Title:
Radiation Safety Program Audit

Approved by: _____

Steven Snay, Principal

Prepared by

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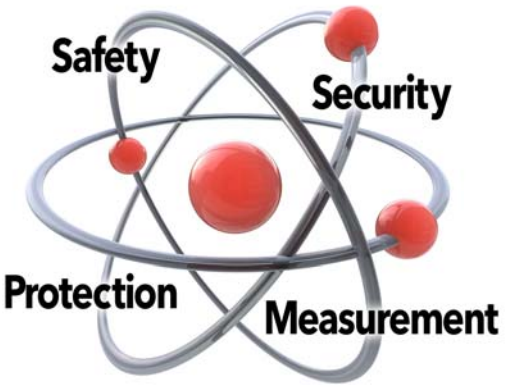

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1.0 Summary

A Radiation Safety Program Audit was performed for the Idaho State University. The onsite review occurred on September 23, 2019 through September 25, 2019, and included three auditors as identified in Section 4.0 below. The scope included all aspects of the ionizing radiation safety program and specifically those activities associated with the Nuclear Regulatory Commission (NRC) licenses for the campus broad scope, production, nuclear reactor, and Special Nuclear Material (SNM) from January 1, 2018 to present.

This audit included;

- License review,
- Procedure review,
- Review of records generated in support of program activities,
- Instrumentation review,
- Field observations of Authorized User activities,
- Interviews with users, radiation workers, and staff,
- Effluent release program,
- Radioactive material security
- Material receipt and shipping,
- Radioactive material inventory controls,
- Review of radiological surveillances, and
- Increased Controls

The audit did not include licensee activities of Non-Ionizing radiation (e.g. Laser, RF, etc.) or other non-NRC jurisdictional areas (e.g. radiation generating devices).

In general, the Radiation Safety Program functions are acceptable. There were no major safety issues identified during this Audit. Through interviews and interaction with staff, there is an evident staff awareness of radiation safety and engagement with the Radiation Safety Officer (RSO). There was a significant focus on safety for high risk (High Radiation Area) areas. All personnel actively engaged with the audit team. This was especially evident during a field walk downs in the Reactor, Accelerator and main campus locations.

There are no “findings” associated with this assessment that would indicate a fundamental and significant breakdown in the Radiation Safety Program. There were also no deficiencies observed and eighteen recommendations resulting from review of the program. These recommendations for program improvement are detailed below and in the attached audit checklist.

2.0 Audit Details

The following are audit definitions that apply to this assessment.

Finding – A fundamental and significant breakdown of the RP program that could have safety implications and will likely result in regulatory concerns. Root cause evaluation and corrective actions to prevent recurrence are expected.

Deficiencies - A departure from specified requirements as found in program, procedures, or regulatory guidance. There may be a minor potential for regulatory impact. Corrective action response is required.

Recommendations – Identified areas for improvement based on industry experience, best practices, industry standards, etc. Documentation of corrective action or brief statement of reason for not implementing expected.

2.1 Findings

NONE

2.2 Deficiencies

NONE

2.3 Recommendations

Recommendation 1:

Records prior to the current RSO, in support of license amendments, submitted to the NRC, were not all located.

Recommendation: *locate and retain all license correspondents to ensure a complete understanding of the entire program commitments*

Recommendation 2:

The RSO is continually checking the regulations to stay current but was unaware of the NRC announcement/subscription of services.

Recommendation:
The RSO should join the NRC Lyris subscription services to receive current bulletins, regulation changes, etc.
https://www.nrc.gov/public-involve/listserver.html#lyris

Recommendation 3:

All training records are compiled into a database that is used to determine appropriate retraining dates.

Recommendation: *remove unnecessary radiation workers from the database at a given frequency and communicate with workers in need of retraining*

Recommendation 4:

Recommendation 5:

The HP student staff is highly trained in their areas of work. One student was very knowledgeable on lab surveys, dose and contamination measurements, postings, and general lab requirements.

Recommendation: *create a credentialing document for the HP staff to benchmark the information they must learn to demonstrate proficiency in a given task. Only when the requirements are met and are signed off by the RSO or designee, will they be allowed to conduct that task independently.*

Recommendation 6:

As per survey requirements defined in TSO-08-07 Rev. 1 section A of "Laboratory Safety Procedure", the frequency of surveys is based upon allowable isotope activity in regards to its ALI. When prompted, it was not clear on how the survey frequency was determined.

Recommendation: *Create a clearly outlined method to determine the radioactivity to ALI ratio that determines the frequency of lab surveys.*

Recommendation 7:

Survey records were/are maintained and reviewed by the RSO. The records contained dose and contamination measurements, type of meter used but lacked the isotopes in the space.

Recommendation: *Survey record forms could be updated to include AU of lab, type of survey performed (e.g. annual, semi-annual, quarterly) isotopes used in the lab, and/or instruments necessary to adequately perform radiation surveys commensurate with the work being done in the lab.*

Recommendation 8 & 9:

The Radiation Safety Office is monitoring ~400 occupational workers or areas for radiation exposure. A sample of area monitoring dosimetry records were reviewed. In an unrestricted area, it is justified that one will receive less than 10% of the annual dose and therefore they are not required to wear a dosimeter. If an employee is excluded from entering a High Radiation Area then an external dosimeter is not needed. Given a history of low dosimetry results, a large portion of these badged users are well below 10% of the annual dose limit and in most cases the administrative limits.

Recommendation*: The RSO should consider a reduction of number of monitored radiation workers, removing any unnecessary assigned badges.*

Recommendation*: Add the "At the discretion of the Radiation Safety Officer" language to the radiation safety manual and associated dosimetry procedures to allow the RSO more freedom and control of the occupationally monitored population.*

Recommendation 10:

Based on capabilities of the Landauer OSL dosimetry statistical fluctuations in dose results in a quarterly monitoring program, it is not possible to determine a 1 mrem dose above its background measurement.

Recommendation*: Update the dose threshold with dosimetry supplier to allow for better statistical tracking of dosimetry results. An acceptable practice is to set the threshold from 1 mrem to 10 mrem.*

Recommendation 11:

Brief information on declaring a pregnancy is provided in the initial radiation worker training, additional information can be found in the Radiation Safety Manual.

Recommendation: *Update training or procedures to include the distribution of NRC Regulatory Guide 8.13 "Instruction Concerning Prenatal Radiation Exposure".*

Recommendation 12:

Quarterly and annual exposure records are reviewed by the Health Physics Staff. Records are available and are stored digitally.

Recommendation*: Create a form or memo to justify to regulators/inspectors that a certified review of quarterly and annual occupational dose reports are being conducted.*

Recommendation 13:

Radiation Safety currently stores control and spare dosimetry in a metal desk on the main campus. This setup reduces the absorbed background radiation dose which could result in false positive dose readings when the entire dosimetry batch is measured.

Recommendation*: Store spare and control dosimetry in a location that does not supress the dose results and is more than 6inches away from any concrete walls. This allows for a uniform flux of background radiation to penetrate the dosimetry.*

Recommendation 14:

In laboratories and throughout the Radiation Safety Manual, user guidance on proper waste techniques is lacking. There is no procedure written for waste handling.

