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Docket No. 50-116

August 27, 1996

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

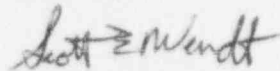
Subject: Technical Specifications for the Iowa State University Reactor Facility, Update of
Technical Specifications

Dear Sir:

Recent modifications to the Nuclear Engineering Laboratory have necessitated the need to change the Technical Specification definition of Confinement Boundary. Three additional changes which were suggested by the NRC inspector during the most recent inspection of the facility are also submitted for approval. Enclosed is the complete text of the two sections, the Definitions section and the Administrative Controls section, which are affected by the changes. Deletions are indicated by the word 'deleted' in parentheses and additions have been underlined. Also enclosed are an explanation for the changes to the Technical Specifications and updated building drawings.

Questions may be directed to me during normal working hours at (515) 294-0539.

Sincerely,



Scott E. Wendt
Reactor Manager

Enclosure

cc: D.B. Bullen, Facility Director
R.A. Jacobson, Chm., Radiation Safety Committee
W. DeVries, Chm., Mechanical Engineering Department
E.E. Sobottka, Dir., Environmental Health & Safety
E.B. Bartlett, Chm., Reactor Use Committee
US NRC, Region III

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CHANGE TO DEFINITIONS SECTION OF TECHNICAL SPECIFICATIONS

Page 1-1

Change the definition of **CONFINEMENT BOUNDARY**.

Reason for the Change:

In January of this year (1996) the Nuclear Engineering Laboratory underwent extensive modifications to bring the building up to the fire code in the state of Iowa. The modifications included: the addition of fire walls to enclose and partition existing hallways, the replacement of many of the building's original doors with more fire resistant doors, and the construction of an external, enclosed stairwell on the north end of the building. The construction of a new wall inside of the current confinement boundary has necessitated the change in the Technical Specification definition of the confinement boundary.

Safety Implications:

No reduction in safety results from the proposed change in the definition of the confinement boundary.

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Add the requirement that operations personnel shall meet or exceed the requirements set forth in 10CFR55 as well as ANSI/ANS-15.4-1988.

Reason for the Change:

During the last NRC inspection, the inspector noted that several operators had medical physical frequencies that were greater than 24 months (but less than 30 months). This met the requirements of ANSI/ANS 15.4-1988 but not 10CFR50. The inclusion of the requirement that the selection, training and requalification of operations personnel meet or exceed the requirements in **both** ANSI/ANS 15.4-1988 **and** 10CFR50 will eliminate the ambiguity that existed before.

Safety Implications:

The inclusion of the requirement that the selection, training and requalification of operations personnel meet or exceed the requirements in **both** ANSI/ANS 15.4-1988 **and** 10CFR50 will ensure compliance with the most restrictive rule. It is for this reason that no reduction in safety results from following the additional qualifications set forth in 10CFR50.

Page 6-3

Add a statement to the Reactor Use Committee Charter and Rules stating the conditions under which phone polls may be used in lieu of a face-to-face vote.

Reason for the Change:

During the last NRC inspection, the inspector questioned the use of phone polls in place of face-to-face meetings of the Reactor Use Committee. The inspector suggested that it would be prudent to include in the Technical Specifications the rules governing the use of phone polls.

Safety Implications:

The same rules apply to phone polling and to face-to-face voting, and any member can veto the phone poll and call for the convening of a face-to-face meeting. Therefore, no reduction in safety results from the inclusion of the use of phone polls by the Reactor Use Committee.

Page 6-8

Delete the sentence which allowed the reporting of an effluent release as "less than 25% of the allowed or recommended concentration".

Reason for the Change:

During the last NRC inspection, the inspector indicated that he would prefer to see the actual amount of Ar-41 effluents reported on the Annual Operations Report instead of "less than 25% of the allowable concentration" as previously allowed.

Safety Implications:

No reduction in safety results from reporting additional information in the Annual Operating Report.

1.0 DEFINITIONS

The terms Safety Limit, Limiting Safety System Setting, and Limiting Condition for Operation are as defined in paragraph 50.36 of 10 CFR Part 50.

CHANNEL TEST - The introduction of a signal into the channel for verification that it is operable.

