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April 24, 2000

U.S. Nuclear Regulatory Commission
Mr. Alexander Adams, Jr., REXB
Mail Stop 012-D3
Washington, DC 220555

Re: Proposed amendment to CAVALIER Technical Specifications, in conformance with
NRC's Request for Additional Information (TAC No. MA8249) of February 25, 2000
[CAVALIER License No. 123, Docket No. 50-396]

Dear Mr. Adams,

Please find enclosed a proposed update to Section 6.0 to the CAVALIER Technical Specifications, regarding the U.Va. Organizational Structure. The section is being submitted in its entirety due to significant changes both in content and formatting. These changes are shown with bars in a companion copy included for informational purposes only. The proposed amendment is requested so as to bring the UVAR and CAVALIER TS into agreement as regards facility management .

Should you have questions regarding these proposed amended Technical Specifications, please call me at (804)982-5440.

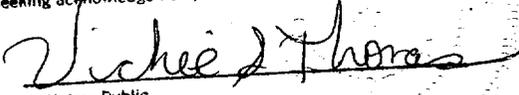
Sincerely,


Robert Mulder, Director
Nuclear Reactor Facility

City/County of Albemarle
Commonwealth of Virginia

I hereby certify that the attached document is a true and exact copy of a letter, presented before"
(type of document)

me this 24th day of April, 2000
by Robert Mulder
(name of person seeking acknowledgment)


Notary Public

My commission expires 2/28 2002

cc: U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, DC
Mr. Craig Bassett, Region II, Atlanta, Georgia

AD20/11

FACILITY LICENSE R-123

TECHNICAL SPECIFICATIONS

FOR THE

UNIVERSITY OF VIRGINIA

CAVALIER REACTOR

(Decommissioning Period)

April 2000

DOCKET NO. 50-396

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Objective: The objective is to assure that fuel which is being stored will not become supercritical and will not reach unsafe temperatures.

Specification:

- (1) All reactor fuel elements not in the reactor core shall be stored in a geometric array where k_{eff} is less than 0.9 for all conditions of moderation.
- (2) Irradiated fuel elements and fueled devices shall be stored in an array which will permit sufficient natural convection cooling by water or air such that the fuel element or fueled device surface temperature will not exceed the boiling point of water.

Bases: Within these specifications, the fuel can be stored safely under all conditions. The UVAR storage facility was constructed to meet these specifications and will be used to store the CAVALIER elements.

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6.0. ADMINISTRATIVE CONTROLS

6.1. Organization

Applicability: The specifications listed below in TS 6.1.1 through TS 6.1.4. apply to the organizational structure of the University of Virginia as it relates to the activities conducted at the Reactor Facility during the permanent shutdown and decommissioning period.

Objective: The objective is to describe the chain of command having responsibility for the safe maintenance, defueling, decontamination and decommissioning of the Reactor Facility.

At the various administration levels, the functions, assignments, responsibilities and associated professional background, training and requalification requirements are listed, as applicable.

Specifications:

6.1.1. Structure

The Reactor Facility shall be an integral part of the University of Virginia. The organizational structure of U.Va. relating to the Reactor Facility is shown in Figure 6.1. The Vice President for Research and Public Service (Level 1) shall have overall responsibility for management of the Facility. The Reactor Decommissioning Committee Chair shall be responsible for advising the Reactor Director (Level 2) on all matters pertaining to the decommissioning and decontamination of the University of Virginia Reactor Facility. The decommissioning committee members may include reactor staff from Level 3, and employees from the Office of Environmental Health and Safety.

6.1.2. Responsibility

During the CAVALIER permanent shutdown and decommissioning period, the Reactor Facility Director (Level 2) shall be responsible for overall facility operation and the direction of decommissioning activities at the Reactor Facility. During

periods when the Reactor Facility Director is absent, the Director's responsibilities are automatically delegated to the Reactor Supervisor (Level 3). The Reactor Facility Director shall have at least a bachelor's degree in science or engineering and a minimum of 5 years of experience in the nuclear field. A graduate degree may fulfill 4 years of experience on a one-for-one time basis. The Reactor Supervisor shall be responsible for the day-to-day activities at the Reactor Facility and ensuring that these are conducted in a safe manner and within the limits prescribed by the CAVALIER reactor license. The Reactor Supervisor shall have the equivalent of a bachelor's degree in science or engineering and at least 2 years of experience in Reactor Operations at this facility, or an equivalent facility, or at least 6 years of experience in Reactor Operations. Equivalent education or experience may be substituted for a degree. Within nine months after being assigned to the position, the Reactor Supervisor shall obtain and maintain a NRC Senior Reactor Operator license if reactor fuel elements are still at the Facility. A NRC Senior Reactor Operator license, or a Reactor Operator license, is not required for level 3 and 4 personnel once all reactor fuel elements have been shipped offsite.

6.1.3. Staffing

A licensed Senior Reactor Operator shall supervise any movement of reactor fuel. One or more health physicists, organizationally independent of the Reactor Staff as shown in Figure 6.1, shall be responsible for radiological safety at the Reactor Facility.

6.1.4. Selection and Training of Personnel

The selection, training and requalification of Reactor Facility personnel shall follow the American National Standard for Selection and Training of Personnel for Research Reactors, ANSI/ANS-15.4-1988, Sections 4-6, to the extent applicable to the

decommissioning status of the facility. The selected criteria for the personnel will be contained in the NRC-approved Operator Requalification Program, as amended.

Bases: Sections 6.1, 6.1.1, 6.1.2, 6.1.3 and 6.1.4 of the American National Standard ANSI/ANS 15.1-1990 "The Development of Technical Specifications for Research Reactors," describe a generic and generally acceptable organizational structure for U.S. research reactors. They provide the bases for TS 6.1 above. Some of the ANSI standard recommendations apply to operable or operating reactor facilities, and are not necessarily valid for staff hired to perform decommissioning activities.

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6.2 Radiation Safety, Reactor Safety and Reactor Decommissioning Committees

6.2.A. Radiation Safety Committee

Applicability: The specifications 6.2.A.1 and 6.2A.2 apply to the expert group who will provide oversight over the Reactor Safety and Reactor Decommissioning Committees.

Objective: To describe the makeup, responsibilities, and authority of the Radiation Safety Committee as regards reactor permanent shutdown and decommissioning.

Specifications:

6.2.A.1. Composition and Qualification

There shall be a Radiation Safety Committee (RaSC) to ensure that the Reactor Facility is shutdown and decommissioned in a safe manner within the terms of its reactor and other licenses, reactor Technical Specifications and NRC approved plans. The RaSC shall advise the Vice President and Provost and the Director of the Reactor Facility on safety and other concerns involving the decommissioning of the Reactor Facility. The RaSC shall include its Chairman, the Radiation Safety Officer, the Director of the Reactor Facility, representatives of the hospital administration, Nuclear Medicine, and Radiological Physics or Radiation Oncology. Additional members may be drawn from such areas as Environmental Health and Safety, Radiology, Pathology, Biology, Nursing, Nuclear Engineering, Microbiology, Physics, Obstetrics and Gynecology. Membership of the RaSC will change as appointments are made by the Office of the President of the University. However, the Radiation Safety Officer and the Reactor Director shall have standing appointments to the RaSC. Collectively, the RaSC members shall represent a broad spectrum of expertise in the radiological sciences. The

membership of the Committee shall be such so as to maintain a high degree of technical proficiency in areas relating to radiation safety. The RaSC Chairman is the coordinator for all university licenses involving the use of radioactive materials and radiation producing equipment. The Radiation Safety Committee is charged with ensuring that licensed material is used safely and in compliance with NRC regulations and institutional licenses. The RaSC reviews changes to the Broad Scope and other licenses. The RaSC also identifies program problems and recommends solutions and remedial actions. Some of its functions are carried out through the use of subcommittees, such as the Reactor Safety Committee and the Reactor Decommissioning Committee. The RaSC will carry out most of its functions relating to the Reactor Facility through these two subcommittees.

6.2.A.2. RaSC Charter and Rules

- (1) To establish a quorum, the ex-officio members and any 5 other Committee members must be present.
- (2) The Committee shall meet as often as necessary to conduct its business by not less than once in each calendar quarter.
- (3) The Committee shall have a written charter defining such matters as the authority of the Committee, the subjects within its purview, and other administrative provisions.
- (4) Radiation Safety Committee meeting minutes shall be distributed to the committee membership within three months following a meeting. These minutes shall be reviewed for approval at the next scheduled committee meeting.

6.2.B. Reactor Safety Committee

Applicability: The specifications 6.2.B.1 through 6.2B.3 apply to the expert group who will provide specific reviews and audits of Reactor Facility operations while reactor fuel elements are on-site.

Objective: To describe the makeup, responsibilities, and authority of the Reactor Safety Committee.

