

**CASE WESTERN RESERVE UNIVERSITY  
DEPARTMENT OF OCCUPATIONAL &  
ENVIRONMENTAL SAFETY (DOES)  
RADIATION SAFETY  
ANNUAL REPORT 2008-2009**

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# RADIATION SAFETY ANNUAL REPORT 2008-2009

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# **RADIATION SAFETY ANNUAL REPORT 2008-2009**

## **INTRODUCTION**

This report is submitted to the President and designated members of the Senior Administration of the University, as required by the Radiation Safety Committee (RSC) Operating Guidelines and Case Western Reserve University's State of Ohio (Nuclear Regulatory Commission Agreement State) Broadscope License. This report summarizes the activities of the Radiation Safety Office (RSOF) of the Department of Occupational & Environmental Safety (DOES) at Case Western Reserve University. Its contents cover the period from July 1, 2008 through June 30, 2009.

## **SUMMARY**

### **DEPARTMENT STRENGTHS**

The RSOF has a staff with broad and diverse backgrounds that can address and resolve a wide range of issues faced in Radiation Safety at Case Western Reserve University (CASE). The RSOF has developed programs that meet or exceed regulatory requirements. This program proactively anticipates new safety requirements by promulgation of new programs. Success of these programs continues is enhanced by excellent Administrative Support.

### **DEPARTMENT OPPORTUNITIES**

The RSOF enjoys excellent interaction with other departments that are developing safety-related initiatives and outside agencies that are dedicated to improving environmental quality in our facilities.

### **RADIATION SAFETY ACCOMPLISHMENTS FOR 2008-2009**

Over the past year, the DOES continued to improve the effectiveness of the Radiation Safety Program. Notable new accomplishments included:

- Through its services to the research community at Case Western Reserve University, the Radiation Safety Program generated In-house savings accrued from meter calibration, recycling, and decay in storage programs amounting to more than \$52,665 in 2008/2009.
- The RSOF implemented a quarterly audit to track progress of laser safety program.
- Radiation waste procedures concerning animal mixed waste (Infectious and Radioactive) were updated. Procedures were specifically implement to ensure that infectious and radioactive animal carcasses were stored in a newly implemented purple bag until radioactive material(s) were decayed or removed the carcasses were rendered noninfectious.
- The Irradiator Safety Program was fully implemented as part of the Broadscope License of the University. Security procedures for this Program were developed in collaboration with State of Ohio ODH Regulators to meet mandates of new Homeland Security guidelines. Currently all irradiator users are fingerprinted and appropriately registered in federal databases.
- Radiation Committee Guidelines were revised and approved to bring them up to date with current activities of the Radiation Safety Committee (RSC).
- Implementation of new HP Assist Software to replace the existing Helix database which has been in use since 1992 is underway. Helix is no longer adequately supported for new computer platforms necessitating this change. Introduction of the new database was accompanied by

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introduction of a new Website for DOES. A new Web-based interface for this database will service the University Community. Access to the new Webpage is already provided for the University and selective access is also provided for the world-wide safety community in a cleaner, more service rich and more attractive platform for access that promotes DOES Radiation Safety Programs.

- A new UV information module has also been included on the Departmental website.

## RADIATION SAFETY GOALS FOR 2009-2010

The continuing goal of the Radiation Safety Program is to position DOES for more effective interaction with the educational and research goals of the University through training and training development. A secondary goal is to increase the impact of Case Western Reserve University Safety Programs on the surrounding community through educational and programmatic interaction with local partners and emergency responders. Specific efforts will address:

- Promotion of community interaction through complimenting services, participating in local safety forums, and provision of both material and intellectual support to Community partners. Specific efforts include:
  - Continuation of efforts to foster our excellent relationships our Community emergency response providers.
  - Continuation of our mutual development of campus Emergency response with the University's new Safety Coordinator and with Protective Services and the Campus Police Department to ensure that use of radioactive materials is carried out in a secure environment.
  - Augmentation of our partnership with plant Services and the Animal Resources Center to provide services required for use of radioactive materials and radioactive source material by the research community at Case Western Reserve University (CASE).
- A number of internal program enhancements will also be a focus for radiation safety personnel over the coming year. These areas of focus will include:
  - Completion of implementation of the new HP Assist Software to replace all parts of the existing Helix database. Over the coming year, this new Software System will be employed for all Radiation Safety database management at DOES. This program will provide significant enhancements for users of Radiation Safety Services and a more comprehensive and stable platform for all radiation Safety database-dependent services. The platform also will also ultimately provide audit information and a running log of the status of DOES Radiation Safety Programs.
  - A number of enhancements to laser safety programs will also be introduced over the coming year. These will include:
    - Development of new educational programs in the areas of non-ionizing radiation (microwave, electromagnetic).
    - Improved on-line tools for Review & accounting of laser safety training, and laser inventory at the University.
  - All User Radiation Safety Protocols that are more than 10 years old will be reviewed and revised if necessary.
- A new training module on NMR safety will also be developed and introduced.
- All personnel will be encouraged to work toward certification in their training specialty areas as part of continuing efforts to build expertise within the Radiation Safety Group.
- Formalize enforcement policies for programs requiring use of Radiation Generating Equipment (RGE) & irradiators will be develop

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## OHIO DEPARTMENT OF HEALTH (ODH) LICENSE

Case Western Reserve University has one Ohio Department of Health (ODH) Broadscope license. The license covers possession and use of both nuclear accelerator-produced radioactive material (NARM) and naturally occurring radioactive material (NORM) for experimental purposes. It also provides for the licensed use of four (4) irradiators.

No inspections of the Broadscope License were conducted by the regulatory agencies during this fiscal year. The ODH last inspected the Broadscope License on September 27-28, 2007. The ODH conducted an irradiator inspection to provide details of a new Security program on November 20, 2007. The Radiation Safety Program responded to a Department of Transportation citation in May 2008.

The University has one ODH Radiation Generating Equipment (RGE) registration. The registration covers the receipt, possession, use, storage, and disposal of all radiation-generating sources including dental x-ray machines, x-ray diffraction units, fluoroscopy units, and electron microscopes.

There were no inspections of the Radiation-Generating Equipment (RGE) registration by the ODH during the fiscal year. A partial inspection of new x-ray equipment was last conducted on October 4, 2007.

ODH LICENSE	EXPIRATION DATE	PURPOSE
011-011800-11	January 1, 2010	Broadscope License
09-M-06944-12	May 31, 2010	Radiation-Generating Equipment Registration

## **DECOMMISSIONING FUNDING PLAN**

The Broadscope License and the Decommissioning Funding Plan became effective March 15, 2005. The University is required to maintain a Standby Letter of Credit to cover possible costs if the University's Broadscope License is required to undergo rapid decommissioning. Funds required for this letter of credit depend on the kind and amounts of radioactive materials maintained in active use or waste by the University. Experimental procedures using more sensitive methods increasingly require less radioactive materials. Therefore, it was possible to decrease the Standby Letter of Credit carried by the University by more than 40% to \$288,000, consistent with radioactive materials currently located at the University at the time of the last submission of the University Broadscope License to the State.

## **RADIOACTIVE MATERIAL USE AND STORAGE LOCATIONS**

Radioactive material is located at the following facilities:

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- Main campus of Case Western Reserve University, 10900 Euclid Avenue, Cleveland, OH
- University Hospitals (UH), 2065 Adelbert Road, Cleveland, OH
- Wolstein Research Building, 2103 Cornell Road, Cleveland, OH

Radioactive material is received and stored at the following sites:

- Shipping and Receiving, 2232 Circle Drive, Cleveland, OH
- Cedar Avenue Service Center, 10620 Cedar Avenue, Cleveland, OH
- Wolstein Research Building, 2103 Cornell Road, Cleveland, OH

## PURPOSE FOR RADIOACTIVE MATERIAL (RAM) USE

The majority of isotope use at the University is for biomedical research. The most typical isotopes used are  $^{14}\text{C}$ ,  $^3\text{H}$ ,  $^{125}\text{I}$ ,  $^{32}\text{P}$ ,  $^{33}\text{P}$ , and  $^{35}\text{S}$ . Isotopes used in sealed sources contained within irradiators, scintillation counters, gamma counters, check sources, and calibration standards are most commonly  $^{137}\text{Cs}$ ,  $^{133}\text{Ba}$ , and  $^{241}\text{Am}$ . Six (6) licensed low to high activity radiation sources are currently used for biomedical and other research. These include a  $^{241}\text{Am}$ -Be neutron source and four high dose irradiators that contain  $^{60}\text{Co}$  or  $^{137}\text{Cs}$  sources and one low dose irradiator charged with  $^{192}\text{Ir}$ . One currently out of service.

The number of Individual workers authorized to use irradiators are shown in the following table.

IRRADIATOR	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Total Workers	68	55	45	28	10	5	2
Total Irradiators	4	4	4	4	3	3	3

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## RADIATION SAFETY PROGRAM - RESPONSIBLE PARTIES

### **RADIATION SAFETY COMMITTEE (RSC)**

The Radiation Safety Committee sets policy for use of radioactive materials for the University Community. Members of this Committee are appointed by the President of the University and have the responsibility of monitoring and enforcing compliance with the University's Radiation Safety Program as outlined in its Ohio Department of Health (ODH) Broadscope License. Radiation Safety Committee members are chosen from diverse disciplines to provide comprehensive expertise. The Committee reviews all applications for use of radioactive materials.

The 2008-2009 Radiation Safety Committee membership and their affiliations are listed below. The ODH is informed of committee membership changes. The Committee is also aided by input from ex-officio (non-voting) and visiting members (non-voting).

### VOTING MEMBERS

Dr. Anthony Berdis Dept. of Pharmacology HG Wood 276A Term Expires: 1/1/2011 Chairperson: 12/31/2007	Dr. Jeffery Coller Dept. of RNA Center HG Wood 113 Term Expires: 10/1/2010	Dr. Monica Montano Dept. of Pharmacology HG Wood 367 Term Expires: 9/1/2011
Dr. James Bruzik Dept. of RNA Molecular Biology/Biochemistry HG Wood 103 Term Expires: 9/1/2011	Dr. Lax Devireddy Dept. of Pathology Wolstein 6524 Term Expires: 10/1/2010	Dr. Thomas McCormick Dept. of Dermatology BRB 530 Term Expires: 9/1/2011
Dr. Zhenghong Lee Dept. of Radiation Oncology Bishop S109B Term Expires: 9/1/2010	Dr. Saba Valadkhan Dept. of RNA Center Research Tower 100-8 Term Expires: 11/1/2010	Dr. Eckhard Jankowsky Dept. of Biochemistry HG Wood 447 Term Expires: 1/1/2011
Dr. W. David Sedwick Radiation Safety Officer (RSO) Dept. of Medicine DOES - Service Building, 1 <sup>st</sup> Floor		

### EX-OFFICIO MEMBERS

Richard Jamieson Vice President of Campus Svcs. Adelbert Hall 205	Karen Janiga Asst. Dir./Asst. RSO DOES Service Building, 1 <sup>st</sup> Floor Left CASE - 3/2009	Felice T. Porter Asst. Dir./Asst. RSO - 4/2009 Quality Assurance Specialist DOES Service Building, 1 <sup>st</sup> Floor
Bruce DeMeza Radiation Technologist University Hospitals Case Medical Center Bishop S611	R. Michael Sramkoski Senior Research Associate & Laser Specialist Comprehensive Cancer Center WRB 3542	

### SUPPORT STAFF

Shirley Mele Office Supervisor	Gwendolyn Cox-Johnson Department Assistant
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Service Building, 1 <sup>st</sup> Floor	Service Building, 1 <sup>st</sup> Floor
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The Radiation Safety Committee acts as an advisory and enforcement body to ensure that radioactive materials are safely used in accordance with ALARA (As Low As Reasonably Achievable) principles. The Committee conducts audits each trimester, which address programmatic compliance. The RSC also conducts an annual audit in which the entire program is reviewed. The audits ensure:

- Specific program components conform to the licensed program as described in the Case Western Reserve University Radiation Safety Manual and License.
- Accurate documentation for program conformance and license compliance is maintained.
- Adequate training is provided for all classes of workers.
- Oversight for RSOF activities is maintained through RSC familiarity with the daily function of the University Radiation Safety Program.

The Committee met on six occasions during the 2008-2009 fiscal year to review applications for radioisotope use and act on other business. The minutes of the RSC meetings and Executive Committee actions are available in the RSOF, through the RSC, or through the University Administration.

APPLICATIONS	08/09	07/08	06/07	05/06	04/05	03/04	02/03
New AU	5	7	14	11	8	3	8
Additional Isotopes	1	7	7	6	10	2	13
Radioisotope use in Animals	2	5	6	5	7	4	4
Sealed Sources	1	1	1	6	1	1	2
AU Reactivation	0	0	0	1	0	1	0
Possession Limit Increase	0	0	1	0	1	0	0
AU Protocol Update	0	0	0	0	3	0	0
TOTAL APPROVALS	9	20	29	29	30	11	27

Major topics discussed with or benefiting from RSC advice included:

- New database was approved and ordered
- Peer Audit of DOES by University of California Irvine, University of Southern California, & Dartmouth College scheduled for 9/28-29/2008
- New Lose Dose Irradiator Programs
- Contingency Report regarding budgetary cuts
- Update and Approval of RSC Guidelines
- Voted on action to reduce delinquent AUs correspondence
- Karen Janiga, Asst. RSO, leaving for new position as RSO at University at California-Riverside
- University's new hiring of an Emergency Response Coordinator
- Security of RAM stock vials/samples in locked box or freezer
- Reviewed of a laboratory incident at UCLA resulting in a Fatality (12/2008)
- Reviewed of OSHA Clarification of PPE requirements (effective 1/2009)
- Notified RSC of ODH inspection of UH Radiation Program 3/2009
- Summary of Laser Safety Program
- Welcome of Felice Thornton-Porter as Interim Asst. Dir./Asst. RSO
- Emerging Infections Committee review of the Avian Flu Policy and Procedures
- Hand sanitizer installation around campus
- Quarterly Audits completed and Preparation for annual audits
- Review of Delinquent AU response

The RSC Chairperson and the RSO reviewed the RSC guidelines. The RSC approved the revised RSC guidelines in March 2009.



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## **SENIOR MANAGEMENT**

The Radiation Safety Program monitors, inspects, and audits radiation materials, radiation generating equipment and source use by AUs and their personnel. Senior management oversight and support of radiation safety-related activities is ensured by attendance of the Vice President for Campus Services at all RSC meetings. The RSC conducts independent audits of the Radiation Safety Program. Radiation Safety Office (RSOF) staff immediately responds to audit findings. Audit findings and responses are reported to senior management and the Committee.

Richard Jamieson (Vice President of Campus Services) has actively and effectively continued to direct administrative interaction with the Radiation Safety Programs.

## **RSOF AND AUTHORIZED USERS (AUs)**

The AU and RSOF shared responsibility for safety. The AU is directly responsible for safe use of radioactive materials in the laboratory. The Radiation Safety Office is responsible for ensuring that appropriate safety procedures are implemented and that AUs are fulfilling their responsibilities for monitoring safety during experiments carried out in their laboratories. Audits of laboratories are conducted by the RSOF to ensure compliance with Case Western Reserve University's license. The audit program includes routine unannounced inspections of each AU's laboratory.

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## ADMINISTRATIVE CONTROLS

Administrative controls are established and approved by the Radiation Safety Committee for laboratories where radioactive materials (RAM) is used. Controls include signage, training, laboratory access, and dosimetry. Written procedures document procurement, use, and the disposal of all RAM at the University.

The General Safety Compliance Enforcement Policy prescribes sanctions for those who jeopardize safety or the continued favorable relationship between the University and the Ohio Department of Health. It is designed to encourage the participation and cooperation of users of RAM and to promote safe use of such materials in a manner consistent with the rules and regulations of the ODH as interpreted by the RSC and the RSOF.

There are three classes of violations defined as minor, moderate, and major severity.

