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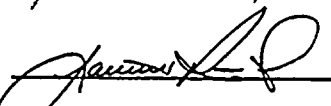
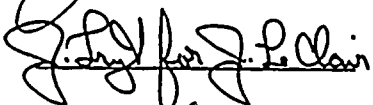
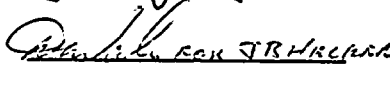
NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION

UNIT II OPERATIONS

02-REQ-008-361-2-01 Revision 0

TITLE: OVERVIEW OF TITLE 10 OF THE CODE OF FEDERAL REGULATIONS (10-CFR)

	<u>SIGNATURE</u>	<u>DATE</u>
PREPARER		<u>5/30/91</u>
TRAINING AREA SUPERVISOR		<u>5/31/91</u>
TRAINING SUPPORT SUPERVISOR		<u>5-31-91</u>
PLANT SUPERVISOR/ USER GROUP SUPERVISOR		<u>5/31/91</u>

Summary of Pages

(Effective Date: 5/31/91)

Number of Pages: 27

<u>Date</u>	<u>Pages</u>
May 1991	1 - 27

MASTER

CONTROLLED
TRAINING DEPARTMENT RECORDS ADMINISTRATION ONLY
VERIFICATION

DATA ENTRY:
DOCUMENT
RECORDS

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PDR ADDCK 05000410
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ENCLOSURE

I. TRAINING DESCRIPTION

- A. Title of Lesson: Overview of Title 10 of the Code of Federal Regulations (10-CFR).
- B. Lesson Description: This lesson contains information that will provide overview knowledge of Title 10 of the Code of Federal Regulations.
- C. Estimate of the Duration of the Lesson: 2 hours.
- D. Method of Evaluation, Grade Format, and Standard of Evaluation: A written exam will be given with a minimum grade of 80% required for satisfactory performance.
- E. Method and Setting of Instruction: Lecture conducted in the classroom.
- F. Prerequisites:
 - 1. Instructor:
 - a. Certified in accordance with NTP-16.
 - 2. Trainee:
 - a. In accordance with eligibility requirements of NTP-11.
- G. References:
 - 1. 10-CFR

II. REQUIREMENTS

- A. AP-9, Administration of Training
- B. NTP-11, Licensed Operator Requalification Training

III. TRAINING MATERIALS

- A. Instructor Materials:
 - 1. Training Record (TR)
 - 2. Instructor's working copy of Lesson Plan
 - 3. Whiteboard and Markers
 - 4. Overhead Projector
 - 5. Transparencies as needed
 - 6. Flipchart
 - 7. Copy of Trainee Handouts
 - 8. Trainee Course Evaluation Forms

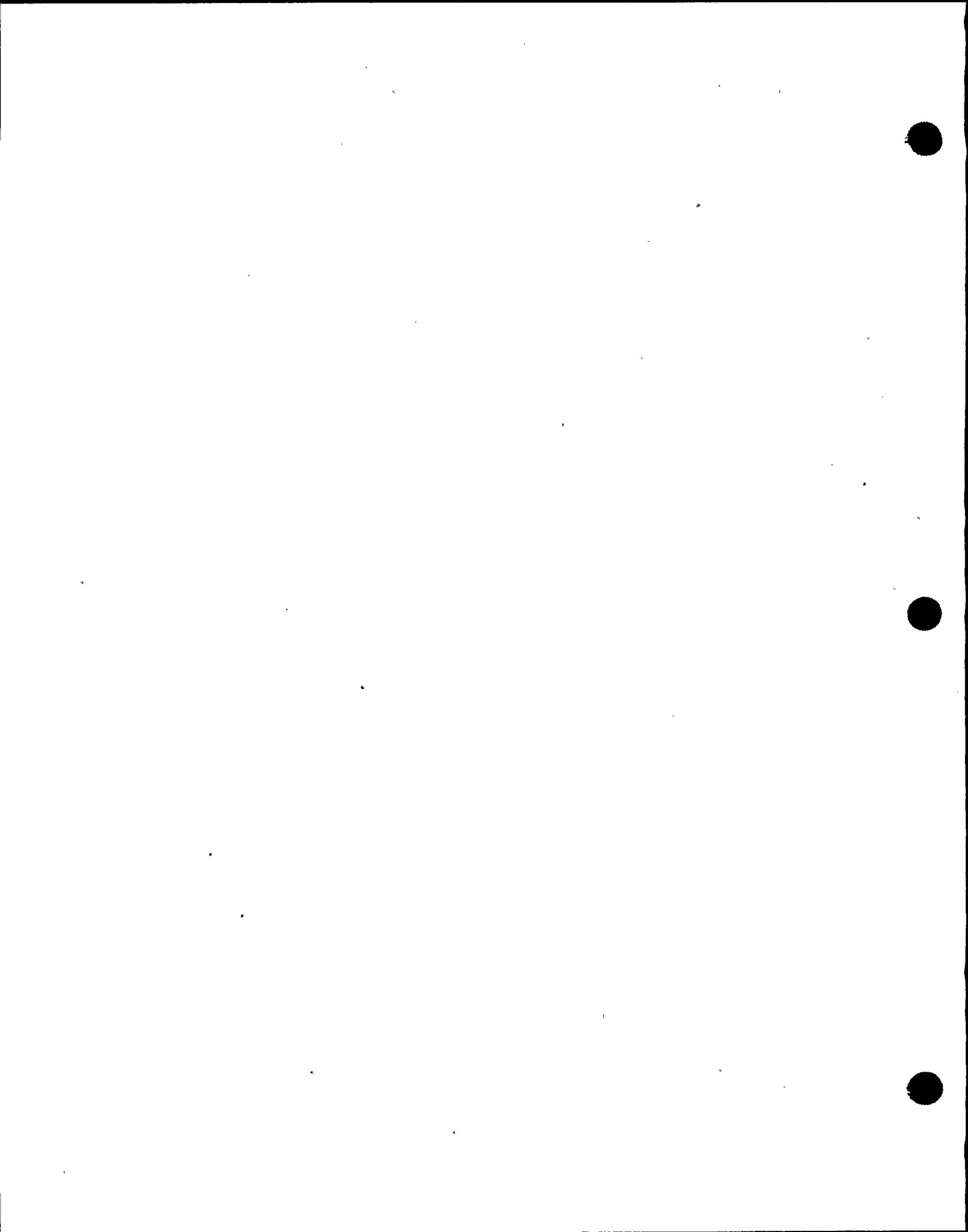


B. Trainee Materials:

1. Handouts
2. Paper or notebook
3. Pen or pencil

IV. EXAMS AND MASTER ANSWER KEYS

- A. Exam and master answer keys will be on permanent file with the designated clerk.



V. LEARNING OBJECTIVES

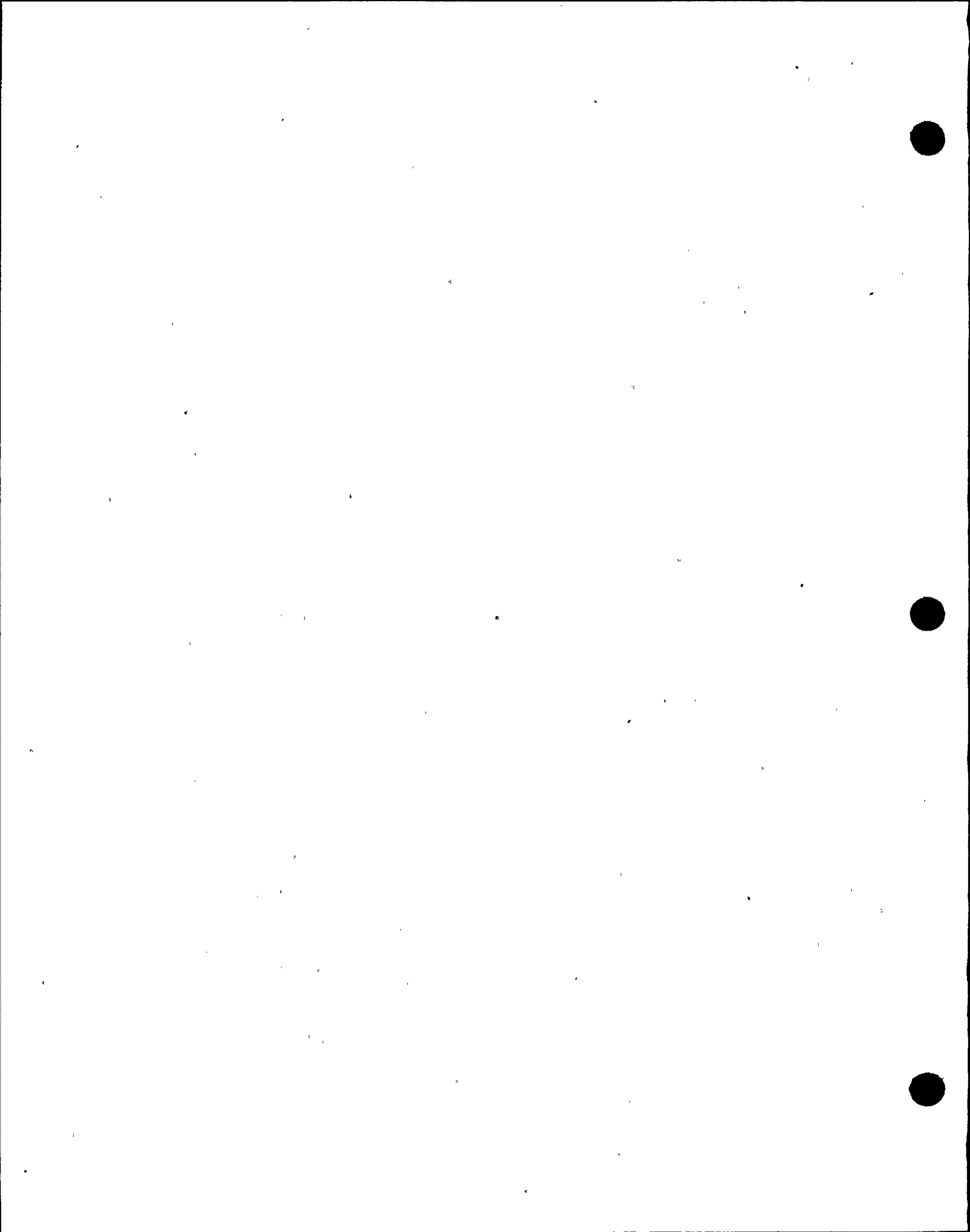
Upon completion of this lesson the trainee will have gained the knowledge related to Title 10 of the Code of Federal Regulations to:

A. Terminal Objectives:

- TO-1.0 Direct Actions to Ensure Compliance with Local, State, and Federal Environmental Regulations. (3410340303)
- TO-2.0 Apply Tech Spec Directions for Safety Limits, LCOs, and Limiting Safety System Settings. (3410180303)
- TO-3.0 Maintain a valid Senior Reactor Operator License. (3410370303)
- TO-4.0 Write and Review Operational Reports (LERs). (3430160303)
- TO-5.0 Authorize the Deviation from Tech Specs./Procedures during Emergency Conditions in Accordance with 10-CFR-50.54 x and y. (3440480303)

B. Enabling Objectives:

- EO-1.0 Describe the Tech Spec terms:
 - a. Safety Limit
 - b. Limiting Safety System Setting
 - c. Limiting Conditions for Operation
- EO-2.0 Describe the rights given to a licensed operator as defined on the NRC license document.
- EO-3.0 Describe eight of the ten conditions of licenses other than restrictions which you shall observe.
- EO-4.0 State whether conditions of the license are stated on the NRC operating license document.
- EO-5.0 State whether a civil penalty may be levied upon a holder of an operating license.
- EO-6.0 Describe the requirements for manipulating the controls of a reactor which may affect its reactivity or power level and include the TWO exceptions to these requirements.



- EO-7.0 State who shall be present during core alternations of the core of a nuclear power plant.
- EO-8.0 Describe the two conditions which must be met in order to "take reasonable action that departs from a license condition or a technical specification" during an emergency (include approval requirements and reportability time frames).
- EO-9.0 . State the time frame in which a disability must be reported to the NRC and the person responsible for making sure this notification is made.
- EO-10.0 Describe the consequences to "any person who willfully violates any provision of the act or any regulation or order issued there under".



I. INTRODUCTION

- A. Introduce yourself to the class.
- B. Distribute TR for completion.
- C. Distribute Course Evaluation forms and describe how it should be utilized.
- D. Explain that the evaluation will be conducted as part of a written exam at the end of the week.
- E. Review the learning objectives with the class.

Passing the weekly exam with $\geq 80\%$ is satisfactory for this lesson.

II. PURPOSE

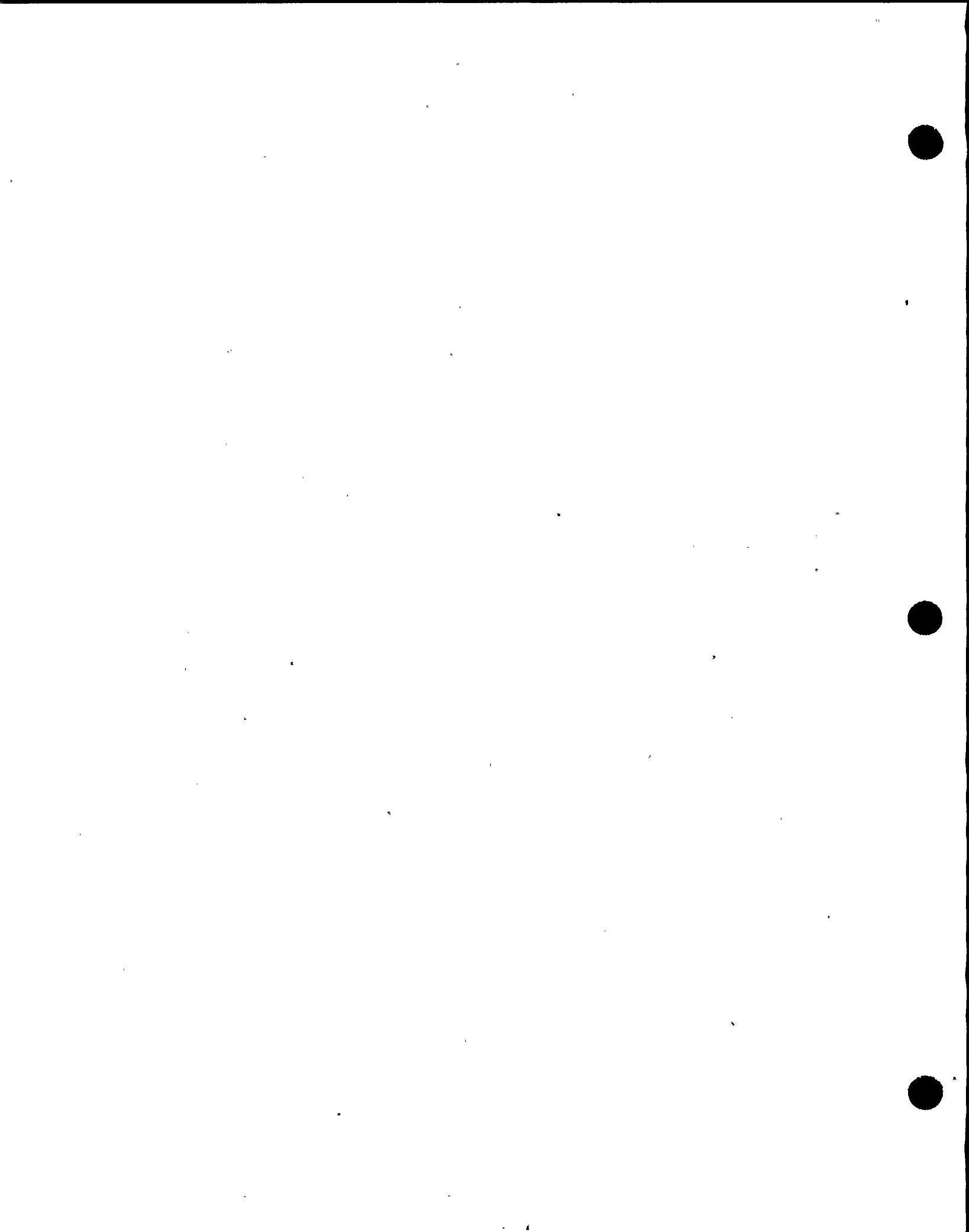
- A. Code of Federal Regulations delineates federal regulations for a wide variety of areas.
- B. Code is composed of over 50 titles generally bearing the name of the federal issuing agency.
- C. Title 10 deals with energy.
 1. Volume I deals with NRC regulations in Part 0-199.