Specifications:

6.2.B.1. Composition and Qualification

There shall be a Reactor Safety Committee (ReSC) to review and audit reactor operations and ensure that the Reactor Facility is operated in a safe manner within the terms of the reactor license. However, reactor safety concerns will end once all reactor fuel elements have been permanently shipped from the Reactor Facility. At that time the need for a Re SC shall cease, and any remaining radiation safety issues shall be referred to and be addressed by the University's Radiation Safety Committee. The Technical Specification requirement for a Reactor Safety Committee shall cease following the shipment of all reactor fuel elements off-site. The Reactor Safety Committee shall be part (a subcommittee) of the Radiation Safety Committee (RaSC) and report to its Chairman, who is the coordinator for all licenses involving the use of radioactive materials and radiation producing equipment at the University of Virginia. The Reactor Safety Committee shall be composed of at least four members, and shall include the Radiation Safety Officer of the University and the Director of the Reactor Facility. The Reactor Director shall be the sole reactor staff representative on the Committee. Collectively, the committee members shall represent a broad spectrum of expertise in the

research-reactor field. The membership of the Committee shall be such so as to maintain a degree of technical proficiency in areas relating to reactor safety. The members may be drawn from within or outside the operating organization. The ReSC shall advise the Vice President for Research and Public Service and the Director of the Reactor Facility on reactor safety concerns with the operation of the facility. ReSC reviews and audits are designed to uncover deficiencies that affect reactor safety.

6.2.B.2. Charter and Rules

- (1) A quorum of the Committee shall consist of not less than the majority of the full committee. The Chair can designate another member from the Committee to preside in his absence.
- (2) The Committee shall meet at least semiannually and shall be on call by the Chair. Minutes of all meetings shall be disseminated as designated by the Chair.
- (3) The Committee shall have a written charter defining such matters as the authority of the Committee, the subjects within its purview, and other administrative provisions as are required for effective functioning of the Committee.
- (4) Radiation Safety Committee meeting minutes shall be distributed to the committee membership within three months following a meeting. These minutes shall be reviewed for approval at the next scheduled committee meeting.

6.2.B.3. Review and Audit Functions

As a minimum the responsibilities of the Reactor Safety Committee include:

- (1) Review and approval of untried experiments and tests that are

significantly different from those previously used or tested in the reactor, as determined by the Facility Director.

- (2) Review and approval of changes to the reactor core, reactor systems or design features that may affect the safety of the reactor.
- (3) Review and approve all proposed amendments to the reactor license, Technical Specifications, and changes to the standard operating procedures (Note: SOPs are discussed in Section 6.3 of these specifications).
- (4) Review reportable occurrences, to include violations of Technical Specifications, License or of Standard Operating Procedures that have safety significance, as well as the occurrences listed in ANSI/ANS-15.1-1990 Item 6.6.2. Also, to review the actions taken to identify and correct the cause of these occurrences.
- (5) Review significant operating abnormalities or deviations from normal performance of facility equipment that affect reactor safety.
- (6) Audit annually [through a selective yet comprehensive examination of records, logs and personnel]:
 - a) Facility operations for conformance to TS and License
 - b) Results of actions taken to correct verified deficiencies that may occur in reactor equipment, systems, structures or method of operations that affect reactor safety.... and audit biennially:
 - c) Operator retraining and requalification program for the reactor operations staff
 - d) Reactor Facility Emergency Plan and Implementing Procedures

- (7) Review and approval of changes to experiments, reactor systems and procedures as per 10 CFR 50.59.

Bases: American National Standard ANSI/ANS-15.1-1990, "The Development of Technical Specifications for Research Reactors," describes in Section 6.2 acceptable composition and qualification criteria for reactor safety committees and their review and audit functions. Section 6.3 of the standard describes the organizational relationship of the group responsible for radiation safety to the reactor operations group. These sections of the standard are used as bases for the specifications listed above.

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6.2.C. Reactor Decommissioning Committee

Applicability: The specifications 6.2.C.1 through 6.2C.3 apply to the expert group who will have responsibility and oversight for decommissioning planning and execution activities at the Reactor Facility.

Objective: To describe the makeup, responsibilities and authority of the Reactor Decommissioning Committee.

Specifications:

6.2.C.1. Composition and Qualification

There shall be a Reactor Decommissioning Committee (RDC) to plan the safe, legal and timely decommissioning of the Reactor Facility. Collectively, the decommissioning committee members shall represent a broad spectrum of expertise in the research-reactor and health-physics fields, with experience in reactor management, radiological safety, research reactor decommissioning and university administration. Committee members may be drawn from within or outside the University of Virginia, including subcontracted companies. The Committee shall be composed of at least four members, and shall include the Radiation Safety Officer of the University and the Director of the Reactor Facility. The Reactor Decommissioning Committee shall be part (subcommittee) of the Radiation Safety Committee, which reports to the Vice President and Provost. The Decommissioning Committee shall advise the Reactor Director (Level 2) on all matters impacting the decommissioning of the Reactor Facility.

6.2.C.2. Charter and Rules

- (1) A quorum of the Decommissioning Committee shall consist of not less than the majority of the full committee. The RDC Chair can designate

another member from the Committee to preside in his absence.

- (2) The Reactor Decommissioning Committee shall meet at least quarterly and shall be on call by the Chair. Meeting minutes shall be disseminated as per the RDC Charter.
- (3) The Reactor Decommissioning Committee shall have a written charter defining such matters as the authority of the Committee, the subjects within its purview, and other administrative provisions as are required for effective functioning of the Committee.
- (4) The Reactor Director shall cast a single vote in the name of the operations staff at Reactor Decommissioning Committee meetings. The operations staff encompasses the reactor staff, decommissioning subcontractors and anyone directly supporting decommissioning and working under the direction of the Reactor Director.
- (5) Reactor Decommissioning Committee meeting minutes shall be distributed to the committee membership within three months following a meeting. These minutes shall be reviewed for approval at the next scheduled committee meeting.

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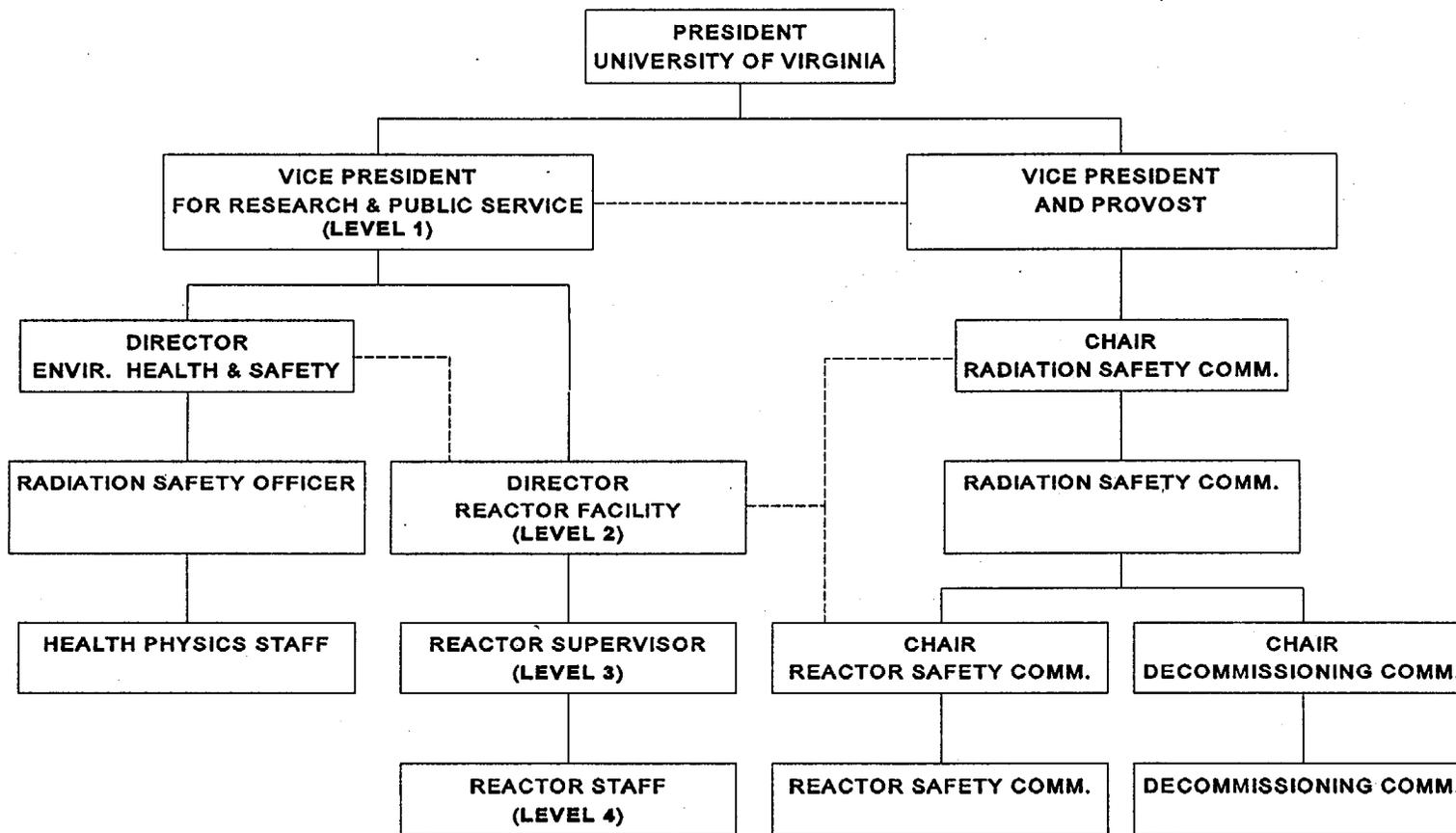
6.2.C.3. Decommissioning Committee Functions

