room Systems and Facility Walk-through"

This category of the operating test is used to determine if the applicant's knowledge in the area of plant system design is adequate and to determine if the applicant is able to safely operate those systems. As such, this category implements the requirements of items 3, 4, 7, 8, and 9 identified in 10 CFR 55.45(a). It also encompasses several types of systems, including primary coolant, emergency coolant, decay heat removal, auxiliary, radiation monitoring, and instrumentation and control.

Category B is divided into two subcategories. The first and larger subcategory (B.1, "Control Room Systems") focuses on those systems with which licensed operators are most involved (i.e., those having controls and indications in the main control room). The second subcategory (B.2, "Facility Walk-Through") ensures that the applicant is familiar with the design and operation of systems located outside the main control room. The applicant's knowledge and abilities relative to each system are evaluated by administering JPMs and specific follow-up questions.

Subcategories B.1 and B.2 are administered in a one-on-one, walk-through format and are graded collectively (refer to ES-302 and ES-303).

3. Category C, "Integrated Plant Operations"

This category of the operating test implements items 1 through 8 and 11 through 13 identified in 10 CFR 55.45(a). This is the most performance-based category of the operating test and is used to evaluate the applicant's ability to safely operate the plant's systems under dynamic, integrated conditions.

The simulator test is administered in a team format with up to three applicants (or surrogates) filling the RO and SRO license positions (as appropriate) on an operating crew. (Refer to ES-201 for additional guidance on crew composition and ES-302 for test administration instructions.) This format enables the examiner to evaluate each applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated (refer to 10 CFR 55.45(a)(13)).

Each team or crew of applicants is administered a set of scenarios designed so that the examiners can individually evaluate each applicant on a range of competencies applicable to the applicant's license level. Appendix D describes those competencies, and Forms ES-303-3 and ES-303-4, the "Integrated Plant Operations Competency Grading Worksheets" for ROs and SROs, break down each competency into a number of specific rating factors to be considered during the grading process (refer to ES-303).

Each applicant must demonstrate proficiency on every competency applicable to his or her license level. The only exception is that SRO Competency Number 5, "Control Board Operations," is optional for SRO-upgrade applicants.

C. RESPONSIBILITIES

1. Facility Licensee

The facility licensee is responsible for the following activities, as applicable, depending upon the examination arrangements confirmed with the NRC regional office in accordance with ES-201 approximately four months before the scheduled examination date:

a. Prepare proposed examination outlines in accordance with Section D and submit them to the NRC regional office for review and approval in accordance with ES-201.

b. Submit the reference materials necessary for the NRC regional office to prepare and/or review the requested examination(s) (refer to ES-201, Attachment 2).

c. Prepare and review the final operating tests in accordance with the previously approved examination outline(s) and the instructions in Sections D and E, and submit the tests to the NRC regional office in accordance with ES-201.

d. Make the simulation facility available, as necessary, for NRC examiners to prepare for the operating tests.

e. Meet with the NRC in the regional office or at the facility, when and as necessary, to review the proposed operating tests and discuss potential changes (refer to ES-201).

f. Revise the operating test outlines and the final tests as applicable and as agreed upon by the NRC regional office (refer to ES-201). The NRC retains final authority to approve the operating tests.

2. NRC Regional Office

The NRC regional office is responsible for the following activities:

a. Ensure that the operating tests are developed in accordance with Section D.

b. Ensure that the operating tests are reviewed for quality in accordance with Section E.

c. Meet with the facility licensee, when and as appropriate, to prereview the operating tests in accordance with ES-201.

D. INSTRUCTIONS

Prepare each category of the operating test in accordance with the following general guidelines and specific instructions:

1. General Guidelines

a. In an effort to reduce examination preparation effort, the same operating test may be used to examine multiple applicants and simulator crews. Depending on the number and license level of the applicants being examined, it might be possible to use the same set of JPMs and scenarios to examine all of the applicants if the operating test is administered in multiple segments (e.g., single scenarios or two-four JPMs) each of which can be given to all of the applicants in a single day. The facility licensee and the NRC chief examiner shall discuss the options and reach agreement on the process before developing the operating tests.

To minimize predictability and maintain test integrity, varied subjects, systems, and operations shall be evaluated with applicants that are not being examined at the same time, unless measures are taken to preclude interaction among the applicants. Overlap or duplication between successive operating tests shall be minimized; simulator scenarios shall not be repeated on successive days, and no more than three (one in the case of upgrade SROs) JPMs taken directly from the bank may be repeated day-to-day (i.e., new JPMs may not be repeated on successive days).

Operating tests written by the facility licensee may not repeat test items (simulator scenarios or JPMs) from the applicants' audit test given at or near the end of the license training class. Simulator events that are similar to events that were tested on the audit examination are permitted provided the actions required to mitigate the transient are significantly different from those required during the audit examination.

Sufficient operating test materials shall be developed to ensure that all applicants can be tested with the available personnel according to the schedule agreed upon by the NRC regional office and the facility licensee (refer to ES-201).

b. To the extent permitted for each category of the operating test, select and modify testing materials (i.e., JPMs, questions, and simulator scenarios) from the facility's examination banks. Every selected test item must satisfy the qualitative and quantitative criteria specified for the applicable section of the operating test or be modified accordingly.

c. Consider the K/As associated with normal, abnormal, and emergency tasks and evolutions as a source of topics for use in evaluating applicant competency in each category of the operating test.

The knowledge and abilities associated with the tasks and questions planned for the operating test should have importance factors of at least 2.5. Tasks with importance factors of less than 2.5 may be used if there is a substantive reason for including them (e.g., a recent licensee event or a significant system modification).

The K/As should be appropriate to the plant-specific requirements for the applicant's license level. Refer to the facility's job and task analysis (if available), learning objectives, and other reference material to confirm that the operating test is correctly oriented to the facility and the applicant's license level.

The facility licensee's site-specific task list may be used to supplement or override, on a case-by-case basis, selected individual items in the NRC's K/A catalogs. In order to maintain examination consistency, the site-specific task list shall not be used in place of the entire K/A catalog.

d. When selecting and developing materials (JPMs, scenarios, and questions) for the operating test, ensure that the materials contribute to the test's overall capacity to differentiate between those applicants who are competent to safely operate the plant and those who are not. Any test items that, when missed, would raise questions regarding adequate justification for denying the applicant's license should not be included on the operating test.

e. SRO applicants, whether upgrade or instant, will be examined for the highest on-shift position for which the SRO's license is applicable (e.g., shift supervisor),

regardless of the position to be assigned when licensed. SRO applicants should demonstrate their supervisory abilities and an attitude of responsibility for safe operation, and are expected to assume a management role during plant transients and upset conditions while taking
Category C of the operating test. The operating test briefing, discussed in Appendix E, ensures that the applicants are advised of this policy.

Differences in administrative controls and facility design will affect the SRO's responsibilities, but, in general, the following guidelines should be used to differentiate the SRO operating test from that of an RO.

- In directing licensed activities, the SRO must evaluate plant performance and make operational judgments accordingly. SRO applicants should, therefore, be more knowledgeable in areas such as operating characteristics, reactor behavior, and instrument interpretation.

- In directing licensed activities, the SRO must have a broader and more thorough knowledge of facility administrative controls and methods, including limitations imposed by the regulations and the facility's technical specifications and their bases.

- The SRO may be assigned responsibilities for auxiliary systems that are outside the control room (e.g., waste disposal and handling systems) and are not normally operated by licensed operators. Because the SRO may have these additional responsibilities, the SRO license applicant should demonstrate knowledge of the designs of such systems as they relate to maximum permissible concentrations, effluent release rates, and other radiological considerations.

f. Incorporate facility-specific and industry-generic operating experience into the operating test whenever possible. Documentation such as licensee event reports, significant event reports, and service information letters are readily available sources of operationally oriented plant anomalies.

Evaluate the dominant accident sequences (DASs) for the facility to determine if they are suitable for testing, on a sampling basis, during the dynamic simulator or walk-through tests. DASs are those sequences that contribute significantly to the frequency of core damage as determined by the facility licensee's probabilistic risk assessment (PRA) or individual plant examination (IPE).

The PRA/IPE should also be used to identify risk-important operator actions. Chapter 13, "Operational Perspectives," of NUREG-1560, "Individual Plant Examination Program: Perspectives on Reactor Safety and Plant Performance," identifies a number of important human actions that may be appropriate for evaluation on the operating test. In determining what actions to evaluate, do not overlook actions that are relied upon or result in specific events being driven to

low risk contribution. This will help identify those human actions, assumed to be very reliable, that might otherwise not show up in a list of risk-dominant actions.

g. If the applicants at a facility qualify for dual or multi-unit licenses, the operating tests should evaluate their knowledge of the design, procedural, and operational differences between the units.

Divide the operating test coverage among the units and do not become predictable by conducting the walk-through tests on only one unit. Different applicants may be examined on different units, or each applicant may be asked to explain or demonstrate his or her understanding of variations in control board layouts, systems, instrumentation, and procedural actions between the units at the facility.

Most dual- or multi-unit stations have a simulator that is modeled after only one of the units. Therefore, ensure that the applicants are properly tested on the different systems, control board layouts, and any other differences between the units during the walk-through portion of the operating test. For example, after administering Category C of the operating test on Browns Ferry Unit 1, the control room systems portion of Category B of the operating test could be administered on Unit 2 or Unit 3 or both.

h. The operating test should examine a broad range of knowledge and abilities, systems and components, and operations and events. The three categories of the test should not be redundant, nor should they duplicate material that is covered on the written examination. It is particularly important that Categories B and C be developed and reviewed as a package to preclude the same tasks and events from appearing on both parts of the test.

i. Every facet of the operating test, including the questions and answers, JPMs, and simulator scenarios, should be planned, researched, validated, and documented to the maximum extent possible before the test is administered.

j. Examiners who will be administering the operating tests but were not involved in their development are expected to research and study the topics and systems to be examined on the operating test so that they are prepared to ask whatever follow-up questions might be necessary to determine if the applicant is competent in those areas. Examination team members are strongly encouraged to meet as a group with the chief examiner to review the examination materials after they have been approved for administration by the responsible supervisor. The discussions should focus on those test items that might require extensive cueing by the examiner and those that are unique to the facility and require a response different from what the examiner might expect based on past experience.

k. JPMs should include the elements identified in Appendix C (e.g., initiating and

terminating cues, critical steps, and performance criteria). The guidelines and forms (or equivalents) in that appendix should be used when developing new JPMs. Facility procedures may be adapted for use as JPMs by identifying critical steps and entering comments on how to execute particular steps.

l. The prescripted questions for Categories A and B may include a combination of open- and closed-reference items. Open-reference items that require applicants to apply their knowledge of the plant to postulated normal, abnormal, and emergency situations are preferred. Closed-reference items may be used to evaluate the immediate actions of emergency and other procedures, certain automatic actions, operating characteristics, interlocks, and set points, as appropriate to the facility. Minimize the use of closed-reference questions that rely solely on memory, and avoid the use of open-reference questions whose answer can simply be looked up if the applicant can find the correct document.

Refer to Section B.6 of Appendix C for more guidance regarding the development and use of open reference questions for the walk-through test.

m. If it becomes necessary to deviate from a test outline that has been approved by the NRC chief examiner in accordance with ES-201, discuss the proposed deviation with the chief examiner and obtain concurrence before proceeding with the changes. Be prepared to explain why the original proposal could not be implemented and why the proposed replacement is considered an acceptable substitute.

2. Specific Instructions for Category A, "Administrative Topics"

Although the administrative topics may be examined separately, it is preferable, whenever possible, to link, associate, or integrate them with tasks and events conducted during Categories B and C. However, it is important to keep in mind that the applicant's proficiency in the

administrative topics should be deliberately evaluated and not inferred solely from observations made during the simulator portion of the operating test.

a. For *each* of the administrative topics listed below, select the required number of subjects to be evaluated during the operating test. Section B.1 provides examples of the types of subjects that should be evaluated under each topic; the lists are not all-inclusive.

Topic	Number of Subjects
A.1, "Conduct of Operations"	2
A.2, "Equipment Control"	1
A.3, "Radiation Control"	1
A.4, "Emergency Plan"	1

b. For each administrative subject, determine the best method for evaluating the applicant's knowledge or ability in that area. Although a performance-based evaluation, using a single administrative JPM is generally preferred, two prescripted questions may be used to conduct the evaluation in each specific subject area selected for evaluation. The questions may be associated with Category B JPMs (as additional questions) or they may be administered separately.

c. In general, SROs have more administrative responsibilities than ROs, so SRO applicants should be evaluated in greater depth on the administrative topics. RO applicants need only understand the mechanics and intent of the related subjects, as they pertain to tasks at the facility.

d. The following specific guidelines should be applied when selecting or developing questions or JPMs to confirm the applicant's competence with regard to each topic:

Topic A.1, "Conduct of Operations"

Many of these subjects can be covered within the framework of a shift turnover or by integrating them into other discussions, as they apply, throughout the examination.

The subject of fuel handling can be covered in the control room, but attempt to cover this subject in the fuel handling areas of the plant whenever possible. The RO applicant should be aware of his or her duties in the control room during fuel handling. These duties include monitoring instrumentation and responding to alarms from the fuel handling area, communicating with the fuel handling and storage facility, and operating systems from the control room in support of (re)fueling operations. For the SRO applicant, evaluate topics such as core

alterations, new and spent fuel storage and movement, the design of the fuel handling area, use of the fuel handling tools, and fuel handling casualties.

The applicant's security awareness should be evaluated by observing his or her behavior during the operating test. However, passive observations, in and of themselves, are insufficient to justify an evaluation in that subject area. It is appropriate to question an SRO applicant on applicable aspects of the facility's security plan and the operating crew's interactions with the security shift supervisor.

Topic A.2, "Equipment Control"

These subjects can be evaluated within the framework of a normal maintenance evolution. For example, ask the applicant to demonstrate how he or she would take a failed system or component out of service initiate maintenance on the system, and test the system before placing it back in service.

Topic A.3, "Radiation Control"

This topic is best covered in conjunction with the JPMs and questions prepared for Category B.2 of the walk-through (i.e., local systems and operations). It is most appropriate to evaluate these subjects during an entry into the radiologically controlled area (RCA).

The levels of knowledge expected of RO and SRO applicants in some radiation control subjects are significantly different. The RO's duties generally require knowledge of radiation worker responsibilities and operation of plant systems associated with liquid and gaseous waste releases. Therefore, the depth to which RO applicants are evaluated should be limited to their responsibilities and the monitoring requirements before, during, and after the release. The SRO, however, may be involved in reviewing and approving release permits and should be cognizant of the requirements associated with those releases, as well as their potential effect on the health and safety of the public. The SRO applicants may be asked to discuss or simulate (i.e., with a JPM) a planned release (e.g., liquid, gaseous, or containment purge) when examining these topics.

Topic A.4, "Emergency Plan"

There are significant differences between the knowledge required of RO and SRO applicants in this area. RO applicants should be familiar with the emergency plan and with their plant-specific responsibilities under the emergency plan implementing procedures (EPIPs). SRO applicants, however, must demonstrate additional knowledge based upon their responsibility to direct and manage the implementation of the EPIPs during the initial phases of an emergency. Because of this, SRO applicants should have a more detailed

understanding of the EPIPs, in general, and be familiar with event classification procedures, protective action recommendations, and communication requirements and methods.

This topic is best evaluated by integrating it into a discussion of a Category C transient that requires implementation of the emergency plan, or by conducting a JPM requiring use of the emergency plan. Such a JPM can be conducted immediately following a simulator scenario or during the walk-through (Category A or B) examination.

e. The planned administrative subjects should normally take no more than 1 hour and 1.5 hours to administer to RO and SRO applicants, respectively.

f. On Form ES-301-1, "Administrative Topics Outline," briefly describe the administrative subjects selected for evaluation and the method(s) by which each subject will be evaluated. The method of evaluation should include the title of any planned JPMs and a brief summary of the proposed questions.

g. Forward the completed outline to the NRC chief examiner so that it is *received* by the date agreed upon with the NRC regional office at the time the examination arrangements were confirmed; the outline is normally due at least 60 days before the scheduled examination date. Refer to ES-201 for additional instructions regarding the review and submittal of the examination outline.

The NRC chief examiner and responsible supervisor shall review the test outline coverage as soon as possible in accordance with ES-201 and forward any comments to the originator for resolution.

h. After the NRC chief examiner approves the operating test outline, prepare the final Category A test materials (i.e., the JPMs, questions, and answers) in accordance with the general operating test guidelines in Section D.1, the open-reference question guidelines in Appendix B, and the JPM guidelines in Appendix C.

i. When the materials are complete, review the quality of the final Category A walk-through test using Form ES-301-3, "Operating Test Quality Assurance Checklist." This review shall be performed in conjunction with the associated Category B walk-through and the dynamic simulator operating test as noted in Sections D.3 and D.4.

Submit the entire operating test package to the designated facility reviewer or the NRC chief examiner, as appropriate, for review and approval in accordance with Section E. The test must be received by the NRC chief examiner at least 30 days before the scheduled administration date, unless other arrangements have been made.

3. Specific Instructions for Category B, "Control Room Systems and Facility Walk-Through"

This category of the operating test evaluates the applicant's systems-related K/As by having the applicant perform selected tasks and probing his or her knowledge of the task and its associated system with specific, prescripted, follow-up questions. The Category B tasks and questions are *in addition to* and should be *different from* the events and evolutions conducted during Category C, "Integrated Plant Operations."

a. Refer to Section 1.9 of the K/A catalog applicable to the type of reactor for which the applicant is seeking a license (i.e., NUREG-1122 for PWRs and NUREG-1123 for BWRs). From the nine safety function groupings identified in the catalog, select the appropriate number of systems (see the table below) to be evaluated for each subcategory of the test based on the applicant's license level. The emergency and abnormal plant evolutions (E/APEs) listed in Section 1.10 of the appropriate NUREG may also be used to evaluate the applicable safety function (as specified for each E/APE in the first tier of the written examination outlines attached to ES-401).

License Level	Subcategory B.1	Subcategory B.2	Total
RO	7	3	10
SRO-instant (I)	7	3	10
SRO-upgrade (U)	2 or 3	3 or 2	5

The 10 systems and evolutions selected for RO and SRO-I applicants should evaluate at least 7 different safety functions. All of the systems and evolutions in each subcategory of the test should be selected from different safety function lists, and the same system or evolution should not be used to evaluate more than one safety function in each subcategory.

The 5 systems and evolutions selected for an SRO-U applicant should evaluate at least 5 different safety functions. One of the control room systems or evolutions (Subcategory B.1) must be an engineered safety feature, and the same system or evolution should not be used to evaluate more than one safety function.

Keep in mind that the systems and evolutions selected for evaluation in Subcategories B.1 and B.2 must be oriented toward control room operations and local operations, respectively.

b. For each system selected for evaluation, select from the applicable K/A catalog or the facility licensee's site-specific task list *one* task for which a JPM exists or can be developed. Review the associated simulator outline if it has already been prepared (refer to Section D.4), and avoid those tasks that have already been selected for evaluation on the dynamic simulator test.

In order to protect the integrity and security of the examination process, no more than 80 percent of any applicant's walk-through test (i.e, 8 out of 10 or 4 out of 5 JPMs, as applicable) may be taken directly from the facility's testing materials without significant modification. A significant modification means that at least one condition has been substantively changed in a manner that alters the course of action of the JPM. Additionally, no more than 30 percent of the walk-through test may be repeated from the last NRC licensing examination at the facility.

At least one of the tasks shall be related to a shutdown or low- power condition, and one or two of the tasks shall require the applicant to execute alternate paths within the facility's operating procedures. In addition, at least one of the tasks conducted in the plant (i.e., Subcategory B.2) shall evaluate the applicant's ability to implement actions required during an emergency or abnormal condition, and another should require the applicant to enter the RCA. This provides an excellent opportunity for the applicant to discuss or demonstrate the radiation control subjects described in Administrative Topic A.3.

If it is not possible to develop or locate a suitable task/JPM for each of the selected systems, return to Step (a), above, and select a different system or evolution. After identifying a JPM for each system, list it and its associated safety function number on Form ES-301-2, "Individual Walk-Through Test Outline." Also indicate the type of JPM by entering the applicable code(s) identified at the bottom of the form.

c. For each system and evolution selected for evaluation, refer to the applicable section in the K/A catalog and select two system-specific or generic K/As to be evaluated with prescripted questions. The prescripted questions should be diversified among the different K/A categories associated with each system or evolution. List the selected K/A numbers, their importance factors, and a brief description of the topic on Form ES-301-2.

d. Forward the completed walk-through test outline to the NRC chief examiner so that it is *received* by the date agreed upon with the NRC regional office at the time the examination arrangements were confirmed; the outlines are normally due at least 60 days before the scheduled examination date. Refer to ES-201 for additional instructions regarding the review and submittal of examination outlines.

The NRC chief examiner and responsible supervisor shall review the test outline in accordance with ES-201 and forward any comments to the originator for

resolution.

e. After the NRC chief examiner approves the operating test outline, prepare the final Category B test materials (i.e., the JPMs, questions, and answers) in accordance with the general guidance in Section D.1 and the JPM guidelines in Appendix C.

f. When the materials are complete, review the completed walk-through test for quality using Form ES-301-3, "Operating Test Quality Assurance Checklist," and make any changes that might be necessary. To minimize duplication, this review shall be performed in conjunction with the associated administrative topics and the simulator operating test (refer to Sections D.2 and D.4).