CHANNEL CALIBRATION - The adjustment of the channel such that its output corresponds with acceptable accuracy to known values of the parameter which the channel measures. Calibration shall encompass the entire channel, including equipment actuation, alarm, or trip and shall be deemed to include a Channel Test.

CHANNEL CHECK - A qualitative verification of acceptable performance by observation of channel behavior. This verification, where possible, shall include the comparison of the channel with other independent channels or systems measuring the same variable.

CONFINEMENT BOUNDARY - The surface surrounding the reactor facility defined by the interior partition walls of offices and laboratories on the north, east and south sides of the building and by the west interior wall which isolates the basement, first floor, and the west corridor of the second floor from the central bay.

CONFINEMENT SECURED - The confinement shall be considered secured when:

- a. Doors 1-2, CS 101, 101, 114, 113-1, CX112, 112, 111-1, CX111, CC110, CE117-2, (items deleted) CC201B, CC201C are closed or are attended by a person with the ability to close the door in the event of an emergency, and
- b. Windows on the north, south, east and west sides of the penthouse, on the west wall of room 112A, on the south wall of room 101, on the east wall above door CX112, (phrase deleted) on the south wall of corridor CC201, on the west wall of corridor CC212, on the north wall of corridor CC211 are unbroken and closed or are attended by a person with the ability to close the window in the event of an emergency, and
- c. The interior partitioned walls of the first floor offices and laboratories on the north, south, and east sides of the building; and the west interior wall which isolates the basement (phrase deleted) and first floor offices on the west side of the building from the central bay area; and the second floor north, south, east and west interior walls which isolate the second floor from the central bay area are intact and capable of performing as a non-pressure tight boundary, and
- d. The roof covering the central bay area (phrase deleted) is intact and capable of performing as a non-pressure tight boundary.

CONTROL ROD - A plate fabricated with Boral as the neutron absorbing material which is used to establish neutron flux changes and to compensate for routine reactivity losses. This includes safety-type and regulating rods.

CORE - The portion of the reactor volume which includes the graphite reflector, core tanks, and control rods. The thermal column and shield tank duct are not included.

DELAY TIME - The elapsed time between reaching a limiting safety system setpoint and the initial movement of a safety-type rod.

DELAYED NEUTRON FRACTION - When converting between absolute- and dollar-value reactivity units, a beta of 0.00763 is used.

DROP TIME - The elapsed time between reaching a limiting safety system setpoint and the full insertion of a safety-type rod.

EXCESS REACTIVITY - That amount of reactivity that would exist if all control rods (control, regulating, etc.) were moved to the maximum reactive condition from the point where the reactor is exactly critical.

EXPERIMENT - Any operation, hardware, or target (excluding devices such as detectors, foils, etc.) which is designed to investigate non-routine reactor characteristics or which is intended for irradiation within the core region, on or in a beam port or irradiation facility and which is not rigidly secured to a core or shield structure so as to be a part of their design.

MEASURED VALUE - The value of a parameter as it appears on the output of a channel.

MEASURING CHANNEL - The combination of sensor, line, amplifier and output devices which are connected for the purpose of measuring the value of a parameter.

MOVABLE EXPERIMENT - An experiment where it is intended that the entire experiment may be moved in or near the core or into and out of the reactor while the reactor is operating.

OPERABLE - A component or system is capable of performing its intended function.

OPERATING - A component or system is performing its intended function.

REACTIVITY LIMITS - Those limits imposed on reactor core excess reactivity. Quantities are references to a Reference Core Condition.

REACTIVITY WORTH OF AN EXPERIMENT - The maximum absolute value of the reactivity change that would occur as a result of intended or anticipated changes or credible malfunctions that alter experiment position or configuration.

REACTOR OPERATING - The reactor is operating whenever it is not secured or shutdown.

REACTOR OPERATOR (RO) - An individual who is licensed to manipulate the controls of a reactor.