Minor Severity violations are listed under the following categories:

- Improper laboratory records
- Improper RAM use and storage
- Improper laboratory environment/general safety

Moderate Severity violations include the following:

- Food/cosmetics in laboratory
- RAM unsecured
- RAM in unauthorized areas
- Unapproved move
- Unapproved disposal
- Unidentified contamination
- Failure to respond to written notice

Major Severity violations include the following:

- Falsification of records
- Unreported loss or theft of radioactive materials
- Unapproved transfer of radioactive materials

Of the 27 moderate violations listed below, 19 were the result of unsecured RAM found during after-hours security checks and routine compliance reviews. Two (2) were food and drink violations and two (2) unauthorized move of RAM which were found by the Radiation Safety staff during routine audits. Documented follow up and resolutions were completed for all moderate violations.

VIOLATIONS	08/09	07/08	06/07
Minor	103	83	57
Moderate	27	43	11
Major	0	0	1
Total	130	106	69

The Assistant RSO, the RSOF staff, and RSO have updated and revised most of the Departments manuals, training, licenses, certificates, and standard operating procedures in 2008-2009.

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## AU CATEGORIES:

### **RADIATION ACTIVE (RA)**

AUs who actively use RAM are “Radiation Active”. Laboratories of these AUs are inspected by the RSOF three times per year. Audits are more frequent if there are particular concerns in a laboratory. A listing of AUs and their radioactive materials can be found in the Appendix.

### **RADIATION ACTIVE & RADIATION GENERATING EQUIPMENT/ X-RAY (RX)**

These AUs actively use RAM and X-Ray equipment.

### **RADIATION GENERATING EQUIPMENT/ X-RAY (X)**

These AUs actively use X-Ray equipment only.

### **RADIATION INACTIVE (RI)**

These AUs do not currently use RAM and do not possess radioactive materials. AUs in storage mode for more than two years were placed in Radiation Inactive mode this fiscal year.

### **RADIATION ACTIVE (STORAGE MODE) – RA (SM)**

AUs who did not actively use RAM for a period of at least six months and no more than two years, but who wished to maintain their RAM inventory are, by their request, placed in storage mode status this fiscal year.

### **DEPARTED (D)**

AUs who no longer carry out research at Case Western Reserve University and whose laboratories have been decommissioned for radioactive material use are placed in the Departed category this fiscal year.

AUs	08/09	07/08	06/07	05/06	04/05	03/04
RA	91	92	112	124	116	123

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RX	0	0	0	2	3	1
X	23	22	22	23	27	27
RI	1	14	8	12	2	7
SM	4	5	6	4	9	8
D	6	8	12	11	12	12

## **MASTER ISOTOPE LIST**

The master isotope (see APPENDIX) list shows the University's isotope inventory, the sum of the AUs' inventory (excluding sealed sources), and the sum of the AU Possession Limits, relative to NRC/ODH Registration Limit.

## **AU RADIOISOTOPE INVENTORY**

The Radioisotope Inventory Report (see APPENDIX) lists researchers along with the amount of radioactive material each is authorized to use, each AU's possession limits, and the activity of isotopes on hand.

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## RADIATION SAFETY OFFICE (RSOF)

### STAFFING

The RSOF operated under University approval with the following positions:

RSO (1)	Assistant Director/RSO (1)
Specialist Positions (4)	Department Administrator (1)
Department Assistant (1)	2 <sup>nd</sup> Shift Specialist (1)
Quality Assurance Specialist (1)	Student (1)
Analyst Programmer (1)	

One staff member in the administrative position of the RSOF left Case Western Reserve University during this fiscal year. The Quality Assurance Specialist assumed the Acting Assistant Director/Assistant RSO responsibilities.

Training and education are central to our Department's aim to develop diverse skills among our personnel that are required for response to safety incidents and for maintenance of regulatory mandates. New specialists receive training and work under the auspices of experienced personnel. New specialists also attend in-house training and commercially offered training.

Specialists are encouraged to attend training and continuing education. Seminars, training, and conferences attended in 2008-2009 included RCRA Hazardous Materials Manager 8-hour Refresher training, HAZWOPER 8-hour, National Incident Command System (ICS)/National Incident Management System (NIMS) FEMA Certification 8-hour, DOT Hazardous Materials Shipment Refresher Training, and the State of Ohio Licensed Lead Inspector and Risk Assessor Training.

One member of the Radiation Safety Staff is responsible for maintaining the DOES website that houses all on-line departmental training programs and schedules, safety manuals, safety newsletters, MSDSs, and safety information resources. The website is an essential resource for the campus community that requires continuous updating. This individual also monitors and backs up all departmental databases.

### LIAISON PROGRAM

The Liaison Program requires RSOF personnel to visit University laboratories on a routine basis to offer safety advice and to answer safety questions. This program has helped to foster a service oriented relationship between the RSOF Staff and the research community and has improved follow up on inquiries and safety concerns. Staff members are assigned to various buildings and are responsible for maintaining contact with designated laboratories.

### EMAIL HOT-LINE

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Since implementing the 'hotline', the number of inquiries and safety concerns raised by Case Western Reserve University personnel has averaged ten emails per day. This communication has led to swift response and follow-up of safety concerns reported by our user community.

## **TRAINING SESSIONS**

It is the responsibility of the RSC to ensure that individuals using RAM are adequately trained to keep doses to personnel and releases to the environment "As Low As Reasonably Achievable" (ALARA). The RSOF provides training for all personnel that use RAM or Radiation Generating Equipment (RGE)/X-Ray. Initial training must be completed before use of any radioactive materials or RGE/X-Ray equipment. Annual retraining is required for the continued use of RAM. Ancillary workers (non-radiation workers) who occasionally have contact with RAM are retrained annually. Personnel that are trained include:

### AU

An Authorized User is a Faculty member who has been approved by the RSC to use RAM.

### RADIATION WORKER

A Radiation Worker is any person who uses RAM under the supervision of an AU.

### ANCILLARY RADIATION LABORATORY WORKER

Personnel listed under an AU who work in RAM laboratories but have only minor incidental contact with radioactive material or have to service radioactive laboratories or classrooms where RAM is used.

### ANCILLARY WORKER

An Ancillary Worker is a Non-Radiation worker who may have contact with laboratories or classrooms where RAM is used. This includes individuals working in Facility Services, Protective Services, In-house and contract Custodial Services, Shipping/Receiving, Animal Resource Center, and Research Department Assistants. During orientation, non-laboratory personnel are required to attend training that includes a radiation safety component.

### RADIATION GENERATING EQUIPMENT (RGE) WORKER

An X-Ray Worker is any person that uses RGE under the supervision of an AU.

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## IRRADIATOR USERS

Personnel using irradiators are required to attend initial Radiation Safety training conducted by the RSOF and site-specific training with the manager of the irradiator. An Irradiator worker is any person that uses an Irradiator under the supervision of an Irradiator User.

## TRAINING

The RSOF documents dates of training, attendees, and content of training. Records of refresher training offered online are also maintained. Classes and online sessions attended are essential components of Case Western Reserve University safety philosophy. Training is audited on a monthly basis by the Assistant RSO to ensure compliance.

TYPE	NEW CLASSES	NEW USERS	ONLINE RETRAINING
Radiation Safety	28	223	430
X-Ray	26	97	0
Laser	11	66	28
RTK (Right to Know)	10	57	0
Custodial Contractor	4	46	0
Plant Maintenance	5	72	0
ARC (Animal Research Center)	4	74	0
Shipping	3	14	0
Protective Services	16	67	0
Custodial	3	129	0
Irradiator (site specific)	6	56	0

New isotope user training classes are offered at least three times per month. Annual radiation safety retraining is done online. X-Ray training classes are conducted once a month. AUs are responsible for machine and performance-specific annual refresher training for workers who use X-Ray equipment in their laboratory programs. Fluoroscopy users are required to complete a Fluoroscopy Training Module (kindly provided by University Hospitals CASE Medical Center) in addition to the general X-Ray and site-specific trainings. Right-To-Know Fluoroscopy training is provided on an as-needed basis to individuals who desire to observe Fluoroscopy procedures. Additionally, there are monthly training classes for users of Class 3B and Class 4 lasers. The RSOF requires annual retraining which is offered on-line.

All non-laboratory personnel are required to attend Hazard Communication training, which incorporates radiation safety training. ARC, Security, Shipping/ Receiving, and Custodial departments use a safety orientation DVD, allowing supervisors to train staff at shift changes, thereby greatly increasing training compliance. Employees who do not complete training are restricted from working in areas where radioactive materials are used.

TRAINING	08/09	07/08	06/07	05/06	04/05	03/04	02/03
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Radiation	223	240	297	284	284	283	322
Retraining	0	0	0	0	0	0	11
Online Retraining	418	430	695	724	775	793	754
X-Ray	97	96	64	51	74	45	84
Ancillary	403	382	402	413	356	448	540
Laser	66	41	56	31	116	0	0
Laser Online	28	15	10	11	0	0	0
Irradiator	56	10	14	50	0	0	0

## FACILITIES AND EQUIPMENT

Case Western Reserve University administration and the RSC ensure that appropriate facilities, equipment, and trained personnel are available for the safe operation, storage, and disposal of licensed material. The RSO and Assistant RSO are responsible for overseeing the review of applications and inspection of all facilities, equipment, and personnel that use licensed material. Facilities that are available at Case Western Reserve University for the use of licensed material include:

AW Smith	Bingham	Biomedical Research
Bishop	Bolwell	DeGrace
Glennan	Hanna Pavilion	HG Wood
Kent Hale Smith	Med East	Millis
Olin	Pathology	RBC
Rockefeller	Service	Wearn
White	Wickenden	Wolstein Research
Wood Research Tower	Lerner Tower	

## LABORATORIES

There are approximately 302 radiation, X-Ray, and Laser laboratories on campus equipped to use licensed material and equipment. The laboratories typically include chemical safety hoods, survey meters, protective clothing, analytical detection and measurement equipment, waste receptacles, and decontamination supplies.

### Radiation Safety Office (RSOF)

Facilities and equipment used by the RSOF to support laboratory inspection or isotope storage are located in the Service Building (1<sup>st</sup> Floor), Medical School (Rm. DOA990), and the Wolstein Building (Rms. 1118, 1119, & 1120).

Up-to-date hardware is crucial to ensure efficient and quick access to records in the RSOF. A Smart Board System augments the in-house training program, and allows our trainers to directly demonstrate the use of on-line database and training materials. It also provides direct access to library services and campus maps during staff meetings, and emergency incident exercises or responses.

The Legato backup service was set up on all DOES personal computers (PCs). The Carbonite backup service was used for the DOES Server. A Website backup was started to ensure that key files could be replaced.



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The following maintenance was accomplished this fiscal year:

## Hardware Maintenance

- Repaired about 80 workstation hardware problems
- Purchased and set up six new workstations
- Setup Carbonite backup on second server
- Restored crashed server from backup

## Software Maintenance

- Repaired about 500 workstation software problems
- Rewrote and released departmental website
- Major transition toward Onsite database

The Department of Occupational and Environmental Safety has transitioned to the use of Employee ID number in lieu of Social Security Numbers in its training program. All Social Security Numbers were purged from the DOES Radiation Safety system.

## RSOF Laboratory:

The RSOF is located in the Service Building on the 1<sup>st</sup> Floor at 2220 Circle Drive. The laboratory in the RSOF is equipped with a Packard Model 1900C Liquid Scintillation Counter (duplicate machines are located in both Radioactive Waste Facilities), and a Packard 5000 Gamma Counter. The RSOF maintains bioassay equipment consisting of a single-channel analyzer and a detector for monitoring thyroid uptake of <sup>125</sup>I. The Department also has a multi-channel analyzer with a sodium iodide detector. These instruments are used for bioassays and the quantification of air samples for EPA audits, as well as for identification of unknown isotopes found during radiation inspections. The RSOF laboratory also houses a chemical hood, survey meters, decontamination supplies, and essential analytical and calibration equipment.

## Radioactive Waste Facilities:

### Medical School Waste Facility (DOA990):

This facility has a separate office, and a process/storage room for radioactive material and disposal activities. This facility is maintained at negative pressure and has a filtered air exhaust system. It also has a waste compactor, waste shredder, chemical and walk-in hood, survey meters, liquid scintillation counter, air monitoring equipment, and emergency response equipment.

The storage area contains racks for the proper storage of solid and liquid waste. Waste streams consist of dry solid, bulk liquid, and liquid scintillation vials. Dry solid waste and

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the liquid scintillation vials are packed in standard 55-gallon drums. Liquid waste is stored in 5-gallon carboys placed in spill trays to contain leakage. Radioactive animal carcasses are kept in a designated freezer in the ARC until they are disposed.

### **Wolstein Building Waste Facility:**

This facility has a counting room (Rm. 1120) that contains a chemical hood, a liquid process/ storage area (Rm. 1119) that contains a walk-in chemical hood, and solid process/ storage area (Rm. 1118) for disposal activities. The liquid process/ storage area and solid process/ storage area are used for short-term storage only. All waste is transferred to the DOA990 facility for decay in storage and disposal. This area maintains negative pressure relative to surrounding building spaces.

One room (1120) in this Facility has been developed as a combined Chemical and Radioactive Materials Emergency Response Center. It contains spill supplies, a liquid scintillation counter, survey meters for both count and dose rates, and a computer that provides access to our Helix web database and MSDS in the event of radioactive/ chemical spills.

### **IODINATION EQUIPMENT**

Special hoods, air pumps and activated charcoal-filter exhaust are placed in laboratories that conduct iodinations. Currently no laboratories are performing iodinations. All five iodination hoods are in storage. Their locations are as follows:

WRB 1119 - Radiation Waste Facility Storage (3)  
DOA 990 – Storage (2)

### **ANIMAL RESOURCE CENTER (ARC)**

Conventional animal care facilities are located in the Medical School East Building (Robbins), Wearn Building, and the Wolstein Research Building. These facilities are used by AUs to conduct animal studies with radioactive, chemical, and biological materials. A variety of animals (mice, rats, hamsters, rabbits, groundhogs, ferrets & large animals such as sheep, dogs, pigs) are housed in the Medical School East (Robbins) facility as needed. The Wearn and Wolstein facilities predominantly house mice and rats. Contaminated items are stored in the ARC freezer in Medical School East (Robbins) until disposal. Animals used in studies involving radioactive materials are not housed in the Wolstein facility. The Medical School East (Robbins) facility completed a major renovation during in 2009.

### **EQUIPMENT CALIBRATION**

## **RADIATION SAFETY ANNUAL REPORT 2008-2009**

Annual calibration procedures consist of an electronic assessment of survey instruments, plus a measurement of their performance using calibrated isotope reference standards. Survey meters that require dose rate calibrations or repairs are not calibrated by the RSOF. These instruments are sent to an appropriate vendor by the AU's laboratory. Instruments requiring simple repairs are repaired in-house.

Liquid Scintillation Counter (LSC) and Packard Auto Gamma Minaxi 500 Counter calibrations are conducted monthly for the DOES Radiation Laboratory and as needed for the LSC in both DOA 990 and WRB 1119. The continuous air monitor (CAM) in DOA 990 was repaired and recalibrated. The LSCs in the Radiation Laboratory and in DOA 990 were serviced and cleaned.

# **RADIATION SAFETY ANNUAL REPORT 2008-2009**

## **RADIATION SAFETY PROGRAM**

### **PURCHASE OF RADIOACTIVE MATERIALS**

AUs and their approved designees purchase radioactive material. All radioactive isotope purchases must be approved by the RSOF before the order is processed through the Purchasing Department.

AUs must be approved for the isotope and the quantity ordered. The activity, when added to the AU's existing inventory, cannot exceed the AU's approved possession limit for that isotope. Replacement shipments, trial kits, and free samples also must be approved by the RSOF. All deliveries are sent to the Shipping and Receiving Area for RSOF inspection and clearance before delivery to the AUs' laboratories.

