April 12, 2010

Regional Administrator
NRC Region III
2443 Warrenville Road
Lisle, Illinois 60532

Dear Sir,

Based on NRC Confirmatory Order (IA-09-026) issued to me on July 28, 2009, I have agreed within 45 days following each periodic (quarterly) Radiation Safety Committee meeting, to provide minutes of the meeting to the permittee, the NHPP, and the NRC. Enclosed is a copy of the signed minutes from the March 4, 2010 Radiation Safety Committee meeting with attachments.

If you have any questions, please contact me at 859-381-5929.

Sincerely,

Michael T. Hackett, MS

Enclosure

cc: Director, VA Medical Center, Lexington, Kentucky (electronic copy)
Director, National Health Physics Program (electronic copy)

Radiation Safety Committee (RSC) Minutes
March 4, 2010

AGENDA ITEM	DISCUSSION	ACTION	TARGET
Current Old Business			
1. Previous Minutes – Dr. Baker	**Minutes from December 30, 2009 meeting** (reviewed by RSC prior to obtaining signatures - presented at January 2010 Environment of Care Council) RSC Signed Minutes Link to minutes with attachments	No further action required	Complete
2. Closeout Surveys – S. Brown & M. Hackett (10 minutes)	**Closeout Surveys SOP & Research Lab Deactivation** Closeout Survey Methods - NHPP Closeout Surveys SOP RSC discussed the SOP that was taken from the NHPP recently revised (Dec 2009) guidelines for closeout survey methods. The SOP was approved by all Committee members present (6) and will be posted in radiation safety folder on the public drive. As discussed in the December 2009 RSC meeting, 6 research labs (C309, C314, C323A, D301A, D305, D310) that are currently inactive for radioactive materials use will have closeout surveys done for the RSC's approval to release for unrestricted use. A large amount of dedicated RSO time is required to properly perform the closeout surveys along with the required documentation (>40 hrs).	Perform closeout surveys on 6 labs with quarterly RSC updates – M. Hackett (will be followed in old business performance goals)	Dec 2010
3. Brachytherapy – Dr. Baker & M. Hackett (5 minutes)	**Prostate Brachytherapy** Seed Location Review 2008-2009 RSC discussed the seed location review done by VA Radiologist on the 12 VA patients who had prostate brachytherapy done at an outside institution in 2008-2009. The Committee agreed that contractor performance was very good . The Committee recommended that we continue reviewing these cases.	Develop quarterly audit which will include seed location & medical reviews – M. Hackett (will be followed in new business qtrly review)	May 2010
4. Back-up for RSO – Dr. Baker & M. Hackett (2 minutes)	**Back-up RSO Options** Dr. Baker reported on discussion with the UK Radiation Safety Officer, and the committee identified 3 options for temporary RSO coverage, should an urgent need arise. Options include: University of Kentucky radiation safety, a local radiation physics group, VA RSOs at other facilities (Louisville). If the need occurs, the RSC should consult with NHPP & meet to further discuss immediate options.	No further action required	Complete

Radiation Safety Committee (RSC) Minutes
March 4, 2010

AGENDA ITEM	DISCUSSION	ACTION	TARGET
5. 1105.01/MCM 00-27 – V. Kiefer & M. Hackett (2 minutes)	**Revised VHA Directive 1105.01 (i.e., Updating MCM 00-27)** VHA Directive 1105.01 10.07.2009 · MCM 00-27 RSC 10.24.2007 · RSC MCM 00-27 2010 Update RSC discussed the updated RSC MCM. Minor changes to the October 2007 MCM were done to reflect the recent minor changes in VHA Directive 1105.01 (i.e., updated file - red highlights are items to be changed/removed with yellow highlights being updated/additional items). The MCM updates were approved by all Committee members present (6) and will be sent for administrative review and posting.	Administrative review & posting – Public Affairs Officer	Apr 2010
6. Res AU Renewals – Dr. Baker & M. Hackett (5 minutes)	**Renewal of Research Authorized User Applications** Drs. Ain & VanderWesthuyzen's renewal applications will be sent via e-mail for RSC review & approval.	Renewal applications sent via e-mail – M. Hackett (will be followed in old business performance goals)	Apr 2010
7. Repeated CTs – Dr. Baker & M. Hackett (2 minutes)	**Repeated CTs** CT Exam Repeat Corrective Action As discussed in the December 2009 RSC meeting, a young female patient had three CTs within 3 weeks. Per the RSC recommendation, this case was reported to the Office for Quality and Safety for their review. As of this meeting, no official results of their review were available for the RSC. Our local Clinical Applications group has developed a process (i.e., attached MRI procedure prototype) when a selected radiology procedure is being ordered, the prior similar procedure(s) will be displayed giving the date(s) done along with the interpretation. This process will implemented locally for various CT exams and has been shared with other VAs.	Follow up with Office for Quality and Safety for their review – D. Jacobs	May 2010
8. Previous Qtrly Audits – Dr. Baker & M. Hackett (5 minutes)	**Follow up on Previous Qtrly Audits** a. Patient Radiation Exposure in Cath & EP Labs Dr. Baker and Mike Hacked reported on their meeting with Cardiology. Cardiology agreed to implement a 3-6-9 Gy dose alert to cardiologist during procedures and to provide additional cardiology fellow radiation safety training as well as a process for patient follow-up for patients receiving high radiation doses. b. Cath & EP lab staff ALARA findings Cath lab nurse manager discussed radiation exposure with nurse. No one monitored in cath lab exceeded 10% of the annual occupational limits in 2009.	a. Develop 3-6-9 Gy dose alert & patient follow up criteria – M. Hackett/Dr. Ziada (will be followed in old business performance goals) b. No further action required	Apr 2010 Complete

Radiation Safety Committee (RSC) Minutes
March 4, 2010

AGENDA ITEM	DISCUSSION	ACTION	TARGET
9. Performance Goals – Dr. Baker & M. Hackett (10 minutes)	**RSC Performance Goals for 2009** These goals were discussed as part of the annual review below.	Continue to monitor progress of performance goals – M. Hackett	May 2010
Current New Business			
1. Qtly Audits – Dr. Baker & M. Hackett (5 minutes)	**Quarterly Radiation Safety Audits for Oct-Dec 2009** Combined Trending Report with Summaries with Detailed Areas Audits Qtrly Trending Report · Nuclear Medicine · Research · Rad-Fluoro · ALARA-Rad Exp This quarterly review was discussed as part of the annual review below.	Continue to monitor as part of the qtrly audits – M. Hackett	May 2010
2. Annual Review – Dr. Baker & M. Hackett (10 minutes)	**Comprehensive Radiation Safety Program Annual Review for Calendar Year 2009** Comprehensive Review for 2009 · RSC e-mail Review Discussion included several items from the annual review: • RSC met qtrly w/ quorum present & minutes presented to Environment of Care Council • Radiation safety training completed in 2009 • NRC NOV in April 2009 w/ our NOV reply in May 2009 • Performance goals completed, ongoing, terminated, and additional ones for 2010 • Highlights from deficiency summaries (e.g., local radiopharmacy return package documentation, patient radiation doses from cardiac cath), and notable changes and updates (e.g., Nuclear Medicine ALARA). Although this annual review and the Oct-Dec quarterly audits were available to the RSC prior to the meeting and reviewed in part at this meeting, minor changes to the annual review were made and sent out after the meeting to RSC along with the quarterly audits for further RSC review. These reviews/audits along with their actions and changes were approved by e-mail by all Committee members who were present (6) at this meeting (see attached "RSC e-mail Review"). After this meeting the annual review was presented to the Environment of Care Council and was approved by the Medical Center Director (see attached signed annual review).	Continue to monitor the radiation safety program through progress of performance goals and by the qtrly audits – M. Hackett	May 2010
3. Clinical AU – Dr. Baker & M. Hackett (2 minutes)	**Clinical Authorized User Approval** Due to meeting time constraints, this item will be carried over as new business at the next RSC meeting.	Discuss at next meeting – M. Hackett	May 20190

Radiation Safety Committee (RSC) Minutes
March 4, 2010

AGENDA ITEM	DISCUSSION	ACTION	TARGET
4. Res AU Amendment – Dr. Baker & M. Hackett (2 minutes)	**Research Authorized User Amendments** Due to meeting time constraints, this item will be carried over as new business at the next RSC meeting.	Discuss at next meeting – M. Hackett	May 2010
5. Tabletop Rad Emerg – Dr. Baker & M. Hackett (2 minutes)	**Tabletop Exercise on Radiological Emergency Response** Tabletop - Rad Emerg Response It was noted that a tabletop exercise involving radiological emergency response is being developed for use in 2010. RSC committee members agreed that additional emergency response training is desired for all RSC members. Discussion included possibility of including a guest to give a presentation at the next RSC meeting.	Follow up at next meeting – M. Hackett	May 2010
6. Ni-63 Sources – Dr. Baker & M. Hackett (2 minutes)	**Ni-63 Source Disposal** Due to meeting time constraints, this item was address to the RSC via e-mail shortly after this meeting. The RSO requested the RSC's approval to properly dispose of 2 Ni-63 ECD sources that are no longer in use. This was approved by e-mail by all Committee members who were present (6) at this meeting (see New Business item 2 attached "RSC e-mail Review").	Dispose of Ni-63 sources – M. Hackett	Apr 2010
7. Interventional CT – Dr. Baker & M. Hackett	**Interventional CT Review** Due to meeting time constraints, this item although not listed on the agenda was address to the RSC via e-mail shortly after. The request to discontinue the 100% review of all Interventional CT cases. Of the 153 interventional CT cases in 2009, 145 (95%) were for cardiac CTA with an average patient effective dose (mSv) of 9.7 mSv which is within reported values in the literature (i.e., 5-32 mSv) while the non-Cardiac patient doses were lower. This was approved by e-mail by all Committee members who were present (6) at this meeting (see New Business item 2 attached "RSC e-mail Review").	Drop Interventional CT review from qtrly audit – M. Hackett	Complete

Items Referred for Higher Level/Council Review and/or Other Committee Review

- The radiation safety annual review is regularly scheduled to be presented during the March 2010 Environment of Care Council meeting
- The minutes from this meeting are regularly scheduled to be presented during the April 2010 Environment of Care Council meeting.

Radiation Safety Committee (RSC) Minutes
March 4, 2010

AGENDA ITEM	DISCUSSION	ACTION	TARGET

Next Meeting – May 27, 2010 @ 11:30 am in Nuclear Medicine Conference Room, B101A

Next Meeting's Tentative Old Business including items from current agenda requiring further action (see above).
1. **Review of Previous RSC Minutes**
2. **RSC Performance Goals**
3. **Updating MC00-27**
4. **Repeated CTs**
5. **Ni-63 Source Disposal**
6. **Tabletop Exercise on Radiological Emergency Response**

Next Meeting's Tentative New Business
1. **Quarterly Audit Review**
2. **Clinical Authorized User Approval**
3. **Research Authorized User Amendments**

Attendance:	Meeting Time:	Recorder:
Sign In Sheet; RSC Dates and Attendance for 2009	1:00 pm – 2:00 pm	Michael T. Hackett, MS

Recommend Approval / ~~Disapproval~~ Michael T. Hackett, M.S., Radiation Safety Officer	Recommend Approval / ~~Disapproval~~ Cheryl D. Baker, M.D. Chief of Radiology/RSC Chair
Recommend Approval / ~~Disapproval~~ for Donna K. Jacobs, FACHE, Associate Director/RSC Management Representative	Approved / ~~Disapproved~~ for Sandy J. Nielsen, FACHE, Director

Radiation Safety Committee (RSC) Minutes
December 30, 2009

AGENDA ITEM	DISCUSSION	ACTION	TARGET
Current Old Business			
1. Review of Previous RSC Minutes – Dr. Baker	**Minutes from August 27, 2009 meeting** (reviewed by RSC prior to obtaining signatures - presented at October 2009 Environment of Care Council) RSC Signed Minutes Link to minutes with attachments Minutes were approved by all Committee members present (7).	No further action required	Complete
2. Footprint Management – Dr. Baker & M. Hackett	**Footprint Management Procedure** Closeout Survey Methods - NHPP Research AU-Lab Listing e-mail - Request to Release C304 RSC reviewed closeout documentation for C304 via email and in Nov 2009 and approved release of the lab through electronic voting. RSC reviewed current research AU/Lab listing and recommended that D310 be the next lab deactivated. NHPP recently revised (Dec 2009) guidelines for closeout survey methods. We will utilize this reference to revise our draft footprint management procedure.	a. Revise the draft procedure for RSC review via e-mail before the next meeting – M. Hackett & Dr. Brown b. Deactivate D310 – M. Hackett	a. Feb 2010 b. Jun 2010
3. 2009 Performance Goals – Dr. Baker & M. Hackett	**RSC Performance Goals for 2009** RSC Performace Goals for 2009 2 of 8 items completed, 5 underway. Item 1, development of core indicators was discussed, and identified possible core indicators including: # times ALARA level >10%, # of NM 'issues', # of research 'issues', # of CT patients exceeding 100mSv, # of fluoro patients exceeding 15Gy, # of users >30 days overdue for training. The committee decided that the last item, Improve access to Radiation Safety Information, should be tabled, as current access is good and further change is unlikely to have much effect. There was also discussion about adding members from Surgery & Medicine and changing the scheduled meeting time/date to Wednesday afternoon.	Continue to track completion of performance goals during qtrly meetings – M. Hackett Discuss possibility of expanded membership and new scheduled time/date at CEC – Drs. Pellecchia/Baker	Feb 2010 Jan 2010
4. Follow up on previous Qtrly Audits – Dr. Baker & M. Hackett a. Research lab issue	**Radioactive Use Approval** Dr. Smyth has not and does not have any immediate requirements to use radioactive materials at the VA; therefore, the currently inactive labs under Dr. Morris's approval which Dr. Smyth worked in have been placed on the list to be deactivated.	No further action required	Complete