Submit the entire operating test package to the designated facility reviewer or the NRC chief examiner, as appropriate, for review and approval in accordance with Section E. The test must be received by the NRC chief examiner at least 30 days before the scheduled administration date, unless other arrangements have been made.

4. Specific Instructions for Category C, "Integrated Plant Operations"

a. Based on the anticipated crew compositions, determine the number of scenarios and scenario sets necessary to rotate each RO and SRO-I applicant into the lead reactor operator position so that he or she can perform a direct reactivity manipulation. For example, a crew consisting of two ROs and one SRO-I will normally require three scenarios to evaluate each applicant's performance on the reactor controls; however, a surrogate SRO will have to fill the supervisory role while the SRO-I applicant is in the lead operator position. Similarly, the crews and scenarios will have to be planned so that every SRO applicant (U and I) fills the supervisory role for at least one scenario.

SRO-U applicants are given credit for their previous RO license evaluation and experience and are normally not required to manipulate the controls.

It may be possible to significantly reduce the number of simulator scenario sets required to examine a large group of applicants by administering the same set of scenarios on the same day to two (or more) different crews of applicants. However, provisions must be made to ensure that the crews remain out of contact until all crews have completed the set of scenarios (refer to ES-302).

Additional or replacement scenarios should also be prepared and available while administering the operating tests in accordance with ES-302 in case one of the planned scenarios does not work as intended.

b. The simulator operating tests (i.e., scenario sets) will be constructed by selecting

and modifying scenarios from existing facility licensee or NRC scenario banks and by developing new scenarios.

In order to maintain test integrity, every applicant shall be tested on at least one new or significantly modified scenario that he or she has not had the opportunity to rehearse or practice. A significant modification means that at least one condition or event has been substantively changed to alter the course of action in the scenario. Furthermore, any other scenarios that are extracted from the facility licensee's bank must be altered to the degree necessary to prevent the applicants from immediately recognizing the scenarios based on the initial conditions or other cues.

c. The initial conditions, normal operations, malfunctions, and major transients should be varied among the scenarios and should include startup, low-power, and full-power situations. Review the associated walk-through outline if it has already been prepared (refer to Section D.3), and take care not to duplicate operations that will be tested during the walk-through portion of the operating test.

d. In order to maximize the quality and consistency of the operating tests, develop new scenarios in accordance with the instructions in Appendix D. Modify existing scenarios, as necessary, to make them conform with the qualitative and quantitative attributes described in that appendix and enumerated on Form ES-301-4, "Simulator Scenario Quality Assurance Checklist." The quantitative attribute target ranges that are specified on the form are not absolute limitations; some scenarios may be an excellent evaluation tool but may not fit within the ranges. A scenario that does not fit into these ranges shall be evaluated to ensure that the level of difficulty is appropriate. Whenever possible, the critical tasks should be distributed so that each applicant is required to respond.

Each scenario set must, at a minimum, exercise each applicant on the types of evolutions, failures, and transients in the quantities identified for the applicant's license level on Form ES-301-5, "Transient and Event Checklist." An applicant should only be given credit for those events that require the applicant to perform verifiable actions that provide insight to the applicant's competence. Each event should only be counted once per applicant; for example, a power change can be counted as a normal evolution OR as a reactivity manipulation, and, similarly, a component failure that immediately results in a major transient counts as one or the other, but not both.

Furthermore, each scenario set must also enable the examiner to evaluate the applicant's performance on each competency and rating factor germane to the applicant's license level. Use Form ES-301-6, "Competencies Checklist," to verify that the competencies are adequately evaluated by entering the scenario and event numbers that are intended to assess each competency.

Appendix D provides detailed instructions for completing Form ES-D-1, the "Scenario Outline," and Form ES-D-2, the expected "Operator Actions," that examiners will use to administer the simulator operating tests. In order to minimize the amount of rework that might be required as a result of changes in the planned scenario events, Form ES-D-2 should be completed after the NRC chief examiner has had the opportunity to review and comment on the proposed simulator operating test outlines (i.e., Form ES-D-1) in accordance with ES-201.

e. When the proposed simulator operating test outlines are complete, forward them to the NRC chief examiner so they are *received* by the date agreed upon with the NRC regional office at the time the examination arrangements were confirmed; the outlines are normally due at least 60 days before the scheduled examination date. Refer to ES-201 for additional instructions regarding the review and submittal of the examination outlines.

The NRC chief examiner shall review the operating test outlines in accordance with ES-201, and forward any comments to the originator for resolution.

f. After the NRC chief examiner approves the operating test outlines, prepare the final simulator test materials by revising Form(s) ES-D-1 as requested by the NRC chief examiner and completing a detailed operator action form (ES-D-2) for each event. All substantive operator actions (e.g., opening, closing, and throttling valves; starting and stopping equipment; raising and lowering level, flow, and pressure; making decisions and giving directions; *not* acknowledging alarms or verifying automatic actions) shall be documented, and critical tasks shall be identified. Events that do not require an operator to take one or more substantive actions will not count toward the minimum number of events required for each operator per Form ES-301-5.

g. Review the completed simulator operating test for quality using Form ES-301-4, "Simulator Scenario Quality Assurance Checklist," and make any changes that might be necessary. This review shall be performed in conjunction with the associated walk-through test (refer to Sections D.2 and D.3) to minimize duplication.

Submit the entire operating test package to the designated facility reviewer or the NRC chief examiner, as appropriate, for review and approval in accordance with Section E. The test must be received by the NRC chief examiner at least 30 days before the scheduled administration date, unless other arrangements have been made.

E. QUALITY ASSURANCE REVIEWS

1. Facility Management Review

If the operating test was prepared by the facility licensee, it shall be independently reviewed and approved by an authorized facility representative (refer to ES-201) before it is submitted to the NRC regional office for review and approval. The reviewer should evaluate the examination using the criteria on Forms ES-301-3 and ES-301-4 and include the signed forms (for each different operating test) in the examination package submitted to the NRC in accordance with ES-201.

2. NRC Examiner Review

a. The NRC chief examiner shall independently review each operating test for content, wording, operational validity, and level of difficulty. As a minimum, the chief examiner shall check the items listed on Forms ES-301-3 and ES-301-4, as applicable. The examiner should keep in mind that counting the number of scenario quantitative attributes is not always indicative of the scenario's level of difficulty. Although there are no definitive minimum or maximum attribute values that can be used to identify scenarios that will not discriminate because they are too easy or difficult, scenarios that fall outside the target ranges specified on Form ES-301-4 should be carefully evaluated to ensure they are appropriate. If the chief examiner wrote the operating test, another NRC examiner shall perform the independent review.

b. The chief examiner should review the operating tests as soon as possible after receipt so that supervisory approval can be obtained before the final review with the facility licensee, which is normally scheduled about two weeks before the administration date. It is especially important that the chief examiner promptly review tests prepared by a facility licensee because of the extra time that may be required if extensive changes are necessary. The chief examiner shall consolidate the comments from other regional reviewers and submit one set of comments to the author.

c. If the facility licensee developed the operating test, it assumed primary responsible for technical accuracy and compliance with the restrictions concerning the use of examination banks. However, the chief examiner is expected to use his or her best judgment and take reasonable measures, including selective review of reference materials and past tests, to verify these items.

d. The chief examiner will note any changes that need to be made and forward the tests to the responsible supervisor (or a designated alternate other than the chief examiner) for review and comment in accordance with Section E.3 before reviewing the examinations with the author or facility contact. There are no minimum or maximum limits on the number or scope of changes the chief examiner may direct the author or facility contact to make to the proposed tests, provided that they are necessary to make the tests conform with established acceptance criteria. Refer to ES-201 for additional guidance regarding NRC

response to facility-developed examinations that are significantly deficient.

e. Upon supervisory approval, and generally at least 14 days before the operating tests are scheduled to be given, the chief examiner will review the tests with the facility licensee in accordance with ES-201.

Tests that were developed by the NRC shall be clean, properly formatted, and "ready-to-give" before they are reviewed with the facility licensee. The region shall not rely on the facility licensee to ensure that the tests are of acceptable quality to administer.

f. After reviewing the tests with the facility licensee, the chief examiner will ensure that any comments and recommendations are resolved and the tests are revised as necessary. If the facility licensee developed the tests, it will generally be expected to make whatever changes are recommended by the NRC.

g. After the necessary changes have been made and the chief examiner is satisfied with the examination, he or she will sign Form(s) ES-301-3 and forward the test package to the responsible supervisor for final approval.

3. NRC Supervisory Review

a. Per ES-201, the responsible supervisor (or a designated alternate other than the NRC author or chief examiner) shall review and approve the operating tests before the facility prereview. The supervisory review is not intended to be another detailed review, but rather a general assessment of test quality, including a review of the changes recommended by the chief examiner, and a check to ensure that all of the applicable administrative requirements have been implemented.

b. The responsible supervisor should ensure that any significant deficiencies in the original operating tests submitted by a facility licensee are evaluated in accordance with ES-201 to determine the appropriate course of action. At a minimum, the supervisor should ensure that they are addressed in the final examination report in accordance with ES-501.

c. Following the facility review, the responsible supervisor should again review the tests to ensure that the concerns expressed by the facility licensee and the chief examiner have been appropriately addressed. The supervisor shall not sign Form(s) ES-301-3 until he or she is satisfied that the examination is acceptable to be administered.

F. ATTACHMENTS/FORMS

Form ES-301-1, "Administrative Topics Outline"

Form ES-301-2,	"Individual Walk-Through Test Outline"
Form ES-301-3,	"Operating Test Quality Assurance Checklist"
Form ES-301-4,	"Simulator Scenario Quality Assurance Checklist"
Form ES-301-5,	"Transient and Event Checklist"
Form ES-301-6,	"Competencies Checklist"

Facility: _____ Date of Examination: _____

Examination Level (circle one): RO / SRO Operating Test Number: _____

Administrative Topic/Subject Description		Describe method of evaluation: 1. ONE Administrative JPM, OR 2. TWO Administrative Questions
A.1		
A.2		
A.3		
A.4		

Facility: _____ Date of Examination: _____
Exam Level (circle one): RO / SRO(I) / SRO(U) Operating Test No.: _____

System / JPM Title / Type Codes*	Safety Function	Planned Follow-up Questions: K/A/G - Importance - Description
1.		a.
		b.
2.		a.
		b.
3.		a.
		b.
4.		a.
		b.
5.		a.
		b.
6.		a.
		b.
7.		a.
		b.
8.		a.
		b.
9.		a.
		b.
10.		a.
		b.

* Type Codes: (D)irect from bank, (M)odified from bank, (N)ew, (A)lternate path, (C)ontrol room, (S)imulator, (L)ow-Power, (P)lant, (R)CA

Facility:	Date of Examination:	Operating Test Number:

	1. GENERAL CRITERIA	Initials a	Initials b	Initials c
a.	The operating test conforms with the previously approved outline; changes are consistent with sampling requirements (e.g., 10 CFR 55.45, operational importance, safety function distribution).			
b.	Repetition from operating tests used during previous licensing examinations is within acceptable limits (30% for the walk-through) and should not compromise test integrity.			
c.	Day-to-day repetition between this and other operating tests to be administered is within acceptable limits (30% of bank JPMs for the walk-through; none for the simulator).			
d.	Overlap with the written examination and between operating test categories is within acceptable limits.			
e.	It appears that the operating test will differentiate between competent and less-than-competent applicants at the designated license level.			
	2. WALK-THROUGH (CATEGORY A & B) CRITERIA	---	---	---
a.	Each JPM includes the following, as applicable: • initial conditions • initiating cues • references and tools, including associated procedures • validated time limits (average time allowed for completion) and specific designation if deemed to be time critical by the facility licensee • specific performance criteria that include: - detailed expected actions with exact criteria and nomenclature - system response and other examiner cues - statements describing important observations to be made by the applicant - criteria for successful completion of the task - identification of critical steps and their associated performance standards - restrictions on the sequence of steps, if applicable			
b.	Prescripted (Administrative and JPM follow-up) questions are predominantly open reference and meet the criteria in Appendix C.			
c.	There are no direct look-up questions; memory level questions do not permit the use of references.			
d.	At least 20 percent of the JPMs and questions on each test are new or significantly modified.			
	3. SIMULATOR (CATEGORY C) CRITERIA	---	---	---
a.	The associated simulator operating tests (scenario sets) have been reviewed in accordance with Form ES-301-4 and a copy is attached.			

	Printed Name / Signature	Date
a. Author		
b. Facility Reviewer(*)		
c. NRC Chief Examiner (*)		
d. NRC Supervisor (*)		

(*) The facility signature is not applicable for NRC-developed tests; two independent NRC reviews are required.

Facility: Date of Exam: Scenario Numbers: / / Operating Test No.:

QUALITATIVE ATTRIBUTES		Initials a	b	c
1.	The scenarios have clearly stated objectives in the scenario summaries.			
2.	The initial conditions are realistic, in that some equipment and/or instrumentation may be out of service, but it does not cue the operators into expected events.			
3.	The scenarios consist mostly of related events.			
4.	Each event description consists of • the point in the scenario when it is to be initiated • the malfunction(s) that are entered to initiate the event • the symptoms/cues that will be visible to the crew • the expected operator actions (by shift position) • the event termination point (if applicable)			
5.	No more than one non-mechanistic failure (e.g., pipe break) is incorporated into the scenario without a credible preceding incident such as a seismic event.			
6.	The events are valid with regard to physics and thermodynamics.			
7.	Sequencing and timing of events is reasonable, and allows the examination team to obtain complete evaluation results commensurate with the scenario objectives.			
8.	If time compression techniques are used, the scenario summary clearly so indicates. Operators have sufficient time to carry out expected activities without undue time constraints. Cues are given.			
9.	The simulator modeling is not altered.			
10.	The scenarios have been validated.			
11.	Every operator will be evaluated using at least one new scenario. All other scenarios have been modified in accordance with Section D.4 of ES-301.			
12.	All individual operator competencies can be evaluated, as verified using Form ES-301-6 (submit the form along with the simulator scenarios).			
13.	Each applicant will be significantly involved in the minimum number of transients and events specified on Form ES-301-5 (submit the form along with the simulator scenarios).			
14.	The level of difficulty is appropriate to support licensing decisions for each crew position.			

TARGET QUANTITATIVE ATTRIBUTES (PER SCENARIO)		Actual Attributes	---	---	---
1.	Total malfunctions (5-8)	/ /			
2.	Malfunctions after EOP entry (1-2)	/ /			
3.	Abnormal events (2-4)	/ /			
4.	Major transients (1-2)	/ /			
5.	EOPs entered/requiring substantive actions (1-2)	/ /			
6.	EOP contingencies requiring substantive actions (0-2)	/ /			
7.	Critical tasks (2-3)	/ /			

OPERATING TEST NO.:

Applicant Type	Evolution Type	Minimum Number	Scenario Number			
			1	2	3	4
RO	Reactivity	1				
	Normal	1				
	Instrument	2				
	Component	2				
	Major	1				
As RO	Reactivity	1				
	Normal	0				
	Instrument	1				
	Component	1				
	Major	1				
SRO-I						
As SRO	Reactivity	0				
	Normal	1				
	Instrument	1				
	Component	1				
	Major	1				
SRO-U	Reactivity	0				
	Normal	1				
	Instrument	1				
	Component	1				
	Major	1				

Instructions: (1) Enter the operating test number and Form ES-D-1 event numbers for each evolution type.
(2) Reactivity manipulations must be significant as defined in Appendix D.

Author: _____
Chief Examiner: _____

Competencies	Applicant #1 RO/SRO-I/SRO-U				Applicant #2 RO/SRO-I/SRO-U				Applicant #3 RO/SRO-I/SRO-U			
	SCENARIO				SCENARIO				SCENARIO			
	1	2	3	4	1	2	3	4	1	2	3	4
Understand and Interpret Annunciators and Alarms												
Diagnose Events and Conditions												
Understand Plant and System Response												
Comply With and Use Procedures (1)												
Operate Control Boards (2)												
Communicate and Interact With the Crew												
Demonstrate Supervisory Ability (3)												
Comply With and Use Tech. Specs. (3)												

Notes:

(1) Includes Technical Specification compliance for an RO.
(2) Optional for an SRO-U.
(3) Only applicable to SROs.

Instructions:

Circle the applicant's license type and enter the event numbers that test the competency for each scenario in the set.

Author: _____

Chief Examiner: _____

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Division of Reactor Controls and Human Factors
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555–0001

ABSTRACT

The Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized-Water Reactors (PWRs) (NUREG-1122, Revision 1) provides the basis for the development of content-valid licensing examinations for reactor operators (ROs) and senior reactor operators (SROs). The examinations developed using the PWR Catalog along with the Operator Licensing Examiner Standards (NUREG-1021) and the Examiner's Handbook for Developing Operator Licensing Written Examinations (NUREG/BR-0122), will cover the topics listed under Title 10, Code of Federal Regulations, Part 55 (10 CFR 55).

The PWR Catalog contains approximately 5,100 knowledge and ability (K/A) statements for ROs and SROs at PWRs. The catalog is organized into six major sections: Catalog Organization, Generic Knowledge and Ability Statements, Plant Systems, Emergency and Abnormal Plant Evolutions, Components and Theory.

Revision 1 to the PWR Catalog represents a modification in form and content of the original catalog. The K/As were linked to their applicable 10 CFR 55 item numbers. Generic Knowledges and Abilities were expanded. Systems were organized into nine safety functions and the emergency and abnormal evolutions were reorganized and expanded. .

2.2 Equipment Control (Continued)

2.2.18 **Knowledge of the process for managing maintenance activities during shutdown operations.**
(CFR: 43.5 / 45.13)
IMPORTANCE RO 2.3 SRO 3.6

2.2.19 **Knowledge of maintenance work order requirements.**
(CFR: 43.5 / 45.13)
IMPORTANCE RO 2.1 SRO 3.1

2.2.20 **Knowledge of the process for managing troubleshooting activities.**
(CFR: 43.5 / 45.13)
IMPORTANCE RO 2.2 SRO 3.3

2.2.21 **Knowledge of pre- and post-maintenance operability requirements.**
(CFR: 43.2)
IMPORTANCE RO 2.3 SRO 3.5

2.2.22 **Knowledge of limiting conditions for operations and safety limits.**
(CFR: 43.2 / 45.2)
IMPORTANCE RO 3.4 SRO 4.1

2.2.23 **Ability to track limiting conditions for operations.**
(CFR: 43.2 / 45.13)
IMPORTANCE RO 2.6 SRO 3.8

2.2.24 **Ability to analyze the affect of maintenance activities on LCO status.**
(CFR: 43.2 / 45.13)
IMPORTANCE RO 2.6 SRO 3.8

2.2.25 **Knowledge of bases in technical specifications for limiting conditions for operations and safety limits.**
(CFR: 43.2)
IMPORTANCE RO 2.5 SRO 3.7

2.2.26 **Knowledge of refueling administrative requirements.**
(CFR: 43.5 / 45.13)
IMPORTANCE RO 2.5 SRO 3.7

2.2.27 **Knowledge of the refueling process.**
(CFR: 43.6 / 45.13)
IMPORTANCE RO 2.6 SRO 3.5

2.4 Emergency Procedures /Plan (Continued)

2.4.37 **Knowledge of the lines of authority during an emergency.**
(CFR: 45.13)
IMPORTANCE RO 2.0 SRO 3.5

2.4.38 **Ability to take actions called for in the facility emergency plan, including (if required) supporting or acting as emergency coordinator.**
(CFR: 43.5 / 45.11)
IMPORTANCE RO 2.2 SRO 4.0

2.4.39 **Knowledge of the RO's responsibilities in emergency plan implementation.**
(CFR: 45.11)
IMPORTANCE RO 3.3 SRO 3.1

2.4.40 **Knowledge of the SRO's responsibilities in emergency plan implementation.**
(CFR: 45.11)
IMPORTANCE RO 2.3 SRO 4.0

2.4.41 **Knowledge of the emergency action level thresholds and classifications.**
(CFR: 43.5 / 45.11)
IMPORTANCE RO 2.3 SRO 4.1

2.4.42 **Knowledge of emergency response facilities.**
(CFR: 45.11)
IMPORTANCE RO 2.3 SRO 3.7

2.4.43 **Knowledge of emergency communications systems and techniques.**
(CFR: 45.13)
IMPORTANCE RO 2.8 SRO 3.5

2.4.44 **Knowledge of emergency plan protective action recommendations.**
(CFR: 43.5 / 45.11)
IMPORTANCE RO 2.1 SRO 4.0

2.4.45 **Ability to prioritize and interpret the significance of each annunciator or alarm.**
(CFR: 43.5 / 45.3 / 45.12)
IMPORTANCE RO 3.3 SRO 3.6

2.4.46 **Ability to verify that the alarms are consistent with the plant conditions.**
(CFR: 43.5 / 45.3 / 45.12)
IMPORTANCE RO 3.5 SRO 3.6

CATAWBA OPERATIONS TRAINING
HLP 97-1 SCHEDULE
REV. 21

WEEK 1

TIME/DATE	01/06/97	01/07/97	01/08/97	01/09/97	01/10/97
0700	INTRODUCTION	OP	VI	AS	EXAM #1
0800	NS-01				
0900			RFY	STUDY	
1000	TECH SPECS				
1100		UNIT DIFFERENCES STUDY	STUDY		
1200					
1300					
1400					
1500					
1600					
1700					
1800					
1900					
2000					
2100					
2200					
2300					
2400					
0100					

SELF STUDY: KR; RL; EFA

DRAWING:

CLASSROOM ATTENDANCE AS OF 1/6-10/97

HLP CLASS

TEST 1

CLASS/INSTR	NSO1/SMJ		ADM-TS/GBI		ADM-OP/GBI		ADM-UD/RLE		SS-VI/SMJ		SS-RFY/TNC		SS-AS/REK		TOTAL
NAME	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	HRS
Capps, S. E.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Cornwell, R. J.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Daniels, G. L.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Evans, K. L.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Garrison, T. W.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Gates, J. L.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Gooch, A. W.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Heavner, M. D.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Herring, R. L.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Howington, G. S.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Jackson, G. M.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Kulesa, E. B.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Rudd, W. G.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Simril, R. T.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
Smith, B. W.	1/6	1	1/6	4	1/7	1	1/7	0.5	1/8	2	1/8	1	1/9	1	10.5
															0

CLASS/INSTR															TOTAL
NAME	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	HRS
Capps, S. E.															10.5
Cornwell, R. J.															10.5
Daniels, G. L.															10.5
Evans, K. L.															10.5
Garrison, T. W.															10.5
Gates, J. L.															10.5
Gooch, A. W.															10.5
Heavner, M. D.															10.5
Herring, R. L.															10.5
Howington, G. S.															10.5
Jackson, G. M.															10.5
Kulesa, E. B.															10.5
Rudd, W. G.															10.5
Simril, R. T.															10.5
Smith, B. W.															0

LPSO TRAINING OBJECTIVES

1. Describe the purpose of Tech Specs
2. List the different sections of Tech Specs
3. Describe the information contained in each LCO as follows:
   - 3.1 Limiting Condition for Operation
   - 3.2 Applicability
   - 3.3 Action Statement
   - 3.4 Surveillance Requirements
4. Describe Technical Specification as they apply to the responsibilities of a Reactor Operator in accordance with NSD 203 Operability and CNS Site Directive 3.1.18 Compensatory Actions.
5. Describe OMP 2-29 "Technical Specification Action Item Logbook"
6. Describe CNS Site Directive "FSAR and Technical Specification Amendment Processing and Interpretation
7. List definitions as found in Section 1.0 of Tech Specs.
8. List Specific Technical Specifications as found in Sections 2.0 and 3.0.
9. Describe information in the following sections:
   - 9.1 Section 4.0 Surveillance Requirements
   - 9.2 Section 5.0 Design Features
   - 9.3 .Sections 6.0 Administrative Controls
   - 9.4 Bases for Section 3.0 & 4.0
10. Describe information contained in "Selected Licensee Commitments".
11. Apply Tech Specs to a given situation, using reference material that would normally be available to the senior reactor operator.