### **TRANSFER OF RADIOACTIVE MATERIALS**

The RSOF reviews and approves the transfer of all radioactive material internally (on campus) and externally (off campus) to, or from, an AU. Before initiating a transfer, either the internal or external transfer form must be completed and forwarded to the RSOF for approval. There were 98 isotope transfers approved this year, for a total of 324 mCi.

### **RECEIPT OF RADIOACTIVE MATERIALS**

Every package of radioactive material is inspected by the RSOF for contamination, dose rates, and evidence of damage or breakage. If a package is contaminated or has dose rates greater than 10 mR/hr at 1 meter or 200 mR/hr at the surface, the package is held by the RSOF and the laboratory is contacted. An inspection sticker and the RAM Package Receipt Form placed on the package confirm that inspection has been completed by the RSOF. Direct pickup by a laboratory designee alleviates the need to complete the Bill of Lading since the package is carried to the laboratory and not transported in a vehicle. The AU or designee is required to survey all radioactive material packages upon receipt for contamination and evidence of damage or breakage.

Radioisotope use, for biomedical research, results in frequent movement of radioactive materials to and from the campus. The Broadscope License requires that shipments be surveyed within three hours of arrival. In the past year, 428 isotope shipments (totaling 714 mCi) were inspected and approved by the RSOF after receipt on the campus.

### **DISPOSAL OF RADIOACTIVE MATERIALS**

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Excluding decay of isotope in laboratories and minor inventory changes, isotopes were removed from laboratories either by 556 isotope waste pickups by RSOF staff (218 mCi) or by 76 AU-directed disposals into the sanitary sewers (5 mCi). The following table presents a tabulated breakdown by isotope of radioactive materials entering and leaving laboratories.

RADIATION MATERIALS	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Orders	428	832	776	933	1036	1310	1594

  

ISOTOPE	ORDERS		WASTE PICKUPS		SEWER DISPOSALS		TRANSFERS	
	#	mCi	#	mCi	#	mCi	#	mCi
<sup>11</sup> C	0	0	0	0	0	0	30	32.50
<sup>14</sup> C	25	19.62	158	29.51	11	0.38	7	1.00
<sup>45</sup> Ca	2	1.99	3	0.45	2	0.14	0	0
<sup>36</sup> Cl	2	0.10	7	0.74	1	0.01	4	2.52
<sup>57</sup> Co	2	2.00	19	1.14	0	0	0	0
<sup>137</sup> Cs	0	0	3	0.07	0	0	0	0
<sup>18</sup> F	0	0	0	0	0	0	31	264.80
<sup>55</sup> Fe	1	5.00	0	0	0	0	0	0
<sup>59</sup> Fe	6	6.00	29	3.86	2	0.01	0	0
<sup>3</sup> H	65	83.37	191	88.24	25	1.76	16	3.05
<sup>125</sup> I	4	2.02	5	0.01	3	0.08	5	0.36
<sup>63</sup> Ni	0	0	30	3.34	0	0	0	0
<sup>32</sup> P	286	540.40	84	62.61	27	2.15	2	0.24
<sup>33</sup> P	12	2.84	4	0.11	2	0.01	0	0
<sup>86</sup> Rb	0	0	2	0.03	0	0	0	0
<sup>35</sup> S	23	50.42	21	27.45	3	0.35	0	0
<sup>99m</sup> Tc	0	0	0	0	0	0	3	19.49
Total	428	713.76	556	217.52	76	4.88	98	323.96

  

mCi	714	1692	1212	1332	1428	1470	1570
Pickups	556	548	506	634	725	796	1064
mCi	218	355	383	304	503	327	61
Sewer Disposals	76	90	98	119	98	148	160
mCi	5	14	14	12	12	17	18
Transfers	98	33	240	124	66	31	0
mCi	324	40	1234	273	149	21	0

### SEALED SOURCES

Case Western Reserve University's sealed source inventory contains 211 sealed sources. Of these, 201 sealed sources are required to be inventoried every six months. One (1) of the 201 sealed sources is a low-dose irradiator. Ten (10) sealed sources require six-month leak tests, as stated in our ODH license. Four (4) of the 10 sources are high-level dose irradiators, and one (1) is used to irradiate material with neutrons. These are the only radioactive material sources that could produce significant external dose hazards should their shielding be compromised. See the Appendix for a list of sealed sources on campus. These sources are not included in the general summary reports for radioactive materials. This fiscal year, two (2) sealed sources were disposed.

INVENTORY	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Sealed Sources	211	213	207	168	204	204	171
Exempt	201	190	188	154	183	186	158
Irradiator	5	4	4	4	3	3	3

# RADIATION SAFETY ANNUAL REPORT 2008-2009

Neutron	1	1	1	1	1	1	1
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## RADIATION SURVEY METER CALIBRATIONS

Case Western Reserve University's ODH Broadscope license requires annual calibration of portable survey meters. Properly calibrated meters are necessary for laboratories to perform accurate radiation surveys. AUs are responsible for the annual calibration, maintenance, and repair of their survey instruments. Count rate calibrations on survey instruments and minor repairs are provided by the RSOF as a free service. The in-house services provided by DOES generated \$16,710 in cost saving over the fiscal year in lieu of using outside vendors.

CALIBRATION/ SERVICE	COST PER SERVICE	COST SAVINGS
172 meters	\$75/meter	\$12,900
0 pumps	\$70/pump	\$0
44 thyroid assays	\$50/assay	\$2,200
23 filter changes	\$70/ filter change	\$1,610
	TOTAL COST SAVINGS	\$16,710

There are 230 survey meters on campus. The RSOF calibrated 172 of these meters in the last fiscal year. There were 58 meters removed from service. In service meter calibrations totaled 172. Certificates of calibration are kept in the RSOF for all meters in service at the University. Records for all meters include instrument efficiencies for isotopes used in laboratories.

No operational pumps for radioactive materials were calibrated for use in the iodination hoods.

CALIBRATION/ SERVICE	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Meter Calibration	172	170	157	188	233	245	250

METERS IN USE	TOTAL
Bicron	2
Dosimetry	1
Hi-Q	5
Inovision	1
Ludlum	118
RPI Mini Monitor	15
Technical	1
Victoreen	12
WB Johnson	17

METER CALIBRATION BY MONTH	TOTAL
7.2008	9
8.2008	10
9.2008	13
10.2008	6
11.2008	19
12.2008	14
1.2009	14
2.2009	12
3.2009	10

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4.2009	15
5.2009	26
6.2009	11

## RAM SECURITY

Radioactive materials and potentially hazardous chemicals must be secured against unauthorized access or removal when unattended. All refrigerators, freezers, or other storage units with RAM labels that are located in unsecured areas must either have a security lock to limit access to the refrigerator or freezer or must contain a secured and labeled lock box within the storage unit. Access to isotope inventory must also be controlled when no authorized individual is in the area and constant surveillance cannot be maintained. Security checks by the RSOF are conducted on a monthly basis after normal working hours to ensure that radioactive materials are properly secured. All buildings undergo radiation security inspections each month. Only minor violations of required security procedures were found.

RAM SECURITY CHECKS	08/09	07/08	06/07	05/06	04/05	03/04
Violations	19	37	54	74	89	104

## PERSONNEL MONITORING

Personal radiation dosimeters are issued through the RSOF to radiation workers and personnel who have the potential to receive a measurable radiation dose while working at the University. All laboratory workers, visitors to the laboratory, maintenance workers and contractors working in a laboratory are candidates for inclusion in the dosimetry program. Other personnel may request dosimeters, which, are provided by the RSOF. Radiation workers who are issued dosimeters must complete the New Radiation Worker Training Class and fill out an Occupational Exposure History Form. Dosimeters are to be returned promptly at the end of each cycle of use so that the RSOF can take timely action, consistent with implementation of ALARA, in the event any significant exposure to radiation is detected by the dosimeter.

## PREGNANT WORKER PROGRAM

Any radiation worker who is, or thinks she may be pregnant is advised to complete a Declaration of Pregnancy Form found on the DOES website <https://www.case.edu/finadmin/does/> under the 'Radiation Safety' link and send it to RSOF. Counseling is provided and an additional dosimeter is issued to the worker that is read every month. This additional fetal dosimeter is worn to conservatively measure any dose to the developing baby. One woman declared her pregnancy. During monitoring, no fetal doses above background radiation levels were detected.

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## NEUTRON USERS

For experiments and procedures involving the use of neutron sources, personnel monitors sensitive to neutron radiation must be worn. These can be obtained from the RSOF. There were four neutron dosimeter users during the fiscal year.

## USERS OF RGE/ X-RAY

The RSOF provides special dosimeters for individuals carrying out experiments and procedures involving the use of radiation generating (x-ray) equipment, such as fluoroscopes. The four Fluoroscopy users had collar badges.

Although only 20% of the workers currently monitored are required to wear dosimeters to comply with the terms of the Case Western Reserve University Broadscope License or Radiation generating equipment programs, the use of dosimeters is encouraged because it provides an excellent method to detect activities that might be dangerous to individual workers.

PERSONNEL MONITORING	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Pregnant Workers	1	2	2	6	6	13	15
Neutron	4	4	0	0	0	0	0
RGE/ X-Ray	103	70	38	60	201	160	180
General	698	665	705	905	1005	970	1030

Case Western Reserve University uses Luxel badges, which are considered to be state-of-the-art detection technology for personnel dosimetry. Luxel badges can measure minimum detectable limits of 1.0 mRem. ODH regulations require that all monitored workers be advised annually of their occupational dose exposure. All workers were sent a copy of their prior calendar year's dose report in 2009.

## **RADIATION GENERATING EQUIPMENT**

Machines that produce ionizing radiation (RGE) require safety labeling using appropriate warning indicator systems augmented by testing for radiation leakage during operation. Analytical research units include electron microscopes, X-Ray diffraction and particle accelerators. There are also X-Ray units in use for health care & diagnostic research. Radiation-generating equipment is inventoried quarterly and surveyed annually for leakage. Investigators in charge of RGE, not the RSOF, are required to provide site-specific training programs for workers using this equipment. DOES provides general safety classes for individuals using RGE.

RADIATION-GENERATING UNITS (In Use)	08/09	07/08	06/07	05/06	04/05	03/04	02/03



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Health Care & Diagnostic Research	35	37	36	42	32	32	32
Analytical Research	38	36	39	40	48	51	51
Tubes Only	12	12	11	17	19	18	19
<b>TOTAL</b>	<b>85</b>	<b>85</b>	<b>86</b>	<b>99</b>	<b>99</b>	<b>101</b>	<b>102</b>

<b>RADIATION-GENERATING UNITS (Not In Use)</b>	<b>08/09</b>	<b>07/08</b>	<b>06/07</b>	<b>05/06</b>	<b>04/05</b>	<b>03/04</b>	<b>02/03</b>
Analytical units In storage	15	18	19	23	21	23	23
Analytical units Disabled	4	1	2	3	7	5	7
Analytical units Out of Service	9	9	9	11	9	7	7
Diagnostic units Disposed	3	4	4	7	3	2	1
Diagnostic units Purchased	3	3	4	11	2	1	1

## **RADIOACTIVE MATERIAL RELEASES**

### SEWER EXPOSURE CONTROL & MONITORING

State and Federal regulations permit Case Western Reserve University to dispose of low levels of radioactive materials into the sanitary sewers. The Northeast Ohio Regional Sewer District (NEORS) requires semiannual reports on radioactive material discharged to the sanitary sewer system. Case Western Reserve University's sewer releases were in compliance with both Federal and State regulations. The report for July through December 2008 was filed by January 31, 2009 and the report for January through June 2009 was filed by July 31, 2009. AUs in Storage Mode or using only sealed sources were exempt from completing this form. One hundred percent compliance with sewer disposal regulations was achieved for both reporting periods.

### AIR EXPOSURE CONTROL & MONITORING

During the 2008 calendar year, radioactive material releases to the air were less than 10% of the maximum levels set by the EPA. Therefore, Case Western Reserve University had no reports to file, and the University was in compliance with the air effluent releases stipulated by the EPA Clean Air Act, the NRC, and the ODH.

With regard to airborne exposure control, the primary concern is to safeguard against exposure to airborne radioactive iodine that is used for protein iodination experiments. To control exposures, the RSOF requires that reactions involving use of volatile radioactive iodine isotopes be performed in an iodination hood that is housed in a chemical hood. The charcoal-filtered exhaust from the iodination hoods typically reduce radioactive material emissions by approximately 90%. Experiments requiring use of large amounts of iodine in especially volatile form are routinely carried out in closed

# RADIATION SAFETY ANNUAL REPORT 2008-2009

systems to prevent airborne release of radioiodine. There were no experiments requiring the use of volatile iodine conducted this fiscal year.

## BIOASSAY PROGRAM

Bioassays are required for employees who may receive an internal, measurable radiation dose. Bioassay procedures include, but are not limited to, thyroid screening and urinalysis. The RSOF can perform bioassays for radioactive iodine (thyroid scan) and tritium uptake (urinalysis). Bioassay records are retained in the RSOF and are available for review by the assayed individuals.

## RADIOACTIVE IODINE

During 2008-2009, there were no active iodination laboratories. The RSO maintains an inventory of five iodination hoods to be deployed when needed. A bioassay is required when more than 1 mCi of radioactive iodine is used in volatile form. The RSOF must be notified prior to:

- Handling more than 1.0 mCi of volatile radioactive iodine. The following must be completed prior to the procedure.
- Performance of a baseline bioassay for anyone involved in the procedure that does not have a baseline radioactive iodine bioassay on file.
- Arrangements for monitoring of effluent releases to the atmosphere during the first iodination procedure using a new protocol to measure and mitigate any release to the environment.

After an iodination procedure, individuals involved in the procedure must contact the RSOF and arrange for a bioassay to be completed by the end of the next business day. Bioassays were completed for the RSOF staff involved in radioactive waste handling. There were no iodination procedures performed this fiscal year. No workers exceeded 10% of the ODH limits. This chart highlights the decrease in iodination procedures in University laboratories.

IODINATION PROCEDURES	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Total	0	0	6	6	7	11	20

<sup>125</sup> I BIOASSAYS	08/09	07/08	06/07	05/06	04/05	03/04	02/03
RSOF Staff	44	44	32	64	67	64	40
Additional	0	0	0	7	10	13	20
Total	44	44	32	71	77	77	60

## TRITIUM

Urine bioassays must be carried out for individuals using more than 10 mCi of tritium, with a baseline bioassay required prior to experiment. There were no urine bioassays required during this fiscal year.

# RADIATION SAFETY ANNUAL REPORT 2008-2009

## RADIOACTIVE MATERIALS INCIDENTS

### EMERGENCY RESPONSE

Emergency response procedures have been developed and approved by the RSOF and RSC for spills, releases or loss of RAM, small fires, large fires, internalized contamination and medical emergencies. The goal during any emergency response is to protect people first and property second. The RSO or designee provides instruction, assistance and supervision of clean up as required. The RSO is authorized to act independently and take prompt remedial action in situations involving RAM that present imminent danger or threat to personnel, property, or the community at large.

### INCIDENT/ SPILL RESPONSE

#### MAJOR INCIDENT/ SPILL

This is a spill that involves personnel contamination or results in contamination outside of the intended work area; one that cannot be easily and effectively contained and cleaned up.

#### MINOR INCIDENT/ SPILL

This is a spill that does not involve personnel contamination and that remains inside the intended work area; one that can be easily and effectively contained and cleaned up without assistance from the RSOF.

There were no major incidents and twenty (20) minor incidents documented over the past year.