Recommendation: *Create a radioactive waste handling procedure that provides user friendly guidance to aid in the waste process, separations, etc.*

Recommendation 15:

During the site visit, a fume hood in the pharmacy building was found due for calibration.

Recommendation*: include a fume hood review/check on routine radiation surveys to ensure proper calibration is met*.

Recommendation 16:

Decommissioning records contain a detailed plan that includes specific work done at the site to be decommissioned, building surveys, equipment surveys, and radioactive material shipments required from the decommissioning.

Recommendation: *Maintain a list of areas where possible contamination could reside after decommissioning has been completed. For example: duct work beyond fume hoods that were used for work with radioactive material and were unable to be removed at the time of decommissioning*.

Recommendation 17:

[redacted]

Recommendation 18:

The Reviewing Official has indicated there is no written documentation for the decision basis why individuals were either granted or denied unescorted access.

Recommendation: *Create written documentation for the access authorization program as to why an individual is either granted or denied unescorted access.*

3.0 Conclusion

This review determined that the RP Program at the Idaho State University System is adequate to ensure safety and regulatory compliance. There were NO findings identified and NO deficiency identified. All recommendations identified are areas for improvement, and need to be evaluated by management based on benefits to be gained and impact on organizational resources.

4.0 Assessment Personnel

Steven Snay (Auditor)
Robert Puckett (Auditor)
Alexis LaViolette (Auditor)

5.0 Personnel Contacted

John Longley (RSO)
Mason Jaussi (HP)
Jon Stoner (Chair of the RSC)
Scott Snyder (Vice President, License management representative)
Mary Lou Dunzik-Gougar (Reactor Director)
Ted Pollick (Senior Reactor Operator)
Lewis Eakins (Chief Security Officer)
Roy Dunker (Authorized User EML)
Blaine Gustafson (Student employee EML)
Kevin Claver (Laboratory manager EAL)
Abigail Eastman (Student employee EAL)
Pam Manglona (Student employee (EAL
Carl Crome (Student employee Radiation Safety)
Sandra Millard (Receiving clerk)
Ali Habashi (Authorized user Pharmacy)
Chad O'Neil (Accelerator operator)
Tim Gardner (Radiochemist)

6.0 Summary of Documents Reviewed

RSO delegation of authority
Radioactive materials license
Radiation Safety Manual
Procedure EHS-19-01 Radiation Safety Program Oversight
Procedure EHS-09-16 Rev 2 Radioactive Material inventory
Procedure EHS-18-01 Rev 1 100 mrem report
Procedure EHS-18-02 Rev 1 Dosimetry
Procedure TSO-08-05 Rev 0 NMMSS Report
Procedure TSO-08-04 Rev 1 Sealed Source Leak Tests
Procedure TSO-00-17 Rev 3 Radiation Use Application
Procedure TSO-08-07 Rev 1 Radionuclide Laboratory Safety
Procedure TSO-08-08-Rev 1 Radionuclide Laboratory Evaluations
Procedure TSO-08-09 Rev 1 Sewage Disposal of Non-Hazardous, Non-Toxic Radioactive Liquids
Procedure TSO-08-10 Rev 1 National Emission Standards for Hazardous Air Pollutants for Radionuclides (Rad NESHAPS)
Procedure TSO-08-12 Rev 1 Calibrations

Procedure TSO-08-15 Rev 0 Chain of Custody for Bioassay Urinalysis Samples
Procedure TSO-09-15 Rev 0 Operational Procedure for Shepherd and Associates Cs-137 sources
Procedure TSO-10-14 Rev 4 Shipment of Excepted Quantities of Radioisotopes
Procedure TSO-10-18 Rev 1 Receipt of Package containing Radioactive Material
ISU Radiation Safety Committee (RSC) Charter
ISU Radiation Safety Committee meeting minutes
2017-2018 Radiation Audits
2018 Radiation Surveys
2018 Leak Tests
2018 Dosimetry Records
Various radiation shipment and receipt papers
Radiation Instrument Calibrations
Increased Control Program Documents
ISU Radiation Training Program Documents
ISU Radiation Effluent Discharges
Radiation Safety Postings
Decommissioning Report Airport Facility
Laboratory Decommissioning Surveys

Attachment 1

Audit Check List

1.0 RADIOACTIVE MATERIAL LICENSE, PROGRAMS, AND PROCEDURES				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
1.1	Licensed Activities	Review license and associated programs to ensure activities performed are adequately described on the license • Specific actions required by the license Conditions are covered by procedures • Personnel identified in license are current	The following licenses were reviewed for content. • NRC Broadscope license 11-27380 (amendment 37 Exp 2/29/2020), • NRC Special Nuclear Material license SNM-1373 (amendment 5, Exp 8/11/2021), • NRC production license 11-27380-04 (Amendment 5, exp. July 31, 2024), and • Reactor license R-110. The RSO on the licenses is John Longley CHP and the RSC chairperson is Jon Stoner, of which both are current.	**SAT**

1.0 RADIOACTIVE MATERIAL LICENSE, PROGRAMS, AND PROCEDURES				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
1.2	Radiation Protection Program	Review the RP Program to ensure it is adequate for the size and scope of licensed activities and that it contains appropriate controls including an ALARA provision	The RP program is comprised of two full time Health Physicists and supported by student staff. The radiation use on campus includes a nuclear reactor, particle accelerators, source production, and various campus research. With a very diverse range of radiation use, it is imperative the staffing is retained with relevant experience. The number of radiation safety staff should be maintained that it is commensurate with the amount of use.	**SAT**

1.3	Amendments and Program Changes	Review license and program documents to determine if amendments to the license were properly implemented since last review; • If applicable, program and procedural changes were approved and implemented in accordance with license conditions • No material changes to procedures submitted as part of the license were made that affect the license commitments	The radiation safety program has communicated to the NRC with relevant changes and received amendments specifically since the new RSO. These records form the basis of what specific commitments occurred and what is tied to the license (broadscope section 30). Records prior to the current RSO, in support of a license amendment, submitted to the NRC, were not all located. ***Recommendation:*** *locate and retain all license correspondents to ensure a complete understanding of the entire program commitments.* The RSC meets to review new users, uses, and procedural changes. A vote to approve is recorded in the minutes. A list of program procedures is retained in an encompassing safety Excel worksheet (along with monthly and weekly tasks) where the procedure (listed with a link) is displayed. Every radiation safety staff member must review and be trained on each procedure.	**SAT**

1.0 RADIOACTIVE MATERIAL LICENSE, PROGRAMS, AND PROCEDURES				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
1.4	Regulator Licensee Correspondence	Review records to determine if licensee has records of all applicable NRC/Agreement State bulletins, notices, newsletters etc. and has taken appropriate response to such.	The RSO is continually checking the regulations to stay current but was unaware of the NRC announcement/subscription of services. ***Recommendation:*** *The RSO should join the NRC Lyris subscription services to receive current bulletins, regulation changes, etc.* https://www.nrc.gov/public-involve/listserver.html#lyris	**SAT**

