ENCLOSURE 1

EXAMINATION REPORT - 50-269/OL-85-02

Facility Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Facility Name: Oconee Nuclear Station

Facility Docket No.: 50-269

Written examinations were administered at Oconee Visitors Center near Seneca, South Carolina.

Simulator examinations were administered at Oconee Training Center near Seneca, South Carolina.

Oral examinations were administered at Oconee Nuclear Station near Seneca, South Carolina.

Chief Examiner: Sandy Lawyer — 9/23/85 Date Signed

Approved by: Bruce A. Wilson, Section Chief — 9/23/85 Date Signed

Summary:

Examinations on August 19-22, 1985.

Written examinations were administered to 16 candidates; 12 of whom passed.
Simulator examinations were administered to 16 candidates; 13 of whom passed.
Oral examinations were administered to 16 candidates; 13 of whom passed.

REPORT DETAILS

1. Facility Employees Contacted:

*J. N. Pope, Superintendent of Operations
*C. W. Graves, G. O./Ops Services
**T. A. Loflin, OTC
**P. M. Stovall, OTC
**L. M. Hindman, OTC
**T. L. Farmer, OTC
**J. M. Byko, OTC
**G. R. Lowery, Shift Operating Engineer
*J. B. Price, Shift Supervisor
**R. A. Yarbrough, OTC

*Attended Exit Meeting

**Attended Exam Review

2. Examiners:

*S. Lawyer, NRC
W. Apley, PNL
J. Huenefeld, PNL
B. Gore, PNL

*Chief Examiner

3. At the conclusion of the written examination, the examiners gave a copy of the examination and answer key to the facility personnel for their review. The following comments were submitted to the chief examiner at the exit meeting or were disclosed on further review by the staff.

a. SRO exam - General comments.

Overall the test was adequate and fair except it is felt that in some instances question wording was confusing.

The only complaint, as far as fairness of the materials tested, is the requirement to memorize operating procedure steps and EP Subsequent Action steps. This directly conflicts with Duke Power Company practice and directives. Duke Power Company feels the practice of operating without the procedure in hand could be detrimental to reactor safety.

(1) Section 7 and 8 Questions noted below.

Facility Comment:

The following questions require an operator to memorize procedures that are normally available to him on shift. ONS and Duke Power Directive specifically require operators to have a procedure in their possession when performing the task. The intent being to ensure operators do not try to perform the task from memory. Ref: OMP 1-2 p.2; OMP 4-1 p.8; SD 2.2.1 p.4; APM 4.2.6 p.4.2-6, APC-S.D p.10

Questions: 7.9
7.10
7.17
7.29
8.8
8.13
8.15
8.17
8.27
8.31
8.32
8.34

NRC Resolution:

Questions 7.9, 7.10 and 8.34 are inappropriate. They were deleted.

Each of the remaining questions objected to has been reviewed and found to test recognition and cognitive ability as opposed to memorization. Therefore, the utility comment is not applicable to these questions. No change was required.

(2) Section 6, 7, and 8 questions noted below.

Facility Comment:

The following questions require an operator to memorize subsequent actions of emergency procedures. Duke Power Company believes only immediate actions should be memorized. Memorizing subsequent actions could lead to operator action without the procedure in hand. This practice could be detrimental to reactor safety.

*6.36
*7.2
*7.8
*7.18
7.19
*7.20
7.24
7.36
8.34
8.36

*individually commented on

NRC Resolution:

Each of the ten questions objected to has been reviewed and found to test recognition and cognitive ability as opposed to memorization. Furthermore, in the case of these ten questions, the knowledge required is a generalized knowledge of the intent of the procedure or the correct answers can be easily deduced from a reasonable knowledge of the system's operating characteristics. No change was required.

(3) Question 5.14

Facility Comment:

Either answer, c or d, is correct depending on initial detector placement. Answer c shows the detector located "too far" from the source and d shows the detector located "too near". Ref: FNRE p. 124-128

NRC Resolution:

Figure 3-14 represents a situation in which detector to source distance is variable and it portrays the effects referenced in the comment. The question wording may not be clear and therefore, answers c and d will be accepted.

(4) Question 5.24

Facility Comment:

"The curves of figure 2.1-2A are based on the more restrictive of two thermal limits and include the effects of potential fuel densification and rod bowing:

(a) Combination of ..... that yields no less than the CHF correlation limit."

All answers to this question are related to DNB; therefore, there is no correct answer to this question. Students picked an answer rather than leave the question blank. Ref: T.S. 2.1 p. 2.1-2

NRC Resolution:

We concur. The question was deleted.

(5) Question 5.32

Facility Comment:

The answer key is wrong. The answer should be answer e. Since an 80 EFPD curve would indicate more K excess to be overcome by poison, the ECP would indicate a lower rod position than the actual critical rod position. Answer d (answer on the key) is wrong since using 300°F differential boron worth curve indicates boron worth is higher than actual, requiring less rod control or insertion; therefore, the ECP rod position will be higher than the actual critical rod position. Ref: OP/1103/15

NRC Resolution:

The answer key is incorrect. The utility analysis is correct. The answer key was changed.

(6) Question 6.1

Facility Comment:

All three units use the new vent mechanism and procedure. Answers a, c, and d are correct answers.

Answer a - vent tool by ONS terminology refers to the old vent mechanism assembly. This is no longer required on any unit.

Answer c - (answer on answer key) - is correct (for all three units).

Answer d - Ref: Enclosure 4.6 of procedure - p. 1 of 4 Caution - "If knurled sleeve won't move, there may be pressure under the quick disconnect." Ref: OP/1,2 and 3/1103/02

NRC Resolution:

The newly provided lesson plan referenced on the answer key clearly indicates that only answer c is correct. No reference material was provided to support the contention that all three

units now use the new vent mechanism, but the contention itself is adequate documentation that the lesson plan provided is out dated and incorrect. Since three of five answers are correct, the question was deleted.

(7) Question 6.3

Facility Comment:

All answers reflect an area protected by a sprinkler system. Answer key answer - d reflects an area considered to be part of the plant. Keowee is protected by its own sprinkler system. Therefore, there is no correct answer to the question posed. Students picked an answer rather than leave the question blank. Ref: T.S. 3.17 Table 3.17-1 p. 3.17-8

NRC Resolution:

The referenced TS clearly distinguishes between the sprinkler system which protects equipment in choices a, b, c, and e and the emulsifire/spray system protecting the Keowee hydro main lube oil storage room of choice d. This is supported by lesson plan OP-OC-SPS-CM-KHG on page 15. No change was required.

(8) Question 6.6

Facility Comment:

There is no correct answer to this question listed. This is a training deficiency in that the lesson plan is inaccurate. Ref: B&W lesson plan CROM-Electrical p. 13 and 36

NRC Resolution:

The utility comment is supported by the new reference. The question was deleted.

(9) Question 6.11

Facility Comment:

None. During staff review, distractor e was determined not to be sufficiently incorrect.

NRC Resolution:

Credit will be given for this response in addition to choice d.

(10) Question 6.13

Facility Comment:

Answer a is answer key answer. Each RPS channel is powered from a separate vital bus. Answer c, therefore, appears to be a trick answer. Ref: IC-RPS p. 62

NRC Resolution:

The wording of this question is lacking in specificity. The question was deleted.

(11) Question 6.31

Facility Comment:

Answer d is correct also. The Emergency Start signal reset at the DG panel is called "Emergency Control Function Override." Ref: SSF-DG p.44, p.48 and p.63

NRC Resolution:

The contention that answer d is also correct is supported by the three additional references supplied. The training material cited in the answer key should be corrected. Answers d and e will be accepted. The answer key has been changed accordingly.

(12) Question 6.35

Facility Comment:

Answer a (answer key) is not correct since each source range detector system is composed of 4 detectors in parallel, rather than 2. Due to this discrepancy, students picked an answer rather than leave the question blank. Ref: IC-NI p. 10

NRC Resolution:

It is felt that answer a is correct since each of the two detectors consists of four cans. Each of the sets of cans is referred to in the referenced material as "a detector". This is further supported by other Duke Power Company material. See for example, "Fundamentals of Nuclear Reactor Engineering", Duke Power Company, Figure 5-15, p. 262 and paragraph b., p. 263. Even if the candidates were confused by the reference to "two", a knowledgeable candidate would not find any of the other choices to be even confusingly acceptable. No change was required.

(13) Question 6.36

Facility Comment:

EOP also lists HP-24 and HP-26 to be operated. Some students listed only 6 of 8 valves called for by the EOP since the question specified to list only six. Ref: EP/1800/01

NRC Resolution:

The utility comment is correct. The lesson plan is in error and should be corrected. Any six of the eight correct responses will be accepted for full credit. The answer key was changed accordingly.

(14) Question 6.37

Facility Comment:

Answer key is not technically correct since pressing the emergency start button in the control rooms and cable rooms only start the Keowee; not make the Keowee tie to the main feeder buses. Most students understood what was really being asked, but some did not. Ref: CM-KHG p. 34

NRC Resolution:

The reference in the lesson plan uses the same terminology as that used in the question and therefore, it should be familiar to all of the students even if it is "technically" incorrect. In addition, the question clearly asks for four responses further reinforcing the candidates selection of this as a fourth response. No change was required.

(15) Question 6.38

Facility Comment:

One candidate assumed more restrictive meant "increase", but wrote assumptions on the test.

NRC Resolution:

The candidates assumptions, if noted on the examination paper or answer paper, were fully considered and credited according to their validity.

(16) Question 6.40

Facility Comment:

Answer e terminology is confusing. At ONS the operators say "Turbine in Hand or Manual". This answer may be left off students answers due to terminology confusion. Ref: IC-ICS p. 23

NRC Resolution:

The referenced material seems to support the terminology comment. Since the question did not state that five responses were required, candidates who omitted choice e will not be penalized for the omission. The answer key will be changed to indicate choice e as optional.

(17) Question 7.2

Facility Comment:

Answer d is correct also by ONS new EOP which is replacing the LOCA EP referenced in the answer key. Some students answered by the LOCA EP and some by the new EOP. This question should be deleted due to having to reference the LOCA EP and the confusion as to reference it or not. Ref: EP/1800/01

NRC Resolution:

The utility cited reference is lacking in specificity and is therefore difficult to utilize. However, a cursory review of the entire procedure leads to the conclusion that choice d is not correct, i.e., 1800/01 Section 501 "loss of subcooling" requires that all RCP's be tripped. Therefore, it is not clear that any conflict between the two procedures exists. No change was required.

(18) Question 7.4

Facility Comment:

All answers are things the operator would expect to see on CCW failure. Answer b (answer key) is an expected action since main steam pressure increases dramatically on reactor and turbine trips. S. Lawyer told student that "atmospheric steam dumps" are the same as ONS "main steam relief valves". Therefore, there is no correct answer to the question posed. Students picked an answer rather than leave the question blank. Ref: EP/0/A/1800/2 (Turbine Trip)

NRC Resolution:

The three conditions stated in the stem of the question are identical to the three symptoms stated in the answer key referenced emergency procedure. The emergency procedure states six immediate actions which the candidate must have memorized. Choice b is the only one not on this memorized list (irrespective of what name it is called). It should be noted that the utility referenced procedure, by prior agreement, was replaced with EP/1/A/1800/01. This latter procedure supports the answer key answer also (i.e., it does not indicate on pg. 2, immediate automatic actions that main steam relief valves open). No change was required.

(19) Question 7.8

Facility Comment:

T.S. 3.1.2 and OP/1102/10 allows only one RCP to be run if below 200°F. Since a cooldown would be in progress, this Tech Spec would apply. Ref: T.S. 3.1.2 and OP/1102/10

NRC Resolution:

Neither of the utility cited references are specific. Tech Spec 3.1.2 specifies acceptable pressure-temperature combinations, and heat up and cooldown rates. It refers to Table 3.1-2 "operational guidance for plant cooldown" which in turn gives pump constraints necessary to render the guidance valid. Those constraints are apparently the referenced information. Those constraints require that no more than 1 pump per loop be operated under the temperature and pressure specified in this question. Therefore, this is in agreement with EP/1800/01 cited in the answer key. No change was required.

(20) Question 7.10

Facility Comment:

Placing the SG/Rx master (in auto) is its own separate step and is performed at the operator's discretion between 560°F and 579°F. Therefore, either answer d or e is acceptable, while technically, between the two points is more correct. There is no correct answer for the question posed. Students picked an answer rather than leave the question blank. Ref: OP/1102/01 p. 5 of enclosure 4.3

NRC Resolution:

See #1 general above.

(21) Question 7.13

Facility Comment:

There is no correct answer given for this question. Psuedo Indication is only given for the Reactor Bailey, Startup FDW Valves and Turbine Bypass Valves. Students picked an answer rather than leave the question blank. Ref: IC-ICS p. 66 and p. 65

NRC Resolution:

The referenced material does not clearly support the answer key answer. Therefore, the question has been deleted.

(22) Question 7.16

Facility Comment:

Question 7.16 was answered as a "label the drawing" type question. He did label #4 correctly.

NRC Resolution:

If candidates labeled enclosure 4.5 correctly, full credit will be given.

(23) Question 7.18

Facility Comment:

The actions are required in all sections of the EP since to verify a step means to verify auto actions and perform any manually that did not occur automatically. There are no correct answers to the question posed. Ref: EP/1800/01 Sec. 505 p. 62 of 142

NRC Resolution:

We concur. The question has been deleted.

(24) Question 7.20

Facility Comment:

Training on the EOP requires that, if heat transfer is or has been excessive, to go to the excessive heat transfer section (TSOR considerations). A subcooling margin of only 10°F indicates other than a normal trip condition (possible excessive heat transfer). Ref: EP/1800/01 EOP

NRC Resolution:

The utility comment is correct, answer b or c will be accepted. The answer key was changed accordingly.

(25) Question 7.32

Facility Comment:

These references require removal of protective clothing prior to frisking, thereby superseding answer C. Therefore, there are no correct answers given for the question posed. The students based on knowledge of the references and practice, picked an answer rather than leave the question blank. Ref: HPM p.27 and S.D. 3.3.2 p. 6

NRC Resolution:

The stated objection is inaccurate. It is true that frisking is required by the references after removal of protective clothing. However, this is not the same as requiring removal of protective clothing prior to frisking. Choice c is a direct quote of Health Physics Manual Pg. 72. In addition, the utility referenced station directive 3.3.2 p. 6 states, "Perform a hand and foot frisk... per enclosure 4.1." And Enclosure 4.1 states "2.4 contact Health Physics, if the frisker alarms during the Check of Clothing, and/or body surfaces." It was found that choice b was lacking in specificity and for that reason was included as an acceptable answer.

(26) Question 7.38

Facility Comment:

None. During staff review prior to grading it was noted that part b of the question was lacking in clarity and that while the referenced procedure did not specify certain items to be performed on unit one, these are procedural inadequacies. In addition, inclusion of part b would have created a double jeopardy for the candidate.

NRC Resolution:

The question will be graded without considering part b. Point values will be credited according to the plan originally shown on the answer sheet.

(27) Question 7.39

Facility Comment:

Part c has two correct answers - 6 and 11.
Part e has two correct answers - 7 and 9.
Ref: IC-PRM p. 9 and p. 11

NRC Resolution:

Omission of choices 6 and 7 as noted in the utility comment, was an examiner error. They were added to the answer key.

(28) Question 8.9

Facility Comment:

Answer a is not entirely correct in that one of the curves is based on quality, not DNBR. Ref: T.S. p. 2.1-3d

NRC Resolution:

While it is true that the two pump curve is based on both DNBR and quality, thus making choice a incomplete, it does not make it incorrect. More importantly, none of the other choices are even partially correct. This will be considered prior to future use of this question. No change was required to this examination.

(29) Question 8.13

Facility Comment:

Should say "within _____ minutes of site assembly."

NRC Resolution:

The utility comment is correct. The suggested change will be made prior to any future use of this question.

(30) Question 8.14

Facility Comment:

T.S. limit for operation is .15 ppm cl - Therefore a cl - concentration of .14 ppm is not a LCO. Therefore, there is no correct answer for the question posed. Students picked an answer rather than leave the question blank. Ref: T.S. 3.1.5 p. 3.1-12

NRC Resolution:

The utility comment is correct. This resulted from examiner error. The question was deleted.

(31) Question 8.15

Facility Comment:

The question directs the operator to get permission from the Duty Operating Engineer for startup clearance. OMP 1-3 requires the Duty Engineer to get this clearance from the station manager. Therefore, answer e could be considered a trick question.
Ref: OP/1102/02 Trip Recovery

NRC Resolution:

The word "decision" was not emphasized and should have been. Distractor e will be accepted in addition to answer c.

(32) Question 8.22

Facility Comment:

This question should say, "when relieving the shift supervisor." A unit supervisor is not an emergency coordinator.

NRC Resolution:

The utility comment is correct. The suggested change will be made prior to any future use of this question.

(33) Question 8.24

Facility Comment:

While it is understood that this is a Tech Spec question, it is not the operator's responsibility to ensure surveillance is performed at the proper intervals. This responsibility falls to other groups at ONS. Therefore, this question should not be asked of an operator without the benefit of being able to use the reference as during an oral interview. Ref: S.D. 2.1.4 p.1

NRC Resolution:

Proper performances of surveillance are required to assure that operation is within the safety limits and LCOs. This is a very general question which tests whether the operator can make a proper judgement regarding the operability of safety-related equipment. This in turn is a condition of operator and senior operator licenses. No change was required.

(34) Question 8.25

Facility Comment:

This T.S. requires that incore neutron detection be operable at 80% of the power allowable for the pump combination. Therefore, there are no correct answers given for the question posed.
Ref: T.S. 3.5.4 p. 3.5-33

NRC Resolution:

The utility comment is correct. This resulted from examiner error. The question was deleted.

(35) Question 8.26

Facility Comment:

None. It was disclosed on staff review that distractor b was not sufficiently different from the answer a.

NRC Resolution:

Both were accepted.

(36) Question 8.31

Facility Comment:

None (other than as noted in 1 above). It was disclosed during staff review that the wording utilized in the stem, particularly the word "restart", was not adequately defined.

NRC Resolution:

The question was deleted.

(37) Question 8.35

Facility Comment:

It is not the responsibility of the operator to ensure training is completed at the proper intervals. This responsibility is delegated to the ONS training group. Therefore, this question should not be asked of an operator without benefit of being able to use the reference material.

NRC Resolution:

To know the precise interval for the required training, use of the documentation suggested may be appropriate. However, each licensed person is responsible for assuring that his training has been completed in accordance with station procedures prior to this certification on form 398. To ask the operator to identify the interval within a factor of two is not unreasonable.

(38) Question 8.38

Facility Comment:

At least three candidates believed they were not given complete sets of enclosures for this question. Therefore, their answers are incomplete. A page check was not completed prior to the test commencing as had been the procedure in the past. (The facility identified the three candidates by name.)

During the staff review, a typo was discovered on the answer key. The response "23" should have read "21".

NRC Resolution:

Enclosures for the three candidates have been checked again and found to be complete. A page check was completed prior to the commencement of the examination by the chief examiner and the candidates name was printed on the examination at that time. This was done to provide a more positive assurance that all pages were included. The typo was changed on the answer key.

4. Exit Meeting

At the conclusion of the site visit the examiners met with representatives of the plant staff to discuss the results of the examination. Those individuals who clearly passed the oral examination were identified.

There were no generic weaknesses (greater than 75 percent of candidates giving incorrect answers to one examination topic) noted during the oral examination.

The cooperation given to the examiners and the effort to ensure an atmosphere in the control room conducive to oral examinations was also noted and appreciated.

The licensee did not identify as proprietary any of the material provided to or reviewed by the examiners.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Sandy
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ENCLOSURE 3

U. S. NUCLEAR REGULATORY COMMISSION

SENIOR REACTOR OPERATOR LICENSE EXAMINATION

Facility: Oconee
Reactor Type: PWR B&W I77
Date Administered: August 19, 1985
Examiners: S. Lawyer
Applicant: _____

INSTRUCTIONS TO APPLICANT:

Use separate paper for the answers. Write answers on one side only. Staple question sheets on top of the answer sheets. Points for each question are indicated in parentheses after the question. The passing grade requires at least 70% in each category and a final grade of at least 80%. Examination papers will be picked up six (6) hours after the examination starts.

Category Value	Total	Score	Value	Category
38 ~~40~~ ~~38~~	~~25~~ 26.3			5. Theory of Nuclear Power Plant Operation, Fluids and Thermodynamics
37 ~~40~~ ~~38~~	25.5			6. Plant Systems: Design, Control & Instrumentation
35 ~~40~~ ~~37~~	~~25~~ 24.1			7. Procedures-Normal, Abnormal, Emergency Radiological Control
35 ~~40~~ ~~36~~	~~25~~ 24.1			8. Administrative Procedures, Conditions and Limitations
145 ~~160~~ ~~150~~	100			TOTALS

Final Grade _____%

All work done on this exam is my own, I have neither given or received aid.

_____
Applicant Signature

5.0 THEORY OF NUCLEAR POWER PLANT OPERATION, THERMODYNAMICS, HEAT TRANSFER AND FLUID FLOW (40.0)

5.1 Figure 5.1, "Surface Utilization vs. Flow," represents the heat transfer process in your OTSGs. Which of the following statements is CORRECT concerning Departure from Nucleate Boiling (DNB) Ratio as it relates to this Figure? (1.0)

a. DNBR of 1.0 occurs prior to nucleate boiling and cannot be shown on this figure.

b. DNBR of 1.0 occurs between the nucleate boiling and the film boiling areas.

c. DNBR of 1.0 occurs between the film boiling and the superheat areas.

d. DNBR of 1.0 must be avoided all at costs and does not occur in the OTSGs.

5.2 Which of the following statements is most nearly accurate regarding control rod worth? (1.0)

a. It is proportional to reactor power.

b. It is proportional to rod speed.

c. It is higher in regions of higher relative neutron flux.

d. It is not dependent upon rod position.

e. It is proportional to boron concentration.

5.3 During a reactor startup, power is being raised above the point of adding heat (POAH). Which of the following statements is CORRECT? (Assume a linear reactor power increase to about 3% power) (1.0)

a. Since header pressure is 885 psig, Tave will not rise above the corresponding saturation temperature of 532°F.

b. Since the OTSGs are low level limited and header pressure is being maintained at 885 psig, Tave will rise and the steam temperature will tend to follow Th.

c. With the header pressure being maintained at 885 psig, the OTSGs will remain at saturated conditions and no superheat will be added.

d. Since the OTSGs are low level limited, the steam is superheated at zero power conditions and rises proportionally with power.