We will look briefly at Parts 19, 20 and 100.

A more detailed look at Parts 50 and 55 will be conducted.

III. DETAILED DESCRIPTION

- A. 10-CFR-19 Notices, Instructions, and Reports to Workers: Inspections
 1. Specifies the notices and documents which must be made available to individuals at a licensed facility.



2. Describes the conduct of regulatory inspectors at a licensed facility.
 3. States the rights of workers to report instances of regulatory non-compliance by a licensee (utility, carrier of radioactive material, etc.) to the NRC.
- B. 10-CFR-20 Standards for Protection against Radiation.
1. Specifies Radiation Exposure limits for workers, non-workers, minors and pregnant women.
 2. Specifies requirements for radiation limits, contamination limits and airborne radiation levels.
 - a. Specifies posting and entry requirements for these areas.
 3. Defines maximum permissible concentration for isotopes in air and water.
 4. Defines reportable events and time frames for radiological emergencies.

10-CFR-20 will be totally revised over the next few years. All plants will comply by 1993. Changes will be very significant.



C. 10-CFR-50 Domestic Licensing of Production and Utilization Facilities.

1. Defines the requirements to be met in obtaining and maintaining a license for the facility from construction to decommissioning.

2. Definitions 10-CFR-50.2

a. Controls--apparatus and mechanisms, the manipulation of which directly affects the reactivity or power level of the reactor.

Operators should be familiar with this definition.

EO-6.0

b. Also defines many other terms such as:
1) Reactor Coolant Pressure Boundary
2) Safe Shutdown (non-DBA)
3) Design bases
4) Station blackout

Safe shutdown and station blackout are covered in 50.2 page 528.

3. Written Communications 10-CFR-50.4

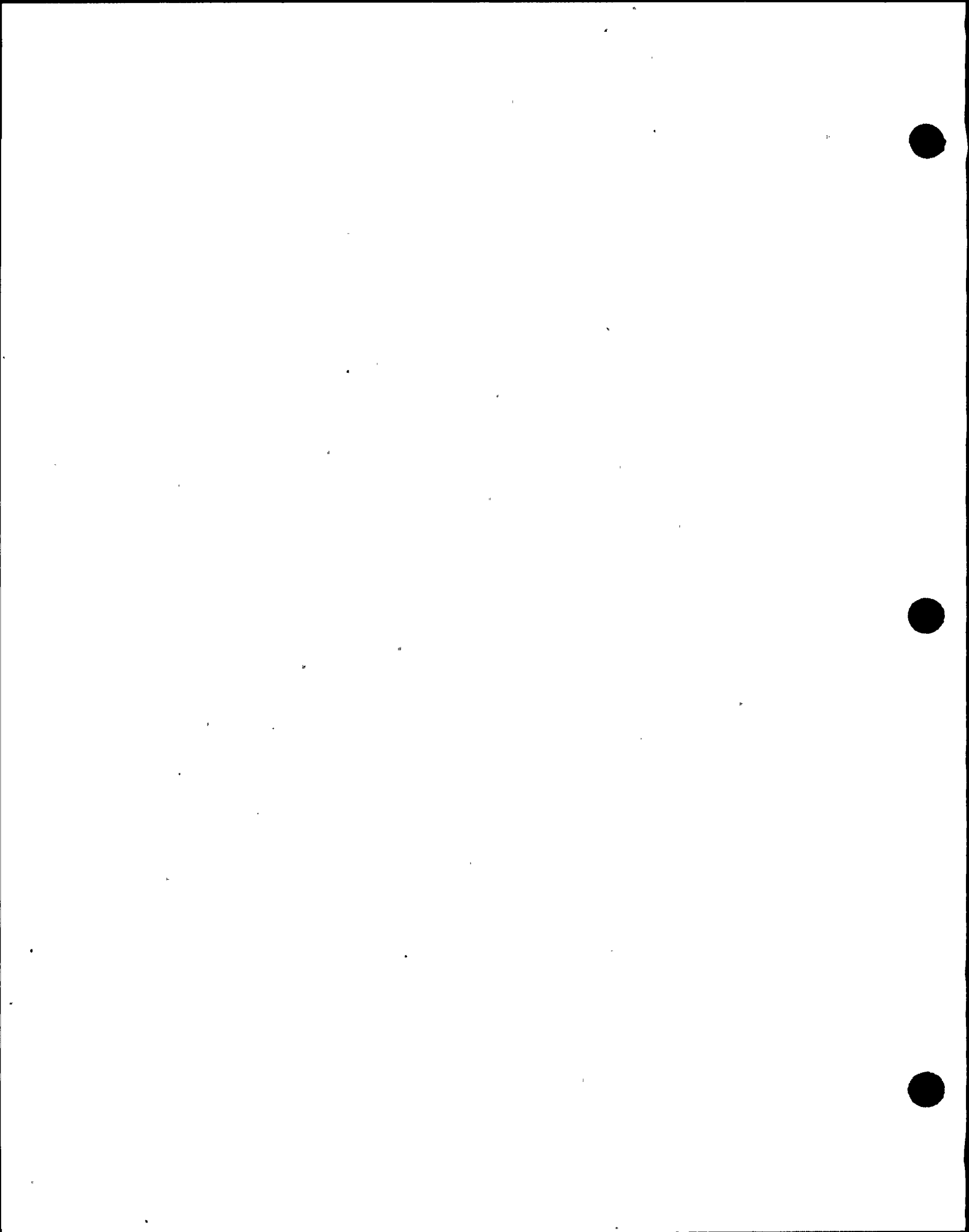
a. Describes required filings and applications along with submittals for construction permit and license application.

4. Licensing Requirements 10-CFR-50.10

a. Details activities requiring a license.

Paragraph (c) details Construction Permit requirements.

b. Details authorization for granting a license.

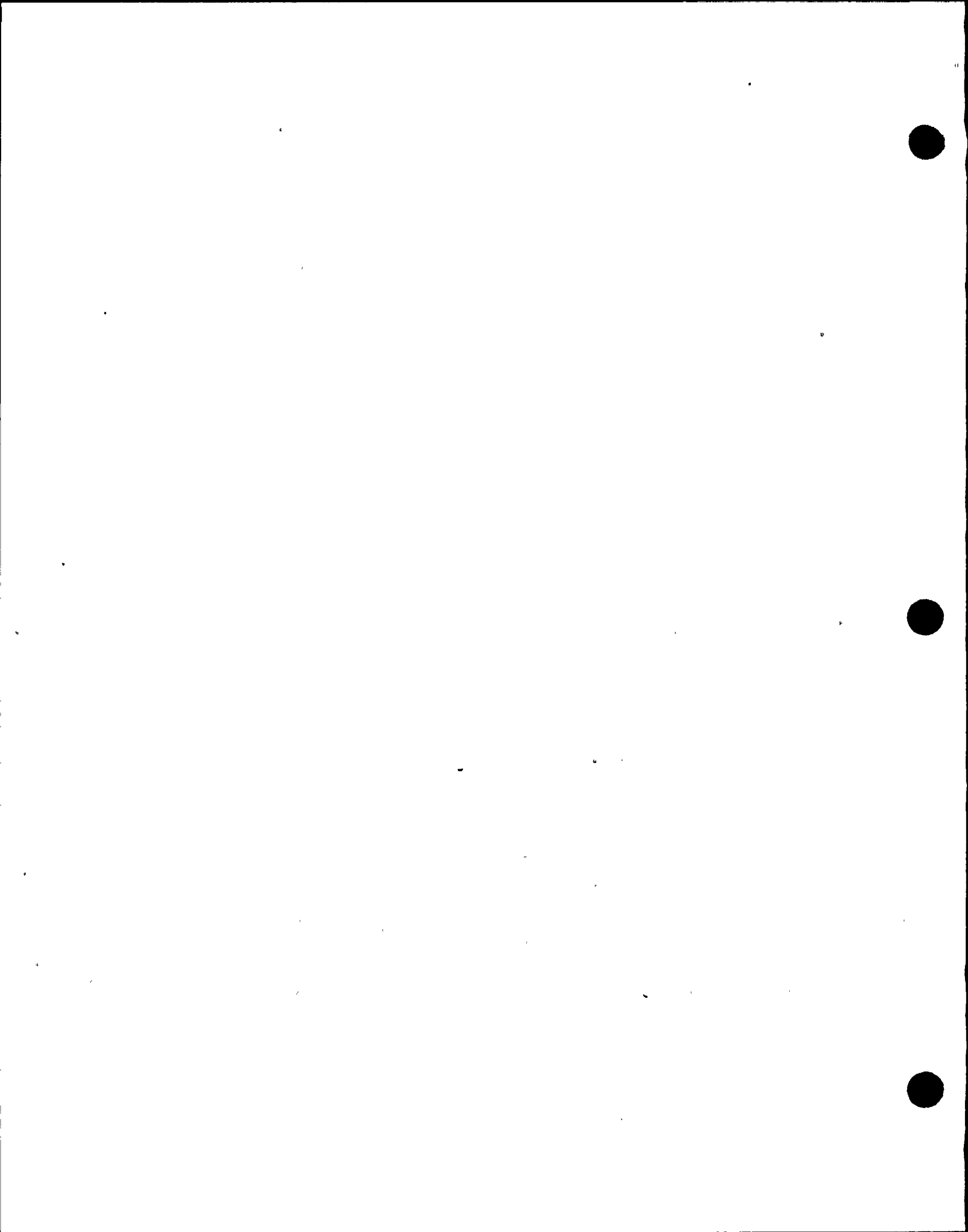


5. License Applications 10-CFR-50.30-35
 - a. Details the information and documentation required to submit a license application including General and Technical information.
6. Technical Specifications 10-CFR-50.36
 - a. Technical Specifications will be derived from the analyses and evaluation included in the safety analyses.
 - b. License applications must include Technical Specifications.
 - c. A summary statement of the bases or reasons for such specifications is required but shall not become part of the specification.
 - d. Tech. Specs. will include items in the following areas:
 - 1) Safety Limit-limits upon important process variables that are found to be necessary to reasonably protect the integrity of certain physical barriers that guard against the uncontrolled release of radioactivity.

EO-1.0a

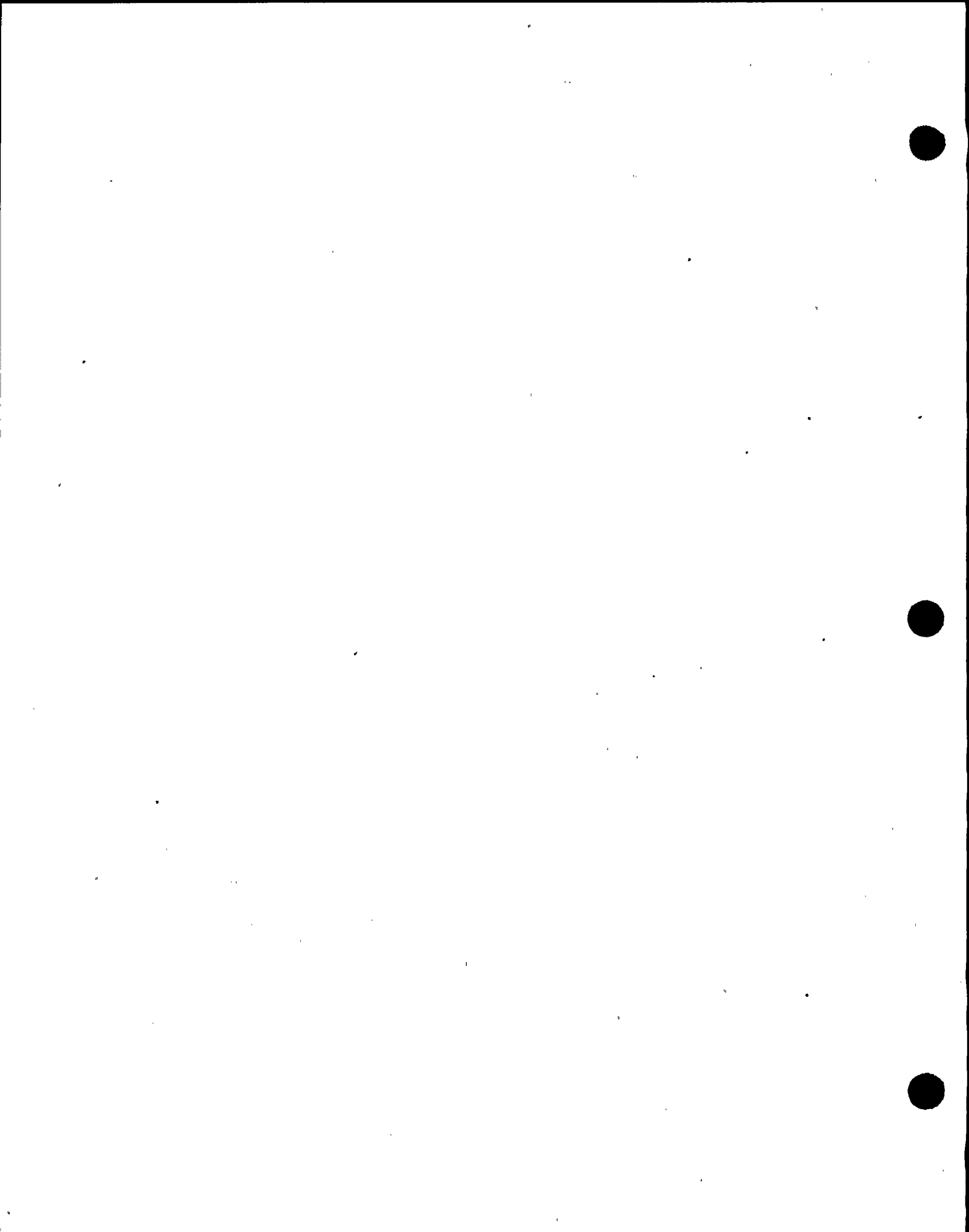


- a) Safety limit violation- requires plant shutdown, NRC notification, complete review and documentation of the situation, and corrective action.
 - b) Operation may not be resumed without NRC authorization.
 - c) Unit 2 has four Safety Limits
- 2) Limiting Safety System Settings- Settings for automatic protective devices related to those variables having significant safety functions. EO-1.0b
- 3) Limiting Condition for Operation- The Lowest functional capability or performance levels of equipment required for safe operation of the facility. EO-1.0c
- 4) Surveillance Requirements- Requirements relating to test, calibration, or inspection to assure that the necessary quality of systems and components is maintained.