As a minimum, the responsibilities of the Reactor Decommissioning Committee following the termination of the Reactor Safety Committee shall include:

- (1) Review and approval for changes to the Reactor Facility and to the CAVALIER SOPs as applicable and described in 10 CFR 50.59.
- (2) Review and approval of proposed changes to reactor licenses, Technical Specifications, NRC-approved plans (such as the Emergency and Security Plans), as well as the CAVALIER Standard Operating Procedures (SOPs), with the exception of changes to the organizational structure. [The responsibility and authority for the organizational structure for the Reactor Facility resides with the Vice President and Provost.]
- (3) Review unusual and reportable occurrences, to include those violations of Technical Specifications, License, or of Standard Operating Procedures that have safety significance, as well as the occurrences listed in ANSI/ANS-15.1-1990, Item 6.6.2. Also, to review the actions taken by reactor management to identify and correct the cause of these occurrences.
- (4) Annually audit [through a selective, yet comprehensive, examination of records, logs and personnel] facility operations for conformance to licenses, Technical Specifications, NRC regulations and inspections, as well as CAVALIER SOPs; and to recommend remedial action to correct identified deficiencies.
- (5) Biennially audit the Operator Retraining and Requalification Program

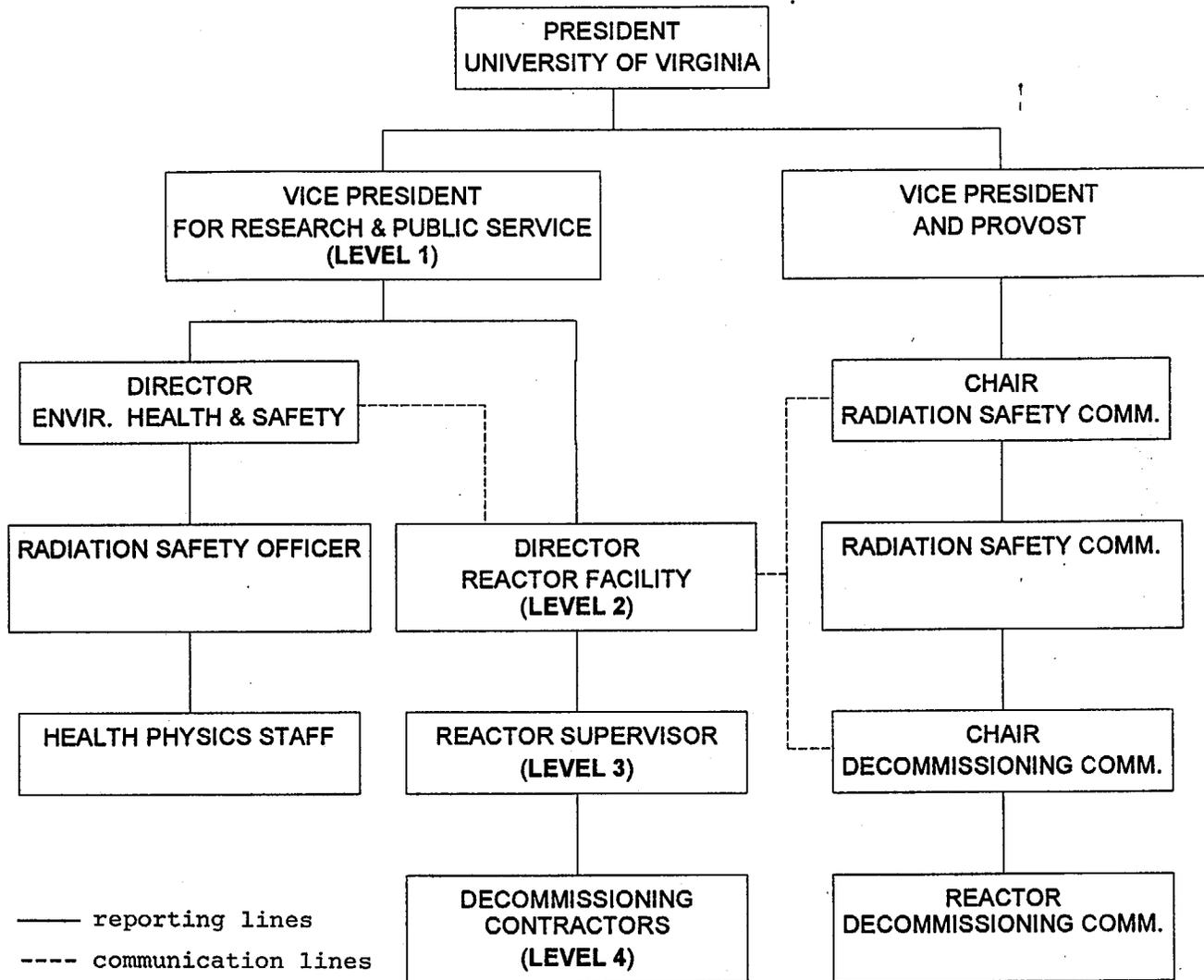
of the reactor staff, as well as the Reactor Facility Emergency Plan and
Implementing Procedures.

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— reporting lines
 - - - communication lines

FIGURE 6.1 "A"
ORGANIZATIONAL CHART
UNIV. OF VIRGINIA NUCLEAR REACTOR FACILITY
(PRIOR TO SHIPMENT OF ALL FUEL ELEMENTS OFF-SITE)



— reporting lines
- - - communication lines

FIGURE 6.1 "B"
ORGANIZATIONAL CHART
UNIV. OF VIRGINIA NUCLEAR REACTOR FACILITY
(AFTER SHIPMENT OF ALL FUEL ELEMENTS OFF-SITE)

6.3. Standard Operating Procedures

Applicability: The specification below concerns the procedural controls used to operate the CAVALIER, and conduct experiments.

Objective: The objective is the safe operation of the reactor in compliance with license conditions, federal regulations.

Specifications:

6.3.1. Items Covered by SOPs

Written procedures, reviewed and approved by the Reactor Safety Committee shall be in effect and followed for the items listed below. These procedures shall be adequate to ensure the safe decommissioning of the reactor, but should not preclude the use of independent judgment and action should the situation require such.

- (1) Startup, operation and shutdown of the reactor.
- (2) Installation or removal of fuel elements, control rods, experiments, and experimental facilities.
- (3) Actions to be taken to correct specific and foreseen potential malfunctions of systems or components, including responses to alarms, suspected primary coolant system leaks, abnormal reactivity changes.
- (4) Emergency conditions involving potential or actual release of radioactivity, including provisions for evacuation, re-entry, recovery, and medical support.
- (5) Preventative and corrective maintenance operations that could have an effect on reactor safety.
- (6) Periodic surveillance.
- (7) Radiation control.

6.3.2. Changes to SOPs

Substantive changes to approved procedures shall be made only with the approval of

the Reactor Safety Committee (or the Reactor Decommissioning Committee after the ReSC ceases to exist.) Changes that do not change the original intent of the procedures may be made with the approval of the Facility Director. All such minor changes shall be documented and subsequently reviewed by the Reactor Safety Committee (or by the Reactor Decommissioning Committee after the ReSC ceases to exist).

Basis: Section 6.4 of American National Standard ANSI/ANS 15.1-1990, "The Development of Technical Specifications for Research Reactors," suggests acceptable procedural controls to applied to operating U.S. research reactors.

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6.4. Review and Approval of Experiments

Applicability: Specifications 6.4.1 through 6.4.6 listed below apply to classes of experiments run in the CAVALIER core and tank.

Objective: The objective is the safe operation of the reactor and experiments, in accordance with license conditions and federal regulations. Experiments run in conjunction with the reactor should not adversely affect reactor and radiation safety. Notwithstanding the regard for safety, the requirement for review and approval of experiments shall not limit the flexibility of experimenters performing work covered under general written procedures, or for which unanalyzed safety issues do not exist, as determined by the Reactor Director.

Specifications:

6.4.1. Experimental Procedures and Methods

- (1) Classes of experiments involving the CAVALIER shall be carried out with established and approved written experimental procedures. The Reactor Safety Committee shall review all new classes of experiments prior to their initiation and approve written experimental procedures governing their operation.
- (2) Written experimental methods that implement Reactor Safety Committee approved experimental procedures may be developed by the staff and/or experimenters, as needed. Such experimental methods shall be approved by a Reactor Supervisor or the Reactor Director prior to use.
- (3) The Reactor Director or the Reactor Safety Committee shall decide whether an experimental procedure is required. Usually, an experimental procedure will not be required if the work in question is already covered under an existing approved general experimental procedure or by a Standard Operating Procedure.

6.4.2. Reactivity limits

As applicable, reactivity limits for experiments given in experimental procedures shall be based on analyses of maximum reactivity insertions that can be handled by the reactor or its control and safety systems without exceeding safety limits. Reactivity limits have been established in TS 3.5 Limitations on Experiments for maximum absolute reactivity worth of individual experiments and the sum of the absolute values of the worth of all experiments.

6.4.3. Materials

As applicable, special requirements shall be established in the experimental procedures for significant amounts of special materials such as fissionable materials, explosives or metastable materials capable of significant energy release, or materials that are corrosive to reactor components or highly reactive with coolants.

Requirements listed in experimental procedures may range from detailed analyses to double encapsulation and prototype testing.