TIME: 2.0 HOURS

TECHNICAL SPECIFICATIONS

LESSON PLAN

P:staff IGBI/ ADM-TS.DOC

Prepared By: _____ Date_____

Reviewed By: _____ Date_____

Ops Review : _____ Date_____

Approved By: _____ Date_____

1. OVERVIEW:

This lesson provides an in-depth look at the Technical Specifications book as to the types of information contained therein. It does not teach the student specific specifications.

2. REFERENCES:

2.1 Technical Specifications and Interpretations

2.2 10CFR50 "Domestic Licensing of Production and Utilization Facilities", Paragraph 50.36 "Technical Specifications"

2.3 OMP 2-29 Technical Specification Logbook

2.4 INPO Task List 1190150301 Apply Tech Spec Requirements

2.5 CNS Site Directive 2.1.7 "FSAR and Technical Specification Amendment Processing and Interpretation."

2.6 FSAR Chapter 16.0 "Selected Licensee Commitments"

2.7 Nuclear System Directive : 203. Operability

2.8 Catawba Nuclear Site Directive : 3.1.18 Compensatory Action

3. AIDS:

3.1 Handout(s) as prepared by the Instructor

3.2 Transparencies selected by the Instructor

3.3 Slides, videos and/or other motivational tools at the Instructors discretion

ISS TRAINING OBJECTIVES

1. Discuss orally and in writing, the purpose of Tech specs.
2. List the different sections of Tech Specs
3. Define the following terms:
   - 3.1 Containment Integrity
   - 3.2 Core Alteration
   - 3.3 Operable
   - 3.4 Operational Mode
   - 3.5 Reactor Building Integrity
   - 3.6 Unrestricted Area
   - 3.7 LCO
   - 3.8 Applicability
   - 3.9 Surveillance Requirements
4. Describe Technical Specifications as they apply to the responsibilities of a NON Licensed Operator in accordance with CNSD 3.1.18.

TIME: 1.0 HOURS

NLO TRAINING OBJECTIVES

1. Discuss orally and in writing, the purpose of Tech specs.
2. List the different sections of Tech Specs
3. Define the following terms:
   - 3.1 Containment Integrity
   - 3.2 Core Alteration
   - 3.3 Operable
   - 3.4 Operational Mode
   - 3.5 Reactor Building Integrity
   - 3.6 Unrestricted Area
   - 3.7 LCO
   - 3.8 Applicability
   - 3.9 Surveillance Requirements
4. Describe Technical Specifications as they apply to the responsibilities of a NON Licensed Operator in accordance with CNSD 3.1.18.

TIME: 1.0 HOUR

LPRO TRAINING OBJECTIVES

1. Describe the purpose of Tech Specs
2. List the different sections of Tech Specs
3. Describe the information contained in each LCO as follows:
   - 3.1 Limiting Condition for Operation
   - 3.2 Applicability
   - 3.3 Action Statement
   - 3.4 Surveillance Requirements
4. Describe Technical Specifications as they apply to the responsibilities of a Reactor Operator in accordance with NSD 203 Operability and CNS Site Directive 3.1.18 Compensatory Actions.
5. Describe OMP 2-29 "Technical Specification Action Item Logbook"
6. Describe CNS Site Directive "FSAR and Technical Specification Amendment Processing and Interpretation
7. List definitions as found in Section 1.0 of Tech Specs.
8. List Specific Technical Specifications as found in Sections 2.0 and 3.0.
9. Describe information in the following sections:
   - 9.1 Section 4.0 Surveillance Requirements
   - 9.2 Section 5.0 Design Features
   - 9.3 Sections 6.0 Administrative Controls
10. Describe information contained in "Selected Licensee Commitments".
11. Apply Tech Specs to a given situation, using reference material that would normally be available to the reactor operator.

TIME: 2.0 HOURS

LPSO TRAINING OBJECTIVES

1. Describe the purpose of Tech Specs
2. List the different sections of Tech Specs
3. Describe the information contained in each LCO as follows:
   - 3.1 Limiting Condition for Operation
   - 3.2 Applicability
   - 3.3 Action Statement
   - 3.4 Surveillance Requirements
4. Describe Technical Specification as they apply to the responsibilities of a Reactor Operator in accordance with NSD 203 Operability and CNS Site Directive 3.1.18 Compensatory Actions.
5. Describe OMP 2-29 "Technical Specification Action Item Logbook"
6. Describe CNS Site Directive "FSAR and Technical Specification Amendment Processing and Interpretation
7. List definitions as found in Section 1.0 of Tech Specs.
8. List Specific Technical Specifications as found in Sections 2.0 and 3.0.
9. Describe information in the following sections:
   - 9.1 Section 4.0 Surveillance Requirements
   - 9.2 Section 5.0 Design Features
   - 9.3 Sections 6.0 Administrative Controls
   - 9.4 Bases for Section 3.0 & 4.0
10. Describe information contained in "Selected Licensee Commitments".
11. Apply Tech Specs to a given situation, using reference material that would normally be available to the senior reactor operator.

TIME: 2.0 HOURS

PTRQ TRAINING OBJECTIVES

1. Describe the purpose of Tech Specs
2. List the different sections of Tech Specs
3. Describe the information contained in each LCO as follows:
   - 3.1 Limiting Condition for Operation
   - 3.2 Applicability
   - 3.3 Action Statement
   - 3.4 Surveillance Requirements
4. Describe Technical Specification as they apply to the responsibilities of a Senior Reactor Operator in accordance with NSD 203 Operability and CNS Site Directive 3.1.18 Compensatory Actions.
5. Describe OMP 2-29 "Technical Specification Action Item Logbook"
6. Describe CNS Site Directive "FSAR and Technical Specification Amendment Processing and Interpretation
7. List definitions as found in Section 1.0 of Tech Specs.
8. List Specific Technical Specifications as found in Sections 2.0 and 3.0.
9. Describe information in the following sections:
   - 9.1 Section 4.0 Surveillance Requirements
   - 9.2 Section 5.0 Design Features
   - 9.3 Sections 6.0 Administrative Controls
   - 9.4 Bases for Section 3.0 & 4.0
10. Describe information contained in "Selected Licensee Commitments".
11. Apply Tech Specs to a given situation, using reference material that would normally be available to the operator.

TIME: 2.0 HOURS

LESSON OUTLINE

1. INTRODUCTION

- 1.1 Objective
- 1.2 Purpose
- 1.3 Requirements

2. LESSON PRESENTATION

- 2.1 Limiting Condition for Operation
- 2.2 Operable/Operability
- 2.3 Tech Spec Sections
- 2.4 Tech Spec Action Item Log Book
- 2.5 Tech Spec Interpretations
- 2.6 Selected Licensee Commitments
- 2.7 Operational occurrences

3. SUMMARY

- 3.1 Purpose
- 3.2 Objectives

1. INTRODUCTION

1.1 Cover objectives with class

1.2 Purpose - Technical Specifications provide limits and guidelines for the safe operation of the plant to minimize hazards to the public and maintain plant integrity. (ISS & NLO Obj. 1) (LPRO & LPSO Obj. 1)

1.3 Requirements

A. Tech Specs are required by 10CFR50 Section 50.36 as follows:

- Each applicant for a license authorizing operation of a production or utilization facility shall include in the application proposed Tech Specs in accordance with requirements of this section. A summary statement of the bases or reasons for such specifications, other than those covering administrative controls, shall also be included in the application but shall not become part of the technical specification.

B. 10CFR50 also denotes what sections must be covered by Tech Specs. These will be covered in the next section of this lesson.

2. LESSON PRESENTATION

2.1 Limiting condition for operation (LCO) - each Tech Spec LCO is divided into 4 parts: (ISS & NLO Obj. 3.7, 3.8, & 3.9) (LPRO & LPSO Obj. 3)

A. LCO - Describes the lowest functional capability or performance levels of equipment required for safe operation of the facility.

B. Applicability - Describes when the LCO conditions are required (modes)

C. Action Statement - Describes the required actions to be taken should the conditions described in the LCO not be met.

D. Surveillance Requirements - Describes the methods by which operability of equipment or systems is determined which ultimately determines whether the conditions set forth by the LCO can be met.

2.2 Using NSD 203 Operability , cover the requirements for operability determination. (NLO/ISS/LPRO/LPSO/PTRQ Obj. #4.

A. SSC's clearly inoperable upon initial discovery(section 203.6.1).

B. SSC's requires an operability evaluation upon initial discovery)(section 203.6.2).

C. The SSC requires a past operability evaluation(section 203.6.3)

D. The SSC is found to be inoperable from some previous time at initial discovery (section 203.6.4).

E. Responsibilities of OSM's.

2.3 Tech Spec Sections (ISS & NLO Obj. 2.) (LPRO & LPSO Obj. 2 & 4)

A. Section 1.0 "Definitions" (ISS & NLO Obj. 3.1 thru 3.6) (LPRO & LPSO Obj. 7

1. Provides definitions for key terms used in Tech Specs.
2. The student should have a working knowledge of all definitions in this section.

B. Section 2.0 "Safety Limits and Limiting Safety Systems Settings" (LPRO & LPSO Obj. 8)

1. Required by 10CFR50 paragraph 50.36(c)(1).
   a) Safety limits for nuclear reactors are limits on important process variables which are found to be necessary to reasonably protect the integrity of certain of the physical barriers which guard against the uncontrolled release of radioactivity.
   b) If any safety limit is exceeded, the Reactor shall be S/D.
2. The bases for Section 2.0 are included as Section 2.1. - The bases summarize the reasons for the specifications found in Section 2.0

C. Section 3.0 "Limiting Conditions for Operations" (LCO) - (LPRO & LPSO Obj. 8)

1. 10CFR50 paragraph 50.36(c)(2)
   a) LCO's are the lowest functional capability or performance levels of equipment required for safe operation of the facility.
   b) When a LCO cannot be met, the applicable action statement shall be applied.
2. Section 3.0 is subdivided into sections to cover the different areas of systems in the plant:
   a) Applicability/Section 3.0
      1) Applicability refers to WHEN a component or system is required to be operable.
      2) Section 3.0.1 states that LCOs must be complied with when specified by the individual Tech Spec. If the LCO cannot be met, then the associated action statement shall be complied with 3.0.1 implies that components are expected to be available to perform their intended function, therefore, intentional removal of equipment from service must be evaluated based on criteria specified by management.
      3) Section 3.0.2 defines 'non-compliance' as failure to comply with the LCO or the ACTION within the specified time interval. The ACTION clock begins at the time responsible station personnel determine inoperability.

4) Section 3.0.3 provides guidance when neither the LCO or the ACTION can be complied with. Provides a 'blanket' action. Action must be taken within 1 hour to place the Unit in a Mode that the LCO does not apply. 1 hour is provided to allow adequate time to prepare for an orderly shutdown.

5) Place the unit as applicable in:

   (a) Mode 3 within the next 6 hours

   (b) Mode 4 within the following 6 hours

   (c) Mode 5 within the subsequent 24 hours

   Implementation of 3.0.3 has been interpreted by CNS management as follows. If there is a high confidence that the inoperable components can be restored to operability prior to the end of the first 7 (1+6) hours, a power reduction is not necessary. If it is uncertain whether equipment problems can be resolved, operation may continue up to 3 hours prior to initiating power reduction while the problem is assessed. All required power reductions will begin at a time that will allow for a controlled shutdown to be performed.

6) It should be noted that 3.0.3 is not necessarily the most restrictive action applicable in all cases.

7) The time allowed under any ACTION is provided to allow controlled and orderly shutdown. For example, if a unit which is currently in Mode 3 were to enter an ACTION requiring shutdown to Mode 3 in 6 hours and shutdown to Mode 4 in the following 6 hours, the unit must be in Mode 4 within 6 hours as the 6 hours allowed to achieve Mode 3 is not needed. However, if the unit were in Mode 1 and enters the same action, any time left over from the 6 hours required to reach Mode 3 may be added to the time required to reach Mode 4. In this case, the full 12 hours would be allowed to reach Mode 4.

8) Section 3.0.4 establishes limitations on mode changes when LCOs are not met. Entry into a mode with equipment inoperable that is required in that mode is prohibited unless:

   (a) The specific Tech Spec states that 3.0.4 is not applicable or,

   (b) The associated ACTION does not require a shutdown.

   If the applicable mode is exited, then the ACTION clock may be reset to 0.

MODE

Mode of Operation is that combination of reactivity condition, power level, and reactor coolant temperature as specified in Definitions table 1-2.

SPECIFIED CONDITION

Specified Condition means a condition other than strictly a mode requirement that is described in the APPLICABILITY section of the individual Tech Spec. It must appear in this location to be considered a specified condition in the context of T.S. 3.0.4. An example is 'loops filled' and 'loops not filled'.

~~9) Section 3.0.5 states that Tech Specs apply to both units individually except as specifically noted.~~

b) Section 3.1 - "Reactivity Control Systems" - States the LCO's for systems required to control reactivity in the core. It also describes requirements for shutdown margin, minimum temp for criticality and rod insertion limits.

c) Section 3.2 - "Power Distribution Limits" - States the limits for various core/NC system parameters that must be met to prevent over power or over temp conditions at any particular area in the core.

d) Section 3.3 - "Instrumentation" - States the minimum requirements for various instrumentation required to monitor plant parameters during normal operation and accident conditions. It also states the instrumentation requirements for ESF actuation.

e) Section 3.4 - "Reactor Coolant System" - States the requirements for normal operation of the NC system. This includes various pieces of equipment, leakage requirements, chemistry & activity of the primary system and pressure/temp limits.

f) Section 3.5 - "Emergency Core Cooling Systems" - States the operability requirements necessary for protection of the core during LOCA events.

g) Section 3.6 - "Containment Systems" - States the LCO's for systems affecting Containment Integrity, temperature, pressure, H_2 removal, ice condensers and containment ventilation systems.

h) Section 3.7 - "Plant Systems" - States the LCO's for the secondary plant systems, primary support systems, chemistry, ventilation and standby shutdown system.

i) Section 3.8 - "Electrical Power Systems" - States the LCO's for electrical system requirements both on and off site.

j) Section 3.9 - "Refueling Operations" - States the LCO's specific to refueling operations.

k) Section 3.10 "Special Test Exceptions" - During certain testing evolutions and other plant conditions, it is necessary to place the plant in situations that will exceed the LCO's for given systems. The "Special Test Exceptions" section gives the times, conditions, and limits for exceeding the LCO's during testing evolutions.

l) Section 3.11 - "Radioactive Effluents" - This section covers any systems in the plant designed to process, hold, or purify radioactive fluids. It also covers limits for releases and dose limits for releases.

m) Section 3.12 - "Radiological Environmental Monitoring" - This section sets forth where and how often samples are taken from the environment to monitor activity levels.

D. Section 4.0 "Surveillance Requirements" - (LPRO & LPSO Obj. 9.1)

1. 10CFR50 paragraph 50.36(c)(3) "Surveillance Requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained, that facility operations will be within the safety limits, and that the LCO's will be met."

2. Relation to LCO's

a) Every LCO in Tech Spec has a surveillance item associated with it.

b) The surveillance items are found on the same pages as the respective LCO.

c) Surveillance requirements denote operability of a system.

d) Every surveillance item is to be performed on a periodic basis. The frequency is stated in the surveillance requirement.

e) All surveillance items are performed via Periodic Test Procedures (PTs).

1) PT/1/A/4600/02 Periodic Surveillance items covers the daily and semi-daily requirements.

2) PT/1/A/4600/03A, B and C cover the Monthly, Quarterly and Annual Surveillance items.

3. Surveillance/Section 4.0

a) Section 4.0.1 states that surveillance shall be performed at the specified interval whenever the component is required to be operable. Refer to Definitions table 1-1 for a description of intervals.

b) Section 4.0.2 states that the maximum allowed extension beyond a surveillance interval shall not exceed 25% of the specified interval.

c) Section 4.0.3 states that failure to perform surveillance when required will result in the component or system being considered inoperable. The ACTION clock begins at the time it was determined that the surveillance was not performed. If, at the time of discovery, the associated ACTION requires something to be done in less than 24 hours, implementation of ACTION requirements may be delayed for up to 24 hours to allow the surveillance to be performed. Although the ACTION Clock will have started from the time of the missed surveillance, the time period between the missed surveillance and the time of discovery will be considered to have been in non-compliance and will result in a Tech Spec violation, if the associated ACTION has expired. Compliance with the ACTION at the time of discovery is required as specified above.

d) Section 4.0.4 states that surveillance is required to be current on equipment required for a mode change. If the individual Tech Spec states that 4.0.4 is not applicable, then mode change is allowed, providing that the surveillance is completed within 24 hours of the mode change. If the surveillance has not been performed in 24 hours, the component must then be declared inoperable and the ACTION complied with. If a Tech Spec does not state that 4.0.4 is not applicable but does state that 3.0.4 is not applicable, then mode change is allowed providing the component is declared inoperable at the time of the mode change and the associated ACTION complied with.

e) Section 4.0.5 states that ASME pressure vessel surveillance shall be performed. The ASME code shall not supersede Tech Specs.

~~f) Section 4.0.6 states that surveillance requirements apply to the units individually except as noted in the individual Tech Spec.~~

E. Bases for Sections 3.0 and 4.0 (LPSO Obj. 9.5)

1. Required by 10CFR50 to be in Tech Specs but not a part of Tech Specs. This section summarizes the reasons for each LCO in Section 3.0 & 4.0.

2. Required knowledge at the SRO level.

F. Section 5.0 "Design Features" (LPRO & LPSO Obj. 9.2)

1. 10CFR50 paragraph 50.36(c)(4) - "Design features to be included are those features of the facility such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety and are not covered in other areas of Tech Spec.

2. Gives design for:
   a) Site
   b) Containment
   c) Reactor Core
   d) Reactor Coolant System
   e) Meteorological Tower Location
   f) Fuel Storage
   g) Component Cyclic or transient limit

G. Section 6.0 "Administrative Controls" (LPRO & LPSO Obj. 9.3) - 10CFR50 paragraph 50.36(c)(5) - "Administrative Controls are the provisions relating to organization and management, procedures, record keeping, review and audit, and reporting necessary to assure operation of the facility."

H. Appendix B Environmental Protection Plan - This section is written to provide protection of non-radiological environmental values during operation of a nuclear facility.

1. Verifies the plant is operated in a manner acceptable to the environment.
2. Coordinates NRC requirements with other Federal, state, and local requirements.

Keeps NRC informed of environmental effects of facility construction and operations.

