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

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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}C, ^{3}H, ^{125}I, ^{32}P, ^{33}P, and ^{35}S. Isotopes used in sealed sources contained within irradiators, scintillation counters, gamma counters, check sources, and calibration standards are most commonly ^{137}Cs, ^{133}Ba, and ^{241}Am. Six (6) licensed low to high activity radiation sources are currently used for biomedical and other research. These include a ^{241}Am- 1 0 0 1 176.78 425.47h(0 1he)-176(7.4)2EI0.029-4(r)-3(1()5(r)r53 471he)-11cou

407Tm [(P)[-3(r)-3(en)14(t)-4llatioa67(-37-)-221 0 0 1 9 1 (ator)-4(s.)-4(47 Tm -0.0298 Tc[(241)] TJ ET BT 400.51e 12.8f 1

RADIATION SAFETY

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 S

x

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 particular0( )-3(4(con(r)ce3(r)-3(e n)-18800)5(nsp-18800)a-18800)l(nsab(r)ora-4(i)ory)9

RX	0	0	0	2	3	1

RADIATION SAFETY OFFICE (RSOF)

STAFFING

The RSOF operated under University approval with the following positions:

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

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

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 wlra2e f* 288orkers wlr37.417 60.0 0 1 107.66 340.13 Tm6e f* 288orkers are wfa

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 (1st 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.

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.

RADIATION SAFETY

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

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

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
TOTAL	85	85	86	99	99	101	102

RADIATION-GENERATING UNITS (Not In Use)	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Analytical units In storage	15	18	19	23	21	23	23
Analytical units Disabled	4	1					

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 462.912-3( )-f3(i)9(n)-4(e)-3(r] TJ ET BT 1 0 0 1 18299.2107.11 Tm [(b)] TJ ET B

SOF mia nbea3( )-14(R)oa o;i ROR o; Ri o; R RineR

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

			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	^{32}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 ^{3}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.

			RSOF. They were aware of procedure.	procedure.
12/17/2008	Minor Incident	0.01 mCi of ^{133} 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	^{32}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.

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/ REL OCATION PROGRAM

The RSOF requires at least three weeks notice to decomm(T)1 0 05(i)5(on)3( )-254(l)5(eb)orat [( )] TJ

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

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			

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:

AREA AUDITED	# OF INDIVIDUAL FILES EXAMINED
RAM Ap1rbeeols-5(e)d8(P 1 0sTJ ET BT 1 0 0 1 162.04 T62.54 Tm 0 g)] TJ ET BT 1 0 0 1 162.02 542.54 Tm 0 g	

[illegible]

RADIATION SAFETY

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.

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}I and no orders of ^{3}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

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. 6 L REPORT 200Ltgram3(t)-458cessf pnedreehehe(es w)13(ere)t123(R)5(ecoE(

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,

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.

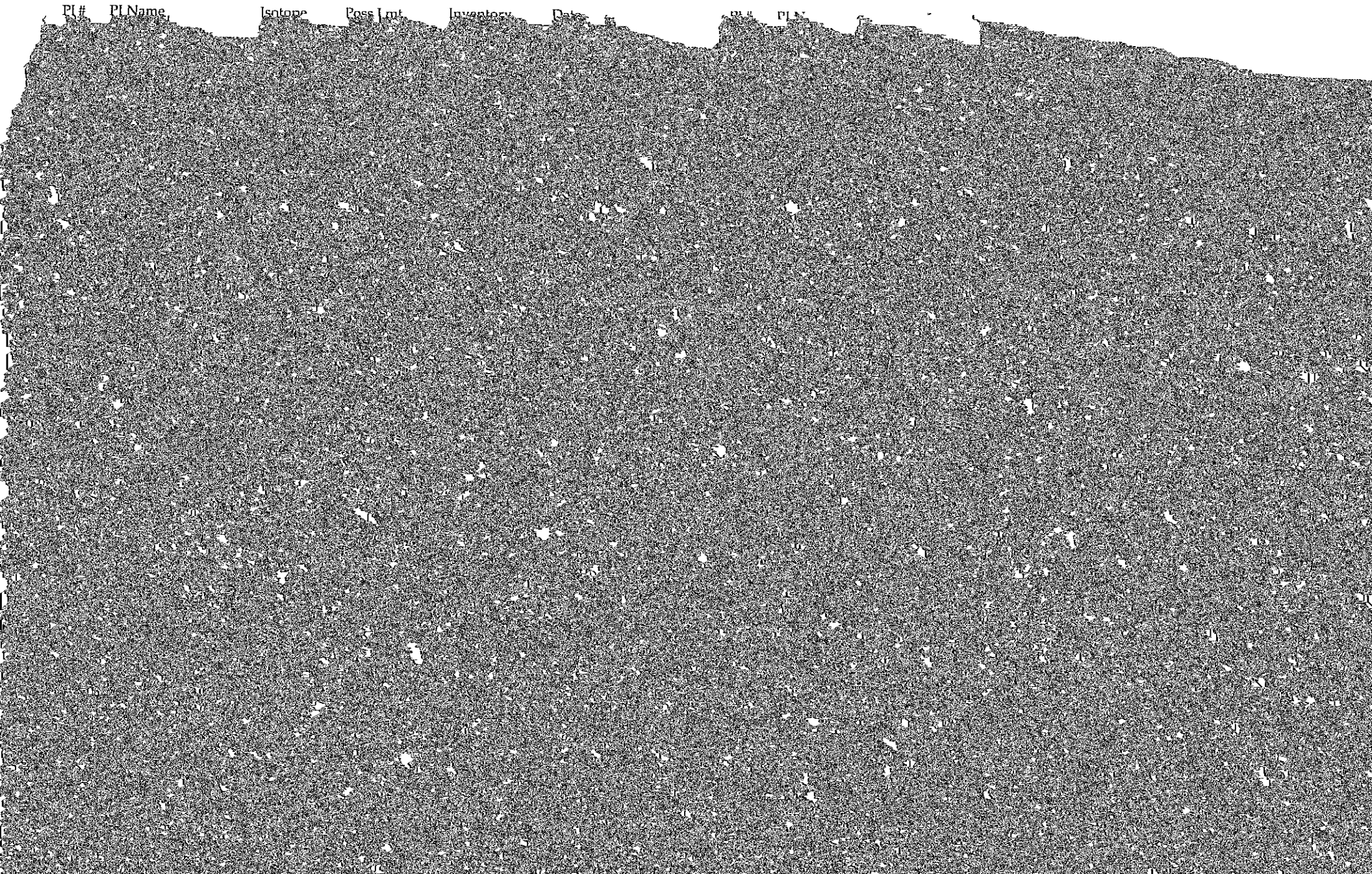
SHIPPING PAPERS

RSC AUDIT COMMENTS:

APPENDIX

PI Rad Summary Listing and Post Screen

PI Rad Summary Listing and Post Screen



	PI Name	Location	Isotope	Emits	Current Activity	
113	RSOF	Service Building Rad	Co57	gamma	3.25e-4	mCi
326	Matisoff,Gerald	A.W. SMITH 211F	Co57	Gamma	1.78e-7	mCi