2.0 MANAGEMENT OVERSIGHT AND ORGANIZATIONAL STRUCTURE				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
2.1	Organizational Structure	Review organization charts and discuss organization with management and employees to determine: • Organization is adequately described in licensing documents and covers scope of activities performed • Staff size is adequate for program • Senior licensee management is appropriately involved with the radiation safety program and or RSO oversight	The Radiation Safety Program is managed by the Radiation Safety Officer (RSO) whom reports directly to the Vice-President of Research (VPR) whom is the designated management representative and licensee for all licenses. The license commitments reference the RSO, RSC, and VPR relationship through the Radiation Safety Manual (RSM). It is evident through license correspondence and attendance at the RSC meetings that the VPR is involved and aware of the program. The manual describes, in detail the responsibilities of the RSO, RSC, RSC Chair (RSCC), the Authorized User (AU), and the responsible user. The RSM (rev. 12) is quite wordy and can be confusing in some sections. This was brought to the attention of the RSO and RSCC, which have been working to address this. They are making the RSM more user friendly with specific locations to find all the task needed by the AU, responsible user, etc.	**SAT**

2.0 MANAGEMENT OVERSIGHT AND ORGANIZATIONAL STRUCTURE				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
2.2	Radiation Safety Officer	Review license documents and discuss organization with management and employees to determine: • The individual performing RSO duties is named on the license and users are familiar with the RSO • The RSO has sufficient time and adequately fulfils his/her duties • RSO has documented Stop Work Authority for Rad Safety issues per RSC	John Longley is an American Academy of Health Physics (AAHP) board Certified Health Physicist (CHP) with years of experience in the operations of a radiation safety program. Through communications, it is evident Mr. Longley is aware and capable of the running of a Radiation Safety Program. The RSO and staff are overburdened due to the complexity of the radiation safety program and the amount of sources, users, and tasks that must be conducted for compliance. The delegation of authority letter was written by the VPR on August 27, 2019. The letter included relevant language to document “stop work authority” and the responsibilities the RSO has over the program.	**SAT**

2.0 MANAGEMENT OVERSIGHT AND ORGANIZATIONAL STRUCTURE				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
2.3	Authorized Users (AU) /Principle Investigators/ registered users	Review records and perform field observations to determine: • Individuals using licensed materials are authorized or supervised by AU • Users are adequately using and controlling material • Proper staff is in place to perform licensed activities	As per the RSM, the AU responsibilities (page 25-26) are described in detail. Specifically the RSM details AU instruction and oversight for all personnel under their purview for radiation safety, accurate inventory, accident notification, and acquisition of relevant safety equipment. Responsible users are instructed on their responsibilities in training and in the RSM (pages 26-28) specifically participating in training, providing information necessary for dosimetry, maintaining records, and a clear communication line without ramification for safety concerns.	**SAT**
2.4	Radiation Safety Committee	Review RSC/ALARA meeting minutes and activities to determine if RSC if fulfilling its function to: • Adequately audit and oversee program • Authorize activities and users as allowed by the license	The RSC is required to meet four times per year to review and approve users, conduct audits, ALARA performance, annual safety policy review, and review compliance issues. All responsibilities are described in the RSM (Pages 19-23) and in the “Radiation Safety Committee Meeting Minutes” procedure TSO-08-06 Rev 0. All RSC meetings occurred and contained a quorum, which is greater than 50% of the membership. Radiation doses of over 100mrem/year were reviewed as part of the ALARA review.	**SAT**

2.0 MANAGEMENT OVERSIGHT AND ORGANIZATIONAL STRUCTURE				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
2.5	Condition Reporting and Event Follow-up	Review records to determine: • Review all condition reports since last annual audit to assess threshold, timely action, and appropriate closure. • Abnormal events are adequately reported documented • Management performs adequate event resolution activities • Evaluate any trend analysis or RP tracking matrices	Several NRC inspections resulted in violations of which, all have been discussed with the RSC. Some issues have already been resolved. Other violations have a plan to address or identify the causes. Outside support was/is used to address or identify issues for improvement and to recommend changes. Outside support is also used to conduct a “causual analysis” to rectify confirmatory order EA-18-153.	**SAT**
2.6	Program Audits	Review records to determine if appropriate audits are being performed on the radiation protection program and that: • Audits are conducted as required by procedures • Content and implementation of the radiation protection program is reviewed annually [Ref 20.1101(c)] or similar State regulations. • Records of audits are complete and maintained [Ref 20.2102] or State regulations	Audits are conducted by the RSC annually. After review of the audit template, a new revision of the audit was created for future use. Past audits include all relevant information for program review. The current audit template specifically determines a calendar year review period. The audit is scheduled to occur every April. The internal audit template contains a more robust format that encompasses specific program information. The audit template includes review of access controls, lab inspection reviews, trainings, calibrations, etc.	**SAT**

3.0 TRAINING, RETRAINING, AND INSTRUCTIONS TO WORKERS				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**

3.1	Training Program	Review training program to determine adequacy for size and scope of licensed activities. • RSO Training • RP Professional Staff • Authorized Users/PI Training • Radiation Workers Training/retraining • Program is described in facility documents • Personnel involved with shipments are trained in hazards per DOT regulations • Review current records	The RSO is a CHP and as such must partake in continuing advancement to maintain the certification. The HP full time staff are all graduates with a masters in Health Physics. All RAD shippers have DOT shippers training and certificates dated 6/7/2019 and 2/21/19 were reviewed. All radiation workers must complete the online form, training, and a study guide. The online training covers: organizational structure, responsibilities, radiation interactions, units, dosimetry, background levels, limits, ALARA policy, training, area classifications, monitoring, records, emergency response, and contacts. All training records are compiled into a database that is used to determine appropriate retraining dates. ***Recommendation:*** *remove unnecessary radiation workers from the database at a given frequency and communicate with workers in need of retraining.* The online annual training is robust and is supplemental to the Authorized Users site specific training. The training is outdated and references an old point of contact for the RSO and staff. The training quiz is hosted online as a URL based exam with 27 well-worded questions. [redacted]	**SAT**

3.0 TRAINING, RETRAINING, AND INSTRUCTIONS TO WORKERS				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
			[redacted] ***Recommendation:*** [redacted]	

3.0 TRAINING, RETRAINING, AND INSTRUCTIONS TO WORKERS

Item Number	Audit Area	Audit Methods	Audit comments	Sat/ Unsat
3.2	Worker Knowledge	Interview workers and perform walk downs and field assessments to determine if: • Workers have access to license, program material, and procedures • Workers have a clear understanding of regulations, procedures and safe use practices including o Responsibility as an Employee o 10CFR19 & 20 requirements o RP Program o RM security o Annual dose limits o Declared Pregnant Women procedures and limits o Procedures for opening packages o Emergency procedures • Supervisors are clear on their responsibilities to manage users and events	After communicating with many researchers across campus, it was evident that the staff was aware of their responsibilities and requirements, dose limits or where to find them, room security, emergency procedures, etc. The Authorized Users (AU) were knowledgeable on their roles in training their staff as well as the training requirements for a radiation worker. The following radiation workers surveyed: Roy Dunkin, Kevin Claver, Blaine Gustafson, Abigail Eastman, Pam Manglona, Chad O'Neil, Tim Gardner, and Carl Crome were questioned on their training status and confirmed to be trained in Radiation Safety's database. The HP student staff is highly trained in their areas of work. One student was very knowledgeable on lab surveys, dose and contamination measurements, postings, and general lab requirements. ***Recommendation:*** *create a credentialing document for the HP staff to benchmark the information they must learn to demonstrate proficiency in a given task. Only when the requirements are met and are signed off by the RSO or designee, they will be allowed to conduct that task solo*.	**SAT**