AGENDA ITEM	DISCUSSION	ACTION	TARGET
b. Cath lab doses	**Accuracy of Cath Lab Patient Doses Values** The correction factor recommended by the outside expert has been applied to doses reported to this committee - effective with the report reviewed today. (New Business Item 1)	No further action required	Complete
c. CT Protocols	**CT Acquisition Protocol Review** • The process being used to evaluate and monitor patient radiation exposure during CT exams was described and discussed. • This review has been incorporated into the quarterly audits of this committee.	No further action required	Complete
5. Draft VHA Handbook – Dr. Baker	**Draft VHA Fluoroscopy Handbook** No follow up information to review at this time.	Drop from agenda pending further instructions from higher levels – Dr. Baker	N/A
6. Prostate Brachytherapy – Dr. Baker & M. Hackett	**Prostate Brachytherapy Review (i.e., VA Patients Sent Out for Therapy)** Prostate Brachytherapy Audit · Procedure Record · Post CT Review The RSC discussed some additional information that should be included on the audit (e.g., breakdown of location of seeds [in prostate versus outside of prostate] seen on post CT review; independent review of post CT).	Update audit for discussion at the next RSC meeting – M. Hackett	Feb 2010
Current New Business			
1. Qtly Audits – Dr. Baker & M. Hackett	**Quarterly Radiation Safety Audits for Jul-Sep 2009** Combined Trending Report with Summaries with Detailed Area Audits Qtrly Trending Report · Nuclear Medicine · Research · Rad-Fluoro · ALARA-Rad Exp Discussion included items found on the trending report's deficiency (e.g., local radiopharmacy return package documentation), and notable changes and updates (e.g., Mo-99 setting on dose calibrator constancy checks, changed from CT exam review to CT case review, updated estimated dose values from cath lab to better reflect actual dose values) summaries which included any action taken. These actions and changes were approved by all Committee members present (7) with no further action required except for: a. There was discussion of possible ways to lower patient exposures in Cath & EP lab. b. Committee members suggested investigation of cause behind higher ALARA readings in one of the nurse compared to a different nurse with the same job.	Continue to monitor as part of the qtrly audit – M. Hackett a. Work with Cardiology to address this b. RSO to investigate – Dr. Baker & M. Hackett	Feb 2010 Feb 2010

Radiation Safety Committee (RSC) Minutes
December 30, 2009

AGENDA ITEM	DISCUSSION	ACTION	TARGET
2. NRC Request – Dr. Baker & M. Hackett	**NRC Requests Organizations to Report on Tritium Exit Signs in Their Possession** NRC Request NRC Fact Sheet Engineering completed this survey early in 2009 and reported that neither division had any tritium EXIT signs.	None required – Informational	N/A
3. RSO Memos – Dr. Baker & M. Hackett	**VHA Memos Concerning Radiation Safety Officers** RSO Memo from 10N RSO Memo from NM & RS Service The two memos (i.e., 10N and 115) outline RSC Committees' responsibility to provide for continuous RSO coverage. Committee decided that, until a firm plan is in place, in the event of an unexpected absence of our RSO, the Chair will call an emergency meeting of the Committee. Note was made that Dr. Shih has served as interim RSO in the past.	Further discussion of options at next RSC meeting – Dr. Baker	Feb 2010
4. NRC Exemption – Dr. Baker & M. Hackett	**NRC Exemption from Requirements on Procurement and Transfer of Tc-99m and Calibration on Equipment using Tc-99m** NRC Exemption Due to recent shortages of Mo-99, the NRC has issued exemptions from requirements on procurement and transfer of Tc-99m, calibration on equipment using Tc-99m. Even though our patient schedule has been compromised during recent Mo-99/Tc-99m shortages, we have not needed to utilize either of these exemptions.	None required – Informational	N/A
5. Revised VHA Directive 1105.01 – Dr. Baker & M. Hackett	**VHA Directive 1105.01, Management of Radioactive Materials** VHA Directive 1105.01 10.07.2009 MCM 00-27 RSC 10.24.2007 The major changes in this Directive incorporate a focus to a safety culture, oversight for facility-level Radiation Safety Committees, and undue reliance on affiliate universities or consultants. Our local MCM concerning the RSC already addresses oversight by the Environment of Care Committee (now a Council). We do not have any undue reliance on UK or consultants as it pertains to radiation safety. Our local MCM is up for revision in late 2010; therefore, the RSC recommended it be updated using the revised Directive.	Update MCM 00-27 for review at the next RSC meeting – M. Hackett & V. Kiefer	Feb 2010

Radiation Safety Committee (RSC) Minutes
December 30, 2009

AGENDA ITEM	DISCUSSION	ACTION	TARGET
6. Renewal of Research Authorized User Applications – Dr. Baker & M. Hackett	**Renewal of Research Authorized User (AU) Applications** Due to meeting time constraints the Committee agreed that the application with summary be sent via e-mail to the Committee for further review and voting. a. Dr. Stephen Brown On 01/13/2010, 5 of the 9 RSC members had voted for approval with no changes to the applications (i.e., 2 had not cast a vote, 1 member position vacant, 1 member was applicant); therefore, RSC re-approval has been given to Dr. Brown per the below approved application: RSC Approved AU 01.13.2010 · RSC Approval via e-mail · Summary of AU Application · C311A Air Flow Evaluation · C311B Air Flow Evaluation Use link (open & close, then retry) if above application will not open: Blank Authorized User Application. b. Additional renewal applications will be sent out via e-mail to the Committee after completion of application supporting documentation.	a. None required – Informational b. Send via e-mail applications/supporting documentation for RSC review/approval before the next meeting – M. Hackett	Complete b. Feb 2010
7. FDA Safety Investigation – Dr. Baker & M. Hackett	**FDA Safety Investigation of CT Brain Perfusion Scans** Initial Notification 10.07.2009 · Update 12.08.2009 Currently we are not performing CT brain perfusion scans but we have been taking measures to evaluate and reduce patient radiation doses from other CTs that we perform.	None required – Informational	N/A
8. Repeated CTs – Dr. Baker	**Repeated CTs within Short Timeframe** Same Patient Review It was reported that a young female patient had three CTs within 3 weeks. The RSC recommended that the case be reported to the Office for Quality and Safety for their review.	Report any follow up at next RSC meeting – Dr. Baker	Feb 2010

Items Referred for Higher Level/Council Review and/or Other Committee Review

- The minutes from this meeting are regularly scheduled to be presented during the January 2010 Environment of Care Council meeting.
- New business agenda item #8 to be reported to Office for Quality and Safety for further review,

Radiation Safety Committee (RSC) Minutes
December 30, 2009

AGENDA ITEM	DISCUSSION	ACTION	TARGET

Next Meeting – February 25, 2010 @ 11:30 am in Nuclear Medicine Conference Room, B101A

Next Meeting's Tentative Old Business including items from current agenda requiring further action (see above).

1. Review of Previous RSC Minutes
2. Footprint Management & Research Lab Deactivation
3. RSC Performance Goals for 2009
4. Prostate Brachytherapy
5. Follow up on previous Qtrly Audits
   a. Patient Radiation Exposure in Cath & EP Labs
   b. Cath & EP lab staff ALARA findings
6. Back-up RSO options
7. Revised VHA Directive 1105.01 (i.e., Updating MC00-27)
8. Renewal of Research Authorized User Applications
9. Repeated CTs

Next Meeting's Tentative New Business

1. Quarterly Audit Review
2. Comprehensive Radiation Safety Program Annual Review for Calendar Year 2009

Attendance:	Meeting Time:	Recorder:
Sign In Sheet; RSC Attendance for 2009 Reviews	10:00 am – 11:40 am	Michael T. Hackett, MS

Recommend Approval / ~~Disapproval~~ Michael T. Hackett, M.S., Radiation Safety Officer	Recommend Approval / Disapproval Cheryl D. Baker, M.D. Chief of Radiology/RSC Chair
Recommend Approval / ~~Disapproval~~ Donna K. Jacobs, FACHE, Associate Director/RSC Management Representative	Approved / ~~Disapproved~~ 1/25/10 Sandy J. Nielsen, FACHE, Director

Closeout Survey Methods

(Last Revised: December 15, 2009)

1. General Questions About Closeout Surveys for VHA Facilities

2. Unrestricted Use Release Criteria

3. Historical Site Assessment

4. Closeout Survey Measurements (3 Types: Scanning, Wipes, and Exposure)

5. Closeout Survey Documentation

1. General Questions About Closeout Surveys for VHA Facilities

a. What is a closeout survey?
For decommissioning purposes, a "closeout survey" refers to performance and documentation of a historical assessment and radiological measurements/calculations of sufficient quality to support release of a room, area, or building for unrestricted use per 10 CFR 20.1402.

b. What types of areas must have a closeout survey?
Any room or building authorized for radioactive materials use on a VHA permit or any area or any other area which became contaminated and could not be reduced below unrestricted area criteria will need a closeout survey before it can be released for unrestricted use with respect to radioactive materials.

c. When is a decommissioning-quality closeout survey necessary?
When principal activities[1] with radioactive materials are permanently discontinued in a room, building, or area, the permittee should perform closeout surveys in a timely manner to show that the room meets unrestricted release criteria. Until the area is released by the appropriate authority, the use of the area should be controlled in accordance with 10 CFR 19, 10 CFR 20, and other applicable regulations.

d. What are the regulatory due dates for performing decommissioning closeout survey?
Decommissioning timeliness requirements are in 10 CFR 30.36(d). The RSO should be familiar with these requirements. Under 10 CFR 30.36(d), if permittee management decides to cease principal activities in all rooms of a building or if such use stops in all rooms of a building for 24 months (regardless of management decisions), then a closeout survey should be completed within 60 days of that point to show that residual radioactivity is below applicable unrestricted release criteria. If a survey cannot be completed within 60 days, then a notification must be

[1] Principal activities, according to 10 CFR 30, means activities authorized by the permit which are essential to achieving the purpose(s) for which the permit was issued or amended. Storage during which no permitted material is accessed for use or disposal and activities incidental to decontamination or decommissioning are not principal activities.

made to NHPP and decommissioning must be initiated. After that notification, the permittee will have an additional 24 months to complete closeout surveys to show the area meets unrestricted release criteria. Failure to make a notification (if required) or to complete closeout surveys within 24 months after a notification (if required) is a violation of 10 CFR 30.36(d).

e. Who has the authority to release a room or building for unrestricted use?
Whether the facility, NHPP, or NRC has authority to release a location of use depends on the type of permit held and specific circumstances related to the location of use. The table below is a general summary of release authorities. If there is any question about who has authority to release the location, the RSO should discuss the circumstances with NHPP.

Release Authority Table.pdf

f. Is an approved Decommissioning Plan required prior to start-up of decommissioning?
Requirements for a formal Decommissioning Plan (DP) are provided in 10 CFR 30.36(g)(1). If a DP is required, then the permittee may not begin decommissioning activities until authorized by NHPP (who must gain authorization from NRC). For most VHA permittees a DP is not expected to be necessary. The RSO should determine whether the following conditions apply (if these conditions do not exist, then an approved DP is not needed):

> "The procedures and activities necessary to carry out decommissioning of the site or separate building or outdoor area have not been previously approved by [NHPP] and these procedures could increase potential health and safety impacts to workers or to the public, such as in any of the following cases:
>
> (i) Procedures would involve techniques not applied routinely during cleanup or maintenance operations;
>
> (ii) Workers would be entering areas not normally occupied where surface contamination and radiation levels are significantly higher than routinely encountered during operation;
>
> (iii) Procedures could result in significantly greater airborne concentrations of radioactive materials than are present during operation; or
>
> (iv) Procedures could result in significantly greater releases of radioactive material to the environment than those associated with operation."

Generally, when radioactive materials were used in a way that precluded their release into the environment, did not cause the activation of adjacent materials, or did not result in contaminated work areas above decommissioning screening criteria (see Section 2), then no formal Decommissioning Plan is expected to be needed.

One example of when a DP might be needed is a cyclotron production facility with activated or contaminated components or structures above background levels that might need to be removed

using methods that could create significant airborne concentrations of radioactive materials or significant environmental releases (e.g., by cutting or scarifying contaminated surfaces or materials).

2. Unrestricted Use Release Criteria

a. NUREG-1556 Series Criteria

VHA permittees generally state, in their permit application documents, that they will use criteria in NUREG-1556 series publications for unrestricted release of areas and equipment. These criteria originate from the older Regulatory Guide 1.86 published by the U.S. Atomic Energy Commission in 1974 and apply to contaminated surfaces.