REACTOR SECURED - A reactor is secured when:

(1) It contains insufficient fissile material or moderator present in the reactor to attain criticality under optimum available conditions of moderation and reflection, or

(2) A combination of the following:

- a. The minimum number of neutron absorbing control rods are fully inserted or other safety devices are in shutdown position, as required by technical specifications, and
- b. The magnet power keyswitch is in the off position and the key is removed from the lock, and
- c. No work is in progress involving core fuel, core structure, installed control rods, or control rod drives unless they are physically decoupled from the control rods, and
- d. No experiments in or near the reactor are being moved or serviced that have, on movement, a reactivity worth exceeding the maximum value allowed for a single experiment or $0.763\% \Delta k/k$ whichever is smaller.

REACTOR SHUTDOWN - The reactor is shutdown if it is subcritical by at least $0.763\% \Delta k/k$ in the Reference Core Condition and the reactivity worth of all experiments is accounted for.

REACTOR SAFETY SYSTEMS - Those systems, including their associated input channels, which are designed to initiate automatic reactor protection or to provide information for initiation of manual protective action.

READILY AVAILABLE ON CALL - Applies to an individual who:

- (1) Has been specifically designated and the designation known to the operator on duty, and
- (2) Keeps the operator on duty informed of where he or she maybe rapidly contacted (e.g., by phone, etc.), and
- (3) Is capable of getting to the reactor facility within a reasonable time under normal conditions (e.g., 30 minutes).

REFERENCE CORE CONDITION - The condition of the core when it is at ambient temperature (cold) and the reactivity worth of xenon is negligible, less than $0.23\% \Delta k/k$.

REGULATING ROD - A low-worth control rod used primarily to maintain an intended power level that does not have scram capability. It's position may be varied manually or by the servo-controller.

SAFETY CHANNEL - A measuring or protective channel in the reactor safety system.

SAFETY-TYPE ROD - A rod that can be rapidly inserted by cutting off the holding current in its electromagnetic clutch. This applies to safety #1, Safety #2, and shim-safety.

SECURED EXPERIMENT - Any experiment, experiment facility, or component of an experiment that is held in a stationary position relative to the reactor by mechanical means. The restraining forces must be substantially greater than those to which the experiment might be subjected by hydraulic, pneumatic, buoyant, or other forces which are normal to the operating environment of the experiment, or by forces which can arise as a result of credible malfunctions.

SENIOR REACTOR OPERATOR (SRO) - An individual who is licensed to direct the activities of a Reactor Operator (RO) and to manipulate the controls of a reactor.

SHALL, SHOULD, AND MAY - The word "shall" is used to denote a requirement, the word "should" to denote a recommendation, and the word "may" to denote permission, neither a requirement nor a recommendation.

SHUTDOWN MARGIN - The minimum shutdown reactivity necessary to provide confidence that the reactor can be made subcritical by means of the control and safety systems starting from any permissible operating condition although the most reactive rod is in its most reactive position, and that the reactor will remain subcritical without further operator action.

TRUE VALUE - The actual value of a parameter or variable.

UNSCHEDULED SHUTDOWN - Any unplanned shutdown of the reactor caused by actuation of the reactor safety system, operating error, equipment malfunction, or a manual shutdown in response to conditions which could adversely affect safe operation, not including shutdowns which occur during testing or check-out operations.

6.0 ADMINISTRATIVE CONTROLS

6.1 Organization

6.1.1 Structure

The organization for the management of the reactor facility shall be structured as indicated in Figure 6-1. Job titles are shown for illustration and may vary. Levels of authority indicated divide responsibility as follows:

- Level 1: Responsible for the facility license and site administration.
- Level 2: Responsible for the reactor facility operation and management.
- Level 3: Responsible for daily operations.

The Reactor Use Committee is appointed by, and shall report to the University Radiation Safety Committee. Radiation safety personnel shall report to Level 2 or higher through an independent organizational channel.

6.1.2 Responsibility

The Facility Director shall be responsible for the facility license and site administration. The dean, College of Engineering, shall appoint persons, qualified in accordance with paragraph 6.1.4, to the Facility Director and Reactor Manager positions.

Individuals at the various management levels shown in Figure 6-1, in addition to having responsibility for the policies and operation of the facility, shall be responsible for safeguarding the public and facility personnel from undue radiation exposures and for adhering to all requirements of the Operating License and the Technical Specifications.

In all instances, responsibilities of one level may be assumed by designed alternates, or by higher levels, conditional upon appropriate qualifications.

