Report of an Audit

of the

Idaho State University

AGN 201M Reactor

Conducted on April 7, 1993

by

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on behalf of the

National Organization of

Test, Research and Training Reactors

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Introduction

At the request of the Dean of the College of Engineering at Idaho State University (ISU) Dr. Brian Dodd and Dr. Bill Vernetson, representing the National Organization of Test, Research and Training Reactors (TRTR), conducted an audit of the ISU's AGN 201M reactor operations program. The appendix attached to this report consists of the checklist used as the basis of the audit.

Positive Areas Observed

The notable positive aspects of the ISU reactor program observed by the auditors are listed below.

- Direction of Movement

There were several indications that the program is now moving in a positive direction. It is expected that there will be further improvements following the appointment of the current Acting Reactor Supervisor to the full-time position in the fall. It appears as if the new direction was initiated with several changes made by the previous Reactor Supervisor.

- Reactor Safety Committee

The ISU reactor is particularly fortunate to have a quality group of outside people on its Reactor Safety Committee (RSC). The minutes of recent RSC meetings are clear and comprehensive. The implementation of the new RSC charter is one of the positive directions initiated by the previous supervisor as is the new RSC Audit and Review Program. The decision to change to a minimum of two meetings per year is also a good idea.

- Health Physics Support

While only a few health physics records were reviewed, it appears as if there is close cooperation and good support from the campus radiation safety group. There did not appear to be any of the problems or conflicts which characterize some research reactor facilities.

- Acting Reactor Supervisor

The auditors felt that the Acting Reactor Supervisor has the background, experience and motivation to continue the positive improvements initiated by his predecessor. The addition of more reactor operators following examinations in July will be of significant help to him also.

Areas for Improvement

As a general comment, it would appear that the ISU reactor program has al, or most, of the procedures, logs and records required by its license and applicable regulations, but they are not of the quality that one would like to see at such a facility. Therefore, it is felt that a concerted effort should be made to improve them.

Specific areas of deficiency with associated recommendations are given below.

- Surveillance

Two instances were noted where items had not been performed within the time interval required by the Technical Specifications (TS). It appears as if these have now been completed, but not recorded.

Recommendations:

- Report these violations to the USNRC in the manner required by T.S. 6.9.2.

- Consider improvements in the mechanism to ensure that all surveillance and maintenance items are performed in a timely manner. This change should involve a more formal tracking method.

- Communicate to the RSC the importance of completing their reviews and audits in a timely manner once they have been reminded of the need to perform the item. Assure that this requirement is communicated to the RSC memebership well in advance, so that perhaps they may schedule their reviews in connection with one of the semi-annual RSC meetings.

- Posting

There are regulatory requirements in 10 CFR parts 19 and 20 that certain items be posted or a notice be posted as to where those items can be found. This information was not posted in or around the reactor facility.

Recommendation:

- Post the required information as soon as possible.

- Procedures

A number of procedures, including experiment procedures, had been modified in pen and ink (or pencil) on the console copy. Some of these changes were potentially significant. The method for updating or changing procedures given in TS 6.6 did not appear to have been followed.

There do not appear to be any administrative procedures in use at the facility. This has been found to be a useful way to codify a number of the

general policies associated with reactor facilities.

There is no organized system for archiving previous versions of procedures and similar documents. Archiving is required by the American Nuclear Insurers and is generally thought to be useful in order to be able to reconstruct the situation that was in existence at a particular date, especially during inspections.

The on-duty Senior Reactor Operator (SRO) is not recorded in the console log. Again, this is necessary to be able to identify the individuals involved in any specific event recorded in the console log book. This improvement will become more important as more ROs are licensed in the near future.

Recommendations:

- Replace the console copies of procedures with updated clean versions. Keep the signed procedure approval sheet as the cover page of the procedure.

- Consider writing some administrative procedures. Examples of the types of items typically found in such procedures can be identified by looking at the administrative procedures developed at the auditor's facilities.

- Develop a system for archiving appropriate documents such as procedures, the emergency plan, the security plan, the requalification plan.

- Change console log forms to include an item which identifies the SRO of record. Allow for SRO changes during operation of the reactor and log such changes.

- Technical Specifications

There are a number of items which the Technical Specifications require that the ISU reactor does not have. In most instances these are things that are not really applicable to such a facility. However, the facility is open to being cited under the current situation.

Recommendations:

- To resolve this situation in the near term, review all of the items required by the Technical Specifications, and ensure that they are all addressed in some way with written documentation, even if it is only a signed memorandum.