INCIDENTS	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Major	0	1	2	0	1	1	5
Minor	20	6	7	0	4	8	5
TOTAL	20	7	9	0	5	9	10

DATE	INCIDENT	CONTAMINATION	ROOT CAUSE	FOLLOW UP
5/12/2009	Minor Incident	<sup>32</sup> P use with PPE infraction	Student not wearing laboratory coat working with radioactive material. Student wearing flip-flops with socks while conducting radioactive experiments.	The AU was contacted and the student corrected both infractions while RSOF was present. The issues were addressed at their laboratory meeting.
5/11/2009	Minor Incident	PPE infraction	Student wearing shorts and flip-flops with no laboratory coat or gloves carrying chemical through the laboratories.	The AU was contacted and the issues were addressed at their laboratory meeting.
5/1/2009	Minor Incident	<sup>32</sup> P contamination & unsecured RAM	During a routine survey of a laboratory several areas were found	The AU was contacted and the area was decontaminated by the

## RADIATION SAFETY ANNUAL REPORT 2008-2009

			contaminated and RAM stock and samples were not secured in an unlocked freezer.	laboratory staff after several follow-ups by the Radiation Safety Office & a RAM locked box was purchased for the RAM.
4/9/2009	Minor Incident	<sup>32</sup> P contamination	During a routine survey of a laboratory several areas were found to be contaminated	The AU was contacted and the area was decontaminated by the laboratory staff after several follow-ups by the Radiation Safety Office
4/1/2009	Minor Incident	Irradiator Intrusion Alarm	The worker went to reopen the door as it was closing. The door timer did not have time to reset, and the alarm went off.	RSOF and security responded to the alarm. The worker that last accessed the area was contacted. The worker was instructed on the irradiator procedures.
4/1/2009	Minor Incident	Irradiator Intrusion Alarm	The intrusion alarm went off in the irradiator room.	RSOF and security responded to the alarm. The worker that last accessed the area was contacted. The worker was instructed on the irradiator procedures.
3/32009	Minor Incident	0.000001 mCi of <sup>3</sup> H needle stick through a radiation waste bag.	Worker received needle stick while boxing radioactive waste. Another worker put the needle in the bag. The needle was not placed in a biohazard rigid container.	The workers attended the radiation safety training again.
2/23/2009	Minor Spill	DOA990 Bathroom clogged causing flood	Bathroom next door to office was clogged. Contractor was snaking drain and flooded the parking lot and office area. No Radiation materials were involved.	Clog was removed the next day. CASE Janitorial staff cleaned office and bathroom.
2/13/2009	Minor Incident	Unauthorized decontamination of RAM active chest freezer unit.	Freezer was decontaminated and moved to ARC garage area by worker. RSOF was not contacted before move.	A verbal reminder will be issued during Ancillary Training that will state that any RAM labeled unit will not be moved/ cleaned/ repaired without clearance by RSOF.
2/12/2009	Minor Spill	Water in decay area	Small puddles of condensation were found on the floor from an overhead pipe.	Samples were run on the Liquid Scintillation Counter indicating that the water was not contaminated. No backflow was possible.
2/4/2009	Minor Spill	0.50 mCi of <sup>3</sup> H/ <sup>14</sup> C contained contamination in leaking bags	The RAM Animal Freezer was unplugged for several days and the animals thawed.	The thawed bags were moved to the new freezer. The liquid mixture was absorbed and the area was surveyed. No contamination was found.
1/26/2009	Minor Incident	Unauthorized move of RAM freezer with <sup>3</sup> H within	The freezer containing <sup>3</sup> H was moved from one location to another without notifying the	The AU was contacted and stated that they had forgotten. They were reminded of the

## RADIATION SAFETY ANNUAL REPORT 2008-2009

			RSOF. They were aware of procedure.	procedure.
12/17/2008	Minor Incident	0.01 mCi of <sup>133</sup> Ba sealed source in Liquid Scintillation Counter (LSC) unauthorized move	A LSC was moved to another University without notifying the RSOF. Thus the LSC was not properly cleared before leaving the University.	The researcher was contacted and made aware of the clearance procedures for equipment leaving CASE.
11/28/2008	Minor Incident	<sup>32</sup> P Radioactive laboratory flooded. No contamination found.	Pipe burst in cold room caused flood in radioactive laboratory.	Radiation Safety Office surveyed room and equipment. No contamination found.
10/2/2008	Minor Incident	Security Pad issue in DOA Waste Facility	Wrong number was keyed into security pad activating the alarm. Security was called.	Alarm was reset.
9/24/2008	Minor Incident	Intrusion Alarm in the DOA Waste Facility	The Waste Facility Office door was opened because a worker did not know that the alarm was activated.	No one from Security responded. Security was contacted and instructed to respond to all Waste Facility Alarms.
8/15/2008	Minor Incident	1.0 mCi of <sup>32</sup> P was left unshielded in an unlocked laboratory	During a waste pickup, it was noted that the laboratory was left open with unshielded radioactive waste containers	The AU was contacted and the containers were shielded and the laboratory door locked.
8/8/2008	Minor Incident	0.07 mCi of <sup>32</sup> P contamination was found in a laboratory	During a routine survey of a laboratory several areas were found contaminated	The AU was contacted and the area was decontaminated by the laboratory staff after several follow-ups by the Radiation Safety Office
7/31/2008	Minor Incident	Improper animal carcass storage	Three unlabeled biohazard bags were found in animal carcass freezer	An investigator accidentally placed non-radioactive carcasses in the radioactive carcass freezer. The radioactive freezer was left unlocked. The Radiation Staff have been reminded to make sure that the freezer is locked after they drop off animal waste.
7/18/2008	Minor Incident	Unauthorized RAM ( <sup>3</sup> H) Room	Chemical Safety found RAM during an inspection of materials left behind in cold room	Ram removed and placed in waste facility; room was surveyed (clean); partial RAM tape removed from bench.

### DOES WEB SITE & NEWSLETTER

The updated DOES home web site (<https://www.case.edu/finadmin/does/>) provides integrated web-based access to DOES services. Information on training classes, on-line retraining, and safety manuals is available at this site. All information is updated on a regular basis.

# **RADIATION SAFETY ANNUAL REPORT 2008-2009**

The DOES newsletter is filled with articles that are designed to keep the campus community abreast of safety issues and concerns. It covers the latest government regulations, addresses concerns that are found during laboratory inspections, and provides answers to questions frequently asked by laboratory personnel. Articles that were submitted during this year included:

- Security of Radioactive Materials
- DOES Welcomes Many New Faces in 2008
- Taking Inventory—Uranyl Acetate
- RAM Storage—Clarifications
- Inactive vs. Storage Mode: Knowing the Difference
- Receipt of Radioactive Material
- Ultraviolet Lights—Use and Maintenance

## **LASER SAFETY PROGRAM**

The Laser Safety Program and related training has progressed well since its inception in September 2004. A standard operating procedure has been incorporated into the Physical Safety Manual that is provided to all laser users.

There are a total of 59 lasers on the campus in 12 buildings. There are currently 152 active users of lasers. The lasers of greatest concern are those labeled Class 3B and Class 4. The laser inventory was updated and new signs were posted. There are 27 Class 4 lasers, 10 Class 3B lasers, and 22 lasers in the other classes of 1, 2, and 3A.

The status of this program is presented to the Case Western Reserve University RSC quarterly. An ad-hoc member with experience in Laser Safety has been recruited to review laser protocols and attends the RSC meetings.

Progress has been made in getting current workers retrained. Former workers have been reclassified as departed. Physical inventories of each laser user have begun.

## **ULTRA VIOLET (UV) SAFETY PROGRAM**

With increased use of UV equipment on campus, a program has been implemented. A UV safety Powerpoint presentation has been put on the DOES website.

## **CLEARANCES/ RELOCATION PROGRAM**

The RSOF requires at least three weeks notice to decommission laboratories. An orchestrated effort between the RSOF, the Safety Services division of DOES, Facilities Services, and the AU facilitates these operations. There were 3 clearances required for 15 pieces of equipment. A total of 7 relocations and 3 terminations were completed over the past year.

## **WASTE MANAGEMENT**

# **RADIATION SAFETY ANNUAL REPORT 2008-2009**

## RADIOACTIVE WASTE FACILITY

Our Radiation Waste Facility decay-in-storage licensing with the ODH specifies that we must dispose of any interim generated waste as soon as practical when a waste site is open. The Case Western Reserve University Radioactive Waste Facility (RWF) is used to segregate waste streams and prepare the waste for disposal. The different waste streams include aqueous waste, sharps, animals, scintillation vials, and dry solid waste.

P32 solid waste is held for decay (equal to or less than 10 half-lives) in the Radioactive Waste Facility. The waste is surveyed and subsequently sent to Stericycle (formally BFI), a commercial disposal facility for incineration. Reducing the volume of waste to be disposed remains a continuing aim of the waste program. S35 and I125 are no longer held for decay, but are shipped along with the long-term solid waste. As part of the waste minimization program, isotope users are encouraged to reduce the volume of waste generated in the laboratory by minimizing the use of extraneous paper products. Currently, only the outside of the bag is surveyed, followed by immediate disposal to simplify handling by staff and provide for compliant and economical disposal of these materials. This procedure has greatly decreased hazard exposures to RSOF personnel handling radioactive waste at Case Western Reserve University. Short-lived non-sewer (chemical waste) is held for decay, resurveyed after ten half lives, and disposed by Chemical Analytics, a commercial hazardous waste disposal company. Long-lived solid waste (at least 10 half lives) and scintillation vials are disposed by ADCO Services, a commercial radioactive waste hauler.

Non-hazardous aqueous waste is no longer held for decay. This waste is picked up from laboratories by the RSOF staff and immediate sewer disposal is carried out in the Radioactive Waste Facility since the isotope activities are significantly below our established regulatory limits as per OAC 3701:1-38-12 Appendix C. A sewer disposal log is kept in the DOES offices. Total sewer disposals are reported semi-annually to the Northeast Ohio Regional Sewer District.

## COLLECTION & DISPOSAL OF ANIMAL REMAINS AND BIOHAZARDOUS WASTE

The Animal Resource Center (ARC) maintains a  $-20^{\circ}\text{C}$  freezer for storage of radioactive animal remains and waste. Radioactive wastes are bagged and labeled in yellow bags in the same manner as dry solid waste. All waste placed in the freezer must be logged on the animal disposal sheet on the cold room door. A log sheet of animals disposed in this manner is also kept for inventory purposes by the laboratories generating the waste.

Any item that has come in contact with an etiologic agent is considered biohazardous. Etiologic agents include bacteria, viruses, and parasites and must be disinfected or decayed to background before disposal. Infected animal waste is placed in the ARC (BRB B05A) for disposal by the RSOF. Radioactive animal waste includes cage bedding, carcasses, viscera, excrement, serum, blood or other animal tissue containing radioactive materials. All waste is tagged. Additional information regarding etiological agents is placed on the tag. All animal waste is disposed by the RSOF.

# RADIATION SAFETY ANNUAL REPORT 2008-2009

## RECYCLING PROGRAM

In the past fiscal year, the RSOF obtained laboratory equipment from AU's who have either left the university or ceased to use RAM. The equipment includes radiation waste containers (lead and Lucite), shielding (lead and Lucite), and survey meters. This equipment is offered to AU's if and when their funds do not allow them to buy new radioactive materials handling equipment. This cost-saving recycling program resulted in re-use of equipment that saved AUs & DOES more than \$10,000 during 2008-2009 in lieu of waste disposal.

## WASTE GENERATED IN JULY 1, 2008 - JUNE 30, 2009

	GENERATED 7/1/2008- 6/30/2009	DISPOSED: HAZ. WASTE SVCS.	DISPOSED: SEWER	DISPOSED: SAFETY	DISPOSED: ADCO	IN STORAGE AS OF 6/30/2009
Short-Lived Dry	95	50 *	0	0	12	33
Long-Lived Dry	50	0	0	0	46	4
Scintillation Vials	30	0	0	0	30	0
Animals	1	1	0	0	0	0
Long-Lived Sewer	50	0	50	0	0	0
Long-Lived Non-Sewer	80	0	0	0	0	80
Short-Lived Sewer	50	0	50	0	0	0
Short-Lived Non-Sewer	20	0	0	20	0	0

All values in the dry waste, vial, and animal categories denote the number of 55-gallon drums. All values for the liquid waste categories are in gallons. The single asterisk (\*) denotes the number of drums generated prior to July 1, 2008, kept for decay in storage, and disposed during the period of July 1, 2008–June 30, 2009. During this fiscal year, all long-lived hazardous aqueous waste was disposed.

ADCO animal waste cost = \$24.5/lb for 10 pound barrel - \$245 per 10 pound barrel

ADCO dry waste cost = \$605 per 55-gallon drum

The cost of disposal for one drum of biomedical waste at Hazardous Waste Services is \$40 per drum. There were 50 drums of dry waste and one (1) 32-gallon drum of animal waste surveyed and disposed during 2008-2009 fiscal year at a cost of \$2,040. Without the decay in storage program, it would cost \$605 to send one 55-gallon drum of decay in storage (DIS) dry waste and it would cost \$245 per 10 lb drum of animal waste through ADCO services. Therefore, in the absence of decay in storage, the cost to dispose of



## RADIATION SAFETY ANNUAL REPORT 2008-2009

the waste drums through ADCO would have been \$27,995. Thus, the indirect savings to researchers due to the decay in storage program was \$25,955.

WASTE GENERATION	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Short-Lived Dry	95	91	85	72	66	63	66
Long-Lived Dry	50	35	20	25	28	31	26
Scintillation Vials	30	25	30	47	44	45	39
Animals	1	2	4	3	2	1	3
Long-Lived Sewer	50	38	35	46	55	60	50
Long-Lived Non-Sewer	80	20	5	15	5	0	0
Short-Lived Sewer	50	140	135	125	115	80	76
Short-Lived Non-Sewer	20	25	30	20	35	75	85

# RADIATION SAFETY ANNUAL REPORT 2008-2009

## RADIATION SAFETY COMMITTEE AUDITS

Radiation Safety Committee (RSC) audits are carried out in two different ways:

- Performance audits are conducted on-site at the Radiation Safety Office (RSOF) by individual RSC members at various times throughout the year
- A compliance inspection of RSOF records is conducted shortly after the end of each fiscal year by a team of RSC Members.

Performance audits of RSOF activities included the following areas:

<u>AREA AUDITED</u>	<u># OF INDIVIDUAL FILES EXAMINED</u>
RAM Applications	10
Isotope Orders/ AU Possession Limits	10
RGE inventory/ training	10
Ancillary staff training	10
AU/ worker training	10
Radiation survey meters	10
Waste disposal facility	2
Shipping papers	10
RAM security checks	10
Bioassays	10
Semi-Annual mailings	10
Sealed sources	10
Web site Accuracy	1
Irradiator	5

These audits were conducted between October and December 2008 and between April and June 2009. This effort resulted in the review of more than 100 files, in the program areas listed above.

## **RSC TRI-ANNUAL AUDITS FOR 2008-2009**

### RSC AUDIT COMMENT:

In October 2008 the Radiation Safety Committee Members, conducted a tri-annual audit of the following components of the Radiation Safety Office:

- Shipping Papers
- AU/ Worker Training
- Sealed Sources
- Valid RAM Applications
- RGE Inventory/ RGE Training
- Isotope Orders/ AU Possession Limits
- Waste Facilities
- Irradiator Program

Each audit consisted of randomly selecting five (5) to twenty (20) files from the past year to ensure its contents were up-to-date, accurate, and consistent with the database.

# **RADIATION SAFETY ANNUAL REPORT 2008-2009**

## **SHIPPING PAPERS**

No deficiencies were reported in ten (10) files randomly audited.

## **RSOF RESPONSE**

No response required.

## **AU/ WORKER TRAINING**

Several deficiencies were reported. Five (5) of the 20 workers listed were under AUs that are inactive for radioactive material use. Eight (8) workers listed were 30 days overdue.

## **RSOF RESPONSE**

The database was corrected for each worker listed under an Inactive AU to update the status of the worker to inactive status once verified by the RSOF. The workers that were 30 days overdue were contacted directly and required to retrain in person. All are now current.

## **SEALED SOURCES**

Of ten (10) files examined, one (1) deficiency was found. The remaining files were compliant. The deficiency consisted of a discrepancy between information present in a computer file versus a hardcopy.

## **RSOF RESPONSE**

The sealed source hard copy was verified and the current information was input into the database.