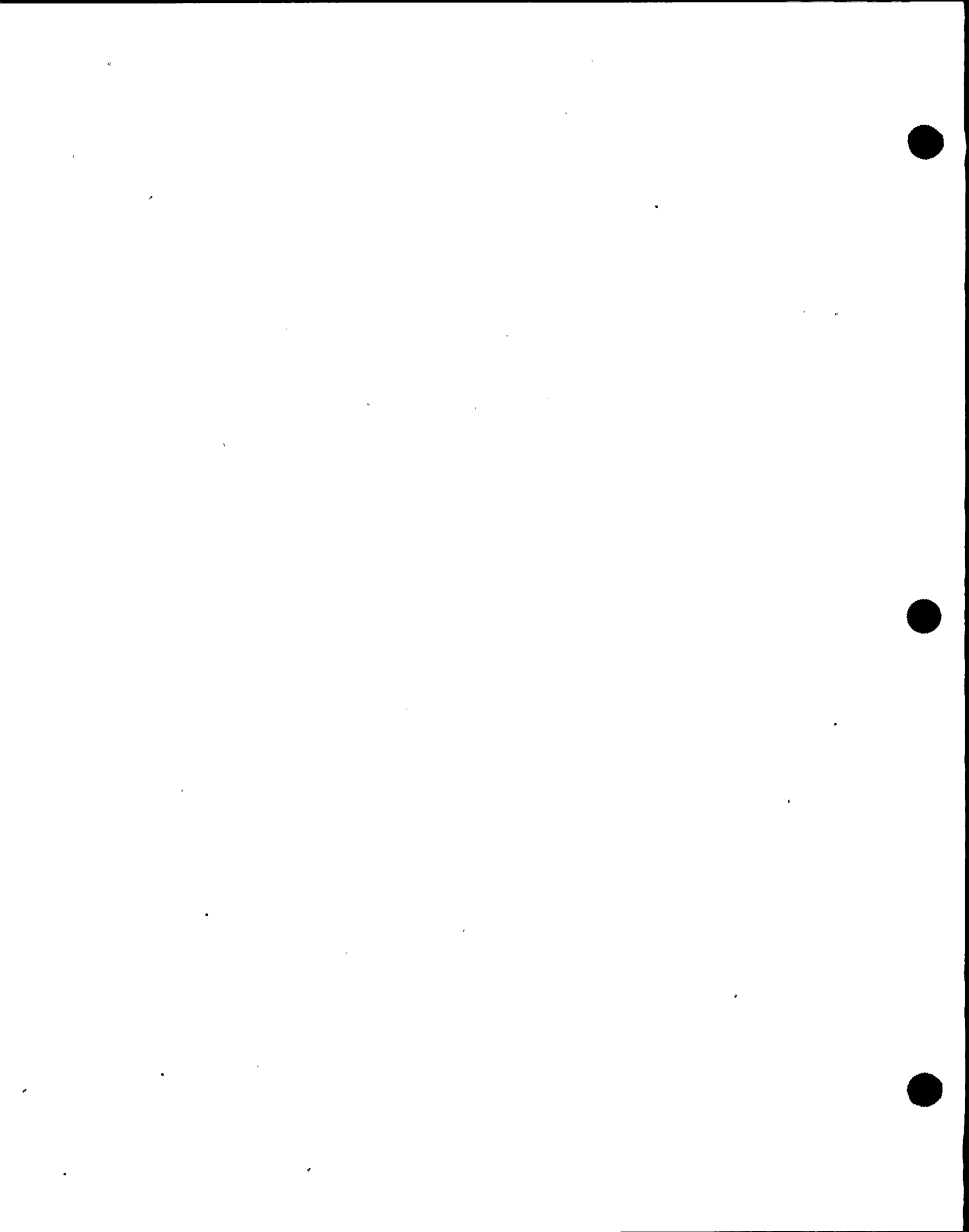


- 5) Design Features - Those features such as materials of construction and geometric arrangements, which, if altered or modified, would have a significant effect on safety.
 - a) Section 5 of Tech. Specs.
- 6) Administrative Controls - Provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure safe operation of the facility.
 - a) Section 6 of Tech. Specs.
7. ECCS Acceptance Criteria 10-CFR-50.46
 - a. Each BWR fueled with uranium oxide pellets and zircaloy cladding must be provided with an ECCS designed such that its calculated cooling performance on a postulated LOCA conforms to the following criteria:
 - 1) Maximum PCT \leq 2200°F.
 - 2) Maximum clad oxidation \leq 17% original clad thickness.

Design criteria required by Appendix K.
Not the same as Design Bases.



- 3) Maximum hydrogen generation \leq 1% hypothetical maximum if all cladding surrounding pellets excluding clad surrounding plenum region underwent chemical reaction.
 - 4) Coolable core geometry must be maintained.
 - 5) Long term cooling must be provided to maintain acceptably low temperature and remove decay heat following initial successful ECCS initiation.
8. Emergency Plans 10-CFR-50.47
- a. NRC needs reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency.
 - b. Describes the standards that the plan must meet.
9. Fire Protection 10-CFR-50.48
- a. Requires fire protection plan that meets criteria set forth in Design Features (Appendix A to 10-CFR-50).
 - b. Appendix R to 10-CFR-50 details more stringent fire protection for those systems associated with achieving and maintaining safe shutdown conditions.
- 02-REQ-008-361-2-01 -11 May 1991



10. Duration of Licenses 10-CFR-50-51
a. Licenses issued for specific period not to exceed 40 years.

Plants presently looking at license extensions now that the first plants are approaching 40 years.

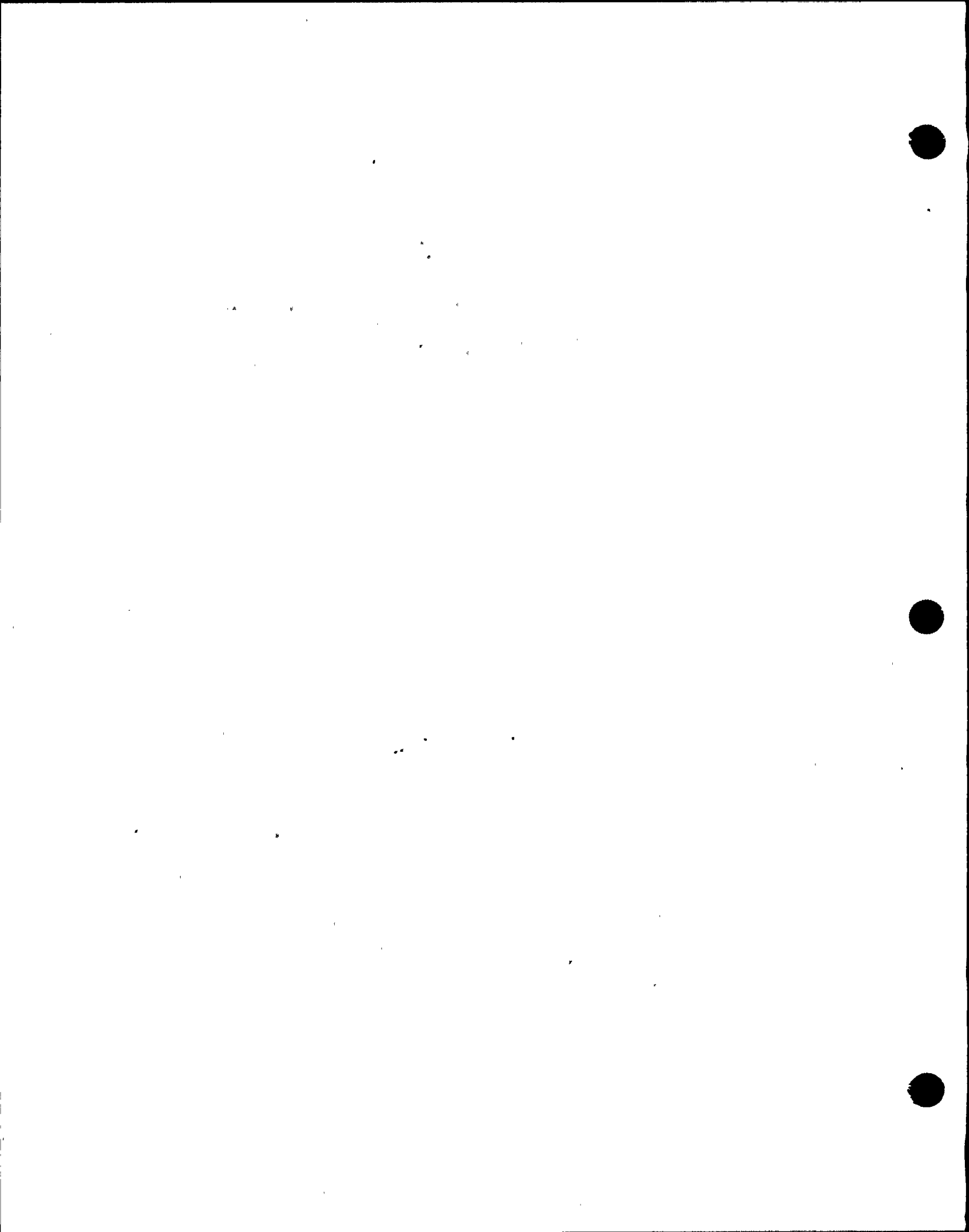
11. Conditions of Licenses 10-CFR-50.54
Conditions which apply to the license whether stated or not:

EO-4.0

- a. 50.54 i-the licensee may not permit the manipulation of the controls of the facility by anyone who is not a licensed operator or senior operator.
- b. 50.54 i-1-within three months after issuance of a license the licensee must have an operator requalification program in effect.
- c. 50.54 j-Apparatus and mechanisms other than controls, the operation of which may affect the reactivity of the reactor shall be manipulated only with the knowledge and consent of a licensed operator or senior operator.
- d. 50.54 k - an operator or senior operator must be present at the controls at all times during the operation of the facility.

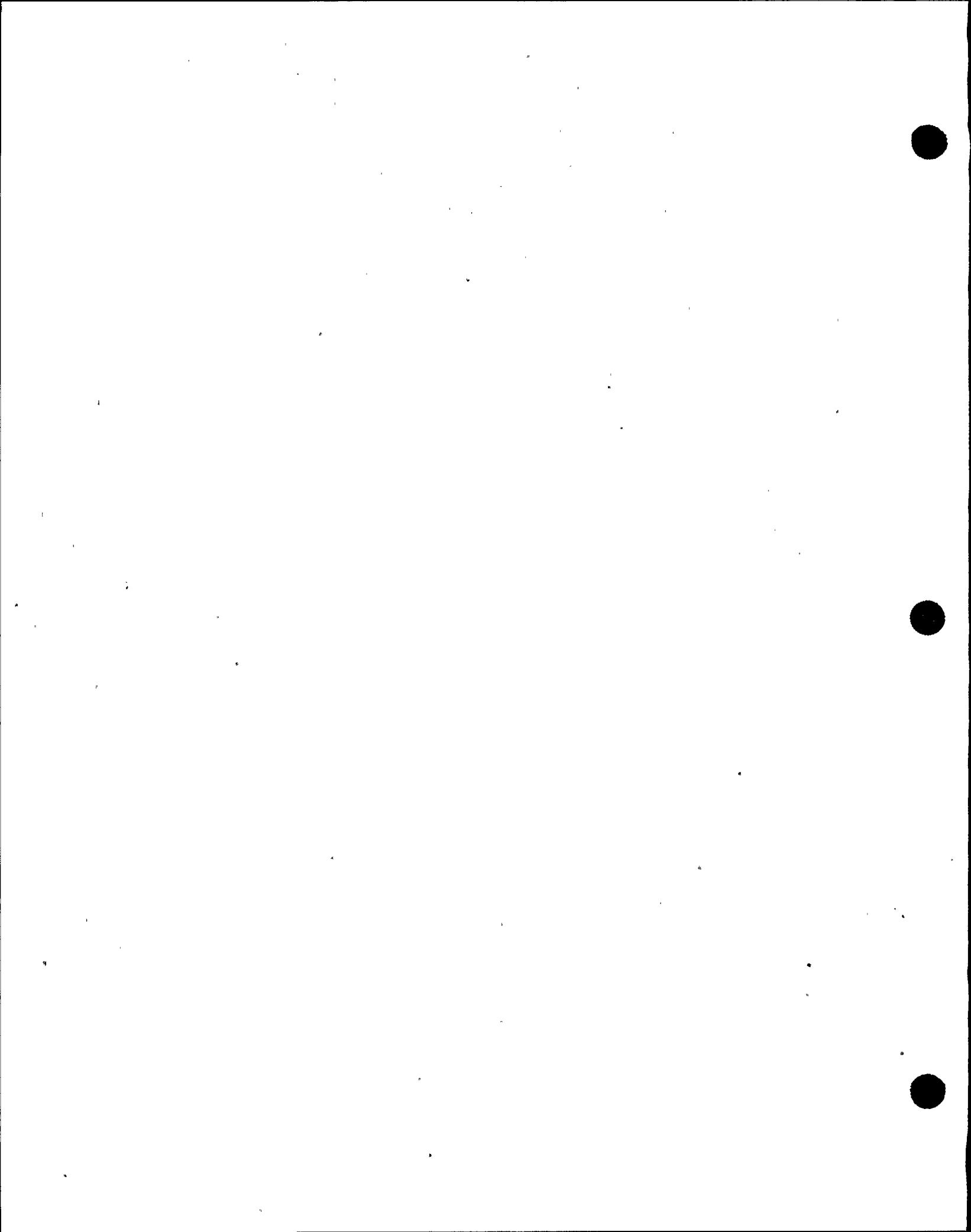


- e. 50.54 l- licensee shall designate individuals to be responsible for directing the licensed activities of licensed operators. These individuals shall be licensed at Senior Operators.
- f. 50.54 m- details the requirements for shift manning under various plant conditions and circumstances.
- 1) Includes requirement for Senior Operator or Senior Operator limited to fuel handling responsible to directly supervise the activities on the refuel floor. EO-7.0
- g. 50.54 x- A licensee may take reasonable action that departs from a license condition or a technical specification in an emergency when this action is immediately needed to protect the public health and safety and no action consistent with license conditions and technical specifications that can provide adequate or equivalent protection is immediately apparent. EO-8.0
- 1) Use of 50.54x is a non emergency one hour report. SRO's need to be very familiar with 50.54x and y.