4.0 FACILITIES

Item Number	Audit Area	Audit Methods	Audit comments	Sat/ Unsat
4.1	Facility Design and Use	Review facilities and determine if facilities are in place as they are described in license and that: • Material use areas are used as designed • Access control measures are in place, and access control procedures are being followed • Radioactive material controls are integral to the facility layout • Proper engineering controls are being utilized to minimize contamination • Calibration facilities are adequate for equipment being calibrated • Proper shielding is in place, and controlled as part of the facility programs • Ventilation is adequate and in place as designed, per license submittal, and tested periodically as appropriate • Area monitoring program is in place per procedures, adequate for purposes, and is evaluated routinely	Access controls are adequate for restricted areas requiring prior training and clearance. Approved shielding plans are reviewed at the RSC. After review of several labs, it was clear the source positioning was conducive to ALARA practices, where the source cabinets were set aside from the general lab space and/or in a shielded configuration. The calibration lab is set up in a way where wall shielding and scatter radiation are negligible with respect to the total dose. At the IAC, ventilation is adequate to remove any potential airborne releases in the space. Although it is not necessary due to their standard operating procedure. Where applicable, vault doors and interlocks are incorporated to prevent unauthorized access to elevated radiation fields.	**SAT**

4.2	Radiological Areas	Perform field observations to determine if regulatory required controls are in place as appropriate for • Radiation Area • High Radiation Area • Radioactive Materials Area • Includes access controls, locks, monitoring, training,	Radiation areas were properly posted with appropriate signage and radiation source security. There were multiple levels of redundant access controls for areas requiring amplified source security. At certain locations fixed radiation detectors were incorporated for area monitoring. Verifying dose levels at a remote location is a great ALARA practice.	**SAT**

5.0 RADIOACTIVE MATERIAL CONTROL				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
5.1	Radioactive Material Quantities	Review isotopes, quantities, and use of radioactive material to determine compliance with license limits per Condition 6, 7, and 8, • Are procedural controls in place to verify license quantity limits are met	The RSO established isotope quantity limits for AU permits to ensure that site license limits are not exceeded. Upon review of several isotopes on campus and cross checking with the license limit, license conditions 6, 7, and 8 were not exceeded. For example, the current inventory of Fe-55 was viewed and compared to the license limits from source section AD of the radioactive materials license. This process confirmed the activity to be below the allowable limit. The RSO has a database query that tracks total source inventory and correlates to licensable limits.	**SAT**

5.0 RADIOACTIVE MATERIAL CONTROL

Item Number	Audit Area	Audit Methods	Audit comments	Sat/ Unsat
5.2	Security	Review material storage and control to determine proper security including: • Access controls to handle routine material • Security for sources of concern exceeding levels requiring heightened security (Category 1 or Category 2 sources per 10CFR 20 Appendix E)	Radiation sources were located within secured rooms and in many cases were secured in cabinets. All staff surveyed had a “questioning attitude” approach to visitors in their space. In many scenarios, staff felt comfortable about contacting the RSO about items of concern or questions relating to radiation safety.	**SAT**
5.3	Sealed Source Inventories/Leak checks	Review sealed source and material inventories to ensure: • Sealed source inventories are conducted at appropriate (i.e. 6 months) intervals on required sources. • Appropriate source inventory and leak testing procedures are in place. • Records are maintained with appropriate information	A monthly task sheet was assembled to assist in tracking source inventory verification frequency, who the inventory verification is assigned to, and the completion of the inventory verification. As per license commitments, and procedure TSO-08-04 Rev. 1 “Sealed Source Leak Test” source inventory verification and sealed source leak tests are required to be conducted on a semi-annual basis for beta/gamma and quarterly for alpha sources. A “Leak Test Worksheet” including Liquid Scintillation Counter (LSC) data is maintained and reviewed by the RSO.	**SAT**

5.0 RADIOACTIVE MATERIAL CONTROL				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
5.4	Irradiator Safety	Review program elements for a facility irradiators • Training • Security • Safety • Monitoring/Alarms	See section 12	**N/A**
5.5	Permits (Rad)	Review permit program • Procedures • Permit Audit/review program • Permit Content and Controls • Permit termination	Every two years all permits expire on the same date. The RSO reviews the program, activities, restrictions, and space before approval.	**SAT**

6.0 SURVEYS AND MONITORING				
Item #	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**

6.1	Survey Instruments	Review instrument records and perform field observations to determine if: • Appropriate types and quantity of operable survey instrumentation is possessed and readily available for both RP use and Lab use • Instruments are appropriately calibrated as required • Calibrations are traceable to NIST • Pre-use operational checks are performed on scales used (daily) • Calibration records are maintained • Instruments used are appropriate to detect expected radionuclides and activities • Performance Charts/Records are maintained for Laboratory instrumentation (daily) • Records are reviewed , as appropriate by facility management • LSC equipment is appropriately calibrated and maintained per manufacturer recommendations • Gamma Spectrometry equipment is appropriately calibrated and maintained	An inventory of survey instruments demonstrates adequate total and variety of instrumentation for the permitted isotopes on the license. As per the procedure TSO-08-12 Rev. 1 “Calibrations,” dose responding meters are calibrated on-site using a NIST traceable Cs-137 source that requires calculation of exposure at appropriate distances prior to use. The detector is never placed closer than 30cm to prevent non-uniform irradiation. Detectors used for contamination are calibrated on-site using an electronic pulser and are efficiency checked for the isotopes of concern. A monthly task sheet is available to assist in tracking the frequency of survey meter calibration, who the calibration is assigned to, and completion of the calibration. After observing staff, pre-operational use and source checks were performed on detectors before surveys are conducted. LSC equipment was calibrated as necessary before daily use. Gamma spectrometry equipment is calibrated and maintained as necessary.	**SAT**