Permit Type	Release Criteria for Contaminated Surfaces
Research Use (NUREG-1556, Volume 7)	NUREG1556v7 App Q.pdf
Medical Use (NUREG-1556, Volume 9)	NUREG1556v9_r2 App R.pdf
Broad scope (research + medical) (NUREG-1556, Volume 11)	NUREG1556v11 App S.pdf

Note that there are no specific criteria for volumetrically contaminated or activated building materials. The permittee would need to propose such criteria for approval by NHPP on a case-by-case basis. Another option would be to dispose of volumetrically contaminated materials as radioactive waste; however, care would be needed to ensure a decommissioning plan was not required by 10 CFR 30.36(g) for removal of such materials.

b. NUREG-1757 Series Criteria

As an alternative to NUREG-1556 series values, NUREG-1757, which was prepared by NRC staff, adopts screening values published by NRC in Federal Register on November 18, 1998 (63 FR 64132) with clarification published on June 13, 2000 (65 FR 37186). These values, as clarified, are generally much greater than NUREG-1556 values and are acceptable to NHPP and NRC for unrestricted release of potentially contaminated building surfaces. The screening values are based on the decommissioning dose limit for unrestricted use specified in 10 CFR 20.1402. The values are also based on an assumption that 10% of the total surface activity is removable. **If the ratio of removable to total activity is unknown, then the screening values must be reduced by a factor of 10 to compensate for this assumption.** These screening values correspond to levels of radionuclide contamination that would be deemed in compliance with the unrestricted use dose limit in 10 CFR 20.1402 (i.e., 0.25 mSv/y (25 mrem/y)).

63FR222.pdf 65FR114.pdf

c. Mixtures of radionuclides

When mixtures of radionuclides are present in the area, the following options exist for evaluating release limits:

(1) Apply the most restrictive (lowest) release value to the total activity.

(2) Determine an effective release limit for total activity based on a weighted average of all radionuclides of concern:

$$\text{Effective Limit} = \left(\sum_{i=1}^{N} \frac{f_i}{RC_i} \right)^{-1}$$

where f_i is the activity fraction of radionuclide i; RC_i is the release value for radionuclide i; and N is the number of radionuclides of concern.

(3) Evaluate all measurements in terms of the sum of ratios (i.e., sum of ratios of each radionuclide's activity to its release criterion). A sum of ratios over one indicates contamination over release limits.

d. ALARA Requirement

In addition to the release criteria (which serve as the limits for release), NRC requirements in 10 CFR 20.1402 specify that residual radioactivity should be reduced to levels that are as low as reasonably achievable. Therefore, when residual radioactivity is located, even though the levels may be below release criteria, reasonable efforts should be taken to reduce the levels.

3. Historical Site Assessment

A historical site assessment of the location of use is a necessary step in the closeout survey process and documentation. In cases where historical information is incomplete, a scoping-type characterization survey might be needed to determine the nature and extent of radionuclides and contamination prior to performing the final closeout survey.

Collection of the following information is generally considered part of the historical site assessment phase:

a. For release of a separate building, the following information should be included as part of the historical assessment:

(1) Facility plan-view diagram showing the location of the building

(2) Total area (acres) of VA facility containing building

(3) Date of issue of first license to use radioactive materials

(4) Street address of the building

(5) Description of building:
   (a) Type of construction (metal frame, wood frame, cinder-block, etc.)
   (b) Number of floors and rooms in the building
   (c) Floor area (square feet) of building (by floor if possible)

(6) Date building construction completed (if known)

(7) Date of first use of building for radioactive materials

(8) List of rooms which involved radioactive materials use or storage

(9) Building plan-view diagram for each floor where radioactive materials were used

(10) Description of area surrounding the building (e.g., residential, industrial, or mixed area)

(11) Type of activities involving radioactive material use in building (e.g., animal research, biomedical research, medical use, medical testing, calibration facility, etc.)

(12) Description of activities for which the building will be used after release and whether the building will remain under VA custody and control (e.g., demolition, transfer in real estate transaction, continued VA research and medical use without radioactive materials, etc.)

(13) All information below for rooms to be released.

b. For release of an individual room, the following information should be included:

(1) Radionuclides and forms (sealed, unsealed, or gaseous) used in the room

(2) Typical maximum activity (per radionuclide) used in the room

(3) First and last date of use (per radionuclide, if known)

Note: A decay assessment can be performed based on half-life, last date of use, and typical maximum amounts to determine a short-list of "radionuclides of concern". Radionuclides with significant residual activity or over values in 10 CFR 20 Appendix C are generally considered to be "radionuclides of concern" and must be evaluated in the closeout survey. The spreadsheet below is an

example of such a calculation and could be adapted for a specific situation.

DecayAssessment.xls

(4) Whether any known spills occurred that resulted in residual activity that could not be removed

(5) For sealed sources, identify whether or not any of the sources stored or used in the room ever leaked or failed a leak test

(6) For sealed sources, provide a copy of the most recent leak test for each sealed source used or stored in the room. Provide additional details for sealed sources that leaked.

(7) Provide details about disposition of radioactive materials and equipment removed from the room(s) as part of decommissioning process. Provide paperwork showing transfer of radioactive sources/wastes to another licensee, as applicable.

(8) If liquid disposal of radioactive materials to sewer occurred, this should be noted, along with a description of the radionuclides disposed and a description of the sewer system (i.e., where does room drain lead to? municipal sewer system, onsite or offsite holding tank or septic system?)

(9) Date decontamination activities started.

(10) Date(s) final status surveys performed and areas surveyed.

4. Closeout Survey Measurements (3 types)

NUREG-1575, Rev. 1 (also known as the Multi-Agency Radiation Survey and Site Investigation Manual, or MARSSIM) and NUREG-1757 series documents provide guidance for performing closeout surveys.

Appropriate radiation detection equipment (sensitive to the type of radiation associated with historical radionuclide use, as determined during the historical site assessment) must be used for surveys. The detection equipment should be calibrated using NIST-traceable calibration standards.

When mixtures of radionuclides exist and the detector cannot distinguish radionuclides, an effective efficiency must be determined and used. An effective efficiency for the detector response can be calculated by the following:

$$\text{Effective Efficiency} = \left(\sum_{i=1}^{N} \frac{f_i}{E_i} \right)^{-1}$$

where f_i is the activity fraction of radionuclide i; E_i is the detection efficiency (e.g., counts/disintegration) for radionuclide i; and N is the number of radionuclides of concern.

Background levels should be established based on the type of material making up the surfaces to be surveyed. Consideration should be given to the different materials of construction in a given room or area (e.g., ceramic floor tiles, counter tops, concrete, painted surfaces, etc.).

Minimum detectable activities (MDAs) should be determined for contamination measurements (scans, direct measurements, and wipes) to ensure that the measurement technique is capable of identifying residual radioactivity at levels less than the release criteria. Methods for determining MDAs are provided in Chapter 6 (Section 6.7) of MARSSIM.

A simplified survey approach, adapted from NUREGs 1757 and 1575, is generally acceptable for VHA permittees. For impacted areas[2], the approach is to prepare an initial survey map by assigning a 1 meter by 1 meter grid to floors, walls (up to 2 meters), fume hoods, workbenches, shelves, drawers, and backsplash areas in impacted areas. This initial grid identifies initial survey locations for wipes, stationary measurements for total surface activity, and ambient exposure rate measurements. Additional locations should be included based on scan results and the surveyor's judgment (e.g., sinks, sink drains, floor drains, fume hood vents, and other locations where contamination might have accumulated). The final survey map should include at least 30 survey locations within each survey unit (i.e., typically an individual room).

Using the final survey map, the following three types of surveys should be performed and documented within each survey unit:

a. **Surface scanning and stationary measurements for total activity (fixed + removable):**

   Surfaces in impacted areas should be scanned for radioactivity at 100% coverage using a suitable survey meter with detector and audible alarm by carefully moving the detector as close as possible over the survey location at a distance not exceeding 1 cm and at a rate of approximately one detector width per second. Any location with elevated radioactivity (e.g., greater than two times background) should be marked on the survey map as additional survey location. In these locations, both a wipe sample and a timed (e.g., one-minute) stationary measurement (using a scalar type survey meter that can record total counts) should be taken.

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[2] Areas should be initially classified as impacted or non-impacted based on the Historical Site Assessment. Non-impacted areas are areas in which radioactive materials were never introduced, used, or stored, and have no reasonable potential for residual contamination and require no further evidence to demonstrate compliance with the release criterion.

Note: MARSSIM (Chapt. 2, Sect. 2.5.2) provides relief from 100% surface scanning by providing guidance for classifying impacted areas based on the potential level of residual radioactive material contamination relative to the established release criteria. The Historical Site Assessment may be used as a basis for making a classification. The classifications and associated best practices for scan surveys are shown in the following table.

Type	Area Description	Scan Survey Coverage
Class 1	Areas where residual contamination, prior to any remediation, is likely to exceed applicable unrestricted release criteria. Survey unit size is restricted to 100 m^2 or less.	100% area coverage
Class 2	Areas where the potential exists for residual contamination, prior to remediation, but the area is unlikely to exceed the applicable unrestricted release criteria. Survey unit size can be up to 1,000 m^2. Most research and medical use areas would be expected to fall under this class.	At least 20% area coverage If any surveys (including scans, wipes, or static direct measurements) reveal contamination approaching release criteria (a value of 10% of release criteria is suggested), the area should be reclassified as Class 1 and scanned at 100%.
Class 3	Areas where measurable levels of residual contamination are unlikely, with any levels being a small fraction (i.e., less than 1%) of the unrestricted release criteria. The survey unit has no area size limit.	At least 10% area coverage If any surveys reveal contamination above background levels, then the area should be reclassified as Class 1 or 2, depending on levels, and undergo additional scanning.

b. Wipe samples of surfaces for removable contamination:

Using the adjusted final survey map (adjusted to include elevated scan locations), swipes for removable radioactive contamination should be taken from each survey location by wiping a minimum 100 cm^2 area (e.g., using a filter paper of ~3 cm diameter and S-shaped pattern of approximately 40 cm in length) while applying moderate pressure to the swipe material at the survey location. Additional judgmental wipes should be taken from sinks, sink drains, floor drains, fume hood vents, vacuum line connections, and other areas where contamination could have accumulated. Wipes should be counted on an appropriate counter depending on radionuclides used in the area (e.g., liquid scintillation counter for low-energy beta emitters like H-3, C-14; NaI well-counter for photon emitters like those found in nuclear medicine applications). In some cases, wipe samples may need to be counted first using a well counter and then by liquid scintillation.

c. Exposure rate measurements for external radiation:

Using the adjusted final survey map (adjusted to include elevated scan locations), exposure rate measurements should be made at each survey location at a distance of 1 meter above floor surfaces to provide a good estimate of potential external radiation exposure.

5. Closeout survey documentation

The following records should be maintained (and submitted to NHPP if required) for close-out surveys:

(1) Documentation of the historical site assessment, including facility and building plan views if applicable, list of radionuclides used, basis for determining radionuclides of concern, list of rooms in which radionuclides were used (if separate building is being released)

(2) Criteria used for unrestricted release (i.e., contamination limits)

(3) Make, model number, and serial number for all detectors used (note that many instruments have a separate set of numbers for the detector probe and the meter/reader; both number sets must be specified)

(4) Minimum detectable activities (for fixed measurements, wipes, and scans) for detection methods.

(5) Calibration records for instruments used with efficiencies for radionuclides of concern

(6) Discussion of daily instrument constancy checks

(7) Description of survey methods

(8) Results and discussion of following:

- Scanning surveys (indicate if any results were greater than two times background) (acceptable to discuss in units of cpm relative to background cpm)

- Stationary measurements for total surface activity (in units of dpm/100cm^2) (at locations with elevated scan results)

- Wipe samples (in units of dpm/100cm^2)

- Exposure rate measurements (in units of mR/hr)

(9) Survey maps showing survey locations in impacted areas being released

(10) Information on instrument sensitivity for radiations of concern (instrument backgrounds; instrument detection efficiencies for radiations of concern; minimum detectable activity

in units of dpm/100 cm2 for scanning and stationary measurements; minimum detectable activity for wipe counter)

(11) Most recent results for any required leak tests for sealed sources

(12) Records of transfers of RAM, associated with decommissioning efforts, to other licensees for disposal

(13) Statement certifying that the area to be released has been cleared of all containers of RAM and that all radiological postings and labels have been or will be removed from the area and destroyed or otherwise obliterated pending approval to release area for unrestricted use.

(14) The report or transmittal memorandum for the report should include a concluding statement that the area meets requirements in 10 CFR 20.1402 for release for unrestricted use. Note that these requirements also specify that residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).

VETERANS AFFAIRS MEDICAL CENTER (VAMC), LEXINGTON, KENTUCKY
STANDARD OPERATING PROCEDURE (SOP), RADIATION SAFETY COMMITTEE

CLOSEOUT SURVEYS

PURPOSE: This SOP establishes guidelines for required radiation safety closeout surveys of locations where use and/or storage of radioactive materials has occurred prior to these areas being released for unrestricted use (i.e., given that the Radiation Safety Committee has approved the release for unrestricted use).

APPLICATION: This SOP applies to rooms/labs where radioactive material(s) have been used and/or stored at the Lexington, KY VAMC.