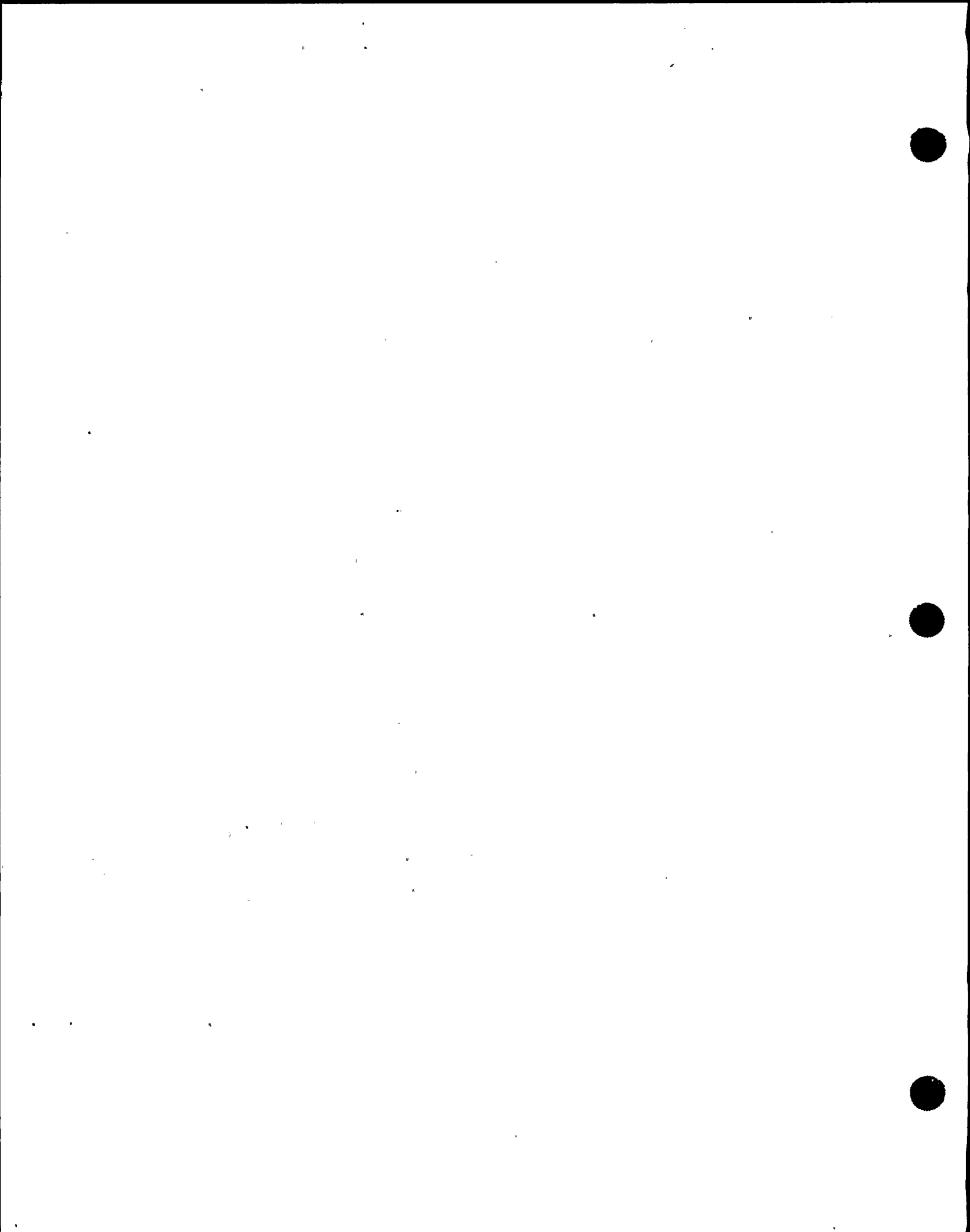
- h. 50.54 y- Licensee action permitted by paragraph x of this section shall be approved, as a minimum, by a licensed senior operator prior to taking the action.
- 12. Requirements for reduction of risk from ATWS
10-CFR-50.62
 - a. Defines ATWS
 - b. Describes requirements that plants are required to have to combat ATWS
 - 1) ARI
 - 2) SLCS automatic injection.
 - 3) Equipment to automatically trip the Recirculation pumps.
- 13. Loss of all Alternating Current Power
10-CFR-50.63
 - a. Describe plant design required to deal with a station blackout.
- 14. Immediate notification requirements
10-CFR-50.72
 - a. Requires the use of the Emergency Notification System (ENS)
 - b. Describe immediate reports (1 hour).
 - c. Describes 4 hour reports.

Red Phone in Control Room: direct hookup to the NRC Operations Center.



- d. Describes requirements for followup reports.
- 15. Licensee event report system 10-CFR-50.73
 - a. Describes requirements for submitting Licensee Event Report including:
 - 1) Event
 - 2) Time frame to report (30 days)
- 16. Notification of change in operator or senior operator status 10-CFR-50.74
 - a. Each licensee shall notify the commission within 30 days of the following in regard to a licensed operator or senior operator:
 - 1) Permanent reassignment from the position for which the licensee has certified the need for a licensed operator or senior operator.
 - 2) Termination of any operator or senior operator.
 - 3) Disability or illness as described in 55.25 of this chapter.

EO-9.0

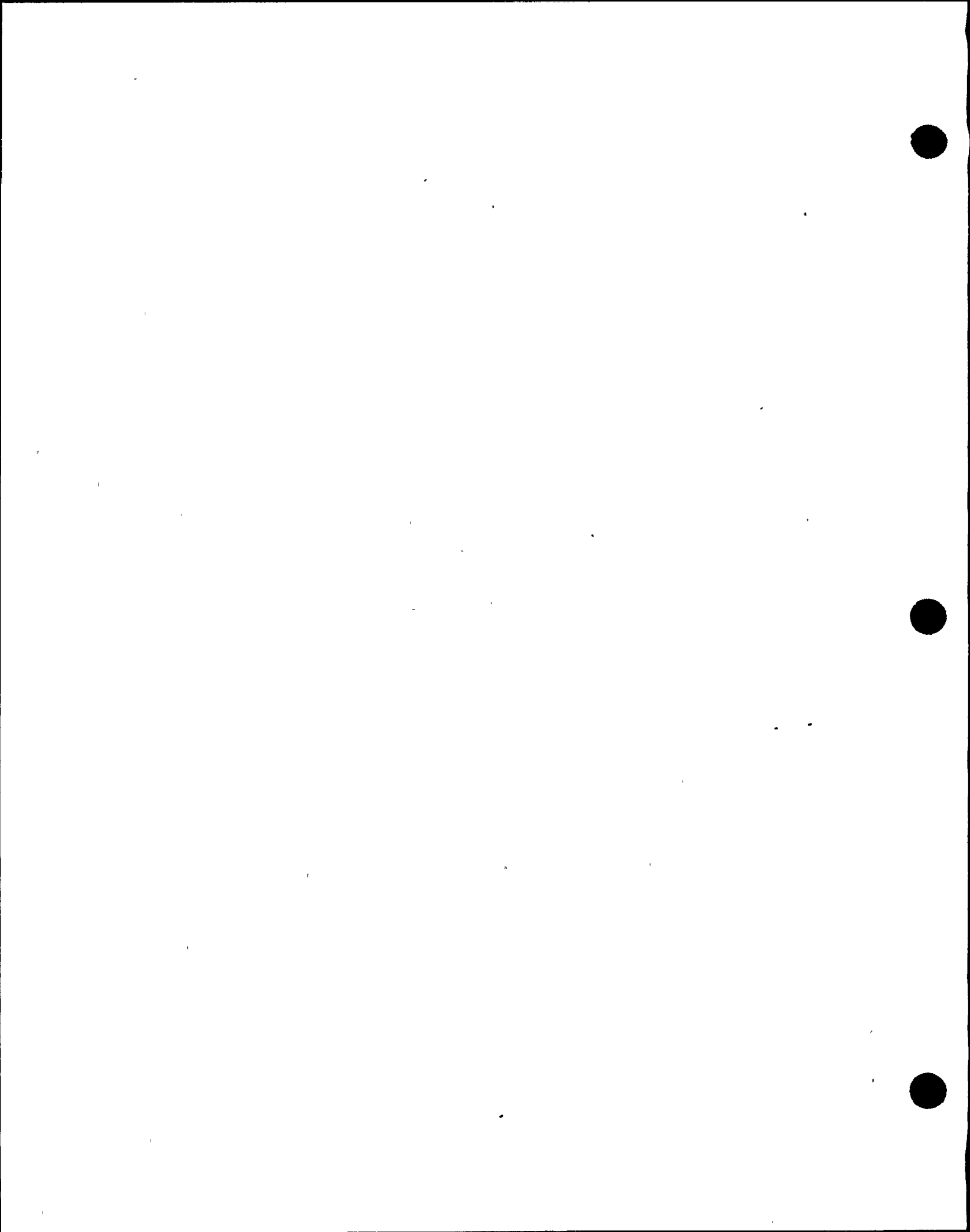


- 17. Remainder of 10-CFR-50
 - a. The remainder of Part 50 deals with such issues as:
 - 1) Decommissioning
 - 2) License Amendment
 - 3) Revoking, Suspending or Modifying a License
 - 4) Backfitting Systems
 - 5) Enforcement of Violations
- 18. 10-CFR-50 Appendices of Interest
 - a. Appendix A General Design Criteria
 - b. Appendix B Quality Assurance Design Criteria
 - c. Appendix C Emergency Planning and Preparedness
 - d. Appendix K ECCS Evaluation Model
 - e. Appendix R Fire Protection Program
- D. 10-CFR-55 Operator's Licenses
 - 1. Purpose 10-CFR-55.1
 - a. Establish procedures and criteria for issuing licenses to operators and senior operators of utilization facilities.

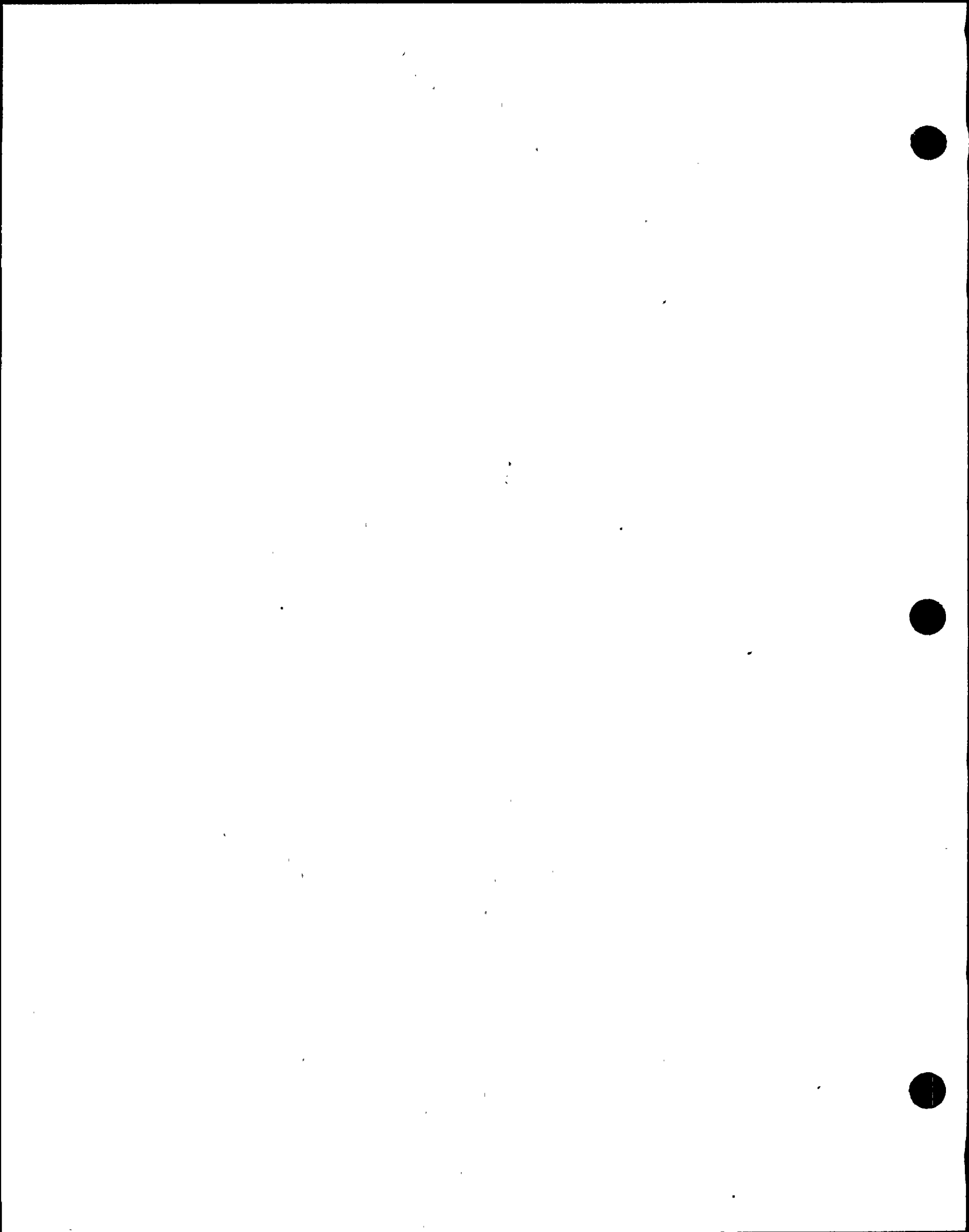
Appendix from which Appendix R valves get their requirements. Refers to "smart fire" criteria.



- b. Provide terms and conditions to issue and modify licenses.
 - c. Provide terms and conditions to maintain and renew these licenses.
2. Scope 10-CFR-55.2
- a. Regulations apply to:
 - 1) Any individual who manipulates the controls of any utilization facility, and
 - 2) Any individual designated by the facility licensee to be responsible for directing any licensed activity of a licensed operator.
3. Definitions 10-CFR-55.4
- a. Actively performing the functions of an operator or senior operator - an individual has a position on the shift crew that requires the individual to be licensed as defined in Technical Specification, and that the individual carries out and is responsible for the duties covered by that position.



- b. Operator - any individual licensed under this part to manipulate a control of a facility. EO-2.0
EO-6.0
 - c. Senior Operator - any individual licensed under this part to manipulate the controls of a facility and to direct the licensed activities of licensed operators.
4. General Exemptions 10-CFR-55-13
- a. The regulations in this part do not require a license for an individual who: EO-6.0
 - 1) Under the direction and in presence of a licensed operator or senior operator, manipulates the controls of a facility as part of the individual's training in a facility licensee's training program.
 - 2) Under the direction and in the presence of a licensed senior operator, manipulates the controls of a facility to load or unload the fuel into, out of or within the reactor vessel.