6.1.3 Staffing

- (1) The minimum staffing when the reactor is not secured shall be:
 - a. A licensed reactor operator in the control room.
 - b. A licensed senior reactor operator readily available on call.
 - c. A health physics-qualified individual readily available on call.
- (2) Events requiring the direction of a senior reactor operator:
 - a. Recovery from unplanned or unscheduled shutdown (in this instance, documented verbal concurrent from a SRO is required).
 - b. Fuel transfer operations.
 - c. Any maintenance activity involving the reactor safety systems that could cause a significant increase in the reactivity of the reactor.
 - d. Relocation of any in-core experiment with a reactivity worth greater than one dollar.

- (3) Events requiring the presence of a health physics-qualified individual:
- a. Fuel transfer operations.
 - b. Installation, changing locations, or removal of an experiment that involves removal of a shield plug or closure.
 - c. Any maintenance activity involving the reactor safety system that could cause an abnormal release of radioactive materials.

6.1.4 Selection and Training of Personnel

The selection, training and requalification of operations personnel shall meet or exceed the requirements of American National Standard for Selection and Training of Personnel for Research Reactors, ANSI/ANS-15.4-1988, or its successor, meet or exceed the requirements set forth in 10 CFR 55, and be in accordance with the Requalification Plan approved by the Nuclear Regulatory Commission.

6.0 ADMINISTRATIVE CONTROLS (continued)

6.2 Review and Audit

The Reactor Use Committee (RUC) shall perform the independent review and audit of the safety aspects of reactor facility operations.

6.2.1 Composition and Qualifications

The Reactor Use Committee shall be composed of the Reactor Manager and radiation health physicist, both ex officio (voting), and at least three other members having expertise in reactor technology. Committee members shall be appointed by the University Radiation Safety Committee. (The Radiation Safety Committee is composed of a representative from each of the colleges in the university in which research in the physical and life sciences and in engineering is conducted, plus three members with specific expertise in radiation protection. At least one of these members shall also represent university management. One of the three other members shall be the University Radiation Safety Officer (RSO). The chair of the committee shall be appointed by the Provost. The terms on the committee for the RSO and chair are indefinite. All others are for three years with reappointments being determined by the Provost.)

6.2.2 Charter and Rules

- (1) The Reactor Use Committee shall meet at least semiannually and more frequently as circumstances warrant, consistent with effective monitoring of facility activities. Written records of its meetings shall be kept and copies forwarded, in a timely manner, to the University Radiation Safety Committee.
- (2) A quorum shall be three members. Members of the operations staff shall not be a voting majority. Phone polling of members is allowed for final approval of items discussed at a meeting or for approval of other items deemed "routine" by the Reactor Manager or the committee chair. Any member can veto the use of the phone poll and request a meeting of the committee.
- (3) Any action recommended by the Reactor Use Committee that may adversely affect the operations and/or safety of the University community shall be reported by the RUC chairman to the University Radiation Safety Committee which shall have veto power over such a recommendation.
- (4) The Reactor Use Committee may appoint one or more qualified individuals to perform the audit function.

6.2.3 Review Function.

The following items shall be reviewed.

- (1) Determinations that proposed changes in equipment, systems, tests, experiments, or procedures do not involve an unreviewed safety question.

- (2) All new procedures and major revisions thereto have safety significance and proposed changes in reactor facility equipment, or systems having safety significance.
- (3) All new experiments or classes of experiments that could affect reactivity or result in the release of radioactivity.
- (4) Proposed changes in the Technical Specifications or the Operating License.
- (5) Violations of the Technical Specifications or the Operating License. Violations of internal procedures or instructions having safety significance.
- (6) Operating abnormalities having safety significance.
- (7) Reportable occurrences listed in 6.6.2.
- (8) Audit reports.

6.2.4 Audit Function

The audit function shall include selective (but comprehensive) examination of operating records, logs, and other documents. Discussions with cognizant personnel and observation of operations should also be used as appropriate. In no case shall the individual immediately responsible for the area, audit in that area. Deficiencies uncovered that affect reactor safety shall be reported immediately to the University Radiation Safety Committee. A written report of the findings of the audit shall be submitted to the Reactor Use Committee within 30 days after completion of the audit. The following items shall be audited.