## **VALID RAM APPLICATIONS**

Ten (10) files examined and three (3) deficiencies were found. One deficiency involves no information for survey meters. The second deficiency involves no records for new rooms, new personnel, inventory, and meters. The third deficiency involves a new person added.

## **RSOF RESPONSE**

The researcher that had no survey meters uses tritium ( $^3\text{H}$ ) only and will analyze wipe test using a liquid scintillation counter. The additional information was completed for the currently active researcher with the second deficiency of missing room, personnel, inventory, and meter information. The third deficiency was corrected by added the new worker to the researchers application upon verification.

# RADIATION SAFETY ANNUAL REPORT 2008-2009

## RGE INVENTORY/ RGE TRAINING

No deficiencies were reported.

## RSOF RESPONSE

No response required.

## ISOTOPE ORDERS / ISOTOPE POSSESSION LIMIT

No deficiencies were reported in ten (10) files randomly audited.

## RSOF RESPONSE

No response required.

## WASTE FACILITIES

Several deficiencies were noted. First, the Dental DOA decay area was missing a survey from June 2008. The Dental DOA 990 office was missing a survey from June 2008. The DOA 990 process area was missing a survey from July 2008. Air monitoring in DOA 990 showed several deficiencies including issues with ordering charcoal, which prohibited completion of bimonthly surveys.

## RSOF RESPONSE

These surveys are now included on the monthly assignments and prospective monitoring of all supplies has been implemented.

## IRRADIATOR PROGRAM

No deficiencies were reported.

## RSOF RESPONSE

No response required.

## RSC AUDIT COMMENT:

No second trimester audit by the RSC was conducted.

# RADIATION SAFETY ANNUAL REPORT 2008-2009

## RSC AUDIT COMMENT:

The RSC conducted a third trimester audit in May 7, 2009. Each audit consisted of randomly selecting five (5) to twenty (20) files in the past year to ensure items were up-to-date, accurate, and matched the database. The following components of the Radiation Safety Office were audited:

- Survey Meters
- Security Checks
- DOES Webpage (Radiation Safety)
- Semi-Annual Mailings
- Bioassays
- Support Staff Training
- RGE Inventory/ RGE Training
- Decommissioning Surveys
- Active Surveys

## SURVEY METERS

Ten (10) files for survey meters were randomly evaluated. No deficiencies were reported.

## RSOF RESPONSE

No response required.

## SECURITY CHECKS

Ten (10) files were randomly surveyed. No deficiencies were reported.

## RSOF RESPONSE

No response required.

## DOES WEBPAGE (RADIATION SAFETY)

Ten (10) links on the Radiation Safety Office Web Page were reviewed for being up-to-date for training, forms, and information related to safety. No deficiencies were reported.

## RSOF RESPONSE

No response required.

# RADIATION SAFETY ANNUAL REPORT 2008-2009

## SEMI-ANNUAL MAILING

Ten (10) AU files were randomly audited for semi-annual mailings. No deficiencies were reported.

## RSOF RESPONSE

No response required.

## BIOASSAYS

There is only one (1) record of an order greater than 1 mCi of  $^{125}\text{I}$  and no orders of  $^3\text{H}$  greater than 10 mCi. No deficiencies were reported.

## RSOF RESPONSE

No response required.

## SUPPORT STAFF TRAINING

Five (5) files were randomly audited. One (1) deficiency was noted in which the hard copy could not be verified.

## RSOF RESPONSE

The hard copy had been misfiled and was filed correctly.

## RGE INVENTORY/ RGE TRAINING

Ten (10) files were randomly surveyed. No deficiencies were reported.

## RSOF RESPONSE

No response required.

## DECOMMISSIONING SURVEYS

Ten (10) files were randomly surveyed. No deficiencies were reported.

## RSOF RESPONSE

# RADIATION SAFETY ANNUAL REPORT 2008-2009

No response required.

## ACTIVE SURVEYS

Ten (10) files were randomly surveyed. No deficiencies were reported.

## RSOF RESPONSE

No response required.

Overall, this tri-annual part of the audit process was successful. Records were easily accessed and reviewed. The program was found to be efficient. Productive interaction among committee members and RSOF staff during the audit process helped expedite the process. All corrections to the files and Helix database were made following each trimester audit.

## ANNUAL RADIATION SAFETY PROGRAM AUDIT REPORT

The Radiation Safety Committee conducted its annual audit of the Radiation Safety Office the first week in June 2009. Members of the RSC conducted the audit. The committee reviewed the performance of 17 components of the RSOF. The areas were:

- Ancillary Staff Training
- AU and Worker Training
- Bioassays
- Compliance Review
- Isotope Orders, AU Possession Limits, and the Helix Database
- Dosimetry Program
- Incident Reports
- Irradiator Program
- Isotope Security Checks
- Licensing Status
- Radiation Generating Equipment Inventory and Training
- Radiation Survey Meters
- Seal Source Leak Test
- Shipping Papers
- Semi-Annual Mailings (air/sewer inventory)
- Valid RAM Application
- Water Disposal Facilities (DOA990, Wolstein) & RSOF Laboratory

The Results of this audit are summarized in this report as follows.

## ANCILLARY STAFF TRAINING

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## RSC AUDIT COMMENT:

An annual audit was conducted to verify the training status on ancillary personnel encompassing the following segments of this program: Animal Resource Center, Shipping/Receiving, Custodial, Security, and Plant Services. Ancillary staff workers were surveyed from July 1, 2008 through June 30, 2009. Of twenty-seven (27) files examined, twenty-six (26) workers are overdue for training.

## RSOF RESPONSE:

The date of the annual training was delayed by one month. The Custodial, Facilities, and ARC trainings were scheduled to be held in July 2009.

## AU AND WORKER TRAINING

### RSC AUDIT COMMENT:

Forty-two (42) files were examined to verify the training dates of AU and workers during the period of July 1, 2008 through June 30, 2009. Thirty-four (34) files were found to be overdue for training. Of those, one is past due for ~4 months. An additional six (6) are within a week of becoming overdue.

### RSOF RESPONSE:

All overdue personnel were contacted directly and required to attend Radiation Safety Training in person. Ordering privileges were held for the researcher whose training was four months overdue until retraining was complete. Retraining is now complete for all noted.

## BIOASSAYS

### RSC AUDIT COMMENT:

Audits were conducted to verify completion of bioassays for laboratories using >10 mCi of  $^3\text{H}$  and/or 1 mCi  $^{125}\text{I}$  during the period of July 1, 2008 through June 30, 2009. No bioassays were performed so no files were examined. It is recommended that this program be terminated.

### RSOF RESPONSE

This program will be placed on hold until further needed.

## COMPLIANCE REVIEW

### RSC AUDIT COMMENT:



## **RADIATION SAFETY ANNUAL REPORT 2008-2009**

Forty-eight (48) files were examined to verify that AU laboratories were audited within the last six months and that any non-compliant issues were appropriately followed up. All files were compliant.

### **RSOF RESPONSE**

No response required.

### **ISOTOPE ORDERS, AU POSSESSION LIMITS, AND THE HELIX DATABASE**

#### **RSC AUDIT COMMENT:**

Thirty-five (35) files were examined to verify that the amount of RAM ordered is within AU possession limits and that the orders are in the Helix database. No deficiencies were reported.

### **RSOF RESPONSE**

No response required.

### **DOSIMETRY PROGRAM**

#### **RSC AUDIT COMMENT:**

Fifty (50) files were randomly examined to verify that AU laboratories possessed current dose records for the past year (July 1, 2008 and June 30, 2009). Only two (2) files were deficient and the records were unavailable for two principal investigators.

### **RSOF RESPONSE**

One worker without a dose report attended the training but did not work with radioactive material. The second worker was a Kelly employee working for a CASE researcher and was trained by a Kelly contractor. The worker will not use radioactive material.

### **INCIDENT REPORTS**

#### **RSC AUDIT COMMENT:**

During the period of July 1, 2008 and June 30, 2009, monthly incident reports were reviewed for verification and documentation of follow-up by the RSOF. During this time,

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there were a total of twenty-three (23) incidents reported. All reports were resolved by the PI or cleared by security.

## **RSOF RESPONSE**

No response required.

## **IRRADIATOR INFORMATION REVIEW**

### **RSC AUDIT COMMENT:**

Irradiator information files were examined to verify that the irradiators were audited by the RSOF for the period encompassing July 1, 2008 through June 30, 2009. Of the four (4) listed irradiators, only three (3) were active during the past year. All other files were up-to-date and compliant.

## **RSOF RESPONSE**

No response required.

## **ISOTOPE SECURITY CHECKS**

### **RSC AUDIT COMMENT:**

During the period of July 1, 2008 and June 30, 2009, reports were reviewed for verification and documentation of radioisotope security checks. During this period, a total of twenty-six (26) security checks were generated. There were twelve (12) episodes of unsecured RAM. All incidences were resolved in a timely fashion.

## **RSOF RESPONSE:**

None required.

## **LICENSING STATUS**

### **RSC AUDIT COMMENT:**

An annual audit was conducted to verify the status of the radiation licensing status of the radiation safety office. Components of this audit include the following: Broadscope License, RGE License, Waste License, Radiation Manual, X-ray Manual, Radiation Training, X-Ray training, Radiation Online Retraining, and RSC Guidelines. The Broadscope License is current. All training endeavors including the Radiation Manual, Radiation Online Retraining, X-ray Manual, Radiation Training, and RSC Guidelines are current. Only X-Ray training is out-of-date and should be updated.

## **RSOF RESPONSE**

# **RADIATION SAFETY ANNUAL REPORT 2008-2009**

The X-Ray training was updated.

## RADIATION GENERATING EQUIPMENT INVENTORY AND TRAINING

### RSC AUDIT COMMENT:

Twenty (20) files were examined for inventory status and last survey date of equipment during the period of July 1, 2008 and June 30, 2009. No deficiencies were found in any of the files examined.

### RSOF RESPONSE:

No response required.

## RADIATION SURVEY METERS

### RSC AUDIT COMMENT:

Fifty (50) files were examined to verify that survey meters were compliant for calibration dates within the last twelve months. All meters have a current calibration date with records in both files and in Helix database.

### RSOF RESPONSE:

No response required.

## SEALED SOURCE LEAK TEST

### RSC AUDIT COMMENT:

Fifty (50) files were randomly screened during the last four months for verification that the sealed source had been leak tested. Of fifty (50) sealed source files examined, no deficiencies were identified.

### RSOF RESPONSE:

No response required.

## SHIPPING PAPERS

### RSC AUDIT COMMENTS:

## **RADIATION SAFETY ANNUAL REPORT 2008-2009**

Thirty-five (35) shipping papers were randomly audited to ensure that they were adequately completed for the transfer of RAM material from site to site during the period of July 1, 2008 and June 30, 2009. Of all files examined, five (5) were noted as containing typographical errors with respect to catalogs numbers. These errors were corrected.

### **RSOF RESPONSE:**

No response required.

### **SEMI-ANNUAL MAILINGS (AIR/ SEWER INVENTORY)**

#### **RSC AUDIT COMMENT:**

Fifty (50) files were examined to verify receipt of semi-annual mailings from the last twelve months. All files were complete except for three (3) files that were outdated.

### **RSOF RESPONSE:**

The researchers were contacted directly and the files were updated.

### **VALID RAM APPLICATION**

#### **RSC AUDIT COMMENT:**

Fifty (50) files were randomly audited to verify that they were valid, complete and current, during the period of July 1, 2008 and June 30, 2009. Only one (1) file was incomplete.

### **RSOF RESPONSE:**

The researcher file was a duplicate and was removed.

### **WASTE DISPOSAL FACILITIES (DOA990/WOLSTEIN) & RSOF LABORATORY**

#### **RSC AUDIT COMMENT:**

The Waste Disposal facilities and Laboratories of the RSOF were inspected to ensure safe operation and adequacy of amenities as required by programs of the RSOF during the period of July 1, 2008 and June 30, 2009. All records of the Facilities Maintenance and General Housekeeping, Record Maintenance, and Waste Storage and Handling were audited and found to be compliant, adequate, orderly, and secure.

### **RSOF RESPONSE:**

# RADIATION SAFETY ANNUAL REPORT 2008-2009

No response required.

## SUMMARY

### RSC AUDIT COMMENT:

No major problems exist in the RSOF program and the RSOF staff is functioning on a very competent level.

### RSOF RESPONSE:

The RSOF thanks the RSC for its careful audit of safety activities over the past year. Deficiencies uncovered during the audit were referred to the RSOF auditor for increased scrutiny during the coming year.

## **DOES INTERNAL AUDITS**

Three layers of audits are utilized by the RSOF on an ongoing basis to ensure that the Radiation Safety programs and procedures are working smoothly. In addition to audits conducted by the RSOF Staff and Radiation Safety Committee, the Department's Quality Control Specialist reviews all programs and Departmental records on a periodic basis and assists with resolving compliance issues in the RSOF.

Sealed Source	RAM Security Checks	Bioassays
Shipping Papers	Semi-Annual Mailings	Dosimetry
Valid RAM Applications	RGE Inventory/ Training	Survey Meters
Isotope Orders/ AU Possession Limits	Ancillary Training	Compliances
AU/ Worker Training	Licensing	Website Accuracy
Waste Disposal Facility	Incidents	Liaison Program
Active/ Decommissioned Surveys	Irradiator	Laser Program

DOES audits have resulted in administrative modifications over the past year to improve record compliance and RSOF response to safety issues in AU's laboratories. Full audit results of this program are available in the DOES office. Radiation Safety Internal Audits were conducted either monthly or quarterly.

## INTERNAL AUDITS

This year, in response to audit finding, the RSOF has implemented changes to its procedures and programs. The RSOF's audit of applications for use of radioactive materials revealed that numerous applications should be updated to be consistent with existing application requirements. AUs will be required to update protocols that are more than 10 years old and every 5 years thereafter.

Internal audit of the following Radiation Safety Programs were conducted during this fiscal year of the following areas of operation:

# RADIATION SAFETY ANNUAL REPORT 2008-2009

- Dosimetry Records
  - Recommendations
    - Ensure all files are reviewed each year to check duplicated and file misplacement.
    - Ensure all files have current dosimeter summary.
    - Ensure active badge wearers are in Helix.
    - Ensure inactive files in Landauer are shown in file.
  - Response
    - All files will be reviewed in hard copy, in Landauer, and in the database. During review dose summary currency will be checked.

This year, in response to internal audit findings, Radiation Safety continues to improve its procedures and programs.

Prepared by Felice Thornton-Porter on 10/15/2009.