- For a better, longer term solution to this situation request a change in the Technical Specifications which removes items which are not applicable to the ISU facility. Such changes will require a basis which will need to be submitted to the USNRC as part of the requested change.

- **Safety Evaluations**

The auditors could find no evidence of any safety evaluations being made pursuant to 10 CFR 50.59 involving changes to tests, experiments, procedures or the facility as described in the Safety Analysis Report (SAR). While there may not be many such items in a facility such as the ISU AGN, there are certain to be some which should at least be considered.

Recommendations:

- Write a procedure, or include in the administrative procedures, a methodology and criteria for performing safety evaluations pursuant to 10 CFR 50.59. Keep records of such evaluations.

- Enter on the procedure approval sheet words noting the fact that the changes were evaluated and found not to constitute an unreviewed safety question, or otherwise, as the case may be.

- **Emergency Plan**

The emergency plan did not seem to conform completely to ANS/ANSI 15.16 or NUREG 0849 guidelines. In particular, the emergency classification system in the ISU plan could cause some confusion and might result in unnecessary excessive response by regulatory authorities.

Some items in the plan might best be separated from the plan and included in a separate document consisting of the emergency plan implementing procedures, especially since these can then be revised in-house through the procedure revision methodology without USNRC approval.

There are no current written agreements from the outside support agencies involved in the ISU emergency plan.

Recommendations:

- Continue the planned revision to the emergency plan and make its format conform to the ANSI standard as much as possible, especially with regard to accident classifications and action levels.

- Consider removing some detailed material and including it in a set of implementing procedures.

- Get new written agreements signed as soon as possible.

- **Operator Training and Exams**

Some problems have been encountered with respect to the material on which reactor operators have been examined by the USNRC. This is a problem common to many facilities.

Recommendation:

- Compile a standard training package which consists of the material that the reactor operators must know and which they should be examined

on. Send this package to the USNRC when they make their request. Do not include in this package information which is of a less significant nature that it may be nice to know but not essential for licensing purposes.

- Miscellaneous Items

Control rod drop tests are performed external to the core. This may not provide assurance that they would take the same time to drop if they were installed in the core.

Senior reactor operators are allowed to carry reactor console keys with them at all times. This does not seem to be necessary and could lead to concerns with respect to the integrity of the security associated with that key.

The reactor operator does not have any physical control of samples being inserted into the reactor via the pneumatic transfer system. This could lead to unexpected, albeit small, reactivity changes.

Radioactive material is on occasion walked across campus from the reactor facility to the laboratory where it will be used. There is some question as to whether this constitutes a shipment and, therefore, whether it should strictly be packaged and documented according to DOT regulations.

Recommendations:

- Perform rod drop time tests with the rods installed by hooking up a timing circuit to the upper and lower limit switches or some other such method. Performing at least one set of measurements ex-core prior to performing them in-core is recommended in order to develop a set of baseline data to assure validity of previous tests.

- Keep console keys controlled in such a manner that they do not leave the facility, and that they are locked up whenever they are not in use.

- Install an interlock, power switch, or solenoid to the pneumatic transfer system in such a manner that the reactor operator has to turn on the system before it can be run from another room. Activation of this system would require SRO approval.

- Request the ISU radiation safety group to evaluate the situation with respect to the transport of radioactive material when it is walked across campus. Seriously consider making this a regular shipment according to DOT regulations.

- Housekeeping and Professionalism

Much of the areas associated with the reactor have an untidy and unkept appearance, and many of the records similarly are not kept neatly. This situation can be understood in light of past activities and the current transitions in staffing. It is generally recognized that good housekeeping goes hand-in-hand with good health physics control. In addition, it also provides an overall impression of professionalism which in turn results in

a positive image of the facility. It is also felt that a clean, tidy, professional approach is important in training and teaching students

Recommendations:

- Make a concerted effort to clean and tidy the reactor and associated facilities.

- Put reactor logs, records and procedures in a format which is orderly and easily accessed.

Conclusions

While the auditors did find a number of areas where improvements can be made, it should be emphasized that they have no concerns with respect to safety of the reactor, the staff or the public. Almost all of the comments relate to regulatory compliance and good practice regarding paperwork and documentation. In addition, the auditors would like to highlight the positive aspects of the reactor program with respect to the direction in which it is moving.

Finally, the auditors would like to thank the administration of the College of Engineering and the staff of the AGN 201M facility for their cooperation, openness and candor during this audit. It made the task one which was simple and pleasurable.