RELEASE CRITERIA:

1. NUREG-1556:
   Release criteria for contaminated surfaces are found in Nuclear Regulatory Commission (NRC) NUREG-1556 Consolidated Guidance About Materials Licenses, Volume 11 Program-Specific Guidance About Licenses of Broad Scope, Appendix S Radiation Safety Survey Topics:

   NUREG-1556 Vol 11 App S

2. NUREG-1757:
   NUREG-1757 Consolidated Decommissioning Guidance may be used as an alternative to NUREG-1556 series values. This NUREG adopts screening values published by NRC in Federal Register on November 18, 1998 (63 FR 64132) with clarification published on June 13, 2000 (65 FR 37186):

   63 FR 64132 65 FR 37186

   These values, as clarified, are generally much greater than NUREG-1556 values and are acceptable to VHA National Health Physics Program (NHPP) and NRC for unrestricted release of potentially contaminated building surfaces. The screening values are based on the decommissioning dose limit for unrestricted use specified in 10 CFR 20.1402. The values are also based on an assumption that 10% of the total surface activity is removable. If the ratio of removable to total activity is unknown, then the screening values must be reduced by a factor of 10 to compensate for this assumption. These screening values correspond to levels of radionuclide contamination that would be deemed in compliance with the unrestricted use dose limit in 10 CFR 20.1402 (i.e., 0.25 mSv/y (25 mrem/y)).

3. Mixtures of Radionuclides:
   When mixtures of radionuclides are present in the area, the following options exist for evaluating release limits:

   a. Apply the most restrictive (lowest) release value to the total activity.

   b. Determine an effective release limit for total activity based on a weighted average of all radionuclides of concern:

$$\text{Effective Limit} = \left(\sum_{i=1}^{N} \frac{f_i}{RC_i} \right)^{-1}$$

where f_i is the activity fraction of radionuclide i; RC_i is the release value for radionuclide i; and N is the number of radionuclides of concern.

c. Evaluate all measurements in terms of the sum of ratios (i.e., sum of ratios of each radionuclide's activity to its release criterion). A sum of ratios over one indicates contamination over release limits.

4. As Low As Reasonably Achievable (ALARA) Requirement:
In addition to the release criteria (which serve as the limits for release), NRC requirements in 10 CFR 20.1402 specify that residual radioactivity should be reduced to levels that are as low as reasonably achievable. Therefore, when residual radioactivity is located, even though the levels may be below release criteria, reasonable efforts should be taken to reduce these levels.

HISTORICAL SITE ASSESSMENT:

A historical site assessment of the location of radioactive material use is a necessary. In cases where historical information is incomplete, a scoping-type characterization survey might be needed to determine the nature and extent of radionuclides and contamination prior to performing the final closeout survey. For release of an individual room, the following information should be included:

1. Radionuclides and forms (sealed, unsealed, or gaseous) used in the room.

2. Typical maximum activity (per radionuclide) used in the room.

3. First and last date of use (per radionuclide, if known).

   Note: A decay assessment can be performed based on half-life, last date of use, and typical maximum amounts to determine a short-list of "radionuclides of concern". Radionuclides with significant residual activity or over values in 10 CFR 20 Appendix C are generally considered to be "radionuclides of concern" and must be evaluated in the closeout survey. The spreadsheet below is an example of such a calculation and should be adapted (e.g., add/delete radionuclides) for a specific situation.

   Decay Assessment

4. Whether any known spills occurred that resulted in residual activity that could not be removed.

5. For sealed sources, identify whether or not any of the sources stored or used in the room ever leaked or failed a leak test.

6. For sealed sources, provide a copy of the most recent leak test for each sealed source used or stored in the room. Provide additional details for sealed sources that leaked.

7. Provide details about disposition of radioactive materials and equipment removed from the room(s) as part of decommissioning process. Provide paperwork showing transfer of radioactive sources/wastes to another licensee, as applicable.

8. If liquid disposal of radioactive materials to sewer occurred, this should be noted, along with a description of the radionuclides disposed and a description of the sewer system (i.e., where does room drain lead to, e.g., municipal sewer system, onsite or offsite holding tank, or septic system).

9. Date decontamination activities started.

10. Date(s) final status surveys performed and areas surveyed.

CLOSEOUT SURVEY MEASUREMENTS (3 types):

NUREG-1575, Rev. 1 (also known as the Multi-Agency Radiation Survey and Site Investigation Manual, or MARSSIM) and NUREG-1757 series documents provide guidance for performing closeout surveys.

Appropriate radiation detection equipment (sensitive to the type of radiation associated with historical radionuclide use, as determined during the historical site assessment) must be used for surveys. The detection equipment should be calibrated using NIST-traceable calibration standards.

When mixtures of radionuclides exist and the detector cannot distinguish radionuclides, an effective efficiency must be determined and used. An effective efficiency for the detector response can be calculated by the following:

$$\text{Effective Efficiency} = \left(\sum_{i=1}^{N} \frac{f_i}{E_i} \right)^{-1}$$

where f_i is the activity fraction of radionuclide i; E_i is the detection efficiency (e.g., counts/disintegration) for radionuclide i; and N is the number of radionuclides of concern.

Background levels should be established based on the type of material making up the surfaces to be surveyed. Consideration should be given to the different materials of construction in a given room or area (e.g., ceramic floor tiles, counter tops, concrete, painted surfaces, etc.).

Minimum detectable activities (MDAs) should be determined for contamination measurements (scans, direct measurements, and wipes) to ensure that the measurement technique is capable of identifying residual radioactivity at levels less than the release criteria. Methods for determining MDAs are provided in Chapter 6 (Section 6.7) of MARSSIM.

A simplified survey approach, adapted from NUREGs 1757 and 1575, is generally acceptable. For impacted areas[1], the approach is to prepare an initial survey map by assigning a 1 meter by 1 meter grid to floors, walls (up to 2 meters), fume hoods, workbenches, shelves, drawers, and backsplash areas in impacted areas. This initial grid identifies initial survey locations for wipes, stationary measurements for total surface activity, and ambient exposure rate measurements. Additional locations should be included based on scan results and the surveyor's judgment (e.g., sinks, sink drains, floor drains, fume hood vents, and other locations where contamination might have accumulated). The final survey map should include at least 30 survey locations within each survey unit (i.e., typically an individual room).

Using the final survey map, the following three types of surveys should be performed and documented within each survey unit:

1. Surface scanning and stationary measurements for total activity (fixed + removable):

   Surfaces in impacted areas should be scanned for radioactivity at 100% coverage using a suitable survey meter with detector and audible alarm by carefully moving the detector as close as possible over the survey location at a distance not exceeding 1 cm and at a rate of approximately one detector width per second. Any location with elevated radioactivity (e.g., greater than two times background) should be marked on the survey map as additional survey

[1] Areas should be initially classified as impacted or non-impacted based on the Historical Site Assessment. Non-impacted areas are areas in which radioactive materials were never introduced, used, or stored, and have no reasonable potential for residual contamination and require no further evidence to demonstrate compliance with the release criterion.

location. In these locations, both a wipe sample and a timed (e.g., one-minute) stationary measurement (using a scalar type survey meter that can record total counts) should be taken.

Note: MARSSIM (Chapt. 2, Sect. 2.5.2) provides relief from 100% surface scanning by providing guidance for classifying impacted areas based on the potential level of residual radioactive material contamination relative to the established release criteria. The Historical Site Assessment may be used as a basis for making a classification. The classifications and associated best practices for scan surveys are shown in the following table.

Type	Area Description	Scan Survey Coverage
Class 1	Areas where residual contamination, prior to any remediation, is likely to exceed applicable unrestricted release criteria. Survey unit size is restricted to 100 m^2 or less.	100% area coverage
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Class 3	Areas where measurable levels of residual contamination are unlikely, with any levels being a small fraction (i.e., less than 1%) of the unrestricted release criteria. The survey unit has no area size limit.	At least 10% area coverage If any surveys reveal contamination above background levels, then the area should be reclassified as Class 1 or 2, depending on levels, and undergo additional scanning.

2. Wipe samples of surfaces for removable contamination:

Using the adjusted final survey map (adjusted to include elevated scan locations), wipes for removable radioactive contamination should be taken from each survey location by wiping a minimum 100 cm^2 area (e.g., using ~3.5 cm x ~3.5 cm filter paper and S-shaped pattern of approximately 40 cm in length) while applying moderate pressure to the wipe material at the survey location. Additional judgmental wipes should be taken from sinks, sink drains, floor drains, fume hood vents, vacuum line connections, and other areas where contamination could have accumulated. Wipes should be counted on an appropriate counter depending on radionuclides used in the area (e.g., liquid scintillation counter for beta emitters like H-3, C-14, P-32; NaI well-counter for photon emitters like Cr-51, I-125, and those found in nuclear medicine applications). In some cases, wipe samples may need to be counted first using a well counter and then by liquid scintillation.

3. Exposure rate measurements for external radiation:

Using the adjusted final survey map (adjusted to include elevated scan locations), exposure rate measurements should be made at each survey location at a distance of 1 meter above floor and/or other surfaces to provide a good estimate of potential external radiation exposure.

CLOSEOUT SURVEY DOCUMENTATION:

The following records should be maintained for closeout surveys:

1. Documentation of the historical site assessment, including facility and building plan views if applicable, list of radionuclides used, and basis for determining radionuclides of concern.

2. Criteria used for unrestricted release (i.e., contamination limits).

3. Make, model number, and serial number for all detectors used (note that many instruments have a separate set of numbers for the detector probe and the meter/reader; both number sets must be specified).

4. Minimum detectable activities (for fixed measurements, wipes, and scans) for detection methods.

5. Calibration records for instruments used with efficiencies for radionuclides of concern.

6. Discussion of daily instrument constancy checks.

7. Description of survey methods.

8. Results and discussion of following:

    a. Scanning surveys (indicate if any results were greater than two times background) (acceptable to discuss in units of cpm relative to background cpm).

    b. Stationary measurements for total surface activity (in units of dpm/100cm^2 at locations with elevated scan results).

    c. Wipe samples (in units of dpm/100cm^2).

    d. Exposure rate measurements (in units of mR/hr).

9. Survey maps showing survey locations in impacted areas being released.

10. Information on instrument sensitivity for radiations of concern (instrument backgrounds; instrument detection efficiencies for radiations of concern; minimum detectable activity in units of dpm/100 cm^2 for scanning and stationary measurements; minimum detectable activity for wipe counter).

11. Most recent results for any required leak tests for sealed sources.

12. Records of transfers of radioactive materials, associated with decommissioning efforts, to other licensees for disposal.

13. Statement certifying that the area to be released has been cleared of all containers of radioactive materials and that all radiological postings and labels have been or will be removed from the area and destroyed or otherwise obliterated pending approval to release area for unrestricted use.

14. The report or transmittal memorandum for the report should include a concluding statement that the area meets requirements in 10 CFR 20.1402 for release for unrestricted use. Note that these requirements also specify that residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA).

REFERENCE:

NHPP Closeout
Survey Methods '09

Prostate Brachytherapy Seed Location Review for 2008-2009 Patients

	Info Supplied by Lexington Clinic					Review by VA Radiologist	
Patient Name (see RSO file)	Date of Implant	# of Seeds Planned	# of Seeds Implanted	# of Seeds Outside TV	% Outside versus Plan	# of Seeds Outside TV	Location of Seeds Outside TV (>1cm outside of Treatment Area)
	02/12/08	63	63	0	0.0%	0	
	02/19/08	74	74	0	0.0%	0	
	03/18/08	76	77	1	1.3%	1	ANT INF, R at 1cm (edge of treatment) Prob O.K.
	04/11/08	72	76	5	6.9%	4	2 R POST SUP, 2 INF ANT R
	06/06/08	59	59	0	0.0%	0	
	11/14/08	81	81	1	1.2%	0	
	02/24/09	68	70	2	2.9%	2	1 ANT INF, 1 (L) INF ANT
	04/21/09	69	69	1	1.4%	0	
	06/09/09	71	73	1	1.4%	1	(L) medial seminal vesicle
	06/23/09	66	66	0	0.0%	0	
	09/29/09	79	79	2	2.5%	0	
	10/27/09	74	74	2	2.7%	0	

Treatment Volume (TV) is ~<1 cm outside of the Prostate Volume.

Prostate Brachytherapy Seed Location Review for 2008-2009 Patients

Patient Information		Prostate Brachytherapy Information Supplied by Lexington Clinic													VA Radiologist Independent Review
		Implant Information				Post Implant CT Information									Curtis Manning, M.D. Date of Review: 02/05/10
							Seeds Inside Treatment Volume			Seeds Outside Treatment Volume					
Patient Name (see RSO file)	Last 4 SS#	Date of Implant	# of Seeds Planned	# of Seeds Implanted	% Implanted versus Plan	Date of CT	# of Seeds Inside TV	% Inside versus Plan	% Inside versus Implanted	# of Seeds Outside TV	% Outside versus Plan	% Outside versus Implanted	% Inside + Outside versus Implanted	# of Seeds Outside TV	Location of Seeds Outside TV (i.e., ~>1cm outside of Prostate Volume)
		02/12/08	63	63	100.0%	03/12/08	63	100.0%	100.0%	0	0.0%	0.0%	100.0%	0	
		02/19/08	74	74	100.0%	03/20/08	74	100.0%	100.0%	0	0.0%	0.0%	100.0%	0	
		03/18/08	76	77	101.3%	04/17/08	76	100.0%	98.7%	1	1.3%	1.3%	100.0%	1	ANT INF, R at 1cm (edge of treatment) Prob O.K.
		04/11/08	72	76	105.6%	05/09/08	71	98.6%	93.4%	5	6.9%	6.6%	100.0%	4	2 R POST SUP, 2 INF ANT R
		06/06/08	59	59	100.0%	07/07/08	59	100.0%	100.0%	0	0.0%	0.0%	100.0%	0	
		11/14/08	81	81	100.0%	01/06/09	80	98.8%	98.8%	1	1.2%	1.2%	100.0%	0	
		02/24/09	68	70	102.9%	04/18/09	68	100.0%	97.1%	2	2.9%	2.9%	100.0%	2	1 ANT INF, 1 (L) INF ANT
		04/21/09	69	69	100.0%	05/21/09	68	98.6%	98.6%	1	1.4%	1.4%	100.0%	0	
		06/09/09	71	73	102.8%	07/14/09	72	101.4%	98.6%	1	1.4%	1.4%	100.0%	1	(L) medial seminal vesicle
		06/23/09	66	66	100.0%	07/29/09	66	100.0%	100.0%	0	0.0%	0.0%	100.0%	0	
		09/29/09	79	79	100.0%	11/04/09	77	97.5%	97.5%	2	2.5%	2.5%	100.0%	0	
		10/27/09	74	74	100.0%	12/01/09	72	97.3%	97.3%	2	2.7%	2.7%	100.0%	0	

Treatment Volume (TV) is ~<1 cm outside of the Prostate Volume.