6.2	Radiation and Contamination Surveys	Review survey requirements, records, and perform field observations to determine if: • Radiation and contamination surveys are being performed as required per procedures • Radiation and contamination levels are within administrative and regulatory limits • Proper survey records are maintained and reviewed by management • Perform field observations to determine if loose radioactive material is being handled to minimize contamination and that contamination is being controlled.	As per survey requirements defined in TSO-08-07 Rev. 1 section A of "Laboratory Safety Procedure", the frequency of surveys is based upon allowable isotope activity in regards to its ALI. When prompted, it was not clear on how the survey frequency was determined. ***Recommendation:*** *Create a clearly outlined method to determine the radioactivity to ALI ratio that determines the frequency of lab surveys*. A monthly task sheet is available to assist in tracking survey frequency, whom the survey is assigned to, and completion of the survey. Radiation surveys are performed to assure that radiation fields and radioactive material contamination levels are within administrative and regulatory limits. Decontamination procedures per requirements in TSO-08-07 Rev. 1 "Laboratory Safety Procedure" are followed in the event laboratory contamination is found. Survey records were/are maintained and reviewed by the RSO. The records contained dose and contamination measurements, type of meter used but lacked the isotopes in the space.	**SAT**

6.0 SURVEYS AND MONITORING				
Item #	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
			Recommendation: *Survey record forms could be updated to include AU of lab, type of survey performed (e.g. annual, semi-annual, quarterly) isotopes used in the lab, and/or instruments necessary to adequately perform radiation surveys commensurate with the work being done in the lab.* Radiation workers were interviewed on radioactive contamination practices. It was clear that radiation workers understood how to control radioactive material and use good practices in minimizing contamination. This includes working only in designated areas in addition to taking frequent surveys.	

6.3	Air Sampling and Monitoring	Review air sampling and monitoring records to determine if air sampling/monitoring is being performed as appropriate • Types on hand are adequate of X-ray use, Rad material use, Accelerator use, and Reactor use • Flow rate equipment used is appropriately calibrated at required frequencies • Sample analysis results are reviewed • Determine if any respiratory protection program is in use and maintained IAW industry standards (e.g. NUREG-0041) • Required records are maintained	Activity and mass balance computations are used to estimate airborne radioactivity releases from Cu-67 production operations. The 2018 summary of "Airborne Radioactive Materials to the Environment" Radiation Safety used the EPA comply code, release parameters, source information, and receptor locations to determine conservative doses due to the releases. No limits were exceeded. Lapel samplers are used when the potential for intakes could exist (decommissioning, etc.). One specific occurrence for lapel monitoring was during a decommissioning evolution (6/27/19). The lapel sampler was calibrated using a calibrated flow meter. The flow meter calibration by Qal-Tek (Due 10/17/19) was sufficient. The lapel sampler wear time recorded on the RSO logbook, entries were sufficient. After a lapel sampler is worn, the user External Dose Equivalent (EDE) is calculated on a report along with counting data (counts, MDA, efficiency) and DAC. The Total EDE for all measurements have been determined to be negligible with respect to the users other monitoring (EDE) Recommendation: Create a lapel monitoring limit where if exceeded, the RSO would combine with their other montoring methods such as	**SAT**

6.0 SURVEYS AND MONITORING				
Item #	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
			requesting bioassay, combine with dosimetry, etc.	
6.4	Member of the Public Surveys	Review records and evaluations of public dose to ensure that: • Adequate surveys are made to demonstrate either that if an individual were continuously present in an unrestricted area, the external dose would not exceed 100 mrem in a year • Unrestricted area radiation levels do not exceed 2 mrem in any one hour • Exposure limits can be assessed by prospective analysis, establishing a constraint value, or through effluent monitoring • Records are maintained documenting public dose	As part of their commissioning and frequent surveys, radiation safety staff conducts radiation monitoring in public spaces around radiation laboratories. Radiation safety has positioned area dosimetry across campus to demonstrate compliance with public dose requirements.	**SAT**
6.5	Independent environmental Monitoring	Compare the results of auditor monitoring to site records to evaluate if radiation levels or contamination levels are being recorded accurately.	No auditor onsite measurements were taken.	**N/A**

6.0 SURVEYS AND MONITORING				
Item #	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
6.6	Emergency Response	Review emergency response and spill response procedures. • Evaluate readiness (spill kits) • Inventory of spill kits • Current contact information up to date • Personnel decontamination methods and facilities availability	The Radiation Safety Office has spill kits prepared in the event that they need to respond to a radioactive spill. As per section 19 of the RSM “Emergency Preparedness and Response” radiation workers are aware of how to respond in the event of a radioactive spill. During site visits emergency contact information was/is posted, up to date, and was/is accessible to radiation workers.	**SAT**

7.0 POSTING AND LABELING

Item Number	Audit Area	Audit Methods	Audit comments	Sat/ Unsat
7.1	Part 19 Postings	Perform field observations to determine that: • "Notice to Workers" is posted • Parts 19, 20, 21, Section 206 of Energy Reorganization Act, procedures adopted pursuant to Part 21, and license documents are posted, or a notice indicating where documents can be examined is posted	A visual inspection of the radiation workspace was conducted. As required by 10 CFR 19 the current revision of "Notice to Workers" is posted in areas visible to radiation workers. The NRC form 3 posting was also found in both English and Spanish.	**SAT**
7.2	Facility Postings	Perform field observations to determine if regulatory required postings are in place as appropriate including: • Very High Radiation Areas • High Radiation Areas • Radiation Areas • Radioactive Materials Areas • Airborne Radioactive Materials Determine if other area postings are in place as may be required by procedures including: • Restricted Areas • Contaminated Areas • Neutron Exposure Areas • Low Dose Waiting Areas	As required by 10 CFR 20 radiation area postings, restricted area postings, and contaminated area postings were in place where required.	**SAT**

7.0 POSTING AND LABELING				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
7.3	Labels	Perform field observations to determine if radioactive material are labelled in accordance with regulatory requirements as well as facility procedures • Consistency of labelling program between labs	From field observation, proper labelling of radioactive material is being performed in accordance with 10 CFR 20 as well as the EHS-09-16 Rev. 2 “Radioactive Material Inventory” There is a consistent labelling program across all laboratories.	**SAT**

8.0 INTERNAL AND EXTERNAL DOSIMETRY

Item Number	Audit Area	Audit Methods	Audit comments	Sat/ Unsat
8.1	Evaluation of Required Monitoring	Review records and interview workers to determine if an appropriate documented evaluation has been performed to justify unmonitored workers will not receive >10% of allowable limits Review procedures to determine if the adequate and appropriate population is being monitored for occupational dose.	The Radiation Safety Office is monitoring ~400 occupational workers for radiation exposure. A sample of area monitoring dosimetry records were reviewed. In an unrestricted area, it is justified that one will receive less than 10% of the annual dose and therefore they are not required to wear a dosimeter. If an employee is excluded from entering a High Radiation Area then an external dosimeter is not needed. Given a history of low dosimetry results, a large portion of these badged users are well below 10% of the annual dose limit and in most cases the administrative limits. ***Recommendation**: The RSO should consider a reduction of number of monitored radiation workers, removing any unnecessary assigned badges.* ***Recommendation**: Add the "At the discretion of the Radiation Safety Officer" language to the radiation safety manual and associated dosimetry procedures to allow the RSO more freedom and control of the occupationally monitored population.*	**SAT**