5.4 A general rule is often stated "doubling the count rate halves the margin to criticality." This is mathematically stated by the equation. (1.0)

$$\frac{CR1}{CR2} = \frac{1-keff\ 2}{1-keff\ 1}$$

Which one of the following statements is CORRECT concerning the above statement and equation?

a. Both keff 1 and keff 2 have to be less than 1.0.

b. Equal changes in keff result in equal changes in subcritical multiplication level.

c. The equation only approximates the instantaneous change in count rate; once equilibrium value is reached, the count rate will be higher.

d. A second doubling of the count rate will result in the reactor becoming critical or supercritical.

e. The statement is approximately correct but CR1 and CR2 are inverted.

5.5 OP-1102/01, "Reactor Startup", requires that the critical rod position be taken at 10^{-8} amps on the intermediate range. If, during a xenon free reactor startup at MOL, the operator "overshot" 10^{-8} amps and instead leveled off at 10^{-7} amps, which of the following statements is CORRECT? (1.0)

a. At 10^{-7} amps, there are little or no effects from nuclear heat but since the reactor is a decade higher in power, the critical rod position would be higher.

b. At 10^{-7} amps, there are little or no effects from nuclear heat; therefore, the critical rod position should be the same as at 10^{-8} amps.

c. At 10^{-7} amps there are substantial effects from nuclear heat; therefore, the critical rod positions will be higher than at 10^{-8} amps.

d. At 10^{-7} amps, nuclear heat, xenon and being a decade higher in power level will result in a higher critical rod position.

e. At 10^{-7} amps, there are substantial effects from nuclear heat but they are cancelled by the additional burnable poison depletion. Therefore, the critical rod position should be the same as at 10^{-8} amps.

5.6 The reactor trips from full power, equilibrium xenon conditions. Six hours later the reactor is brought critical at 10^{-8} amps on the intermediate range. If power level is maintained at 10^{-8} amps which of the following statements is CORRECT concerning control rod motion? (1.0)

a. Rods will approximately remain as is since the xenon concentration is independent of time.

b. Rods will approximately remain as is as the xenon establishes its equilibrium value for this power level.

c. Rods will have to be rapidly inserted since the critical reactor will cause a high rate of xenon burnout.

d. Rods will have to be inserted due to xenon decay.

e. Rods will have to be withdrawn since xenon will closely follow its normal build-in rate.

5.7 Figure 5.7 shows a graph of pump laws, i.e., the relationship between pump speed and other pump parameters. Which one of the following parameters is represented by curve 2? (1.0)

a. Power

b. Flow Rate

c. Voltage

d. Discharge Pressure

5.8 Startup of a centrifugal pump with the discharge valve shut is best characterized by which one of the following? (1.0)

a. low motor current and low discharge pressure

b. low motor current and high discharge pressure

c. high motor current and low discharge pressure

d. high motor current and high discharge pressure

5.9 Concerning the behavior of samarium-149, in the reactor, which of the following statements is CORRECT? (1.0)

a. Most of the Sm produced comes directly from fission.

b. Most of the removal of Sm is by radioactive decay.

c. Sm reactivity is independent of flux once it has reached equilibrium.

d. Equilibrium Sm is reached about 40 hours after the initial startup of the reactor.

e. Sm reactivity is independent of Sm concentration.

5.10 One of the characteristics of water is that it will hold gases dissolved in solution. Which of the following will INCREASE the concentration of dissolved gases in a quantity of water? (1.0)

a. Increasing the pressure and/or lowering the temperature.

b. Decreasing the pressure and/or lowering the temperature.

c. Increasing the pressure and/or raising the temperature.

d. Decreasing the pressure and/or raising the temperature.

5.11 In the feedwater subsystem of the ICS, feedwater demand is modified as a function of feedwater temperature. Select the CORRECT statement concerning this feedwater temperature compensation. (1.0)

a. Since feedwater temperature remains constant as power increases, additional heat must be provided in the OTSG for the steam to reach the proper superheat criteria.

b. The effect of cooler FW entering the OTSG is that aspirating steam flow is reduced, header pressure decreases, and therefore, MW gen will decrease.

c. The FW temperature compensation will affect the BTU limit calculation but have no effect on the FW demand signal.

d. FW must be temperature compensated to account for the differing mass content of a gallon of water as temperature varies.

5.12 To maintain steam header pressure constant, it is necessary for OTSG steam pressure to _____ by approximately 25 psig from no load to full load. This is in response to the laws of fluid dynamics which state that as the flow of steam increases in a steam line, the pressure drop experienced per unit line length _____. (1.0)

a. increase; increases

b. increase; decreases

c. decrease; increases

d. decrease; decreases

5.13

5.14 You are plotting an inverse multiplication plot (1/m) during fuel loading. When fuel is loaded so that the distance between the detector and the fuel steadily decreases while the source to detector distance is constant, the 1/m plot will look like ____ in Figure 5.14. (1.0)

a.

b.

c.

d.

5.15 The Main Steam Line Break Accident forms the basis for the Shutdown Margin requirement at End-of-Life (EOL) conditions because: (1.0)

a. Beta-effective is at its maximum value.

b. Boron concentration is at its maximum value.

c. Control rod insertion limits are most restrictive.

d. Hot channel factors are at the most conservative values.

e. MTC is at its most negative value.

5.16 The process of hydrogen generation in the reactor building after a LOCA which is controlled by the addition of caustic (NaOH) is: (1.0)

a. Radiolysis

b. Zirc-water reaction

c. Hydrogen coming out of solution

d. Zinc-boric acid reaction

e. Steam-steel reaction

5.17 Which of the following is NOT one of the conditions necessary for brittle fracture? (1.0)

a. plastic deformation at or below the yield point.

b. temperature at or below the NDTT

c. nominal stress level

d. flaw such as a crack present

5.18 The startup, intermediate and power range channels all use boron in their respective detectors (BF_3 or boron lined). (1.0)

Which of the following is the CORRECT reason for use of boron?

a. It reduces the critical volume (size) of the detector. Detectors which rely solely on gas ionization by neutrons are much larger.

b. Neutrons do not carry a net electric charge. Neutron detection must depend upon their interaction with target nuclei.

c. Ionization of the Boron by neutrons is much more responsive and accurate than other ionizations such as neutron-rhodium used in the in-core detectors.

d. The neutron-boron reaction produces beta particles which have a much higher specific ionization than neutrons alone.

5.19 Select the CORRECT statement concerning pump cavitation. (1.0)

a. Vapor bubbles are formed when the enthalpy difference between the pump discharge and pump suction exceeds the latent heat of vaporization.

b. When the vapor bubbles enter a higher pressure region, the bubbles collapse which produces high pressure pulses or shock waves.

c. Vapor cavities (bubbles) are produced when the localized pressure exceeds the vapor pressure at the existing temperature.

d. As the vapor bubbles are discharged from the pump they impinge on downstream piping and valves causing water hammer.

5.20 The ratio of both Pu-239 and Pu-240 atoms to U-235 atoms changes over core life. Which one of the pairs of parameters below are most affected by this change? (1.0)

a. Beta and thermal neutron diffusion length

b. Thermal neutron diffusion length and moderator temperature coefficient

c. Moderator temperature coefficient and doppler coefficient

d. Doppler coefficient and beta

5.21 A moderator is necessary to slow neutrons down to thermal energies. Which of the following is the CORRECT reason for operating with thermal instead of fast neutrons? (1.0)

a. Increased neutron efficiency since thermal neutrons are less likely to leak out of the core than fast neutrons.

b. Reactors operating primarily on fast neutrons are inherently unstable and have a higher risk of going prompt critical.

c. The fission cross section of the fuel is much higher for thermal energy neutrons than fast neutrons.

d. Doppler and moderator temperature coefficients become positive as neutron energy increases.

5.22 Which one of the following factors will help, rather than hinder, natural circulation? (1.0)

a. Lowering OTSG level

b. Lowering RCS pressure

c. Increasing RCS temperature

d. Lowering turbine bypass valve setpoint

5.23 Following a trip from full power with the reactor shutdown and 4 RCPs operating, the 125 psi bias is suddenly removed from the turbine bypass valves. Which one of the following statements best describes plant response? (1.0)

a. The OTSG saturation temperature drops causing a decrease in RCS T_c and a rapid drop in pressurizer level.

b. OTSG pressure drops and levels rise. The increased OTSG levels cause an overcooling of the RCS.

c. Since OTSG pressures drop 125 psi, BTU limit alarms will be received on both generators and feedwater will cut back.

d. The resulting cooldown of the RCS will decrease the shutdown margin to less than Tech Spec limits.

5.24 Which one of the following is NOT one of the DNB related parameters that must be maintained within Tech Spec limits? (1.0)

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a. Hot leg temperature

b. Reactor Coolant pressure

c. Reactor Coolant flow rate

d. Neutron power

e. Reactor power imbalance

5.25 Which of tne following will NOT change over core life? (1.0)

a. The minimum acceptable shutdown margin

b. The acceptable reactor power imbalance

c. Differential boron worth

d. Doppler deficit

e. Peak Sm worth after SD from full power

5.26 When synchronizing the generator to the grid, OP-1106/01, "Turbine Generator Startup" directs the operator to regulate turbine speed to slowly rotate the synchroscope in the fast (clockwise) direction. Which choice below CORRECTLY gives the two parameters that the synchroscope is indicating? (1.0)

a. Current and voltage differences

b. Voltage and frequency differences

c. Frequency and phase differences

d. Phase and resistance differences

e. Resistance and current differences

5.27 Which one of the following statements is CORRECT concerning the paralleling of electrical systems? (1.0)

a. Although it is desirable to have speed and phase position matched, it is much more important to have voltages matched.

b. If voltages are not matched at the time the synchronizing switch is closed, there will be VAR flow from the lower voltage source to the higher one.

c. If the incoming machine is at synchronous speed but out of phase with the running when the breaker is closed, heavy currents will flow to either accelerate or retard the incoming machine.

d. If the incoming machine is in phase but slightly faster than synchronous speed when paralleled, the system will tend to speed up the incoming machine to synchronous speed.

e. If the resistances are not matched at the time the synchronizing switch is closed, heavy currents will flow to tend to speed up the incoming machine to synchronous speed.

5.28 Which one of the following is NOT one of the ECCS Acceptance Criteria as specified in 10 CFR 50.46? (1.0)

a. Peak cladding temperature shall not exceed 2200°F

b. Long term cooling is available to remove decay heat.

c. Total oxidation of cladding shall nowhere exceed 17% of the total cladding thickness before oxidation.

d. Total amount of hydrogen generated shall not exceed 1% of the maximum hypothetical amount.

e. DNB and Kw/ft limits shall be maintained $\leq$ 1.30 and $\geq$ 18.0 Kw/ft. respectively.

5.29 Figure 5.29 illustrates a cross-sectional view of the fuel rod from pellet centerline out into the coolant channel. Which of the following is CORRECT concerning heat transfer and temperatures as shown in this figure? (1.0)

a. The mode of heat transfer through the pellet is a combination of conduction and convection.

b. Due to the ceramic nature of the zirc-4 clad, a large ΔT is needed to transfer heat through it.

c. The ΔT across the gap is relatively small (10 - 30°F) due to the fact that the heat transfer coefficient of gas is much larger than for a solid.

d. A typical ΔT across the cladding would be 350°F.

e. A typical ΔT across the pellet may be from centerline of 1500°F down to approximately 700°F.

5.30 A negative MTC is great to have for safe reactor control, but creates a problem when it comes to cold water accidents or a steam/feedline break. What natural safeguard (inherent feature) of the Oconee low enriched core acts initially to limit the severity of these transients? (1.0)

a. Minimum Temperature for Criticality

b. Doppler Coefficient

c. Void Coefficient

d. Fuel Redistribution

e. Main Steam Stop Valves

5.31 Which of the following is CORRECT concerning temperatures at which fuel and/or cladding damage will occur? (1.0)

a. The cladding will melt at approximately 2200°F.

b. Uranium dioxide fuel will melt at approximately the same melting temperature as the cladding.

c. UO_2 melt limit is approximately 5000°F while Zirconium will melt at about 3300°F.

d. The melting temperature for both fuel and cladding drop sharply over core life.

e. Sustained temperatures greater than 1800°F may cause zircaloy to react with the helium fill gas.

5.32 An estimated critical position has been calculated for a startup that is to be performed 15 hours after a trip following a 60-day full power run. Which of the following actions will contribute to a higher actual rod position than the calculated ECP? (1.0)

a. Controlling the OTSG levels above the low level limit.

b. Delaying the startup six hours longer than anticipated.

c. Decreasing the APSR position for criticality from 25% to 10%.

d. Using the 300°F differential boron worth vs. burnup curve instead of the 532°F curve.

e. Using 80 EFPD instead of 180 EFPD when determining the core excess reactivity from the excess reactivity vs. burnup curve.

5.33 Which of the following statements best describes the behavior of xenon and samarium? (1.0)

a. Xenon concentrations may increase or decrease when taking the plant from Mode 3 to full power but samarium will always decrease during this transient after the core's equilibrium samarium has been reached.

b. After a reactor trip occurs, xenon will eventually decay to a xenon free condition, but a Samarium free condition will not occur until after the next refueling outage.

c. The xenon and samarium peak concentration following a trip occurs at a time independent of the previous power level.

d. After a reactor trip occurs, xenon concentration initially increases and samarium initially decreases.

e. After a reactor trip occurs, xenon and samarium concentrations may initially increase or decrease, but both will change in the same direction.

5.34 Which of the following is a true statement concerning radioactive decay? Remember the atomic number is the number of protons and the mass number is the number of neutrons plus protons. (1.0)

a. When an element decays by Beta emission, the new element will have increased in atomic number by one and the mass number will remain the same as the original element.

b. When an element decays by Alpha emission, the new element will have decreased in atomic number and mass number by two, from the original element.

c. When an element decays by Neutron emission, the new element will have increased in atomic number by one and decreased in mass number by one, from the original element.

d. When an element decays by Gamma emission, the new element will have increased in atomic number by one and the mass number will remain the same as the original.

5.35 The amount of aspirating steam (lbm/hr) used in the OTSG _____. (1.0)

a. Increases as the temperature of the feedwater increases

b. Increases as power increases from 10 to 100%

c. Increases as the feedwater flow decreases

d. Decreases as the temperature of the feedwater decreases

5.36 Given a quantity of superheated steam, would the following processes cause specific enthalpy to increase, decrease, or stay the same?

a. an iso-thermal compression (0.5)

b. an iso-baric (constant pressure) increase in temperature (0.5)

5.37 The amount of energy being delivered by the OTSGs is actually greater than the thermal energy being supplied by the nuclear core. How can this imbalance exist during steady-state conditions? (1.5)

5.38 TRUE or FALSE. A pump whose centerline is above the level of water in a tank from which it is taking a suction will cavitate even though the NPSH is positive. (0.5)

5.39 Refer to Figure 5.39, "Protective System Maximum Allowable Setpoints". Identify by name or title the parts of the Figure marked A, B, C, and D (A-Axis; B&C-line; D-area). Numerical values are not required. (2.0)

END OF SECTION 5

6.0 PLANT SYSTEMS: DESIGN, CONTROL AND INSTRUMENTATION (40.0)

deleted per 3

6.1 The following statements refer to the CRDM vent cap design. Which one is a CORRECT statement for the nuclear unit referenced? (1.0)

a. On unit one, the design does not require a vent tool.

b. On unit two, the vent plug must be removed before the vent valve can be operated.

c. On unit two, the valve body turns to operate the vent valve.

d. On unit three, pressure between the vent valve and the quick disconnect cap will prevent removal of the quick disconnect cap.

e. On unit three, the hex nut at the top of the vent cap must be removed before attaching the external vent tool.

6.2 The attached drawing (Figure 6.2) shows several components in a typical regulating or auxiliary CRD power supply. Which one of the following CORRECTLY identifies its incicated component? (1.0)

a. DC hold

b. 600VDC/24VDC transformer

c. 140 VAC overvoltage protection switch

d. Breaker A (or B)

e. UV relay A (or B)

6.3 With regard to Plant Fire Protection Systems, the sprinkler system protects all but one of the following areas. Which one is NOT protected by the sprinkler system? (1.0)

a. Unit 1 Turbine driven emergency FDW pump.

b. Transformer CT-3

c. Unit 2 Cable Room

d. Keowee Hydro Main lube oil storage room

e. Unit 3 cable shaft 3rd level

6.4 Which of the following describes how a thermocouple will indicate when it fails open? (1.0)

a. It will exhibit an increase in potential across its output leads which corresponds to a high or maximum temperature.

b. It will exhibit a decrease in potential across its output leads which corresponds to a low or minimum temperature.

c. It will exhibit an increase in potential across its output leads which corresponds to a low or minimum temperature.

d. It will exhibit a decrease in potential across its output leads which corresponds to a high or maximum temperature.

e. It will exhibit a different potential across its output leads depending upon whether the temperature at the point of the failure is above or below ambient temperature.

6.5 Which of the following accurately depicts the number of required core flood tanks and the amount of core coverage that the core flood system will provide post LOCA assuming no liquid remains in the reactor vessel before start of reflood. (1.0)

a. One core flood tank will cover the core hot spot.

b. Two core flood tanks will cover the core hot spot.

c. One core flood tank will cover the entire core.

d. Two core flood tanks will cover the entire core.

6.6 While in automatic on the Operator Control Panel (Diamond Panel), which of the following indicating lamps, when illuminated, will also switch the diamond panel to MANUAL? (1.0)

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a. Sequence-Inhibit Lamp

b. Automatic-Inhibit Lamp

c. Asymmetric Rods Lamp

d. Out-Inhibit Lamp

6.7 Which of the choices listed below correctly depicts two conditions, that cause I.C.S. to runback to the load limit indicated and at the rate indicated? (1.0)

a.
- Loss of 1 RC pump with 4 running, I.C.S. runs back to 75% full load reactor demand at 50%/min.
- Loss of a feedwater pump, I.C.S. runs back to 45% full load reactor demand at 50%/min.

b.
- Asymmetric Rod, I.C.S. runs back to 60% full load reactor demand at 20%/min.
- Loss of 2 RC pumps with 4 running, I.C.S. runs back to 45% full load reactor demand at 50%/min.

c.
- Loss of 1 RC pump with 4 running, I.C.S. runs back to 75% full load reactor demand at 50%/min.
- Reactor coolant flow limit, I.C.S. runback to a full load reactor demand level equal to 1.1 times the flow at 30%/min.

d.
- Loss of a feedwater pump, I.C.S. runs back to 65% full load reactor demand at 50%/min.
- Reactor coolant flow limit, I.C.S. runs back to a full load reactor demand level equal to 1.1 times the flow at 20%/min.

e.
- Loss of a feedwater pump, I.C.S. runs back to 45% full load reactor demand at 50%/min.
- Loss of 2 RC pumps with 4 running, I.C.S. runs back to 45% full load reactor demand at 50%/min.

6.8 Assuming the I.C.S. is in its normal automatic lineup and power output is at 50%. Which one of the following statements most accurately describes the response the I.C.S. would take if one of the bypass valves on the 'A' side failed open? (1.0)

a. The increased steam flow would start to decrease loop 'A' Tc. The delta Tc controller would reratio feedwater, cutting back on the 'A' side and increasing 'B' side feed. E. H. C. will decrease turbine throttle setting to return header pressure to setting.

b. The increased steam flow would start to decrease loop 'A' Tc. The delta Tc controller would reratio feedwater reducing 'A' feed and increasing 'B' side feed to balance delta Tc. Reactor demand would pull rods to recover Tave.

c. The increased steam flow would start to decrease steam header pressure which would then cause an error signal between header pressure and set pressure. This error signal would then be given to the control valves to close to compensate for the increased steam flow.

d. The increased steam flow would cause a decrease in Tave thereby causing the reactor demand to pull rods to compensate for the decrease. With the correction being greater than 5%, feedwater would be cross limited and increased by 2% to makeup for the increased steam flow.

e. The increased steam flow would cause header pressure to drop slightly and cause Tave to decrease. This would continue until the reactor power reaches high-limit at which time feedwater flow will increase and generated megawatts will begin to decrease slowly.

6.9 The operation of the control rod hoist, on the Main Fuel Handling Bridge, is limited by load indication on the Dillon Load Cell. The hoist cannot be LOWERED if the Dillion reads less than: (1.0)

a. 1550 lbs.

b. 1750 lbs.

c. 1950 lbs.

d. 2350 lbs.

e. 2650 lbs.

6.10 Which one of the following ESF subsystems is actuated at the trip setpoint indicated? (1.0)

a. ES 1, 2, 7 & 8 - Penetration room ventilation, reactor building isolation, reactor building spray - 10 psig RB.

b. ES 7 & 8 - high pressure injection, low pressure injection, reactor building cooling, penetration room ventilation, reactor building isolation - 3 psig RB.

c. ES 5 & 6 - Reactor building spray - 3 psig RB.

d. ES - 3 & 4 Low pressure injection - 650 psig RCS.

e. ES 1 & 2 - High pressure injection, Keowee emergency start and non-essential RB isolation - 1600 psig RCS.

6.11 Which one of the following accurately describes the purpose of the Emergency Feedwater System? (1.0)

a. Provides 2200 ppm borated water for Emergency Plant Shutdown.

b. Provides 400 F demin water to the O.T.S.G. in the event of a loss of main feedwater.

c. Provides makeup from the condenser hotwell to the OTSGs during startup.

d. Provides unheated, chemically treated water to the OTSGs to allow safe cooldown.

e. Provides sufficient feedwater for approximately five hours cooldown at a flow rate of 1780 gal/min.

6.12 Which of the following RPS trips is NOT bypassed when the RPS is in "Shutdown Bypass"? (1.0)

a. Low Pressure (1800 psig)

b. High Flux (105.5%)

c. Flux/flow - imbalance

d. Variable Low Pressure

e. Power/RCPs

6.13 All RPS equipment (sensors, recorders, modules, etc.) is powered from: (1.0)

a. ±15 VDC or 120 VAC from its associated channel.

b. ±15 VDC or 120 VAC from the other three channels.

c. ±15 VDC or 120 VAC from a separate vital bus.

d. the DC distribution system.

e. auxiliary DC power supply from the other three channels.

