

1. Name and Address of Licensee:

Georgia Institute of Technology  
Neely Nuclear Research Center  
900 Atlantic Drive  
Atlanta, Georgia 30332

2. Date of Inspection:

Dec. 11, thru 13, 1995  
DOCKETED  
USNRC

'96 JUL 18 P12:31

3. Type of Inspection:

Routine/Announced

OFFICE OF SECRETARY  
DOCKETING & SERVICE  
BRANCH

4. License Number: GA. 147-1

Priority: II

Category: Broad Academic

5. Date of Previous Inspection:

October 12, thru 15, 1993

6. Recommend Reinspection Date:

October 1997

7. Scope of Inspection:

Organizational Structure

Radiation Safety Committee-Functions, staffing, and assigned duties

Training-Number, type, frequency of courses conducted, by whom, attendees.

User Licensing and License Renewals (approval process for new applicant, amendment or renewal)

Instrumentation-Types, numbers, calibration frequency.

Personnel Monitoring-film badges, TLDs, bioassays.

Sealed Sources-Inventory, accountability, and leak testing.

Waste Handling, Storage, Disposal

Hotcell Controls

Surveys - Radiation Safety Audits.

8. Participants:

Ratib Karam, Ph.D., Director Neely Nuclear Research Center

Rodney Ice, Ph.D., Manager of the Office of Radiation Safety

Fritz Strydom, Health Physicist

Cynthia Taylor, Principal Radiological Health Specialist, DNR, EPD, RMP \*Rod Harrell, Principal Radiological Health Specialist, DNR, EPD, RMP \*

9. Management Interviews:

Entrance interview consisted of Dr. Karam, Dr. Rodney Ice and the State Inspectors. The scope and the inspection process were discussed. A discussion of the pool irradiator status. The licensee informed the inspector that the pool irradiator was not licensed in accordance with Rule .09 because the Department did not consider it a pool irradiator, instead it is a research irradiator. The inspectors had no knowledge of the decisions nor were they aware of any decisions that had been made by the Department concerning the pool water conductivity. \*

NUCLEAR REGULATORY COMMISSION

Docket No. 59-160-REN EXHIBIT NO. 62In the matter of Dr. Ice☐ Staff ☐ Applicant ☒ Intervenor ☐ Other☒ Identified ☐ Received ☐ Rejected Reporter WCWDate 6/25/96 Witness Karen B

The inspector requested an update on the status of an NRC finding that Depleted Uranium was not properly inventoried. Apparently the licensee is suppose to report on Federal forms the amount of depleted uranium possessed. According to the records NRC thinks that the licensee has 38 kilograms (84 pounds) of depleted uranium and the licensee can only account for 13 pounds. Dr. Karam thinks that the difference may be because of shipments of depleted uranium to Barnwell for disposal. State regulations do not require that the licensee report its inventory of depleted uranium. \*

We discussed the status of incident GA-94-041 this incident is still open pending the return of the leaking Ni 63 source from Anartica. Follow-up on incident that occurred on March 23, 1995, when the storage pool dropped more than six inches. The licensee amended liquid discharge procedure to ensure that it does not happen again. This amended procedure has been approved by the radiation safeguards committee and operators have been trained on the amended procedure. \*

The licensee was told that after this inspection a decision would be made concerning the storage pool conductivity and they would be notified of the decision.

The exit interview consisted of Dr. Ice and the State Inspector. There were no items of non-compliance cited during this inspection. The inspector was concerned about the following items:

1. the licensee does not conduct retraining for principal investigators (PI) or for persons working under their supervision. Some persons using licensed materials were trained last in 1987 with no refresher training. \*
2. the licensee does not issue licenses or permits to PI that include what licensed materials are allowed and how they might be used. If the licensee issued permits to PI's that were amended when locations, protocols, or users changed the broad licensee would be able to better keep up with what materials a PI is allowed to have and under what conditions the materials can be used. \*
3. the licensee should establish a procedure for termination of inactive PI's. There are several PI's who do not currently use radioactive materials and have no immediate intention to start using radioactive materials and their files are maintained as active.
4. the licensee indicated that PI authorizations are amended in their entirety when changes are requested. Record review indicate that this is not true. PI's may be working from several authorizations at one time. This leads to confusion and should be changed to only allow one authorization for each PI that includes all protocols, uses, locations of use and conditions of use. \*

5. the licensee has started a program where each PI is issued a notebook containing the PI's application (Form A), copies of users training (Form B), the Georgia Tech Radiation Safety Manual, and radiation survey data sheets. This is a good practice and every effort should be made to insure that all PI's have a notebook in their lab that is checked each month during the monthly surveys by radiation safety staff.