6.4.4. Failure and Malfunctions

- (1) Credible failures of any experiments shall not result in the release or exposures in excess of the annual limits established in Title 10, Code of Federal Regulations, Part 20.
- (2) Experiments shall be designed such that they will not contribute to the failure of other experiments, core components, or principal physical barriers to uncontrolled release of radioactivity. Similarly, no reactor transient shall cause an experiment to fail in such a way as to contribute to an accident.

6.4.5. Experimental Facility Specific LCO

Limiting Conditions of Operation limits unique to an experiment shall be specified, as necessary, in the written experimental procedures. Specific

surveillance activities which may be required for experiments will also be addressed in the experimental procedures.

6.4.6. Deviations from Experimental Procedures

- (1) Changes to previously approved experiments and experimental procedures, determined by the Reactor Director to be substantive, shall be made only after review and approval by the Reactor Safety Committee.
- (2) Minor changes to experimental procedures may be made with the approval of the Reactor Director, who will determine that no new reactor safety concerns exist, and with the approval of the Reactor Health Physicist, who will assure that radiological safety requirements can be met.

Bases: National Standard ANSI/ANS-15.1-1990, "The Development of Technical Specifications for Research Reactors," suggests acceptable provisions governing reactor-based experiments in sections 3.6 and 6.4. These sections served as bases for the above specification. In addition, examples are presented of activities involving the reactor which typically do not require individualized written procedures, because they are covered under a general procedure for an approved class of experiments, or covered by SOPs. It is unreasonable to require procedures with undue specificity when this would limit reasonable experimental flexibility and no unanalyzed safety issues exist. The Reactor Director has the resources and authority to determine when experimental procedures are required.

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6.5 Plant Operating Records

Applicability: The specifications below apply to CAVALIER operating records.

Objective: The objective is to maintain and keep on file reactor operating records for future reference, and for demonstration of compliance with license conditions and federal regulations.

Specifications:

6.5.1. Records To Be Retained for at least Five Years

In addition to the requirements of applicable regulations, records of the items listed below shall be kept in a manner convenient for review:

- (1) Normal reactor facility operation (for example, reactor logbooks, reactor checklists and irradiation request forms).
- (2) Principal reactor systems maintenance records.
- (3) Reportable occurrences.
- (4) Equipment and component surveillance activity required by Technical Specifications.
- (5) Reactor Facility radiation and contamination surveys.
- (6) Experiments performed with the CAVALIER.
- (7) Fuel inventories, transfers of radioactive material to and from the R-123 license.
- (8) Approved changes to operating procedures.
- (9) Records of meetings and audit reports of the Reactor Safety Committee.
- (10) Records of meetings and audit reports of the Reactor Decommissioning Committee.

6.5.2. Records To Be Retained for One Certification Cycle

Records of retraining and requalification of licensed operators shall be maintained at all times the individual is employed or until licensing is renewed.

6.5.3. Records To Be Retained for the Life of the Facility

In addition to the requirements of applicable regulations, records (or logs) of the items listed below shall be kept in a manner convenient for review and shall be retained as indicated:

- (1) Gaseous and liquid radioactive effluents released from the Reactor Facility.
- (2) Off-site (radiological) environmental monitoring surveys.
- (3) Radiation exposures for all personnel monitored at the Reactor Facility.
- (4) Updated, corrected and as-built drawings of the Reactor Facility.
- (5) Changes to reactor systems, components, or equipment that may affect reactor safety.

Basis: American National Standard ANSI/ANS-15.1-1990, "The Development of Technical Specifications for Research Reactors," provides record-keeping guidance in Section 6.8. This is the basis for the above specifications.

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6.6. Required Actions

Applicability: The specifications below apply to instances where radiologically unsafe situations have been, or were likely to have been, generated.

Objective: The objective is to report unsafe conditions, study their causes and consequences, determine their effect on the health and safety of personnel and the public, and take corrective action to prevent recurrence.

Specifications:

6.6.1. Action To Be Taken in the Event of a Reportable Occurrence

A reportable occurrence is any of the following conditions:

- (1) An observed inadequacy in the implementation of either administrative or procedural controls, such that the inadequacy could have caused the existence or development of an unsafe condition at the Reactor Facility.
- (2) Abnormal and significant degradation in reactor fuel, and/or cladding, coolant boundary, or containment boundary (excluding minor leaks) where applicable that could result in exceeding prescribed radiation-exposure limits of personnel and/or environment.
- (3) Occurrences listed in Item 6.6.2 of ANSI/ANS-15.1-1990

In the event of a reportable occurrence, the following action shall be taken:

- (1) Ongoing activities shall cease until the occurrence has been resolved.
- (2) The Director of the Reactor Facility or his designee shall be notified as soon as possible and corrective action taken as foreseen in the procedures.
- (3) A written report of the occurrence shall be made which shall include an analysis of the cause of the occurrence, the corrective action taken, and recommendations for measures to preclude or reduce the probability of

reoccurrence. This report shall be submitted to the Director and the Reactor Safety Committee and/or the Radiation Safety Officer for review.

- (4) A report shall be submitted to the Nuclear Regulatory Commission in accordance with Section 6.7 of these specifications.

Bases: National Standard ANSI/ANS-15.1-1990, "The Development of Technical Specifications for Research Reactors," describes in sections 6.6 and 6.7 acceptable specifications for required actions related to safety limits violations, actions to be taken upon their discovery, and reporting requirements. These form the bases for the above specifications.

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6.7. Reporting Requirements

Applicability: The specifications 6.7.1 and 6.7.2 listed below apply to routine and special reports made by the University of Virginia Reactor Facility to the U.S. Nuclear Regulatory Commission.

Objective: The objective is to provide the licensing agency (NRC) with relevant information concerning normal and abnormal reactor operations which are necessary for the fulfillment of its mission to protect the public health and safety. A secondary objective is to comply with reporting requirements as given in the federal regulations.

Specifications: In addition to federal regulatory requirements (for example, follow 10 CFR 20, 30.50, 40.60, and 70.50, as applicable), reports should be made to the U.S. Nuclear Regulatory Commission as follows:

6.7.1. Reporting of Incidents

- (1) Immediate notification should be made by telephone, to the U.S. Nuclear Regulatory Commission Headquarters Operations Center of:
 - (a) Personnel total effective dose equivalent of 25 rem or more.
 - (b) The release of radioactive material, inside or outside of a restricted area, that results, or could result, over a 24 hour period, in personnel intake of five times the annual limit on intake specified in 10 CFR 20.
 - (c) Violation of CAVALIER Technical Specifications.
- (2) A special report should be made by telephone as soon as possible, but no later than the next working day, to the U.S. Nuclear Regulatory Commission Headquarters Operations Center of:
 - (a) Personnel exposures or releases of radioactive material greater than the limits in 10 CFR 20.
 - (b) Reportable occurrences as defined in TS 6.6.1 and Item 6.6.2 of

ANSI/ANS-15.1-1990.

- (c) Violation of a safety limit or technical specification.
- (3) A special written report should be sent by mail within 14 days to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555
- (a) Accidental off-site release of radioactivity above 10 CFR 20 limits, whether or not the release resulted in property damage, personal injury, or exposure.
 - (b) Reportable occurrence as defined in Section 6.6.2 of ANSI/ANS-15.1-1990 and TS 6.6.1.
 - (c) Violation of a safety limit or technical specification.
- (4) A special written report should be sent by mail within 30 days to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555, of:
- (a) Accidental off-site release of radioactivity above 10CFR20 limits, whether or not the release resulted in property damage, personnel injury, or exposure.
 - (b) Reportable occurrence as defined in Section 6.6.1 of these specifications, and Item 6.6.2 of ANSI-ANS-15.1-1990.
 - (c) Changes in personnel serving as Vice President For Research and Public Service, the Radiation Safety Committee Chair, Reactor Decommissioning Committee Chairman, Reactor Safety Committee Chair, Reactor Facility Director, or Reactor Supervisor.
- (5) A written report should be sent within nine months after initial criticality of the reactor or within 90 days of completion of the startup test programs,

whichever is earlier, to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555, upon receipt of a new facility license, an amendment to the license authorizing an increase in power level or the installation of a new core with fuel elements of a design different design than previously used. The report will include the measured values of the operating conditions or characteristics of the reactor under the new conditions, including:

- (a) Total control rod reactivity worth.
- (b) Reactivity worth of the single control rod of highest reactivity worth.
- (c) Minimum shutdown margin both at ambient and operating temperatures.

6.7.2. Routine Annual Reports

A routine annual report will be made by March 31 of each year on decommissioning and related activities completed during the previous calendar year. The report should be sent to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555, providing the following information:

- (1) Reactor Facility utilization,
- (2) Description of university staff assigned to decommissioning: numbers, background and responsibilities,
- (3) TS compliance and reportable events,
- (4) Results of NRC inspections and licensing actions,
- (5) Summary report on RDC meetings and audit findings,
- (6) Health Physics Program
- (7) Annual waste content and volume shipped,
- (8) Summary of the nature and amount of radioactive solid, liquid and airborne

effluents released or discharged to the environs beyond the effective control of the licensee, as measured or calculated at or prior to the point of such release or discharge,

- (9) Results of environmental surveys and sampling outside the Reactor Facility,
- (10) Reactor Facility personnel and visitor radiation exposure summary report, including the dates and times of significant exposures (greater than 500 mrem for adults and 50 mrem for persons under 18 years of age),
- (11) Summary of radiation and contamination surveys performed within the Reactor Facility,
- (12) Status of decommissioning funding and expenditures,
- (13) Description of contractor companies operating on-site,
- (14) Summary of contracted tasks and time lines,
- (15) Significant Changes to the Reactor Facility, Reactor SOPs and of all changes made per 10 CFR 50.59,
- (16) Summary of large equipment transfers,
- (17) New and modified SOPs having radiation safety significance,
- (18) Status of emergency preparedness,
- (19) Figures on industrial accidents or incidents.