2.4 Tech Spec Action Item Logbook - (LPRO & LPSO Obj 5) - required by OMP 2-29-
Tech Spec Coordinator for documenting of the following Tech Spec Items:

A. Any time an LCO is exceeded and its associated action statement cannot be met for the existing mode. (Compliance with 3.0.3)

B. Inoperable equipment that causes operation in an ACTION statement for the existing mode.

C. Inoperable redundant equipment not required in the existing mode.

- EXAMPLE: in Modes 5 and 6, one NV pump and boration flow path are required to be operable; however when either of the NV pumps becomes inoperable it should be logged. This flags the operator that he can not rely on the redundant train to meet Tech. Specs. if the operable train becomes inoperable.

D. Inoperable equipment due to Surveillance Requirements.

1. Does not meet Acceptance Criteria.
2. Not performed within the specified time interval (including the additional time allowance specified in 4.0.2 of the APPLICABILITY section).

E. All equipment made inoperable by the inoperability of other systems or equipment.

1. Tells how different support components affect operability of T.S. required systems.

- EXAMPLE: Mode 5 and 6, one D/G is required operable; with either D/G inoperable it would be logged to flag the operator that he cannot rely on redundant D/G. He would also declare the train related NV pump and boration flow path and VC/YC inoperable as they rely on the D/G for an emergency power source.

F. Whenever a component which is required to be operable by a Selected Licensee Commitment (SLC) is inoperable, it shall be logged in TSAIL and identified in the Remarks column as "Selected Licensee Commitment".

2.5 Tech Spec Interpretations - Per S.D 2.1.7, section 5.5. (LPRO & LPSO Obj 6)

A. Interpretation requests are sent to the Compliance Manager and are written utilizing the recommendations of individuals familiar with the applications of Tech Specs.

B. Approved by the Station Manager.

C. Are not an official part of Tech Specs.

2.6 Selected Licensee Commitments (SLC)

A. The Selected Licensee Commitment manual is Chapter 16.0 to the CNS FSAR. It is meant to contain those commitments which required control but are not appropriate in Tech Specs as they do not impact the Design Basis Accident.

B. Allows updating material via 10CFR50.59 evaluation rather than a Tech Spec change.

C. The SLCs are formatted similar to Tech Specs:

- Applicability - equivalent to T.S. 3.0 and 4.0
- Commitment - equivalent to LCO
- Remedial Action - equivalent to T.S. Action
- Testing Requirements - equivalent to Surveillance
- References
- Bases

2.7 Operational Occurrences

A. There have been 3 occasions where valve operator chains were inappropriately secured to snubbers. With a chain attached to the snubber, the operability of the snubber becomes questionable. Therefore, where valves must be chained and locked into position, care should be taken to lock the valve to a structure that is not required to perform a safety function.

B. On November 28, 1985, at 1000 hours, with Diesel Generator (D/G) 1A inoperable, the availability of Offsite Power Sources was not verified. This was discovered at 1320 hours on November 28, 1985, and corrective action was immediately initiated to ensure Offsite Power Sources were available. Unit 1 was at 64% power at the time of this incident.

- This incident is classified as Event Cause Code A, Personnel Error. The Nuclear Equipment Operator (NLO) used the incorrect procedure to perform the required surveillance. Also, the Unit Supervisor misinformed the NLO of the requirement to verify the availability of Offsite Power Sources.
- To ensure all Tech Spec surveillance are performed using the correct procedure, a Tech Spec Procedure Cross Reference List is available in the Control Room. This list cross references each Tech Spec Action Item to the applicable procedure used to meet the required surveillance. The Unit Supervisor determines the appropriate procedure to be used, and should instruct the NLO accordingly.

C. On November 19, 1986, with the unit in Mode 2, Startup, an Assistant Nuclear Control Operator noticed that one of the four containment pressure gauges was not moving with changes in other containment pressure indications. At 0630 hours, he initiated a work request to investigate and repair the cause for the gauge not indicating properly. At 1000 hours, the Shift Technical Advisor logged the pressure gauge inoperable in the Tech Spec Action Item Log under Accident Monitoring Instrumentation Tech Spec. Subsequent investigation by IAE on December 6, with the unit at 100% power, revealed that the isolation valve for the pressure transmitter in the loop was closed. The valve had been verified open on October 28, so it was apparently closed between then and November 19. This valve being closed resulted in a violation of Tech Specs with a containment pressure channel being unknowingly inoperable and not placed in the tripped condition.

- This incident is classified as Event Cause Code A, Personnel Error. The isolation valve was inappropriately closed, resulting in the Tech. Spec violation. The individual responsible for closing the valve could not be identified.
- A contributing cause to this incident is also classified as Event Cause Code A, Personnel Error. The Shift Technical Advisor did not adequately investigate the problem to determine if the entire instrument loop was inoperable, as opposed to just the gauge. Had he determined that the loop was inoperable, he would have logged it under the Engineered Safety Features Actuation System Tech Spec, and the Tech Spec violation would not have occurred.
- This incident is reportable pursuant to 10CFR 50.73, Section (a) (2) (i) (B).

3. SUMMARY

3.1 Purpose

3.2 Objectives

CATAWBA OPERATIONS TRAINING
HLP 97-1 SCHEDULE
REV. 21

WEEK 6

TIME/DATE	02/10	02/11	02/12	02/13	02/14
0700	SEQUENCER	VA	RN	KC	STUDY
0800					
0900					
1000	REVIEW EXAM				
1100		VX			
1200					
1300		EQB FAM	EQB FAM	RN FAM	RN FAM
1400					
1500					
1600					
1700					
1800					
1900					
2000					
2100					
2200					
2300					
2400					
0100					

SELF STUDY; OMP 2-10; 2-11
DRAWING: RN; KC

CLASSROOM ATTENDANCE AS OF 2/10-18/97

HLP CLASS

TEST 5

CLASS/INSTR	DG-EQB/		PSS-VA/		CNT-VX/		DG-EQB FAM/		PSS-RN/		PSS-KC/		PSS-RN FAM/		TOTAL
NAME	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	HRS
Capps, S. E.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Cornwell, R. J.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Daniels, G. L.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Evans, K. L.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Garrison, T. W.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Gates, J. L.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Gooch, A. W.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Heavner, M. D.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Herring, R. L.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Howington, G. S.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Jackson, G. M.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Kulesa, E. B.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Rudd, W. G.	2/10	3		0		0	2/12	1.5		0	2/13	1	2/14	2.5	8
Simril, R. T.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
Smith, B. W.	2/10	3	2/11	2	2/11	1	2/12	1.5	2/12	3	2/13	1	2/14	2.5	14
															0

CLASS/INSTR	PSS-KC FAM/														TOTAL
NAME	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	HRS
Capps, S. E.	2/17	2													16
Cornwell, R. J.	2/17	2													16
Daniels, G. L.	2/17	2													16
Evans, K. L.	2/17	2													16
Garrison, T. W.	2/17	2													16
Gates, J. L.	2/17	2													16
Gooch, A. W.	2/17	2													16
Heavner, M. D.	2/17	2													16
Herring, R. L.	2/17	2													16
Howington, G. S.	2/17	2													16
Jackson, G. M.	2/17	2													16
Kulesa, E. B.	2/17	2													16
Rudd, W. G.	2/17	2													10
Simril, R. T.	2/17	2													16
Smith, B. W.	2/17	2													16

LPSO TRAINING OBJECTIVES

1. State the purpose of the RN System.
2. List the water sources to the RN System in normal and emergency operations.
3. State the discharge path for all RN System Hx's in service during normal operations.
4. List the three ways the RN strainers backwash.
5. Explain why KC is used in some heat exchangers instead of those Hx's being cooled directly by RN. Identify the one Hx which is the exception.
6. Explain the RN system alignment for the following conditions:
   - 6.1 Normal operation
   - 6.2 Compliance with Tech Specs.
   - 6.3 SNSWP Ice Melt
   - 6.4 SNSWP Makeup
7. Explain how to initiate emergency cooling water supply to Service Building Instrument Air.
8. List the loads on the essential and non-essential headers.
9. Describe how RN pumps minimum flow protection is accomplished.
10. Explain the action which takes place on a blackout, an emergency low pit level, a safety injection signal, an S_p signal, and ASP to local.
11. Describe the reason for <u>not</u> isolating the Auxiliary Building non-essential header supply valve on a blackout signal.
12. Explain what indication for the RN system are available in the control room and what the operator should expect to see on these indications during normal operation.
13. Explain the purpose of the YV system and its basic operation.

LPSO TRAINING OBJECTIVES

1. State the purpose of the RN System.
2. List the water sources to the RN System in normal and emergency operations.
3. State the discharge path for all RN System Hx's in service during normal operations.
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11. Describe the reason for <u>not</u> isolating the Auxiliary Building non-essential header supply valve on a blackout signal.
12. Explain what indication for the RN system are available in the control room and what the operator should expect to see on these indications during normal operation.
13. Explain the purpose of the YV system and its basic operation.

14. Explain the purpose of the VZ system and the basic operation of the system.

15. List the limits and precautions associated with the RN System.

16. Describe the following associated with RN system Tech Specs

    16.1 Limiting Condition for Operation

    16.2 Applicability

    16.3 Action to take for a given situation given the RN system Tech Specs and the RN Operating Procedure

    16.4 Bases

17. Explain the symptoms and discuss the supplementary actions for the loss of RN AP.

18. Given a set of specific plant conditions and all required procedures, use the rules of usage and outstanding PPRB's to identify the correct procedure flow path..

NUCLEAR SERVICE WATER

LESSON PLAN

Prepared By: C E Vickers, Jr. Date 3-9-98

Reviewed By: Ronald M Fitch Date 3-23-98

Ops Review : N/A Date

Approved By: James Tuttle Date 3/25/98

1. OVERVIEW:

This lesson provides a general description of the components. Normal and Emergency operation of the Nuclear Service Water System is also discussed.

2. REFERENCES:

2.1 Flow Diagrams CN-1574-1.0 thru CN-1574-2.8

2.2 Flow Diagrams CN-2574-2.0 thru CN-2574-2.7

2.3 Electrical Diagram CNEE 0138-01 (RN)

2.4 Electrical Diagram CNEE 0131.05 (VZ)

2.5 OP/1/A/6450/20 (Containment Chill Water System)

2.6 OP/0/A/6400/06B (Nuclear Service Water Pump Structure Ventilation System).

2.7 OP/0/A/6400/06C (Nuclear Service Water System)

2.8 OP/0/A/6400/06M (Nuclear Service Water System Unwatering Procedure)

2.9 AP/0/A/5500/20 (Loss of Nuclear Service Water)

3. AIDS:

3.1 Handout(s) as prepared by the instructor.

3.2 Transparencies selected by the instructor.

3.3 Slides, videos and/or other motivational tools at the instructors discretion.

ISS TRAINING OBJECTIVES

1. State the purpose of the RN System.
2. List the water sources to the RN System in normal and emergency operations.
3. State the discharge path for all RN System Hx's in service during normal operations.
4. List the three ways the RN strainers backwash.
5. Explain why KC is used as an intermediate cooling system. Identify the one Hx which is the exception.
6. Explain the RN system alignment for the following conditions:
   - 6.1 Normal operation
   - 6.2 Compliance with Tech Specs.
   - 6.3 SNSWP Ice Melt
   - 6.4 SNSWP Makeup
7. Explain how to initiate emergency cooling water supply to Service Building Instrument Air.
8. List the loads on the essential and non-essential headers.
9. Describe how RN pumps minimum flow protection is accomplished.
10. Explain the action which takes place on a blackout, an emergency low pit level, a safety injection signal or an S_p signal.
11. Describe the reason for <u>not</u> isolating the Auxiliary Building non-essential header supply valve on a blackout signal.
12. Draw a block diagram of the RN System per the training drawing OP-CN-PSS-RN-36.

13. Explain the purpose of the YV system and basic operation of the system.

    13.1 Purpose

    13.2 Normal Alignment

    13.3 Flow Path

    13.4 Control switch alignments & parameters required for auto swap.

    13.5 Parameters required for YV operable status

14. Explain the purpose of the VZ system and the basic operation of the system.

    14.1 Purpose

    14.2 Normal Alignment

    14.3 Describe how temperature is controlled.

15. Recognize the applicable Limits and Precautions associated with the RN System.

16. State the basic actions required of a NLO for the loss of RN (Nuclear Service Water) AP, and why.

NLO TRAINING OBJECTIVES

1. State the purpose of the RN System.
2. List the water sources to the RN System in normal and emergency operations.
3. State the discharge path for all RN System Hx's in service during normal operations.
4. List the three ways the RN strainers backwash.
5. Explain why KC is used as an intermediate cooling system. Identify the one Hx which is the exception.
6. Explain the RN system alignment for the following conditions:
   - 6.1 Normal operation
   - 6.2 Compliance with Tech Specs.
   - 6.3 SNSWP Ice Melt
   - 6.4 SNSWP Makeup
7. Explain how to initiate emergency cooling water supply to Service Building Instrument Air.
8. List the loads on the essential and non-essential headers.
9. Describe how RN pumps minimum flow protection is accomplished.
10. Explain the action which takes place on a blackout, an emergency low pit level, a safety injection signal or an S_p signal.
11. Describe the reason for <u>not</u> isolating the Auxiliary Building non-essential header supply valve on a blackout signal.

12. Explain the purpose of the YV system and basic operation of the system.

    12.1 Purpose

    12.2 Normal Alignment

    12.3 Flow Path

    12.4 Control switch alignments & parameters required for auto swap.

    12.5 Parameters required for YV operable status.

13. Explain the purpose of the VZ system and the basic operation of the system.

    13.1 Purpose

    13.2 Normal Alignment

    13.3 Describe how temperature is controlled.

14. State the basic actions required of a NLO for the loss of RN (Nuclear Service Water) AP, and why.

LPRO TRAINING OBJECTIVES

1. State the purpose of the RN System.
2. List the water sources to the RN System in normal and emergency operations.
3. State the discharge path for all RN System Hx's in service during normal operations.
4. List the three ways the RN strainers backwash.
5. Explain why KC is used in some heat exchangers instead of those Hx's being cooled directly by RN. Identify the one Hx which is the exception.
6. Explain the RN system alignment for the following conditions:
   - 6.1 Normal operation
   - 6.2 Compliance with Tech Specs.
   - 6.3 SNSWP Ice Melt
   - 6.4 SNSWP Makeup
7. Explain how to initiate emergency cooling water supply to Service Building Instrument Air.
8. List the loads on the essential and non-essential headers.
9. Describe how RN pumps minimum flow protection is accomplished.
10. Explain the action which takes place on a blackout, an emergency low pit level, a safety injection signal, an S_p signal and ASP to local.
11. Describe the reason for <u>not</u> isolating the Auxiliary Building non-essential header supply valve on a blackout signal.
12. Explain what indication for the RN system are available in the control room and what the operator should expect to see on these indications during normal operation.
13. Explain the purpose of the YV system and its basic operation.

14. Explain the purpose of the VZ system and the basic operation of the system.

15. List the limits and precautions associated with the RN System.

16. Describe the following associated with RN system Tech Specs.

    16.1 Limiting Condition for Operation

    16.2 Applicability

    16.3 Action to take for a given situation given the RN system Tech Specs and the RN Operating Procedure

17. Explain the symptoms and discuss the supplementary actions for the loss of RN AP.

LPSO TRAINING OBJECTIVES

1. State the purpose of the RN System.
2. List the water sources to the RN System in normal and emergency operations.
3. State the discharge path for all RN System Hx's in service during normal operations.
4. List the three ways the RN strainers backwash.
5. Explain why KC is used in some heat exchangers instead of those Hx's being cooled directly by RN. Identify the one Hx which is the exception.
6. Explain the RN system alignment for the following conditions:
   - 6.1 Normal operation
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   - 6.3 SNSWP Ice Melt
   - 6.4 SNSWP Makeup
7. Explain how to initiate emergency cooling water supply to Service Building Instrument Air.
8. List the loads on the essential and non-essential headers.
9. Describe how RN pumps minimum flow protection is accomplished.
10. Explain the action which takes place on a blackout, an emergency low pit level, a safety injection signal, an S_p signal, and ASP to local.
11. Describe the reason for <u>not</u> isolating the Auxiliary Building non-essential header supply valve on a blackout signal.
12. Explain what indication for the RN system are available in the control room and what the operator should expect to see on these indications during normal operation.
13. Explain the purpose of the YV system and its basic operation.

14. Explain the purpose of the VZ system and the basic operation of the system.

15. List the limits and precautions associated with the RN System.

16. Describe the following associated with RN system Tech Specs

    16.1 Limiting Condition for Operation

    16.2 Applicability

    16.3 Action to take for a given situation given the RN system Tech Specs and the RN Operating Procedure

    16.4 Bases

17. Explain the symptoms and discuss the supplementary actions for the loss of RN AP.

18. Given a set of specific plant conditions and all required procedures, use the rules of usage and outstanding PPRB's to identify the correct procedure flow path..

PTRQ TRAINING OBJECTIVES

1. List the water sources to the RN System in normal and emergency operations.
2. State the discharge path for all RN System Hx's in service during normal operations.
3. Explain the RN system alignment for the following conditions:
   - 3.1 Normal operation
   - 3.2 Compliance with Tech Specs.
   - 3.3 SNSWP Ice Melt
   - 3.4 SNSWP Makeup
4. Explain how to initiate emergency cooling water supply to Service Building Instrument Air.
5. Describe how RN pumps minimum flow protection is accomplished.
6. Explain the action which takes place on a blackout, an emergency low pit level, a safety injection signal, an S_p signal, and ASP to local.
7. Describe the reason for <u>not</u> isolating the Auxiliary Building non-essential header supply valve on a blackout signal.
8. Explain the limits and precautions associated with the RN System.
9. When given a set of Tech Specs and initial plant conditions, determine the correct action to be taken.
10. Explain the symptoms and discuss the supplementary actions for the loss of RN AP.
11. Explain the bases for the RN System Tech Specs.
12. Explain the purpose of the YV system and its basic operation.

TIME: 3.0 HOURS

OUTLINE

1. DESIGN
2. PRESENTATION
   - 2.1 General Description
   - 2.2 Component Description
   - 2.3 Limits and Precautions
   - 2.4 RN System Annunciators
   - 2.5 Tech Specs
   - 2.6 System Operation
   - 2.7 Power Supplies
   - 2.8 Incidents 27
3. SUMMARY

1. DESIGN

1.1 Purpose: (ISS/NLO/LPRO/LPSO #1)

A. The Nuclear Service Water System (RN) serves to provide assured cooling during normal and emergency conditions for all heat loads in the Auxiliary and Reactor Building except for the ice condenser (NF) System.

1. Many of the heat exchangers are cooled by RN directly.

2. The component cooling water system (KC) cools those heat exchangers in which a tube leak could allow radioactive fluid to enter the cooling water. Heat is then transferred to the RN system by the component cooling heat exchanger. (ISS/NLO/LPRO/LPSO #5)

3. One exception is the containment spray (NS) heat exchanger where post LOCA Sump water rejects the heat from the accident directly to the RN System.

a) Monitored for activity prior to RN discharge lines.

B. Supplies assured make up to various systems, such as NW, KF, CA and KC.

1.2 Design Bases: The RN System is designed to supply cooling water to various heat loads in both the safety and non-safety related portions of each unit. Provisions are made to ensure a continuous flow of cooling water to those systems and components necessary for plant safety during normal operations and under accident conditions. Sufficient redundancy of piping and components is provided to ensure that cooling is maintained to essential loads at all times including the low probability worse case combination of events which is:

A. LOCA on 1 Unit, and

B. Extended shutdown of the other unit, and

C. Loss of Lake Wylie Dam, and

D. Prolonged drought and hot weather, and

E. Loss of Offsite Power

F. Single Active Failure

2. PRESENTATION

2.1 General Description

A. The Nuclear Service Water System consists of five functional sections, which, when put together in series, serve to assure a supply of cool river water to various station heat loads and return the heated effluent back to its proper heat sink. In order of flow, these are:

1. The Source and Intake Section
2. RN Pumphouse Section
3. The Main Supply Section
4. The Heat Exchanger Section
5. The Main Return Section

B. Normal Operation Flow Path (ISS/NLO/LPRO/LPSO #6; PTRQ #3)

During normal operation, the RN pumps take suction from Lake Wylie, There is only one source leading from the lake to the RN Pumphouse serving the RN pumps in operation. In the Pumphouse there are two separate pits (Pit A and Pit B) from which two independent and redundant channels of RN pumps take suction. The Unit 1 and Unit 2 A train pumps take suction from Pit A, and the Unit 1 and Unit 2 B train pumps take suction from Pit B.

Nuclear Service Water supplied by the RN pumps is used in both units to supply essential and non-essential cooling water needs or as an assured source of water for other safety related systems.

Essential components are those necessary for the safe shutdown of the unit, and must be redundant to meet single failure criteria. Non-essential components are not necessary for the safe shutdown of the unit, and are not redundant. Each unit has two trains of essential heat exchangers designated A and B, and one train of non-essential heat exchangers supplied from either A or B.

When RN pumps are taking suction from Lake Wylie the discharge crossover valves are open, and all heat exchangers in operation discharge through the Channel A return to Lake Wylie via the Low Pressure Service Water discharge. (ISS/NLO/LPRO/LPSO #3; PTRQ #2)

One RN pump is sufficient to supply train A and train B of Unit 1 and Unit 2 with ample cooling water during normal operation.

Nuclear Service Water also serves as an assured supply of cooling water to non-safety systems VI, VV during a station blackout (non-LOCA).