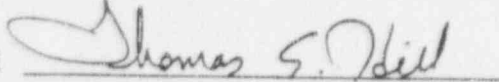
10. Action and Date: Letter to Licensee

Clear ☒ N/C ☐

11. INSPECTOR:  
Rod Harrell  
Cynthia Taylor

REPORT DATE:  
December 20, 1995

REVIEWER



DATE OF REVIEW: 1/2/96

Thomas Hill, Manager

A. Organization Structure:

President of Georgia Tech	Gerald Wayne Clough
Dean of Engineering	John White
Nuclear Safeguards Committee	(see list below)
Director of the NNRC	Ratib Karam, Ph.D.
Radiation Safety Office Manager	Rodney Ice, Ph.D.
Health Physic's Staff	Edgar Jawdeh and Fritz Styrdon
Health Physics' Graduate Students	3 student assistants

B. Nuclear Safeguards Committee Membership:

The Nuclear Safeguards Committee (NSC) consists of twelve senior members who have experience and expertise in relevant technical disciplines, e.g., reactor engineering, reactor operations, chemistry, radiochemistry, instrumentation and control systems, radiological safety, radiation protection, mechanical systems, and electrical systems. Each member serves a three year term and is appointed by the President. With one third of the committee changing each year. There have been no changes to the committee since the last inspection.

This committee make up has been accepted by the Department, however there should be a member on the committee representing College Executive Administration. This issue should be addressed during the license renewal process. The committee is setup so that the only way to practically get business before the committee is to go through the Director of NNRC. This concern should also be addressed during the license renewal process.

Nuclear Safeguards Committee Members	
Name	Address
EM Cobb, Chairman	Georgia Power Company
Dr. P. V. Desai	Mechanical Engineering
Dr. Bernd Kahn	Nuclear Engineering
Dr. T. G. Tornabene	College of Science
Mr. Jackie Vickery	Police Department
Dr. B. R. Livesay	PSD/EML Baker
Dr. Peggy Girard	Biology
Dr. S. M. Ghiaasiaan	Nuclear Engineering
Dr. Robert Braga	Chemistry
Mr. Len T. Gucwa	Licensing, EBASCO Plant Services
Mr. Steve C. Ewald	Georgia Power Company
Mr. James O'Hara	3393-P Peachtree Corner Circle, Norcross, GA 30092

## Meeting Frequency and Quorum:

The NSC meets, at a minimum, once per calendar quarter, and as circumstances warrant. Written records are maintained of the meetings that include any recommendations or occurrences, e.g., procedural review and PI application approval, these records are distributed to all NSC members and to the office of the President of Georgia Tech. To conduct business a quorum, a simple majority of the members, must be present. When a quorum is not established, as was the case for meeting held on March 17, 1994, all issues discussed are reviewed and approved or disapproved at the next meeting when a quorum is established.

There is no requirement that the Manager of Radiation Safety or the Director of Neely Nuclear Research Center be present, however nothing makes it to the committee unless it is first approved by the Director of NNRC. The function of the committee as Radiation Safety Officer should be reviewed during the license renewal process. \*

## Minutes of the Meetings:

The minutes of the meeting were reviewed from January 1994 thru October 1995. Most of the business conducted during the meetings was related to issues concerning the reactor. Other matters considered by the committee included approval of campus PI applications, and discussions of issues related to incidents involving radioactive materials that occurred on campus, and conditions required for use of licensed materials on campus.

The inspector attended part of a Nuclear Safeguards Committee meeting on December 13, 1995. This meeting was primarily called to approve procedures necessary for defueling the nuclear reactor. The procedures had not been reviewed by the committee prior to the meeting and this process could have been more informative and technical if the procedures had been reviewed by the membership prior to the meeting. Every effort should be made by the licensee to insure that issues presented to the committee are reviewed by the members prior to discussions and decisions. The licensee has committed to remove all fuel from the reactor prior to the 1996 Summer Olympic Games. \*

## Responsibilities:

The NSC is responsible for establishing policies governing the procurement, use, storage, control and accountability of radioactive materials and radiation generating devices.

The NSC is responsible for acting on applications submitted by the Ga Tech faculty and staff for the use of radioactive materials and radiation generating devices. All application for use of these materials must be approved by the NSC.



The Neely Nuclear Research Center (NNRC) has the administrative responsibility for the Ga Tech Radiation Safety Program and provides radiation protection services such as personnel monitoring, waste disposal, periodic laboratory surveys, maintenance of records required by the State of Georgia and consultation on the safe use of radioactive materials and radiation devices.