MANAGEMENT OF RADIOACTIVE MATERIALS

1. REASON FOR ISSUE: This Veterans Health Administration (VHA) Directive establishes policies and assigns the actions to implement and maintain Nuclear Regulatory Commission (NRC) License No. 03-23853-01VA. ***NOTE:*** *NRC issued this master materials license to VHA on March 17, 2003.*

2. SUMMARY OF MAJOR CHANGES: The major changes in this Directive incorporate focus to a safety culture, oversight for facility-level Radiation Safety Committees, and undue reliance on affiliate universities or consultants.

3. RELATED ISSUES: None.

4. RESPONSIBLE OFFICE: The Office of Patient Care Services, National Health Physics Program Office (11/HP) is responsible for the contents of this Directive. Questions are to be directed to 501-257-1571 or e-mail address: vhconhpp@va.gov.

5. RESCISSIONS: VHA Directive 1105.1 dated September 22, 2004, is rescinded.

6. RECERTIFICATION: This Directive is scheduled for recertification on or before the last working day of October 2014.

Gerald M. Cross, MD, FAAFP
Acting Under Secretary for Health

DISTRIBUTION: E-mailed to the VHA Publication Distribution List 10/7/09

MANAGEMENT OF RADIOACTIVE MATERIALS

1. PURPOSE: This Veterans Health Administration (VHA) Directive establishes policies and assigns actions to implement and maintain the Nuclear Regulatory Commission (NRC) License No. 03-23853-01VA. ***NOTE:*** *NRC issued VHA a master materials license on March 17, 2003.*

2. BACKGROUND

a. NRC has regulatory authority for by-product radioactive materials as defined in applicable NRC regulations. Formerly, NRC issued individual licenses to Department of Veterans Affairs (VA) medical facilities to use by-product radioactive materials. Under the master materials license, VHA is authorized to issue individual permits to VA medical facilities; replacing previous NRC licenses.

b. The Under Secretary for Health is the named license official for the master materials license. The Under Secretary for Health establishes policies for the master materials license through VHA Directive 1105.01, and commitments in the master materials license application. The Under Secretary for Health provides oversight for the master materials license through the National Radiation Safety Committee (NRSC).

c. NRSC is the principal VA Central Office level organizational element to implement the master materials license. NRSC maintains and implements the master materials license through the National Health Physics Program (NHPP). NRSC operates under a committee charter and delegation of authority approved by the Under Secretary for Health.

d. NHPP directs the day-to-day implementation of the master materials license and coordinates NRSC activities. The NHPP Director is concurrently the VHA Radiation Control Program Officer and NRSC Executive Secretary.

3. POLICY: It is VHA policy to ensure the management of radioactive materials by implementing and maintaining NRC Master Materials License No. 03-23853-01VA.

4. ACTION

a. **Under Secretary for Health.** The Under Secretary for Health functions as the named master materials license official, establishes policies for the master materials license, provides a delegation of authority for the master materials license, assigns actions to implement and maintain the master materials license to achieve commitments in the license application and regulatory compliance by:

(1) Using NRC licensing and inspection criteria.

(2) Following consensus best practices for the safe use of radioactive materials.

(3) Maintaining potential exposure of ionizing radiation to workers and the public from radioactive materials to a level that is as low as reasonably achievable (ALARA).

b. **NRSC.** NRSC functions as the principal VA Central Office level organizational element to implement the master materials license. It is responsible for:

(1) Implementing and maintaining the master materials license.

(2) Completing actions under the committee charter using the delegation of authority.

(3) Providing management oversight through quarterly committee meetings.

(4) Preparing an annual report to the Under Secretary for Health based on a series of program assessments.

(5) Monitoring results of the core performance indicators.

(6) Evaluating significant programmatic actions (e.g., permitting, inspections and enforcement, response to incidents, and response to allegations).

(7) Maintaining the master materials license by periodically reviewing license policies and procedures, and if needed, submitting amendment requests for program changes to NRC.

(8) Reviewing, evaluating, and taking appropriate programmatic actions to protect worker and patient health and safety from other types of ionizing radiation, such as machine sources.

c. **NHPP Director.** The NHPP Director (the overall programmatic organizational element to implement and maintain the master materials license) who functions concurrently as the Radiation Control Program Officer for the master materials license and Executive Secretary for the NRSC, is responsible for:

(1) Serving as the principal VA Central Office level advisor on policies and procedures for the master materials license.

(2) Directing the day-to-day implementation of the master materials license, such as: permitting, inspections and enforcement, response to incidents and response to allegations.

(3) Coordinating NRSC activities under the supervision of the committee chairperson and as authorized by the delegation of authority.

(4) Developing policy and program guidelines for the master materials license and other uses of ionizing radiation.

d. **Medical Facility Directors.** Medical facility directors with a master materials license permit, function as the responsible official to ensure safe use of radioactive materials and regulatory compliance by:

(1) Establishing and implementing radiation safety practices and procedures commensurate with the radioactive materials scope of use.

(2) Providing executive management oversight to ensure protection of the health and safety of workers, the public, and environment, and to achieve regulatory compliance under the master materials license permit with a focus to a safety culture.

(3) Assigning staff with sufficient authority and resources to implement the radiation safety practices and procedures. Establishing a Radiation Safety Committee and ensuring approval and continuous coverage by a Radiation Safety Officer.

(4) Complying with master materials license permit commitments, conditions, and applicable regulations.

(5) Requiring research protocols that require the use of ionizing radiation as part of the research, be reviewed by the Radiation Safety Committee and other appropriate committees and subcommittees (e.g., Research and Development Committee, Institutional Review Board, Institutional Animal Care and Use Subcommittee, Subcommittee on Research Safety) in accordance with VHA Handbook 1200.01. ***NOTE:*** *See Section 4. e. (16) below for requirements if the research only requires the use of the results of tests using ionizing radiation that has been conducted for medical care purposes only.*

(6) Reporting to NHPP any incidents or medical events exceeding dose limits or contamination limits, unauthorized disposals or missing radioactive materials, or any significant program deficiencies.

(7) Routing amendment requests or other programmatic information to NHPP at:

National Health Physics Program (115HP/NLR)
Department of Veterans Affairs
Veterans Health Administration
2200 Fort Roots Drive, Bldg 101, Room 208
North Little Rock, AR 72114

(8) Ensuring radiation workers and other workers and staff have information and assistance, as needed, to report safety concerns, engage in other protected activities, and have a safety conscious work environment.

(9) Notifying NHPP when the medical facility is inspected, or otherwise contacted by NRC.

(10) Notifying NHPP when the medical facility is contacted by an Agreement State or other regulatory authority regarding the use of radioactive materials.

(11) Avoiding undue reliance on affiliate universities or consultants.

e. **Radiation Safety Committee and Radiation Safety Officer.** The Radiation Safety Committee and Radiation Safety Officer function together to support the Director and take all actions necessary to ensure the safe use of radioactive materials and regulatory compliance. In the usual organizational arrangements, the Radiation Safety Officer completes day-to-day actions with oversight by the Radiation Safety Committee. Overall, the actions by the Radiation Safety Committee and Radiation Safety Officer must include, but not be limited to:

(1) Providing oversight for the safe use of radioactive materials with a focus to ensure occupational and public doses are ALARA and a safety conscious work environment is achieved.

(2) Establishing committee membership to include the Radiation Safety Officer, a management representative, a representative for each type of authorized use and a representative from Nursing Service.

(3) Holding meetings at intervals not to exceed 6 calendar months; and establishing a committee quorum of at least one-half of committee membership for meetings which must include the Radiation Safety Officer and management representative.

(4) Preparing records and reporting committee results as required by executive management and/or Title 10 Code of Federal Regulations (CFR), Part 35; and ensuring the records document executive management approvals for actions under 10 CFR 35 (e.g., 35.24 and 35.26).

(5) Coordinating with other medical facility committees as needed, and reporting results of committee meetings to executive management or other medical facility oversight committees.

(6) Completing or providing oversight for the radiation safety program through periodic reviews and audits, to include:

(a) Annual radiation safety program review per 10 CFR 20.1101, to include locations of use with emphasis on decommissioning records per 10 CFR 30.

(b) Reviews or audits as needed based on the radioactive materials scope of use.

(c) Evaluation of results from audits, reviews and inspections to determine possible generic issues or trends. Identify root causes, specify corrective actions and actions to prevent recurrence, and determine if any results are applicable to other uses of radioactive materials.

(d) Distribution of results of audits, reviews and inspections to all work centers and availability to the staff working with or around radioactive materials.

(e) Oversight and follow-up to resolve health and safety issues and radiation safety program deviations as needed.

(f) Evaluation of possible undue reliance on affiliate universities or consultants.

(7) Reviewing, at least every 6 months, occupational and public doses.

(8) Reviewing, at least every 6 months, any identified health and safety issues or possible radiation safety program deviations from regulatory compliance or required practices.

(9) Reviewing and approving training and experience for prospective Radiation Safety Officers, authorized users and other staff requiring regulatory approval.

(10) Reviewing and approving proposed changes to training, equipment, facilities and radiation safety procedures or practices.

(11) Ensuring sealed source inventories are completed:

(a) Quarterly, for sealed sources with either current activity greater than 1 millicurie or current activity greater than 1000 times the quantities in 10 CFR 20, Appendix C.

(b) Semiannually, for all other sealed sources except sources specifically exempted by 10 CFR 30

(12) Ensuring sealed source records are maintained for transfer or disposition to document leak test results, if the sealed source was required by regulation or permit condition to have a leak test.

(13) Providing results if requested, for sealed source inventories and leak tests to NHPP.

(14) Providing oversight for security of radioactive materials by:

(a) Compliance with regulations per 10 CFR 20.1801, 10 CFR 20.1802 and 10 CFR 37 (when issued).

(b) Prevention of adversary or unauthorized removal of radioactive materials.

(c) Compliance with the security guidelines in VHA Handbook 1200.06.

(d) Focusing on adequate security commensurate with possible risks of radioactive materials unauthorized use.

(15) Classifying sealed sources, not in active use for their intended clinical or research purpose for a period of 24 months, as disused sources and evaluating the disused sources for disposal as expeditiously as possible.

(16) Reviewing and evaluating human subject research by:

(a) Compliance with regulations per 10 CFR 35.6 for radioactive materials use in human subject research.

(b) Compliance with guidelines for obtaining and documenting research informed consent as required by VHA Handbook 1200.05.

(17) Using NRC documents (NUREG-1556 series) as guidance to prepare and submit requests for new, renewed, or amended permits.

(18) Restricting radiation safety program implementation to be consistent with the program codes (i.e., whether broad-scope or limited-scope medical or research uses) and permitting conditions approved for the permittee.

(19) Ensuring approvals for authorized users and locations of use (except as authorized per 10 CFR 35.14) are limited to broad-scope permittees.

(20) Ensuring compliance with posting requirements per 10 CFR 19 and 10 CFR 21.6, as in the following:

(a) VHA Radioactive Material Permit No. [insert specific permit number] issued under VHA NRC License No. 03-23853-01VA authorizes the use of radioactive materials at this location. Contact [insert Radiation Safety Officer name] at [insert location information such as room number, mail stop, or telephone number] to examine the permit and supporting documents.

(b) VHA license, amendments, and supporting application are available for examination by contacting NHPP at 501-257-1571, or at mailing address NHPP (115HP/NLR), Bldg 101, Room 208, 2200 Fort Roots Drive, North Little Rock, AR 72114.

(21) Providing information to workers at the various locations of use or work centers, especially satellite locations of use, on current radiation safety program and regulatory issues, as needed, using NHPP Intranet Web site, periodic newsletters, and other information resources made available to permittees.

5. REFERENCES

a. Title 10 CFR 19-21, 30-33, 35, 37 (when issued), and 71.

b. Title 49 CFR 100 to 177.5.

c. VHA Handbook 1200.01.

d. VHA Handbook 1200.05.

e. VHA Handbook 1200.06.

VA MEDICAL CENTER
LEXINGTON, KENTUCKY

MEMORANDUM NO. 00-27
OCTOBER 24, 2007

RADIATION SAFETY COMMITTEE

1. PURPOSE: To delegate responsibilities and define membership of the Radiation Safety Committee (RSC) at the Lexington VA Medical Center.