**RADIATION SAFETY  
ANNUAL REPORT 2008-2009**

APPENDIX

# RADIATION SAFETY ANNUAL REPORT 2008-2009

## AUTHORIZED USERS

### RADIATION ACTIVE

Irina Pikuleva	1/21/2009	Youwei Zhang	5/20/2009
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### STORAGE MODE

Ronald Conlon	7/15/2008	Mary Laughlin	1/12/2009
Edward Medof	1/26/2009	Noa Noy	3/27/2009

### RADIATION INACTIVE

Thomas Hering	4/3/2009
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### DEPARTED

Melvin Berger	7/24/2008	Helen Evans	8/31/2008
Koh Fujinaga	7/2/2008	George Gorodeski	1/13/2009
Tao Yan	6/4/2009	Magdalena Tary-Lehmann	1/13/2009



# RADIATION SAFETY ANNUAL REPORT 2008-2009

## X-RAY AUTHORIZED POSSESSOR LIST

<u>AP CODE</u>	<u>AP NAME</u>	<u>CONTACT PERSON</u>
AVI	Amir Avishai	Amir Avishai
BEN	Jay Bensusan	Jay Bensusan
CD	Chris Dealwis	Chris Dealwis
CHO	Gary Chottiner	Gary Chottiner
DC	Sally Baden	Melody Long
FUJ	Hisashi Fujioka	Midori Hitomi
GRE	Edward Greenfield	Teresa Pizzuto
HAR	Ralph Harvey	Ralph Harvey
HIL	Anne Hiltner	Deepak Langhe
JAI	Mukesh Jain	Yingjie Cui
JEN	Wayne Jennings	Wayne Jennings
LAG	Peter Lagerlof	Peter Lagerlof
LEE	Zhenghong Lee	Chris Flask
MAC	Alan Mcllwain	Alan Mcllwain
MAT	Gerald Matisoff	Gerald Matisoff
MUZ	Raymond Muzic, Jr.	Chris Flask
OLI	Nancy Oleinick	John Mulvihill
PRO	John Protasiewicz	John Protasiewicz
SAIRC	Raymond Muzic	Chris Flask
SCH	Daniel Scherson	Daniel Scherson
SHO	Menachem Shoham	Menachem Shoham
VP	Vikas Prakash	Vikas Prakash

## LASER USERS

Mary Barkley	Clemens Burda	Paul Carey
Patty Conrad	David Dean	Diana Drisooll
Steven Eppell	Miklos Gratzl	Stefan Herlitze
Anne Hiltner	Alex Huang	Yoshikazu Imanishi
Hatsuo Ishida	James Jacobberger	Alexander Jamieson
Jaikrishnan Kadambi	Yasuhiro Kamotani	Kathleen Kash
Jack Koenig	J. Adin Mann	Roger Marchant
M. Edward Medof	Claudia Mizutani	Vikas Prakash
Syed Qutubuddin	Andrew Rollins	Charles Rosenblatt
David Scherson	David Schwam	Jie Shan
Kenneth Singer	Ben Strowbridge	Melissa Knothe Tate

## Master Isotope List

Isotope	1/2 Life (hours)	Sum of PI Inv	Sum PI Limits	NRC/ODH Limit
Al26	6,486,840,000.00	0.0000	0.0001	300 mCi
Am241	4,012,080.00	0.0000	0.0000	10 mCi
Ba133	93,732.00	0.0000	0.0000	300 mCi
Bi207	262,800.00	0.0000	0.0000	300 mCi
Bi210	195,348.00	0.0000	0.0000	300 mCi
C11	0.33	0.0000	110.0000	300 mCi
C14	50,194,800.00	34.3791	330.0200	2,000 mCi
Ca45	3,904.80	1.6366	25.0000	300 mCi
Cd109	11,300.40	0.0000	0.1000	300 mCi
Ce141	780.72	0.0000	0.0000	300 mCi
Cf252	23,117.64	0.0000	0.0000	10 mCi
Cl36	2,636,760,000.00	1.5200	5.2000	300 mCi
Co56	1,855.20	0.0000	0.0000	300 mCi
Co57	6,408.00	0.1459	3.0000	300 mCi
Co60	46,165.08	0.0000	0.0000	300 mCi
Cr51	667.20	0.0000	76.0000	500 mCi
Cs137	262,800.00	3.2426	10.0000	300 mCi
Eu152	113,880.00	0.0000	0.0000	300 mCi
Eu154	68,328.00	0.0000	0.0000	300 mCi
F18	1.87	0.0000	162.0000	300 mCi
Fe55	23,652.00	7.1808	14.0000	300 mCi
Fe59	1,080.00	0.1725	31.0000	300 mCi
Ga68	1.10	0.0000	0.0000	300 mCi
Gd153	5,664.00	0.0000	0.0000	300 mCi
Ge68	6,888.00	0.0000	0.0000	300 mCi
H3	108,010.80	244.2169	4053.0000	20,000 mCi
I123	13.00	0.0000	30.0000	300 mCi
I124	100.80	0.0000	10.0000	300 mCi
I125	1,432.80	0.0916	173.5450	2,000 mCi
I129	14,016,000,000.00	0.0000	0.0000	300 mCi
I131	193.56	0.0000	30.0000	300 mCi
In111	67.20	0.0000	30.0000	300 mCi
Ir192	1,783.00	0.0000	0.0000	300mCi
Kr85	94,608.00	0.0000	0.0000	300mCi
Mg28	21.30	0.0000	1.0000	300 mCi
Mn54	7,500.00	0.1226	3.1000	300 mCi
MXD	68,328.00	0.0029	3.5000	10 mCi
MXD2	4,012,080.00	0.0000	1.0000	10 mCi
MXD3	4,012,080.00	0.0000	0.0000	10 mCi
N13	0.17	0.0000	60.0000	300 mCi
Na22	22,776.52	0.3561	7.5000	300 mCi
Nb94	100,000,000.00	0.0000	0.0000	300 mCi

## Master Isotope List

Isotope	1/2 Life (hours)	Sum of PI Inv	Sum PI Limits	NRC/ODH Limit
Ni63	1,051,200.00	8.0184	20.0000	300 mCi
O15	0.03	0.0000	60.0000	300 mCi
P32	342.96	24.2703	754.2500	4,000 mCi
P33	605.00	0.4912	90.7500	300 mCi
Pb210	1,954,818.00	0.0005	1.0000	300.mCi
Pm147	22,977.48	0.0000	0.0000	300 mCi
Po208	25,404.00	0.0000	0.0000	300 mCi
Po210	3,321.60	0.0000	0.0000	300 mCi
Pu239	210,809,400.00	0.0000	0.0000	10 mCi
Ra224	87.84	0.0000	0.0000	10 mCi
Ra226	14,016,000.00	0.0003	0.0060	10 mCi
Ra228	50,370.00	0.0000	0.0003	10 mCi
Rb86	447.84	0.0000	12.0000	300 mCi
Re188	16.98	0.0000	0.0000	300 mCi
Rn222	91.68	0.0000	0.0000	10 mCi
Ru106	8,836.80	0.0000	0.0000	300 mCi
S35	2,098.56	13.1132	762.0000	4,500 mCi
Si32	876,600.00	0.0000	0.0000	300 mCi
Sn119m	5,880.00	0.0000	0.0000	300 mCi
Sn121m	481,800.00	0.0000	0.0000	300 mCi
Sr85	1,536.00	0.0000	5.0000	300 mCi
Sr90	255,091.00	0.0000	0.0000	1,000 mCi
Tc99	1,865,880,000.00	0.0000	0.0000	300 mCi
Tc99m	6.02	0.0000	80.0000	300 mCi
Th230	674,520,000.00	0.0000	0.0000	10 mCi
Ti44	8,766,000.00	0.0000	0.0000	300 mCi
Tl201	73.00	0.0000	0.0000	300 mCi
Y90	64.10	0.0000	0.0000	300 mCi
Zn65	5,832.00	0.3561	11.0000	300 mCi