C. Operation Under Emergency Flow Path (ISS/NLO/LPRO/LPSO #2/PTRQ #1)

Should Lake Wylie be lost due to a seismic event in excess of the design of Wylie Dam, the station will automatically shift its supply from Lake Wylie to the Standby Nuclear Service Water Pond (SNSWP). In order to accomplish this, several actions must take place. First, the isolation valves from the lake must close; second, the isolation valves from the pond must open; third, the return isolation valves to the lake must close; and fourth the return isolation valves to the pond must open. It is necessary to run at least 2 RN pumps to supply enough cooling to meet the worst case scenario of cooling down both units with one in a LOCA condition to cold shutdown.

2.2 Component Description

A. Source and Intake (ISS/NLO/LPRO/LPSO #2/PTRQ #1)

1. Source

a) The RN System is served by two bodies of water, Lake Wylie and the SNSWP.

1) Lake Wylie serves as the non-safety class, non-seismic, normal source of nuclear service water to both pits.

2) Suction and discharge valves swap at 557.5'.

3) Control Room indication of Lake Wylie level is provided.

b) The SNSWP is designed to supply adequate cooling water during a one unit LOCA and simultaneous single unit cooldown and to supply a sufficient quantity of cooling water to the RN system to allow operation of safety related equipment for a period of 30 days following the LOCA.

1) Natural water shed (approx. 46 acres) to maintain level, with overflow provided to Lake Wylie at 574 ft. May add to SNSWP from Lake Wylie using RN pump.

2) Level indication is provided in the Control Room for SNSWP.

3) Annunciator alarm is initiated on low level of 572 ft and annunciator alarm is initiated at low-low level of 571.5 ft.

2. SNSWP Intake

a) The SNSWP intake structure is Category 1 seismically designed structure with two transport lines to the RN pumphouse, one for each pumphouse pit. Water is drawn through a bar screen trash rack at a velocity less than 0.5 ft/sec, as required by the EPA. Each transport line can be secured by a single motor operated valve in the RN Pumphouse.

3. Lake Wylie Intake

   a) The Lake Wylie RN Intake Structure is identical in design to the SNSWP Intake Structure, with the exception that only one line leads from the structure to the RN Pumphouse. Outside the RN Pumphouse wall this line splits, one line entering each pit. Inside each pit, the lines are secured by two EMO valves in series, each powered from separate normal and assured power supplies. This configuration assures at least one valve will function following a seismic event to prevent loss of the SNSWP to a "dry" Lake Wylie.

4. SNSWP and Lake Intake Isolation Valves

   a) 1RN1A, 1RN2B, 1RN5A, 1RN6B; pumphouse isolation valves from Lake Wylie

      1) Normally open

      2) Close automatically on:

         (a) Pit emergency low level or Unit 1 ASP to LOCAL

            (1) Valve will cycle open and then back closed if position is attempted to be changed within 2 minutes of receiving Pit emergency low level.

      3) EMO from Control Room or Auxiliary handwheel on 600' level in pumphouse.

      4) Powered from essential motor control center in RN pumphouse

   b) 1RN3A, 1RN4B; Pumphouse isolation valves from SNSWP

      1) Normally closed

      2) Opens automatically on

         (a) Pit emergency low level or Unit 1 ASP to LOCAL

            (1) Valve will cycle closed and then back open if position is attempted to be changed within 2 minutes of receiving Pit emergency low level.

      3) EMO from Control room or Auxiliary handwheel

      4) Powered from essential motor control center in RN pumphouse

5. Freeze Protection

   a) Ice formation in the source and intake section is felt to be impossible because the intake structures are well below the surface of Lake Wylie and the SNSWP. In cold weather the RN system can be aligned to the SNSWP to prevent severe ice accumulation on the surface of the pond. (ISS/NLO/LPRO/LPSO #6.3; PTRQ #3.3)

B. RN Pumphouse Section

1. RN Pumphouse Structure

a) The RN Pumphouse was designed to protect the RN pumps. The Pumphouse is a Category I seismically designed concrete structure capable of withstanding a safe shutdown earthquake, tornado missile, or maximum probable flood. It contains two separate pits from which independent channels of RN pumps draw suction. The train A section is physically separated from the train B section by a concrete wall.

b) Flow enters each pit from either Lake Wylie or the SNSWP and is diffused by a wall perforated with 3" holes. These "flow spreaders" prevent excessive vortices and flow irregularities. Flowing back to the pumps, the water is strained by 1" x 1" removable lattice screens that can be pulled out in sections by a monorail hoist.

c) The operating floor of the RN Pumphouse is located above maximum flood level. The RN pump motors, RN strainers, and electric motor operators for the pit isolation valves are located on this level.

d) A trough (curbed area) is provided on the operating floor above each Pumphouse pit where debris can be hosed off the lattice screens. Debris is flushed outside to the RN Pumphouse trash basket.

2. RN Pumphouse Components

a) RN Pumps

Four nuclear service water pumps (RN pumps) supply nuclear service water to the entire station. The pumps are numbered 1A, 2A, 1B, and 2B to identify their Unit and emergency power sources. Pumps 1A and 2A draw water from the "A" pit and discharge into a common train A supply header that services both units. Likewise, pumps 1B and 2B draw water from the "B" pit and discharge into a common train B supply header that serves both units.

1) Powered from 4160V essential Bus

(a) 1A - 1ETA

(b) 1B - 1ETB

(c) 2A - 2ETA

(d) 2B - 2ETB

2) Cooled by RN

(a) Upper bearing oil cooler

(b) Motor cooler

(c) Shaft bearing and seals

3) Pumps (ISS/NLO/LPRO/LPSO #10; PTRQ #6)

(a) S_s - all 4 RN pumps

(b) Either Unit Train related blackout

(c) Emergency Lo pit level starts all 4 RN pumps

(1) Pumps can be stopped at any time after the emergency low level occurs.

4) Controlled from MC-11 or ASP "A & B"

5) Pump Data

(a) Maximum flow, 25,800 gpm

(b) Minimum flow, 10,000 gpm (or per Limits and Precautions of OP/0/A/6400/06C)

(c) Design pressure (max.), psig 150 Normal ~80 psig

(d) Minimum flow is automatically controlled at approximately 10,000 gpm by providing a flow path through either unit's idle KC heat exchanger by placing the appropriate "KC Hx OTLT Mode" switch to "Mini Flow". The circuit monitors all running RN pumps, selects the smallest flow output, and modulates the KC HX flow to raise it to 10,000 gpm. (ISS/NLO/LPRO/LPSO #9/PTRQ #5)

6) RN Pump associated valves.

(a) 1RN11A, 1RN20B; Pump 1A and 1B Motor Cooler Inlet Isolation Valves.

(1) Motor operated valves, interlocked with respective pump motor starters, so valve opens on pump start and closes when pump stops. This prevents circulation of cold water through motor when not operating with resulting condensation damage.

(b) 1RN854, 1RN855; Pump Discharge Vacuum Breakers

(1) Open at ~ .2 psig of VAC (~.4" H_2O VAC) to allow air to enter pump discharge to provide air cushion which will prevent water hammer on pump restart.

(c) 1RN28A, 1RN38B; RN Pumps Discharge Valves

(1) Interlocked to open when pumps start and close when pumps stop.

7) Each RN pump requires bearing lube injection and packing flush water which is fed up the shaft from the impeller. In addition, heat exchangers are provided to cool the RN pump motors and the RN pump motor upper bearing oil.

b) RN Strainers (ISS/NLO/LPRO/LPSO #4)

1) Four nuclear service water strainers (RN strainers) remove debris and large particles from nuclear service water. Each strainer receives flow from the RN pump of corresponding channel. They are horizontal, automatic backwash strainers.

2) RN strainer backwash is initiated upon

(a) high differential pressure of 4 psi across a strainer,

(b) upon a time cycle of 8 hours,

(c) or it can be manually initiated from the control room (on MC-11), or locally

3) In a backwash cycle, a motor operated plug valve the (backwash valve) opens a flow path to the RN Pumphouse trash basket, a throttled gate valve regulates flow, and the strainer motor turns the backwash arm past the tubular straining elements. Internal pressure forces water backwards through the strainer openings and flushes the residue through the backwash path to the trash basket. A throttling gate valve is used so that if the backwash path clogs, the valve may be opened to pass the object blocking flow. The strainers can be backwashed without being taken out of service. All of the strainers are backwashed on a time cycle, even if not in service, to minimize scale formation on the straining elements. In this mode backwash uses internal pressure supplied by the RN pump house channel crossover.

(c) 1RN28A, 1RN38B; RN Pumps Discharge Valves

(1) Interlocked to open when pumps start and close when pumps stop.

7) Each RN pump requires bearing lube injection and packing flush water which is fed up the shaft from the impeller. In addition, heat exchangers are provided to cool the RN pump motors and the RN pump motor upper bearing oil.

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c) Nuclear Service Water Pump Bearing Lube Water

1) An assured source of water is supplied by the RN pumps from the impeller up the shaft to lubricate the rubber bearings along the fifty-foot long pump shafts. Seal injection is normally isolated to all four RN pumps.

2) 1RN36A, 1RN37B; Pump Bearing Lube Injection Strainer Inlet Crossover Valves.

(a) Allows one valve to be opened to provide pumphouse general use fire protection water.

(b) Close on safety injection signal.

d) Nuclear Service Water Pump Motor Coolers and Upper Bearing Oil Coolers.

Each RN pump motor is cooled by a set of motor coolers and an upper bearing oil cooler, which are in turn cooled by RN water. Internal fans recirculate motor air through the adjacent pump motor coolers. Cooling flow is provided to the air and oil coolers on each pump motor only when that pump is in operation. Connections have been provided to backflush clam larvae from the RN pump motor coolers and the upper bearing oil coolers. Flow provided for the Nuclear Service Water Pump motor coolers and upper bearing oil coolers is not filtered through the lube injection strainers.

e) RN Pumphouse Trash Basket

The RN Pumphouse trash basket collect debris from the lattice screens, RN strainers, and RN pump bearing lube injection strainers. It is a single basket installed below grade in a pit outside the Pumphouse. It is covered with steel grating that must be removed to empty the basket. When it is clogged, it is lifted out by a crane and empties into a dump truck. The bottom of the basket can be opened to empty its contents.

f) RN Clam Backwash Drain Valves.

The RN clam backwash drain valves isolate the RN supply lines from the RN clam backwash drain line. These valves are normally locked closed to prevent RN flow from being "short circuited" to Lake Wylie. They should never be opened except during a clam backwash or to drain the main supply lines.

3. Intake and Pumphouse Instrumentation

a) Temperature

1) RN Pump Motor Internal Air Temperature

Provides Control Room indication of RN pump motor air temperature. An alarm is provided for high temperature (125°F)

2) Standby Nuclear Service Water Pond Temperature

Provides Control Room indication of the temperature of the SNSWP at the level of the RN intake structure. Technical Specifications limits station operation and required shutdown if the high setpoint exceeded (91.5°F) (Surveillance PT requires <89.3°F on the OAC or <88.1°F on the meter).

b) Pressure

1) RN Pump Discharge Pressure

Provides Control Room indication of RN pump discharge pressure. Computer alarms are provided for high and low pressure setpoints.

2) RN Strainer Differential Pressure

(a) This instrumentation monitors the pressure differential across the RN strainers and initiates the automatic backwash cycle on high Delta P 4 psid. This instrumentation is safety related. Strainer control panels are located in the RN pumphouse, but the strainers can be controlled either locally or from the Control Room.

3) RN Pump Bearing Lube Injection Strainer Differential Pressure

(a) This instrumentation monitors the differential pressure across the RN pump bearing lube injection strainers. High differential pressure is alarmed on the plant computer.

c) Flow

1) RN Strainer Outlet Flow

(a) This instrumentation provides flow indication in the Control Room and on the Auxiliary Shutdown Panel.

It also provides high and low flow alarms and a signal to the RN minimum flow selector. High flow 24,000 gpm, Low flow 8,600 gpm.

2) RN Pump Cooling and Lubrication Flow

Local indication is provided for the following process flows:

(a) RN Pump Stuffing Box Packing Lube Outlet Flow

(b) RN Pump Stuffing Box Bearing Lube Injection Inlet Flow

(c) RN Pump Motor Cooler Outlet Flow

(d) RN Pump Motor Upper Bearing Oil Cooler Outlet Flow

d) Level

1) Lake Wylie Water Level provides Control Room indication of the level of Lake Wylie. No alarms are provided.

2) Standby Nuclear Service Water Pond Level provides Control Room indication of the level of the SNSWP. An annunciator and computer alarm is initiated at low level (572 ft) and an annunciator alarm is initiated at low-low level (571.5 ft). Level marks visible from shore are painted on the SNSWP instrumentation pier.

3) RN Pumphouse Screen Relative Level Differential provides Control Room indication of the relative differential levels across the RN Pumphouse screens. An alarm is provided on high (15" water column) differential level to alert personnel of partially blocked screen. This instrumentation monitors relative differential level regardless of absolute level and is safety grade.

4) RN Pump Intake Pit A and Pit B Levels

This safety grade instrumentation provides Control Room indication of the absolute level in the RN Pumphouse pits. Alarms are provided on low (559) and emergency low (557.5) levels. In addition, the following actions are automatically initiated upon two out of three emergency low level in either RN Pumphouse pit: (ISS/NLO/LPRO/LPSO #10; PTRQ #6)

(a) Start RN Pumps 1A, 1B, 2A, 2B.

(b) Isolate non-essential supply header from low Pit

(1) Close 1 and 2 RN48B (E-Lo, Pit A)

(2) Close 1 and 2 RN47A (E-Lo, Pit B)

(c) Swap to the SNSWP

(1) Open valves 1RN3A, 1RN4B, 1RN58B, 1RN63A 1 & 2 RN846A, 1 & 2 RN848B.

(2) Close valves 1RN1A, 1RN2B, 1RN5A, 1RN6B, 1RN53B, 1RN54A, 1RN57A , 1RN843B, 1 & 2 RN847A, 1 & 2RN849B.

(3) There is a 2 minute time delay before the valves can be swapped back to their normal position.

4. RN Pumphouse Miscellaneous

   a) Fire hose racks in the RN Pumphouse are supplied from the general use headers.

   b) Temperatures inside the RN Pumphouse will be maintained by the VZ System, so freeze protection is not necessary.

   c) VZ System

      1) Purpose (ISS/NLO/LPSO/LPRO #14)

         (a) The purpose of the VZ system is to provide normal and emergency ventilation of the Nuclear Service Water Pump compartments during all operating conditions. The fans of the VZ system will use outside air and return air from within the pump structure to maintain the specified design temperatures.

      2) General Description

         (a) The VZ System consists of two, 100% capacity safety related, vane-axial fans for each pump compartment. One fan in each compartment is designated Unit 1 and the other Unit 2. Fans 1A and 2A will service RN pumps 1A and 2A while fans 1B and 2B will serve RN pumps 1B and 2B.

         (b) In addition to the above safety fan, one non-safety fan is provided to ventilate the RN pumps intake area when local maintenance is performed.

         (c) Local thermostatically controlled heaters (non-safety related) are provided to maintain ambient temperatures during winter months in the pump compartments.

         (d) Dampers consist of a check damper on the discharge of each safety related fan and a combination outside air/return air damper on the intake of each safety related fan.

3) Normal System Operation

(a) During both normal and emergency plant operation only one safety related fan per pump compartment can operate.

(b) To turn on a fan, place the "Auto-Off" selector switch, for one fan in each pump compartment in the "Auto" position and the fan selected will start. The "Auto-Off" selector switch for the fan not selected is placed in the "AUTO" position, to allow it to auto start if the running fan trips.

(c) The combination outside air/return air damper associated with each operating fan will modulate as required by its room thermostat to provide the proper mixture of outside and return air to maintain temperature at 75°F. The damper is aligned for full recirculation below 75°F. The damper fails to outside air in event of loss of signal.

(d) Electric Unit Heaters

The electric unit heaters are not safety related.

Each heater is controlled by a thermostat mounted on the unit heater, which maintains temperature > 55°F.

4) Emergency Operation

(a) A sequencer signal from either unit will start one VZ fan, unless one fan was already running in which case it will continue to run.

(1) With both fans initially selected to :OFF:, a circuit problem could cause both fans to fail to start (Reference PIP 0-C98-0835).

(i) OPS will always have one fan in "AUTO", unless very cold conditions warrant both fans "OFF."

27

(b) Any ASP taken to "Local" will start that panel specific VZ fan if one of that train's RN pumps is on and the other fan is not already running. (same train)

5) Tech Spec Interpretation requires pumphouse temperature between 35°F and 115°F for RN to be considered operable.

C. Main Supply Section

1. Main Supply Pipes and Headers

Underground pipes convey nuclear service water from the RN Pumphouse to the Auxiliary and Diesel Buildings. The discharge lines from RN pumps 1A and 2A are combined into a single train A supply line, and the discharge lines from RN pumps 1B and 2B are combined into a single train B supply line.

The RN supply lines split into unit specific essential headers at the Auxiliary Building. Each unit has two essential headers and one non-essential header. Essential supply headers are also provided to the Diesel Buildings.

Main supply line A provides flow to the 1A and 2A essential supply headers and main supply line B provides flow to the 1B and 2B essential supply headers. The Unit 1 crossover provides a flowpath between the 1A and 1B essential supply headers. The Unit 2 crossover provides a flowpath between the 2A and 2B essential supply headers. The RN nonessential headers receive flow from the Unit 1 and Unit 2 crossovers. With this arrangement, the flow from any RN pump can be directed to any RN header on either unit.

2. Main Supply Valves

a) RN Supply Header Isolation Valves (1&2RN67A and 69B)

1) These valves must be open at all times to help provide a flow path to the diesel generators from either train of RN pumps. A "COVER TO PREVENT INADVERTENT OPERATION" is installed over each control switch at all times except maintenance.

2) Each valve receives a signal to open when its associated ASP is placed in LOCAL.

b) RN Supply Crossover Isolation Valves (1&2RN47A and 48B)

The RN supply crossover isolation valves are <u>normally</u> <u>open</u> to supply cooling water to the non-essential header.

1) Each valve closes upon a "S_p" signal from its respective unit.

2) The RN supply crossover isolation valves are also equipped with safety related interlocks to close upon emergency low level in one of the Pumphouse pits.

(a) Emergency low level in pit A close 1 & 2 RN48B

(b) Emergency low level in pit B close 1 & 2 RN 47A

c) There are no valves to isolate the RN essential headers to the Diesel Buildings. The diesel generator engine jacket water cooler inlet isolation valves are discussed in the Heat Exchanger Section.

D. Heat Exchanger Section

1. Essential Headers (ISS/LPRO/LPSO #8)

a) Essential Header Components

Each RN essential header provides flow to a redundant set of safety related components and systems. Essential header pressure indication is provided in the control room with an alarm <46 psig, and essential header supply temperature indication is also provided. The following components and systems are served by each essential header:

1) Heat Exchangers:

(a) Diesel Generator Engine Jacket Water Cooler

(b) Diesel Generator Engine Starting Air Aftercoolers (two per essential header)

(c) Containment Spray Heat Exchanger

(d) The Control Room Area Chiller (Condensers A and B are shared between units, so they are fed by Unit 1 essential headers only)

(e) Backup to Auxiliary Shutdown Panel Air Conditioning Unit (The ASPSUs are required for normal operational modes, including loss of offsite power, but are not required for safety shutdown following a LOCA) KC is normal supply.

(f) Component Cooling Hx

2) Assured Makeup/Supply:

(a) Assured Auxiliary Feedwater Supply (CA) Auto opens on low suction pressure with CA auto start

(b) Assured Fuel Pool Makeup (KF) (Manual)

(c) Assured KC System Makeup (Manual)

(d) Assured CNT Isol Seal Water System Supply (NW) (Auto opens on S_t with NW surge tank low level or Lo-Lo Press and S_t).

3) Miscellaneous

(a) Diesel Generator Building Fire Water (RF)

(b) Flush connections (WS System Flush manifold)

2. Essential Header Valves

a) Diesel Generator Engine Jacket Water Cooler Isolation Valves (1&2 RN232A and 292B)

1) These valves are normally closed

2) Each valve is interlocked to open upon the start of its respective diesel.

3) Diesel Generator Return Isolation Valves to SNSWP (1&2RN846A and 848B) These valves on Unit 2 are normally open with power removed providing a discharge from the Unit 2 D/Gs; The valves on Unit 1 are normally closed, but are opened whenever RN water is drawn from the SNSWP. They automatically open upon 26

(a) Emergency low level in either RN Pumphouse pit. They are interlocked with the Diesel Generator Engine RN Cooling Water Lake Wylie Return Isolation valves.(See description below)

(b) Unit/Train related ASP to LOCAL

4) Diesel Generator Return Isolation Valves to Lake Wylie (1&2RN847A and 849B)

(a) The valves on Unit 1 are normally open to provide a flow path whenever Diesel is started. The valves on Unit 2 are closed with power removed until the leak in the RN piping can be repaired. 26

(b) Interlocked with SNSWP return valves so that the Lake return valves are open whenever the SNSWP valves are closed (switch is spring return to auto) and the SNSWP valves receive an open signal whenever the lake return valves are closed.

(c) Close on

(1) RN pumphouse pit Emergency Low signal from either pit, or

(2) Unit/Train related ASP to "LOCAL"

b) Component Cooling Heat Exchanger Inlet Isolation Valves (1&2RN287A and 347B)

1) These valves should remain open at all times to be available for use in RN minimum flow operation. A "COVER TO PREVENT INADVERTENT OPERATIONS" is installed over each valve's control switch.