8.0 INTERNAL AND EXTERNAL DOSIMETRY

Item Number	Audit Area	Audit Methods	Audit comments	Sat/ Unsat
8.2	External Dosimetry Supplier	Review records and facility requirements to ensure dosimetry used is in accordance with commitments and that: • Dosimetry is performed by a NVLAP certified supplier • Dosimetry is changed at the required frequency per facility procedures • If secondary dosimetry is used, those dosimetry devices are calibrated and compared to official dosimetry results	The Radiation Safety Office is using Landauer as their dosimetry supplier. Landauer is NVLAP certified vendor. Dosimetry is exchanged quarterly, which is commensurate with action levels and doses received. Based on capabilities of the Landauer OSL dosimetry statistical fluctuations in dose results in a quarterly monitoring program, it is not possible to determine a 1 mrem dose above its background measurement. ***Recommendation****: Update the dose threshold with dosimetry supplier to allow for better statistical tracking of dosimetry results. An acceptable practice is to set the threshold from 1 mrem to 10 mrem.* Electronic personal dosimeter and pocket dosimeters are used for real time dose measurements and are not used for occupational dose records. Calibration records of electronic personal dosimeters were sampled.	**SAT**

8.0 INTERNAL AND EXTERNAL DOSIMETRY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
8.3	External and Internal Dosimetry Evaluations	Review records to determine if evaluations and calculations for external or internal doses have been conducted using industry acceptable methods and surveys and dosimetry results to support calculations are readily available	Whole body and extremity dosimetry is the method for tracking external occupational dose. During the scope of this audit, no external dose investigations were performed. There were no occurrences where dose investigations were needed due to absent whole body dosimetry. Radiation workers wearing lead aprons have their doses reduced by a factor of 0.3, which is an industry standard acceptable adjustment. Landauer has the calculation listed on the dose report. Lapel sampling is used to monitor internal dosimetry in certain evolutions (see section 6.3). Internal dosimetry is not required based on the current use.	**SAT**

8.4	Dosimetry Limits	Review records to determine if: • Workers are being assigned appropriate administrative or regulatory limits • Controls are in place to adhere to the limits • Declared Pregnant Worker procedures are in place • Exposures are Maintained ALARA	Appropriate administrative limits are set in place for whole body, extremity, and minor dosimetry. The current administrative limits are more stringent than the regulatory limits. ALARA administrative investigations were initiated for users who received doses exceeding the set administrative limit. Good ALARA practices were utilized upon investigation to help reduce further exposure. A selection of dosimetry records were reviewed and the exposures were ALARA. There were no minors monitored for occupational dose during the scope of this audit. The Radiation Safety Program has a declared pregnant worker established procedure. Additional dosimetry monitoring is provided when a radiation worker declares their pregnancy. Brief information on declaring a pregnancy is provided in the initial radiation worker training, additional information can be found in the RSM. ***Recommendation:*** *Update training or procedures to include the distribution of NRC Regulatory Guide 8.13 "Instruction Concerning Prenatal Radiation Exposure".*	**SAT**

8.0 INTERNAL AND EXTERNAL DOSIMETRY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
8.5	Dosimetry Records	Review records to determine: • NRC Form 4 “Cumulative Occupational Exposure History” records are complete: • NRC Form 5 “Occupational Exposure Record for monitoring Period” are complete • Records of internal and external dose evaluations are complete and on file	Radiation Safety has requested previous occupational dose history (NRC Form 4 or equivalent) for applicable radiation workers. Radiation Safety distributes NRC Form 5 “Occupational Exposure Record for monitoring Period” to applicable radiation workers on an annual basis with all necessary and relevant information. Quarterly and annual exposure records are reviewed by the Health Physics Staff. Records are available and are stored digitally. ***Recommendation****: Create a form or memo to justify to regulators/inspectors that a certified review of quarterly and annual occupational dose reports is being conducted.*	**SAT**

8.0 INTERNAL AND EXTERNAL DOSIMETRY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
8.6	Dosimetry Storage	Review the storage location of control and spare dosimetry. Determine if current arrangement is appropriate.	Radiation Safety currently stores control and spare dosimetry in a metal desk on the main campus. This setup reduces the absorbed background radiation dose which could result in false positive dose readings when the entire dosimetry batch is measured. ***Recommendation****: Store spare and control dosimetry in a location that does not supress the dose results and is more than 6inches away from any concrete walls. This allows for a uniform flux of background radiation to penetrate the dosimetry.*	**SAT**

9.0 RADIOACTIVE WASTE MANAGEMENT				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
9.1	Storage and Packaging	Review records and perform facility walk downs to determine if waste storage and packaging are performed in accordance with facility procedures and that a tracking mechanism in place • Inventory or log of waste on hand is maintained • Any mixed waste is kept separate form radioactive material waste	As per section 17 in the RSM "Radioactive Waste Management" Radioactive waste is stored properly to meet specifications for segregation and packaging. This includes a record keeping system to account for all radioactive waste on-site or shipped for disposal. In laboratories and throughout the RSM, user guidance on proper waste techniques is lacking. There is no procedure written for waste handling. ***Recommendation:*** *Create a radioactive waste handling procedure that provides user friendly guidance.*	**SAT**

9.0 RADIOACTIVE WASTE MANAGEMENT				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
9.2	Decay in Storage	Review decay-in-storage requirements and processes to determine if radioactive waste is being decayed and disposed in accordance with facility procedures and regulatory guidance (NRC RIS 2004-17) • Drum monitor operational records • Calibration procedures on Drum monitor • Technical basis document on Drum Monitor	As per section 17 of the RSM "Radioactive Waste Management," radioactive material with half-lives less than 120 days will be held for at least ten half-lives once transferred to waste storage. Waste container labels include activity, isotope, dose rate, date container was opened, estimated date of release, and any other precautions specific to the waste.	**SAT**
9.3	Waste Disposal	Review records to determine if waste is being disposed of at appropriate facilities and that records of disposal are being maintained	Waste manifests were reviewed and compliant with waste disposal procedures and regulations.	**SAT**

9.0 RADIOACTIVE WASTE MANAGEMENT				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
9.4	Effluents	Perform a review of records and interview site employees to determine if effluent pathways, controls, and discharges are being performed in accordance with regulatory and program requirements (Airborne/liquid) • Effluent ALARA is being practiced • Review Effluent releases • Review Effluent release calculations and semi-annual reports	All effluents are summarized in the annual "Airborne Radioactive Materials to the Environment" document (refer to section 6.3). In many cases, material is handled in fume hoods, or where other engineering controls are incorporated to reduce personnel exposures. During the site visit, a fume hood in the pharmacy building was found due for calibration. ***Recommendation****: include a fume hood review/check on routine radiation surveys to ensure proper calibration is met*.	**SAT**
9.5	Waste Equipment	Review equipment used for waste storage, packaging, and discharges to determine operability in accordance with license requirements and procedures	All equipment reviewed was in acceptable condition. Items reviewed included storage drums of good integrity and functioning freezer storage. The waste room was adequately secured through multiple key access control. All labelling was acceptable and legible.	**SAT**