2. POLICY: This VA Medical Center will have a hospital wide committee, which will oversee the radiation safety program.

3. RESPONSIBILITIES: The Radiation Safety Committee functions in conjunction with the Radiation Safety Officer to support the Director and ensure the safe use of radioactive materials and regulatory compliance. The committee's responsibilities are as follows:

a. Provides oversight for the safe use of radioactive materials to ensure occupational and public doses are as low as reasonably achievable (ALARA).

b. Establishes committee membership to include the Chair, Radiation Safety Officer, a management representative, a representative for each type of authorized use including Research Service, and a representative from Patient Care Services.

c. Holds meetings that are scheduled on a recurring date during each quarter that is set by the committee. These meetings must have a quorum present of at least one-half of the committee membership and must include the Chair (or designee), Radiation Safety Officer and a management representative (or designee). If a meeting is rescheduled or canceled, meeting intervals must not exceed 6 calendar months.

d. Prepares records and reporting committee results as required by executive management and/or Title 10 Code of Federal Regulations (CFR) 35; and ensures the records document executive management approvals for actions under 10 CFR 35 (e.g., 35.24 and 35.26).

e. Coordinates with other medical center committees (e.g., Environment of Care, Research committees), as needed.

f. Completes and/or provides oversight for the Radiation Safety Program through periodic reviews and audits, to include:

(1) Annual radiation safety program review per 10 CFR 20.1101 to include locations of use with emphasis on decommissioning records per 10 CFR 30.

(2) Reviews and/or audits, as needed, based on the radioactive materials scope of uses.

(3) Evaluates results from audits, reviews, and inspections to determine possible generic issues or trends, identify root causes, specify corrective actions and actions to prevent recurrence, and determine if any results are applicable to other uses of radioactive materials.

(4) Distributes the results of audits, reviews, and inspections to all work centers and makes available to the staff working with, or around, radioactive materials.

(5) Oversees and follows up on resolutions of health and safety issues, and radiation safety program deviations, as needed.

g. Reviews at least every 6 months, occupational and public doses.

h. Reviews at least every 6 months, any identified health and safety issues or possible radiation safety program deviations from regulatory compliance or required practices.

i. Reviews and approves training and experience for prospective Radiation Safety Officers, authorized users, and/or other staff requiring regulatory approval.

j. Reviews and approves proposed changes to training, equipment, facilities, and radiation safety procedures or practices.

k. Ensures sealed source inventories are completed:

(1) Quarterly, for sealed sources with either current activity greater than one millicurie or current activity greater than 1000 times the quantities in 10 CFR 20, Appendix C

(2) Semiannually, for all other sealed sources, except sources specifically exempted by CFR 30.

l. Ensures sealed source records are maintained for transfer or disposition to document leak test results, if the sealed source was required by regulation or permit condition to have leak testing.

m. Provides results for sealed source inventories and leak tests to the NHPP, if requested.

n. Provides oversight for security of radioactive materials by:

(1) Compliance with regulations per 10 CFR 20.1801 and 10 CFR 20.1802.

(2) Prevention of adversary or unauthorized removal of radioactive materials.

(3) Compliance with the security guidelines in VHA Handbook 1200.06.

(4) Focusing on adequate security commensurate with possible risks of radioactive materials unauthorized use.

o. Classifies sealed sources, not in active use for their intended clinical or research purpose for a period of 24 months, as disused sources and evaluates the disused sources for disposal as expeditiously as possible.

p. Reviews and evaluates human subject research by:

(1) Complying with regulations per 10 CFR 35.6 for radioactive materials use in human subject research.

(2) Complying with guidelines for obtaining and documenting research informed consent as required by VHA Handbook 1200.5.

(3) Coordinating with the IRB to ensure that for research requiring the use of ionizing radiation, the consent process and the written informed consent document informs the research subject about the study requirement for such a test and the risks associated with the tests. For research involving the use of test results where the test uses ionizing radiation and is conducted solely for medical care purposes, that the consent process and the written informed consent document informs the research subject that the test is not required for the research and only the results will be used.

q. Uses the Nuclear Regulatory Commission documents (NUREG-1556 series) as guidance to prepare and submit requests for new, renewed, or amended permits.

r. Restricts radiation safety program implementation to be consistent with the program codes (i.e., whether broad-scope or limited-scope medical or research uses) and permits conditions approved for the permittee.

s. Ensures approvals for authorized users and locations of use (except as authorized per 10 CFR 35.14) are limited to broad-scope permittee.

t. Ensures compliance with posting requirements per 10 CFR 19 and 21.6, as in the following:

(1) VHA Radioactive Material Permit No. 16-08896-04 issued under VHA Nuclear Regulatory Commission License No. 03-23853-01VA authorizes the use of radioactive materials at this location. Contact [*current Radiation Safety Officer's name*] at [*insert current location information such as room number, mail stop, or telephone number*] to examine the permit and supporting documents.

(2) VHA license, amendments, and supporting application available for examination by contacting the NHPP at (501) 257-1571, or at mailing address NHPP (115HP/NLR), Bldg 101, Room 208, 2200 Fort Roots Drive, North Little Rock, AR 72114.

u. Provides information to workers at the various locations of use or work centers, especially satellite locations of use, on current radiation safety program and regulatory issues, as needed, using the NHPP intranet Web site, periodic newsletters, and other information resources made available to permittees.

4. PROCEDURES:

a. The Chair, Radiation Safety Committee, and Radiation Safety Officer will have stop work authority and direct access to the director.

b. The minutes of each meeting will be recorded and sent to the Medical Center Director for approval through the Committee Chair and the Associate Director. After the Director's approval, the minutes will be reported to the Environment of Care Committee for review. The minutes will be distributed to the Committee members, Chair of the Environment of Care Committee, Chief of Staff, Chief of Nuclear Medicine, and the ACOS/Research.

c. Membership:
Radiation Safety Officer
Member from Management
Member from Nuclear Medicine Service (physician, Clinical authorized user)

Member from Nuclear Medicine Service (technical staff)
Member from Patient Care Services
Member from Research Service (research authorized user)
Member from a clinical service involved with non-radioactive ionizing radiation (physician)
Member from a clinical service involved with non-radioactive ionizing radiation (technical staff)
NAGE Safety Officer
(Names of actual members and appointments by the Director will be on file in the Radiation Safety Office.)

5. REFERENCES: VHA Directive 1105.1, Title 10 Code of Federal Regulations, VHA Permit number 16-08896-04, NUREG-1556 Volumes 7, 9, and 11.

6. RESCISSION: This memorandum rescinds Medical Center Memorandum No. 115-01, dated July 30, 2004 and will be due for review by October 24, 2010 in accordance with procedures in Medical Center Memorandum 001-01.

Sandy J. Nielsen
Director
VAMC Lexington

VA MEDICAL CENTER
LEXINGTON, KENTUCKY

MEMORANDUM NO. 00-27
OCTOBER 24, 2007
??, 2010

RADIATION SAFETY COMMITTEE

1. PURPOSE: To delegate responsibilities and define membership of the Radiation Safety Committee (RSC) at the Lexington VA Medical Center.

2. POLICY: This VA Medical Center will have a hospital wide committee, which will oversee the radiation safety program.

3. RESPONSIBILITIES: The Radiation Safety Committee functions in conjunction with the Radiation Safety Officer to support the Director and ensure the safe use of radioactive materials and regulatory compliance. The committee's responsibilities are as follows: The Radiation Safety Committee and Radiation Safety Officer function together to support the Director and take all actions necessary to ensure the safe use of radioactive materials and regulatory compliance. In the usual organizational arrangements, the Radiation Safety Officer completes day-to-day actions with oversight by the Radiation Safety Committee. Overall, the actions by the Radiation Safety Committee and Radiation Safety Officer must include, but not be limited to:

a. Provides oversight for the safe use of radioactive materials to ensure occupational and public doses are as low as reasonably achievable (ALARA). Provides oversight for the safe use of radioactive materials with a focus to ensure occupational and public doses are ALARA and a safety conscious work environment is achieved.

b. Establishes committee membership to include the Chair, Radiation Safety Officer, a management representative, a representative for each type of authorized use including Research Service, and a representative from Patient Care Services.

c. Holds meetings that are scheduled on a recurring date during each quarter that is set by the committee. These meetings must have a quorum present of at least one-half of the committee membership and must include the Chair (or designee), Radiation Safety Officer and a management representative (or designee). If a meeting is rescheduled or canceled, meeting intervals must not exceed 6 calendar months.

d. Prepares records and reporting committee results as required by executive management and/or Title 10 Code of Federal Regulations (CFR) 35; and ensures the records document executive management approvals for actions under 10 CFR 35 (e.g., 35.24 and 35.26).

e. Coordinates with other medical center committees (e.g., Environment of Care, Research committees), as needed. Coordinates with other medical center committees/councils (e.g., Environment of Care Council, Research committees, GEMS, Emergency Management) as needed, and reports results of committee meetings to executive management or other medical center oversight committees/councils (e.g., Environment of Care Council).

f. Completes and/or provides oversight for the Radiation Safety Program through periodic reviews and audits, to include:

(1) Annual radiation safety program review per 10 CFR 20.1101 to include locations of use with emphasis on decommissioning records per 10 CFR 30.

(2) Reviews and/or audits, as needed, based on the radioactive materials scope of uses.

(3) Evaluates results from audits, reviews, and inspections to determine possible generic issues or trends, identify root causes, specify corrective actions and actions to prevent recurrence, and determine if any results are applicable to other uses of radioactive materials.

(4) Distributes the results of audits, reviews, and inspections to all work centers and makes available to the staff working with, or around, radioactive materials.

(5) Oversees and follows up on resolutions of health and safety issues, and radiation safety program deviations, as needed.

g. Reviews at least every 6 months, occupational and public doses.

h. Reviews at least every 6 months, any identified health and safety issues or possible radiation safety program deviations from regulatory compliance or required practices.

i. Reviews and approves training and experience for prospective Radiation Safety Officers, authorized users, and/or other staff requiring regulatory approval.

j. Reviews and approves proposed changes to training, equipment, facilities, and radiation safety procedures or practices.

k. Ensures sealed source inventories are completed:

(1) Quarterly, for sealed sources with either current activity greater than one millicurie or current activity greater than 1000 times the quantities in 10 CFR 20, Appendix C

(2) Semiannually, for all other sealed sources, except sources specifically exempted by CFR 30.

l. Ensures sealed source records are maintained for transfer or disposition to document leak test results, if the sealed source was required by regulation or permit condition to have leak testing.

m. Provides results for sealed source inventories and leak tests to the NHPP, if requested.

n. Provides oversight for security of radioactive materials by:

(1) Compliance with regulations per 10 CFR 20.1801, and 10 CFR 20.1802, and 10 CFR 37 (when issued).

(2) Prevention of adversary or unauthorized removal of radioactive materials.

(3) Compliance with the security guidelines in VHA Handbook 1200.06.

(4) Focusing on adequate security commensurate with possible risks of radioactive materials unauthorized use.

o. Classifies sealed sources, not in active use for their intended clinical or research purpose for a period of 24 months, as disused sources and evaluates the disused sources for disposal as expeditiously as possible.

p. Reviews and evaluates research protocols by:

(1) Complying with regulations per 10 CFR 35.6 for radioactive materials use in human subject research.

(2) Complying with guidelines for obtaining and documenting research informed consent as required by VHA Handbook 1200.5.

(3) Coordinating with the IRB to ensure that for research requiring the use of ionizing radiation, the consent process and the written informed consent document informs the research subject about the study requirement for such a test and the risks associated with the tests. For research involving the use of test results where the test uses ionizing radiation and is conducted solely for medical care purposes, that the consent process and the written informed consent document informs the research subject that the test is not required for the research and only the results will be used.

q. Uses the Nuclear Regulatory Commission documents (NUREG-1556 series) as guidance to prepare and submit requests for new, renewed, or amended permits.

r. Restricts radiation safety program implementation to be consistent with the program codes (i.e., whether broad-scope or limited-scope medical or research uses) and permits conditions approved for the permittee.

s. Ensures approvals for authorized users and locations of use (except as authorized per 10 CFR 35.14) are limited to broad-scope permittee.

t. Ensures compliance with posting requirements per 10 CFR 19 and 21.6, as in the following:

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u. Provides information to workers at the various locations of use or work centers, especially satellite locations of use, on current radiation safety program and regulatory issues, as needed, using the NHPP intranet Web site, periodic newsletters, and other information resources made available to permittees.

4. PROCEDURES:

a. The Chair, Radiation Safety Committee, and Radiation Safety Officer will have stop work authority and direct access to the Director.

b. The minutes of each meeting will be recorded and sent to the Medical Center Director for approval through the Committee Chair and the Associate Director. After the Director's approval, the minutes will be reported to the Environment of Care Committee Council for review. The minutes will be distributed to the Committee members, Chair of the Environment of Care Committee Council, Chief of Staff, Chief of Nuclear Medicine, and the ACOS/Research.

c. Membership:

Radiation Safety Officer
Member from Management
Member from Nuclear Medicine Service (physician, Clinical authorized user)
Member from Nuclear Medicine Service (technical staff)
Member from Patient Care Services
Member from Research Service (research authorized user)
Member from a clinical service involved with non-radioactive ionizing radiation (physician)
Member from a clinical service involved with non-radioactive ionizing radiation (technical staff)
NAGE Safety Officer
(Names of actual members and appointments by the Director will be on file in the Radiation Safety Office.)

5. REFERENCES: VHA Directive 1105.1, Title 10 Code of Federal Regulations, VHA Permit number 16-08896-04, NUREG-1556 Volumes 7, 9, and 11.

6. RESCISSION: This memorandum rescinds Medical Center Memorandum No. 115-01, dated July 30, 2004 OCTOBER 24, 2007 and will be due for review by October 24, 2010 ??, 2013 in accordance with procedures in Medical Center Memorandum 001-01.