2) Opens on Unit/Train related ASP to "LOCAL" if Associated KC pump is running.

c) Component Cooling Heat Exchanger Outlet Throttle Valves (1&2RN291 and 351)

1) When in "KC Temp" mode these valves modulate to maintain the shell side (KC side) outlet temperature at 90°F. They are controlled by temperature instruments on the KC System.

2) These valves fail open upon

(a) Loss of instrument air.

(b) "S_s" signal (LOCA unit only)

(c) Unit/Train related ASP to LOCAL

3) Reset required at MCB to operate these valves after S_s.

4) When a KC train is inactive, the KC Hx outlet throttle valve can be aligned to the RN pump minimum flow controller. The valve will then modulate to allow the operating RN pump(s) to pass minimum flow (i.e. 10,000 gpm). (ISS/NLO/LPRO/LPSO #9; PTRQ #5)

(a) Upon loss of offsite power the power to this controller is lost causing failure to the "KC TEMP" mode. This will cause the valve associated with the idle KC Hx to close since this Hx has no heat load. Therefore the operator will have to take action to insure adequate miniflow is available for the operating RN pumps.

5) With a KC Hx isolated and drained, the NS Hx's on both units are aligned for 3400 gpm each to insure minimum flow is maintained.

d) Containment Spray Heat Exchanger Inlet Isolation Valves (1&2RN144A and 225B)

1) These valves are normally closed.

2) They do not receive any automatic signals to open. They are opened by the operator during swapover from the ESF safety injection mode to the ESF sump recirculation mode.

e) Containment Spray Heat Exchanger Outlet Throttle Valves (1&2RN148A and 229B)

1) These valves are normally closed.

2) They do not receive any automatic signals to open.

3) They are opened by the operator during swapover from the ESF safety injection mode to the ESF sump recirculation mode.

4) These valves are equipped with a jog circuit which allows the operator to adjust the RN flow through the NS Hxs. Under no circumstances should the RN flow be allowed to exceed 5000 gpm through a NS Hx. (EP's direct the operator to align for a maximum of 4600 gpm).

5) Closed indication comes off a torque switch and not a limit switch. For this reason, the operator must hold the closed pushbutton for 5 seconds after receiving the closed indication to ensure the valve is fully closed.

6) NS Heat Exchanger Wet Layup

(a) 2 inch lines are connected to the inlet and outlet RN piping for the NS Hx to allow attachment of wet layup equipment for chemical treatment while the NS Hx's are not in use.

f) VC/YC Condenser Automatic Control Valves (1RN244A and 1RN304B)

1) These valves throttle RN flow to maintain a set refrigerant head pressure in the condensers. This control is critical, as icing may occur if the condenser is overcooled. Because a fine degree of control is necessary at all times, these valves have electro-hydraulic actuators.

2) They will continue to modulate after blackout or LOCA, when most other control valves will go to the fail-open position. If the hydraulic system fails, these valves will fail in the last position.

g) Auxiliary Shutdown Panel Air Conditioning Unit Automatic Control Valves (1&2RN173 and 185)

1) These valves throttle RN flow or KC flow to maintain refrigerant head pressure in the condenser. Refrigerant pressure is routed to the valve actuator for control which does not rely on electricity or an air supply.

2) If a refrigerant line should break, the affected valve will fail closed.

3) RN cooling is used only during ASP EVENTS. At all other times KC is used to avoid clam fouling.

h) 1RN149, 1RN230; NS Hx 1A and 1B Radiation Monitor Inlet Isolation Valves, and 1RN150, 1RN231; Rad. Mon. Outlet Throttling Valves

1) The NS Hx is the only Hx with no secondary loop between radioactive water and lake water. Therefore, a radiation monitor (EMF-45A) (B) is installed around the NS Hx outlet flow meter with an alarm and readout in the Control Room. These valves are left open with the outlet valves throttled to provide design flow at P-signal conditions. (ISS/LPRO/LPSO #5)

2) Considered converting NS HX's to KC cooling, but a probabilistic risk assessment study showed more potential problems so remained with RN.

3. YV System

Purpose is to supply chilled water to equipment in containment. (ISS/NLO/LPRO/LPSO #13; PTRQ #12)

a) YV is located in a separate mechanical equipment building in the yard. It is not safety related and does not receive power during a loss of station power or a LOCA condition. During a loss of station power, cooling is provided by the RN system. There is no cooling during a LOCA.

b) Consists of:

1) 3 50% capacity double suction chilled water pumps (Powered from MXI, MXE)

2) 3 50% capacity water chillers (Powered from 6.9 KV buses)

3) Piping and valves necessary to allow chilled water to service containment cooling through RN rather than raw water.

c) Valves RNCO2, RNCO3, RNA83, RNC04 are used to isolate the chilled water system from RN.

1) In the event of a loss of station power, RN is used to provided cooling. A 3 Position switch "YV/RN Cool Water Mode", in the Control Room controls the above 4 valves (Must be selected to Control Room control). 26 27

(a) In the "YV" position, chilled water will be supplied to the YV loads. 27

(b) In "RN" position, the RN supply and return valves open and the YV supply and return valves close to allow RN to containment.

(c) In "Auto", if an undervoltage is actuated on MXI OR MXE, the RN supply and return valves to containment will open, and YV valves close (1(2)RNA83,CO4 open; 1(2)RNCO2, CO3 close) (This will occur after a 5 minute time delay). 26

(d) The "YV operable" light will be lit if the following exists. - YV supply and return valves open - YV supply temperature <50°F - YV supply pressure >40 psig 27

(e) The "RN operable" light will be lit if the RN supply and return valve are open.

(f) The RN and YV isolated lights will light if their respective supply and return valves are closed.

(g) When the "YV/RN Cool Water Mode" switch is turned to RN, RN is opened and YV is closed without delay. 27

d) A two-position "YV/RN Cool Water Ctrl", switch in the control room allows selection of where the supply and return valves are controlled. 27

1) C/R - Control Room Control (Must be in this position for Auto Swap to RN on loss of MXE OR MXI to occur). 26 27

2) Local - Containment Mechanical Equipment Building Control (Will block Auto Swap to RN if in this position). 27

e) A bleed line to WC is provided for system cleanup. Auto makeup is supplied by YM. This would be necessary if swap to RN is made.

f) Auto Swap reset.

1) The swap in auto may be prevented if prior to 5 minute timer completion:

(a) Power is restored to MCC's and Auto swap reset PB is depressed. 26

(b) or, the "YV/RN Cool Water Mode" switch can be taken to the "YV" position. 27

(c) or, the "YV/RN Cool Water Ctrl" switch can be taken to "local". 27

2) To return to YV following an auto swap to RN, a procedure enclosure directs the return. 26

(a) The only control manipulations needed are to depress the Auto Swap reset PB to realign the valves to YV.

g) Startup

1) The Chiller Pumps and Chillers are controlled from the Containment Mechanical Equipment Building.

2) Normally 2 chillers and two pumps will be placed in "Auto" then, the master stop/start, "start" pushbutton is depressed.

3) YV Supplies

(a) Lower Containment Vent Units (4) per Unit

(b) Incore Instrument Vent Units (2) per Unit

(c) NCP motor air coolers (4) per Unit

(d) Upper Containment Vent Units (4) per unit

(e) VF Supply Units on Unit 1

h) YV System Trips and Isolates on S_p Signal. (due to system low flow when the Containment isolation valves shut)

i) RN isolation valves to YV are being periodically cycled per OP/2/A/6450/20 ENCL. 4.10, to reduce the accumulation of biological and corrosion products on the RN side of the valves. This is to prevent buildup which may result in the valves failing to automatically open on demand.

4. Non Essential Headers (ISS/NLO/LPRO/LPSO #8)

a) Non-essential Header Components

The nonessential header on each unit provides flow or can provide flow to the following set of nonsafety components:

1) Reciprocating Charging Pump Fluid Drive Cooler (1 per Unit)
2) Auxiliary Building Supply Vent Units (2 per Unit)
3) Fuel Handling Area Supply Vent Unit (Unit 2 Only)
4) * Upper Containment Vent Units (4 per Unit)
5) *Lower Containment Vent Units (4 per Unit)
6) * Incore Instrumentation Room Vent Units (2 per Unit)
7) * Reactor Coolant Pump Motor Coolers (4 per Unit)
8) #Instrument Air Compressors (Intercooler, Oil Cooler, and Aftercooler) (E and F)
9) Waste Monitor Tank Pump A Discharge Flush Line (Unit 1 only)
10) Waste Monitor Tank Pump B Discharge Flush Line (Unit 1 only)

*The containment vent units, incore instrumentation room vent units, and NCP motor coolers normally receive cooling flow from the YV system, but are automatically aligned to the RN system upon loss of power to YV. (ISS/NLO/LPRO/LPSO #11; PTRQ #7)

#The instrument air compressors are normally cooled by the KR System. The RN System can be manually aligned to cool these components if necessary.(Note: "D" instrument air compressor cannot be cooled by RN) (ISS/NLO/LPRO/LPSO #7; PTRQ #4)

b) Non-essential Header Valves

1) Non essential header supply and return valves (1 & 2 RN49A, 50B, 51A, 52B)

(a) These valves are normally open, controlled from the control room and close on an S_p signal.

2) Auxiliary Building Vent Unit Header Supply and Return Isolation Valves (1&2RN839A and 841B) These valves are normally open, but are closed upon a "S" signal (LOCA unit only) to isolate certain nonessential components and conserve flow for the essential headers during the ESF event. The following nonessential components are isolated by these valves:

(a) Auxiliary Building Supply Vent Units (2 per unit)

(b) Fuel Handling Area Supply Vent Unit (Unit 2 only)

E. Main Return Section (Discharge)

1. Main Return Pipes and Headers (ISS/NLO/LPRO/LPSO #3; PTRQ #2)

Underground pipes convey nuclear service water from the Auxiliary and Diesel Buildings to either Lake Wylie or the SNSWP. Three main return lines are provided: A nonsafety return line ties into the RL System discharge lines to Lake Wylie, and two safety related lines return flow to the SNSWP. When aligned to the SNSWP, essential headers 1A and 2A discharge to SNSWP return line A, and essential headers 1B and 2B discharge to SNSWP return line B.

a) RN Return Lines from the Diesel Buildings

RN return lines from the Diesel Building are routed directly to the SNSWP return lines and the RL return line. Nonsafety diesel generator engine cooling water return lines are routed to the RL return line.

b) RN Return Line to the RL System

The RN return line to the RL System receives RN discharge from the Auxiliary and Diesel Buildings, WL discharge from the waste monitor tanks, and RL discharge from the containment chillers. It ties into the RL discharge lines to Lake Wylie.

2. Main Return Valves

a) SNSWP Return Isolation Valves (1RN63A and 1RN58B)

A single isolation valve isolates each RN Auxiliary Building return header from its corresponding return line to the SNSWP. The SNSWP return isolation valves are normally closed, but open

1) upon a "S_p" signal from either unit,

(a) to assure safety related discharge flow path for RN and meet single failure criteria (Spurious close of 1RN843B or 1RN-57A)

2) Emergency low level in either RN Pumphouse pit.

3) Unit 1 Train related ASP to "LOCAL"

b) RL Return Line Isolation Valves (1RN57A and 1RN843B) Two isolation valves in series isolate RN Auxiliary Building return header A from the RN return line to the RL System. These valves are normally open, but close upon

1) Emergency low level in either RN Pumphouse pit.

2) Unit 1 Train related ASP to "LOCAL"

c) RN Return Header Crossover Isolation Valves (1RN54A and 1RN53B)

Two isolation valves in series isolate RN Auxiliary Building return header A from RN Auxiliary Building return header B. These crossover valves are normally open, but close upon,

1) Emergency low level in either RN Pumphouse pit.

2) Unit 1 Train related ASP to "LOCAL".

2.3 Refer to Limits and Precautions per OP/0/A/6400/06C, OP/0/A/6450/20, OP/0/A/6400/06M, OP/0/A/6400/06B) (ISS/LPRO/LPSO #15; PTRQ #8)

2.4 RN System Annunciators

A.	RN Pump A(B) Flow Hi/Lo	24,000 gpm/8,600 gpm
B.	RN Essential Header Pressure-Lo	46 psig
C.	SNSWP Level Lo	572 feet
D.	SNSWP Level Lo-Lo	571.5 feet
E.	RN Pump Intake Pit A(B) Level-Lo	559 feet
F.	RN Pit A(B) Swap to SNSWP	557.5 feet
G.	RN Pit A(B) Screen Hi D/P	15" water column
H.	RN Pump Motor A(B) Air Temp-Hi	125°F
I.	RN Pump A(B) Strainer Hi D/P	4 psid
J.	Diesel Gen Hx A(B) Outlet Flow-Lo	855 gpm
K.	KC HX A(B) RN Outlet Flow-Lo	2000 gpm

1. To remove a "nuisance" alarm during normal operation, the RN outlet Flow-lo annunciator is not enabled until 72 seconds after a S_s signal. The time delay is to allow the valve to fully open.

L.	NS HX A(B) RN Outlet Flow-Lo	4150 gpm
M.	NS HX A(B) RN Outlet Flow-Hi	4650 gpm

2.5 Technical Specifications (LPRO/LPSO #16; PTRQ #9)

A. Refer to T.S. 3.7.4 and 3.7.5 (LPRO/LPSO #16) and 3.3.2 item 14g.

1. Refer to Tech Spec interpretation, OMP 2-29 Att 2, and OP/0/A/6400/06C enclosures 4.11, 4.12, 4.13, 4.14, and 4.15.

2. The requirements for temperature and level in the SNSWP are <90.4°F and >571.5 ft per the surveillance PT.

2.6 System Operation (ISS/NLO/LPRO/LPSO #6; PTRQ #3)

A. RN Pumphouse Alignment and Operation

1. The RN System is normally aligned to Lake Wylie. It is automatically aligned to the SNSWP on ASP transfer, or emergency low level in either pumphouse pit. The operator may also align the system to the SNSWP during cold weather to prevent ice accumulation on the pond.

2. The number of RN pumps in operation should be varied to meet system needs. Under normal circumstances, the flow from any RN pump can be directed to any RN header on either unit. The operator should operate an appropriate number of pumps such that the pumps neither runout or run at minimum flow. Since the RN flow to many heat exchangers is temperature controlled, the system flow demands of winter will be less than the flow demands of summer.

B. RN Operability

1. RN Requirements

a) Provide adequate flow for:

1) 1 Unit with a LOCA in progress, and

2) 1 Unit shutting down and cooling down to cold shutdown

b) Provide adequate flow for:

1) 1 Unit with a LOCA in progress, and

2) 1 Unit maintained in cold shutdown

c) These flow requirements must be met for the plant to handle the design basis accident.

1) LOCA on one unit coincident with an earthquake that wipes out the switchyard and Lake Wylie.

2. Tech Spec Allowances (LPSO #16; PTRQ #11)

   a) Tech Spec Action Time

      1) Safety systems are designed to handle a single failure and still have capacity to handle the DBA (e.g. ECCS has two trains, so that if either train fails, one train still delivers 100% of needed capacity).

         (a) If one train becomes inoperable Tech Specs doesn't require us to assume another single failure as long as the train can be returned to service in a credible time frame (e.g. 72 hours).

         Therefore if an accident occurs while one ECCS train is inoperable we don't assume the operable train will fail.

   b) RN (A shared system)

      1) The above logic works fine for systems that are unit related, such as ECCS.

      2) But RN is not unit related

         (a) The RN system is interconnected to both units so that a Unit 1 KC Hx doesn't know whether its water is coming from a Unit 1 or a Unit 2 pump. All it knows is that it's getting water from somewhere. (Therefore an inoperability on RN affects both units).

3. Since RN is shared we want to be able to take credit for an operable RN pump on both units.

   a) To do this the two units must be interconnected and with the units interconnected one failure can affect both units (e.g. If a SNSWP suction isolation to one Train's pumps fails to open during a DBA, then two pumps (1A and 2A or 1B and 2B) will be lost.

      1) This is ok if all 4 pumps are initially operable (leaving two available to meet the DBA, which meets the RN flow requirements), or if one unit is already in cold S/D and only one RN pump is inoperable (leaving one available to meet the DBA, which also meets the RN flow requirements).

      2) Therefore with one RN pump inoperable we put both units in an RN Tech Spec action statement.

         (a) This gives us 72 hours that we don't have to assume any more RN failures, leaving us with 3 RN pumps available, more than enough.

3) One D/G inoperable also requires RN to be declared inoperable.

(a) With one D/G inoperable, within 2 hours we verify that all equipment on the other train is still operable, which keeps us from having to assume that train will fail for 72 hrs.

- The other unit's equipment still has to withstand a single failure, which makes one RN pump not starting because its D/G is inoperable and the two opposite train pump's SNSWP suction isolation failing to open, leaving only one pump available (not acceptable).

4. Sequencer in Test

a) If any sequencer is in "Test", its associated RN pump will not auto start on a blackout or LOCA on the opposite unit or emergency low pit level in either pit.

1) Therefore when a sequencer is placed in "Test" the associated RN pump must be declared inoperable, but the pump may still be run if needed.

C. ACTION ON BLACKOUT ON ETA OR ETB (ISS/NLO/LPRO/LPSO #10; PTRQ #6)

1. START ASSOCIATED TRAIN RN PUMPS

a) Pump start

1) opens its discharge valve

2) opens its motor cooler inlet valve

2. OPEN: Diesel Generator Engine Jacket Cooler Inlet Isolation Valve, because of D/G Start.

1) 1(2)RN232A or 1(2)RN292B

D. ASP OPERATION (LPRO/LPSO #10; PTRQ #6)

1. BIG PICTURE

a) SWAP RN SUCTION AND DISCHARGE TO SNSWP (achieved by unit 1 ASP's)

b) SPLIT A/B TRAIN DISCHARGES (achieved by unit 1 ASP's)

c) SWAP DIESEL DISCHARGE TO SNSWP (panel specific valve)

d) ENSURE ESSENTIAL HEADER SUPPLY OPEN (panel specific valve)

e) FULL FLOW TO KC HX's (panel specific valve)

2. DETAILS

a) RN PUMP CONTROLS ARE AVAILABLE

1) MANUAL ACTION: MAY START/STOP A PUMP AT ITS RELATED ASP.

2) If a pump is started, the pump specific support equipment is operated:

(a) Ventilation fan runs

(b) Discharge valve opens

(c) Motor and oil cooler isolation opens

b) 1 ASP A to LOCAL

1) CLOSE: 1RN5A, 54A, 847A

2) OPEN: 1RN67A, 63A, 846A, 1RN291(KC throttle)

3) If a RN pump is running or started in that same train (1A or 2A pump) then:

(a) CLOSE: 1RN1A, 57A

(b) OPEN: 1RN3A

4) If a unit 1 "A" train KC pump is running then

(a) OPEN: 1RN287A

c) 1ASP B to LOCAL

1) CLOSE: 1RN2B, 843B, 849B

2) OPEN: 1RN69B, 58B, 848B, 1RN351 (KC throttle)

3) If a RN pump is running or started in that same train (1B or 2B pump) then

(a) CLOSE: 1RN6B, 53B

(b) OPEN: 1RN4B

4) If a unit 1 "B" train KC pump is running then

(a) OPEN: 1RN347B

d) 2ASP A to LOCAL

1) CLOSE: 2RN847A

2) OPEN: 2RN67A, 846A, 2RN291 (KC throttle)

3) If a unit 2 "A" train KC pump is running then

(a) OPEN: 2RN287A

e) 2ASP B to LOCAL

1) CLOSE: 2RN849B

2) OPEN: 2RN69B, 848B, 2RN351 (KC throttle)

3) If a unit 2 "B" train KC pump is running then

(a) OPEN: 2RN347B

E. ACTION ON EMERGENCY LOW PIT LEVEL (clogged intake or loss of lake Wylie due to a seismic event) (ISS/NLO/LPRO/LPSO #10; PTRQ #6)

1. START ALL 4 RN PUMPS

a) Pump start

1) opens its discharge valve

2) opens its motor cooler inlet

2. SWAP RN SUCTION AND DISCHARGE TO SNSWP

a) CLOSE: 1RN1A, 2B, 5A, 6B, 57A, 843B

b) OPEN: 1RN3A, 4B, 63A, 58B

3. SWAP DIESEL DISCHARGE TO SNSWP

a) CLOSE: 1RN847A, 1RN849B, 2RN847A, 2RN849B

b) OPEN: 1RN846A, 1RN848B, 2RN846A, 2RN848B

4. SPLIT A/B TRAIN DISCHARGES

a) CLOSE: 1RN53B, 1RN54A

5. ISOLATE NONESSENTIAL SUPPLY HEADER FROM THE LOW PIT(s)

a) "E-Lo" PIT A: CLOSE 1 and 2 RN48B

b) "E-Lo" PIT B: CLOSE 1 and 2 RN47A

6. There is a two minute time delay before the operator may realign the suction valves to the lake. This allows system restoration to normal if the signal was erroneous. Two minutes is sufficient time for all components to respond and allows the operator to verify the error prior to attempting to return to the normal lineup.