This relationship between NNRC, the Nuclear Safeguards Committee (NSC), and Campus Radiation Safety Program should be reviewed during the license renewal process. It appears that it is contrary to the normal relationship of all other broad licensees, in that a Principle Investigator (PI) manages the program instead of the program managing the PI (Neely Nuclear Research Center).

The Manager, Office of Radiation Safety (MORS), is responsible for the Radiation Protection Program of the campus including determining compliance with rules and regulations, licensing conditions and the conditions of the license. The MORS reports directly to the director of the NNRC. PI protocols are approved by the NSC in consultation with the MORS.

C. Training:

Training for all users of radioactive materials is provided by the MORS. Anyone wishing to use radioactive materials must complete an 8 hour class in the safe use of radioactive materials offered by the MORS every quarter. Successfully completing this course is documented on training Form B. Specific training is given by each PI pertaining to their specific protocols. At this time this is the only training required for persons using radioactive materials on campus.

D. Licensure of Users of Radioactive Materials:

The prospective Principal Investigator must complete the application (Form A) and forward the completed application to the Office of Radiation Safety. The application includes a description of the procedures (protocols) that will be used to perform the work and handle the radioactive material in a safe manner.

The application is reviewed by the MORS and an interview is scheduled with the prospective principal investigator to evaluate the available facilities as well as the training and experience of the applicant (Form B). Upon review and concurrence with the request, the MORS forwards the application to the Director of the Neely Nuclear Research Center for review.

When the Director's reviews and concurs with the application, it is forwarded to the NSC for its approval and the signature of the committee chairman.

There are currently 50 authorized PI's on the Georgia Tech campus, however only 36 are using radioactive material. The remaining investigators do not use radioactive materials but use radiation producing machines.

The licensee does not have an established procedure for terminating inactive PI's. The inspector visited the labs of four PI's, two were not currently using radioactive material and have not for several years. However radioactive material was possessed by all four and the Office of Radiation Safety was not aware that one of the PI's was inactive. The licensee should have a procedure for collecting unused radioactive materials from inactive PI's and terminating or placing authorizations in a non-active status. \*

E. Instrumentation:

✓ Geiger counters are used for general survey purposes. The Office of Radiation Safety (ORS) use to provide instruments to all PI's, due to budget constraints, new PI's are required to purchase appropriate survey instruments that are maintained and calibrated by ORS. There are approximately 59 survey meters on the campus. Survey instruments are calibrated every 6 months (the interval may be adjusted  $\pm 25\%$ ). The ORS checks the calibration dates during the routine periodic survey. All survey instruments are tracked on the licensee's work order system and are flagged for calibration every six months. The licensee also possesses twenty nine pocket dosimeters. The pocket dosimeters are checked for accuracy on a six months interval. Records of survey instrument calibration review from November 1993 thru November 1995.

F. Radiation Monitoring and Control:

Laboratories and facilities where radioactive materials are used or stored are surveyed periodically (monthly) in order to detect changes in radiation levels and prevent the spread of radioactive contamination. It is the responsibility of the Principal Investigator to inform the ORS whenever there is a change in working conditions which might necessitate a change in the survey schedule.

Radiation surveys are performed monthly in all areas or rooms where greater than the exempt quantities of radioactive materials are stored or used. The number of surveys required each month might be significantly decreased if inactive authorizations were terminated. Monthly surveys are tracked by the licensee's work order process. \*

G. Leak Test:

Each Beta and/or gamma sealed source is tested for leakage at six month intervals. Each Alpha and/or neutron sealed sources are tested for leakage at three month intervals. The licensee keeps records of sealed sources possessed under the license. The wipe sample is taken from the most accessible surface of sealed source and is normally counted with a low background alpha/beta counter. The results are recorded and kept in a notebook.

The licensee does not issue a leak test certificate to PI's who possess sources that require leak testing. There is no requirement that a certificate be issued for each source leak tested under the license, this practice should be reevaluated \*

during the license renewal process. PI's should be issued a certificate indicating that sources in their possession are not leaking. \*

H. Physical Inventory:

Presently the licensee is conducting a physical inventory on a three month  $\pm$  25% interval as is required by a condition in the license. The physical inventory includes all licensed material possessed by the PI.

1. Radiation Safety prints a list of materials they are aware the PI possesses.
2. The list is sent to each PI.
3. The PI verifies that the materials are stored in their lab and actually conducts the physical inventory.
4. The PI sends the printout back to Radiation Safety.

Any discrepancies are followed up on and cleared up prior to closing out the inventory. Records reviewed for 1994 and 1995.