9.0 RADIOACTIVE WASTE MANAGEMENT				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
9.6	Sink Disposal	Review sink disposal records by observation at posted inventory. • Review RP collected records to demonstrate use each monitoring period • Ensure records support State monthly average limits • Review basis assumptions for calculations (volume)	A review was conducted of the sink disposal records from 2018-2019, a few discharges occurred. The report included all relevant discharge information such as the location, isotope, quantity, and concentration. In a worksheet, this data was used to compare the release to their respective limits. During a site visit, sink disposal location and procedures were reviewed.	**SAT**

10.0 RECEIPT AND TRANSPORT OF RADIOACTIVE MATERIAL				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
10.1	Material Receipt	Review material receipt records to determine if receipt surveys and inspections are being performed in accordance with appropriate written procedures and requirements including: • 3 hour survey requirement for labelled package • Type A package receipt is scheduled • Damaged package surveys • Notifications of damaged packages • Records of receipts / transfers	Procedure TSO-10-18 Rev. 2 “Receipt of Package Containing Radioactive Material” was well-worded and included relevant information to support a proper receipt. The central receiving staff, Sandra Millard, was questioned about her role in receiving material. Sandra was able to identify all the relevant labels, was knowledgeable on package refusal, understood the three-hour receipt limit, and was comfortable communicating to the RSO. On site, the packages are placed in a source safe to ensure security of the material before it is picked up by the radiation safety staff. Sandra was trained by the RSO on 3/21/19.	**SAT**
10.2	Shipment Classification	Review shipment paperwork to determine if packages are properly classified as: • DOT Exempt • Limited Quantity • Type A • Survey records are available • Procedures are in place that provide direction	Radioactive shipments were reviewed to determine if the RSO is properly classifying outgoing radioactive shipments. From a sampling, it was clear the shipments were accurately classified given the isotope activity, form, and type of package.	**SAT**

10.0 RECEIPT AND TRANSPORT OF RADIOACTIVE MATERIAL				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
10.3	Packages	Review records and perform observations to determine if: • Authorized packages are used in accordance with regulations and site procedures [Ref 173.415, 173.416(b)] • Packages are closed and sealed during transport [173.475(f)] • Liquid shipments contain absorbent materials that will absorb twice the volume of the liquid	After communicating with radiation safety staff, packages are certified (for Type A), secured in transport, and properly monitored. When preparing outgoing radioactive shipments, an authorized shipper follows a quality assurance checklist. The checklist is used to assure the shipment is using approved packages [Ref 173.415, 173.416(b)]. The packages in the shipment are closed/sealed and liquid shipments contained the suitable amount of absorbent material.	**SAT**
10.4	Markings and Labels	Perform observations and review packages to determine proper shipping markings and labels are applied	The Health Physics Staff are applying the proper shipping markings and labels to outgoing radioactive shipments. The quality assurance checklist assures packages have the accurate labels and markings.	**SAT**

10.0 RECEIPT AND TRANSPORT OF RADIOACTIVE MATERIAL				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
10.5	Shipping Papers	Review shipping papers and determine if they are prepared, readily accessible during transport, and used in accordance with regulations and procedures [Ref 172.200(a)] and include: • Proper Shipping Name, • Hazard Class, UN Number, • Quantity, • Package Type, • Nuclide, • RQ, • Radioactive Material, • Physical and Chemical Form, Activity, • Category of label, • T1, • Shipper's Name, • Certification and Signature, • Emergency Response Phone Number, "Cargo Aircraft Only" (if applicable)} [ref 172.200-204]	A large sample of shipping papers were reviewed. It was clear from the sample that the shipments are being properly prepared with applicable regulations and procedures. The reviewed shipment paperwork included all relevant and necessary information.	**SAT**

10.0 RECEIPT AND TRANSPORT OF RADIOACTIVE MATERIAL				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
10.6	Shipping Vehicles	Review shipping records and perform observations, as applicable, to determine if: • Cargo blocked and braced [177.842(d)] • Placarded, if needed [172.504] • Proper overpacks, if used (shipping name, UN Number, labelled, statement indicating that inner package complies with specification package) [173.25]	Shipping across campus is conducted in state vehicles and all transporters of packages (as long as placarding is not required) are Haz-Mat trained.	**SAT**

11.0 DECOMMISSIONING

Item Number	Audit Area	Audit Methods	Audit comments	Sat/ Unsat
11.1	Decommissioning Records	Perform a review of records to determine if records of information important to the safe and effective decommissioning of the facility maintained in an independent and identifiable location until license termination and they include all information • Review records of lab terminations for previous users • Review any decommissioning records currently maintained	Records of lab terminations include authorized user assigned to area, isotope use history in the area, and a detailed description on the decommissioning process. Decommissioning records include a detailed plan that includes specific work done at the site to be decommissioned, building surveys, equipment surveys, and radioactive material shipments required from the decommissioning. ***Recommendation:*** *Maintain a list of areas where possible contamination could reside after decommissioning has been completed. For example: duct work beyond fume hoods that were used for work with radioactive material and were unable to be removed at the time of decommissioning*.	**SAT**

11.0 DECOMMISSIONING				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
11.2	Decommissioning Plans and Reports	Review prior or ongoing decommissioning plans and reports to determine if they are being performed in accordance with site commitments and regulatory requirements • Are required updates to Plans being made at the required frequency specific to reactor facility	An active ongoing decommissioning (Eames building) is being conducted as required. The process includes source removal, site assessment, discussion on plan, and eventually license removal.	**SAT**

12.0 REACTOR SPECIFIC RAD SAFETY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
12.1	Experimental Permits and Authorizations	Review Safety Review of Rx experiments and operation. • Authorized Permit Users are identified • Copy of Permits are available at main control room	There is an established Reactor Safety Committee which approves experiments and operations. Experiments and permits are posted with the Reactor Administrator. The Reactor Safety Committee meets on an annual basis and telecommunicate more frequently. The Authorized Users list is maintained by the Reactor Administrator.	**SAT**
12.2	Training of Users	Review Rad Safety Training program specific to Rx use • Specific training is provided to users • Review adequacy of material covered	Students acting as interim reactor operators are trained commensurate with their role in the standard operating procedures and emergency procedures. Certified Reactor Operators receive in-depth frequent training that is adequate to their role with Reactor Use.	**SAT**

12.0 REACTOR SPECIFIC RAD SAFETY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
12.3	Surveys/instrumentation	Review survey records specific to Rx use for A/S, rad levels and contamination. • Whenever any change is made to shielding, operation, equipment or adjacent occupancy areas • Review neutron monitoring program equipment/dosimetry/controls • Radiation Monitoring should be available in at specified locations	There were no changes to shielding, equipment, operations, or adjacent occupancy areas. Radiation Safety provides an adequate neutron monitoring program by providing appropriate dosimetry and a neutron survey of the reactor running at full power using a calibrated remball. Radiation area monitoring is in use. There are various radiation detectors available for use when needed.	**SAT**
12.4	Posting and Labelling	Review by field walkdown; • Are controls and barriers adequate to ensure compliance with occupational and members of the public dose limits • Pathways leading to High Radiation Areas (HRA) shall be posted	Controls and barriers are adequately in place to meet the dose limits for occupational workers and members of the public. Pathways that lead to HRA are posted accordingly and when necessary.	**SAT**