F. ACTIONS ON SAFETY INJECTION "S_s" (ISS/NLO/LPRO/LPSO #10; PTRQ #6)

1. ANY unit S_s will:
   a) START ALL RN PUMPS
      1) Pump start
         (a) opens its discharge
         (b) opens it motor cooler inlet
   b) CLOSE LUBE INJECTION STRAINER CROSSOVER VALVES
      1) CLOSE: 1RN36A AND 1RN37B
2. LOCA unit specific action on S_s:
   a) OPEN LOCA UNIT DG INLET ISOLATIONS (receive open signal from diesel start)
      1) UNIT 1 S_s - OPEN: 1RN232A, 292B
      2) UNIT 2 S_s - OPEN: 2RN232A, 292B
   b) FULL RN KCHX FLOW ON LOCA UNIT
      1) Throttle valve fully opens
         (a) unit 1 S_s open: 1RN291, 351
         (b) unit 2 S_s open: 2RN291, 351
         (c) low flow annunciator enabled after 72 second time delay.
   c) ISOLATE LOCA UNIT AUX BLD VENT HEADER
      1) UNIT 1 S_s - CLOSE: 1RN839A, 841B
      2) UNIT 2 S_s - CLOSE: 2RN839A, 841B
3. If control has been switched to the ASP's, the only equipment automatically positioned on an S_s (which will occur during NC cooldown) will be the lube injection strainer crossover valves (1RN36A, 37B), and the Aux Bldg vent header (1 and 2 RN839A, 841B)

G. ACTIONS ON CONTAINMENT HIGH-HIGH PRESSURE "S_p" (ISS/NLO/LPRO/LPSO #10; PTRQ #6)

1. ASSURE DISCHARGE FLOW PATH
   a) ANY S_p - OPEN 1RN63A, 58B
2. SPLIT LOCA UNIT ESSENTIAL HEADER SUPPLIES
   a) UNIT 1 S_p - Close 1RN47A, 48B
   b) UNIT 2 S_p - Close 2RN47A, 48B

3. ISOLATE LOCA UNIT NON-ESSENTIAL HEADER
   a) UNIT 1 S_p - Close 1RN49A, 50B, 51A, 52B
   b) UNIT 2 S_p - Close 2RN49A, 50B, 51A, 52B
4. ISOLATE LOCA UNIT RN TO CONTAINMENT
   a) CLOSE LOWER CONTAINMENT ISOLATION VALVES
      1) UNIT 1 S_p - Close 1RN437B, 484A, 487B
      2) UNIT 2 S_p - Close 2RN437B, 484A, 487B
   b) CLOSE UPPER CONTAINMENT ISOLATION VALVES
      1) Unit 1 S_p - Close 1RN404B, 429A, 432B
      2) Unit 2 S_p - Close 2RN404B, 429A, 432B
5. All S_p actions in the RN System occur at 3 psig in containment or when a Manual Phase B isolation is actuated.

H. ACTIONS ON LOSS OF OFFSITE POWER (ISS/NLO/LPRO/LPSO #10; PTRQ #6)
1. EACH DIESEL GENERATOR STARTS
   a) OPEN ASSOCIATED DIESEL GENERATOR ENGINE JACKET COOLER INLET ISOLATION VALVE.
2. START ASSOCIATED RN PUMP
   a) Pump start
      1) opens its discharge valve
      2) opens its motor cooler inlet
3. Valves on the non essential header.
   a) RN THROTTLE VALVES FAIL OPEN ON:
      1) Fuel handling area supply vent units
      2) Aux building supply vent units
      3) Aux building radwaste area vent unit
      4) Lower containment vent units
      5) Upper containment vent units
      6) Incore instrument room vent units
      7) Reactor coolant pump motor coolers
   b) RN Pump Miniflow
      1) Fails to the "KC TEMP" Mode.

4. Operator manual action. RN to VI (ISS/NLO/LPRO/LPSO #7; PTRQ #4)
   a) The following actions are to be taken to align the RN System to cool the instrument air compressors and aftercoolers following a loss of offsite power:
      1) Close 1KR214 and 1KR217
      2) Close 1RL178 and 1RL298
      3) Open 1KR215 and 1KR216
      4) Open 1RL177 and 1RL297
      5) Open 1RN379 and 1RN380
   b) Instrument air compressor "D" is not safety related and is not supplied with RN flow.

I. Refer to AP/20 for Loss of RN (ISS #16; NLO #14; LPRO/LPSO #17; PTRQ #10)
   1. Case 1 Loss of RN Train
   2. Case 2 Loss of Pit Level
   3. NLO Actions On Loss of RN
      a) If RN is lost to the KD Hx's and the Unit 2 D/G's are desired to be run, cooling can be established from the fire hose in the D/G room.
         1) Isolate the normal supply to the KD Hx.
         2) Connect fire hose sections to two fire hose stations in either diesel room from 2 fire hose stations in 2ETB room.
         3) Limit load on the D/G to 3870 KW and lower load as necessary to maintain KD temperature on the engine outlet <190 °F.
         4) Only one D/G can be put in this alignment at a time.

2.7 Power Supplies

A. The following valves have the capability of being supplied power from either Unit 1 or 2.

1. 1RN-1A RN Pumphouse Pit "A" Isol. from Lake - 1EMXO
2. 1RN-2B RN Pumphouse Pit "A" Isol. from Lake - 2EMXP
3. 1RN-3A RN Pumphouse Pit "A" Isol. from SNSWP - 1EMXO
4. 1RN-4B RN Pumphouse Pit "B" Isol. from SNSWP - 2EMXP
5. 1RN-5A RN Pumphouse Pit "B" Isol. from Lake - 1EMXO
6. 1RN-6B RN Pumphouse Pit "B" Isol. from Lake - 2EMXP
7. 1RN-36A RN Pump Seal Inj. Water Filter Inlet Crossover - 1EMXO
8. 1RN-37B RN Pump Seal Inj. Water Filter Inlet Crossover - 1EMXO
9. 1RN-53B Station RN Disch. Header Crossover- 2EMXH
10. 1RN-54A Station RN Disch. Header Crossover - 1EMXG
11. 1RN-57A Station Header Disch. to RL System - 1EMXG
12. 1RN-58B "B" Header Return to SNSWP - 2EMXH
13. 1RN-843B Station RN Header Disch. to RL System - 2EMXH
14. 1RN-63A "A" Header Return to SNSWP - 1EMXG
15. 1RN-40B "B" Strainer Blowdown - 1EMXR
16. 1RN-30A "A" Strainer Blowdown - 1EMXQ
17. 1RN-244A Control Cable and Equipment Room Air Conditioning Condenser "A" Control Valve
18. 1RN-304B Control Room Air Chiller Condenser 1B Auto Control Valve

2.8 Incidents

3. SUMMARY

3.1 Review Objectives

A. Purpose

1. Assured cooling water in normal and emergency situations

B. Water Sources

1. Normal - Lake Wylie
2. Emergency - SNSWP

C. Normal Discharge Path

1. Lake Wylie via RL

D. Strainer Backwash

1. Manual in C/R or Local.
2. Auto on timer or high DP.

E. KC used as intermediate boundary to prevent one Hx leak causing a release to the environment.

1. Exception - NS Hx

F. One RN pump normally runs to supply all loads in service on both units.

1. The discharge can be aligned to the SNSWP to makeup to the pond if level is low and suction and discharge can be aligned to the pond if ice is accumulating on the SNSWP.

G. RN to VI

1. Isolate KR locally and align RN locally

H. Loads

1. Essential Header
   a) KC HX
   b) NS Hx
   c) YC Condenser
   d) D/G
   e) Assured Makeup (KF, KC, NW, CA)
2. Non-essential Header
   a) YV backup
   b) VI backup
   c) PD pump
   d) VA and VF AHUs

I. RN pump miniflow

1. 10,000 gpm provided by selecting the idle KC hx to "miniflow".

J. Auto Actions

1. Blackout
   a) Starts train related pumps
   b) Supplies cooling water to affected D/G

2. Emergency Low Pit Level
   a) Swaps suction and discharge to the SNSWP
   b) Starts all 4 pumps
3. Safety Injection
   a) Starts all 4 pumps
   b) Isolates RN to VA and VF AHUs
   c) Provides flow to unit related D/Gs
   d) Full flow to unit related KC hxs.
4. S_p signal
   a) Isolates non-essential header
   b) Separates RN trains
   c) Isolates YV to containment

K. RN is not isolated to the non-essential header on a blackout to make sure it is available to backup YV and VI. (ISS/NLO/LPRO/LPSO #11; PTRQ #7)

L. YV is a closed loop chilled water system that provides cooling to the NCP motors and Upper and Lower Containment AHUs with RN as an Auto backup.

M. VZ provides adequate ventilation for the RN pumphouse to prevent overheating the RN pumps and prevent freezing of equipment.

N. Limits and Precautions
   1. Review L & Ps in OP/0/A/6400/06C

O. NLO actions on loss of RN
   1. If RN is lost to the KD Hx and Unit 2 D/Gs are desired to be run cooling water can be aligned from the fire hose stations in 2ETB SWGR Room to both fire hose stations in either diesel room.
      a) Isolate the normal supply to the KD HX.
      b) Connect fire hose sections to (2) fire hose stations in either diesel room from (2) fire hose stations in 2ETB room.
      c) Limit D/G load to 3870 KW and lower load as necessary to maintain KD temperature on the engine outlet < 190°F.
      d) Only <u>one</u> D/G can be put in this alignment at a time.

CHANGE SUMMARY FORM

Document #	Rev #	Prepared by	Date
OP-CN-PSS-RN	26	C T Kiker	04/24/97

Description of change summary:

1. Changed RN Lesson to take into account the lineup of Unit 2 D/Gs to the SNSWP and to show that YV swaps on MXI "OR" MXE UV not "AND".

CHANGE SUMMARY FORM

Document #	Rev #	Prepared by	Date
OP-CN-PSS-RN	27	C T Kiker	03/05/98

Description of change summary:

1. Deleted Incident reports section since none are critical or current to be covered at this point in time.
2. Added ~~to~~ a section 2.~~1~~2.5.B.4.c)4)(a)(1) which covers a potential inoperability issue from PIP O-C98-0835.
3. Added the names of the switches in section 2.2 D.3.c), d), and f) for better identification.
4. Changed the OPERABLE light setpoint in section 2.2 D.3.c)1)(d) to 50°F per CNM 1211.00-1493 sheet 2. Simulator was changed to this setpoint.

CATAWBA OPERATIONS TRAINING
HLP 97-1 SCHEDULE
REV. 21

WEEK 11

TIME/DATE	03/17	03/18	03/19	03/20	03/21
0700	EXAM #8	RSS	FHS	EMF	SEP
0300					
0900					S/D OPS
1000			FL	EMF FAM	
1100					
1200		REVIEW EXAM			
1300		RSS FAM	RSS FAM	EMF FAM	STUDY
1400					
1500					
1600					
1700					
1800					
1900					
2000					
2100					
2200					
2300					
2400					
0100					

SELF STUDY:
DRAWING:

CLASSROOM ATTENDANCE AS OF 3/18-3/24/97

HLP CLASS

TEST 9

CLASS/INSTR	CP-RSS/ETB		RSS FAM/ETB		FH-FHS/SMJ		FH-FL/SMJ		WE-EMF/JET		EMF FAM/REK		EP-SEP/ETB		TOTAL
NAME	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	HRS
Capps, S. E.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Cornwell, R. J.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Daniels, G. L.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Evans, K. L.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2		0	3/21	2	13
Garrison, T. W.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Gates, J. L.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Gooch, A. W.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Heavner, M. D.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Herring, R. L.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Howington, G. S.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2		0	3/21	2	13
Jackson, G. M.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Kulesa, E. B.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Rudd, W. G.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2		0	3/21	2	13
Simril, R. T.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Smith, B. W.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5

CLASS/INSTR	TA-SO/ETB		WE-WG/TSR		WE-WL/SMJ										TOTAL
NAME	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	HRS
Capps, S. E.	3/21	2.5		0		0									17
Cornwell, R. J.	3/21	2.5	3/24	1	3/24	2									20
Daniels, G. L.	3/21	2.5	3/24	1	3/24	2									20
Evans, K. L.	3/21	2.5	3/24	1	3/24	2									18.5
Garrison, T. W.	3/21	2.5	3/24	1	3/24	2									20
Gates, J. L.	3/21	2.5	3/24	1	3/24	2									20
Gooch, A. W.	3/21	2.5	3/24	1	3/24	2									20
Heavner, M. D.	3/21	2.5	3/24	1	3/24	2									20
Herring, R. L.	3/21	2.5	3/24	1	3/24	2									20
Howington, G. S.	3/21	2.5	3/24	1	3/24	2									18.5
Jackson, G. M.	3/21	2.5	3/24	1	3/24	2									20
Kulesa, E. B.	3/21	2.5	3/24	1	3/24	2									20
Rudd, W. G.	3/21	2.5	3/24	1	3/24	2									18.5
Simril, R. T.	3/21	2.5	3/24	1	3/24	2									20
Smith, B. W.	3/21	2.5	3/24	1	3/24	2									20

CLASSROOM ATTENDANCE AS OF 3/18-3/24/97

HLP CLASS

TEST 9

CLASS/INSTR	CP-RSS/ETB		RSS FAM/ETB		FH-FHS/SMJ		FH-FL/SMJ		WE-EMF/JET		EMF FAM/REK		EP-SEP/ETB		TOTAL
NAME	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	HRS
Capps, S. E.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Cornwell, R. J.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Daniels, G. L.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Evans, K. L.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2		0	3/21	2	13
Garrison, T. W.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Gates, J. L.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Gooch, A. W.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Heavner, M. D.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Herring, R. L.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Howington, G. S.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2		0	3/21	2	13
Jackson, G. M.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Kulesa, E. B.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Rudd, W. G.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2		0	3/21	2	13
Simril, R. T.	3/18	3	3/19	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5
Smith, B. W.	3/18	3	3/18	2	3/19	2	3/19	2	3/20	2	3/20	1.5	3/21	2	14.5

CLASS/INSTR	TA-SO/ETB		WE-WG/TSR		WE-WL/SMJ										TOTAL
NAME	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	DATE	HRS	HRS
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Garrison, T. W.	3/21	2.5	3/24	1	3/24	2									20
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Gooch, A. W.	3/21	2.5	3/24	1	3/24	2									20
Heavner, M. D.	3/21	2.5	3/24	1	3/24	2									20
Herring, R. L.	3/21	2.5	3/24	1	3/24	2									20
Howington, G. S.	3/21	2.5	3/24	1	3/24	2									18.5
Jackson, G. M.	3/21	2.5	3/24	1	3/24	2									20
Kulesa, E. B.	3/21	2.5	3/24	1	3/24	2									20
Rudd, W. G.	3/21	2.5	3/24	1	3/24	2									18.5
Simril, R. T.	3/21	2.5	3/24	1	3/24	2									20
Smith, B. W.	3/21	2.5	3/24	1	3/24	2									20

LPSO TRAINING OBJECTIVES

1. List the four levels of emergency classification at Catawba Nuclear Station and categorize a particular event using the appropriate RP.
2. Explain personnel responsibilities during an emergency at Catawba Nuclear Station.
   - 2.1 List the persons (by title) who may assume the role of emergency coordinator.
   - 2.2 State who is responsible for activation of the emergency warning system (sirens).
   - 2.3 State who is responsible for making recommendations to offsite agencies.
   - 2.4 State your assembly point.
3. State the emergency levels that require various actions to be taken.
   - 3.1 OSC activation.
   - 3.2 TSC activation.
   - 3.3 EOF activation.
   - 3.4 Site assembly.
   - 3.5 Mandatory site evacuation.
4. Name the locations for emergency evacuation sites alpha and bravo, and explain how to determine which site to use in case of an emergency.
5. List the offsite agencies which should be notified during an emergency.
6. Explain the meaning of emergency sirens sounding.
7. State the size of the Emergency Planning Zone (EPZ).
8. Describe actions for natural disasters and major accidents occurring at the station per the following procedures:
   - 8.1 Natural Disaster and Earthquake Response procedure.
   - 8.2 Chemical Spill procedure.
   - 8.3 Collision/Explosion Response procedure.

9. Describe how to conduct site assembly/evacuation according to RP/0/A/5000/10 and Catawba Site Directive 3.0.7.

10. Prepare and evaluate Emergency Notification Reports for both initial and follow-up notification for any given accident scenario.

Time: 2.0 hrs

EMERGENCY PLAN

LESSON PLAN

Prepared By: E. T. Beadle Date 7/1/98

Reviewed By: CBReese Date 7/1/98

Ops Review : John Klingstle Date 7/1/98

Approved By: James Jeffcoat Date 7/6/98

1. OVERVIEW:

This lesson provides a description of the procedures for the Emergency Plan.

2. REFERENCES:

2.1 Emergency Implementing Procedures

2.2 Emergency Response Training for Station Employees

2.3 Catawba Nuclear Station Emergency Plan Booklet

2.4 RP/0/A/5000/01 (Classification of Emergency)

2.5 RP/0/A/5000/02 (Notification of Unusual Event)

2.6 RP/0/A/5000/03 (Alert)

2.7 RP/0/A/5000/04 (Site Area Emergency)

2.8 RP/0/A/5000/05 (General Emergency)

2.9 RP/0/A/5000/06A (Notification to States and Counties from the Control Room)

2.10 RP/0/A/5000/06B (Notification to States and Counties from the Technical Support Center)

2.11 RP/0/A/5000/06C (Notification to States and Counties from the Emergency Operations Facility)

2.12 RP/0/A/5000/07 (Natural Disaster and Earthquake)

2.13 RP/0/A/5000/08 (Chemical Spills)

2.14 RP/0/A/5000/09 (Collision/Explosion)

2.15 RP/0/A/5000/10 (Conducting a Site Assembly or Preparing the Site for an Evacuation) | 16

2.16 RP/0/B/5000/13 (NRC Notification Requirements)

2.17 RP/0/B/5000/24 (OSC Coordinator Procedure) | 16

2.18 EPG 5.1.3 (Emergency Organization) | 16

2.19 HP/0/B/1009/12 (Quantifying Gaseous Release Through Steam - Relief Valves Under Post-Accident Conditions)

2.20 HP/0/B/1009/16 (Distribution of Potassium Iodide Tablets in the Event of a Radioactive Release)

2.21 SD 3.8.8 (Radiological Work Practices)

2.22 OMP 1-2 (TSC Duty Expectations)

3. AIDS:

3.1 Handout(s) as prepared by the instructor.

3.2 Transparencies selected by the instructor.

3.3 Slides, videos and/or other motivational tools at the instructors discretion.

ISS TRAINING OBJECTIVES

1. List the four levels of emergency classification at Catawba Nuclear Station.
2. Explain personnel responsibilities during an emergency at Catawba Nuclear Station.
   - 2.1 List the persons (by title) who may assume the role of emergency coordinator.
   - 2.2 State who is responsible for activation of the emergency warning system (sirens).
   - 2.3 State who is responsible for making recommendations to offsite agencies.
   - 2.4 State your assembly point.
3. State the emergency levels that require various actions to be taken.
   - 3.1 OSC activation.
   - 3.2 TSC activation.
   - 3.3 EOF activation.
   - 3.4 Site assembly.
   - 3.5 Mandatory site evacuation.
4. Name the locations for emergency evacuation sites alpha and bravo.
5. List the offsite agencies which should be notified during an emergency.
6. Explain the meaning of emergency sirens sounding.

Time: 2.0 hrs

LPRO TRAINING OBJECTIVES

1. Describe the four levels of emergency classification at Catawba Nuclear Station and categorize a particular event using the appropriate RP.
2. Explain personnel responsibilities during an emergency at Catawba Nuclear Station.
   - 2.1 List the persons (by title) who may assume the role of emergency coordinator.
   - 2.2 State who is responsible for activation of the emergency warning system (sirens).
   - 2.3 State who is responsible for making recommendations to offsite agencies.
   - 2.4 State your assembly point.
3. State the emergency levels that require various actions to be taken.
   - 3.1 OSC activation.
   - 3.2 TSC activation.
   - 3.3 EOF activation.
   - 3.4 Site assembly.
   - 3.5 Mandatory site evacuation.
4. Name the locations for emergency evacuation sites alpha and bravo, and explain how to determine which site to use in case of an evacuation.
5. List the offsite agencies which should be notified during an emergency.
6. Explain the meaning of emergency sirens sounding.
7. State the size of the Emergency Planning Zone (EPZ).

Time: 2.0 hrs

LPSO TRAINING OBJECTIVES

1. List the four levels of emergency classification at Catawba Nuclear Station and categorize a particular event using the appropriate RP.
2. Explain personnel responsibilities during an emergency at Catawba Nuclear Station.
   - 2.1 List the persons (by title) who may assume the role of emergency coordinator.
   - 2.2 State who is responsible for activation of the emergency warning system (sirens).
   - 2.3 State who is responsible for making recommendations to offsite agencies.
   - 2.4 State your assembly point.
3. State the emergency levels that require various actions to be taken.
   - 3.1 OSC activation.
   - 3.2 TSC activation.
   - 3.3 EOF activation.
   - 3.4 Site assembly.
   - 3.5 Mandatory site evacuation.
4. Name the locations for emergency evacuation sites alpha and bravo, and explain how to determine which site to use in case of an emergency.
5. List the offsite agencies which should be notified during an emergency.
6. Explain the meaning of emergency sirens sounding.
7. State the size of the Emergency Planning Zone (EPZ).
8. Describe actions for natural disasters and major accidents occurring at the station per the following procedures:
   - 8.1 Natural Disaster and Earthquake Response procedure.
   - 8.2 Chemical Spill procedure.
   - 8.3 Collision/Explosion Response procedure.