5. Medical Examination 10-CFR-55.21
 - a. Applicants must have medical examination every two years.
6. Incapacitation because of disability or illness 10-CFR-55.25
 - a. Failure to meet medical requirements of license at any time during the term of the license requires NRC notification within 30 days.
7. Conditions of Licenses 10-CFR-55.53
 - a. Each license contains and is subject to the following conditions whether stated or not:
 - 1) Neither the license nor any right under the license may be assigned or otherwise transferred.
 - 2) The license is limited to the facility for which it is issued.
 - 3) The license is limited to those controls of the facility specified in the license.
 - 4) The license is subject to and the licensee shall observe, all applicable rules, regulation, and Orders of the Commission.

EO-4.0

EO-3.0



- 5) If a licensee has not been actively performing the functions of an operator or senior operator, the licensee may not resume activities authorized by this part except as permitted below.

To maintain active status, the licensee shall actively perform the functions of an operator or senior operator on a minimum of seven 8 hour or five 12 hour shifts per calendar quarter.

- 6) If the paragraph above is not met, before resumption of functions authorized by a license issued under this part, an authorized representative of the facility licensee shall certify the following:
- a) The qualifications and status of the licensee are current and valid.

EO-3.0



- b) The licensee has completed a minimum of 40 hours of shift functions under the direction of an operator or senior operator as appropriate and in the position to which the individual will be assigned. The 40 hours must have included a complete tour of the plant and all required shift turnover procedures.

Requalification requirements in 10-CFR-55.59.

For senior operators limited to fuel handling, one shift must have been completed.

- 7) The licensee shall notify the Commission within 30 days of conviction of a felony.
- 8) The licensee shall complete a requalification program.
- 9) The licensee shall have a biennial medical examination.



10) The licensee shall comply with any other conditions that the Commission may impose to protect health or danger to life or property.

8. Expiration 10-CFR-55.55

a. License expires:

- 1) Six years after date of issue.
- 2) Termination of employment by facility.
- 3) Facility determines that licensed individual no longer needs to maintain a license.

b. If application for renewal is filed 30 days prior to expiration, then license won't expire until disposition of the application.

9. Renewal of License 10-CFR-55.55

a. Applicant's license will be renewed if:

- 1) Medical health of the licensee continues to be such as not to cause operational errors that endanger the public health and safety.



- 2) The licensee:
 - a) Is capable of continuing to competently and safely assume license duties;
 - b) Has successfully completed a requalification program approved by the NRC.
 - c) Has passed the requalification exams and annual operating exams.
 - d) Has passed a comprehensive requalification written examination and operating test administered by the NRC during the six year license.
- 3) There is a continued need for a licensee to operate or for a senior operator to direct operators at a facility designated in the application.
- 4) The past performance of the licensee has been satisfactory to the Commission.

Commission will include Notices of Violation or letters of reprimand in the licensee's docket to make this evaluation.



10. Requalification 10-CFR-55.59
- a. Requalification requirements—each licensee shall:
- 1) Successfully complete a requalification program developed by the facility and approved by the Commission.
 - a) The program shall be conducted for a continuous period not to exceed 24 months.
 - 2) Pass a comprehensive requalification written examination and an annual operating test.
- b. Additional Training
- 1) If the training requirements above are not met the Commission may require the Licensee to complete additional training and submit evidence to the Commission of successful completion before returning to licensed duties.



- c. Requalification requirements
 - 1) Details requirements for
 - a) Schedule
 - b) Lectures
 - c) OJT-lists annual and biannual manipulations.
 - d) Evaluation
 - e) Records
- 11. Modification and Revocation of Licenses
10-CFR-55.61
 - a. Terms and Conditions of all licenses are subject to amendment, revision, or modification by reason of rules, regulations, or orders issued in accordance with the Act or any amendments thereto.
 - b. Any license may be revoked, suspended, or modified, in whole or in part:
 - 1) For any material false statement in the application or in any statement of fact required.



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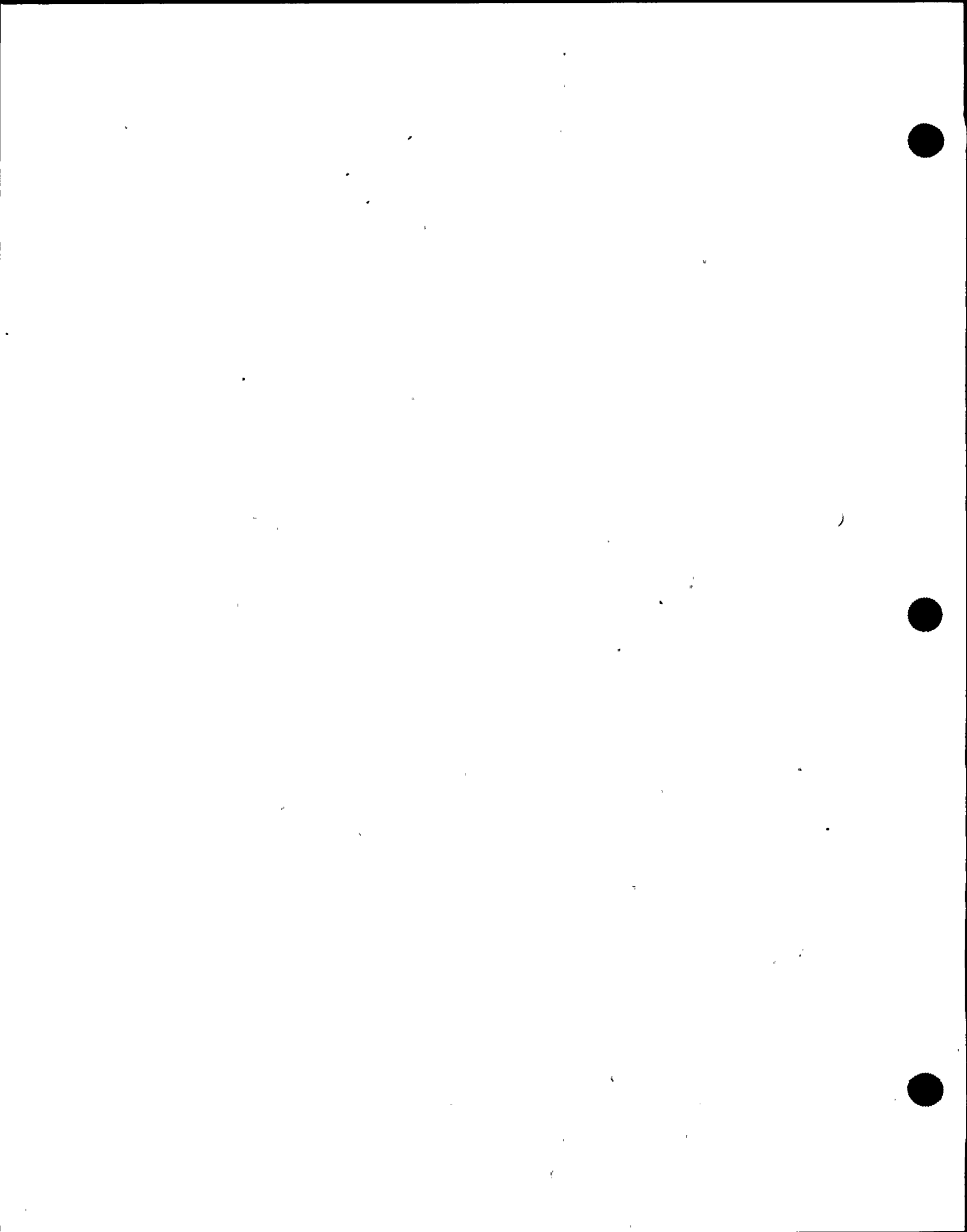
- 2) Because of conditions revealed by the application or statement of fact or any report, record, inspection or other means that can warrant the NRC to refuse to grant a license on an original application.
- 3) Willful violation of, or failure to observe any of the terms and conditions of the Act, or the license, or of any rule, regulation, or order of the Commission.
- 4) Any conduct determined to be a hazard to safe operation of the facility.

EO-10.0

12. Violations 10-CFR-55.71

- a. An injunction or court order may be obtained prohibiting any violation of Federal rules as listed.
- b. A court order may be obtained for the payment of a civil penalty for violations as listed.

EO-5.0



- c. Any person who willfully violates any provision of the Atomic Energy Act or any regulation issued under the Act, may be guilty of a crime and upon conviction, may be punished by fine or imprisonment.

E. 10-CFR-100 Reactor Site Criteria

1. Purpose: To describe criteria to guide the NRC in evaluating sites for stationary power reactors.
2. Defines terms such as Exclusion Area and Low Population Zone and describes how they are determined.
3. Appendix A to 10-CFR-100 deals with Seismic and Geological Sitting Criteria.
 - a. Defines Safe Shutdown Earthquake and Operating Basis Earthquake.

IV. WRAP-UP

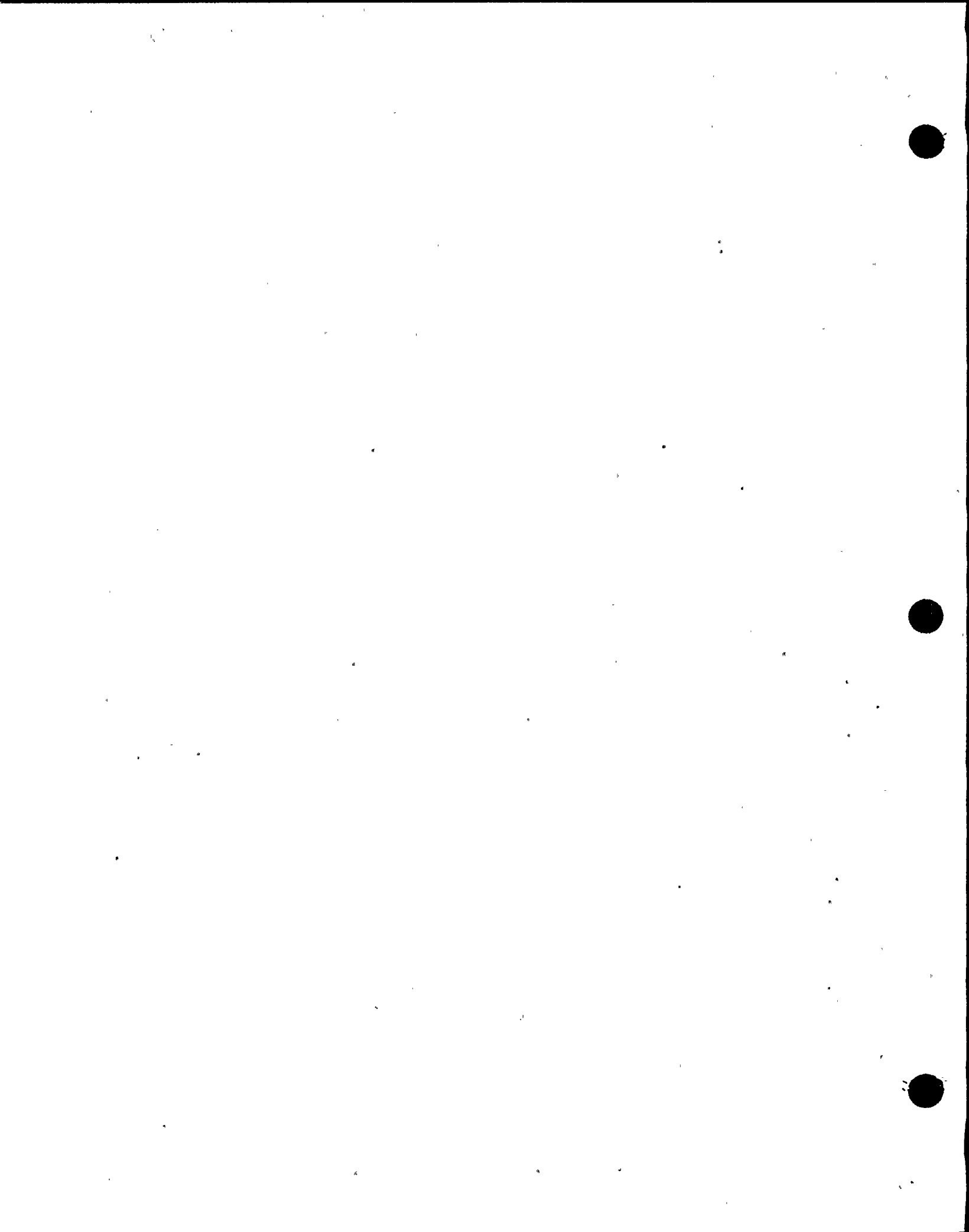
- A. Review Student Learning Objectives.
 1. Spot check learning objectives by asking questions of the students directly.
- B. Request student's fill out TR.
- C. Request student's fill out Trainee Evaluation Form.



ADS MALFUNCTIONS

- AD01 ADS FAILS TO INITIATE
- AD02 RELIEF VALVE FAILURE (1-18 OR ANY OR ALL)
- AD03 ADS/RELIEF VALVE FAILURE - STUCK (1-18 OR ANY OR ALL)
- AD04 ADS/RELIEF VALVE(S) FAILURE - LEAKS (1-18 OR ANY OR ALL)
- AD05 ADS/RELIEF VALVE(S) FAILURE - OPEN (1-18 OR ANY OR ALL)
- AD06 TMI ACCIDENT - BWR EQUIVALENT
- AD07 ADS VALVE TAIL PIPE RUPTURE (A-G OR ANY)
- AD08 ADS VALVE N2 SUPPLY SEVERED (A-G OR ANY)

9999999999



CORE SPRAY MALFUNCTIONS

- CS01 HIGH PRESSURE CORE SPRAY - INADVERTENT INITIATION
- CS02 HIGH PRESSURE CORE SPRAY FAILS TO AUTO START
- CS03 HIGH PRESSURE CORE SPRAY DIESEL ENGINE FAILURE
- CS04 HIGH PRESSURE CORE SPRAY INJECTION VALVE FAILS TO OPEN
- CS05 HIGH PRESSURE CORE SPRAY PUMP TRIP
- CS06 LOW PRESSURE CORE SPRAY PUMP TRIP
- CS07 LOW PRESSURE CORE SPRAY INJECTION VALVE FAILS TO OPEN



R.W.C.U. MALFUNCTIONS

CU01 REACTOR WATER CLEAN-UP PUMP TRIP (A, B OR BOTH)

CU02 REACTOR WATER CLEANUP DRAIN FLOW CONTROL VALVE FAILURE -
OPEN

CU03 REACTOR WATER CLEANUP DRAIN FLOW CONTROL VALVE FAILURE -
CLOSED

CU04 REACTOR WATER CLEANUP DRAIN FLOW CONTROL VALVE FAILURE -
AS IS

CU05 REACTOR WATER CLEANUP FILTER DEMINERALIZER RESIN
DEPLETION (A, B, C, D OR ALL)