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
5	Anthony Sr., Donald D.	C14	2.5000	1.25880	10/16/2009
5	Anthony Sr., Donald D.	H3	20.0000	4.10395	10/16/2009
5	Anthony Sr., Donald D.	P32	10.0000	0.00000	10/16/2009
5	Anthony Sr., Donald D.	S35	10.0000	0.00000	10/16/2009
14	Boom, Willem Henry	Cr51	10.0000	0.00000	10/16/2009
14	Boom, Willem Henry	H3	20.0000	3.42616	10/16/2009
14	Boom, Willem Henry	P32	12.0000	0.00000	10/16/2009
14	Boom, Willem Henry	C14	50.0000	0.00000	10/16/2009
29	Davis, Pamela B.	C14	1.0000	0.00000	10/16/2009
29	Davis, Pamela B.	Ca45	4.0000		10/16/2009
29	Davis, Pamela B.	Cr51	5.0000	0.00000	10/16/2009
29	Davis, Pamela B.	H3	20.0000	0.00000	10/16/2009
29	Davis, Pamela B.	I125	3.0000	0.00000	10/16/2009
29	Davis, Pamela B.	P32	10.0000	0.00000	10/16/2009
29	Davis, Pamela B.	S35	10.0000	0.00000	10/16/2009
29	Davis, Pamela B.	CL36	1.0000	0.66300	10/16/2009
29	Davis, Pamela B.	P33	4.0000	0.00000	10/16/2009
29	Davis, Pamela B.	RB86	5.0000	0.00000	10/16/2009
31	DeHaseth, Pieter L.	C14	5.0000	0.00000	10/16/2009
31	DeHaseth, Pieter L.	H3	30.0000	0.00000	10/16/2009
31	DeHaseth, Pieter L.	P32	25.0000	0.01527	10/16/2009
31	DeHaseth, Pieter L.	S35	5.0000	0.00000	10/16/2009
31	DeHaseth, Pieter L.	P33	4.0000	0.00000	10/16/2009
34	Distelhorst, Clark	H3	20.0000	0.26671	10/16/2009
34	Distelhorst, Clark	S35	10.0000	0.00000	10/16/2009
34	Distelhorst, Clark	P32	10.0000	0.00000	10/16/2009
34	Distelhorst, Clark	Ca45	5.0000	0.00000	10/16/2009
34	Distelhorst, Clark	C14	1.0000	0.04998	10/16/2009
42	Ernsberger, Paul	C14	5.0000		10/16/2009
42	Ernsberger, Paul	H3	10.0000	1.42864	10/16/2009
42	Ernsberger, Paul	I125	2.0000	0.00000	10/16/2009
42	Ernsberger, Paul	P32	2.0000	0.00000	10/16/2009
49	Gerken, Thomas A.	C14	2.0000	0.00640	10/16/2009
49	Gerken, Thomas A.	H3	20.0000	0.58975	10/16/2009
49	Gerken, Thomas A.	S35	10.0000	0.00000	10/16/2009
49	Gerken, Thomas A.	P33	0.7500	0.00000	10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
50	Gerson, Stanton L.	H3	50.0000	5.13999	10/16/2009
50	Gerson, Stanton L.	P32	10.0000	0.00097	10/16/2009
50	Gerson, Stanton L.	S35	5.0000	0.00000	10/16/2009
50	Gerson, Stanton L.	C14	1.0000	0.00000	10/16/2009
50	Gerson, Stanton L.	P33	0.7500	0.00000	10/16/2009
55	Hanson, Richard	H3	25.0000	16.17845	10/16/2009
55	Hanson, Richard	I125	0.5000	0.00000	10/16/2009
55	Hanson, Richard	P32	10.0000	0.00040	10/16/2009
55	Hanson, Richard	C14	4.0000	1.50858	10/16/2009
55	Hanson, Richard	S35	5.0000	0.00000	10/16/2009
57	Harte, Peter J.	P32	10.0000	0.00000	10/16/2009
57	Harte, Peter J.	S35	5.0000	0.00000	10/16/2009
57	Harte, Peter J.	H3	25.0000	0.00000	10/16/2009
57	Harte, Peter J.	C14	1.0000	0.00999	10/16/2009
80	Kazura, James W.	H3	15.0000	0.00000	10/16/2009
80	Kazura, James W.	I125	5.0000	0.00000	10/16/2009
80	Kazura, James W.	P32	5.0000	0.00000	10/16/2009
80	Kazura, James W.	S35	15.0000	0.00000	10/16/2009
80	Kazura, James W.	CR51	10.0000	0.00000	10/16/2009
92	Lamanna, Joseph	C14	10.0000	1.63116	10/16/2009
92	Lamanna, Joseph	H3	20.0000	1.35661	10/16/2009
92	Lamanna, Joseph	P32	5.0000	0.00000	10/16/2009
92	Lamanna, Joseph	S35	5.0000		10/16/2009
105	Liedtke, Carole M.	C14	10.0000	0.89705	10/16/2009
105	Liedtke, Carole M.	CL36	2.0000	0.49999	10/16/2009
105	Liedtke, Carole M.	H3	25.0000	0.00000	10/16/2009
105	Liedtke, Carole M.	I125	1.0000	0.00000	10/16/2009
105	Liedtke, Carole M.	Na22	2.0000	0.00000	10/16/2009
105	Liedtke, Carole M.	P32	10.0000	0.00000	10/16/2009
105	Liedtke, Carole M.	Rb86	2.0000	0.00000	10/16/2009
111	Maguire, Michael E.	C14	2.0000	0.00000	10/16/2009
111	Maguire, Michael E.	Ca45	2.0000	0.00000	10/16/2009
111	Maguire, Michael E.	H3	10.0000	0.00000	10/16/2009
111	Maguire, Michael E.	I125	2.0000	0.00000	10/16/2009
111	Maguire, Michael E.	Mg28	1.0000	0.00000	10/16/2009
111	Maguire, Michael E.	Mn54	3.0000	0.12257	10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
111	Maguire, Michael E.	Ni63	20.0000	8.01838	10/16/2009
111	Maguire, Michael E.	P32	15.0000	0.00000	10/16/2009
111	Maguire, Michael E.	Rb86	2.0000	0.00000	10/16/2009
111	Maguire, Michael E.	S35	15.0000	0.00000	10/16/2009
111	Maguire, Michael E.	Co57	2.0000	0.14586	10/16/2009
111	Maguire, Michael E.	P33	2.0000	0.00000	10/16/2009
111	Maguire, Michael E.	FE55	4.0000	0.18855	10/16/2009
111	Maguire, Michael E.	ZN65	5.0000	0.35613	10/16/2009
113	RSOF	CO57	1.0000	0.00000	10/16/2009
115	Markowitz, Sanford	C14	10.0000	0.54987	10/16/2009
115	Markowitz, Sanford	H3	30.0000	15.97658	10/16/2009
115	Markowitz, Sanford	I125	10.0000		10/16/2009
115	Markowitz, Sanford	P32	21.0000	0.00007	10/16/2009
115	Markowitz, Sanford	S35	20.0000	0.00000	10/16/2009
115	Markowitz, Sanford	P33	5.0000	0.00000	10/16/2009
121	Medof, Edward (SM	C14	5.0000	0.00998	10/16/2009
121	Medof, Edward (SM	Cr51	10.0000	0.00000	10/16/2009
121	Medof, Edward (SM	H3	50.0000	12.53893	10/16/2009
121	Medof, Edward (SM	I125	15.0000	0.00000	10/16/2009
121	Medof, Edward (SM	P32	6.0000	0.00000	10/16/2009
121	Medof, Edward (SM	S35	15.0000	0.00000	10/16/2009
121	Medof, Edward (SM	P33	5.0000	0.00000	10/16/2009
123	Merrick, William	C14	10.0000	0.65597	10/16/2009
123	Merrick, William	H3	15.0000	0.16969	10/16/2009
123	Merrick, William	P32	10.0000	0.00000	10/16/2009
123	Merrick, William	S35	10.0000	1.32984	10/16/2009
125	Mieyal, John J.	C14	4.0000	0.30328	10/16/2009
125	Mieyal, John J.	S35	10.0000	0.00002	10/16/2009
125	Mieyal, John J.	H3	4.0000	2.23089	10/16/2009
128	Monnier, Vincent M.	C14	30.0000	0.09999	10/16/2009
128	Monnier, Vincent M.	H3	10.0000	0.00000	10/16/2009
128	Monnier, Vincent M.	I125	15.0000	0.00000	10/16/2009
128	Monnier, Vincent M.	P32	10.0000	0.00000	10/16/2009
128	Monnier, Vincent M.	S35	10.0000	0.00000	10/16/2009
135	Nilsen, Timothy W.	H3	10.0000	0.00000	10/16/2009
135	Nilsen, Timothy W.	P32	50.0000	0.20818	10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
135	Nilsen, Timothy W.	S35	30.0000	0.41017	10/16/2009
138	Oleinick, Nancy L.	C14	7.0000	1.28817	10/16/2009
138	Oleinick, Nancy L.	H3	10.0000	4.51636	10/16/2009
138	Oleinick, Nancy L.	I125	10.0000	0.00000	10/16/2009
138	Oleinick, Nancy L.	P32	2.5000	0.00000	10/16/2009
138	Oleinick, Nancy L.	S35	10.0000	0.00000	10/16/2009
138	Oleinick, Nancy L.	F18	2.0000		10/16/2009
170	Siegel, Ruth E.	H3	5.0000	0.18125	10/16/2009
170	Siegel, Ruth E.	I125	2.0000	0.00000	10/16/2009
170	Siegel, Ruth E.	P32	3.0000	0.00000	10/16/2009
170	Siegel, Ruth E.	S35	10.0000	0.00000	10/16/2009
170	Siegel, Ruth E.	P33	3.0000	0.00000	10/16/2009
172	Snider, Martin D.	C14	1.0000	0.25034	10/16/2009
172	Snider, Martin D.	H3	50.0000	5.18185	10/16/2009
172	Snider, Martin D.	I125	6.0000	0.00000	10/16/2009
172	Snider, Martin D.	P32	2.0000	0.00000	10/16/2009
172	Snider, Martin D.	S35	25.0000	0.00000	10/16/2009
193	Zigmond, Richard	C14	0.5000	0.00000	10/16/2009
193	Zigmond, Richard	H3	6.0000	2.89683	10/16/2009
193	Zigmond, Richard	I125	0.5000	0.00000	10/16/2009
193	Zigmond, Richard	P32	5.0000	0.00000	10/16/2009
193	Zigmond, Richard	S35	8.0000	0.00000	10/16/2009
197	Cotton, Calvin	C14	1.5000	0.72258	10/16/2009
197	Cotton, Calvin	Cl36	1.0000	0.00000	10/16/2009
197	Cotton, Calvin	Na22	1.5000	0.01600	10/16/2009
197	Cotton, Calvin	I125	6.0000	0.00000	10/16/2009
197	Cotton, Calvin	S35	3.0000	0.00000	10/16/2009
197	Cotton, Calvin	Rb86	2.0000	0.00000	10/16/2009
236	Jamieson, Alexander	NA22	1.0000	0.33630	10/16/2009
284	Greenfield, Edward	P32	3.0000	0.00000	10/16/2009
284	Greenfield, Edward	S35	10.0000	0.00000	10/16/2009
284	Greenfield, Edward	I125	3.0000	0.00000	10/16/2009
284	Greenfield, Edward	H3	5.0000	0.00000	10/16/2009
286	Carlin, Cathleen	H3	10.0000	4.66213	10/16/2009
286	Carlin, Cathleen	I125	15.0000	0.00000	10/16/2009
286	Carlin, Cathleen	P32	10.0000	0.00000	10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
286	Carlin, Cathleen	S35	30.0000	5.26212	10/16/2009
326	Matisoff, Gerald	FE59	1.0000		10/16/2009
326	Matisoff, Gerald	CS137	10.0000	3.24256	10/16/2009
326	Matisoff, Gerald	ZN65	1.0000		10/16/2009
326	Matisoff, Gerald	HG203	1.0000		10/16/2009
326	Matisoff, Gerald	CR51	1.0000		10/16/2009
326	Matisoff, Gerald	MN54	0.1000		10/16/2009
326	Matisoff, Gerald	CD109	0.1000	0.00003	10/16/2009
326	Matisoff, Gerald	NA22	1.0000	0.00383	10/16/2009
326	Matisoff, Gerald	Ra226	0.0060	0.00035	10/16/2009
326	Matisoff, Gerald	Ra228	0.0003		10/16/2009
326	Matisoff, Gerald	MXD	3.5000	0.00295	10/16/2009
326	Matisoff, Gerald	Pb210	1.0000	0.00052	10/16/2009
326	Matisoff, Gerald	MXD2	1.0000	0.00000	10/16/2009
326	Matisoff, Gerald	PO208	0.0000	0.00000	10/16/2009
439	Gott, Jonatha M.	P32	20.0000	0.02444	10/16/2009
439	Gott, Jonatha M.	S35	10.0000	0.00000	10/16/2009
439	Gott, Jonatha M.	P33	10.0000		10/16/2009
442	Petersen, Robert B.	P32	5.0000	0.00000	10/16/2009
442	Petersen, Robert B.	S35	40.0000	0.00000	10/16/2009
442	Petersen, Robert B.	P33	5.0000	0.00000	10/16/2009
442	Petersen, Robert B.	C14	0.1000	0.00000	10/16/2009
504	Hatzoglou, Maria	P32	13.0000	0.64389	10/16/2009
504	Hatzoglou, Maria	S35	20.0000	1.84505	10/16/2009
504	Hatzoglou, Maria	C14	2.0000	0.08093	10/16/2009
504	Hatzoglou, Maria	H3	20.0000	0.19758	10/16/2009
526	McPheeters, David	P32	6.0000	0.00003	10/16/2009
537	DeBoer, Piet	P32	100.0000	0.03417	10/16/2009
537	DeBoer, Piet	S35	100.0000	0.00000	10/16/2009
537	DeBoer, Piet	H3	100.0000		10/16/2009
537	DeBoer, Piet	C14	10.0000		10/16/2009
541	Bruzik, James P.	P32	20.0000	0.00000	10/16/2009
541	Bruzik, James P.	S35	5.0000	0.00000	10/16/2009
571	Conlon, Ronald	P33	3.0000	0.00000	10/16/2009
571	Conlon, Ronald	H3	1.0000	0.03953	10/16/2009
571	Conlon, Ronald	P32	3.0000	0.00000	10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
571	Conlon, Ronald	S35	3.0000		10/16/2009
579	Singh, Neena	C14	5.0000	0.09996	10/16/2009
579	Singh, Neena	S35	50.0000	0.00000	10/16/2009
579	Singh, Neena	H3	10.0000	0.46498	10/16/2009
579	Singh, Neena	P32	10.0000		10/16/2009
579	Singh, Neena	I125	10.0000		10/16/2009
579	Singh, Neena	FE59	10.0000	0.17253	10/16/2009
579	Singh, Neena	FE52	2.0000		10/16/2009
601	Keri, Ruth Ann	P32	5.0000	0.00000	10/16/2009
601	Keri, Ruth Ann	H3	5.0000	0.00000	10/16/2009
601	Keri, Ruth Ann	C14	5.0000	0.00000	10/16/2009
601	Keri, Ruth Ann	S35	8.0000	0.07816	10/16/2009
601	Keri, Ruth Ann	I125	0.0250	0.00000	10/16/2009
625	Levine, Alan D.	H3	10.0000	7.40099	10/16/2009
625	Levine, Alan D.	P32	1.0000		10/16/2009
625	Levine, Alan D.	S35	5.0000		10/16/2009
653	Harris, Michael E.	P32	25.0000	2.90670	10/16/2009
653	Harris, Michael E.	S35	5.0000	0.00000	10/16/2009
653	Harris, Michael E.	P33	4.0000	0.00000	10/16/2009
694	Muzic, Raymond Jr.	F18	50.0000		10/16/2009
694	Muzic, Raymond Jr.	H3	5.0000	0.85930	10/16/2009
694	Muzic, Raymond Jr.	C14	1.0000	0.00000	10/16/2009
700	Arts, Eric	P32	5.0000	1.51424	10/16/2009
700	Arts, Eric	S35	1.5000	0.00000	10/16/2009
700	Arts, Eric	H3	3.0000	0.00000	10/16/2009
700	Arts, Eric	P33	2.0000	0.00000	10/16/2009
715	Laughlin, Mary	P32	5.0000	0.00000	10/16/2009
715	Laughlin, Mary	P33	5.0000		10/16/2009
715	Laughlin, Mary	H3	20.0000	1.59401	10/16/2009
715	Laughlin, Mary	CR51	20.0000	0.00000	10/16/2009
715	Laughlin, Mary	S35	10.0000	0.00000	10/16/2009
716	Wilson-Delfosse, Amy	I125	5.0000	0.00000	10/16/2009
716	Wilson-Delfosse, Amy	P32	10.0000	0.00000	10/16/2009
716	Wilson-Delfosse, Amy	S35	10.0000	0.00000	10/16/2009
716	Wilson-Delfosse, Amy	H3	20.0000	0.00000	10/16/2009
726	Montano, Monica M.	C14	0.5000	0.24975	10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
726	Montano, Monica M.	H3	0.5000		10/16/2009
726	Montano, Monica M.	I125	0.5000		10/16/2009
726	Montano, Monica M.	P32	10.0000	0.04361	10/16/2009
726	Montano, Monica M.	S35	2.0000	0.00221	10/16/2009
733	McCrae, Keith	P32	20.0000	0.00000	10/16/2009
733	McCrae, Keith	C14	2.0000		10/16/2009
733	McCrae, Keith	S35	2.0000	0.00000	10/16/2009
733	McCrae, Keith	H3	2.0000		10/16/2009
733	McCrae, Keith	I125	4.0000		10/16/2009
735	Lee, Irene	H3	2.0000		10/16/2009
735	Lee, Irene	P32	3.0000	0.48341	10/16/2009
735	Lee, Irene	S35	2.5000	0.00000	10/16/2009
739	MacDonald, Paul N.	S35	20.0000	0.00000	10/16/2009
739	MacDonald, Paul N.	I125	2.0000	0.00000	10/16/2009
739	MacDonald, Paul N.	P32	12.0000	0.00018	10/16/2009
739	MacDonald, Paul N.	H3	10.0000	0.00000	10/16/2009
739	MacDonald, Paul N.	C14	10.0000		10/16/2009
740	Weiss, Michael A.	P33	10.0000	0.11576	10/16/2009
740	Weiss, Michael A.	ZN65	5.0000		10/16/2009
740	Weiss, Michael A.	I125	0.1000	0.00000	10/16/2009
740	Weiss, Michael A.	H3	1.0000		10/16/2009
740	Weiss, Michael A.	S35	1.0000		10/16/2009
743	McCormick, Thomas	P32	1.0000	0.00000	10/16/2009
743	McCormick, Thomas	P33	1.0000	0.00000	10/16/2009
743	McCormick, Thomas	CR51	10.0000		10/16/2009
743	McCormick, Thomas	H3	15.0000	5.18800	10/16/2009
744	Danielpour, David	H3	15.0000		10/16/2009
744	Danielpour, David	P32	2.0000	0.06155	10/16/2009
744	Danielpour, David	S35	4.0000	0.00000	10/16/2009
745	Caprara, Mark	P32	24.0000	0.00000	10/16/2009
745	Caprara, Mark	S35	5.0000	0.00000	10/16/2009
745	Caprara, Mark	H3	10.0000		10/16/2009
749	Berdis, Anthony	P32	2.0000	0.01850	10/16/2009
749	Berdis, Anthony	H3	3.0000	0.00000	10/16/2009
752	Lou, Hua	P32	4.0000	0.16148	10/16/2009
752	Lou, Hua	P33	3.0000	0.00000	10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
752	Lou, Hua	S35	15.0000	0.09913	10/16/2009
753	Luo, Guangbin	P32	2.0000	0.65540	10/16/2009
753	Luo, Guangbin	H3	5.0000	0.41183	10/16/2009
753	Luo, Guangbin	C14	0.5000	0.09998	10/16/2009
759	Salomon, Robert	C14	1.0000	0.30931	10/16/2009
759	Salomon, Robert	H3	2725.0000	0.15288	10/16/2009
764	Kao, Hung-Ying	P33	4.0000	0.00000	10/16/2009
764	Kao, Hung-Ying	P32	4.0000	0.00000	10/16/2009
764	Kao, Hung-Ying	S35	20.0000	0.00000	10/16/2009
764	Kao, Hung-Ying	H3	25.0000	0.00000	10/16/2009
764	Kao, Hung-Ying	C14	0.4000		10/16/2009
768	Jankowsky, Eckhard	P32	12.0000	4.47654	10/16/2009
772	Karn, Jonathan	S35	10.0000	0.00000	10/16/2009
772	Karn, Jonathan	P32	10.0000	0.11446	10/16/2009
772	Karn, Jonathan	H3	1.0000		10/16/2009
773	Lee, Zhenghong	I125	10.0000	0.00000	10/16/2009
773	Lee, Zhenghong	I123	20.0000	0.00000	10/16/2009
773	Lee, Zhenghong	I131	20.0000	0.00000	10/16/2009
773	Lee, Zhenghong	TC99M	20.0000	0.00000	10/16/2009
773	Lee, Zhenghong	F18	50.0000	0.00000	10/16/2009
773	Lee, Zhenghong	C14	20.0000	6.03559	10/16/2009
773	Lee, Zhenghong	H3	20.0000	4.87590	10/16/2009
773	Lee, Zhenghong	IN111	10.0000	0.00000	10/16/2009
773	Lee, Zhenghong	TI201	10.0000		10/16/2009
773	Lee, Zhenghong	C11	50.0000		10/16/2009
773	Lee, Zhenghong	FE52	20.0000		10/16/2009
773	Lee, Zhenghong	FE59	20.0000		10/16/2009
778	Whittaker, Jonathan	I125	0.9000	0.07683	10/16/2009
779	Barkley, Mary	P32	5.0000		10/16/2009
779	Barkley, Mary	P33	2.0000	0.19236	10/16/2009
779	Barkley, Mary	C14	5.0000	0.50000	10/16/2009
780	Valadkhan, Saba	P32	25.0000	6.79772	10/16/2009
780	Valadkhan, Saba	P33	0.2500		10/16/2009
782	Andrulis, Erik D.	P32	10.0000	0.22765	10/16/2009
782	Andrulis, Erik D.	C14	10.0000		10/16/2009
782	Andrulis, Erik D.	H3	10.0000		10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
782	Andrulis, Erik D.	S35	10.0000		10/16/2009
783	Bunting, Kevin D.	P32	0.7500	0.00000	10/16/2009
784	Zhou, Guang	S35	6.0000	0.29500	10/16/2009
784	Zhou, Guang	P32	2.0000		10/16/2009
786	Hoppel, Charles	C14	25.0000	10.05688	10/16/2009
786	Hoppel, Charles	H3	25.0000	12.52806	10/16/2009
787	Jain, Mukesh	P32	10.0000	0.00109	10/16/2009
787	Jain, Mukesh	H3	10.0000	1.97706	10/16/2009
787	Jain, Mukesh	S35	20.0000	1.07160	10/16/2009
788	Letterio, John	H3	10.0000	1.21937	10/16/2009
789	Schmaier, Alvin H.	C14	2.0000	0.04300	10/16/2009
790	Scacheri, Peter	P32	2.5000	0.00000	10/16/2009
790	Scacheri, Peter	P33	2.0000		10/16/2009
790	Scacheri, Peter	S35	2.5000		10/16/2009
791	Devireddy, Lax	P32	5.0000	0.00000	10/16/2009
791	Devireddy, Lax	Fe55	10.0000	6.99227	10/16/2009
793	Wang, Yanming	H3	20.0000	10.87199	10/16/2009
793	Wang, Yanming	I125	20.0000	0.01252	10/16/2009
794	Abbott, Derek	P32	10.0000	0.00067	10/16/2009
796	Noy, Noa(SM	S35	1.0000		10/16/2009
796	Noy, Noa(SM	P32	2.0000	0.00000	10/16/2009
796	Noy, Noa(SM	H3	1.0000	0.65756	10/16/2009
796	Noy, Noa(SM	C14	1.0000		10/16/2009
797	Chandler, Margaret	H3	8.0000	0.44739	10/16/2009
797	Chandler, Margaret	C14	8.0000	3.55843	10/16/2009
799	Manor, Danny	P32	12.0000		10/16/2009
799	Manor, Danny	H3	6.0000	0.15064	10/16/2009
799	Manor, Danny	C14	9.0000	0.43959	10/16/2009
799	Manor, Danny	S35	12.0000		10/16/2009
800	Shoham, Menachem	H3	0.5000	0.25673	10/16/2009
801	Dealwis, Chris	C14	5.0000	0.12875	10/16/2009
801	Dealwis, Chris	H3	5.0000	1.32002	10/16/2009
802	Boron, Walter	S35	3.0000		10/16/2009
802	Boron, Walter	C14	2.0000	0.47487	10/16/2009
802	Boron, Walter	C136	0.2000	0.10700	10/16/2009
802	Boron, Walter	H3	20.0000	9.34210	10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
802	Boron, Walter	P32	2.0000		10/16/2009
802	Boron, Walter	Ca45	4.0000		10/16/2009
803	Cooke, Kenneth	CR51	10.0000		10/16/2009
803	Cooke, Kenneth	P32	0.5000	0.00000	10/16/2009
803	Cooke, Kenneth	H3	10.0000	3.80325	10/16/2009
804	Jin, Ge	I125	0.0200	0.00221	10/16/2009
804	Jin, Ge	S35	15.0000		10/16/2009
804	Jin, Ge	P32	2.0000		10/16/2009
804	Jin, Ge	P33	5.0000	0.00000	10/16/2009
805	Zhou, Lan	H3	30.0000		10/16/2009
805	Zhou, Lan	P32	2.0000		10/16/2009
806	Pikuleva, Irina A.	H3	10.0000	1.44566	10/16/2009
806	Pikuleva, Irina A.	C14	10.0000		10/16/2009
809	Jackson, Mark	P32	2.0000	0.06297	10/16/2009
810	McGuffin-Cawley,	AL26	0.0001	0.00005	10/16/2009
811	Zhang, Youwei	P32	1.0000		10/16/2009
939	Alagramam, Kumar	P32	2.0000	0.00000	10/16/2009
940	Romani, Andrea	H3	30.0000	0.87240	10/16/2009
940	Romani, Andrea	C14	10.0000	2.50999	10/16/2009
940	Romani, Andrea	I125	5.0000	0.00000	10/16/2009
940	Romani, Andrea	NA22	2.0000		10/16/2009
940	Romani, Andrea	CA45	5.0000	1.63659	10/16/2009
940	Romani, Andrea	P32	10.0000		10/16/2009
940	Romani, Andrea	CL36	1.0000	0.25000	10/16/2009
940	Romani, Andrea	SR85	5.0000		10/16/2009
940	Romani, Andrea	RB86	1.0000		10/16/2009
940	Romani, Andrea	S35	20.0000		10/16/2009
941	Harter, Marian	P32	2.0000	0.05884	10/16/2009
941	Harter, Marian	H3	50.0000		10/16/2009
941	Harter, Marian	C14	0.0200		10/16/2009
941	Harter, Marian	S35	2.0000		10/16/2009
942	Murakami, Shunichi	P32	2.0000		10/16/2009
942	Murakami, Shunichi	S35	3.0000	0.00098	10/16/2009
944	Palczewski, Krysstof	P32	5.0000	0.00000	10/16/2009
944	Palczewski, Krysstof	S35	5.0000	0.00405	10/16/2009
944	Palczewski, Krysstof	Ca45	5.0000		10/16/2009