6.14 Which one of the following is CORRECT regarding the difference between items A and B on the attached figure 6.14? (1.0)

a. A is a bistable
B is a toggle switch operated momentary contact

b. A is a toggle switch operated momentary contact
B is a key switch operated contact

c. A is a key switch operated contact
B is a relay operated contact

d. A is a relay operated contact
B is a contact buffer

e. A is a contact buffer
B is a bistable

6.15 The turbine driven EFW pump turbine oil cooler is cooled by: (1.0)

a. HPSW (high pressure service water)

b. LPSW (low pressure service water)

c. CCW (condenser circ water)

d. its own discharge

e. CC (component cooling)

6.16 The upper surge tank, condensate storage tank and hotwell with minimum water volume are sufficient to maintain a unit in HOT SHUTDOWN for ___?___ hours with steam discharge to atmosphere. (1.0)

a. 3

b. 8

c. 24

d. 50

e. 100

6.17 Under which one of the following conditions will the Main Feedwater block valves shut? (1.0)

a. Main block valve in "open"; startup control valve demand at 80%.

b. Main block valve in "auto"; main control valve demand >10% increasing.

c. Main block valve in "auto"; Rx power <20%; startup control valve demand 80% increasing.

d. Main block valve in "auto"; Rx power <20%; startup control valve demand <50% decreasing.

e. Main block valve in "open"; Rx power <20%; main control valve demand <20%.

6.18 Which of the following statements about the R.B. Hydrogen purge unit is CORRECT? (1.0)

a. While not a requirement of the Oconee Unit 1 Tech Specs., the availability of this system for Unit 1 was committed to the NRC by letter in 1980.

b. This system must be placed in operation within seven days after a LOCA.

c. The purge blower vacuum breaker, located on the suction side, is set at 18 inches water positive pressure to protect the blower from operating at shutoff head.

d. A portable section of piping is provided to connect the discharge side of the mobile assembly to permanent piping leading back into containment.

e. The purge blower minimum flow of 5 scfm is required by procedure and provided by a blower recirculation line.

6.19 The primary fire protection systems, other than portable carbon dioxide extinguishers, protecting the standby shutdown facility diesel engines is: (select one) (1.0)

a. Freon 12 deluge and Halon deluge systems

b. Halon deluge and wet pipe water sprinkler systems

c. Wet pipe water sprinkler and low pressure carbon dioxide systems.

d. Low pressure carbon dioxide and hose reel water system.

e. Hose reel water and freon 12 deluge systems.

6.20 Which one of the following trips is bypassed when the standby shutdown facility diesel generator is started in the emergency start mode? (1.0)

a. Generator differential

b. Engine high jacket water temperature

c. Engine low-low lube oil pressure (20 psig)

d. Engine overspeed

e. Low starting air pressure (<125 psig)

6.21 Which one of the following statements is true regarding the high pressure injection system? (1.0)

a. The HPI pumps may be started at their local 600 V breakers located on 600V MCC XO.

b. The inlet valve to each letdown cooler is interlocked to prevent opening unless the LPSW supply valve is open.

c. Following a reset of engineered safeguards, the controllers for the A & B HPI pumps must be taken from the "OFF" position and back to "OFF" to secure the desired HPI pump.

d. For the worst case small break accident flow through a single injection nozzle is adequate to cool the core.

e. Under normal operating conditions (non-ES), an HPI pump should never be started without an open flow path to the RC pump seals.

6.22 Why shouldn't hydrazine be added to the RCS during operation of the makeup demineralizers? (1.0)

a. Because the hydrazine will be removed by the demineralizers, and therefore be wasted.

b. The demineralizer resin does not perform satisfactorily at the low temperatures at which hydrazine is used.

c. Hydrazine chemical reaction with the demineralizer resin could result in release of chlorides.

d. If high O_2 levels in the RCS warrant hydrazine addition, a potential source may be the demineralizer and therefore it should be off-service.

6.23 When conducting a plant cooldown, several operations are required to prevent inadvertent ES actuation. Which one of the following statements is TRUE during a plant cooldown? (1.0)

a. Bypassing the digital cabinets is an operator function when system pressure is to be reduced below ES system setpoints.

b. May bypass the low pressure injection whenever RC pressure is <900 psig.

c. May bypass the high pressure injection whenever RC pressure <1800 psig.

d. Bypass must be manually removed whenever RC pressure is increased above 900 and 1750 psig.

e. When low pressure injection is bypassed, secure the RB spray system per OP/1104/05.

6.24 Which of the following statements concerning the Reactor Building Cooling System is CORRECT? (1.0)

a. In normal plant operation, two reactor building cooling units operate in high speed.

b. The cooling coils for the reactor building cooling units are supplied with cooling water from the HPSW system.

c. During ESG operation, a third reactor building cooling unit fan starts and runs in high speed.

d. During ESG operation, the number of auxiliary fan units running is automatically controlled.

e. During ESG operation, additional HPSW flow is automatically diverted from the RB Aux Fans to the "B" RBCU.

6.25 With regard to the Reactor Building Spray System, which of the following statements is CORRECT? (1.0)

a. Upon receipt of an ES actuation signal of 3.0 psig increasing in the RB, the RBS pump suction valves (BS-3 and 4) will automatically stroke to the full open position.

b. A high RB pressure signal (10 psig increasing) starts the 2 RB spray pumps and automatically strokes open the discharge valves (BS-1 and BS-2).

c. The spray pumps start on the 3.0 psig signal while the spray header supply valves (BS-1 and 2) stroke open on the 10 psig RB signal.

d. The 10 psig signal opens both sets of valves (BS-1 and 2 and BS-3 and 4) and starts the 2 RB spray pumps.

6.26 Select the CORRECT statement concerning the Oconee Unit 3 low pressure service water system. (1.0)

a. One pump is normally operated with the second pump serving as backup. A drop in line pressure (25 psi) will start the idle pump.

b. The Unit 3 B LPSW pump power supply can be swapped to feed from either B1T or B2T by use of Kirk-key interlocks.

c. In the event of loss of LPSW on Unit 3, water may be supplied from HPSW only after securing the jockey pump.

d. A LPSW pump is powered from B2T and B LPSW pump is powered from B1T.

e. If RB pressure reaches 3 psig, ESG will isolate the inlet and outlet LPSW cooling flow to the RCPs.

6.27 Select the CORRECT statement about the high pressure injection system. (1.0)

a. The block orifice has two bypasses, (HP-7 and HP-42) both of which are remotely operated from the control room.

b. If it is desired to increase the letdown flow above its normal 70 gpm, a second letdown cooler should be placed in service as well as imposing additional component cooling requirements.

c. The chemical addition system connection is between the makeup line and the letdown filters on Units 2 and 3.

d. A temperature element on the letdown line alarms at 130°F and closes the letdown cooler outlet valves (HP-3 and HP-4) at 135°F to protect the letdown coolers.

e. The deborating demineralizer may be operated in parallel or series with the makeup demineralizers.

6.28 Which one of the following statements is CORRECT regarding the design of the internals vent valves. (1.0)

a. The vent valves were designed to open in the event of a hot leg break when the pressure differential reaches at least 43 psi.

b. The vent valves are designed to open in the event of a cold leg break when the pressure differential reaches at least 43 psi.

c. In the event of a hot leg break, the vent valves should begin to open with a ΔP of about 0.3 psid and be fully open at about 1.5 psid.

d. In the event of a cold leg break, the vent valves should begin to open with a ΔP of about 0.3 psid and be fully open at about 1.5 psid.

6.29 Which of the following statements is CORRECT concerning the Intermediate Range Compensated Ionization Chambers? (1.0)

a. The detectors are surrounded by two inches of lead for shielding fast neutron radiation.

b. The boron lined chamber is sensitive to neutron and gamma radiation, while the unlined chamber is sensitive only to gamma rays.

c. The compensated ion chamber is designed to remove the gamma signal only at high reactor power levels.

d. Undercompensation will cause loss of some neutron current as well as blocking gamma current.

e. Gammas which penetrate the detector's lead shielding will cause ionization which results in a voltage pulse.

6.30 Which one of the following area radiation monitoring system units has a remote visual alarm (at detector location)? (1.0)

a. RIA-1 control room

b. RIA-4 RB entrance

c. RIA-16 main steamline

d. RIA-17 main steamline

e. RIA-18 visitor center roof

6.31 When the SSF diesel engines have been started by an emergency start signal, the emergency stop pushbutton trip signal is blocked and cannot shut the unit down until which of the following has occurred? (1.0)

a. The emergency stop signal has been reset at the local diesel control panel.

b. The emergency stop signal has been reset at the SSF control room panel.

c. The engine increases speed to 850 RPM and the generator output breaker has closed.

d. The emergency start signal has been reset at the local diesel control panel.

e. The emergency start signal has been reset at the SSF control room panel.

6.32 Which of the following will occur if the "VOLTAGE SHUTDOWN" pushbutton is depressed when the SSF diesel generator is being controlled by the electric governor? (1.0)

a. The engine fuel racks trip, the generator output breaker loses its close permissive signal and the field shuts down.

b. The generator output breaker loses its close permissive signal, the field shuts down and the hydraulic governor takes control.

c. The field shuts down, the hydraulic governor takes control and the diesel generator goes to the high speed stop.

d. The hydraulic governor takes control, the diesel generator goes to the high speed stop, and the engine fuel racks trip.

e. The diesel generator goes to the high speed stop, the engine fuel racks trip, and the generator output breaker loses its close permissive signal.

6.33 Which one of the following valves would you NOT expect to fail closed on loss of instrument air? (See Figure 6.33) (1.0)

a. HP-3

b. HP-5

c. HP-7

d. HP-17

e. HP-19

6.34 The synchronizing pin and bearing in the upper portion of the rotor tube in the Control Rod Drive Mechanism (CRDM) is used to ensure... (1.0)

a. uniform rod speed over full travel

b. proper direction of rotation

c. both segment arms move together

d. correct place relationship between individual rods within a group

6.35 Which of the following statements is CORRECT concerning the source range channels? (1.0)

a. The source range signals originate in two high sensitivity BF_3 detectors that operate in the proportional range.

b. The detectors are surrounded by lead shielding, thus making gamma compensation unnecessary.

c. Due to the low level pulses from the detectors, preamplifiers located in the RPS cabinets are required to provide impedance matching.

d. Due to their sensitivity, long term outages will have no noticeable effect on the source range indication.

6.36 In the long term, following as SBLOCA, the BWST has reached its "LP BWST level - Emergency Low" alarm setpoint (3 feet), but RCS pressure has remained above the shutoff head of the LPI pumps. LIST the sequence of valve manipulations (by name or number) that are necessary to set up the Unit 1 or 2 LPI and HPI systems for continued injection into the RCS. (Six valves required.) Are these the same for Unit 3? (1.0)

6.37 List the four separate and diverse conditions (actuating signals) that will cause a Keowee Hydro unit to provide emergency power to Oconee. (1.0)

6.38 Listed below are four parameters that input into the BTU calculator. For each, indicate how it would have to change [INCREASE, DECREASE or REMAIN THE SAME] in order for the BTU limit to be increased. (1.0)

a. Feedwater Temperature

b. Hot Leg Temperature

c. OTSG. Pressure

d. RC System Flow

6.39 On the attached drawing of the KOAC inverter, label the following components with the indicated number. Put the appropriate number in each of the 10 circles. (1.0)

1. alternate source AC input to static switch breaker

2. from DC power supply

3. system output breaker

4. manual bypass switch

5. to Honeywell 45000

6. inverter

7. inverter output breaker

8. from regulated AC power supply

9. dc input breaker

10. static switch

6.40 Which of the following condition(s) will put the Integrated Control System into the tracking mode? (1.0)

a. Cross limits

b. Steam Generator Reactor Demand Hand/Auto Station in "MANUAL"

c. A Feedwater Loop Master Hand/Auto Station in "MANUAL"

d. Both the Diamond Control Station in "MANUAL" and the Reactor Demand Hand/Auto Station in "HAND"

e. Turbine E.H.C., not in operator I.C.S. mode of control

f. A generator output breaker tripped

g. The Reactor tripped

h. Placing FW valves in manual.

END OF SECTION 6

7.0 PROCEDURES-NORMAL, ABNORMAL, EMERGENCY RADIOLOGICAL CONTROL (40.0)

7.1 Listed below are the symptoms which define the four cases A-D in EP/1800/18 "Loose Parts in Reactor Coolant Systems". For which cases is one of your immediate actions "commence a rapid reactor shutdown"? (Select one choice below) (1.0)

Case A: Defined as a sustained noise of large magnitude that causes loose parts monitor alarms.

Case B: Defined as a sustained noise of low magnitude, above background, without a LPM aiarm.

Case C: LPM alarm with no detectable noise.

Case D: Defined as an intermittent noise of any nature not verified as an electronics problem.

a. Cases A & B
b. Cases B & C
c. Cases C & D
d. Cases B & D
e. Cases D & A

7.2 For non-LOCA overcooling events where pressure drops below 1550 psig, select the one correct statement from the following. (1.0)

a. HPI should be reset and throttled immediately once the cause of the problem has been determined to be non-LOCA overcooling.

b. Reactor coolant pumps should be restarted immediately once the cause of the problem has been determined to be non-LOCA overcooling.

c. Reactor coolant pumps should be restarted immediately after correcting the cause of the overcooling if the 50°F subcooling margin is regained.

d. Reactor coolant pumps should not be stopped if the cause of the the problem has been determined to be a non-LOCA overcooling, even if the 50°F subcooling margin is lost.

7.3 The Center CRDM must be checked for accumulation of undissolved gases if: (select one). See Figure 7.3 attached. (1.0)

a. If the reactor coolant system temperature/pressure is above or to the left of the "dissolved gas concentration curve" on enclosure Figure 7.3.

b. Following a loss of level in the pressurizer below 184 inches if its pressurized to greater than 1600 psi with nitrogen.

c. Following a loss of RC system pressure indication during which it cannot be shown that the pressure is below the "dissolved gas concentration curve" on enclosure Figure 7.3.

d. Following a loss of level in either core flood tank below 0 inches if RC pressure is below core flood tank pressure.

e. The dissolved gas volume in RCS is greater than 100 standard CC.

7.4 During operation, the CCW pumps trip, their discharge to the tailrace statalarm actuates and you observe that the main condenser vacuum is low. Which one of the following automatic actions would you NOT expect to see. (1.0)

a. Condenser discharge valves close.
b. Atmospheric steam dumps open.
c. Turbine trips on low vacuum.
d. Main feedwater pumps trips on low-vacuum.
e. Reactor trips.

7.5 EP/1800/9 "Earthquake" under certain circumstances requires you, as immediate actions to either, 1) trip the reactor or, 2) make a survey of the station to locate any damaged equipment or systems. Which pair of conditions below (one choice) leads you to immediately 1) Rx trip and 2) survey. (1.0)

a) 1) If the effects of an earthquake can be visually seen
2) if any disturbance or earthquake is felt

b) 1) if any disturbance or earthquake is felt
2) if the effects of an earthquake can be visually seen.

c) 1) if the recording accelerometer indicates >0.05g.
2) if the recording accelerometer indicates >⅓g.

d) 1) if the recording accelerometer indicates >⅓g.
2) if the recording accelerometer indicates >0.05g.

7.6 The Component Cooling water supply valve CC-8 may fail shut during unit operation. In the event this occurs, which of the following is correct? (1.0)

a. CC-8 can be reopened at the Vital instrument breaker supply for its solenoid.

b. CRD stator temperature will exceed 180°F within 4 minutes.

c. The reactor will have to be tripped if the CRD stator temperature exceeds 135°F.

d. During the first 30 minutes after CC-8 closes, the quench tank cooler temperature is the parameter which limits reactor operation.

e. Control rod drives will be automatically deenergized.

7.7 To reopen CC-8 when its normal operator has failed: (1.0)

a. Use the portable 120VDC battery supply available from I&C.

b. Use the kirk key interlocks at the local AC breaker. (XO)

c. Use the service air connection just outside the RB, adjacent to CC-8.

d. Use the emergency "open" switch on the RZ module.

e. Use the pin from the SS key locker to engage the handwheel for manual opening.

7.8 If, after an ES actuation on Unit 1, with LPI operating, pressurizer level has returned to normal, OTSGs are available, subcooling margin >50°F and RCS P/T is stable, EP/1800/01 directs you to start RC pumps per 1103/06 which in turn provides Figure 7.8 (attached) for guidance. (Note - some information has been deleted from Figure 7.8). If RC temperature and pressure is 200°F and 300 psi, respectively, you should: (1.0)

a. start one pump in either loop

b. start one pump in each loop

c. start two pumps in either loop

d. start two pumps in each loop

e. refer to CP-604 "solid plant cooldown"..

7.9 Refer to figure 7.0. At what point should you place the reactor bailey in auto? (1.0)

a. point 1

b. point 2

c. point 3

d. point 4

e. point 5

dele 5

7.10 Refer to Figure 7.0 at what point should you place the steam generator/reactor master in auto? (1.0)

a. point 1

b. point 2

c. point 3

d. point 4

e. point 5

7.11 Some recorder traces representative of the first several minutes after a valve or an instrument failure are shown in figure 7.11 (attached). Which of the following is the most likely failure? (1.0)

a. A OTSG startup range failed low

b. A RC flow signal lost

c. ΔT_c failure: "A" side failed high

d. B main feedwater valve drifts shut

e. feedwater pump Δp. fails low

7.12 Which one of the following is an appropriate "immediate action" according to EP 1800/05 "Boron dilution" for Unit 2, reactor critical at power. (1.0)

a. Shut off make up flow

b. Establish letdown flow to LDST ≥ 40 gpm.

c. start CBAST pump

d. Evacuate the reactor building

e. Calculate shutdown margin.

7.13 Which one of the following is CORRECT concerning the operation of the ICS main feedwater pump speed control station? (1.0)

dele

a. "Meas-VAR" position indicates feedwater demand error when the main block valves are shut.

b. "MEAS-VAR" position indicates feedwater train ΔP when the main block valves are open.

c. Tripping of the associated feedwater pump will inhibit "auto" operation and light both "auto" and "hand" lamps.

d. Care should be taken when simultaneously transferring both Loops "A" and "B" main feedwater pump control stations to "auto".

7.14 In accordance with the Controlling procedure for unit startup (OP/1/A/1102/01) "when the body of the Controlling procedure refers to another procedure or a section of another procedure, that procedure or section must be completed, reviewed...and signed as complete...prior to proceeding with the Controlling procedure. This will be documented by _____ signing _____". (1.0)

a. the reactor operator, the reactor operator log
b. the reactor operator, the Controlling procedure
c. the reactor operator, the referenced procedure
d. the shift supervisor, the Controlling procedure
e. the shift supervisor, the referenced procedure

7.15 The emergency feedwater system operating procedure states in "limits and precautions" that since 1MS-139 (EFWPT Exhaust to atmosphere check valves) has had its internals removed to prevent over pressurization of the turbine casing, the exhaust of the EFWPT will be to atmosphere only and 1MS-97 (EFWPT Exhaust to Condenser) will be closed and 1MS-96 (EFWPT exhaust to atmosphere) will be open to prevent an inadvertent loss of vacuum. What then is the required positon of the breakers for 1MS-97 and 1MS-96? (1.0)

a. 1MS-97 breaker locked open
   1MS-96 breaker locked open

b. 1MS-97 breaker locked open
   1MS-96 breaker locked closed

c. 1MS-97 breaker locked closed
   1MS-96 breaker locked open

d. 1MS-97 breaker locked closed
   1MS-96 breaker locked closed

7.16 The emergency feedwater system operating procedure enclosure 4.5 "line up for emergency operation" states in part: (1.0)

"2.3 Reset the trip device for 1MS-94 (Emergency Feed Pump Turbine Stop Valve) and manually open 1MS-94 as follows:

1. Reset the RESET LEVER by pushing it toward the turbine shaft until it engages.

2. Rotate the SPINDLE fully clockwise. The LATCH BLOCK should travel upward and protrude ~1" out of the valve hosuing, and the HAND TRIP LEVER should travel to its full up position.

3. Rotate the Spindle counterclockwise to open the valve. The SPRING PLATE should travel up. The spindle should be positioned 1/4 turn from full open."

On figure 7.16, which of the numbered components is the HAND TRIP LEVER referred to above?

a. 1

b. 2

c. 3

d. 4

e. 5

7.17 When running the TDEFWP in recirc for training it is important to: (1.0)

a. lock closed the UST inlet from CST (1C-132)

b. verify that the EFWPT steam supply valve (1MS93) control switch is in "lockout".

c. immediately open the TDEFDWP discharges to lines A2 and B2 blocks (1FW309 and 310) and close TDEFDWP recirc test block valve (1FDW-88) if main feedwater is lost.

d. maintain instrument air to the EFWPT steam supply valve (1MS-93) at all times.

7.18 A step in most emergencies covered by Oconee emergency procedure EP 1800/01 requires you to open (1.0)

°1HP-24 (A HPI BWST suction)
°1HP-26 (A HP injection)
°1HP-25 (B HPI BWST suction)
°1HP-27 (B HP injection)

and to verify HPI pump operation and check flow. For which of the following sections would you expect this to NOT be required?

a. Section 502, loss of heat transfer

b. Section 503, excessive heat transfer

c. Section 504, SG tube leak

d. Section 505, ES actuation

e. Section 506, unanticipated nuclear power production

7.19 See figure 7.19-1 (Page 128 of EP 1800/01) attached. Step 1.0 is signed off and you are adjusting the HPI header flow to maintain RCS P/T within the proper region of enclosure 7.1A. One reactor coolant pump loop is running. The cooldown rate has exceed 100°F/hr while temperature was decreasing 110°F. With RB pressure = 1 psig and RC temperature 350°F, which of the following pressures is it appropriate to control to? (1.0)

a. 150

b. 250

c. 350

d. 450

e. 550

7.20 Refer to Figure 7.20 (page 9 of EP 1800/01). Assume that after a reactor trip: (1.0)

1. All preceeding steps through 5.13 (subsequent action) have been completed and signed off.

2. Subcooling margin is 10°F.

3. You have checked SG level, SG pressure and pressurizer level and found them to all be normal and constant.

4. RCS pressure ~ constant (increasing at 2 lbs/hr)

5. RCS temperature ~ constant (decreasing at 1°F/hr)

According to your guidance on use of the new emergency procedure EP/1/A/1800/01 select the most appropriate action to be taken.

a. go to section 502 "loss of heat transfer".

b. go to section 503 "excessive heat transfer"

c. sign off 5.15

d. go to 5.16, then come back to 5:15 for a recheck.

e. reperform 5.15, being sure to perform the checks (bullets) in the order required (order indicated).

7.21 In response to the symptoms and automatic actions of emergency procedure EP 1800/01, you are directed by the procedure (1.0)

"IF a reactor trip has occurred, OR the reactor should have tripped, THEN _____."

Which of the following CORRECTLY completes this statement?

a. manually trip the reactor

b. manually trip the turbine generator

c. isolate the affected SG

d. manually initiate HPI

e. go to section 506 "unanticipated nuclear power production".

7.22 Emergency operating procedure EP/1/A/1800/01 provides guidance for: (1.0)

1) a reactor trip

2) a condition requiring a reactor trip

3) a unit shutdown required by T.S. due to a SG tube leak.