CU06 REACTOR WATER CLEANUP NON-REGENERATIVE HEAT EXCHANGER
TUBE LEAK

CU07 COOLANT LEAKAGE OUTSIDE PRIMARY CONTAINMENT

CU08 REACTOR WATER CLEANUP ISOLATION FAILURE



AUX WATER MALFUNCTIONS

- CW01 SERVICE WATER PUMP TRIP (A,B,C,D,E,F OR ANY)
- CW02 REACTOR BUILDING CLOSED LOOP COOLING WATER PUMP TRIP
(A,B,C, OR ANY)
- CW03 TURBINE BUILDING CLOSED LOOP COOLING WATER PUMP TRIP
(A,B,C OR ANY)
- CW04 CIRCULATING WATER PUMP TRIP (A,B,C,D,E,F OR ANY)
- CW05 CIRCULATING WATER EXPANSION JOINT LEAKAGE
- CW06 RBCLC BREAK TO DRYWELL UNIT COOLERS



DIESEL GENERATORS MALFUNCTIONS

DG01 DIESEL GENERATOR FAILURE TO START (1,3 OR BOTH)

DG02 DIESEL GENERATOR TRIP (1,3 OR BOTH)

DG03 DIESEL GENERATOR LOAD SEQUENCER TIMER FAILURE (DIV I,
DIV II OR BOTH)



ELECTRICAL DISTRIBUTION MALFUNCTIONS

ED01 MAIN TRANSFORMER LOSS OF COOLING

ED02 LOSS OF OFF-SITE 115KV POWER SOURCES (LINE 5, LINE 6,
BOTH)

ED03 13.8KV BUS FAULT (SWG 001,002,003 OR ANY)

ED04 4.16KV NORMAL BUS FAULT (SWG 11-18, OR ANY)

ED05 4.16KV EMERGENCY BUS FAULT (101,102,103 OR ANY)

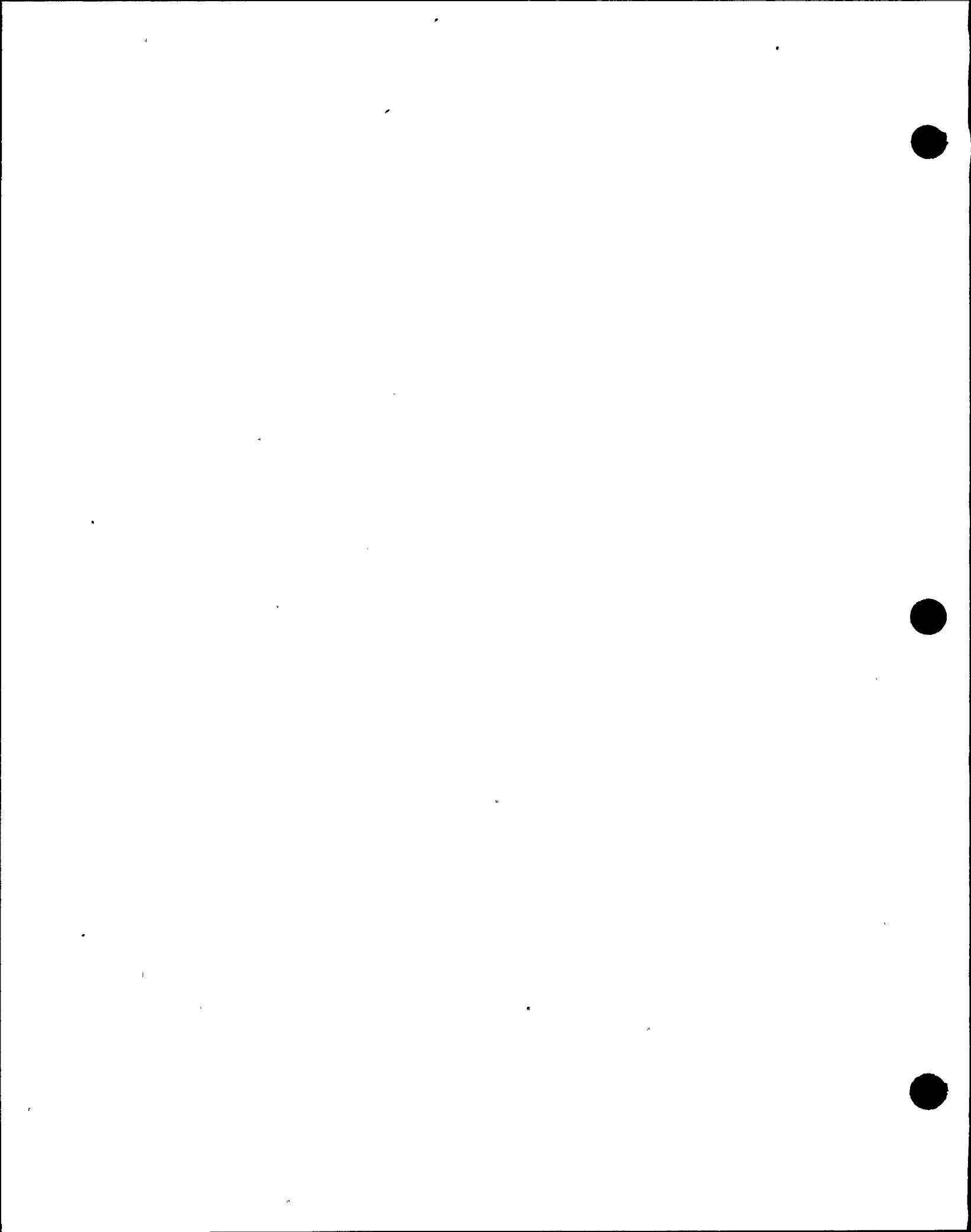
ED06 600V NORMAL BUS FAULT 2NJS-US1--US10 OR ANY, A,B,C AS
APPROPRIATE

ED07 600V EMERGENCY BUS FAULT (US1,US3 OR BOTH)

ED08 125VDC NORMAL BUS FAULT (SWG 001A,B,C OR ANY)

ED09 125VDC EMERGENCY BUS FAULT (2BYS*SWG002A,B,C OR ANY)

ED11 24 VOLT DC NORMAL BATTERY BUS FAILURE (3A,3B OR BOTH)



MAIN GENERATORS MALFUNCTIONS

EG01 MAIN GENERATOR TRIP

EG02 MAIN GENERATOR AUTOMATIC VOLTAGE REGULATOR FAILURE - INCREASE

EG03 MAIN GENERATOR AUTOMATIC VOLTAGE REGULATOR FAILURE - DECREASE

EG04 MAIN GENERATOR CORE INTERNAL HEATING

EG05 MAIN GENERATOR HYDROGEN COOLING SYSTEM LEAKAGE

EG06 MAIN GENERATOR STATOR COOLING PUMP TRIP (A,B OR BOTH)

EG07 MAIN GENERATOR STATOR COOLING DEMINERALIZER - RESIN DEPLETION

EG08 MAIN GENERATOR MAIN AND EMERGENCY HYDROGEN SEAL OIL PUMP FAILURE

EG09 TURNING GEAR OIL PUMP FAILURE

EG10 POWER GRID NETWORK LOAD TRANSIENT - INCREASE

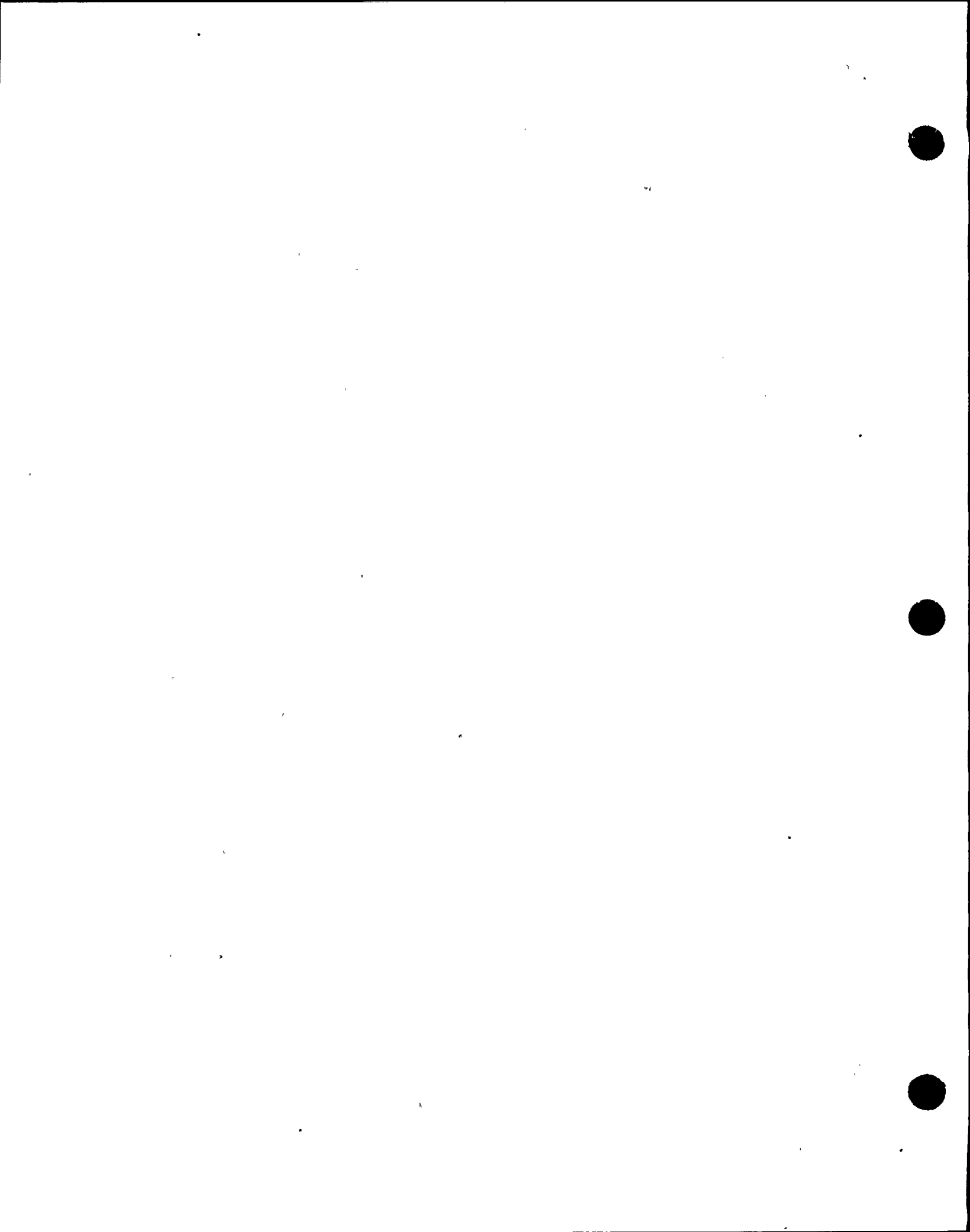
EG11 POWER GRID NETWORK LOAD TRANSIENT - DECREASE

EG12 MAIN GENERATOR ISOPHASE BUS DUCT FAN TRIP (A,B OR BOTH)

EG13 MAIN GENERATOR LOSS OF LOAD

EG14 MAIN GENERATOR AVR FAILURE - OSCILLATIONS

EG15 NO TRANSFER TO RESERVE PWR - SWG 001/003



FIRE PROTECTION MALFUNCTIONS

FP01 TURBINE ISLAND FIRE DETECTOR FAILURE
FP02 - FP06 FIRE DETECTION FAILURE
FP07 ENGINE DRIVEN FIRE PUMP FAILURE
FP08 ELECTRIC FIRE PUMP FAILURE
FP09 AUXILIARY FIRE PUMP FAILURE (A,B OR BOTH)
FP11 LOSS OF CO2 FROM STORAGE TANK (TK1,TK2 OR BOTH)
FP12 FIXED SYSTEM FOAM CONCENTRATE PUMP FAILURE (1A,1B OR BOTH)
FP13 HOSE REEL FOAM CONCENTRATE PUMP FAILURE (1A,1B OR BOTH)
FP14 HALON BANK FAILURE
FP15 FIRE IN NORMAL STATION SERVICE TRANSFORMER (2STX-XNS1)
FP16 FIRE AT TURB BEARING #8
FP17 FIRE IN DIV II DIESEL ROOM
FP18 FIRE IN DIV I BATT. ROOM
FP19 FIRE IN RELAY ROOM



CONDENSATE & FEEDWATER MALFUNCTION

FW01 CONDENSATE PUMP TRIP (A,B,C OR ANY)
FW02 CONDENSATE BOOSTER PUMP TRIP (A,B,C OR ANY)
FW03 FEEDWATER PUMP TRIP (A,B,C OR ANY)
FW04 FEEDWATER LOW PRESSURE LOW FLOW VALVE FAILURE - OPEN
FW05 FEEDWATER LOW PRESSURE LOW FLOW VALVE FAILURE - CLOSED
FW06 FEEDWATER LOW PRESSURE LOW FLOW VALVE FAILURE - AS-IS
FW07 FEEDWATER HIGH PRESSURE LOW FLOW VALVE(S) FAILURE - OPEN
(A,B OR BOTH)
FW08 FEEDWATER HIGH PRESSURE LOW FLOW VALVE FAILURE - CLOSED
FW09 FEEDWATER HIGH PRESSURE LOW FLOW VALVE FAILURE - AS-IS
(A,B OR BOTH)
FW10 FEEDWATER HIGH PRESSURE HIGH FLOW VALVE FAILURE - OPEN
(A,B,C OR ANY)
FW11 FEEDWATER HIGH PRESSURE HIGH FLOW VALVE FAILURE - CLOSED
(A,B,C OR ANY)
FW12 FEEDWATER HIGH PRESSURE HIGH FLOW VALVE FAILURE - AS-IS
(A,B,C OR ANY)
FW13 FEEDWATER MASTER CONTROLLER FAILURE - HIGH
FW14 FEEDWATER MASTER CONTROLLER FAILURE - LOW
FW15 FEEDWATER MASTER CONTROLLER FAILURE - AS-IS
FW16 FEEDWATER PUMP RECIRCULATION VALVE FAILURE - OPEN
FW20 CONDENSATE DEMINERALIZER RESIN DEPLETION (1A THRU 1J, OR ALL)
FW22 FEEDWATER HEATER TUBE LEAK - FEEDWATER HEATER (A1,B1,C1)
FW23 CONDENSATE DEMINERALIZER HIGH DIFFERENTIAL PRESSURE
FW24 CONDENSATE RECIRCULATION VALVE FAILURE - OPEN
FW25 CONDENSATE RECIRCULATION VALVE FAILURE - CLOSED
FW26 CONDENSATE RECIRCULATION VALVE FAILURE - AS-IS
FW27 FEEDWATER HEATER DRAIN PUMP TRIP (A,B,C OR ANY)
FW28 REACTOR VESSEL LEVEL NARROW RANGE TRANSMITTER FAIL - UPSCALE
(A,B,C OR ANY)



CONDENSATE & FEEDWATER MALFUNCTION (CONT'D)

FW29 REACTOR VESSEL LVL NARROW RANGE TRANSMITTER FAIL - DOWNSCALE
(A,B,C OR ANY)

FW30 REACTOR VESSEL LVL NARROW RANGE TRANSMITTER FAIL - AS-IS
(A,B,C OR ANY)