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FACILITY LICENSE R-123

TECHNICAL SPECIFICATIONS

FOR THE

UNIVERSITY OF VIRGINIA

CAVALIER REACTOR

(Decommissioning Period)

March 2000

DOCKET NO. 50-396

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Objective: The objective is to assure that fuel which is being stored will not become supercritical and will not reach unsafe temperatures.

Specification:

- (1) All reactor fuel elements not in the reactor core shall be stored in a geometric array where k_{eff} is less than 0.9 for all conditions of moderation.
- (2) Irradiated fuel elements and fueled devices shall be stored in an array which will permit sufficient natural convection cooling by water or air such that the fuel element or fueled device surface temperature will not exceed the boiling point of water.

Bases: Within these specifications, the fuel can be stored safely under all conditions. The UVAR storage facility was constructed to meet these specifications and will be used to store the CAVALIER elements.

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6.0. ADMINISTRATIVE CONTROLS

6.1. Organization

Applicability: The specifications listed below in TS 6.1.1 through TS 6.1.4. apply to the organizational structure of the University of Virginia as it relates to the activities conducted at the Reactor Facility during the permanent shutdown and decommissioning period.

Objective: The objective is to describe the chain of command having responsibility for the safe maintenance, defueling, decontamination and decommissioning of the Reactor Facility. At the various administration levels, the functions, assignments, responsibilities and associated professional background, training and requalification requirements are listed, as applicable.

Specifications:

6.1.1. Structure

The Reactor Facility shall be an integral part of the University of Virginia. The organizational structure of U.Va. relating to the Reactor Facility is shown in Figure 6.1. The Vice President for Research and Public Service (Level 1) shall have overall responsibility for management of the Facility. The Reactor Decommissioning Committee Chair shall be responsible for advising the Reactor Director (Level 2) on all matters pertaining to the decommissioning and decontamination of the University of Virginia Reactor Facility. The decommissioning committee members may include reactor staff from Level 3, and employees from the Office of Environmental Health and Safety.

6.1.2. Responsibility

During the CAVALIER permanent shutdown and decommissioning period, the Reactor Facility Director (Level 2) shall be responsible for overall facility operation and the direction of decommissioning activities at the Reactor Facility. During

periods when the Reactor Facility Director is absent, the Director's responsibilities are automatically delegated to the Reactor Supervisor (Level 3). The Reactor Facility Director shall have at least a bachelor's degree in science or engineering and a minimum of 5 years of experience in the nuclear field. A graduate degree may fulfill 4 years of experience on a one-for-one time basis. The Reactor Supervisor shall be responsible for the day-to-day activities at the Reactor Facility and ensuring that these are conducted in a safe manner and within the limits prescribed by the CAVALIER reactor license. The Reactor Supervisor shall have the equivalent of a bachelor's degree in science or engineering and at least 2 years of experience in Reactor Operations at this facility, or an equivalent facility, or at least 6 years of experience in Reactor Operations. Equivalent education or experience may be substituted for a degree. Within nine months after being assigned to the position, the Reactor Supervisor shall obtain and maintain a NRC Senior Reactor Operator license if reactor fuel elements are still at the Facility. A NRC Senior Reactor Operator license, or a Reactor Operator license, is not required for level 3 and 4 personnel once all reactor fuel elements have been shipped offsite.

← Ref. to level 4 deleted

6.1.3. Staffing

A licensed Senior Reactor Operator shall supervise any movement of reactor fuel. One or more health physicists, organizationally independent of the Reactor Staff as shown in Figure 6.1, shall be responsible for radiological safety at the Reactor Facility.

6.1.4. Selection and Training of Personnel

The selection, training and requalification of Reactor Facility personnel shall follow the American National Standard for Selection and Training of Personnel for Research Reactors, ANSI/ANS-15.4-1988, Sections 4-6, to the extent applicable to the

decommissioning status of the facility. The selected criteria for the personnel will be contained in the NRC-approved Operator Requalification Program, as amended.

Bases: Sections 6.1, 6.1.1, 6.1.2, 6.1.3 and 6.1.4 of the American National Standard ANSI/ANS 15.1-1990 "The Development of Technical Specifications for Research Reactors," describe a generic and generally acceptable organizational structure for U.S. research reactors. They provide the bases for TS 6.1 above. Some of the ANSI standard recommendations apply to operable or operating reactor facilities, and are not necessarily valid for staff hired to perform decommissioning activities.

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6.2 Radiation Safety, Reactor Safety and Reactor Decommissioning Committees

6.2.A. Radiation Safety Committee

Applicability: The specifications 6.2.A.1 and 6.2.A.2 apply to the expert group who will provide oversight over the Reactor Safety and Reactor Decommissioning Committees.

Objective: To describe the makeup, responsibilities, and authority of the Radiation Safety Committee as regards reactor permanent shutdown and decommissioning.

Specifications:

6.2.A.1. Composition and Qualification

There shall be a Radiation Safety Committee (RaSC) to ensure that the Reactor Facility is shutdown and decommissioned in a safe manner within the terms of its reactor and other licenses, reactor Technical Specifications and NRC approved plans. The RaSC shall advise the Vice President and Provost and the Director of the Reactor Facility on safety and other concerns involving the decommissioning of the Reactor Facility. The RaSC shall include its Chairman, the Radiation Safety Officer, the Director of the Reactor Facility, representatives of the hospital administration, Nuclear Medicine, and Radiological Physics or Radiation Oncology. Additional members may be drawn from such areas as Environmental Health and Safety, Radiology, Pathology, Biology, Nursing, Nuclear Engineering, Microbiology, Physics, Obstetrics and Gynecology. Membership of the RaSC will change as appointments are made by the Office of the President of the University. However, the Radiation Safety Officer and the Reactor Director shall have standing appointments to the RaSC. Collectively, the RaSC members shall represent a broad spectrum of expertise in the radiological sciences. The

membership of the Committee shall be such so as to maintain a high degree of technical proficiency in areas relating to radiation safety. The RaSC Chairman is the coordinator for all university licenses involving the use of radioactive materials and radiation producing equipment. The Radiation Safety Committee is charged with ensuring that licensed material is used safely and in compliance with NRC regulations and institutional licenses. The RaSC reviews changes to the Broad Scope and other licenses. The RaSC also identifies program problems and recommends solutions and remedial actions. Some of its functions are carried out through the use of subcommittees, such as the Reactor Safety Committee and the Reactor Decommissioning Committee. The RaSC will carry out most of its functions relating to the Reactor Facility through these two subcommittees.

6.2.A.2. RaSC Charter and Rules

- (1) To establish a quorum, the ex-officio members and any 5 other Committee members must be present.
- (2) The Committee shall meet as often as necessary to conduct its business by not less than once in each calendar quarter.
- (3) The Committee shall have a written charter defining such matters as the authority of the Committee, the subjects within its purview, and other administrative provisions.
- (4) Radiation Safety Committee meeting minutes shall be distributed to the committee membership within three months following a meeting. These minutes shall be reviewed for approval at the next scheduled committee meeting.

6.2.B. Reactor Safety Committee

Applicability: The specifications 6.2.B.1 through 6.2B.3 apply to the expert group who will provide specific reviews and audits of Reactor Facility operations while reactor fuel elements are on-site.

Objective: To describe the makeup, responsibilities, and authority of the Reactor Safety Committee.

Specifications:

6.2.B.1. Composition and Qualification

There shall be a Reactor Safety Committee (ReSC) to review and audit reactor operations and ensure that the Reactor Facility is operated in a safe manner within the terms of the reactor license. However, reactor safety concerns will end once all reactor fuel elements have been permanently shipped from the Reactor Facility. At that time the need for a Re SC shall cease, and any remaining radiation safety issues shall be referred to and be addressed by the University's Radiation Safety Committee. The Technical Specification requirement for a Reactor Safety Committee shall cease following the shipment of all reactor fuel elements off-site. The Reactor Safety Committee shall be part (a subcommittee) of the Radiation Safety Committee (RaSC) and report to its Chairman, who is the coordinator for all licenses involving the use of radioactive materials and radiation producing equipment at the University of Virginia. The Reactor Safety Committee shall be composed of at least four members, and shall include the Radiation Safety Officer of the University and the Director of the Reactor Facility. The Reactor Director shall be the sole reactor staff representative on the Committee. Collectively, the committee members shall represent a broad spectrum of expertise in the

research-reactor field. The membership of the Committee shall be such so as to maintain a degree of technical proficiency in areas relating to reactor safety.

The members may be drawn from within or outside the operating organization. The ReSC shall advise the Vice President for Research and Public Service and the Director of the Reactor Facility on reactor safety concerns with the operation of the facility. ReSC reviews and audits are designed to uncover deficiencies that affect reactor safety.