4) an Unexpected Transient when the reactor is shutdown.

Which one of the following automatic system actions is common to all of these situations?

a. Turbine generator trip

b. unit auxiliaries transfer to CTI

c. Turbine bypass valve open at ~1010 psig

d. Feedwater runback to control SG level

e. possible ES actuation.

7.23 Which one of the following is NOT a symptom or indication of an Unexpected Transient when the reactor is shutdown as defined in Emergency Operating procedure EP/1/A/1800/01? (1.0)

a. ES actuation

b. SG tube leak

c. subcooling margin $\leq 0^{\circ}F$

d. shutdown margin < Tech Spec limit

e. loss of SG Heat transfer

7.24 Select the appropriate second sentence to complete a caution for CP 605 "subcooled cooldown." (1.0)

CAUTION: "Do not perform natural circulation cooldown unless necessary and with station management approval. _____"

a. RCP jumpers must be installed to prevent inadvertent RCP starts.

b. a significiant RB cleanup will be required due to RV head venting.

c. RV head venting must be maintained to prevent pressure from exceeding the nonductile failure limit of T.S. 3.1.2.1.

d. natural circulation requires depressurizing using 1RC-66 (PORV) which could result in failure to close.

7.25 During implementation of EP 1800/01, Section 507 "Inadequate Core Cooling" a situation may arise in which core exit thermo-couples ≥700°F and one unsuccessful attempt has been made to start an RCP. In this event, the procedure states "Defeat RCP interlocks if necessary (per enclosure 7.4)." Which one of the following is NOT a RCP interlock that is bypassed by the enclosure 7.4 jumper being applied in cabinet 1MTC3. (1.0)

a. upper oil pot level low

b. total seal injection ≤22GPM

c. reactor power ≥ 50%

d. oil lift pump not running

e. LPSW pump not running.

7.26

7.27 Which one of the following immediate actions is appropriate on Unit 2 in the event of failure of one train of the low pressure injection system during ECCS operation? (1.0)

a. If LP-17 or LP-18 fails to open automatically and cannot be remotely operated, depressurize using 1RC-66 (PORV) to relieve backpressure on the valve.

b. If the pump in the unaffected loop has failed, attempt to start LPI pump "C".

c. If the LPI pump in the affected loop has failed, attempt to restart pump.

d. If the LPI pumps in both the affected and unaffected loops fail to start, attempt to repair and return to normal ECCS operation.

e. Verify valves LP-1, LP-2 and LP-3 are open.

7.28 The attached drawing, figure 7.28, shows the LPI system aligned for: (1.0)

a. Switchover mode on Unit 1

b. Switchover mode on Unit 2

c. Normal decay heat removal mode on Unit 1

d. Normal dacay heat removal mode on Unit 2

e. Normal decay heat removal mode on Unit 3.

7.29 Who determines whether a person is a "qualified bridge operator" for the purposes of OP 1502/07 "Refueling Procedure"? (1.0)

a. Superintendent of Operations

b. Shift Supervisor on duty

c. Training Manager

d. Refueling Supervisor

7.30 Which one of the following is CORRECT concerning the bridge and trolley limit switches? (1.0)

a. neither the bridge nor the trolley can be moved when the fuel hoist is on an up limit switch

b. neither the bridge nor trolley can be moved unless the T.V. cylinder is up.

c. the bridge can be moved but the trolley cannot if the control rod tube up limit switch is not satisfied.

d. the trolley can be moved but the bridge cannot if the control rod tube up limit switch is not satisfied.

e. neither the bridge nor trolley can be moved unless the hydraulic pressure >2650 psi.

7.31 The Duke Power Company System Health Physics Manual states that "radiation areas" are defined in accordance with 10 CFR 20 requirements. Which one of the following "Radiation Area" definitions means the same as that given in 10 CFR 20.202. (1.0)

a. any area where the dose rate exceeds five mrem/hr or where, in any five (5) consecutive day period, exceeds 100 mrem/hr at any time.

b. any accessible area where a major portion of the body could exceed a dose of five mrem in any one (1) hour, or in any five (5) consecutive days a dose in excess of 100 mrem.

c. any accessible area where any portion of the body could exceed a dose rate of five mrem/hr or where, in any five (5) consecutive day period, could exceed a dose rate of 100 mrem/hr at any time.

d. any area where the dose rate to any portion of the body could exceed a dose of five mrem in any one (1) hour, or in any five (5) consecutive days a dose in excess of 100 mrem.

7.32 Which one of the following provisions is the responsibility of a reactor operator leaving a radiation control zone (RCZ) or the RCA as part of his whole body frisk? (1.0)

a. observe that the pointer is steady and zeroed prior to starting to frisk.

b. the first step after removing the detector probe from the rack is to carefully and slowly monitor both hands.

c. If an alarm occurs while clothing is being checked, reset the alarm, remove protective clothing, and place it in the proper bins.

d. If an increase or alarm occurs while body surfaces are being checked, immediately proceed to the nearest portal monitor and follow posted instructions.

e. Do not leave the restricted area until contamination on body surfaces is within the limits for a restricted area.

7.33 Which one of the following is CORRECTLY stated regarding a permissible dose to an operator in a restricted area as specified in 10CFR20. (1.0)

a. Under non-accident conditions, the operator is permitted to receive no more than 7½ rems per calendar quarter to each hand and to each foot.

b. Under non-accident conditions, the operator is permitted to receive no more than 1¼ rad of beta per calendar quarter to the lens of the eye.

c. Under accident or emergency conditions, the operator is permitted to receive up to 25 rem once in a lifetime exposure.

d. Under accident or emergency conditions, the operator is permitted to receive up to 250 rem once in a lifetime exposure.

7.34 Select the CORRECT statement concerning the "Gaseous Waste Disposal System," OP/1&2/A/1104/18. (1.0)

a. If the meteorological instrumentation is inoperable, the release may proceed with applicable steps being N/A.

stat 5

b. The "Warning" and "High" setpoints on the radiation monitors are adjusted by Chem Rad and verified by the Shift Supervisor.

c. Any waste gas tank to be released to the environment must be recirculated through at least two tank volumes prior to sampling.

d. It is not required to completely isolate the tank, nor initiate a Release Permit when discharging a waste gas decay tank to containment.

7.35 Which one of the following would NOT be expected to occur on Unit 2 on "loss of instrument air" per EP 0/A/1800/29. (1.0)

a. CC water flow is stopped to CRDs, RCPs and letdown coolers.

b. RCP seal return to LDST is lost.

c. Emergency FW lines to SGs (FDW 315 & FDW 316) air operated valves "fail open"

d. Turbine bypass valves close (MS-19, 22, 28 & 31)

e. Total seal injection flow increases to 60 gpm.

7.36 In the event of an unexplained decrease in fuel transfer canal level: (1.0)

a. the SRO in charge of fuel handling shall immediately notify the operations fuel handling personnel to evacuate the reactor building and the spent fuel pool.

b. the boron concentration in the spent fuel pool and transfer canal will be determined and immediately increased to 1900 ppm if required.

c. upenders in the reactor building shall be lowered and the carriages driven into the spent fuel pool.

d. the control room refueling RO controls all steps in the search to identify and correct the cause of the decrease in level until the SRO in charge of fuel handling arrives in the control room.

7.37 List the Unit 1 automatic immediate actions which the operator must verify according to emergency procedure "condenser circulating water system failure." Use name or number for equipment. (1.0)

7.38 With the Unit 2 reactor coolant system intact, high pressure injection in operation and the reactor critical at zero power you observe one or more of the following:

1. an unexplained neutron level increase.
2. an unexplained LDST water level increase.
3. a continuous dilute permit light is on and feed and bleed valve position lights on the console are on.
4. a chemistry analysis indicating a decrease in boron concentration.

a. List the one immediate automatic action which you expect the RO to verify and all immediate manual actions, other than reporting the occurrence to you, that you expect him to perform. (1.3)

b. Identify those steps which are not necessary on Unit 1 by placing a 1 with a circle around it in front of the item. (0.7)

7.39 The Immediate Actions in response to high alarms from certain process radiation monitors require you to verify that automatic action has occurred. Select from Column B each automatic action that you must verify for each Column A RIA high alarm. (1.0)

A		B	
a.	RIA 4	1.	starts turbine building sump pump.
b.	RIA 33	2.	trips Rx building sump pump.
c.	RIA 37	3.	starts Rx building sump pump.
d.	RIA 45	4.	trips turbine building sump pump.
e.	RIA 49	5.	terminates liquid release
f.	RIA 54	6.	terminates gaseous release
		7.	sounds RB evacuation alarm
		8.	stops RB purge fane
		9.	isolates RB normal sump
		10.	isolates RB purge system
		11.	isolates waste gas tanks

END OF SECTION 7

8.0 ADMINISTRATIVE PROCEDURES, CONDITIONS, AND LIMITATIONS (40.0)

8.1 Which of the following statements is CORRECT concerning the Quandrant Power Tilt (QPT)? (1.0)

a. If QPT exceeds the maximum limit of 20.0, the reactor must be immediately shutdown.

b. If misalignment of a control rod causes the QPT to exceed the transient limit, thermal power must be reduced within 30 minutes.

c. No ACTION is required within one hour regardless of the QPT limit exceeded (steady state, transient, or maximum).

d. If QPT exceeds the steady state limit, but is less than the transient limit, operation may continue indefinitely but only up to 60% allowable for the RCP combination.

8.2 If one of the Unit 2 radiation monitors (2R1A-48, 49, 2, 3, RIA-41, and RIA-6) alarms, personnel in the reactor building should evacuate to room _____, those in the spent fuel building to room _____, and those in the spent fuel receiving area to room _____. (1.0)

a. 315, 315, 315

b. 615, 315, 615

c. 315, 615, 615

d. 615, 615, 315

e. 315, 615, 315

8.3 Personnel loading fuel shall be limited to a maximum of _____ hour shifts for supervisors in charge of fuel loading. There will always be more than _____ person (people) in the location where fuel handling is taking place. (1.0)

a. 12, one

b. 16, one

c. 12, two

d. 16, two

e. 12, three

8.4 An event in process which indicates a potential degradation of the level of safety of the plant is classified as: (1.0)

a. an unusual event

b. an alert

c. a site emergency

d. a general emergency

8.5 If you, while you are off shift, are escorting a visitor when a Site Emergency is declared, you must: (1.0)

a. Escort the visitor to the receptionist lobby.

b. Direct the visitor off site by the most direct route.

c. Direct the visitor to remain with you on site.

d. Escort the visitor to the visitor center office.

e. Either direct or escort the visitor to the administration offices.

8.6 Section 6 of the Oconee T.S. specifies that if a safety limit is exceeded, the reactor shall be shutdown _____. It can resume operation only after authorization by _____. (1.0)

a. immediately, the station manager

b. immediately, the Nuclear Regulatory Commission

c. within one hour, the station manager

d. within one hour, the Nuclear Regulatory Commission

e. within 12 hours, the station manager

8.7 What is the time interval within which a temporary approved procedure change must be approved? (1.0)

a. prior to the end of the shift

b. 24 hours

c. 7 days

d. 30 days

e. 90 days

8.8 Oconee operating procedure OP1106/31 "Control of Secondary Contamination" gives guidance on the primary to secondary steam generator tube leakage at which reactor power should be reduced to reduce leakage. What is that leak rate? (1.0)

a. anything greater than zero, since it is pressure boundary leakage

b. .2 gpm

c. 1 gpm

d. 10 gpm

8.9 The attached Figure 8.9 is the Oconee Unit 3 Technical Specifications bases Figure 2.1-3C. Which one of the following statements is CORRECT concerning these curves? (1.0)

a. These curves represent the conditions at which a minimum DNBR of 1.30 is predicted at the maximum possible thermal power for the number of reactor coolant pumps in operation.

b. For each of these curves, a pressure-temperature point below and to the right of the curve would result in a DNBR greater than 1.30.

c. These curves include the potential effects of the ejected control rod and reactor coolant pump locked rotor accidents.

d. The DNBR curve for four pump operation is more restrictive than any other reactor coolant pump situation.

8.10 Oconee TS states in part "If the CBAST is available but the BWST is neither available nor operable, the BWST shall be restored to operability within _____ or the reactor shall be placed in a _____ condition within 6 hrs..." Fill in the blanks with one of the following choices. (1.0)

a. 15 minutes, hot shutdown

b. 30 minutes, hot shutdown

c. 1 hour, hot shutdown

d. 15 minutes, hot standby

e. 30 minutes, hot standby

8.11 Oconee TS 3.1.3.4 requires that the reactor be maintained subcritical until a steam bubble is formed and a certain level is established in the pressurizer. What is the basis for this specification? (1.0)

a. Assures power transients due to a positive pressure coefficient of reactivity are minimized.

b. Assures the system will not exceed 2500 psi in the event of a rod withdrawal accident.

c. Assures the pressure coefficient of reactivity is always negative in the power range in the event of a startup accident.

d. Assures unnecessary challenges to the PORV and safety valves (as required by ASME Code Section III) will not occur.

e. Assures the RCS cannot become solid in the event of a rod withdrawal accident or a startup accident.

8.12 The Tech Spec ECCS limits on BWST minimum volume and boron concentration ensure that: (Select one of the following). (1.0)

a. sufficient borated water is available within containment to absorb 99% of the iodine released in a LOCA.

b. the 2 hour thyroid dose at the site boundary will be consistent with the analysis presented in the FSAR for postulated steam generator tube rupture.

c. the reactor coolant system can be cooled down to less than 280°F from normal operating conditions in the event of a total loss of off-site power concurrent with a LOCA.

d. a sufficient volume of borated water is available for refueling requirements and the concentration is high enough to ensure that the reactor will remain 1% subcritical at 70°F without any control rods in the core following a LOCA.

e. sufficient borated water is available in the system that one building spray with two coolers is adequate to prevent the reactor building from exceeding its design temperature and pressure and prevent recriticality following a hot leg LOCA.

8.13 According to the Oconee Emergency Plan Implementing Procedure RP/O/B/1000/09, during a Site Area Emergency personnel accountability be verified within _____ minutes of Site Evacuation. (1.0)

a. 15 minutes

b. 30 minutes

c. 45 minutes

d. 60 minutes

8.14 During power operation, which one of the RCS chemistry analysis values given below is less than that requiring immediate shutdown but is greater than that value which allows continued operation without any corrective action? (1.0)

delete 3

a. Fluoride 1.4 ppm

b. Boron 2000 ppm

c. Dissolved oxygen 1.4 ppm

d. Chloride .14 ppm

8.15 According to Operations Management Procedure 1-3, which one of the following positions will make the restart decision following a reactor trip if the immediate cause of the reactor trip cannot be determined? (1.0)

a. Vice President, Nuclear Production Department

b. Director of the Nuclear Safety Review Board

c. Station Manager

d. Superintendent of Operations

e. Operations Duty Engineer

8.16 Anytime a fuel assembly storage position is changed and is not documented on a procedure, who is responsible for documenting this in the appropriate log? (1.0)

a. Control Center Refueling Operator

b. Reactor Engineer

c. Fuel Handling Supervisor

d. Unit Shift Supervisor

8.17 Which one of the following choices CORRECTLY states the refueling flux monitor requirements as specified in OP/1502/07? (1.0)

a. Two flux monitors shall be in operation at all times when the refueling bridge is manned. An X^2 test will be used once per shift.

b. Two flux monitors shall be in operation at all times when the refueling bridge is manned. An X^2 test will be used once per day.

c. Two flux monitors shall be in operation when core geometry is being changed; one when core geometry is not being changed. An X^2 test will be used once per refueling prior to the first fuel movement.

d. Two flux monitors shall be in operation when core geometry is being changed; one when core geometry is not being changed. An X^2 test will be used once per shift.

e. Two flux monitors shall be in operation when core geometry is being changed; one when core geometry is not being changed. An X^2 test will be used once a day.

8.18 Which one of the following statements is CORRECT regarding the axial power imbalance? (1.0)

a. Axial power imbalance is not a directly observable quantity and therefore, limits have been established on the nuclear heat flux hot channel factor produced by the imbalance.

b. The reactor power imbalance reduces the power level trip produced by the power-to-flow ratio such that the boundaries of the power level vs reactor power imbalance (doghouse) curve is produced.

c. The axial power imbalance is defined as the maximum local fuel rod linear power density divided by the average fuel rod linear power density.

d. Negative axial power imbalances are more restrictive due to the coolant temperature rise across the core.

8.19 Figure 8.19 is used in OMP 2-1 to define the area off limits for a Unit 1 reactor operator. Five of these off limit areas have been marked with a circled number. Which one is also an off limit area for the Unit 1 SRO in the control room. (1.0)

a. 1

b. 2

c. 3

d. 4

e. 5

8.20 Which one of the following is NOT considered by TS as reactor coolant leakage? (1.0)

a. Valve packing leaks that are captured and conducted to a sump.

b. Seal water flow from reactor coolant pump seals.

c. Identified and monitored steam generator tube leakage.

d. Leakage into containment atmosphere from known sources.

8.21 The specific activity of the secondary coolant system shall be < _____. The accident this is based on is a _____. Which choice CORRECTLY provides the missing information. (1.0)

a. 1.4 µCi/cc, loss of load accident

b. 224/E µCi/ml, loss of load accident

c. 1.4 µCi/cc, steam line rupture accident

d. 224/E µCi/ml, steam line rutpure accident

8.22 The _____, or his designated alternate, assumes the position of Emergency Coordinator when relieving the unit supervisor. (1.0)

a. Site Emergency Preparedness Coordinator

b. Superintendent of Operation

c. Recovery Manager

d. Station Manager

e. Relief Unit Supervisor

8.23 When a TS required sprinkler and spray system in a safety related area is inoperable, which statement below is the CORRECT required action? (1.0)

a. Restore the sprinkler or spray system to operable status within one hour or shutdown in 12 hours.

b. Restore the sprinkler or spray system to operable status within 15 minutes or shutdown in 12 hours.

c. Commence a unit shutdown within one hour and establish an hourly fire watch patrol for the affected area.

d. Establish a continuous fire watch with backup fire suppression equipment in the affected area within one hour.

e. Establish an hourly fire watch patrol for the affected area and report to the NRC in accordance with T.S. 6.6.2.1.

8.24 The maximum allowable interval between quarterly surveillances is: (1.0)

a. 95 days

b. 100 days

c. 105 days

d. 110 days

e. 135 days

8.25 When is the Incore Monitoring System required to be operable (1.0)

delete 3

a. Only above 5% power with Tave >350°F

b. Only above 80% power

c. With Tave >350°F at any power level

d. When surveillance is required for Axial Imbalance and Quadrant Power Tilt

8.26 Which of the following statements about use of equipment over the fuel transfer canal is CORRECT? (1.0)

a. The reactor building polar crane shall not be operated over the fuel transfer canal when any fuel assembly is being moved.

b. The reactor building polar crane shall not be operated over the fuel transfer canal when any fuel assembly is being moved unless the polar crane is being used to move that assembly.

c. The auxiliary hoist shall not be operated over the fuel transfer canal when any fuel assembly is being moved.

d. The auxiliary hoist shall not be operated over the fuel transfer canal when any fuel assembly is being moved unless it is in accordance with an approved operating procedure stating the purpose of such use.

8.27 During power operation, according to the operation at power procedure (OP/1102/04), for planned power changes > _____ %FP or control rod changes in excess of _____ % rod index the NI calibration should be checked 15 minutes after reaching steady conditions. (1.0)

a. 5, 15

b. 10, 15

c. 15, 15

d. 5, 25

e. 10. 25

8.28 The operability of the Main Steam Code Safety Reliefs is addressed in the Technical Specifications TS 3.4.3. Which of the following most accurately reflects the requirements for Main Steam Code Safety Relief operability? (1.0)

a. All must be operable for continued operation.

b. Up to four may be inoperable, provided that the turbine bypass valves are operable.

c. Up to three may be inoperable, provided RPS setpoints are lowered 7% for each inoperable valve.

d. Up to five may be inoperable provided power is reduced by 7% for each inoperable valve.

8.29 Which of the following statements about Operations Management Procedure 1-11 "chemistry guidelines" is CORRECT? (1.0)

a. The purpose of this OMP is to provide a consolidated listing of all Oconee chemistry limits.

b. Upon notification of "out of spec" chemistry, the STA shall evaluate.

c. After evaluation of "out of spec" chemistry, the shift supervisor will initiate corrective action.

d. The unit supervisor shall report to chemistry the corrective action taken.

e. The chemistry supervisor will notify the shift supervisor promptly in the event the corrective action is not acceptable.

8.30 Operations Management Procedure 1-12 "NRC License Maintenance" assigns responsibility for reviewing all licensed operator, on-shift experience documentation and scheduling on-shift experience. To whom does it assign this responsibility? (1.0)

a. the individual

b. the unit supervisor

c. the projects operating engineer

d. the shift supervisor

e. the station training supervisor

8.31 According to Operations Management Procedure 1-8, "Investigation of Reactor Trips" and operating procedure OP/1/A/1102/02, in the interim between a trip and restart of the unit, the Nuclear Shift Supervisor: (1.0)

a. must ensure that the reactor trip breakers are not reset

b. may authorize the withdrawal of all four Safety Groups provided that a 1% Delta K/K shutdown margin is maintained.

c. may authorize the withdrawal of Safety Group 1 to 50% provided that a 1% Delta K/K shutdown margin is maintained.

d. may take the reactor critical, holding at 10^{-8} amps if all failures in equipment subject to Tech Spec LCO requirements have been corrected.

8.32 Each person entering a high radiation area where: (1.0)

General area radiation levels are _____

(and/or) _____

Radiation levels on contact on any spot are _____

will either wear an operable chirper or contact HP prior to entry. (Select the one choice below which correctly fills the three blanks above).

a. ≥250 mr/hr, or, ≥10 ~~mr~~ R/hr

b. ≥250 mr/hr, and ≥10 ~~mr~~ R/hr

c. ≤250 mr/hr, or ≤10 ~~mr~~ R/hr

d. ≤250 mr/hr, and, ≤10 ~~mr~~ R/hr

changed - announced during exam.

8.33 The Tech Specs require a fire brigade composed of: (1.0)

a. 10 members on site at all times, including 3 members of the minimum operating shift.

b. 10 members on site at all times, excluding 3 members of the minimum operating shift.

c. 5 members on site at all times, excluding 3 members of the minimum operating shift.

d. 5 members on site at all times, including 3 members of the minimum operating shift.

e. 5 members on site at all times, excluding all members of the minimum operating shift.