APPENDIX

SPECIFIC
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IDAHO STATE
UNIVERSITY

RESEARCH REACTOR OPERATIONS AUDIT CHECKLIST

Revision No. 4 - March 29, 1993

This is the GENERAL audit checklist with some modifications to make it SPECIFIC to the Idaho State University AGN-201M reactor.

Determinations of what is appropriate or adequate in the checklist are made on the basis of ANSI/ANS standards for research reactors, in particular ANSI/ANS 15.1. In addition, judgments are also based on the auditor's experience of good research reactor practices.

1. Administration

- Is the organizational structure appropriate?
- Are there clear lines of authority/responsibility?
- Are areas of responsibility clearly defined?
- Is the health physics group separate from operations?
- Does the Health Physicist report to ultimate Director?
- Is there a good working relationship between HP and reactor operations, in terms of coordination, communication, reporting, records, maintenance.
- Are there written job descriptions for key personnel?
- What is general attitude of staff w.r.t.:
  - Superiors
  - Reactor operations
  - Health physics group
  - Experimenters
  - Regulatory requirements
  - Record keeping
- What is morale like?

2. Reactor Safety Committee

- Is the Charter complete and appropriate?
- Is the committee membership (numbers, disciplines, background) appropriate?
- Is the quorum appropriate?
- Is the meeting frequency correct?
- Is there a mechanism for urgent meetings?
- Are the functions of the committee appropriate?
- Are they being fulfilled?
- Does the committee have the necessary authority?

- In practice, can the operations staff control or load the committee to bias a vote?
- Are the committee meeting in accordance with TS 6.4.1?
- Does the committee perform the reviews listed in TS 6.4.2
- Does the committee perform the audits required in TS 6.4.3?
- Do the minutes include the information required in TS 6.4.5?

3. Operators

- How many operators/senior operators and shifts are there currently?
- How many of these actually operate, or just administrate?
- Is this adequate?
- What daily operator supervision is there?
- What is the RO/SRO change procedure?
- How are SRO absences handled?
- How many people are required in the building when the reactor is operating?
- Is the initial training appropriate and adequate?
- Is the requalification plan adequate?
- Does the requalification plan use performance based questions and training?
- Is there a routine review/checkout of operators?
- Are licenses being renewed in a timely fashion?
- Do operators know information they are supposed to know?

4. Procedures

- Are there procedures in existence for all areas required by TS 6.6:
  - Startup
  - Routine operation
  - Shutdown
  - Fuel movement
  - Core/experiment changes affecting reactivity
  - Preventive/corrective maintenance affecting reactor safety
  - Surveillance, testing, and calibration required by TS 4.0
  - Security and Emergency Plan implementing procedures
- Are there procedures in existence for other relevant areas such as:
  - Administrative/personnel
  - 50.59 Safety evaluations
  - Power calibration
  - Control rod calibration
  - Irradiation facilities use
  - Irradiations
  - Emergency operation
  - Ventilation systems
  - Accountability and control of SNM
  - Defects and non-compliance
  - Emergency power system
  - Audits

Records
Radiation Protection Practices

- Are the procedures adequate?
- Are procedures being followed?
- What mechanism ensures that procedural requirements are met?

5. Changes

- Are there mechanisms for changes to the following:
  - Procedures
  - Tests
  - Experiments
  - The facility
  - Emergency plan
  - Security plan
  - Requalification plan
- Are these mechanisms appropriate?
- How are the changes analyzed for unreviewed safety questions?
- How are they approved?
- How are they communicated?
- Are old versions archived?
- Are they retrievable?
- Are procedures etc. reviewed and updated on a routine basis?
- By whom, and how frequently?

6. Surveillance

- Is there a mechanism to ensure that surveillance and maintenance items (S&Ms) are performed?
- Is there a mechanism to ensure that S&Ms are performed in the right time interval (i.e., no creep or exceeding time limits)?
- That measurements etc. are all within the limits?
- Are all Technical Specification 4.0 requirements in S&Ms?
- Are other important S&M requirements in an S&M checklist?