6.2.B.2. Charter and Rules

- (1) A quorum of the Committee shall consist of not less than the majority of the full committee. The Chair can designate another member from the Committee to preside in his absence.
- (2) The Committee shall meet at least semiannually and shall be on call by the Chair. Minutes of all meetings shall be disseminated as designated by the Chair.
- (3) The Committee shall have a written charter defining such matters as the authority of the Committee, the subjects within its purview, and other administrative provisions as are required for effective functioning of the Committee.
- (4) Radiation Safety Committee meeting minutes shall be distributed to the committee membership within three months following a meeting. These minutes shall be reviewed for approval at the next scheduled committee meeting.

6.2.B.3. Review and Audit Functions

As a minimum the responsibilities of the Reactor Safety Committee include:

- (1) Review and approval of untried experiments and tests that are

significantly different from those previously used or tested in the reactor, as determined by the Facility Director.

- (2) Review and approval of changes to the reactor core, reactor systems or design features that may affect the safety of the reactor.
- (3) Review and approve all proposed amendments to the reactor license, Technical Specifications, and changes to the standard operating procedures (Note: SOPs are discussed in Section 6.3 of these specifications).
- (4) Review reportable occurrences, to include violations of Technical Specifications, License or of Standard Operating Procedures that have safety significance, as well as the occurrences listed in ANSI/ANS-15.1-1990 Item 6.6.2. Also, to review the actions taken to identify and correct the cause of these occurrences.
- (5) Review significant operating abnormalities or deviations from normal performance of facility equipment that affect reactor safety.
- (6) Audit annually [through a selective yet comprehensive examination of records, logs and personnel]:
 - a) Facility operations for conformance to TS and License
 - b) Results of actions taken to correct verified deficiencies that may occur in reactor equipment, systems, structures or method of operations that affect reactor safety.... and audit biennially:
 - c) Operator retraining and requalification program for the reactor operations staff
 - d) Reactor Facility Emergency Plan and Implementing Procedures

- (7) Review and approval of changes to experiments, reactor systems and procedures as per 10 CFR 50.59.

Bases: American National Standard ANSI/ANS-15.1-1990, "The Development of Technical Specifications for Research Reactors," describes in Section 6.2 acceptable composition and qualification criteria for reactor safety committees and their review and audit functions. Section 6.3 of the standard describes the organizational relationship of the group responsible for radiation safety to the reactor operations group. These sections of the standard are used as bases for the specifications listed above.

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6.2.C. Reactor Decommissioning Committee

Applicability: The specifications 6.2.C.1 through 6.2C.3 apply to the expert group who will have responsibility and oversight for decommissioning planning and execution activities at the Reactor Facility.

Objective: To describe the makeup, responsibilities and authority of the Reactor Decommissioning Committee.

Specifications:

6.2.C.1. Composition and Qualification

There shall be a Reactor Decommissioning Committee (RDC) to plan the safe, legal and timely decommissioning of the Reactor Facility. Collectively, the decommissioning committee members shall represent a broad spectrum of expertise in the research-reactor and health-physics fields, with experience in reactor management, radiological safety, research reactor decommissioning and university administration. Committee members may be drawn from within or outside the University of Virginia, including subcontracted companies. The Committee shall be composed of at least four members, and shall include the Radiation Safety Officer of the University and the Director of the Reactor Facility. The Reactor Decommissioning Committee shall be part (subcommittee) of the Radiation Safety Committee, which reports to the Vice President and Provost. The Decommissioning Committee shall advise the Reactor Director (Level 2) on all matters impacting the decommissioning of the Reactor Facility.

6.2.C.2. Charter and Rules

- (1) A quorum of the Decommissioning Committee shall consist of not less than the majority of the full committee. The RDC Chair can designate

another member from the Committee to preside in his absence.

- (2) The Reactor Decommissioning Committee shall meet at least quarterly and shall be on call by the Chair. Meeting minutes shall be disseminated as per the RDC Charter.
- (3) The Reactor Decommissioning Committee shall have a written charter defining such matters as the authority of the Committee, the subjects within its purview, and other administrative provisions as are required for effective functioning of the Committee.
- (4) The Reactor Director shall cast a single vote in the name of the operations staff at Reactor Decommissioning Committee meetings. The operations staff encompasses the reactor staff, decommissioning subcontractors and anyone directly supporting decommissioning and working under the direction of the Reactor Director.
- (5) Reactor Decommissioning Committee meeting minutes shall be distributed to the committee membership within three months following a meeting. These minutes shall be reviewed for approval at the next scheduled committee meeting.

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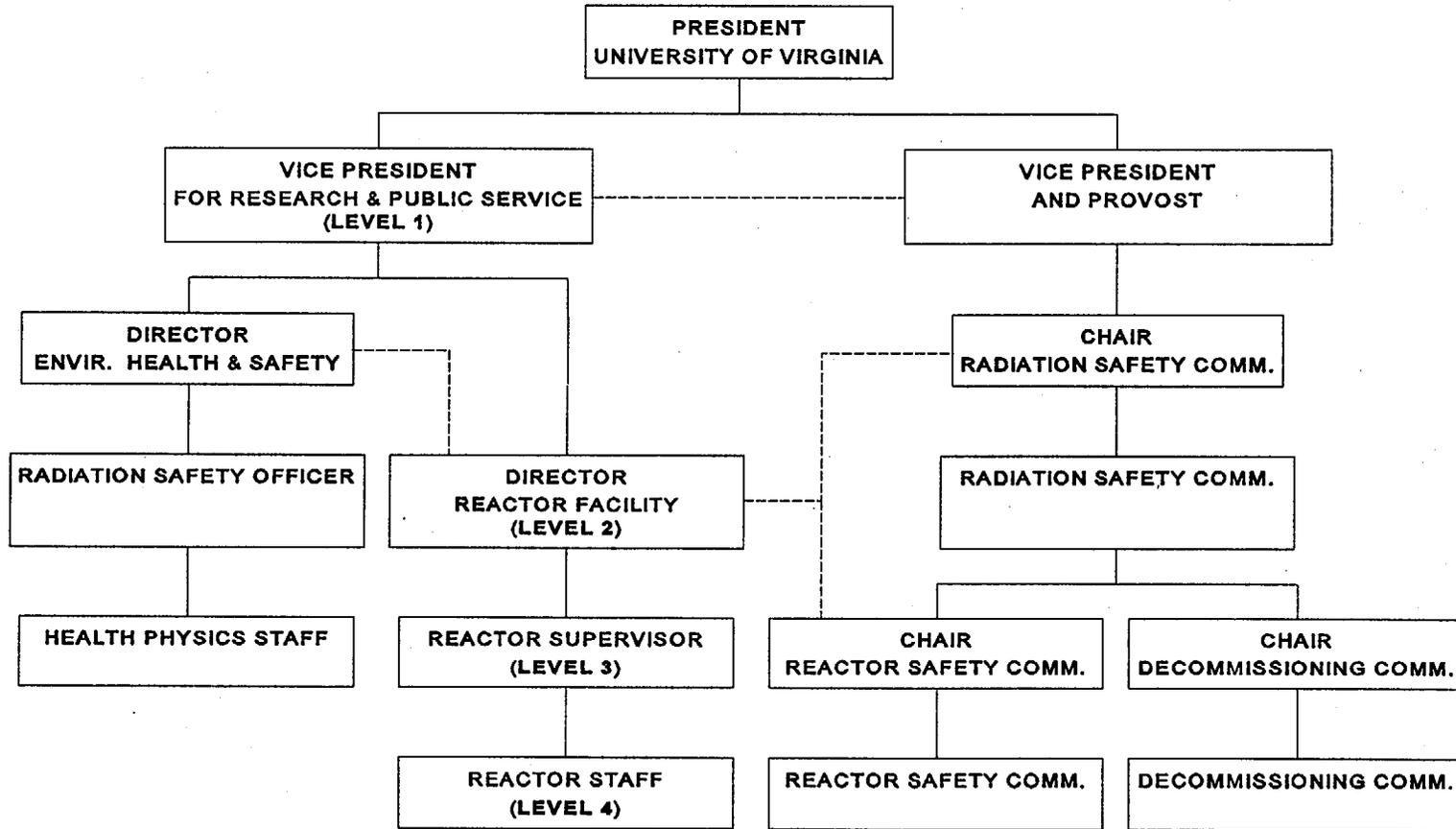
6.2.C.3. Decommissioning Committee Functions

As a minimum, the responsibilities of the Reactor Decommissioning Committee following the termination of the Reactor Safety Committee shall include:

- (1) Review and approval for changes to the Reactor Facility and to the CAVALIER SOPs as applicable and described in 10 CFR 50.59.
- (2) Review and approval of proposed changes to reactor licenses, Technical Specifications, NRC-approved plans (such as the Emergency and Security Plans), as well as the CAVALIER Standard Operating Procedures (SOPs), with the exception of changes to the organizational structure. [The responsibility and authority for the organizational structure for the Reactor Facility resides with the Vice President and Provost.]
- (3) Review unusual and reportable occurrences, to include those violations of Technical Specifications, License, or of Standard Operating Procedures that have safety significance, as well as the occurrences listed in ANSI/ANS-15.1-1990, Item 6.6.2. Also, to review the actions taken by reactor management to identify and correct the cause of these occurrences.
- (4) Annually audit [through a selective, yet comprehensive, examination of records, logs and personnel] facility operations for conformance to licenses, Technical Specifications, NRC regulations and inspections, as well as CAVALIER SOPs; and to recommend remedial action to correct identified deficiencies.
- (5) Biennially audit the Operator Retraining and Requalification Program