8.34 If a general emergency has been declared at 1800 on a holiday, what is the emergency coordinator's immediate protective action recommendation in terms of evacuating residents and sheltering (go indoors, close all windows and doors and turn off ventilation equipment)? (1.0)

a. Within 2 mile radius evacuate, no shelter recommendation.

b. Within 2 mile radius evacuate and in 5 mile, 90° downwind sector shelter.

c. Within 2 mile radius and in 5 mile, 90° downwind sector shelter

d. within 5 mile radius evacuate, no shelter recommendation

e. within 5 mile radius shelter, no evacuation recommendation

8.35 Radiological emergency response training is required for emergency coordinators. Which of the following is correct? (1.0)

a. the training is required quarterly (plus or minus 10 days)

b. the training is required semi annually (plus or minus 45 days)

c. the training is required annually (plus or minus 3 months)

d. the training is required once per requal cycle (plus or minus 3 months)

8.36 When should injecting caustic into the LPI after LOCA be done? (1.0)

a. as soon as LPI starts and the LOCA is confirmed

b. no less than 1 hour prior to switch over to recirculation mode

c. no less than 30 minutes prior to switch over to recirculation mode

d. within 30 minutes after switch over to recirculation mode

e. within 1 hour after switch over to recirculation mode.

8.37

8.38 The listing on the attached figure 8.38 contains all of the unit supervisor's log book "responsibilities" (rules) together with many that apply to the reactor operators log. Identify, by writing the number of the item on your answer sheet, those which apply to the unit supervisor's log book. Your score will be lessened by each incorrectly identified item. There are nine correct items. (3.0)

END OF SECTION 8

END OF EXAM

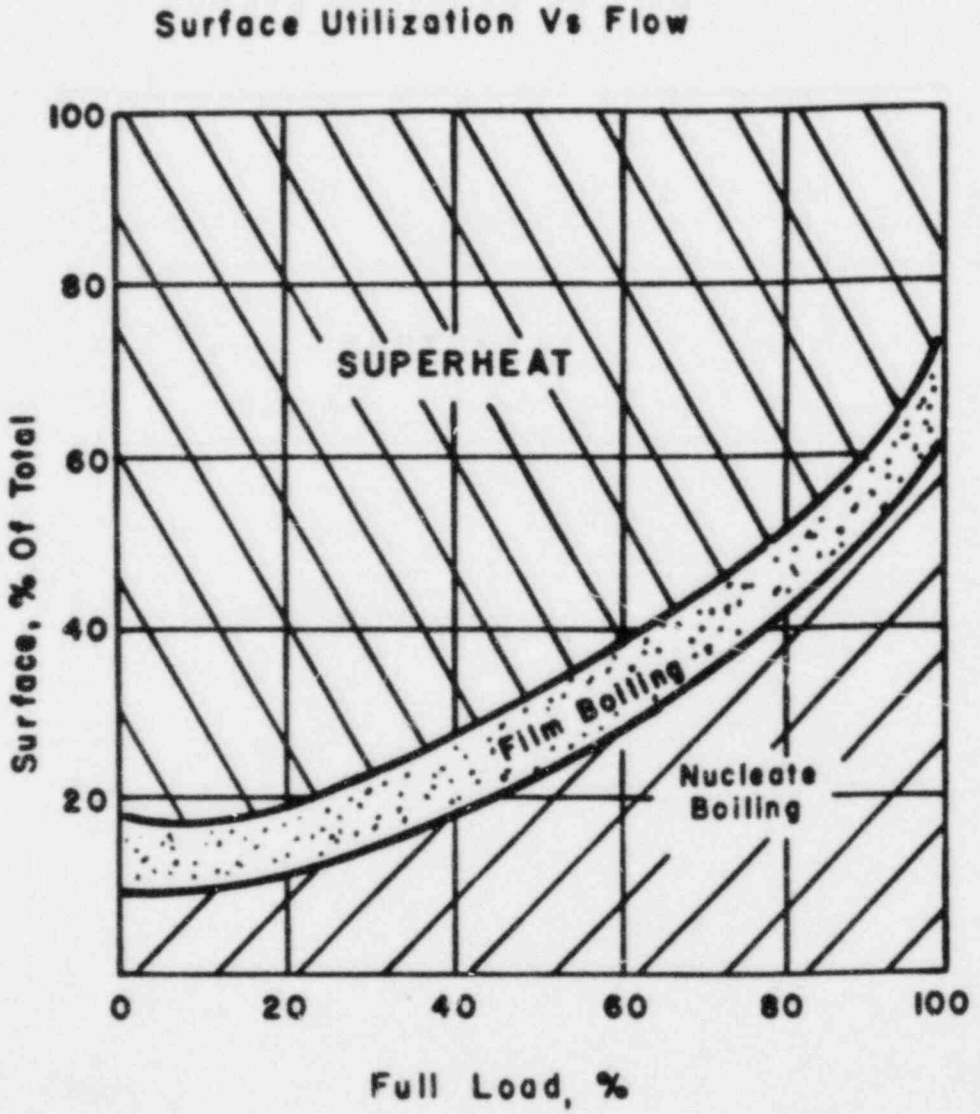
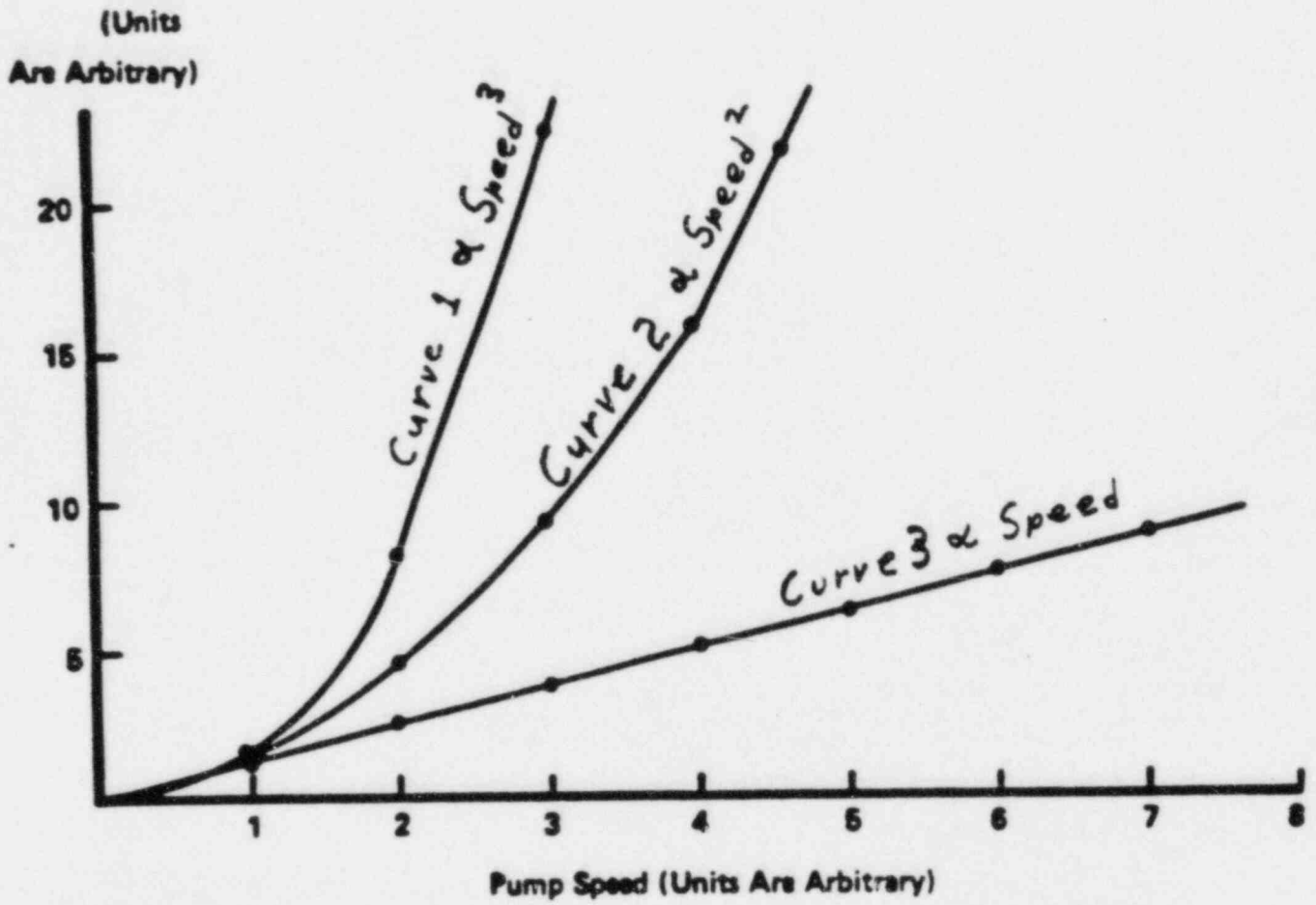


Fig 5.1

TITLE: ONCE-THROUGH STEAM GENERATOR	NOTES: Heat Transfer Area Versus Power Level	OC-CM-SG-10 DATE 2-12-85 B&W TECH MANUAL DRAWN JPO/ARB DWG REF KPB TRAINING USE ONLY



Pump Laws

Fig 5.7

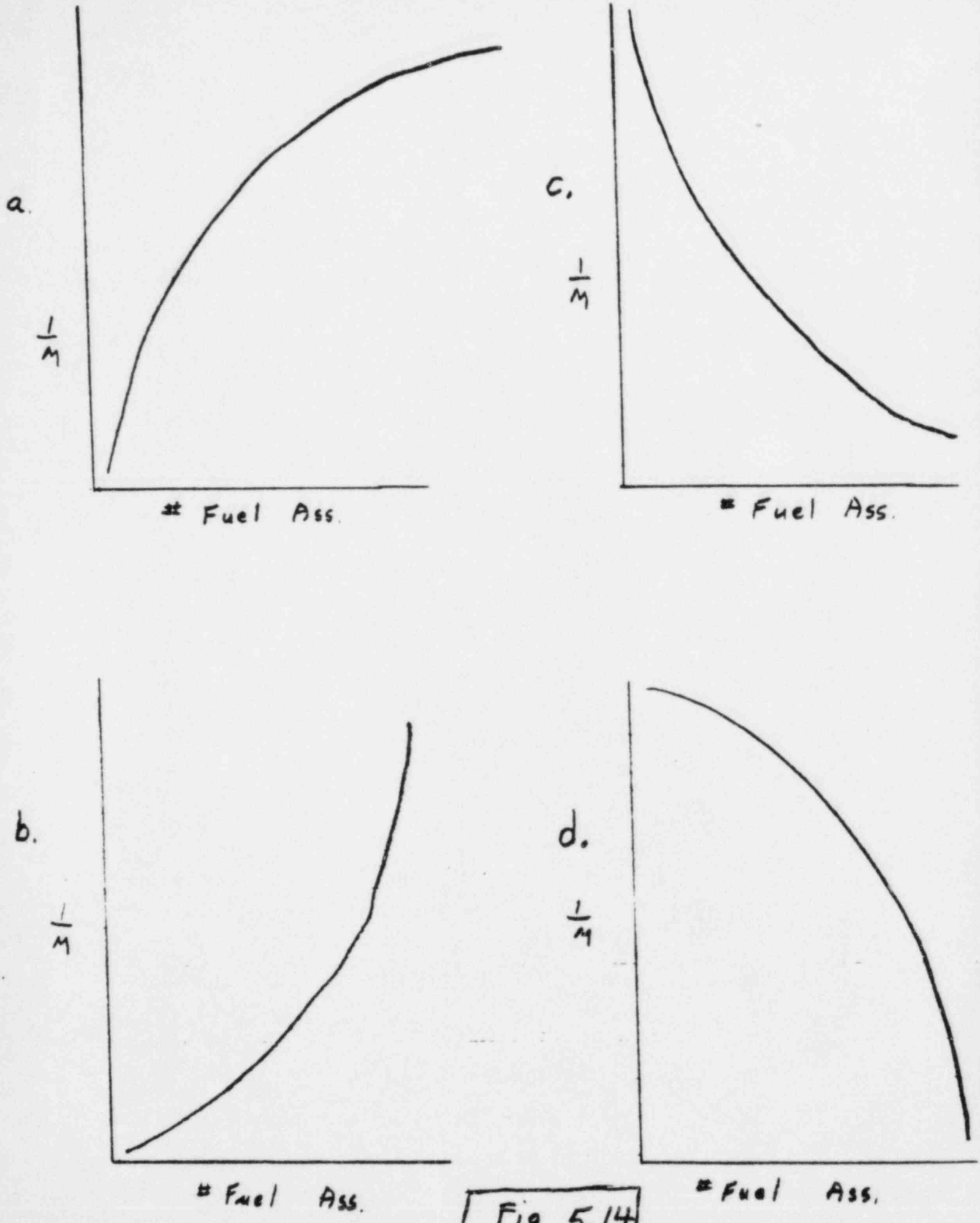


Fig 5.14

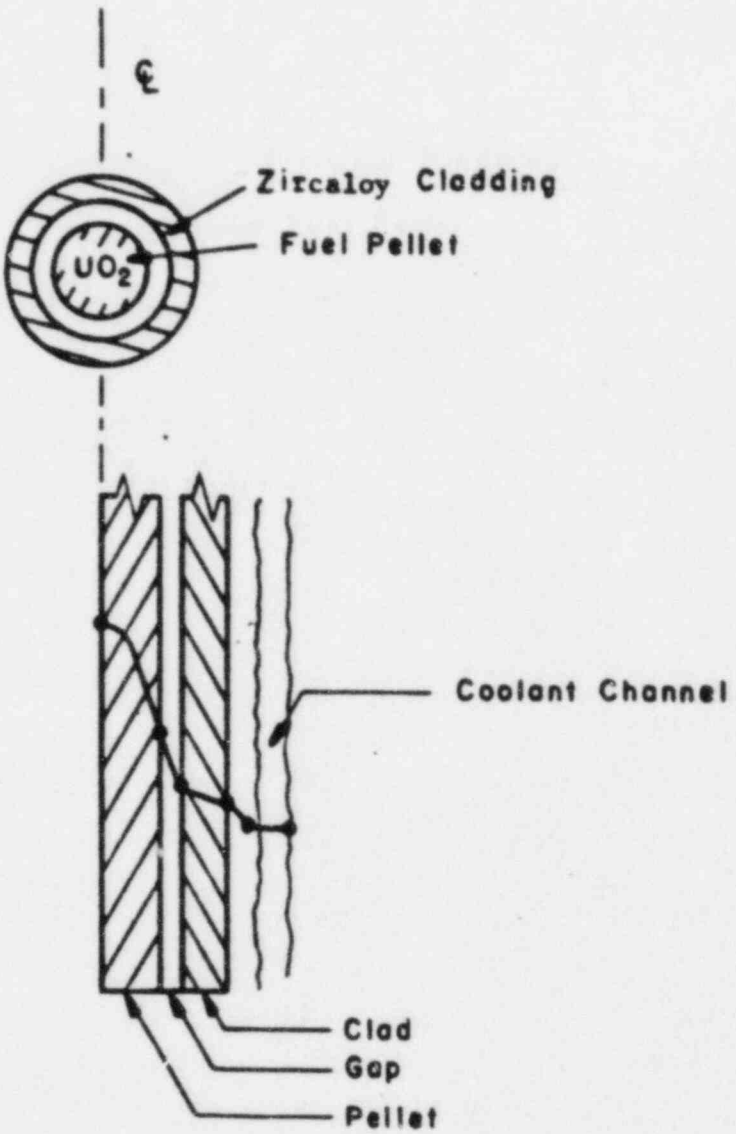
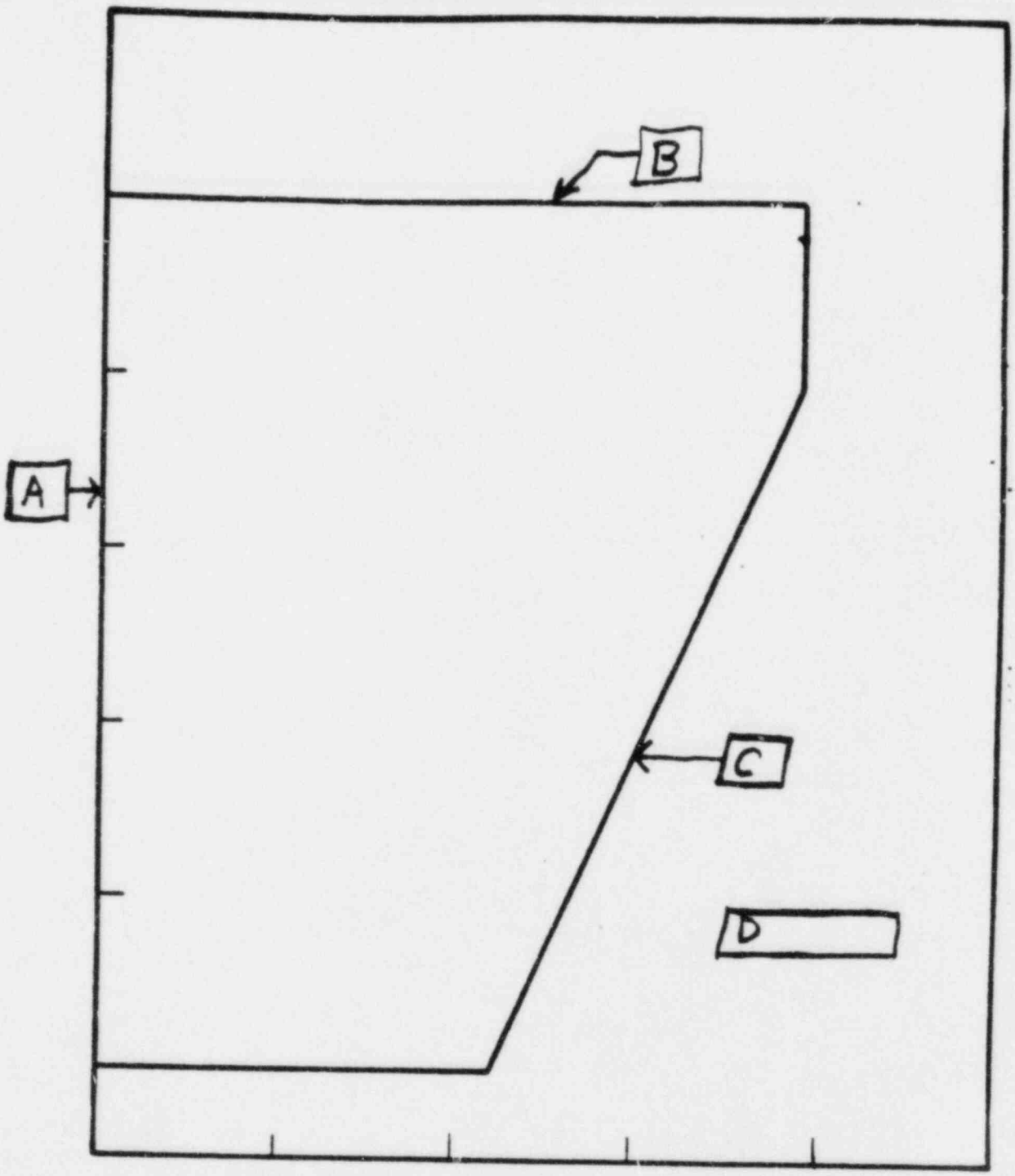