I. Ordering and Receipt Procedures:

Each order for licensed material must be approved by the Office of Radiation Safety. The Radiation Safety Office reviews the request to insure that the material is authorized for use by the requesting PI and that possession limits have not been exceeded. Possession limits include material possessed as waste. Approval must be given by the MRSO or his designee.

**Receipt Procedures:**

All radioactive material is delivered to 900 Atlantic Drive, Room 148, Office of Radiation Safety. The radioactive material is then surveyed and wiped and then stored until the radioactive material is picked up by the principal investigator's representative or by Radiation Safety Staff. No one is allowed to transport licensed materials in personal vehicles.

J. Personnel Monitoring:

Film badges and TLDs are provide by the Radiation Safety Office and are exchanged on a quarterly or monthly frequency. Ring badges are provided for P-32 users. Film badges are provided quarterly and TLDs are issued monthly to visitors, short term users and as area badges. Prior to issuance of a film badge, a worker registration form is completed for each user. Once the application is approved, requirements are outlined on the approval for personnel monitoring and bioassays. Principal Investigators do not receive any radioactive material until they have received their personnel monitoring. \*

The film badges/TLD reports are reviewed by the Manager of the Radiation Safety Office (MRSO). Any unusual exposures above an expected average will be investigated by the RSO. No unusual exposures were note on records reviewed by the inspector. The MRSO calls the person receiving the highest dose each



quarter to discuss the importance of keeping doses ALARA. Radiation Safety staff and reactor personnel badge exchange frequency is monthly

\*  
other report  
says  
but then  
needs  
signed  
\*  
have  
a bio-  
assay

Bioassays are not required with any routine frequency due to small and limited uses of radioisotopes. A bioassay will be called for if during a lab survey the area is found to be contaminated. Any suggestion of possible intake by a radiation worker calls for a bioassay. Urine samples are collected from tritium users and are counted on a liquid scintillation counter. These results are added to results of external radiation exposure annually by the MRSO.

The licensee uses Landauer monthly and quarterly film badges. Records reviewed from January 1, 1994 thru September 31, 1995 for persons with quarterly monitoring.

Highest Readings: 1994 - 80 mRem, 1995 - 80 mRem this review was of the quarterly exposure records only. A sample of records of annual exposure records were examined the addition of results of internal exposure had been added by the MORS.

\*

K. Radioactive Waste Program:

Principal Investigators/Users segregates all radioactive waste into barrels or bags according to the type of waste: solid, liquid, and sharps. Waste is also divided into short lived and long lived materials.

Radioactive waste is collected by the Radiation Safety Office staff. All appropriate paper work identifying the material, quantity, activity, type, etc., must be completed by the Principal Investigator prior to staff accepting the waste for disposal.

Dry radioactive waste is disposed in 5 gallon plastic lined drums (buckets). These buckets are reused after smearing to check for contamination. Liquid waste is poured into 1 gallon "milk jug" type containers. The RSO staff picks up and leaves these containers during routine monthly surveys at the labs.

The picked up waste is taken to the storage room behind the Neely Nuclear Research Center. The solid waste is compacted into smaller bundles. The compacted waste is packaged for shipment. Records are kept on the contents of the bundles and a consolidated list is compiled when the waste is ready for shipment to Barnwell, S.C.

The licensee does no disposal of liquid waste from campus PI's into the sanitary sewerage. Liquid from the source storage pool is released to the sanitary sewers via the refuse tank. All other liquid waste is disposed of through waste brokers.

\*

The licensee is making every effort to insure that all waste is removed from the site for the 1996 Olympics. The licensee utilizes BioMetrics to come on site and packaged and then transport the waste to Quadrex Environmental Corporation to compact the waste prior to transport to Barnwell, S.C.

L. Pool Irradiator and Hot Cell

The licensee has one concrete pool storing approximately 300,000 Curies of Cobalt 60 that is used in the hot cell for irradiation. Results of the pool conductivity measurements were discussed with Dr. Ice and Dr. Karam. The conductivity usually runs less than 100  $\mu\text{mhos/cm}$  and as low as 60  $\mu\text{mhos/cm}$ . However, the licensee feels that attaining a conductivity of 20  $\mu\text{mho/cm}$  would be very difficult in an open system that uses potable water as makeup. Additional information concerning this matter will be discussed with our Program Manager after this inspection and a decision will be made by the Department as to what the pool conductivity limits are.

N.B. Some how a requirement that the licensee maintain the source storage pool at a conductivity of 10  $\mu\text{mho/cm}$  was left off the license as a condition for operation. The licensee has never attained this conductivity but will be required to show how they will obtain and maintain the 10  $\mu\text{mho/cm}$  limit prior to the license renewal.