FW31 FEEDWATER LINE BREAK INSIDE DRYWELL

FW32 FEEDWATER LINE BREAK INSIDE STEAM TUNNEL

FW33 FEEDWATER CHECK VALVES FAIL OPEN

FW34 FEEDWATER INPUT FAILS TO FW CONTROL SYSTEM

FW35 STEAM FLOW INPUT FAILS TO FW CONTROL SYSTEM



INSTRUMENT AIR MALFUNCTIONS

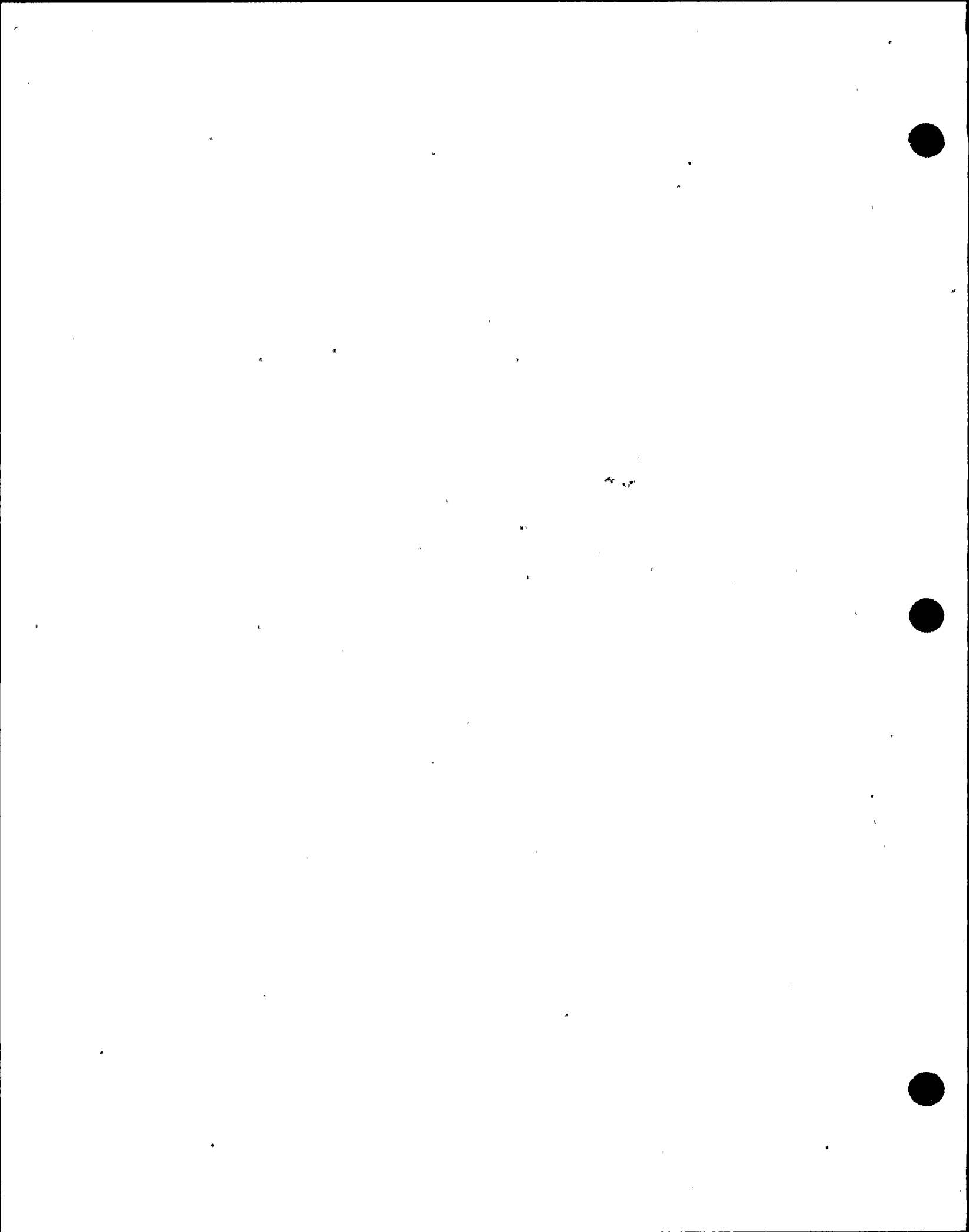
IA01

LOSS OF INSTRUMENT AIR



CONDENSER MALFUNCTIONS

MC01 MAIN CONDENSER AIR INLEAKAGE
MC02 MAIN CONDENSER TUBE LEAK
MC03 HOTWELL LEVEL CONTROLLER FAILURE - HIGH
MC04 HOTWELL LEVEL CONTROLLER FAILURE - LOW
MC05 2CNS-AOV104 HOTWELL REFLOOD VALVE FAILURE - OPEN
MC06 EXPLOSION IN AIR EJECTOR DISCHARGE PIPING



MAIN STEAM MALFUNCTIONS

MS01	STEAM LEAKAGE OUTSIDE PRIMARY CONTAINMENT
MS02	STEAM LINE RUPTURE OUTSIDE PRIMARY CONTAINMENT (DBA)
MS03	STEAM LEAKAGE INSIDE THE PRIMARY CONTAINMENT
MS04	STEAM LINE RUPTURE INSIDE PRIMARY CONTAINMENT
MS05	MAIN STEAM LINE ISOLATION VALVE FAILURE - OPEN (INBOARD - A,B,C,D; OUTBOARD - E,F,G,H; OR ANY)
MS06	MAIN STEAM LINE ISOLATION VALVE FAILURE - CLOSED
MS07	TURBINE STEAM SEAL REGULATOR FAILS CLOSED
MS08	STEAM JET AIR EJECTOR STEAM SUPPLY VALVE FAILURE - CLOSED
MS09	MOISTURE SEPARATOR REHEATER HIGH LEVEL (A,B OR BOTH)
MS10	LOSS OF EXTRACTION STEAM TO FEEDWATER HEATER (E6A, B, C)
MS11	LOSS OF STEAM TO MOISTURE SEPARATOR REHEATER (A,B OR BOTH)
MS12	REACTOR VESSEL ISOLATION
MS13	MSIV ISOLATION FAILURE



NEUTRON MONITORING SYSTEM MALFUNCTIONS

- NM01 SOURCE RANGE MONITOR CHANNEL FAILURE - UPSCALE (A,B,C,D OR ANY)
- NM02 SOURCE RANGE MONITOR CHANNEL FAILURE - DOWNSCALE (A,B,C,D OR ANY)
- NM03 SRM RECORDER FAILURE (RED, BLACK OR BOTH PENS)
- NM04 SRM CHANNEL INOPERATIVE (A,B,C,D OR ANY)
- NM05 SOURCE RANGE MONITOR CHANNEL DETECTOR STUCK (A,B,C,D OR ANY)
- NM06 INTERMEDIATE RANGE MONITOR CHANNEL FAILURE - UPSCALE (A,B,C,D,E,F,G,H OR ANY)
- NM07 INTERMEDIATE RANGE MONITOR CHANNEL FAILURE - DOWNSCALE (A,B,C,D,E,F,G,H OR ANY)
- NM08 IRM RECORDER/APRM RECORDER CHANNEL FAILURE - INOPERATIVE (A,B,C,D OR ANY, RED PEN OR BLACK PEN)
- NM09 INTERMEDIATE RANGE MONITOR CHANNEL FAILURE - INOP (A,B,C,D,E,F,G,H OR ANY)
- NM10 INTERMEDIATE RANGE MONITOR CHANNEL DETECTOR STUCK (A,B,C,D,E,F,G,H OR ANY)
- NM11 AVERAGE POWER RANGE MONITOR CHANNEL FAILURE UPSCALE (A,B,C,D,E,F OR ANY)
- NM12 AVERAGE POWER RANGE MONITOR CHANNEL FAILURE DOWNSCALE (A,B,C,D,E,F OR ANY)
- NM14 LOCAL POWER RANGE MONITOR FAILURE (X-Y-J) UPSCALE
- NM15 LOCAL POWER RANGE MONITOR FAILURE - DOWNSCALE (X-Y-J)
- NM16 ROD BLOCK MONITOR CHANNEL FAILURE - UPSCALE (A,B OR ANY)
- NM17 ROD BLOCK MONITOR CHANNEL FAILURE - DOWNSCALE (A,B OR ANY)
- NM19 ROD BLOCK MONITOR FAILURE (A,B OR BOTH)
- NM20 AVERAGE POWER RANGE MONITOR CHANNEL FAILURE
- NM21 TRAVERSING IN-CORE PROBE FAILURE - STUCK IN CORE



NEUTRON MONITORING SYSTEM MALFUNCTIONS

NM22

LPRM FAILURE - DRIFT + OR - 25% (X-Y-J, ANY)

NM23

APRM UPSCALE NEUTRON TRIP (A,B,C,D,E,F OR ANY)



OFFGAS MALFUNCTIONS

- OG01 EXPLOSION IN AIR EJECTOR DISCHARGE PIPING
- OG02 OG RECOMBINER PREHEATER STM SUPPLY VALVE FAILURE -
CLOSED (A, B OR BOTH)
- OG03 OFFGAS DISCHARGE ISOLATION VALVE FAILURE - CLOSED



CONTAINMENT MALFUNCTIONS

PC01 LOSS OF DRYWELL COOLING

PC02 PRIMARY CONTAINMENT LEAKAGE

PC03 PRIMARY CONTAINMENT ISOLATION

PC04 STANDBY GAS TREATMENT TRAIN EXHAUST FAN TRIP (A,B OR BOTH)

PC05 DBA HYDROGEN RECOMBINER BLOWER FAILURE (A,B OR BOTH)

PC06 SECONDARY CONTAINMENT ISOLATION FAILURE

PC07 HYDROGEN GENERATION IN DRYWELL

PC08 OXYGEN GENERATION IN DRYWELL

PC09 H₂-O₂ BURN/DEFLAGRATION IN DRYWELL

PC10 DRYWELL/WETWELL VACUUM BREAKER PAIR FAILED OPEN (A-D OR ANY)

PC11 DRYWELL/WETWELL VACUUM BREAKER PAIR FAILED CLOSED (A-D OR ANY)

PC12 SUPPRESSION POOL TO RX BLDG LEAK

PC13 FIRE IN THE REACTOR BUILDING (A,B OR BOTH)

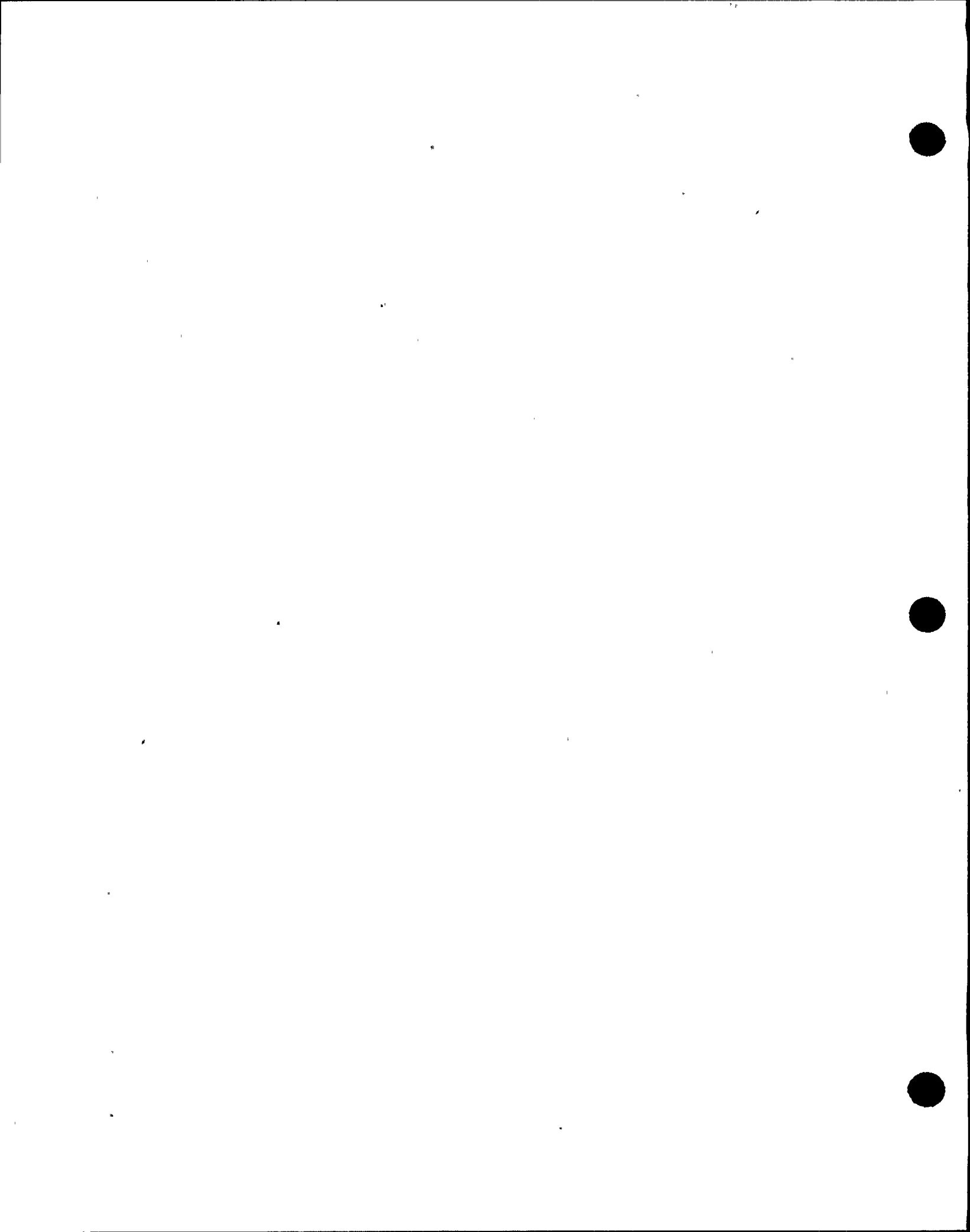
PC14 DW UC1A-D ELECTRICAL FAULT (DRS-UC1A,B,C,D OR ANY)

PC15 DW UC2A-D ELECTRICAL FAULT (DRS-UC2A,B,C,D OR ANY)

PC16 DW UC3A-D ELECTRICAL FAULT (DRS-UC3A,B OR ANY)

PC17 GROUP 8 & 9 DIV I/II ISOLATION FAILURE (A,B, OR BOTH)

PC18 GROUP 8 & 9 DIV I/II ISOLATION OCCURS (A,B, OR BOTH)



RCIC SYSTEM MALFUNCTION

RC01 REACTOR CORE ISOLATION COOLING AUTO START FAILURE
RC02 REACTOR CORE ISOL COOLING FAILURE - ISOLATION OF RCIC
SYSTEM
RC03 RCIC TURBINE SPEED CONTROLLER FAILURE - HIGH
RC04 RCIC TURBINE SPEED CONTROLLER FAILURE - LOW
RC05 RCIC SYSTEM TURBINE SPEED CONTROLLER FAILURE - AS IS
RC06 REACTOR CORE ISOLATION COOLING TURBINE TRIP
RC07 RCIC FLOW TRANSMITTER FAILURE - HIGH
RC08 RCIC FLOW TRANSMITTER FAILURE - LOW
RC09 RCIC FLOW TRANSMITTER FAILURE - AS IS
RC10 RCIC SYSTEM - SPURIOUS INITIATION
RC11 RCIC ISOLATION FAILURE
RC12 RCIC STEAM LEAK IN REACTOR BUILDING ELEVATION 215