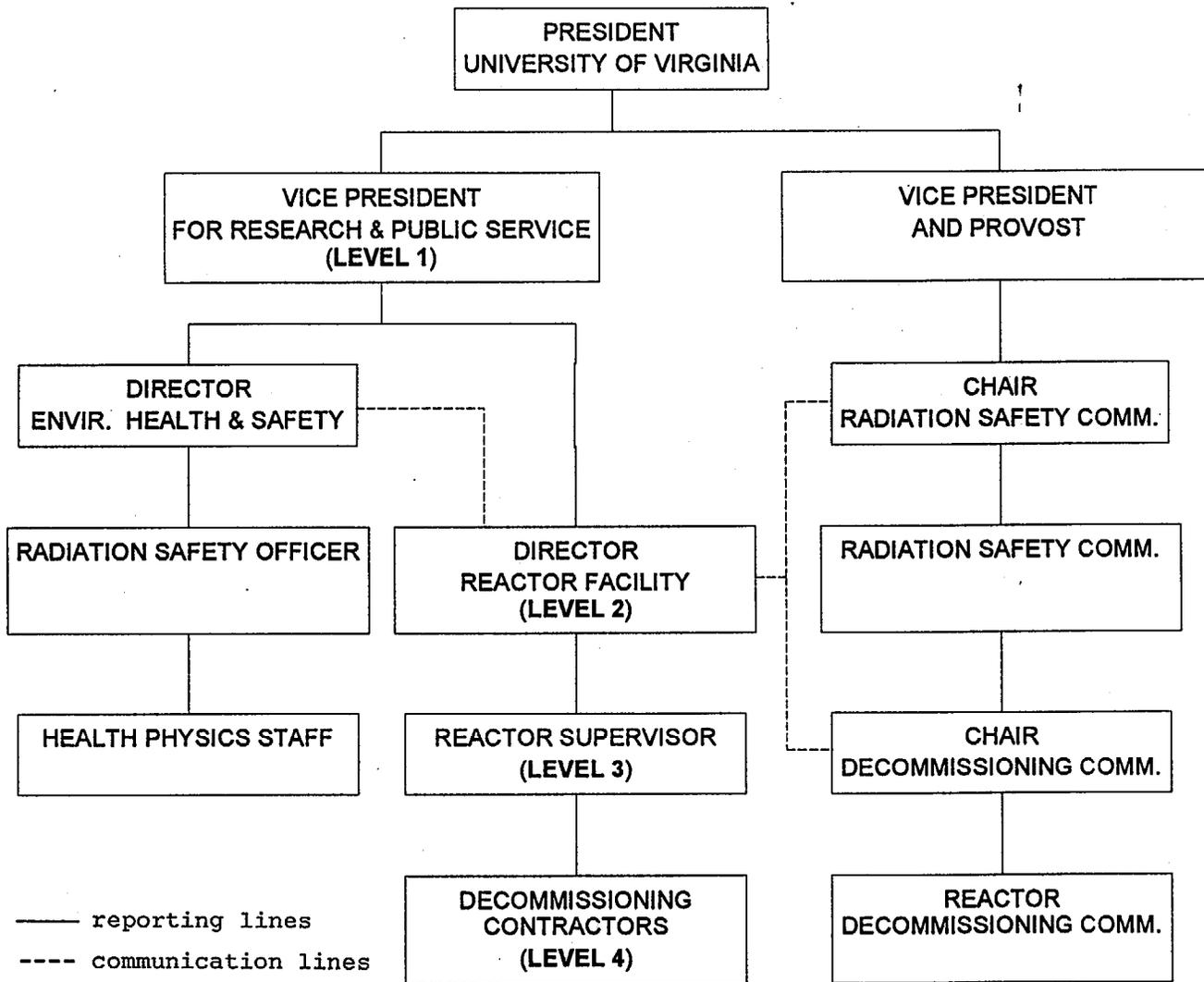
of the reactor staff, as well as the Reactor Facility Emergency Plan and
Implementing Procedures.

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— reporting lines
 - - - communication lines

FIGURE 6.1 "A"
ORGANIZATIONAL CHART
UNIV. OF VIRGINIA NUCLEAR REACTOR FACILITY
(PRIOR TO SHIPMENT OF ALL FUEL ELEMENTS OFF-SITE)



— reporting lines
- - - communication lines

FIGURE 6.1 "B"
ORGANIZATIONAL CHART
UNIV. OF VIRGINIA NUCLEAR REACTOR FACILITY
(AFTER SHIPMENT OF ALL FUEL ELEMENTS OFF-SITE)

6.3. Standard Operating Procedures

Applicability: The specification below concerns the procedural controls used to operate the CAVALIER, and conduct experiments.

Objective: The objective is the safe operation of the reactor in compliance with license conditions, federal regulations.

Specifications:

6.3.1. Items Covered by SOPs

Written procedures, reviewed and approved by the Reactor Safety Committee shall be in effect and followed for the items listed below. These procedures shall be adequate to ensure the safe decommissioning of the reactor, but should not preclude the use of independent judgment and action should the situation require such.

- (1) Startup, operation and shutdown of the reactor.
- (2) Installation or removal of fuel elements, control rods, experiments, and experimental facilities.
- (3) Actions to be taken to correct specific and foreseen potential malfunctions of systems or components, including responses to alarms, suspected primary coolant system leaks, abnormal reactivity changes.
- (4) Emergency conditions involving potential or actual release of radioactivity, including provisions for evacuation, re-entry, recovery, and medical support.
- (5) Preventative and corrective maintenance operations that could have an effect on reactor safety.
- (6) Periodic surveillance.
- (7) Radiation control.

6.3.2. Changes to SOPs

Substantive changes to approved procedures shall be made only with the approval of

the Reactor Safety Committee (or the Reactor Decommissioning Committee after the ReSC ceases to exist.) Changes that do not change the original intent of the procedures may be made with the approval of the Facility Director. All such minor changes shall be documented and subsequently reviewed by the Reactor Safety Committee (or by the Reactor Decommissioning Committee after the ReSC ceases to exist).

Basis: Section 6.4 of American National Standard ANSI/ANS 15.1-1990, "The Development of Technical Specifications for Research Reactors," suggests acceptable procedural controls to applied to operating U.S. research reactors.

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6.4. Review and Approval of Experiments

Applicability: Specifications 6.4.1 through 6.4.6 listed below apply to classes of experiments run in the CAVALIER core and tank.

Objective: The objective is the safe operation of the reactor and experiments, in accordance with license conditions and federal regulations. Experiments run in conjunction with the reactor should not adversely affect reactor and radiation safety. Notwithstanding the regard for safety, the requirement for review and approval of experiments shall not limit the flexibility of experimenters performing work covered under general written procedures, or for which unanalyzed safety issues do not exist, as determined by the Reactor Director.

Specifications:

6.4.1. Experimental Procedures and Methods

- (1) Classes of experiments involving the CAVALIER shall be carried out with established and approved written experimental procedures. The Reactor Safety Committee shall review all new classes of experiments prior to their initiation and approve written experimental procedures governing their operation.
- (2) Written experimental methods that implement Reactor Safety Committee approved experimental procedures may be developed by the staff and/or experimenters, as needed. Such experimental methods shall be approved by a Reactor Supervisor or the Reactor Director prior to use.
- (3) The Reactor Director or the Reactor Safety Committee shall decide whether an experimental procedure is required. Usually, an experimental procedure will not be required if the work in question is already covered under an existing approved general experimental procedure or by a Standard Operating Procedure.

6.4.2. Reactivity limits

As applicable, reactivity limits for experiments given in experimental procedures shall be based on analyses of maximum reactivity insertions that can be handled by the reactor or its control and safety systems without exceeding safety limits. Reactivity limits have been established in TS 3.5 Limitations on Experiments for maximum absolute reactivity worth of individual experiments and the sum of the absolute values of the worth of all experiments.

6.4.3. Materials

As applicable, special requirements shall be established in the experimental procedures for significant amounts of special materials such as fissionable materials, explosives or metastable materials capable of significant energy release, or materials that are corrosive to reactor components or highly reactive with coolants.

Requirements listed in experimental procedures may range from detailed analyses to double encapsulation and prototype testing.

6.4.4. Failure and Malfunctions

- (1) Credible failures of any experiments shall not result in the release or exposures in excess of the annual limits established in Title 10, Code of Federal Regulations, Part 20.
- (2) Experiments shall be designed such that they will not contribute to the failure of other experiments, core components, or principal physical barriers to uncontrolled release of radioactivity. Similarly, no reactor transient shall cause an experiment to fail in such a way as to contribute to an accident.

6.4.5. Experimental Facility Specific LCO

Limiting Conditions of Operation limits unique to an experiment shall be specified, as necessary, in the written experimental procedures. Specific

surveillance activities which may be required for experiments will also be addressed in the experimental procedures.