Sandy J. Nielsen, FACHE
Director
VAMC Lexington

Reason for Request: MRI C SPINE W & W/O CONTRAST(FURTHER SEQUENCES)

PRIOR EXAMS:

Date	Procedure	CPT	Status	Case #
02/16/2010	MRI C SPINE W/O CONTRAST	72141	Verified	133
	Degenerative changes and degenerative disc disease producing			

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Deficiency Summary

Click on the highlighted area links below for more information concerning these deficiencies via the area trending and/or detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
Nuclear Medicine Service									
1. Daily Radiation Surveys:									
# of times surveys greater than trigger level	D	2	2	0	1	1.3	5	*6.8*	*27*
4. Daily Dose Calibrator (DC) Constancy Checks (2 dose calibrators):									
# of times constancy checks not performed daily if used for pts as required	D	0	0	0	1	0.3	1	*0.0*	*0*
18. Quarterly Review of Out-going Radionuclide/Return Package Records:									
# of in-coming shipments from local radiopharmacy that did not have out-going documentation	D	0	1	2	4	1.8	7	*0.0*	*0*
Research Service									
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*	*N/A*
Radiographic-Fluoroscopic Use									
2. Patient radiation dose from Interventional Fluoroscopy (Specials B180):									
# of these exams with total dose ≥ 3 Gy but < 10 Gy	D	0	0	1	1	0.5	2	*N/A*	*1 Dec Only*
3. Patient radiation dose from Cardiac Cath (A233 & A235):									
# of these exams with estimated dose ≥ 3 Gy but < 10 Gy	D	45	51	61	62	54.8	219	*N/A*	*14 Dec Only*
# of these exams with estimated dose ≥ 10 Gy but < 15 Gy	D	0	0	0	2	0.5	2	*N/A*	*0 Dec Only*
ALARA-Radiation Exposure									
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*	*N/A*

D = Discrepancy/Problem Indicator V = Volume Indicator

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Notable Changes & Updates

Click on the highlighted area links below for more information concerning these notable changes & updates via the area trending and/or detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
Nuclear Medicine Service									
3. Mo-99/Tc-99m Assays (discontinued use in June 2008 due revised USP <797>): * Mo-99/Tc-99m generators are not currently being used; therefore, this audit item will be dropped in 2010.					* (see detailed audit)				
21. Radiation Safety Improvements and/or Additional Comments/Problems:									
Updated required annual radiation safety training (e.g., added slides & questions, electronic test with question hint slides & % correct)	N/A	N/A	N/A	N/A	in Oct/Nov	N/A	in Oct/Nov	*N/A*	*N/A*
Restocked replacement items in the radiation spill kit and setup updated mini-radiation spill kits that were later distributed in January	N/A	N/A	N/A	N/A	in Dec	N/A	in Dec	*N/A*	*in Dec*
Research Service									
16. Radiation Safety Improvements and/or Additional Comments/Problems:									
Added annual radiation safety training for research administrative staff	N/A	N/A	N/A	N/A	in Nov	N/A	in Nov	*N/A*	*N/A*
Radiographic-Fluoroscopic Use									
N/A	N/A	N/A	N/A			N/A	N/A	*N/A*	*N/A*
ALARA-Radiation Exposure									
1. Personnel Exposure Records/ALARA Investigational Levels (see below):									
A. Radioactive Materials Use:									
b) # of times ALARA Quarterly Investigational Level I (10% of ¼ annual limit) was exceeded	D	0	0	0	0	0.0	0	*1.75*	*7*
B. Radiographic-Fluoroscopic Use:									
b) # of times ALARA Quarterly Investigational Level I (10% of ¼ annual limit) was exceeded	D	2	0	1	0	0.8	3	*2.5*	*10*
4. Quarterly Area Monitors Involving Radioactive Materials:									
NM2 monitor - wall in main hallway outside Nuclear Medicine (i.e., outer wall of hot lab) qtrly total in mrem	V	8	6	10	1	6.3	25	*17.8*	*71*
# of area monitors with readings > 100 mrem for the current calendar year (i.e., 2009)	D	N/A	N/A	N/A	0	N/A	0	*N/A*	*0*
6. Radiation Safety Improvements and/or Additional Comments/Problems:									
Compliant with NRC's constraint of radioactive air effluents for the current calendar year (i.e., 2009)	N/A	N/A	N/A	N/A	in 2009	N/A	N/A	*N/A*	*in 2008*

D = Discrepancy/Problem Indicator V = Volume Indicator

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Nuclear Medicine Service

Click on the links to the right for the detailed Quarterly Nuclear Medicine Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	2008 Qtrly Average	2008 Total
1. Daily Radiation Surveys:									
# of times surveys not performed daily as required	D	0	0	0	0	0.0	0	0.3	1
# of times surveys greater than trigger level	D	2	2	0	1	1.3	5	6.8	27
By area: Hot Lab	D	0	0	0	0	0.0	0	0.0	0
Imaging Room	D	0	2	0	1	0.8	3	3.8	15
Within the Imaging Room - in regular trash and/or non-radioactive sharps	D	0	1	0	1	0.5	2	1.5	6
Injection Room	D	2	0	0	0	0.5	2	3.0	12
Within the Injection Room - on injection table pad	D	1	0	0	0	0.3	1	2.8	11
# of times appropriate action was not taken to decrease levels below trigger level	D	0	0	N/A	0	0.0	0	0.0	0
2. Weekly Radiation Wipes:									
# of times wipes not performed weekly as required	D	0	0	0	0	0.0	0	0.0	0
# of times wipes greater than trigger level	D	2	1	1	0	1.0	4	1.3	5
By area: Hot Lab	D	1	1	0	0	0.5	2	0.8	3
Imaging Room	D	1	0	1	0	0.5	2	0.3	1
Injection Room	D	0	0	0	0	0.0	0	0.3	1
# of times appropriate action was not taken to decrease levels below trigger level	D	0	0	0	N/A	0.0	0	0.0	0
3. Mo-99/Tc-99m Assays (discontinued use in June 2008 due revised USP <797>):					* (see detailed audit)				
* Mo-99/Tc-99m generators are not currently being used; therefore, this audit item will be dropped in 2010									
# of times Mo-99m/Tc-99m assays not performed for each pt.-use elution	D	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0
# of times Mo-99m/Tc-99m concentration not within limits	D	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0
# of Tc-99m elutions	V	N/A	N/A	N/A	N/A	N/A	N/A	67.0	134
Total Tc-99m activity in mCi from all elutions	V	N/A	N/A	N/A	N/A	N/A	N/A	51,786.4	103,572.7
4. Daily Dose Calibrator (DC) Constancy Checks (2 dose calibrators):									
# of times constancy checks not performed daily if used for pts as required	D	0	0	0	1	0.3	1	0.0	0
# of times constancy checks on non-Tc-99m DC not performed daily but not used for patients	D	0	1	0	0	0.3	1	0.8	3
# of times constancy checks on non-Tc-99m DC incompletely performed but not used for patients	D	0	0	0	0	0.0	0	0.5	2
# of times quarterly full constancy check not performed	D	0	0	0	0	0.0	0	0.0	0
# of times constancy checks not within limits	D	0	0	0	0	0.0	0	0.0	0
5. Quarterly Dose Calibrator Linearity Checks (2 dose calibrators):									
# of times linearity checks not performed quarterly/post repair as required	D	0	0	0	0	0.0	0	0.0	0
# of times linearity checks not within limits	D	0	0	0	0	0.0	0	0.0	0
6. Annual Dose Calibrator Accuracy Checks (2 dose calibrators):									
# of times accuracy checks not performed annually (Sep)/post repair as required	D	N/A	N/A	0	N/A	0.0	0	0.0	0
# of times accuracy checks not within limits	D	N/A	N/A	0	N/A	0.0	0	0.0	0
7. Dose Calibrator Geometry Checks (2 dose calibrators):									
# of times geometry checks not performed post repair as required	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
# of times geometry checks not within limits	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8. Daily Thyroid Probe/Well & Multi-Well Counters Constancy Checks:									
# of times constancy checks not performed daily (i.e., when used) as required	D	0	0	0	0	0.0	0	0.0	0
# of times constancy checks not within limits	D	0	0	0	0	0.0	0	0.0	0
9. Quarterly Thyroid Probe/Well Counter & Multi-Well Counter Checks:									
# of times quarterly checks not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of times quarterly checks not within limits	D	0	0	0	0	0.0	0	0.0	0
10. Monthly Xenon Machine Quality Control Checks:									
# of times monthly/quarterly quality control checks not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of times quality control checks not within limits	D	0	0	0	0	0.0	0	0.3	1

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Nuclear Medicine Service

Click on the links to the right for the detailed Quarterly Nuclear Medicine Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	2008 Qtrly Average	2008 Total
11. Semi-Annual Air Flow Measurements (AFM) & Xenon Spill Clearance Time Calculations/ Annual Fume Hood Certification									
# of times semi-annual (Jun & Dec) AFM not performed as required	D	N/A	0	N/A	0	0.0	0	0.0	0
# of times imaging room & hot lab found not to be under negative pressure based on above AFM	D	N/A	0	N/A	0	0.0	0	0.0	0
# of times smoke test did not confirm that the room was under negative pressure	D	N/A	0	N/A	0	0.0	0	0.0	0
# of times Xenon spill clearance times not calculated and not posted for above AFM	D	N/A	0	N/A	0	0.0	0	0.0	0
# of times annual (Feb) fume hood certification not performed as required	D	0	N/A	N/A	N/A	0.0	0	0.0	0
# of times fume hood sash level not noted for above certification	D	0	N/A	N/A	N/A	0.0	0	0.0	0
12. Annual Survey Meter Calibrations:									
# of times annual calibration (Mar)/post repair not performed as required	D	0	N/A	N/A	N/A	0.0	0	0.0	0
# of survey meters calibrated	V	6	N/A	N/A	N/A	6.0	6	3.5	7
13. Quarterly/Annual Radionuclide Sealed Source Inventory:									
# of times quarterly inventories not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of unaccounted for sealed sources	D	0	0	0	0	0.0	0	0.0	0
# of sealed sources on inventory	V	138	137	137	137	137.3	N/A	136.0	N/A
# of sealed sources added to inventory during the quarter (may/may not be in above total due to when received)	V	0	0	0	0	0.0	0	0.3	1
# of sealed sources removed from inventory during the quarter (may/may not be in above total due to when shipped)	V	1	0	0	0	0.3	1	1.5	6
# of times monthly check of Cs-137 calibration source not performed	D	0	0	0	0	0.0	0	0.0	0
# of times annual (Mar) NHPP sealed source verification not performed as required	D	0	N/A	N/A	N/A	N/A	0	N/A	0
# of sealed sources on NHPP inventory	V	2	N/A	N/A	N/A	N/A	2	N/A	4
14. Semi-Annual Radionuclide Sealed Source Leak Testing:									
# of times semi-annual (Jan & Jul) leak test not performed as required	D	0	N/A	0	N/A	0.0	0	0.0	0
# of sealed sources leak tested	V	4	N/A	3	N/A	3.5	N/A	6.0	N/A
# of leak tests with leakage detected above required limits	D	0	N/A	0	N/A	0.0	0	0.0	0
15. Reportable or Recordable Events/Incidents:									
# of times a reportable or recordable event/incident occurred	D	0	0	0	0	0.0	0	0.0	0
16. Reported Radioactive Spills:									
# of times a reported radioactive spill occurred	D	1	0	0	0	0.3	1	0.3	1
# of times appropriate action to the spill was not taken	D	0	0	0	0	0.0	0	0.0	0
17. Quarterly Review of In-coming Radionuclide Receiving Records:									
# of times receiving records were missing pertinent info (e.g., survey/wipe results)	D	1	0	0	0	0.3	1	0.0	0
# of times package receiving problems noted (e.g., contamination, wrong material)	D	6	0	0	0	1.5	6	0.8	3
Total # of in-coming shipments (note some non-Tc-99m may be included within Tc-99m shipments - see detailed audit)	V	200	237	195	204	209.0	836	132.5	530
# of in-coming shipments noted above that were from the local radiopharmacy	V	181	192	159	183	178.8	715	107.5	430
# of C-14 in-coming shipments	V	0	0	0	0	0.0	0	0.3	1
# of C-14 in-coming shipments noted above that were from the local radiopharmacy	V	0	0	0	0	0.0	0	0.3	1
Total C-14 activity in mCi contained in the above shipments	V	0.000	0.000	0.000	0.000	0.0000	0.000	0.0005	0.002
# of Co-57 in-coming shipments	V	0	0	0	0	0.0	0	0.3	1
Total Co-57 activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	3.8	15.0
# of Ga-67 in-coming shipments	V	1	0	2	0	0.8	3	2.0	8
# of Ga-67 transfers from UK (i.e., not included as a shipment)	V	0	0	0	0	0.0	0	0.3	1
Total Ga-67 activity in mCi contained in the above shipments/transfers	V	12.2	0.0	31.7	4.0	12.0	47.9	27.3	109.3
# of I-123 in-coming shipments	V	0	0	0	0	0.0	0	0.3	1
Total I-123 activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Nuclear Medicine Service