- (1) Facility operations for conformance to the Technical Specifications and applicable Operating License conditions, at least once per calendar year (interval between audits not to exceed 15 months).
- (2) The retraining and requalification program for the operating staff, at least once every other calendar year (interval between audits not to exceed 30 months).
- (3) The results of action taken to correct those deficiencies that may occur in the reactor facility equipment, systems, structures, or methods of operations that affect reactor safety, at least once per calendar year (interval between audits not to exceed 15 months).
- (4) The reactor facility Emergency and Physical Security Plans and implementing procedures at least once every other calendar year (interval not to exceed 30 months).

6.0 ADMINISTRATIVE CONTROLS (Continued)

6.3 Procedures

Written procedures shall be prepared, reviewed and approved prior to initiating any of the activities listed in this section. The procedures shall be reviewed by the Reactor Use Committee (see 6.2.3) and approved by the Reactor Manager or a designated alternate. These reviews and approvals shall be documented in a timely manner. Substantive changes to the procedures shall be made effective only after documented review by the Reactor Use Committee and approval by the Reactor Manager or a designated alternate. Minor modifications to the original procedure which do not change their original intent may be made, but the modification must be approved by the Reactor Manager or a designated alternate within 14 days. Temporary deviations from the procedures may be made by the on-duty SRO in order to deal with special or unusual circumstances or conditions. Such deviations shall be documented and reported to the Reactor Manager or a designated alternate. Several of the following activities may be included in a single manual or set of procedures or divided among various manuals or procedures:

- (1) Startup, operation, and shutdown of the reactor.
- (2) Fuel loading, unloading, and movement within the reactor.
- (3) Routine maintenance of major components of systems that could have an effect on reactor safety.
- (4) Surveillance tests and calibrations required by the Technical Specifications or those that may have an effect on reactor safety.
- (5) Personnel radiation protection consistent with applicable regulations.
- (6) Administrative controls for operations and maintenance and for the conduct of irradiation and experiments that could affect reactor safety or core reactivity.
- (7) Implementation of the Emergency and Physical Security Plans.

6.0 ADMINISTRATIVE CONTROLS (Continued)

6.4 Experiment Review and Approval

Approved experiments shall be carried out in accordance with established and approved procedures.

- (1) All new experiments or classes of experiments shall be reviewed by the Reactor Use Committee and approved in writing by the Reactor Manager or a designated alternate prior to initiation.
- (2) Substantive changes to previously approved experiments shall be made only after they are reviewed by the Reactor Use Committee and approved in writing by the Reactor Manager or a designated alternate. Minor changes that do not significantly alter the experiment may be approved by the Reactor Manager or a designated alternate.

6.0 ADMINISTRATIVE CONTROLS (Continued)

6.5 Required Actions

6.5.1 Action to be Taken in Case of Safety Limit Violation

- (1) The reactor shall be shut down and reactor operations shall not be resumed until authorized by the Nuclear Regulatory Commission (NRC).
- (2) The safety limit violation shall be promptly reported to the Reactor Manager or a designated alternate.
- (3) The safety limit violation shall be reported to NRC.
- (4) A safety limit violation report shall be prepared. The report, and any follow-up report, shall be reviewed by the Reactor Use Committee and shall be submitted to the NRC when authorization is sought to resume operation of the reactor. The report shall describe the following:
 - a. Applicable circumstances leading to the violation including, when known, the cause and contributing factors.
 - b. Effect of the violation upon reactor facility components, systems, or structure and on the health and safety of personnel and the public.
 - c. Corrective action to be taken to prevent recurrence.

6.5.2 Action to be Taken in the Event of an Occurrence of the Type Identified in 6.6.2(1)b and 6.6.2(1) c.

- (1) Reactor conditions shall be returned to normal or the reactor shall be shut down. If it is necessary to shut down the reactor to correct the occurrence, operations shall not be resumed unless authorized by the Reactor Manager or a designated alternate.
- (2) Occurrence shall be reported to the Reactor Manager or a designated alternate and to the NRC.
- (3) Occurrence shall be reviewed by the Reactor Use Committee at its next scheduled meeting.