℄
Zircaloy Cladding
Fuel Pellet
UO_2
Coolant Channel
Clad
Gap
Pellet

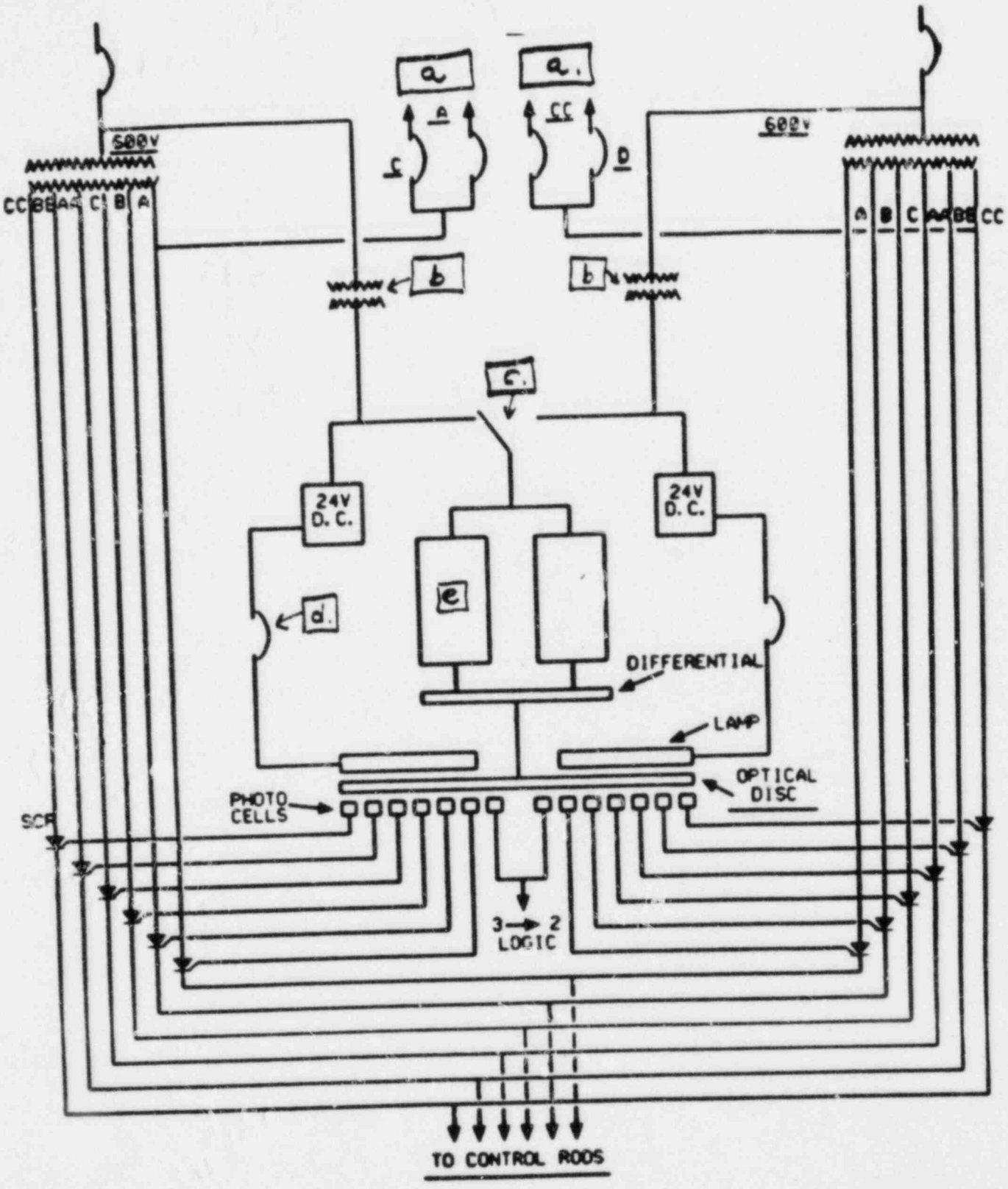
Fig. 5.29



PROTECTIVE SYSTEM MAXIMUM
ALLOWABLE SETPOINTS
UNIT 1
OCONEE NUCLEAR STATION

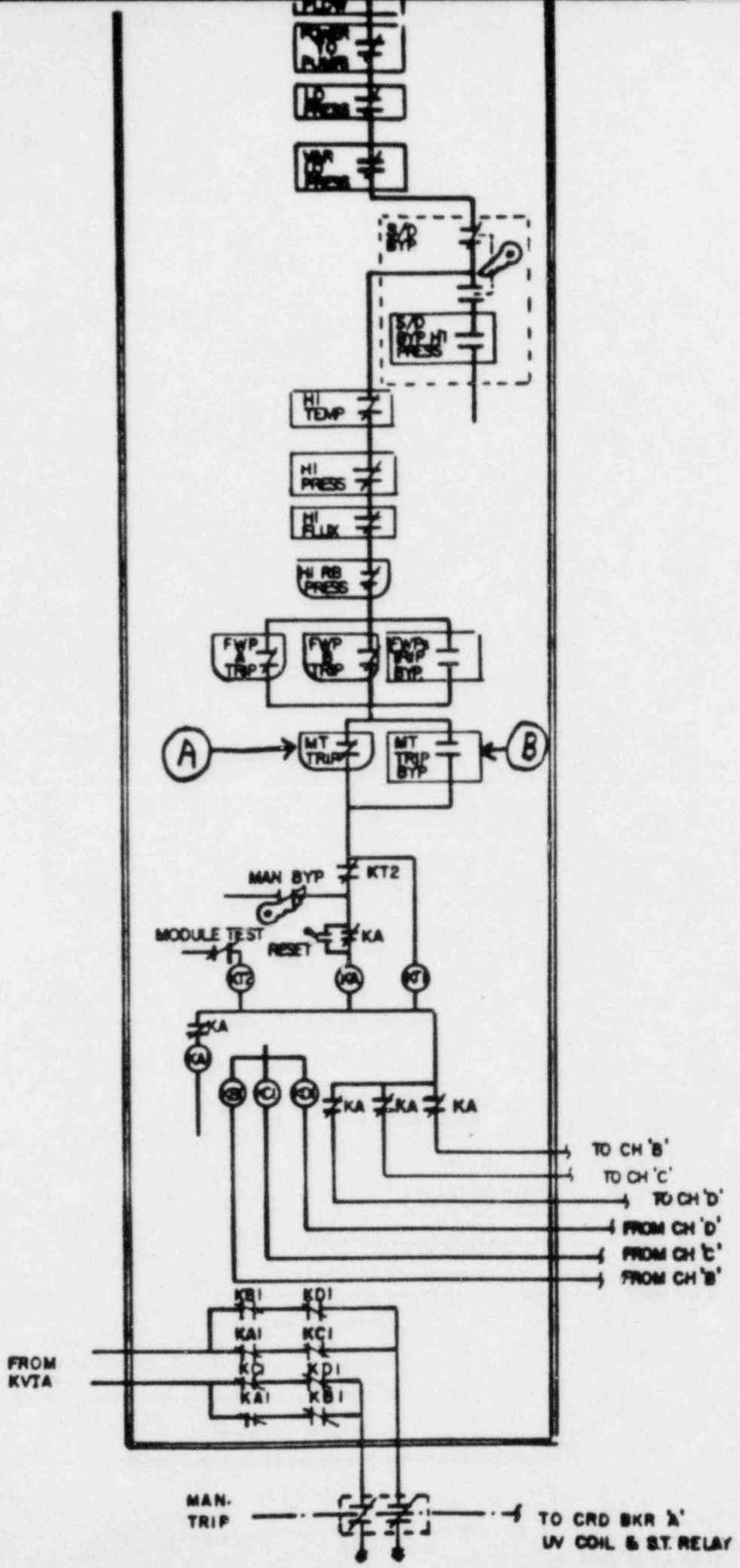
Figure 5.39

A 102/102/99
11/2/81



TITLE: Control Rod Drive Instrumentation (CRI)	NOTES: A Typical Regulating Or Auxiliary CRD Power Supply	DWG NO: OC-IC-CRI-3 DATE: 2-27-85 D.P. 800988A DRAWN: TLF/ARB APPR'D: RPB TRAINING USE ONLY

Fig 6.2



REACTOR PROTECTIVE SYSTEM	
CHANNEL 'A' TRIP STRING DETAIL - TYPICAL OF ALL FOUR CHANNELS	
OC-IC-RPS-248	DATE: 10/83
REF: BAILEY RPS INSTRUCTION	
DRAWN: LMH	APP:
TRAINING USE ONLY	

Fig 6.14

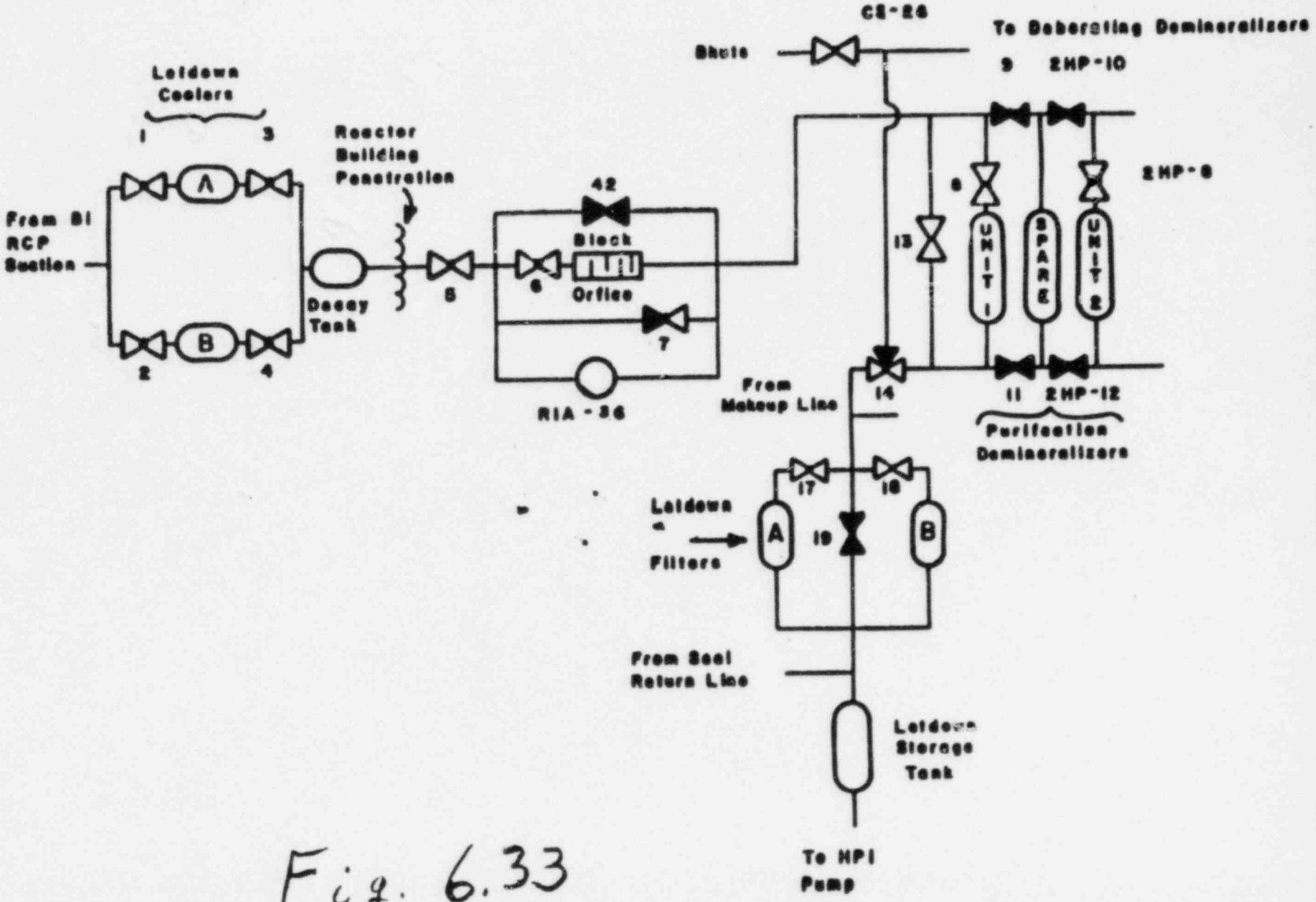


Fig. 6.33

TITLE: High Pressure Injection (HPI)	NOTES: Letdown (all valves are HP valves unless otherwise indicated)	SYS: OC-SY-HPI-1 DATE: 9-20-8 REF: PD-101-A/B / PD-109-A DRAWN: MDT/ARB APPR: RPB TRAINING USE ONLY

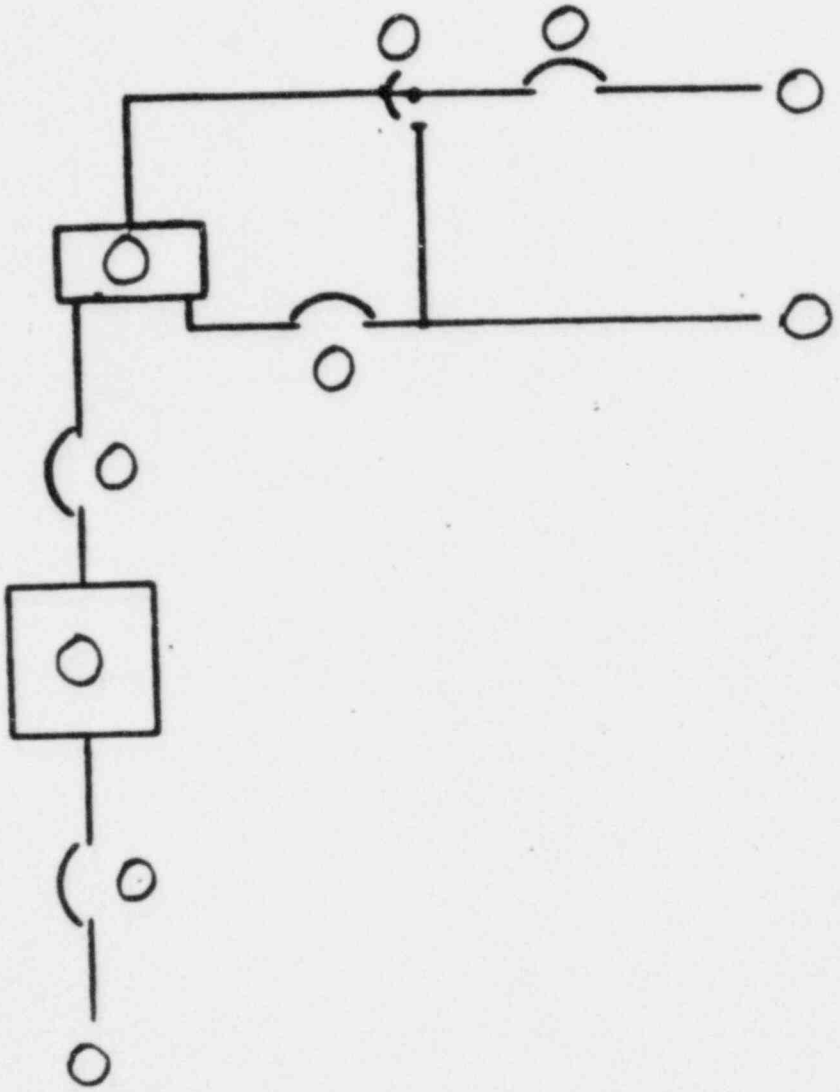


Fig 6.39

Vital Instrumentation and Controls (VPS)	1. One line diagram of the KOAC Inverter	DC-EL-VPS-16 5-31- OP/3/A/1107/01 TLF

Checked Control Copy _____

Date/Time: _____

OP/0/A/1105/09

ENCLOSURE 4.14

DISSOLVED GAS CONCENTRATION CURVE

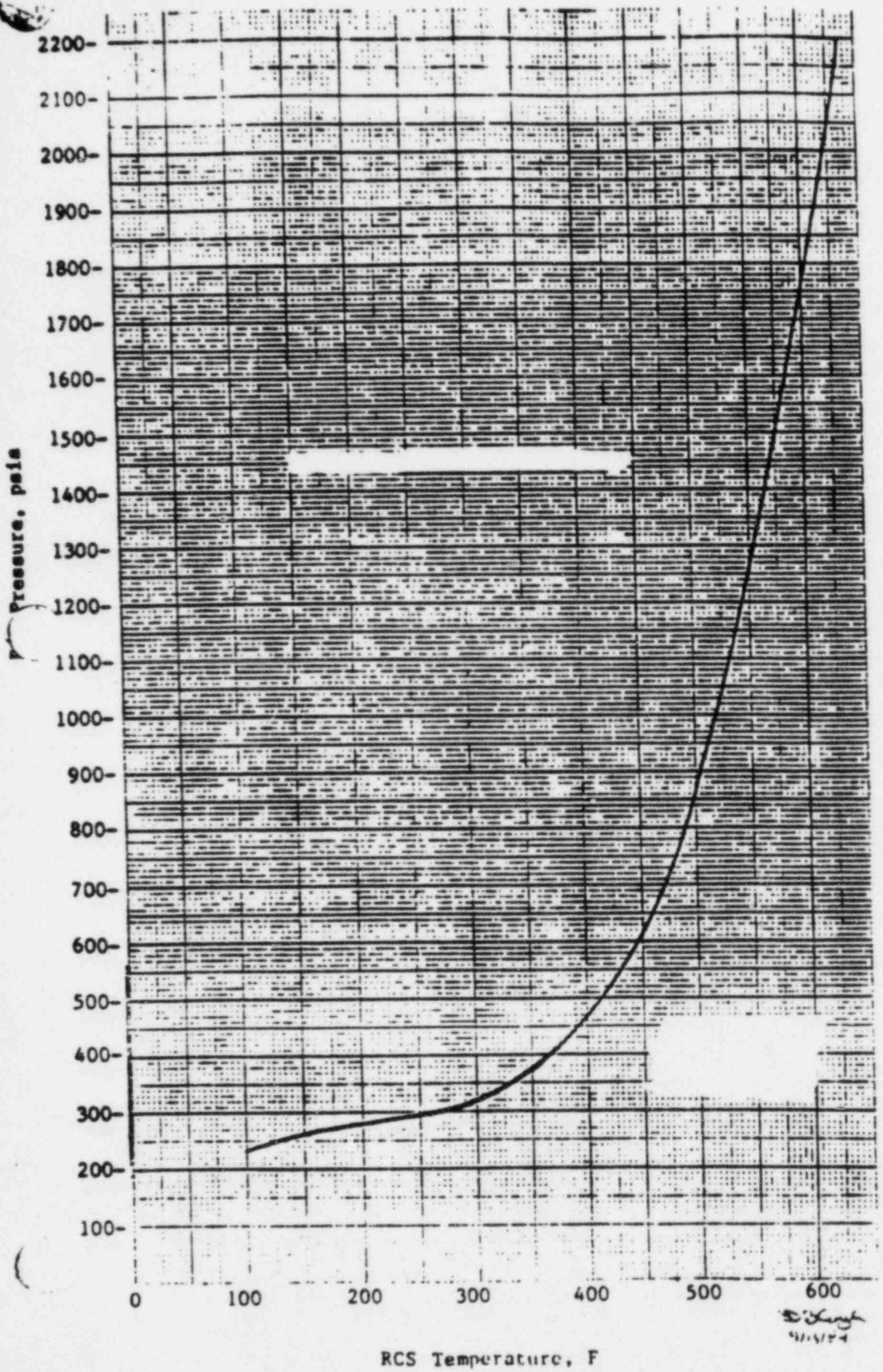


Fig 7.3

Checked Control Copy _____

Date/Time _____

OP/1/A/1103/06
ENCLOSURE 4.9
RCS P/T LIMITATIONS

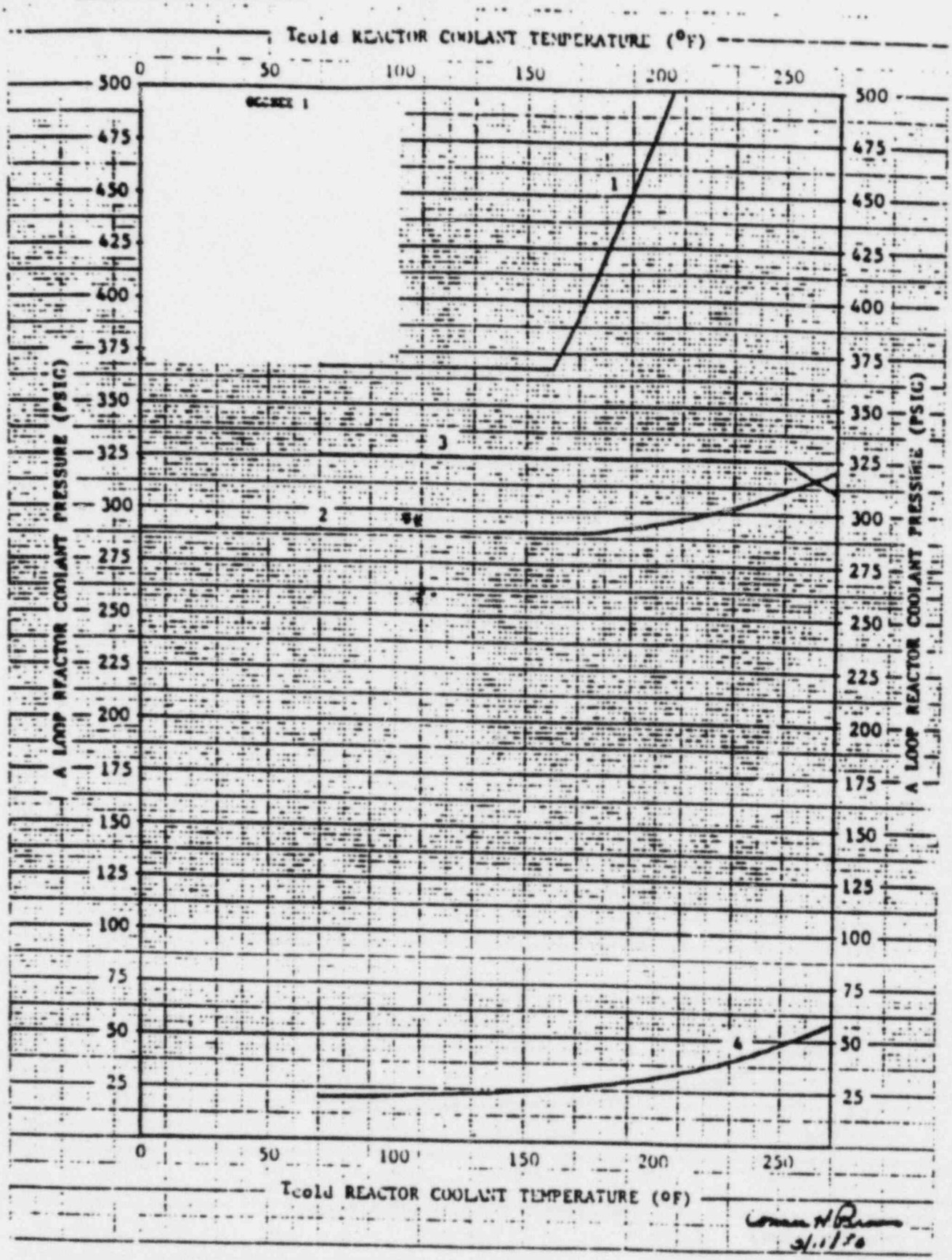


Fig 7.8

Some important points in the sequence for startup from cold shutdown to rated power are:

point 1. 300°F Tave

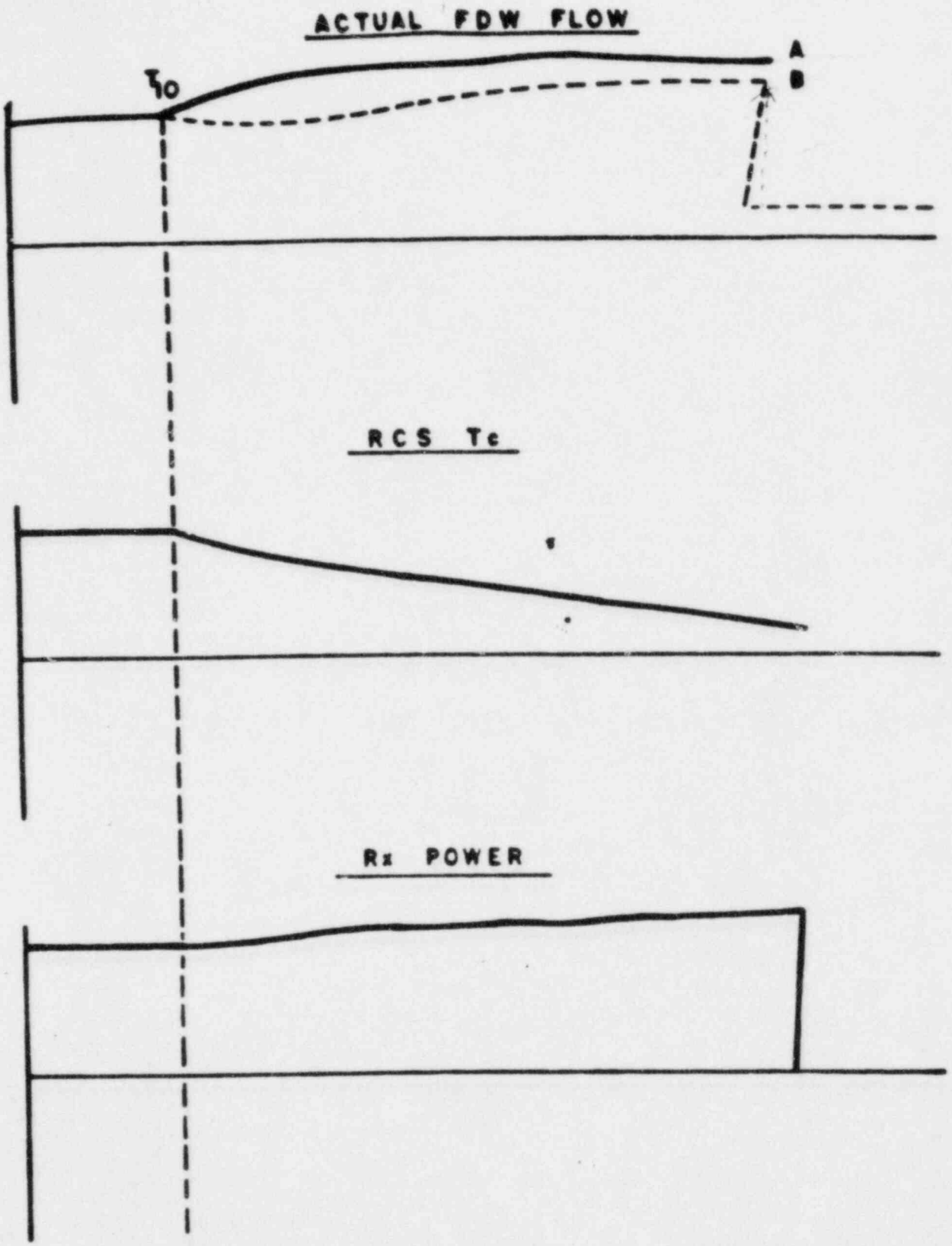
point 2. Hot shutdown

point 3. FWPT at minimum speed

point 4. 560°F Tave

point 5. Rx power at 15%; 579°F Tave.