6.4.6. Deviations from Experimental Procedures

- (1) Changes to previously approved experiments and experimental procedures, determined by the Reactor Director to be substantive, shall be made only after review and approval by the Reactor Safety Committee.
- (2) Minor changes to experimental procedures may be made with the approval of the Reactor Director, who will determine that no new reactor safety concerns exist, and with the approval of the Reactor Health Physicist, who will assure that radiological safety requirements can be met.

Bases: National Standard ANSI/ANS-15.1-1990, "The Development of Technical Specifications for Research Reactors," suggests acceptable provisions governing reactor-based experiments in sections 3.6 and 6.4. These sections served as bases for the above specification. In addition, examples are presented of activities involving the reactor which typically do not require individualized written procedures, because they are covered under a general procedure for an approved class of experiments, or covered by SOPs. It is unreasonable to require procedures with undue specificity when this would limit reasonable experimental flexibility and no unanalyzed safety issues exist. The Reactor Director has the resources and authority to determine when experimental procedures are required.

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6.5 Plant Operating Records

Applicability: The specifications below apply to CAVALIER operating records.

Objective: The objective is to maintain and keep on file reactor operating records for future reference, and for demonstration of compliance with license conditions and federal regulations.

Specifications:

6.5.1. Records To Be Retained for at least Five Years

In addition to the requirements of applicable regulations, records of the items listed below shall be kept in a manner convenient for review:

- (1) Normal reactor facility operation (for example, reactor logbooks, reactor checklists and irradiation request forms).
- (2) Principal reactor systems maintenance records.
- (3) Reportable occurrences.
- (4) Equipment and component surveillance activity required by Technical Specifications.
- (5) Reactor Facility radiation and contamination surveys.
- (6) Experiments performed with the CAVALIER.
- (7) Fuel inventories, transfers of radioactive material to and from the R-123 license.
- (8) Approved changes to operating procedures.
- (9) Records of meetings and audit reports of the Reactor Safety Committee.
- (10) Records of meetings and audit reports of the Reactor Decommissioning Committee.

6.5.2. Records To Be Retained for One Certification Cycle

Records of retraining and requalification of licensed operators shall be maintained at all times the individual is employed or until licensing is renewed.

6.5.3. Records To Be Retained for the Life of the Facility

In addition to the requirements of applicable regulations, records (or logs) of the items listed below shall be kept in a manner convenient for review and shall be retained as indicated:

- (1) Gaseous and liquid radioactive effluents released from the Reactor Facility.
- (2) Off-site (radiological) environmental monitoring surveys.
- (3) Radiation exposures for all personnel monitored at the Reactor Facility.
- (4) Updated, corrected and as-built drawings of the Reactor Facility.
- (5) Changes to reactor systems, components, or equipment that may affect reactor safety.

Basis: American National Standard ANSI/ANS-15.1-1990, "The Development of Technical Specifications for Research Reactors," provides record-keeping guidance in Section 6.8. This is the basis for the above specifications.

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6.6. Required Actions

Applicability: The specifications below apply to instances where radiologically unsafe situations have been, or were likely to have been, generated.

Objective: The objective is to report unsafe conditions, study their causes and consequences, determine their effect on the health and safety of personnel and the public, and take corrective action to prevent recurrence.

Specifications:

6.6.1. Action To Be Taken in the Event of a Reportable Occurrence

A reportable occurrence is any of the following conditions:

- (1) An observed inadequacy in the implementation of either administrative or procedural controls, such that the inadequacy could have caused the existence or development of an unsafe condition at the Reactor Facility.
- (2) Abnormal and significant degradation in reactor fuel, and/or cladding, coolant boundary, or containment boundary (excluding minor leaks) where applicable that could result in exceeding prescribed radiation-exposure limits of personnel and/or environment.
- (3) Occurrences listed in Item 6.6.2 of ANSI/ANS-15.1-1990

In the event of a reportable occurrence, the following action shall be taken:

- (1) Ongoing activities shall cease until the occurrence has been resolved.
- (2) The Director of the Reactor Facility or his designee shall be notified as soon as possible and corrective action taken as foreseen in the procedures.
- (3) A written report of the occurrence shall be made which shall include an analysis of the cause of the occurrence, the corrective action taken, and recommendations for measures to preclude or reduce the probability of

reoccurrence. This report shall be submitted to the Director and the Reactor Safety Committee and/or the Radiation Safety Officer for review.

- (4) A report shall be submitted to the Nuclear Regulatory Commission in accordance with Section 6.7 of these specifications.

Bases: National Standard ANSI/ANS-15.1-1990, "The Development of Technical Specifications for Research Reactors," describes in sections 6.6 and 6.7 acceptable specifications for required actions related to safety limits violations, actions to be taken upon their discovery, and reporting requirements. These form the bases for the above specifications.

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6.7. Reporting Requirements

Applicability: The specifications 6.7.1 and 6.7.2 listed below apply to routine and special reports made by the University of Virginia Reactor Facility to the U.S. Nuclear Regulatory Commission.

Objective: The objective is to provide the licensing agency (NRC) with relevant information concerning normal and abnormal reactor operations which are necessary for the fulfillment of its mission to protect the public health and safety. A secondary objective is to comply with reporting requirements as given in the federal regulations.

Specifications: In addition to federal regulatory requirements (for example, follow 10 CFR 20, 30.50, 40.60, and 70.50, as applicable), reports should be made to the U.S. Nuclear Regulatory Commission as follows:

6.7.1. Reporting of Incidents

- (1) Immediate notification should be made by telephone, to the U.S. Nuclear Regulatory Commission Headquarters Operations Center of:
 - (a) Personnel total effective dose equivalent of 25 rem or more.
 - (b) The release of radioactive material, inside or outside of a restricted area, that results, or could result, over a 24 hour period, in personnel intake of five times the annual limit on intake specified in 10 CFR 20.
 - (c) Violation of CAVALIER Technical Specifications.
- (2) A special report should be made by telephone as soon as possible, but no later than the next working day, to the U.S. Nuclear Regulatory Commission Headquarters Operations Center of:
 - (a) Personnel exposures or releases of radioactive material greater than the limits in 10 CFR 20.
 - (b) Reportable occurrences as defined in TS 6.6.1 and Item 6.6.2 of

ANSI/ANS-15.1-1990.

- (c) Violation of a safety limit or technical specification.
- (3) A special written report should be sent by mail within 14 days to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555
- (a) Accidental off-site release of radioactivity above 10 CFR 20 limits, whether or not the release resulted in property damage, personal injury, or exposure.
 - (b) Reportable occurrence as defined in Section 6.6.2 of ANSI/ANS-15.1-1990 and TS 6.6.1.
 - (c) Violation of a safety limit or technical specification.
- (4) A special written report should be sent by mail within 30 days to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555, of:
- (a) Accidental off-site release of radioactivity above 10CFR20 limits, whether or not the release resulted in property damage, personnel injury, or exposure.
 - (b) Reportable occurrence as defined in Section 6.6.1 of these specifications, and Item 6.6.2 of ANSI-ANS-15.1-1990.
 - (c) Changes in personnel serving as Vice President For Research and Public Service, the Radiation Safety Committee Chair, Reactor Decommissioning Committee Chairman, Reactor Safety Committee Chair, Reactor Facility Director, or Reactor Supervisor.
- (5) A written report should be sent within nine months after initial criticality of the reactor or within 90 days of completion of the startup test programs,

whichever is earlier, to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555, upon receipt of a new facility license, an amendment to the license authorizing an increase in power level or the installation of a new core with fuel elements of a design different design than previously used. The report will include the measured values of the operating conditions or characteristics of the reactor under the new conditions, including:

- (a) Total control rod reactivity worth.
- (b) Reactivity worth of the single control rod of highest reactivity worth.
- (c) Minimum shutdown margin both at ambient and operating temperatures.

6.7.2. Routine Annual Reports

A routine annual report will be made by March 31 of each year on decommissioning and related activities completed during the previous calendar year. The report should be sent to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555, providing the following information:

- (1) Reactor Facility utilization,
- (2) Description of university staff assigned to decommissioning: numbers, background and responsibilities,
- (3) TS compliance and reportable events,
- (4) Results of NRC inspections and licensing actions,
- (5) Summary report on RDC meetings and audit findings,
- (6) Health Physics Program
- (7) Annual waste content and volume shipped,
- (8) Summary of the nature and amount of radioactive solid, liquid and airborne

effluents released or discharged to the environs beyond the effective control of the licensee, as measured or calculated at or prior to the point of such release or discharge,

- (9) Results of environmental surveys and sampling outside the Reactor Facility,
- (10) Reactor Facility personnel and visitor radiation exposure summary report, including the dates and times of significant exposures (greater than 500 mrem for adults and 50 mrem for persons under 18 years of age),
- (11) Summary of radiation and contamination surveys performed within the Reactor Facility,
- (12) Status of decommissioning funding and expenditures,
- (13) Description of contractor companies operating on-site,
- (14) Summary of contracted tasks and time lines,
- (15) Significant Changes to the Reactor Facility, Reactor SOPs and of all changes made per 10 CFR 50.59,
- (16) Summary of large equipment transfers,
- (17) New and modified SOPs having radiation safety significance,
- (18) Status of emergency preparedness,
- (19) Figures on industrial accidents or incidents.

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