12.0 REACTOR SPECIFIC RAD SAFETY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
12.5	Physical Controls	Review HRA/VHRA controls: • Rx access is secured to prevent unauthorized operation or access • Target area controls • Warning light at HRA entrance when radiation present, or access controls in place • Any license specific rad safety features implemented per commitments.	Reactor access is secured to prevent unauthorized access and operation when HRA are present. A HRA warning light is in place and functioning accordingly.	**SAT**

12.6	Security Plan	Review the following components of the security plan: Verify a plan is written that satisfies requirements below: • Identify security resources, equipment, and technology used • Security plan must be reviewed and approved by individual with overall responsibility of program. • Updated when needed and ensure that revisions have been approved by individual with overall responsibility of program • Security plan must be kept for three years after it is no longer required. Verify the following training requirements are covered in the content of trainings: • Responsibility to promptly report any attempted or successful theft or sabotage of material • Response to security alarms • Training must be commensurate with trainee's job function. Verify the following refresher training requirements are covered in the content of trainings • Refresher training is done within twelve months of last training. • Refresher training must include: o Review of training requirements and any changes to security program in past year o Reports on any security issues and lessons learned o Relevant results of Agency inspections	An established NRC approved security program is present and is in place at the licensed facility. The initial security training is a robust process commensurate with the trainee's job function. Refresher training is completed annually. The topics covered meet the security program requirements. Records are maintained appropriately. The security program is reviewed annually to ensure program effectiveness. Program review records are maintained appropriately.	**SAT**

12.0 REACTOR SPECIFIC RAD SAFETY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
		o Relevant results of program review, audit, and maintenance • Training records of initial and refresher training must be kept for three years after date of training. Records must include date, attendance, topics covered, and any other related info. Verify the security program goes through an annual review to measure the effectiveness of the overall security program.		

12.0 REACTOR SPECIFIC RAD SAFETY

Item Number	Audit Area	Audit Methods	Audit comments	Sat/ Unsat
12.7	Security monitoring, detection, and response.	Verify the license has established the ability to continuously monitor, without delay, unauthorized access. Verify the license has established an alternate form of communication and data transmission if the primary form fails. Verify the following Local Law Enforcements Agency (LLEA) requirements: • LLEA must be able to respond with armed response. and provided with: • Facility description • Security measures implemented • Notification that a timely armed response has been requested • Coordination with LLEA must be performed within a twelve month time frame • Documentation describing coordination with LLEA is being maintained for 3 years. • A Memorandum of Understanding (MOU) with LLEA is available	Security has established the ability to continuously monitor for unauthorized access via intrusion alarms and key accessed doors. Entry into the security zone is monitored by video surveillance. Direct visual surveillance in the event of a loss of power. Security has available resources for alternate forms of communication in the event primary communication fails. Security is properly trained to immediately assess situations of actual or attempted theft, sabotage, or diversion. Security is capable of immediate response to actual or attempted situations including an armed response from LLEA. LLEA coordination and response is performed annually. A Memorandum Of Understanding is properly documented.	**SAT**

12.0 REACTOR SPECIFIC RAD SAFETY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
12.8	Security Plan protection of information	Verify the following security plan information: • Security plan is kept in a manner to prohibit unauthorized review. • The Security plan is kept secure to prohibit dissemination. • Security plan and list of people who have access to it must be kept three years after it is no longer needed	The security plan information is protected in a way to prohibit unauthorized review and dissemination. The security plan records have been maintained appropriately.	**SAT**
12.9	Access Authorization Reviewing	The Reviewing Official (RO) must: • Be background checked, fingerprinted, and be affirmed as trustworthy and reliable • Have access to safeguards info	Two Reviewing Officials have been named for the access authorization program. The Reviewing Officials have access to safeguards information.	**SAT**

12.0 REACTOR SPECIFIC RAD SAFETY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
12.10	Access Authorization Informed Consent and Initial Investigation	Review consent form (or equivalent) for the required content: • The background investigation cannot start without the informed and signed consent including authorization to permit sharing of personal info with others as per investigation • The individual has opportunity to correct any errors (post background check). • The individual can withdraw their consent check at any time. • Consent to fingerprinting Review documentation has provisions to cover the below requirements of Background Investigation: • Encompass past seven years or back to their 18th birthday (shorter only) • Fingerprinting and FBI identification and criminal history check (by LLEA) • Verification of true identity to compare against name given using: o Driver's license o Passport o Government ID o Birth certificate • Documentation must be made identification was properly reviewed • Employment history verified • Education history verified • Character and reputation determination checks	The consent form contains the required content needed in an informed consent document for an access authorization program. The background investigation form is included in the informed consent document. The background investigation program meets the necessary requirements and content for a robust background check.	**SAT**

12.11	Authorization Procedures and Determination Basis	• Approval list • Notification methods of those who are denied unescorted access with prompt measures taken to remove access • How those denied or terminated from access can review the findings and they are informed of the grounds for the RO's decision to deny • Opportunity for denied individual to provide additional relevant information Documentation should be created on why access was/was not granted.	The Reviewing Official maintains the approved list of those who have been deemed trustworthy and reliable. The Reactor Administrator controls the measures to remove unescorted access. There have not been any situations at the licensed facility that required denial from the access authorization. The background investigation form lists the opportunity to correct/provide any additional relevant information in the access authorization process. [redacted] The Reviewing Official has indicated there is no written documentation for the decision basis why individuals were either granted or denied unescorted access. ***Recommendation:*** *Create written documentation for the access authorization program as to why an individual is either*	**SAT**

12.0 REACTOR SPECIFIC RAD SAFETY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
			granted or denied unescorted access.	
12.12	Access Authorization Program	• Review the access authorization program to verify the continuing effectiveness of the program. • Verify that any issues be identified and resolved quickly. • Program must be audited and reviewed on an annual basis.	The access authorization program review is conducted at the annual Reactor Safety committee.	**SAT**
12.13	Access Authorization Protection of Info	Review the following for access authorization protection of information: • There is a system created for the protection and security of all background check information • Personal information must not be disclosed to anyone other than the subject individual or his/her designee or to someone who has a need to know for performing assignment duties. • Background investigation records are available for inspection by an authorized designee of the agency	The Reviewing Official and Reactor Administrator maintain records of background investigations and Trustworthy and Reliable checks under lock and key. Protected information is controlled as required.	**SAT**

12.0 REACTOR SPECIFIC RAD SAFETY				
Item Number	**Audit Area**	**Audit Methods**	**Audit comments**	**Sat/ Unsat**
12.14	Records	Review if following records are being maintained: • Maintain adequate safeguards over tampering and loss of records • Reviewing Official Authorization Letter and background check • Trustworthy & Reliable records (background checks, informed consent, records of refusal) • Former and current program documents (procedures and security plan) • List of authorized individuals • LLEA MOU and proof of co-ordination (within 12 months)	Both Reviewing Officials, the Reactor Administrator and the individual named in charge of the Security plan, are currently properly maintaining the required records. Records are currently a combination of both digital and hard copy format with appropriate security protection and signatures.	**SAT**