Figure 7.0



OC-PTR-NT-10	4-18-85
B&W TRACES / SIMULATOR	
JPO / RWP	A-23
TRAINING USE ONLY	

Figure 7.11

Checked Control Copy _____

Date/Time _____

OP/1/A/1106/06
ENCLOSURE 4.3
EFWPT CONTROL

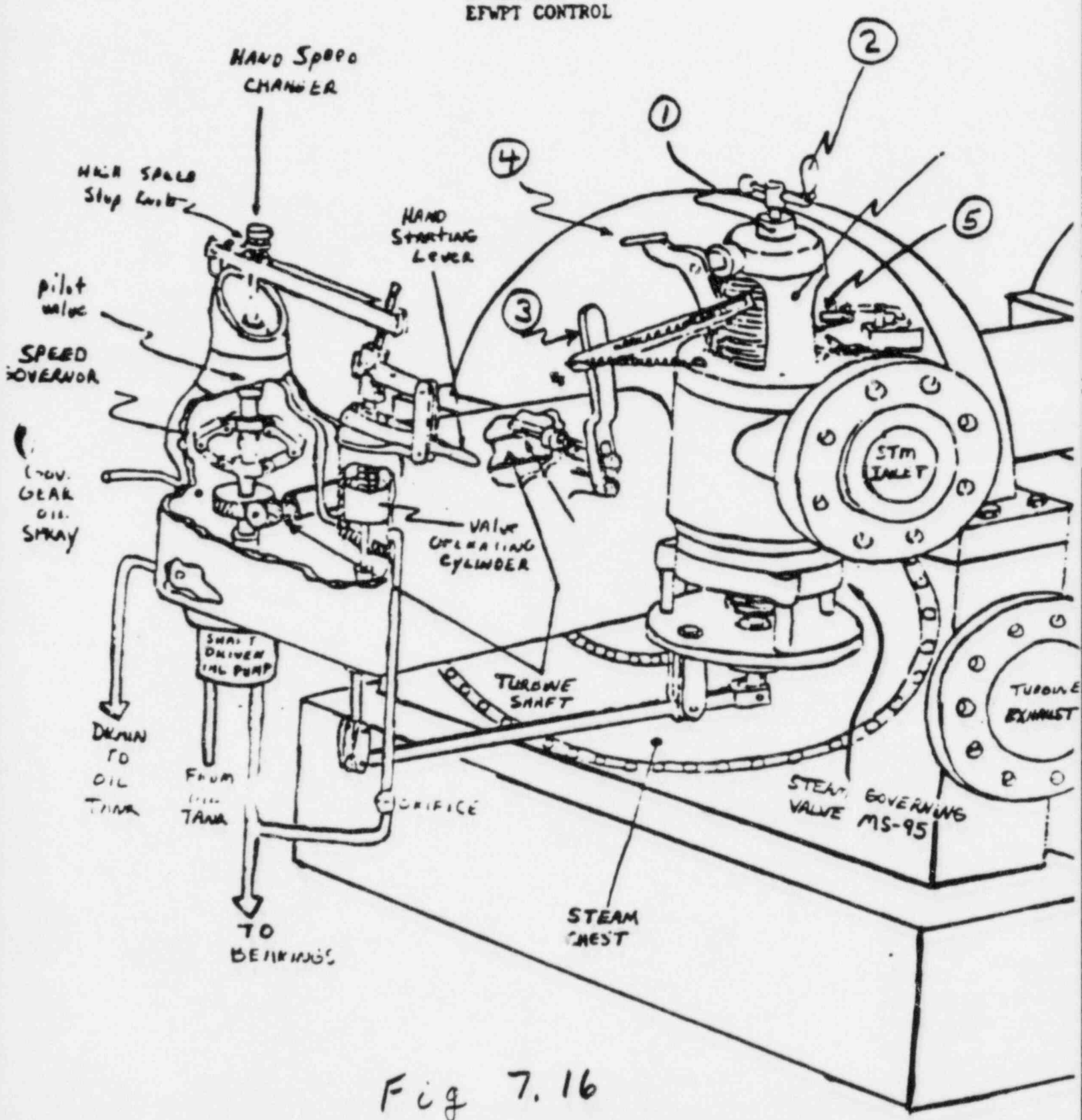


Fig 7.16

CP-604

SOLID PLANT COOLDOWN

____1.0 IF at any time subcooling margin ≤ 0°F,
AND subcooled margin > 0°F IS NOT RESTORED within 2 minutes,
THEN go to CP-602, SG Cooldown with Saturated RCS.

____2.0 Initiate normal letdown.

- Verify CC System operation.
- Open 1HP-5 (Letdown Isolation).

2.1 IF the subcooling margin > 50°F,
THEN control the HPI system as follows:

- Adjust HPI header flow to maintain RCS P/T within the proper region of the appropriate Encl 7.1.

____3.0 Verify closed all High Point Vent Valves.

- 1RC-155 (S/G 'A' Vent Vlv)
- 1RC-156 S/G 'A' Vent Vlv)
- 1RC-157 S/G 'B' Vent Vlv)
- 1RC-158 (S/G 'B' Vent Vlv)
- 1RC-159 (RV Head Vent Vlv)
- 1RC-160 (RV Head Vent Vlv).

Fig 7.19-1

ENCLOSURE 7.1 A

NORMAL CONTAINMENT COOLDOWN LIMITS

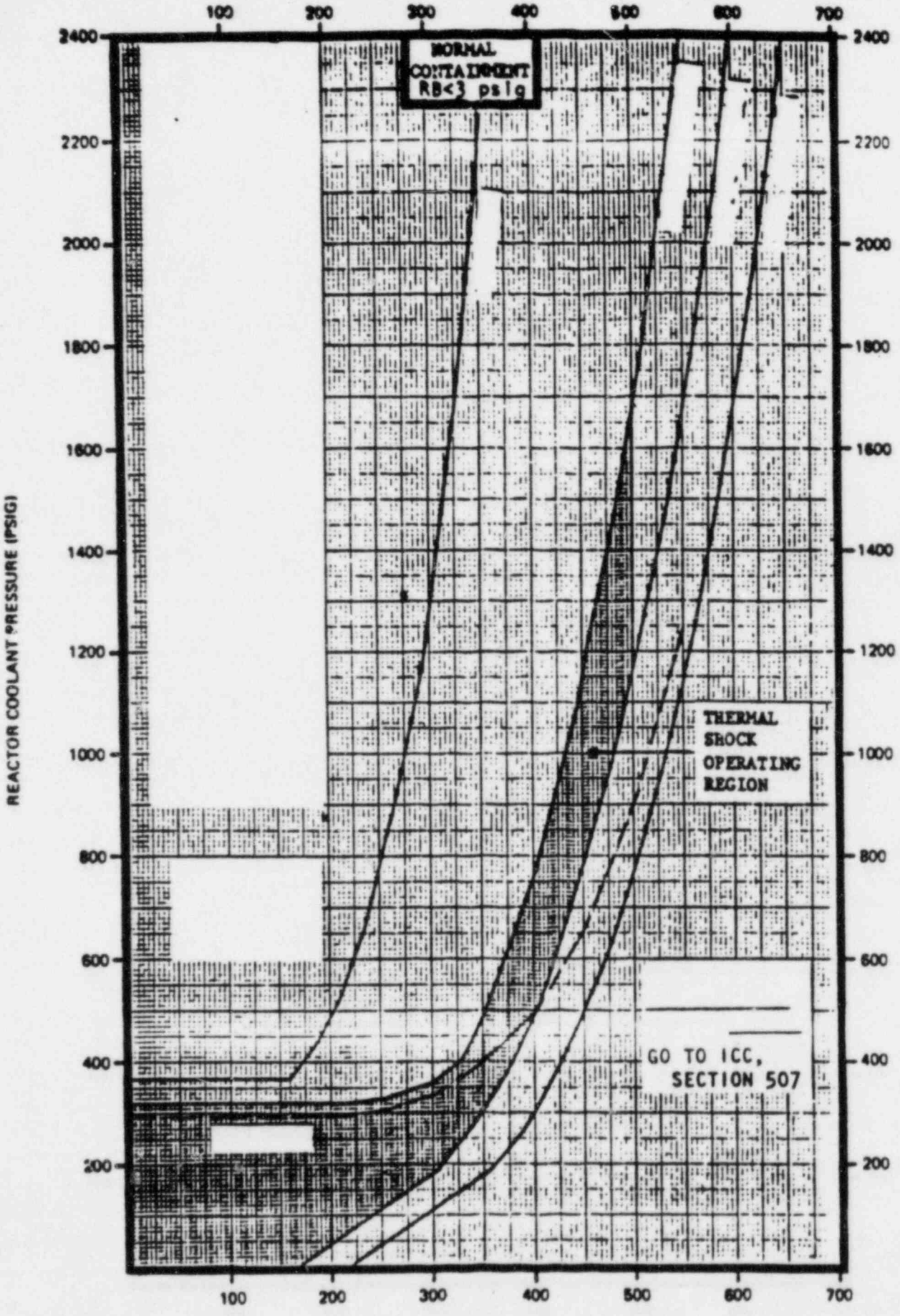


Fig 7.19-2

Subsequent Actions

NOTE Continue to monitor steps 5.14, 5.15, 5.16, until plant conditions stabilize.

____5.14 Check for subcooling margin.

- IF subcooling margin ≤ 0°F,
  THEN go to Section 501, Loss of Subcooling.

____5.15 Check primary to secondary heat transfer.

- IF heat transfer IS NOT adequate:
  - RCS temperatures increasing
  - RCS pressure increasing
  - PZR level increasing
  - SG level(s) low,

  THEN go to Section 502, Loss of Heat Transfer.

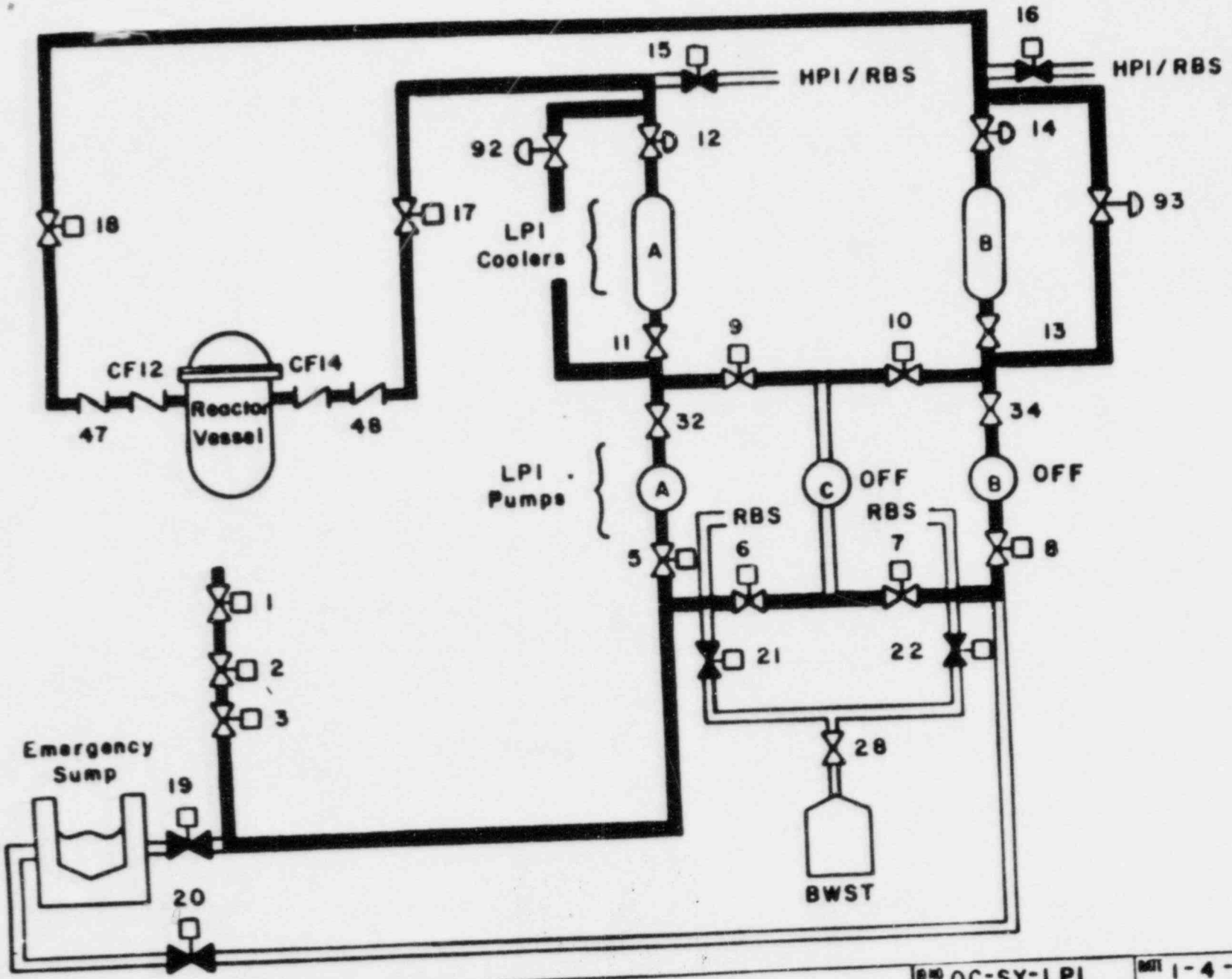
- IF heat transfer IS excessive:
  - RCS temperature decreasing
  - RCS pressure decreasing
  - PZR level decreasing
  - SG(s) pressure low,

  THEN go to Section 503, Excessive Heat Transfer.

____5.16 Check for SG Tube Leak.

- IF a MS line RIA (16 or 17) alarm IS received,
  OR Air Ejector RIA-40 alarm IS received,
  OR SG(s) XSUR level IS increasing uncontrollably,
  OR there IS a feedwater mismatch,
  THEN go to Section 504, SG Tube Leak.

Fig 7.20



Low Pressure Injection System

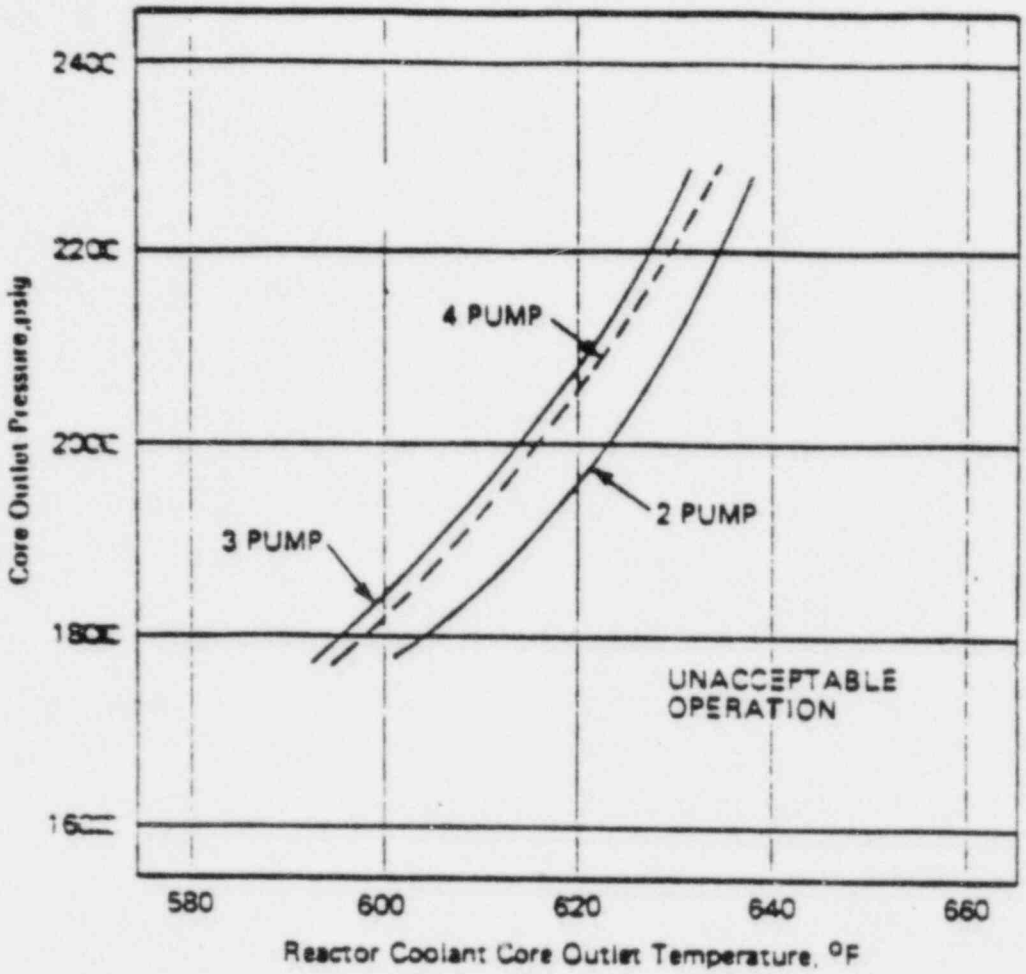
Fig 7.23

OC-SY-LPI

1-4-85

RPB

TRAINING USE ONLY



PUMPS OPERATING	COOLANT FLOW (GPM)	POWER (% FP)	TYPE OF LIMIT
4	374,880(100%)	112.0	DNBR
3	280,035(74.7%)	90.7	DNBR
2	183,690(49.0%)	63.63	DNBR/QUALITY

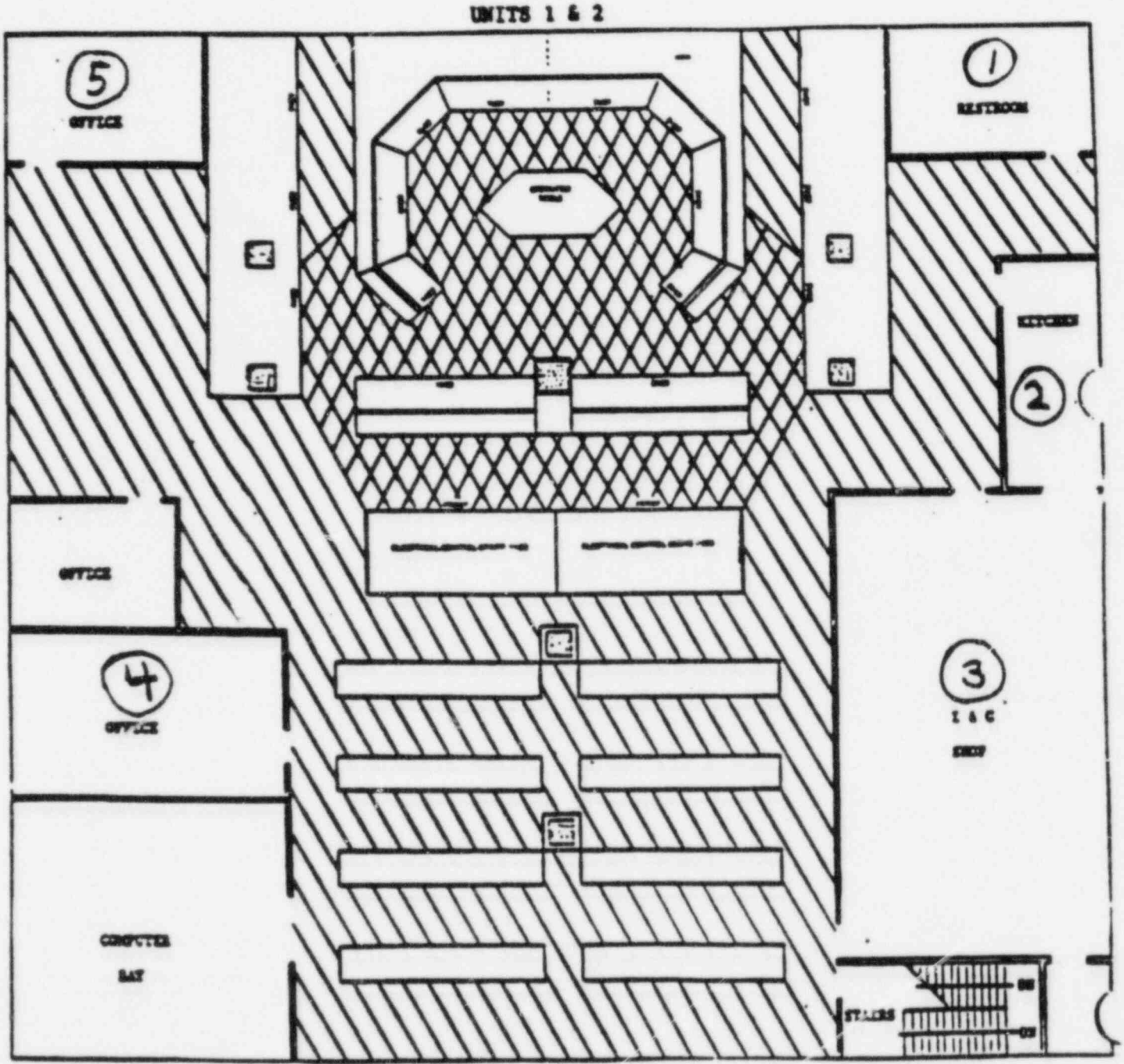
CORE PROTECTION SAFETY LIMITS
UNIT 3
OCONEE NUCLEAR STATION
Figure 2.1-3C

A 113/113/110
9/29/82

Fig 8.9

ENCLOSURE 5.4
FIGURE 1
CONTROL ROOM DEFINITION
CONTROL OPERATORS

UNITS 1 & 2



Cross Hatched Area: At The Controls
Lined Area: Control Room (Second Operator) (Includes clear areas inside boards)
Clear Area: Area Off Limits

Figure 8.19

1. Evolutions which could affect the Boron concentration of the Reactor Coolant System shall be logged

2. The licensed operator in charge will sign the log at the end of each shift.

3. The supervisor in charge of unit will sign the log at the end of each shift.

4. Major activities accomplished shall be described and noted in the log. Examples of major activities are as follows:

   a. RCS reaching cold shutdown
   b. Turbine-Generator off-line
   c. Purification Demineralizer slucied
   d. Reactor critical

5. All log entries will be made by the supervisor in charge of unit during each shift.

6. All log entries will be made in ink. A single line will be drawn through mistakes and/or errors and initialed by the writer.