9. Describe how to conduct site assembly/evacuation according to RP/0/A/5000/10.

10. Prepare and evaluate Emergency Notification Reports for both initial and follow-up notification for any given accident scenario.

Time: 2.0 hrs

PTRQ TRAINING OBJECTIVES

1. List the four levels of emergency classification at Catawba Nuclear Station and categorize a particular event using the appropriate RP.
2. Explain personnel responsibilities during an emergency at Catawba Nuclear Station.
   - 2.1 List the persons (by title) who may assume the role of emergency coordinator.
   - 2.2 State who is responsible for activation of the emergency warning system (sirens).
   - 2.3 State who is responsible for making recommendations to offsite agencies.
3. State the emergency levels that require various actions to be taken.
   - 3.1 OSC activation.
   - 3.2 TSC activation.
   - 3.3 EOF activation.
   - 3.4 Site assembly.
   - 3.5 Mandatory site evacuation.
4. Name the locations for emergency evacuation sites alpha and bravo, and explain how to determine which site to use in case of an emergency.
5. List the offsite agencies which should be notified during an emergency.
6. Explain the meaning of emergency sirens sounding.
7. State the size of the Emergency Planning Zone (EPZ).
8. State the time frames in which immediate and follow-up notifications are to be made to the various offsite agencies.

9. Describe actions for natural disasters and major accidents occurring at the station per the following procedures:

   9.1 Natural Disaster and Earthquake Response procedure.

   9.2 Chemical Spill procedure.

   9.3 Collision/Explosion Response procedure.

10. Describe how to conduct site assembly/evacuation according to RP/0/A/5000/10.

11. Prepare and evaluate Emergency Notification Reports for both initial and follow-up notification for any given accident scenario.

Time: 2.0 hrs

LESSON OUTLINE

1. INTRODUCTION
   - 1.1 Purpose
   - 1.2 Objectives
2. PRESENTATION
   - 2.1 General Description
   - 2.2 Emergency Actions Taken for a Natural Disaster and Earthquake
   - 2.3 Actions for Chemical Spill
   - 2.4 Actions for Collision/Explosion
   - 2.5 Conducting a Site Assembly or Evacuation
   - 2.6 Control of Assessment and Repair Teams
   - 2.7 NRC Notification Requirements
   - 2.8 Quantifying Gaseous Release Through Steam Relief Valves Under Post-Accident Conditions
   - 2.9 Distribution of Potassium Iodide Tablets in the Event of a Radioactive Release
3. SUMMARY

1. INTRODUCTION

1.1 Purpose - The Emergency Plan was developed for the protection of life and property during emergency and accident situations. It primarily addresses radiological situations (radiation, contamination and reactor accidents) where plant personnel and the general public are endangered. In addition, it includes other general industrial emergency and accidents which involve radioactive materials.

2. PRESENTATION

2.1 General Description - The Emergency Plan is a coordinated effort involving station personnel, station facilities, and equipment, the emergency resources of the Duke Power Emergency Plan, various offsite local, state and Federal government agencies.

A. Key Elements of the Emergency Plan

1. A uniform means of reporting and handling any emergency or accident situation.
2. An emergency classification system of increasing severity, based on specific criteria, Emergency Action Levels (EAL) and a method for relating EALs to Protective Action Guides.
3. Interaction with various local, state and federal agencies concerned.

B. Emergency Classification System (ISS/LPRO/LPSO/PTRQ #1)

1. The four classes with increasing severity are:
   a) Notification of Unusual Event
   b) Alert
   c) Site Area Emergency
   d) General Emergency
2. Emergency Classification Symptoms/Description are made using RP/0/A/5000/01, Classification of Emergency. Refer to RP/01 when discussing the following levels of emergencies.
   a) <u>Notification of Unusual Event</u>
      1) Events are in progress or have occurred which indicate a <u>potential</u> degradation of the level of safety of the plant.
      2) No releases of radioactive material requiring offsite response or monitoring are expected unless further degradation of safety occurs.

3) Examples - Tornado on site, Fire on site >10 min., ECCS initiation, Loss of offsite power.

4) Make notifications within 15 minutes of declaring the event: (ISS/LPRO/LPSO/PTRQ #5)

   (a) North and South Carolina

   (b) York, Gaston, and Mecklenburg Counties

   (c) NRC (ENS phone)

   (d) Station Manager or Designee

   (e) Senior VP

NOTE: To ensure complete understanding of the Emergency Organization activation method, discuss actions contained in Response Procedures and Site Directive 3.8.4.

b) Alert

1) Events are in progress or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant.

2) Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline exposure levels.

3) Examples - > 50gpm NC leak, fuel damage, fire affecting safety systems, etc.

4) Notify same agencies as for Notification of Unusual Event.

5) OSM must activate the TSC/OSC/EOF, make announcement over PA, and conduct site assembly.

c) Site Area Emergency

1) Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public.

2) Any releases are not expected to exceed EPA Protection Action Guideline exposure levels except near the site boundary.

3) Examples - LOCA>ECCS capability, Loss all pwr>15 min., aircraft crash affecting vital structures, etc.

4) Make Initial Notifications.

5) Activate TSC/OSC/EOF and conduct a Site Assembly.

d) General Emergency

1) Events are in progress or have occurred which involve an actual or imminent substantial core degradation or melting with potential for loss of containment integrity.

2) Releases can be reasonably expected to exceed EPA Protective Action Guideline exposure levels offsite for more than the immediate site area.

3) Examples - Loss physical control of station property, ≥ 1 Rem TEDE or ≥ 5 Rem CDE Thyroid at Site Boundary.

4) During General Emergency, TSC, OSC, and EOF activation required. Conduct site assembly and mandatory evaluation of non-essential personnel.

5) Recommend to Off-site Agencies to evacuate 2 mile radius & 5 miles downwind and recommend in-place shelter for zones not evacuated.

3. Immediate Actions During an Emergency

a) Compare actual plant conditions to the Emergency Action Level(s) listed in Enc. 4.1, RP/0/A/5000/01, then declare the appropriate Emergency Class.

NOTE: Using the appropriate forms, have students classify an event and fill out a Emergency Notification Form (ENF). (LPSO #10, PTRQ #11)

b) Make notifications to state and county agencies within 15 minutes of declaring the event. Notify the NRC as soon after the states and counties as is possible, not to exceed 1 hour. Notify all others as soon as possible after the states, counties, and NRC are notified. (PTRQ #8) 16

1) NC and SC

2) York, Gaston, Mecklenburg counties

3) NRC (ENS phone)

4) Senior VP

5) Station Manager or Designee

c) Refer to the applicable Emergency Response Procedure (RP) for the classification found in Enc. 4.1, RP/0/A/5000/01:

Notification of Unusual Event, RP/0/A/5000/02

Alert , RP/0/A/5000/03

Site Area Emergency, RP/0/A/5000/04

General Emergency, RP/0/A/5000/05

d) In the event of an "Urgent Condition" problem that has radiological implications, but does not require EP/RP implementation, Radiation Protection Shift Supervisor shall be contacted to respond with Protective clothing and equipment to accommodate 1 RP Technician and 3 workers in an "Urgent Response Kit". [Track #90-022].

4. Subsequent Actions During an Emergency (PTRQ #8)

a) Dispatch field monitoring teams per individual classification guidelines. (NOUE-none, ALERT-on site, SAE-on site and off site, GE-on site and off site).

b) Make follow-up notifications to states and counties:

1) NOUE, ALERT, SAE and GENERAL EMERGENCY

(a) Hourly until emergency closed out

or

(b) If any significant change in situation

or

(c) As agreed upon with each agency (not to exceed 4 hours).

c) Augment shift resources.

d) Assess plant conditions to determine the need to change emergency classifications per RP/01.

1) Raise classification by declaration of Alert, Site Area or General Emergency. Make initial notification within 15 minutes of declaration.

2) Lower classification by declaration of an Alert or NOUE per Encl. 4.3 of RP/0/A/5000/04, Site Area Emergency or RP/0/A/5000/03, Alert respectively. Make initial notification within 15 minutes of declaration.

3) Termination of an emergency varies with the classification from which the emergency is being terminated. Refer to RP/0/A/5000/02 through 06A.

e) Brief plant personnel as to status of the emergency via the plant page.

f) Make Protective Action recommendations to states and counties, as appropriate.

g) Ensure emergency worker doses do not exceed the limits of RP/0/A/5000/18, Emergency Worker Dose Extension, as appropriate.

h) Provide turnover to the TSC Emergency Coordinator, as appropriate.

C. Personnel Responsibilities (ISS/LPRO/LPSO/PTRQ #2.1)

1. Initially the OPS Shift Manager is the individual who assumes the role of Emergency Coordinator.

2. Subsequently the Station Manager or his designee will assume the role of Emergency Coordinator. After EOF activation, the EOF Director is responsible for overall emergency management.

3. Duties (ISS/LPRO/LPSO/PTRQ #2.3)

NOTE: See EPG 5.1.3 for organizational responsibilities.

a) OPS Shift Mgr/Emergency Coordinator

1) Determine applicable Emergency Class.

2) Declare Emergency and assume the functions of Emergency Coordinator.

3) Assign someone from shift to begin notifications as per applicable procedure.

4) Provide for continuous ENS NRC notification (via FTS) until TSC assumes control.

5) Take necessary onsite remedial actions.

6) Initiate activation of TSC/OSC/EOF as necessary

7) Make Protective action recommendations to offsite agencies. (ISS/LPRO/LPSO/PTRQ #2.3)

b) Station Manager /Emergency Coordinator

1) Relieves the OSM of Emergency Coordinator functions.

2) Staffs OSC and TSC.

3) Institutes procedures necessary to allow Control Room to gain control of emergency situations.

4) Notification & activation of EOF, county, state and NRC.

5) Provide Protective action recommendations to offsite authorities. (ISS/LPRO/LPSO/PTRQ #2.3)

6) Continued maintenance of an adequate state of emergency preparedness until the emergency situation has been effectively managed and the station is returned to a normal or safe operating condition.

c) Review contents of OMP 1-2 (TSC Duty Expectations).

D. Emergency Facilities

1. Control Room - Located in Auxiliary Building, has operational control over the reactor and plant systems.

2. Technical Support Center (TSC) - in Service Building, becomes station's central control area for emergency response and technical management. Actuated at the Alert Status. Will assume responsibility for communication with offsite agencies, including NRC, after activation. (ISS/LPRO/LPSO/PTRQ #3.2)

a) If non-routine line-ups or operations are being considered, then TSC concurrence must be obtained PRIOR to implementing these actions (Track #90-011)

3. Operations Support Center (OSC) - Located in Service Building, Cable Spreading Room (EL.574), provides a location where plant logistical support can be coordinated. Activated at Alert Status. Nuc. Shift Supervisor in charge until OSC Coordinator arrives. Field monitoring teams, maintenance personnel, etc., will be dispatched from OSC. RP required to fill out dose records, radiological conditions, etc. (ISS/LPRO/LPSO/PTRQ #3.1)

4. Emergency Operations Facility (EOF)) - Located in Charlotte Offices (1st floor of Power Building), the EOF Director directs all of Duke Power's response to an emergency from this location. Activated at Alert Status. (ISS/LPRO/LPSO/PTRQ #3.3)

E. Protective Response

1. Site Assemblies - At the Alert Emergency Class or greater. All site personnel are to report to their supervisor at a predesignated location, called the assembly point for initial accountability. For OPS shift personnel, their assembly point is the control room or OSC. (ISS/LPRO/LPSO #2.4). This must be accomplished within 30 minutes. Site Assembly Alarm - heard throughout the plant. Site assembly and site evacuation alarms both activated from same switch in Control Room. Switch labeled "Primary"/"Secondary" to indicate primary and backup power supplies to alarms. (ISS/LPRO/LPSO/PTRQ #3.4)

2. Site Evacuation (ISS/LPRO/LPSO #3.5 & 4)- May occur for Site Area Emergency and always occurs for General Emergency, must be preceded by a Site Assembly. All non-essential site personnel should proceed to one of two Evacuation Sites based on site selection criteria.

   a) Site Alpha - Newport Tie Station on Mt. Gallant Road near SC Hi way 161 in York County (5 miles SW). | 16

   b) Site Bravo - Allen Steam Plant off Southpoint Road in Gaston County (12 miles N).

3. Evacuation of Public - Ordered by states or counties, Duke Power can only make a recommendation. (ISS/LPRO/LPSO/PTRQ #2.2)

F. Offsite Emergency Planning

1. Emergency Planning Zones - Evacuation plans are prepared for the public in and about a 10 mile radius from the plant called the 10 mile Exposure Pathway Zone (EPZ), or Plume Exposure Zone. Other planning efforts are taken in the 50 mile radius from the plant called the 50 mile Ingestion Pathway Zone (IPZ). (LPRO/LPSO/PTRQ #7)

2. Prompt Alerting System - In order to alert the public to a problem at the station, an outdoor warning system of sirens has been installed in the 10 mile EPZ. These sirens can be activated only by the counties warning point for either a radiological emergency or a civil emergency (tornado, flood or nuclear attack). Sirens alert public to tune TV or radio to EBS for further information or directions. (ISS/LPRO/LPSO/PTRQ #6)

3. Notification System - After hearing a siren, the public is to turn on a radio or TV and listen for an Emergency Broadcast System (EBS) message. The message could be: (ISS/LPRO/LPSO/PTRQ #6)

   a) Information only about the emergency.

   b) An instruction to evacuate homes, offices, schools, factories, etc.

   c) An instruction to remain indoors for shelter until further instructions are available.

4. Sheltering - The states and counties have designated shelter space available (located outside the 10 mile EPZ in the host counties) for everyone in the 10 mile EPZ (risk counties) with food, water, and a place to sleep until they are instructed to return home.

2.2 Emergency Actions taken for a Natural Disaster and Earthquake (Refer RP/07) (LPSO/PTRQ #9A & 9B)

A. Referencing RP/0/A/5000/07, discuss the following:

1. Symptoms of entry
2. Immediate actions
3. Subsequent actions and notification requirements

2.3 Actions for Chemical Spill (LPSO/PTRQ #9C)

A. Referencing RP/0/A/5000/08, discuss the following:

1. Symptoms of entry.
2. Immediate actions for onsite and offsite spills.
3. Subsequent actions for onsite and offsite spills.

2.4 Actions for Collision/Explosion (LPSO/PTRQ #9D)

A. Referencing to RP/0/A/5000/09, discuss the following:

1. Symptoms of entry.
2. Immediate Subsequent actions.

2.5 Conducting a Site Assembly or Preparing the Site for an Evacuation (LPSO/PTRQ #10)

A. Referencing to RP/0/A/5000/10, discuss the following:

1. Symptoms of entry.
2. Immediate and subsequent actions for Site Assembly and Evacuation.
3. Locations for Site Evacuation and basis for selection.

2.6 Control of Assessment and Repair Teams

A. Discuss the purpose, precautions and procedure to control the use of repair teams during an emergency. Refer to RP/0/A/5000/24, OSC Coordinator Procedure, Encl. 4.94/4.6.

2.7 NRC Notification Requirements (LPRO/LPSO/PTRQ #5)

A. Referencing to RP/0/A/5000/13, discuss the actions required in communicating to the NRC. Refer to enclosures to clarify notification requirements.

2.8 Quantifying Gaseous Release Through Steam - Relief Valves Under Post-Accident Conditions will be accomplished by Radiation Protection personnel.

2.9 Distribution of Potassium Iodide Tablets in the Event of a Radioiodine Release

A. The Radiation Protection Manager in conjunction with available medical advice shall control the distribution of KI tablets.

B. KI tablets should be given to:

1. Persons suspected of having been in the affected area.
2. Persons present in the affected area.
3. Persons who will enter the area while a significant amount of radioiodine is present.

3. SUMMARY

3.1 Review Lesson Plan Objectives and answer student questions.

CHANGE SUMMARY FORM

Document #	Rev #	Prepared by	Date
OP-CN-EP-SEP	16	ETBEADLE	6/23/98

Description of change summary:

1. Deleted references in the lesson plan for deleted documents: RP/0/A/5000/14, Repair and Assessment Teams - moved to RP/0/A/5000/24, OSC Coordinator Procedure. Deleted SD 3.0.7, Site Assembly/Evacuation - moved to RP/0/A/5000/10, Site Assembly/Evacuation. Deleted SD 3.8.4, Emergency Organization, moved to EPG 5.1.3.

2. Clarified reporting to NRC after states and counties notified. "Immediately" means as soon as possible after notification to states and counties and within one hour of the declaration.

3. Changed the location of evacuation site A to Newport Tie from Newport Power Delivery that was closed to centralize transmission material sites(cost reduction).

4. Made other editorial revisions to enhance the readability of the lesson plan.

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TIMD420                      EMPLOYEE QUALIFICATION                  09/04/98 14:23
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SSN      =                    Qual Type: INITIAL   Prompt for missing Prereqs: _
Name     : RANDALL L_____ HERRING_____________
Facility= CN   Job= OPS_   Qual Task= S0026_____________      Revision No= 07
Status   : I C              Qual Date: 06/14/97               Qual Method: W
Qual Task Title: CLASSFICATION OF EMERGENCY_____________________
Evaluator SSN  :            Name : EDWIN A_______ CRISP_____________
Evaluator Hours: _____
================================================================================
OJT SSN        :            Name : MIKE D_________ FERGUSON___________
OJT Date       : 05/16/97
OJT Method     : W
OJT Hours      : _____

Management SSN: _________ Name : _____________ ____________________


ENTER OR UPDATE EMPLOYEE QUALIFICATION.
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EP-S0026

SENIOR REACTOR OPERATOR T&Q

TASK: Assess plant problems and declare emergencies per approved procedures.

REQUIREMENTS:

- OJT YES
- QUALIFICATION YES

ACCEPTABLE TASK COMPLETION SETTING: W

PREREQUISITES (Academic instruction in the following):

- OP-CN-EP-SEP (Emergency Plan Lesson)

TRAINING AND QUALIFICATION ELEMENTS:

1. Describe the different classifications of emergencies per RP/0/A/5000/01.
   - A. Notification of Unusual Event
   - B. Alert
   - C. Site Area Emergency
   - D. General Emergency
2. Walkthrough using the Emergency Event List for Emergency Classes, and given a set of situations by the trainer, declaring an Emergency Event for each event listed per RP/0/A/5000/01.
   - A. Primary Coolant Leak
   - B. Fuel Damage
   - C. Steam System Failure
   - D. High Radiation/Radiological Effluents
   - E. Loss of Shutdown Function
   - F. Loss of Power
   - G. Fires and Security Actions
   - H. Spent Fuel Damage
   - I. Natural Disasters and Other Hazards
   - J. Other Abnormal Plant Conditions
3. Show how to escalate, de-escalate or close out an emergency per RP/0/A/5000/01.

4. State the immediate actions required for the Notification of Unusual Event Procedure per RP/0/A/5000/02.
   A. Show how to use the Emergency Notification Form and explain what information is required to be given per RP/0/A/5000/06A.
   B. State the notification requirements.
5. Summarize the subsequent actions required for the Notification of Unusual Events procedure per RP/0/A/5000/02.
   A. Describe the procedure to terminate the emergency.
   B. Describe the procedure to give a follow-up message.
      - For events lasting > 1 hour
      - Significant change in the situation
      - Escalation to a higher classification
6. State the immediate actions required for declaring an alert per RP/0/A/5000/03.
   A. Describe the required documentation and notification requirements.
   B. Explain how to activate the Emergency Organization.
7. Summarize the subsequent actions required for an alert per RP/0/A/5000/03.
   A. State the functions of the on-site monitoring teams.
8. State the immediate actions required for declaring a Site Area Emergency per RP/0/A/5000/04.
   A. Explain the on-site and off-site protective actions.
9. Summarize the subsequent actions required for a Site Area Emergency per RP/0/A/5000/04.
   A. Explain the EPA Protective Action Guides and recommendations.
   B. State the exposure limits for emergency workers.
   C. Show how to use the 10 mile Emergency Planning Zone (EPZ) map and Wind Direction Determination Worksheet.
10. State the immediate actions required for declaring a General Emergency per RP/0/A/5000/05.
    A. Explain the on-site and offsite protective actions.
11. Summarize the subsequent actions required for a General Emergency per RP/0/A/5000/05.
    A. Show how to use Protective Action Zone Determination Tables.
12. Demonstrate the correct method of completing an Emergency Notification form and describe how the report is delivered and recorded. Also, describe how the message is transmitted.

13. Summarize the procedure for follow-up notifications per RP/0/A/5000/06A, B, C.
    A. Explain the use of the notification matrix.
14. Demonstrate a mastery of prerequisite knowledge

REFERENCES:

- RP/0/A/5000/01 (Classification of Emergency)
- RP/0/A/5000/02 (Notification of Unusual Event)
- RP/0/A/5000/03 (Alert)
- RP/0/A/5000/04 (Site Area Emergency)
- RP/0/A/5000/05 (General Emergency)
- RP/0/A/5000/06A (Notifications to States and Counties from the Control Room)
- RP/0/A/5000/06B (Notifications to States and Counties from the Technical Support Center)
- RP/0/A/5000/06C (Notifications to States and Counties from the Emergency Operations Facility)

Prepared By: _____ Date 9-25-95
Reviewed By: _____ Date 9-25-95
Ops Review: _____ Date 9/25/95
Approved By: _____ Date 9/26/95