## PI Rad Summary Listing and Post Screen

PI #	PI Name	Isotope	Poss Lmt	Inventory	Date
944	Palczewski, Krysztof	P33	5.0000	0.18303	10/16/2009
944	Palczewski, Krysztof	H3	20.0000	0.71335	10/16/2009
944	Palczewski, Krysztof	C14	1.0000	0.05000	10/16/2009
946	SAIRC	F18	60.0000	0.00000	10/16/2009
946	SAIRC	C11	60.0000	0.00000	10/16/2009
946	SAIRC	N13	60.0000		10/16/2009
946	SAIRC	O15	60.0000		10/16/2009
946	SAIRC	I124	10.0000		10/16/2009
946	SAIRC	I123	10.0000		10/16/2009
946	SAIRC	I125	10.0000		10/16/2009
946	SAIRC	I131	10.0000		10/16/2009
946	SAIRC	IN111	20.0000	0.00000	10/16/2009
946	SAIRC	LU177	20.0000		10/16/2009
946	SAIRC	TC99m	20.0000	0.00000	10/16/2009
947	Cobb, Brian	H3	200.0000	91.43855	10/16/2009
948	Qu, Cheng-Rui	P32	1.0000	0.00000	10/16/2009
950	Croniger, Colleen	H3	4.0000	0.24433	10/16/2009
950	Croniger, Colleen	P32	4.0000	0.00000	10/16/2009
950	Croniger, Colleen	C14	2.0000	0.49999	10/16/2009
952	Coller, Jeff	S35	10.0000	2.71491	10/16/2009
952	Coller, Jeff	P32	20.0000	5.75791	10/16/2009



## SEALED SOURCES

	PI Name	Location	Isotope	Emits	Current Activity
113	RSOF	Dental (DOA) 990	Am241	ALpha	3.24e-3 mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Am241	Alpha	9.70e-4 mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Am241	Alpha	9.87e-2 mCi
665	Akerib, Daniel S.	Rockefeller 314B	Am241	Alpha	6.72e-3 mCi
665	Akerib, Daniel S.	Rockefeller 314G	Am241	Alpha	7.33e+2 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.87e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.87e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi

	PI Name	Location	Isotope	Emits	Current Activity
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Am241	Alpha	8.88e-4 mCi
14	Boom, Willem	BRB 1014	Ba133	Gamma	6.88e-3 mCi
92	Lamanna, Joseph	BRB 501 Corridor	Ba133	Gamma	6.88e-3 mCi
113	RSOF	Dental (DOA) 990	Ba133	Gamma	1.54e-2 mCi
113	RSOF	Service Building Rad	Ba133	Gamma	2.09e-3 mCi
113	RSOF	Service Building Rad	Ba133	Gamma	1.43e-4 mCi
113	RSOF	Wolstein 1120	Ba133	Gamma	1.28e-2 mCi
113	RSOF	Service Building	Ba133	Gamma	1.49e-2 mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Ba133	Gamma	2.77e-4 mCi
665	Akerib, Daniel S.	Rockefeller 314B	Ba133	Gamma	3.90e-3 mCi
665	Akerib, Daniel S.	Rockefeller 314B	Ba133	Gamma	1.21e-3 mCi
665	Akerib, Daniel S.	Rockefeller 314B	Ba133	Gamma	8.45e-4 mCi
665	Akerib, Daniel S.	Rockefeller 16	Ba133	Gamma	4.23e-4 mCi
665	Akerib, Daniel S.	Rockefeller 314B	Ba133	Gamma	1.20e-3 mCi
665	Akerib, Daniel S.	Rockefeller 314B	Ba133	Gamma	5.16e-4 mCi
665	Akerib, Daniel S.	Rockefeller 314B	Ba133	Gamma	6.23e-4 mCi
694	Muzic, Raymond	Wearn 419	Ba133	Gamma	7.11e-3 mCi
773	Lee, Zhenghong	Wearn 539	Ba133	Gamma	7.18e-3 mCi
936	Shutt, Tom	Rockefeller 16	Ba133	Gamma	7.33e-3 mCi
942	Murakami,	BRB 310	Ba133	Gamma	8.58e-3 mCi
236	Jamieson,	Kent Hale Smith 205	Bi207	Beta	6.07e-3 mCi
113	RSOF	Service Building Rad	Bi210	Beta	9.04e-6 mCi
113	RSOF	Service Building Rad	C14	Beta	1.44e-4 mCi
442	Petersen, Robert	Wolstein 5407	C14	Beta	1.63e-4 mCi
113	RSOF	Service Building Rad	Cd109	Gamma	9.80e-8 mCi
113	RSOF	Service Building Rad	Cd109	Gamma	1.37e-4 mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Cd109	Gamma	5.99e-5 mCi

	PI Name	Location	Isotope	Emits	Current Activity	
113	RSOF	Service Building Rad	Co57	gamma	3.25e-4	mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Co57	Gamma	1.78e-7	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co57	Gamma	3.47e-9	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co57	Gamma	7.26e-8	mCi
665	Akerib, Daniel S.	Rockefeller 16	Co57	Gamma	2.26e-4	mCi
665	Akerib, Daniel S.	Rockefeller 16	Co57	Gamma	1.28e-4	mCi
665	Akerib, Daniel S.	Rockefeller 16	Co57	Gamma	3.05e-4	mCi
665	Akerib, Daniel S.	Rockefeller 16	Co57	Gamma	7.26e-4	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co57	Gamma	9.84e-7	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co57	gamma	1.99e-5	mCi
936	Shutt, Tom	Rockefeller 118	Co57	Gamma	2.75e-4	mCi
936	Shutt, Tom	Rockefeller 118	Co57	Gamma	3.91e-3	mCi
936	Shutt, Tom	Rockefeller 118	Co57	Gamma	3.91e-3	mCi
936	Shutt, Tom	Rockefeller 118	Co57	Gamma	3.91e-3	mCi
936	Shutt, Tom	Rockefeller 16	Co57	Gamma	6.23e-2	mCi
946	SAIRC	Lerner Tower B216	Co57	Gamma	9.84e-1	mCi
665	Akerib, Daniel S.	Rockefeller 314B	CO60	Gamma	3.82e-4	mCi
113	RSOF	Service Building Rad	Co60	Gamma	4.72e-4	mCi
113	RSOF	Service Building Rad	Co60	Gamma	3.49e-3	mCi
236	Jamieson,	Kent Hale Smith 205	Co60	Gamma	5.22e-4	mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Co60	Gamma	7.39e-5	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co60	Gamma	5.06e-4	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co60	Gamma	5.06e-4	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co60	Gamma	6.11e-5	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co60	Gamma	1.75e-4	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co60	Gamma	8.74e-5	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Co60	Gamma	2.64e-4	mCi
665	Akerib, Daniel S.	Rockefeller 16	Co60	Gamma	1.29e-3	mCi
946	SAIRC	Lerner Tower B216	Co60	Beta/Gam	4.98e-3	mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Cs134	gamma		mCi
740	Weiss, Michael A.	H.G. WOOD 439	CS137	Beta/Gam	2.52e-2	mCi

	PI Name	Location	Isotope	Emits	Current Activity	
113	RSOF	SOM-Research	Cs137	Beta/Gam	2.61e-2	mCi
113	RSOF	Dental (DOA) 990	Cs137	Beta/Gam	2.67e-2	mCi
113	RSOF	Service Building Rad	Cs137	Beta/Gam	4.26e-3	mCi
113	RSOF	Service Building Rad	Cs137	Beta/Gam	4.89e-4	mCi
113	RSOF	Service Building Rad	Cs137	Beta/Gam	1.82e-4	mCi
113	RSOF	Service Building 1st	Cs137	Beta/Gam	6.93e-4	mCi
113	RSOF	Wearn 520	Cs137	Beta/Gam	5.02e-5	mCi
113	RSOF	RB&C 8407	Cs137	Beta/Gam	2.16e-2	mCi
113	RSOF	Service Building 1 st	Cs137	Beta/Gam	6.17e-4	mCi
113	RSOF	MILLIS 120	Cs137	Beta/Gam	6.53e-4	mCi
115	Markowitz,	Wolstein 3113	Cs137	Beta/Gam	2.59e-2	mCi
121	Medof, Edward	Pathology 301	Cs137	Beta/Gam	2.67e-2	mCi
135	Nilsen, Timothy	H.G. WOOD 128	Cs137	Beta/gam	2.74e-2	mCi
135	Nilsen, Timothy	H.G. WOOD 123	Cs137	beta/gam	2.75e-2	mCi
138	Oleinick, Nancy	BRB 347 Corridor	Cs137	Beta/Gam	2.65e-2	mCi
193	Zigmond,	Med East-Robbins	Cs137	Beta/Gam	2.65e-2	mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Cs137	Beta/Gam	5.23e-4	mCi
439	Gott, Jonatha M.	H.G. WOOD 109	Cs137	Beta/Gam	6.03e-4	mCi
653	Harris, Michael E.	SOM-Research	Cs137	Beta/Gam	6.09e-4	mCi
653	Harris, Michael E.	H.G. WOOD 103	Cs137	Beta/Gam	6.17e-4	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	3.12e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	3.98e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	3.87e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	6.10e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	6.10e-3	mCi
665	Akerib, Daniel S.	Rockefeller 118	Cs137	Beta/Gam	6.10e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	6.10e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	6.10e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	6.10e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	6.10e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	6.10e-3	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	7.36e-4	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Cs137	Beta/Gam	2.92e-3	mCi

	PI Name	Location	Isotope	Emits	Current Activity	
786	Hoppel, Charles	H.G. WOOD 148	Cs137	Beta/Gam	2.52e-2	mCi
801	Dealwis, Chris	SOM-Research	Cs137	Beta/Gam	2.85e-2	mCi
944	Palczewski,	H.G. WOOD 322	Cs137	Beta/Gam	2.77e-2	mCi
946	SAIRC	Lerner Tower B216	Cs137	Beta/Gam	6.24e-2	mCi
113	RSOF	Dental (DOA) 990	Eu152	Gamma	8.50e-3	mCi
740	Weiss, Michael A.	H.G. WOOD 465	Eu152	Gamma	7.77e-3	mCi
665	Akerib, Daniel S.	Rockefeller 16	Fe55	Gamma	2.00e-1	mCi
936	Shutt, Tom	Rockefeller 118	Fe55	Gamma	7.87e-9	mCi
946	SAIRC	Lerner Tower B213	Ge68	Gamma	2.52e-3	mCi
946	SAIRC	Lerner Tower B213	Ge68	Gamma	2.52e-3	mCi
946	SAIRC	Lerner Tower B213	Ge68	Gamma	2.52e-3	mCi
946	SAIRC	Lerner Tower B213	Ge68	Gamma	1.43e-3	mCi
946	SAIRC	Lerner Tower B213	Ge68	Gamma	4.33e-3	mCi
113	RSOF	Service Building Rad	I129	Gamma	4.42e-5	mCi
113	RSOF	Service Building Rad	I129	Gamma	1.03e-4	mCi
936	Shutt, Tom	Rockefeller 118	I129	Gamma	5.00e-5	mCi
138	Oleinick, Nancy	BRB 350A	Ir192	gamma	6.38e-2	mCi
951	Sankaran, Mohan	A.W. SMITH 230C	Kr85	Beta/Gam	1.55e+0	mCi
326	Matisoff, Gerald	A.W. SMITH 211A	Mixed	Gamma		mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Mixed	Gamma		mCi
665	Akerib, Daniel S.	Rockefeller 314B	Mixed	Beta/Gam		mCi
665	Akerib, Daniel S.	Rockefeller 314B	Mixed	Beta/Gam		mCi
665	Akerib, Daniel S.	Rockefeller 314B	Mixed	Beta/Gam		mCi
113	RSOF	Service Building Rad	Mn54	Gamma	3.11e-10	mCi
113	RSOF	Service Building Rad	Mn54	Gamma	6.81e-15	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Mn54	Gamma	2.17e-8	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Mn54	Gamma	2.91e-7	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Mn54	Gamma	2.70e-6	mCi
665	Akerib, Daniel S.	Rockefeller 314B	Mn54	gamma	3.28e-5	mCi
113	RSOF	Service Building Rad	Na22	Gamma	2.87e-5	mCi
113	RSOF	Service Building Rad	Na22	Gamma	1.09e-3	mCi

	PI Name	Location	Isotope	Emits	Current Activity	
326	Matisoff, Gerald	A.W. SMITH 211E	Pb210	Alpha	9.40e-5	mCi
113	RSOF	Service Building Rad	Pm147	Beta	4.35e-7	mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Po210	Alpha	1.87e-20	mCi
951	Sankaran, Mohan	A.W. SMITH 230C	Po210	Alpha/Ga	4.42e-3	mCi
113	RSOF	Service Building Rad	Pu239	Alpha	5.99e-6	mCi
113	RSOF	Wickenden 516	Ra226	Alpha	9.91e-3	mCi
936	Shutt, Tom	Rockefeller 202	Rb83			mCi
113	RSOF	Service Building Rad	Si32	Beta	5.15e-5	mCi
113	RSOF	Service Building Rad	Sr90	Beta	1.25e-5	mCi
113	RSOF	Service Building Rad	Tc99	Beta	4.10e-5	mCi
113	RSOF	Service Building Rad	Th230	Alpha	7.00e-6	mCi
326	Matisoff, Gerald	A.W. SMITH 211E	Ti204	Beta		mCi
236	Jamieson,	Kent Hale Smith 205	Ti44	Gamma	1.95e-3	mCi

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 Revised 6/30/2009