7. Logs and Records

- Is an annual report produced by June 30 each year?
- Does the annual report contain the items listed in TS 6.9.1?
- Are the following records required by TS 6.10.1 kept?
  - Operating logbook, including required info.
  - Startup checkout
  - Power changes
  - Shutdown checkout
  - Installation/removal of fuel elements, control rods or experiments that could affect reactivity
  - Installation/removal of jumpers, tags, notices or other temporary changes to reactor safety circuitry
  - Rod worth measurements and other reactivity measurements
  - Principle maintenance operations
  - Reportable occurrences

TS 4.0 surveillance activities
Facility radiation and contamination surveys
Experiments performed w/reactor, including RAM transfer, etc.
Changes to operating procedures

- Are the following records required by TS 6.10.2 kept?
  - Gaseous and liquid effluents
  - Off-site env. monitoring surveys
  - Fuel inventories and fuel transfers
  - Radiation exposures for all personnel
  - Updated as-built drawings of facility
  - Records of transient cycles for those components designed for a limited number of cycles.
  - Records of training and qualification
  - Records of 50.59 reviews (also TS 6.4.2)
  - RSC meeting records
- Are the following Em. Plan records kept?
  - Summary report of drills
- Are the following procedural records kept?
  - Reactor use requests
  - Training file for each trainee/operator
  - Record of operations of each trainee/operator
  - Maintenance logbook
  - Malfunction logbook
- Are the following requalification plan records kept?
  - Operators individual file containing - license, exams, annual evaluations, requalification program checklist, summary of additional training.
- Are the following additional records required by good reactor operations practice kept?
  - Initial orientation and training
  - Security plan training
  - Operator Time log
  - Experiment log
  - Experimental facilities approved operator log
  - SNM accountability records
  - Byproduct material inventory
  - Source material inventory
  - Emergency plan training for local and support personnel
  - Emergency equipment inventory checks
  - RSC reviews/approvals/audits
  - Security maintenance log
  - Key log
  - HP records (do reactor operations personnel see or benefit from these?)
- Are records & logs archived?
- Are retention requirements being met? (Can a specific document be produced?)
- Are logs and records in good order. In particular, are/do they?
  - Legible?
  - Accessible?
  - Dated?
  - Corrected appropriately?
  - Contain sufficient data to reproduce events?

Have proper signatures?

- Do attendance records have printed names and signatures?

8. Experiments

- Is there a mechanism for reviewing and approving a new or substantially changed experiment?
- Is there a mechanism for reviewing and approving each irradiation?
- Do these assure:
  - Approved procedural methods?
  - Compliance with limits on experiments?
  - Isotope production within license limits?
  - Supervisor and Health Physicist's approval/knowledge?
  - Clear transfer of licensed material?
  - Appropriate encapsulation/health physics controls?
- How does an experimenter become licensed/authorized to receive radioactive material?
- Who has to be present when experiments are conducted?
- Do defined limits on experiments exist?
- Are experimenters aware of the Technical Specification limitations on experiments?

9. Emergency Response Plan

- Are the requirements of the plan being met?
- Is the emergency organization appropriate?
- Are staff currently aware of their responsibilities in the plan?
- How are the emergency responders activated?
- Are there clear written agreements for support agencies?
- Are the implementing procedures appropriate?
- Is training being conducted of the following?
  - Own personnel?
  - Support agency personnel?
- Are the drills adequate?
- Are the exercises adequate?
- Do they have observers/evaluators?
- Are emergency equipment lockers adequately stocked?

10. Physical Security Plan

- Are the requirements of the plan being met?
- Is the organization appropriate?
- Are staff currently aware of their responsibilities in the plan?
- How are the security responders activated?
- Are there clear written agreements for support agencies?
- Are the implementing procedures appropriate?
- Is training being conducted of the following:
  - Own personnel?
  - Support agency personnel?
- Are the drills adequate?
- Are the exercises adequate?

- Do they have observers/evaluators?

11. Health Physics Support

This is not an audit of the health physics program, but an attempt to determine if there is adequate health physics support for reactor operations, and an appropriate interaction between the health physics and reactor groups.

- Is there adequate health physics support of reactor operations in the following areas:
  - Effluent monitoring
  - Waste
  - Personnel monitoring
  - Calibrations
  - Sample monitoring
  - HP Instrumentation
  - Shipping of radioactive material
  - Area monitoring
  - HP training of workers
  - In house surveys
  - Environmental monitoring
  - Receipt surveys of radioactive material
  - Leak testing of sources
- Are there HP procedures in all of these areas?
- Are all the required and necessary HP records being maintained?
- Can reactor personnel get the HP monitoring support when it is needed?
- Do HP personnel unduly interfere with reactor operations?
- Do HP personnel have the authority to terminate work which may be overly hazardous?