7. All statalarms pertaining to reactor core conditions and other important alarms (whether recorded by the computer or not) on Reactor Coolant System, Engineered Safeguards System, Reactor Protective System, RIAs, Turbine-Generator, and others as appropriate will be listed in the log with explanation. This applies only to alarms that would normally not be in the alarm state for the existing plant conditions.

8. Record in the Reactor Operator Log each time makeup through the "B" HPI injection nozzles are used when RCS temperature is greater than 250°F.

9. All log entries will be made at the direction of a licensed operator in charge during each shift.

10. The test procedure number and name of any test (directly affecting operation of the unit) started, in progress or completed during a shift will be entered into the log.

11. All removal and restoration of Station equipment enclosures will be logged when approved for use and when signed as completed.

12. Each time responsibility for containment access control is transferred to another group from Operations or to Operations, the date, time and other Group will be so noted.

Fig 8.38

13. A notation of all releases of radioactive waste, both gaseous and liquid, will be made in the log.

14. The status of other than normal station conditions and events (not pumps running or breakers closed, etc.) will be included in the log in enough detail to provide a smooth transition from one shift to another.

15. During operation, at the beginning of each shift, unit power, Groups 1-8 rod position and the value of the most current boron analysis will be recorded in the log.

16. Operation or malfunction of switchyard breakers or disconnects shall be logged.

17. Starting and stopping of plant equipment from the Control Room shall be logged.

18. Information concerning significant changes in reactivity will be noted in the log. (Startup, shutdown, CRD test, boron changes).

19. Power level changes shall be logged.

20. Chemistry results as reported by Chemistry personnel shall be logged.

21. All "red phone" notifications to the NRC shall be logged.

22. Significant abnormalities which occur will be explained in greater detail than in the other log. The chronological sequence and time of occurrences of significant abnormalities and related circumstances will be recorded in the log. The "First Hit" as indicated by turbine first hit circuitry (Unit 3 only) will be recorded on unit trips.

Fig 8.38

MASTER

ANSWER KEY

5.1 (b)	Ref: 1. CM-SG, p. 11 2. CM-SG-10 3. NETPP p. 3.3-2		(1.0)
5.2 (c)	Ref:	DPC, FNRE, pp. 137, 143	(1.0)
5.3 (b)	Ref: 1. OP 1102/01, Encl. 4.3, p. 3 2. CM-SG, p. 19 3. CR3 HTFF, pp. 148-156 4. IC-ICS, p. 85		(1.0)
5.4 (a)	Ref: 1. DPC, FNRE, p. 120 2. NETRO, 12.1-4		(1.0)
5.5 (b)	Ref: 1. OP 1102/01, Encl. 4.3, p. 3 2. NETRO, p. 7.1-2 3. Westinghouse Reactor Physics, Sect. 3 & 5		(1.0)
5.6 (e)	Ref: 1. NETRO, 10.3-2 2. DPC, FNRE, p. 162		(1.0)
5.7 (d)	Ref: 1. NETPP, p. 6.2-5 2. GP, HT&FF, p. 323		(1.0)
5.8 (b)	Ref:	NETPP, p. 6.4-5	(1.0)
5.9 (c)	Ref: 1. DPC, FNRE, P. 169 2. NETRO, 10.5-2 3. Westinghouse NTO, p. I-5.77		(1.0)
5.10 (a)	Ref: 1. GP, HT&FF, Chapter 1 2. DPC, T, FF&HT, Chapter 1A 3. CR3, ANAO-29, p. 2 4. OC, CH-PC, p. 13		(1.0)
5.11 (d)	Ref: 1. DPC, IC-ICS, p. 42 2. FPC, CR, RO-103, p. 58		(1.0)
5.12 (a)	Ref: 1. OC, CM-SG, p. 13 2. OC, IC-ICS, p. 27 3. CR, RO-103, p. 5		(1.0)
5.13			
5.14 (c)	Ref:	DPC, FNRE, p. 124-128	(1.0)
5.15 (e)	Ref: 1. OC, TS, p. 3.1-23 2. OC, FSAR, Vol. 8, p. 15.13.2		(1.0)

5.16 (d) Ref: SY-HDC, p. 10 & 11 (1.0)

5.17 (a) Ref: DPC, FNRE, pp. 200 & 221 (1.0)

5.18 (b) Ref: DPC, FNRE, pp. 253-257 (1.0)

5.19 (b) Ref: 1. FPC, CR3, HTFF/Thermo, p. 82 (1.0)
2. DPC, OC, T, FF&HT, p. 150

5.20 (d) Ref: 1. NETRO, p. 11.4-3 (1.0)
2. DPC, FNRE, p. 184
3. OC, RT-FP, p. 17, 23

5.21 (c) Ref: NETRO, p. 1.4-1 (1.0)

5.22 (d) Ref: GP, HTT&FF, p. 355 (1.0)

5.23 (a) Ref: OC, PTR-NT, p. 14 (1.0)

dele 3

~~5.24 (e) Ref: OC, TS 2.1-2, 3.5-11 (1.0)~~

5.25 (a) Ref: 1. OC, OP 1103/15, Encl. 8.0, 5.1, 2.0 (1.0)
2. OC, TS 3.1-23, 3.5-10

5.26 (c) Ref: 1. OC, OP 1106/01, p. 10 (1.0)
2. OC, EL-MPD, p. 32

5.27 (c) Ref: 1. OC, OP 1106/01, p. 10 (1.0)
2. CR3, Power System Ops, pp. 22-23

5.28 (e) Ref: GP, HTT&FFF, p. 271 (1.0)

5.29 (e) Ref: DPC, T, FF&HT, pp. 189 & 190 (1.0)

5.30 (b) Ref: DPC, FNRE, p. 279 (1.0)

5.31 (c) Ref: OC, PTR-AM-1, p. 29 (1.0)

5.32 ~~(b)~~ (e) Ref: OP 1103/15 (1.0)

5.33 (a) Ref: DPC, FNRE, pp. 162, 168 (1.0)

5.34 (a) Ref: NETRO, S. 7.2, 7.3, 7.4 (1.0)

5.35 (b) Ref: OC, CM-SG, p. 11 (1.0)

5.36 a. Stay the same or decrease - either is acceptable (0.5)
b. Increase (0.5)

Ref: DPC, 1, FF&HT, p. 22

5.37 Some of the energy (~ 16 MW) from the steam generators is removed from the grid and deposited directly back into the RCS through flow friction resulting from the energy input of the RCPs. (1.5)

Ref: DPC, TFF&HT

5.38 FALSE (0.5)

Ref: DPC, TFF&HT, p. 149

5.39 (2.0)

A. Reactor coolant pressure (psig)
B. RCS pressure - high trip
C. RCS pressure - variable low trip
D. Unacceptable operation

Ref: OC, TS, p. 2.3-5

ANSWERS

dele ~~6.1 (c) Ref: 1. L/P CM-CRD p. 13, K/A 001.000.K1.02 (1.0)~~
~~2. Dwg. CM-CRD-8, 9 & 10.~~

6.2 (a) Ref: 1. L/P IC-CRI p. 15, K/A 001.000.K2.03 (1.0)
2. Dwg. IC-CRI-3, 2/27/85

6.3 (d) Ref: ONS, TS Table 3.17-1, p. 3.17-8 (1.0)

6.4 (b) Ref: ONS, IC-RCI, p. 14 (1.0)

6.5 (b) Ref: 1. ONS, SY-CFS, p. 8 (1.0)
2. ONS, TS p.3.3-5

dele ~~6.6 (a) Ref: 1. ONS, IC-CRI, p. 23 & 28 (1.0)~~

6.7 (d) Ref: 1. ONS, IC-ICS, pp. 18 & 20 (1.0)

6.8 (c) Ref: 1. ONS, IC-ICS, p. 77 (1.0)

6.9 (a) Ref: 1. ONS, FH-FHB, p. 23 (1.0)

6.10 (e) Ref: ONS, IC-ES, p. 7 (1.0)

6.11 (d) Ref: ONS, SY-EF, p. 10 (1.0)

6.12 (b) Ref: ONS, IC-RPS, p. 16 (1.0)

dele ~~6.13 (a) Ref: ONS, IC-RPS, p. 57 (1.0)~~

6.14 (e) Ref: ONS, IC-RPS-24B (1.0)

6.15 (c) Ref: ONS, SY-EF, p. 49 (1.0)

6.16 (a) Ref: ONS, SY-C, p. 33 (1.0)

6.17 (d) Ref: ONS, SY-FDW, p. 14 (1.0)

6.18 (e) Ref: 1. ONS, SY-HDC, p. 20 (1.0)
2. ONS, TS 3.16
3. ONS, OP 1104/29

6.19 (d) Ref: ONS, SSF-FPS, p. 10 (1.0)

6.20 (b) Ref: ONS, SSF-DG, p. 68 (1.0)

6.21 (c) Ref: ONS, SY-HPI, p. 26 (1.0)

6.22 (c) Ref: ONS, CH-PC, p. 10 (1.0)

6.23 (b) Ref: ONS, IC-ES, p. 15 (1.0)

6.24 (a) Ref: ONS, SY-RBC, p. 7 (1.0)

6.25 (b) Ref: ONS, SY-BS, p. 8 (1.0)

6.26 (e) Ref: ONS, SY-LPW, p. 11 (1.0)

6.27 (b) Ref: ONS, SY-HPI, p. 14 (1.0)

6.28 (d) Ref: ONS, PTR-AMY, p. 37 (1.0)

6.29 (b) Ref: ONS, IC-NI, p. 14 (1.0)

6.30 (b) Ref: ONS, IC-ARM, p. 8 (1.0)

6.31 (e) (d) Ref: ONS, SSF-DG, p. 28 (1.0)

6.32 (c) Ref: ONS, SSF-DG, p. 68 (1.0)

6.33 (a) Ref: ONS, SY-HPI, p. 28 (1.0)

6.34 (c) Ref: ONS, CM-CRD, p. 9 (1.0)

6.35 (a) Ref: ONS, IC-NI, p. 10 (1.0)

6.36 1. Open LP-19 and LP-20 (RB sump suction valves) (0.25 each) (1.0)
2. Close LP-21 and LP-22 (BWST suction valves)
3. Open LP-15 and LP-16 (LPI to HPI cross connection)
4. Yes ~ HP-24+26 (HPI BWST suction)
Ref: ONS, SY-LPI, p. 15

6.37 1. ES 1 & 2 actuation with loss of 4160V busses (0.25 each) (1.0)
2. MFBMP signal (or load Shed)
3. Grid protection system actuation
4. Emergency actuation from control room or cable room
Ref: ONS, CM-KHG, p. 34

6.38 a. Increase (0.25 each) (1.0)
b. Increase BTU limit increase
c. Decrease less limiting to ICS Fw
d. Increase
Ref: 1. ONS, IC-ICS, p. 48
2. ONS, IC-ICS-4

6.39 See Attached Drawing (1.0)
Ref: ONS, EL-VPS-16

6.40 a, b, d, e, & g (c optional) (1.0)
Ref: ONS, IC-ICS, p. 22-24

ANSWER

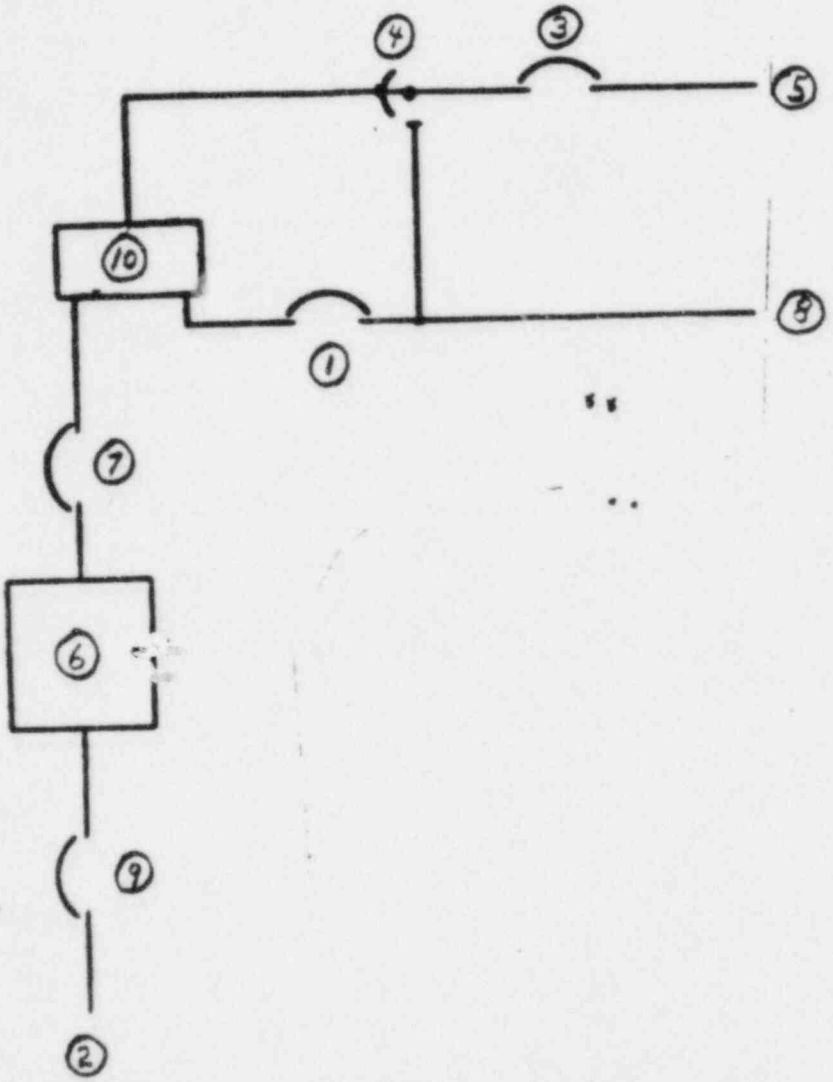


Fig 6.39

Vital Instrumentation and Controls (VPS)	NOTES: 1. One line diagram of the 10AC Inverter	DC-EL-VPS-16 5-31- 01/2/A/1107/01 TLF MANDATORY

SECTION 7 ANSWERS

7.1 (d) Ref: EP/1800/18, p.1 (1.0)

7.2 (c) Ref: EP/1800/04, p.6 (1.0)

7.3 (d) Ref: OP/1105/09, p.1 (1.0)

7.4 (b) Ref: EP/1800/7, p.1 (1.0)

7.5 (a) Ref: EP/1800/9, p.1 (1.0)

7.6 (b) Ref: 1. ONS, SY-CC, p.15 (1.0)
2. EP/1800/26, p.1

7.7 (e) Ref: ONS, SY-CC, p.20 (1.0)

7.8 (b) Ref: ONS, EP 1800/01, p.10 (1.0)

dele ~~7.9 (e) Ref: 1. OP 1102/01 (1.0)~~
~~2. ONS, IC-ICS, p.85~~

dele ~~7.10 (d) Ref: 1. OP 1102/01 (1.0)~~
~~2. ONS, IC-ICS, p. 85~~

7.11 (a) Ref: ONS, PRT-NT, P.13 (1.0)

7.12 (a) Ref: ONS, EP/1800/05, Case D. (1.0)

dele ~~7.13 (c) Ref: ONS, IC-ICS, p. 66 (1.0)~~

7.14 (d) Ref: OP, 1/A/1102/01, p.1 (1.0)

7.15 (a) Ref: OP/1106/06, p.2 (1.0)

7.16 (d) Ref: OP/1106/06, enclosure 4.5 (1.0)

7.17 (c) Ref: OP/1106/06, enclosure 4.7 (1.0)

dele ~~7.18 (d) Ref: EP/1800/01, pp.21, 32, 46 & 68 (1.0)~~

7.19 (d) Ref: EP/1/A/1800/01, enclosure 7.1A (1.0)

7.20 (c) or (b) Ref: ONS, OP 1102/01, p.3 (1.0)

7.21 (a) Ref: EP 1800/01, p.3 (1.0)

7.22 (e) Ref: EP 1800/01, p.2 (1.0)

7.23 (d) Ref: EP 1800/01, p.1 (1.0)

7.24 (b) Ref: EP 1800/01, p. 135 (1.0)

7.25 (e) Ref: 1. EP 1800/01, p.75, enclosure 7.4 (1.0)
2. OP 1103/06, enclosure 4.1, p.3

7.26

7.27 (c) Ref: EP 1800/11, p.1 (1.0)

7.28 (e) Ref: ONS, SY-LPI-5 (1.0)

7.29 (a) Ref: ONS, OP 1502/07, p.6 (1.0)

7.30 (b) Ref: ONS, FH-FHB, p.20 (1.0)

7.31 (b) Ref: 1. ONS, HP manual p.24 (1.0)
2. 10 CFR 20.202

7.32 (c) Ref: ONS, HP manual, pp 71-72 (1.0)

7.33 (b) Ref: 10 CFR 20.101, p. 239, rev. 1/1/85 (1.0)

7.34 (a) Ref: ONS, OP 1104/18, enclosure 4.6, p.1 (1.0)

7.35 (c) Ref: ONS, EP 1800/29, loss of instrument air. (1.0)

7.36 (c) Ref: ONS, OP 1502/07, enclosure 4.14 (1.0)

7.37 1. Condenser discharge valves close (1.0)
2. CCW-1 through 6 (Condenser emergency discharge) (0.1)
and CCW-8 OPEN (0.1)
3. Turbine trips (on low vacuum) (0.2)
4. MFW pumps trips (on low vacuum) (0.2)
5. EFW pumps start (0.2)
6. Rx trips (0.2)

7.38 1. verify auto - RB evacuation alarm (possible) (0.1) (2.0)
2. Trip reactor (0.1)
3. Shutoff bleed transfer pumps A and B (0.2)
4. Close bleed transfer pump A and B discharges (0.2)
5. Close HP-16 (makeup isolation) (0.2)
6. position LDST bypass HP-14 to LDST (0.4)
7. Close HP-120 (RC volume Control) (shutoff makeup flow) (0.2)
8. close HP-6 (letdown orifice inlet) (0.2)
9. adjust HP-7 (letdown flow control) to obtain desired flow to minimum letdown required by pump seals (0.4)

7.39 a. 7 (1.0)
b. 5
c. 11, 6
d. 8, 10
e. 9, 7
f. 4

Ref: 1. EP/1800/24
2. ONS, IC-PRM, p. 22

SECTION 8 ANSWERS

8.1 (b) Ref: ONS, TS p. 3.5-9 (1.0)

8.2 (e) Ref: OP/2/A/1502/07, p.2 (1.0)

8.3 (a) Ref: OP/3/A/1502/07, p.7 (1.0)

8.4 (a) Ref: Emergency Plan, p. D-1 (1.0)

8.5 (a) Ref: RP/0/B/1000/09, enclosure 4.5 p.9 (1.0)

8.6 (b) Ref: Oconee T.S., p. 6.3-1 (1.0)

8.7 (c) Ref: ONS, OMP 4-1, p. 17 (1.0)

8.8 (b) Ref: ONS, OP 1106/31, p. 3 (1.0)

8.9 (a) Ref: ONS, TS p. 2.1-3d (1.0)

8.10 (c) Ref: ONS, TS p. 3.2-1 (1.0)

8.11 (e) Ref: ONS, TS bases, p.3.1-9 (1.0)

8.12 (d) Ref: ONS, TS bases, p. 3.3-6 (1.0)

8.13 (b) Ref: ONS, RP/0/B/1000/09, Enclosure 4.2 p.4 (1.0)

~~8.14 (d) Ref: ONS, TS, p. 3.1-12 (1.0)~~

8.15 (c) Ref: ONS, OMP 1-3, p.2 (1.0)

8.16 (d) Ref: ONS, OP/0/A/1506/01, p.5 (1.0)

8.17 (e) Ref: OP/3/A/1502/07, p.2. (1.0)

8.18 (b) Ref: ONS, TS, pp. 2.3-2, 3.5-12 (1.0)

8.19 (c) Ref: ONS, OMP 2-1, Enclosure 5.4 (1.0)

8.20 (b) Ref: ONS, T.S. p.3.1-14 (1.0)

8.21 (a) Ref: ONS, TS p.3.13-1 (1.0)

8.22 (d) Ref: ONS, E plan, p. A-2 (1.0)

8.23 (d) Ref: ONS, T.S. p. 3.17-2 (1.0)

8.24 (e) Ref: ONS, T.S. p. 4.0-1 (1.0)

dele ~~8.25 (b) Ref: ONS, T.S. p. 3.5-33 (1.0)~~

8.26 (a) a&b Ref: ONS, T.S. P. 3.12-1 (1.0)

8.27 (a) Ref: ONS, OP/2/A/1102/04, p.3. (1.0)

8.28 (a) Ref: ONS, TS 3.4-2 (1.0)

8.29 (d) Ref: ONS, OMP 1-11 (1.0)

8.30 (c) Ref: ONS, OMP 1-12, p.1 (1.0)

dele ~~8.31 (a) Ref: 1. ONS, OMP 1-8 (1.0)~~
~~2. ONS, OP/1102/02, p.6~~

8.32 (c) Ref: ONS, OMP 2-6 (1.0)

8.33 (c) Ref: ONS, TS P. 6.1-6a (1.0)

dele ~~8.34 (e) Ref: ONS, RP/0/B/1000/05, p.1 (1.0)~~

8.35 (c) Ref: ONS, E Plan, p. 0-1 (1.0)

8.36 (d) Ref: ONS, CP/1&2/A/2002/05 (1.0)

8.37

8.38 3, 4, 5, 6, 10, 12, 14, 22, ~~23~~ 21 (+1/3 each righ answer (3.0)
(-1/3 each incorrect pick)

Ref: ONS, OMP 2-2