6.0 ADMINISTRATIVE CONTROLS (Continued)

6.6 Reports

6.6.1 Operating Reports

A routine operating report providing the following information shall be submitted to the Nuclear Regulatory Commission in accordance with the provisions of 10 CFR 50.59 at the end of each 12-month period:

- (1) A narrative summary of reactor operating experience including the energy produced by the reactor.
- (2) The unscheduled shutdowns including where applicable, corrective action taken to preclude recurrence.
- (3) Tabulation of major preventive and corrective maintenance operations having safety significance.
- (4) Tabulation of major changes in the reactor facility and procedures, and tabulation of new tests or experiments, or both, that are significantly different from those performed previously and are not described in the Safety Analysis Report, including conclusions that no unreviewed safety questions were involved.
- (5) A summary of the nature and amount of radioactive effluents released or discharged to the environs beyond the effective control of the owner-operator as determined at or before the point of such release or discharge. The summary shall include to the extent practicable an estimate of individual radionuclides present in the effluent. (sentence deleted)
- (6) A summarized result of any environmental surveys performed outside the facility.
- (7) A summary of exposures received by facility personnel and visitors where such exposures are greater than 25 percent of that allowed or recommended.

6.6.2 Special Reports

- (1) There shall be a report no later than the following working day by telephone to the appropriate NRC Regional Office and confirmed in writing by telegraph or similar conveyance to the Nuclear Regulatory Commission, in accordance with instructions in 10 CFR 50.4, to be followed by a written report that describes the circumstances of the event within 14 days of any of the following:
 - a. Violation of safety limits (see 6.5.1)
 - b. Release of radioactivity from the site above allowed limits (see 6.5.2).

- c. Any of the following (see 6.5.2):
 - (i) Operation with actual safety system settings for required systems less conservative than the limiting safety system setting specified in the Technical Specifications.
 - (ii) Operation in violation of limiting conditions for operation established in the Technical Specifications unless prompt remedial action is taken.
 - (iii) A reactor safety systems component malfunction which renders or could render the system incapable of performing its intended safety function unless the malfunction or condition is discovered during maintenance tests or periods of reactor shutdown.
 - (iv) An unanticipated or uncontrolled change in reactivity greater than the licensed excess reactivity, or one dollar, whichever is smaller.
 - (v) Abnormal and significant degradation in reactor fuel, or cladding, or both, or coolant boundary which could result in exceeding prescribed radiation exposure limits of personnel or environment, or both.
 - (vi) An observed inadequacy in the implementation of administrative or procedural controls such that the inadequacy causes or could have caused the existence or development of an unsafe condition with regard to reactor operations.
- (2) A written report within 30 days to the Nuclear Regulatory Commission in accordance with instructions in 10 CFR 50.4, concerning the following:
 - a. Permanent changes in the organization involving the Facility Director, Reactor Manager, or Radiation Safety Officer.
 - b. Significant changes in the transient or accident analysis as described in the Safety Analysis Report.

6.0 ADMINISTRATIVE CONTROLS

6.7 Records

6.7.1 Records to be Retained for a Period of at Least Five Years or for the Life of the Component if Less than Five Years

- (1) Normal reactor facility operation (but not including supporting documents such as checklists, log sheets, etc., which shall be maintained for a period of at least one year).
- (2) Principal maintenance operations.
- (3) Reportable occurrences.
- (4) Surveillance activities required by the technical Specifications.
- (5) Reactor facility radiation and contamination surveys where required by applicable regulations.
- (6) Experiments performed with the reactor.
- (7) Fuel inventories, receipts, and shipments.
- (8) Approved changes in operating procedures.
- (9) Records of meetings and audit reports of the Reactor Use Committee.

6.7.2 Records to be Retained for at Least One Training Cycle

Retraining and requalification of licensed operators: Records of the most recent complete cycle shall be maintained at all times the individual is employed.

6.7.3 Records to be Retained for the Lifetime of the Reactor Facility

Applicable annual reports, if they contain all of the required information, may be used as records in this section.

- (1) Gaseous and liquid radioactive effluents released to the environs.
- (2) Off-site environmental monitoring surveys required by the Technical Specifications.
- (3) Radiation exposure for all personnel monitored.
- (4) Drawings of the reactor facility.

BASEMENT FLOOR PLAN