M. Notre Dame Style Irradiator

The licensee dismantled its Notre Dame style Irradiator and transferred the radioactive material from the irradiator (12 Cs 137 sources of approximately 420 curies each) to J. L. Shepherd and Associates of California (license number 1777-70) for reuse in other devices manufactured by J. L. Shepherd on December 1, and 2, 1995. The transfer occurred without incident and was observed by Elizabeth Drinnon and Tom Hill of this office. (See reciprocity inspection report) The licensee has completed all shipping papers and has all necessary records for completing the transfer, decontamination of the area has been complete and is available for unrestricted use.

N. Report of Contamination Incident

On January 23, 1995, during a routine monthly radiation survey by radiation safety staff, contamination was found in the hall ways and lab of PI # 94 where P32 was being used. As a result of this incident work in the lab was suspended until the labs were decontaminated and new conditions placed on the authorization. Because of the extent of the problem radiation surveys were conducted of personal vehicles and homes. There was no contamination found at persons homes or in vehicles. Personal shoes were found to be contaminated and were confiscated by radiation safety for decay.

The incident was reported to the Radiation Safeguards Committee. Prior to resuming work in the laboratory, new procedures were initiated for use of radioactive materials by the PI.

Consideration should be given to instituting these procedures campus wide to prevent a recurrence in a different laboratory.

O. Review of some Principal Investigators

Jerry Hubbard (PI #28) authorized for C-14 and Ni-63 foil for gas chromatograph. This PI has retired and is not an active user of licensed materials. This PI possesses H-3 and has possessed it for many years according to inventories. There was no explanation as to how the investigator obtained the H-3, however RS is aware of its presence and it is accounted for in the radioactive materials inventory. Independent measurement taken by the inspector indicated no radiation levels above background in either lab assigned to this PI, the fume hood used by the PI was tested for its face velocity and was found to be adequate for radioactive materials use 115 linear fpm. Monthly surveys have been conducted by Radiation Safety last done on 11/22/95. The PI has not been issued one of the new notebooks containing documentation of investigator's radiation safety program.

ONTAMINATED  
→ LAB

Robert Nerem (PI #139) authorized for P-32 and H-3. This PI has not used licensed material since early 1994, however the PI does possess H-3. Independent measurements indicated no radiation levels above background. It is not clear from the PI's applications exactly where radioactive materials may be used, the application and approval was for room 308/316 and all monthly surveys are preformed in Rm 310. Training for persons using licensed materials in these labs was completed in 1993. One of the conditions of use specified by the NSC was that monitoring for contamination be do using liquid scintillation counter. It is not clear how often monitoring is required. This lab has not been issued one of the new notebooks for documenting radiation safety activities.

CONTAMINATION

OF LAB AND HALLWAYS

Jung Choi (PI #94) authorized for S-35, P-32, I-125, H-3, C-14 and Ca-45. This PI made no specific commitments concerning the use of radioactive materials in the application for use of radioactive materials (Form A). Here as was found to be the case in all situations the application was approved by the NSC without a copy of training (Form B) attached. Training is reviewed and conducted by the MRSO. Four persons were listed as authorized to use radioactive materials under this authorization two of these people were last trained in radiation safety in 1987 and 1989. The licensee should review and revise it radiation safety training program to include refresher training for all users on a periodic bases. Independent measurements by the inspector revealed no unusual radiation levels in these labs, however a labeled centrifuge had fixed contamination as much as 350 cpm above background. As a result of 1/23 incident procedures were modified and a requirement that procedures for exiting areas of use be post in laboratories. These laboratories are surveyed monthly by RS and weekly by workers. There was no record of weekly surveys noted in the logbook.

✓ Chris C-K Wang (PI #142) authorized for use of Cs-137, Co-60, and Cf-252 sealed sources. No independent measurements made in these labs all sources securely locked in storage safes and inventoried and leak tested as required. The PI has been issued a notebook containing radiation safety information.

Summary of PI Review: Records concerning the use of radioactive materials by principle investigators should be consolidated. Every PI should be issued notebooks containing the latest revision of their authorization including current documentation of training (Form B) for each worker. Authorizations should clearly

spell out conditions for use of radioactive materials. Leak test results, survey results, instrument calibration results, training, inventory, and worker exposure results should be coded to each PI. All authorizations for individual PI's should be consolidated to include all approved protocol. Procedures should be established requiring that authorizations are renewed on a periodic bases (i.e. three years) and that these authorization are more than duplicated applications. This will insure that PI's and Radiation Safety Staff are aware of and understand the conditions for using radioactive materials. Inactive authorizations should be placed in an inactive status and all radioactive materials collected from inactive PI's by Radiation Safety Staff.