CONTROL RODS SYSTEM MALFUNCTIONS

RD01 ROD POSITION INFORMATION SYSTEM FAILURE - INOP

RD02 ROD DRIVE CONTROL SYSTEM FAILURE - TIMER MALFUNCTION

RD03 ROD DRIVE CONTROL SYSTEM FAILS TO INSERT

RD04 CONTROL ROD FAILURE (XX-YY) DRIFT IN

RD05 CONTROL ROD FAILURE (XX-YY) DRIFT OUT

RD06 CONTROL ROD FAILURE (XX-YY) - ACCUMULATOR TROUBLE

RD07 CONTROL ROD FAILURE (XX-YY) - STUCK

RD08 CONTROL ROD (XX-YY) FAILURE-UNCOUPLED

RD09 CONTROL ROD FAILURE (XX-YY) - SCRAMMED

RD10 CONTROL ROD FAILURE (XX-YY) - SLOW SCRAM TIME

RD11 CONTROL ROD (XX-YY) FAILURE - RPIS

RD12 CRD FEED PUMP TRIP (A,B OR BOTH)

RD13 CONTROL ROD DRIVE FLOW CONTROL VALVE FAILURE - OPENED
(A,B OR BOTH)

RD14 CRD FLOW CONTROL VALVE FAILURE - CLOSED (A,B OR BOTH)

RD15 LOSS OF INSTRUMENT AIR PRESSURE

RD16 SCRAM DISCHARGE VOLUME RUPTURE

RD17 PARTIAL INSERTION OF ONE BANK OF CONTROL RODS UNDER
SCRAM CONDITIONS

RD18 ONLINE CRD SUCTION FILTER CLOGGED



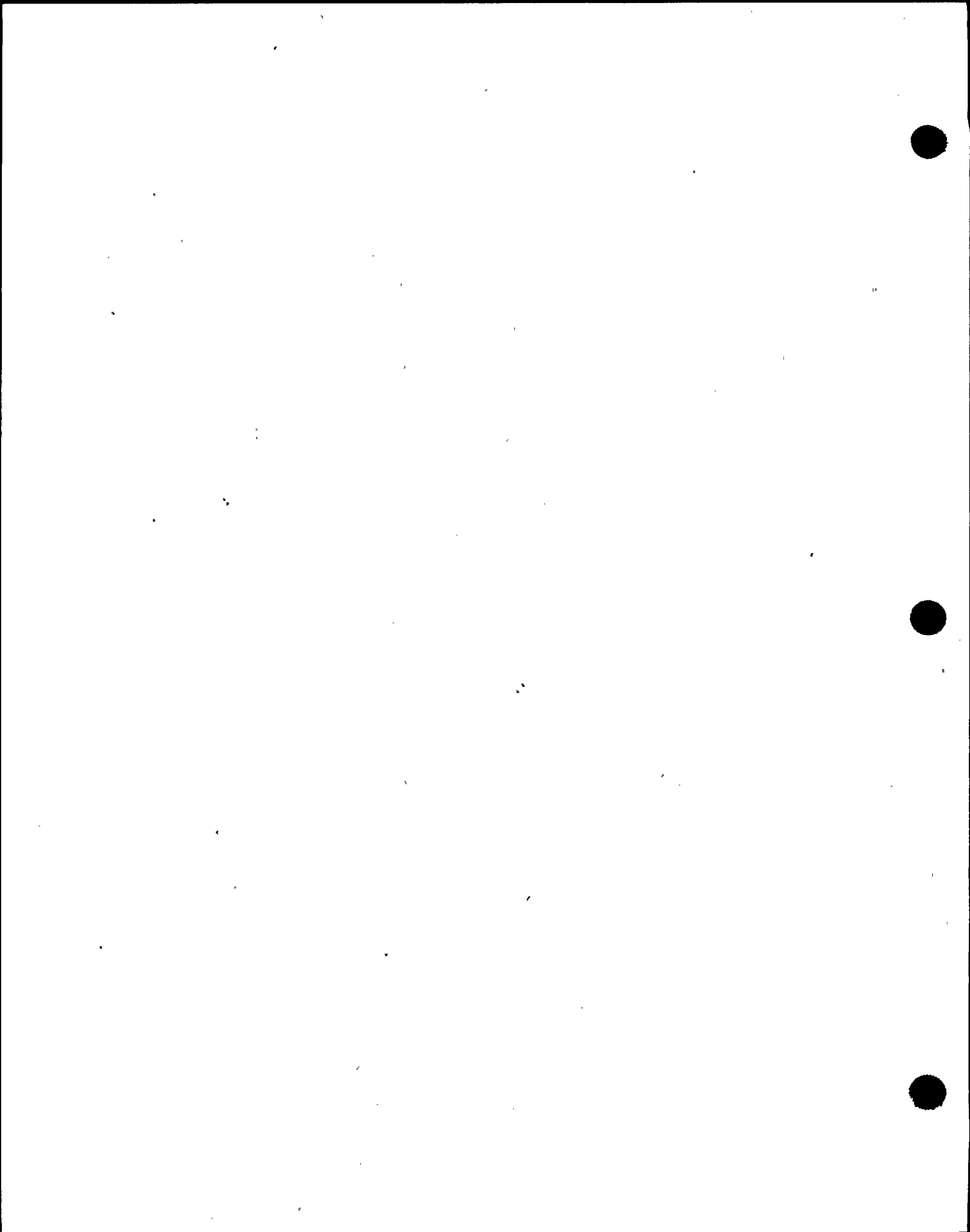
RESIDUAL HEAT REMOVAL SYSTEM MALFUNCTIONS

- RH01 RESIDUAL HEAT REMOVAL PUMP TRIP (A,B,C OR ANY)
- RH02 RESIDUAL HEAT REMOVAL LOW PRESSURE COOLANT INJ VLVS FAIL TO OPEN (A,B,C OR ANY)
- RH03 RESIDUAL HEAT REMOVAL STEAM DUMP VALVE FAILURE - CLOSED (A,B OR BOTH)
- RH04 RESIDUAL HEAT REMOVAL HEAT EXCHANGER TUBE LEAK (A,B OR BOTH)
- RH05 RH REMOVAL HEAT EXCHANGER LVL CONTROLLER FAILURE - UPSCALE (A,B OR BOTH)
- RH06 RH REMOVAL HEAT EXCHANGER LVL CONTROLLER FAILURE - DOWNSCALE (A,B OR BOTH)
- RH07 RHR PUMP SUCTION LINE RUPTURE (A,B, OR BOTH)
- RH08 GROUP 5 ISOLATION FAILURE (RHS*MOV122/113)
- RH09 RHS*MOV215A/B JAMMED (A,B OR BOTH)
- RH10 RHS*MOV24A/B JAMMED (A,B OR BOTH)
- RH11 RHS*MOV33A/B JAMMED (A,B OR BOTH)
- RH12 RHS*MOV38A/B JAMMED (A,B OR BOTH)
- RH13 DIV I/II ECCS INADVERTENTLY INITIATES (A,B, OR BOTH)
- RH14 DIV I/II ECCS FAILS TO INITIATE (A,B, OR BOTH)



REACTOR RECIRCULATION MALFUNCTIONS

- RR01 RECIRC MASTER CONTROLLER FAILURE HIGH
- RR02 REACTOR RECIRC MASTER FLOW CONTROLLER FAILURE-LOW
- RR03 REACTOR RECIRC MASTER FLOW CONTROLLER FAILURE - AS IS
- RR04 REACTOR RECIRC LOOP FLOW CONTROLLER FAILURE - HIGH (A,B OR BOTH)
- RR05 REACTOR RECIRC LOOP FLOW CONTROLLER FAILURE - LOW (A,B OR BOTH)
- RR06 REACTOR RECIRC LOOP FLOW CONTROLLER FAILURE - AS IS (A,B OR ANY)
- RR07 REACTOR RECIRCULATION FLOW UNIT FAILURE - UPSCALE (A,B,C,D OR ANY)
- RR08 REACTOR RECIRCULATION FLOW UNIT FAILURE - DOWNSCALE (A,B,C,D OR ANY)
- RR09 REACTOR RECIRCULATION FLOW UNIT FAILURE - AS IS (A,B,C,D OR ANY)
- RR10 REACTOR RECIRCULATION PUMP BKR TRIP (BKR 4A, B OR BOTH)
- RR11 REACTOR RECIRCULATION PUMP SEIZURE (A,B OR BOTH)
- RR12 RR LOW FREQ MOT GEN SET DRIVE MOT BREAKER TRIP (A,B OR BOTH)
- RR13 RR PUMP HIGH SPEED TO LOW SPEED AUTO TRANS INCOMPLETE (A,B OR BOTH)
- RR14 RR LOW FREQ M.G. SET VOLTAGE REG FAILS - LOW (A,B OR BOTH)
- RR15 FAILURE OF REACTOR RECIRC PUMP INNER SEAL (A,B OR BOTH)
- RR16 RECIRCULATION PUMP UPPER SEAL FAILURE (A,B OR BOTH)
- RR17 REACTOR RECIRC PUMP A(B) DISCHARGE VALVE FAILURE
- RR18 JET PUMP FAILURE ('A' LOOP)
- RR19 COOLANT LEAKAGE INSIDE PRIMARY CONTAINMENT
- RR20 REACTOR RECIRCULATION LOOP RUPTURE - DBA LOCA
- RR21 REACTOR VESSEL PRESSURE RECORDER FAILURE - UPSCALE (A,B



REACTOR RECIRCULATION MALFUNCTIONS

RR22 REACTOR VESSEL PRESSURE RECORDER FAILURE - DOWNSCALE
(A,B OR BOTH)

RR23 REACTOR VESSEL PRESSURE RECORDER FAILURE - AS IS
(A,B OR BOTH)

RR24 REACTOR VESSEL PRESSURE INDICATOR FAILURE - UPSCALE

RR25 REACTOR VESSEL PRESSURE INDICATOR FAILURE - DOWNSCALE

RR26 REACTOR VESSEL PRESSURE INDICATOR FAILURE - AS IS

RR27 RPV LEVEL INSTRUMENTS ALL FAIL UPSCALE

RR28 HPU A PMP NUMBER 1 FAILURE

RR29 HPU A PMP NUMBER 2 FAILURE

RR30 HPU B PMP NUMBER 1 FAILURE

RR31 HPU B PMP NUMBER 2 FAILURE

RR32 HPU A OIL TEMP FAIL HIGH

RR33 HPU B OIL TEMP FAIL HIGH



REACTOR PROTECTION SYSTEM MALFUNCTIONS

RP01 SPURIOUS REACTOR SCRAM

RP02 REACTOR PROTECTION SYSTEM FAILURE TO SCRAM - AUTOMATIC

RP03 REACTOR PROTECTION SYSTEM FAILURE TO SCRAM

RP04 ANTICIPATED TRANSIENT WITHOUT SCRAM

RP05 LOSS OF NORMAL POWER TO RPS CHANNEL (A OR B)

RP06 LOSS OF MOTOR GENERATOR (MG01A,B OR BOTH)

RP07 RRCS 25 SECOND TIMER FAILURE (A - DIV I, B - DIV II)

RP08 RRCS 98 SECOND TIMER FAILURE (A - DIV I, B - DIV II)

RP09 RRCS SPURIOUS INITIATION (A - DIV I, B - DIV II)

RP10 RRCS FAILURE OF FWC RUNBACK (A - DIV I, B - DIV II)

RP11 RRCS FAILURE OF RECIRC PUMP TRIP/DOWNSHIFT

RP12 RRCS DIVISIONAL FAILURE (A - DIV I, B - DIV II)

RP13 RRCS INADVERTENT ARI (A - DIV I, B - DIV II)

RP14 RRCS ARI FAILURE/DEFEATED



RSCS/RWM MALFUNCTIONS

RW01 ROD WORTH MINIMIZER FAILURE

RW02 ROD SEQ CONTROL SYS FAILURE - DOES NOT ENFORCE NOTCH
LOGIC

RW03 ROD SEQUENCE CONTROL SYSTEM TOTAL FAILURE



RX CORE SYSTEM MALFUNCTIONS

- RX01 FUEL CLADDING FAILURE
- RX02 INCREASED ROD WORTH FOR ANY CONTROL ROD (XX-YY)
- RX03 CHANGE IN CORE REACTIVITY
- RX04 CORE POWER INSTABILITY WHEN OPERATING ,IN THE RESTRICTED ZONE .



STANDBY LIQUID CONTROL MALFUNCTIONS

- SL01 STANDBY LIQUID CONTROL PUMP TRIP (A,B OR BOTH)
- SL02 2SLS-VEX 3A, B OR BOTH FAIL TO FIRE WHEN SLC PMP IS
TURNED ON
- SL03 SLC PUMP SUCTION VALVE FAILS TO OPEN (A,B OR BOTH)



TURBINE CONTROL MALFUNCTIONS

- TC01 EHC SYSTEM PRESSURE REGULATOR FAILURE - HIGH (A,B OR BOTH)
- TC02 EHC SYSTEM PRESSURE REGULATOR FAILURE - LOW (A,B OR BOTH)
- TC03 EHC SYS STEAM PRESSURE REGULATOR FAILURE - OSCILLATION
(A,B OR BOTH)
- TC04 MAIN TURBINE ACCELERATION CONTROL FAILURE
- TC05 ALL TURBINE BYPASS VALVES FAIL - OPEN
- TC06 ALL TURBINE BYPASS VALVES FAIL - CLOSED
- TC07 MAIN TURBINE BYPASS VALVE FAILURE - OPEN (#1)
- TC08 MAIN TURBINE BYPASS VALVES FAILURE - CLOSED (#1)
- TC09 NO. ONE TURBINE BYPASS VALVE FAILURE - STICKS OPEN
- TC10 MAIN TURBINE GOVERNOR FAILURE - HIGH
- TC11 MAIN TURBINE GOVERNOR FAILURE - LOW
- TC12 MAIN TURBINE CONTROL VALVE FAILURE - CLOSED (A,B,C,D OR ANY)
- TC13 MAIN TURBINE CONTROL VALVE FAILURE - AS-IS (A,B,C,D OR ANY)



MAIN TURBINE MALFUNCTIONS

TU01 MAIN TURBINE BEARING HIGH TEMPERATURE
TU02 MAIN TURBINE BEARING HIGH VIBRATION
TU03 MAIN TURBINE HIGH ECCENTRICITY
TU04 EXHAUST HOOD SPRAY VALVE FAILURE - CLOSED
TU05 MAIN TURBINE BEARING OIL PRESSURE LOW
TU06 MAIN TURBINE THRUST BEARING WEAR
TU07 SPURIOUS MAIN TURBINE TRIP