Click on the links to the right for the detailed Quarterly Nuclear Medicine Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	2008 Qtrly Average	2008 Total
# of I-131 (C = capsule) in-coming shipments	V	10	5	2	4	5.3	21	10.8	43
# of I-131 (C) in-coming shipments noted above that were from the local radiopharmacy	V	10	5	2	4	5.3	21	10.8	43
Total I-131 (C) activity in mCi contained in the above shipments	V	304.2	175.6	19.5	39.9	134.8	539.2	260.4	1,041.5
# of I-131 (S = solution) in-coming shipments	V	0	0	0	0	0.0	0	0.3	1
# of I-131 (S) in-coming shipments noted above that were from the local radiopharmacy	V	0	0	0	0	0.0	0	0.3	1
Total I-131 (S) activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.1
# of In-111 in-coming shipments	V	1	5	3	3	3.0	12	1.0	4
# of In-111 in-coming shipments noted above that were from the local radiopharmacy	V	1	1	2	2	1.5	6	0.8	3
Total In-111 activity in mCi contained in the above shipments	V	6.5	11.8	3.2	8.9	7.6	30.4	3.2	12.8
# of Mo-99 in-coming shipments	V	0	0	0	0	0.0	0	5.5	22
Total Mo-99 activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	10,080.0	40,320.0
# of Sm-153 in-coming shipments	V	0	0	0	0	0.0	0	0.5	2
Total Sm-153 activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	54.9	219.5
# of Tc-99m in-coming shipments	V	168	192	151	176	171.8	687	94.0	376
# of Tc-99m in-coming shipments noted above that were from the local radiopharmacy	V	168	192	151	176	171.8	687	94.0	376
Total Tc-99m activity in mCi contained in the above shipments	V	24,578.6	27,402.7	19,425.3	25,356.3	24,190.7	96,762.9	14,367.2	57,468.6
# of Tl-201 in-coming shipments	V	6	15	27	5	13.3	53	3.5	14
# of Tl-201 in-coming shipments noted above that were from the local radiopharmacy	V	2	5	4	1	3.0	12	1.5	6
Total Tl-201 activity in mCi contained in the above shipments	V	76.8	228.2	788.6	41.1	283.7	1134.7	42.2	168.7
# of Xe-133 in-coming shipments	V	14	20	10	16	15.0	60	14.3	57
# of Xe-133 in-coming shipments noted above that were from the local radiopharmacy	V	0	1	0	0	0.3	1	0.0	0
Total Xe-133 activity in mCi contained in the above shipments	V	632.7	763.3	376.1	631.2	600.8	2,403.3	561.8	2,247.3
18. Quarterly Review of Out-going Radionuclide/Return Package Records:									
# of times out-going records were missing pertinent info (e.g., survey/wipe results)	D	0	0	0	0	0.0	0	0.3	1
# of times out-going package problems noted (e.g., contamination)	D	0	0	0	0	0.0	0	0.0	0
# of out-coming shipments	V	169	203	158	179	177.3	709	114.8	459
# of out-coming shipments noted above that were Mo-99/Tc-99m used generator returns	V	0	0	0	0	0.0	0	6.3	25
# of out-coming shipments noted above that were return packages to local radiopharmacy	V	168	203	158	179	177.0	708	107.5	430
# of out-coming shipments noted above that were sealed sources returns	V	1	0	0	0	0.3	1	1.0	4
# of in-coming shipments from local radiopharmacy that did not have out-going documentation	D	0	1	2	4	1.8	7	0.0	0
19. Written Directive (WD) Audits for Nuclear Medicine:									
# of total written directives used for the quarter	V	8	5	2	5	5.0	20	9.3	37
# of written directives that were for I-131 thyroid uptake	V	0	0	0	0	0.0	0	0.3	1
# of written directives that were for I-131 whole body imaging	V	3	4	1	4	3.0	12	4.8	19
# of written directives that were for I-131 therapy for hyperthyroidism	V	3	0	1	1	1.3	5	2.5	10
# of written directives that were for I-131 therapy for thyroid cancer	V	2	1	0	0	0.8	3	1.5	6
# of written directives that were for Sm-153 therapy for bone pain	V	0	0	0	0	0.0	0	0.3	1
# of problem noted	D	0	0	0	0	0.0	0	0.0	0
20. Training (Include all staff if dealing with clinical use of radionuclides.):									
Total # of radiation safety training hours provided	V	39.50	6.25	30.20	149.00	56.24	224.95	34.25	137.00
# radiation safety training hours provided to Nuclear Medicine staff	V	10.50	3.50	0.00	8.00	5.50	22.00	6.31	25.25
# radiation safety training hours provided to AOD staff	V	0.00	0.00	0.00	6.00	1.50	6.00	1.25	5.00
# radiation safety training hours provided to EMS staff	V	16.50	0.00	0.00	82.00	24.63	98.50	12.19	48.75
# radiation safety training hours provided to VA Police staff	V	1.00	0.00	0.00	34.00	8.75	35.00	8.44	33.75
# radiation safety training hours provided to Warehouse staff	V	0.00	0.00	0.00	11.00	2.75	11.00	2.38	9.50
# radiation safety training hours provided as FYI training (e.g., Radiation Safety, Safety Office staff)	V	11.50	2.75	30.20	8.00	13.11	52.45	3.69	14.75
# of times DOT HAZMAT training not done as required (i.e., new staff w/i 90 days; 3yr refresher due by 9/21/10 - last done 9/21/07)	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Nuclear Medicine Service

Click on the links to the right for the detailed Quarterly Nuclear Medicine Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
21. Radiation Safety Improvements and/or Additional Comments/Problems:									
Modified the position of the Tc-99m shielded sharps container in the hot lab & added splash guard to help prevent spills	N/A	in Feb	N/A	N/A	N/A	N/A	in Feb	*N/A*	*N/A*
Replaced Cs-137 dose calibrator standard's shielding and labeling	N/A	in Feb	N/A	N/A	N/A	N/A	in Feb	*N/A*	*N/A*
Raised & modified the position of the Tc-99m shielded sharps container in the hot lab to reduce radiation exposure	N/A	N/A	in May	N/A	N/A	N/A	in May	*N/A*	*N/A*
Mounted locked shielded sharps container in the imaging room (1) to the wall to better secure radioactive/biohazard waste	N/A	N/A	in Jun	N/A	N/A	N/A	in Jun	*N/A*	*N/A*
Mounted locked shielded sharps containers (2) in the injection & imaging rooms to the wall to better secure radioactive/biohazard waste	N/A	N/A	N/A	In Jul	N/A	N/A	in Jul	*N/A*	*N/A*
Updated required annual radiation safety training (e.g., added slides & questions, electronic test with question hint slides & % correct)	N/A	N/A	N/A	N/A	in Oct/Nov	N/A	in Oct/Nov	*N/A*	*N/A*
Restocked replacement items in the radiation spill kit and setup updated mini-radiation spill kits that were later distributed in January	N/A	N/A	N/A	N/A	in Dec	N/A	in Dec	*N/A*	*in Dec*

D = Discrepancy/Problem Indicator V = Volume Indicator

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Research Service

Click on the links to the right for the detailed Quarterly Research Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	2008 Qtrly Average	2008 Total
1. Monthly Radiation Surveys/Wipes of Core Labs, Waste, Common Areas done by RSO:									
# of times surveys/wipes not performed monthly as required	D	0	0	0	0	0.0	0	0.0	0
# of times surveys/wipes greater than trigger level	D	0	0	0	0	0.0	0	0.0	0
# of times appropriate action was not taken to decrease levels below trigger level	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Annual Radiation Surveys/Wipes of each Authorized User Lab/Room done by RSO:									
# of times surveys/wipes not performed annually (Dec) as required	D	N/A	N/A	N/A	0	N/A	0	N/A	0
# of times surveys/wipes greater than trigger level	D	N/A	N/A	N/A	0	N/A	0	N/A	1
# of times appropriate action was not taken to decrease levels below trigger level	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
# of rooms monitored	V	N/A	N/A	N/A	11	N/A	11	N/A	12
# of Authorized Users	V	N/A	N/A	N/A	10	N/A	10	N/A	9
3. Quarterly Record Audit of Weekly Radiation Wipes Performed by each Authorized User Labs:									
# of times wipes not performed weekly as required	D	0	0	0	0	0.0	0	1.0	4
By Authorized User: AM	D	0	0	N/A	N/A	0.0	0	1.0	4
# of times wipes greater than trigger level	D	0	0	0	0	0.0	0	0.5	2
By Authorized User-Room: FB/DV-D427	D	0	0	0	0	0.0	0	0.5	2
# of times appropriate action was not taken to decrease levels below trigger level	D	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0
# of rooms monitored	V	12	12	12	14	12.5	N/A	12.0	N/A
# of labs Authorized Users	V	9	9	8	10	9.0	N/A	9.0	N/A
4. Quarterly/Annual Radionuclide Sealed Source Inventory of Labs and Core Labs done by RSO:									
# of times quarterly inventories not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of unaccounted for sealed sources	D	0	0	0	0	0.0	0	0.0	0
# of sealed sources on inventory	V	17	17	17	17	17.0	N/A	17.0	N/A
# of sealed sources added to inventory during the quarter (may/may not be in above total due to when received)	V	0	0	0	0	0.0	0	0.0	0
# of sealed sources removed from inventory during the quarter (may/may not be in above total due to when shipped)	V	0	0	0	0	0.0	0	0.0	0
# of times annual (Mar) NHPP sealed source verification not performed as required	D	0	N/A	N/A	N/A	N/A	0	N/A	0
# of sealed sources on NHPP inventory	V	2	N/A	N/A	N/A	N/A	2	N/A	2
5. Semi-Annual Radionuclide Sealed Source Leak Testing by RSO:									
# of times semi-annual (Jan & Jul) leak test not performed as required	D	0	N/A	0	N/A	0.0	0	0.0	0
# of sealed sources leak tested	V	2	N/A	2	N/A	2.0	N/A	2.0	N/A
# of leak tests with leakage detected above required limits	D	0	N/A	0	N/A	0.0	0	0.0	0
6. Quarterly Radionuclide (Unsealed) Inventory of each Authorized User Lab done by RSO:									
# of times quarterly inventories (based on first date of quarters possession) not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of unaccounted for unsealed sources	D	0	0	0	0	0.0	0	0.0	0
# of times Authorized User was over their possession limits	D	0	0	0	0	0.0	0	0.0	0
# of Authorized Users	V	9	9	8	10	9.0	N/A	9.0	N/A
7. Reported Radioactive Spills:									
# of times a reported radioactive spill occurred	D	0	0	0	0	0.0	0	0.0	0
# of times appropriate action to the spill was not taken	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8. Authorized User Lab Closings:									
# of labs closed out (i.e., monitored and released for general use)	V	0	0	0	1	0.3	1	0.0	0
9. Annual Survey Meter Calibrations:									
# of times annual calibration (Mar)/post repair not performed as required	D	0	N/A	N/A	N/A	0.0	0	0.0	0
# of survey meters calibrated	V	3	N/A	N/A	1	2.0	4	5.0	5
10. Annual Beta Counter (2) Quench Curve and Gamma Counter (2) Calibration:									
# of times Quench Curve and Gamma Calibration not performed annually (Jan)/post repair as required	D	0	N/A	N/A	N/A	0.0	0	0.0	0

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Research Service

Click on the links to the right for the detailed Quarterly Research Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
11. Monthly Beta Counter (2) Normalization, Chi-Square, and Constancy Checks and Gamma Counter (2) Peak, % Resolution, Chi-Square, Constancy, and Efficiency Checks:									
# of times above checks not performed monthly as required	D	0	0	0	0	0.0	0	*0.0*	*0*
# of times above checks not within limits	D	0	0	0	0	0.0	0	*0.0*	*0*
12. Authorized User Approval by the RSC:									
# of authorized user approvals by the RSC	V	0	0	2	0	0.5	2	*0.3*	*1*
13. Quarterly Review of In-coming Radionuclide Receiving Records:									
# of times shipments received that were not pre-approved by the RSO	D	0	0	0	0	0.0	0	*0.0*	*0*
# of times receiving records were missing pertinent info (e.g., survey/wipe results)	D	0	0	0	0	0.0	0	*0.0*	*0*
# of times package receiving problems noted (e.g., contamination, wrong material)	D	0	0	0	0	0.0	0	*0.3*	*1*
By Problem: Shipping label did reflect RSO as delivery point	D	0	0	0	0	0.0	0	*0.3*	*1*
Total # of in-coming shipments	V	1	1	1	4	1.8	7	*2.5*	*10*
# of C-14 in-coming shipments	V	0	0	0	0	0.0	0	*0.3*	*1*
Total C-14 activity in mCi contained in the above shipments	V	0.00	0.00	0.00	0.00	0.00	0.00	*0.06*	*0.25*
# of Cr-51 in-coming shipments	V	0	0	0	0	0.0	0	*0.3*	*1*
Total Cr-51 activity in mCi contained in the above shipments	V	0.00	0.00	0.00	0.00	0.00	0.00	*1.88*	*7.50*
# of H-3 in-coming shipments	V	0	1	0	0	0.3	1	*0.5*	*2*
Total H-3 activity in mCi contained in the above shipments	V	0.00	5.00	0.00	0.00	1.25	5.00	*0.31*	*1.25*
# of I-125 in-coming shipments	V	0	0	0	2	0.5	2	*0.0*	*0*
Total P-32 activity in mCi contained in the above shipments	V	0.00	0.00	0.00	5.95	1.49	5.95	*0.00*	*0.00*
# of P-32 in-coming shipments	V	1	0	1	2	1.0	4	*1.3*	*5*
Total P-32 activity in mCi contained in the above shipments	V	1.27	0.00	0.32	0.67	0.57	2.26	*5.75*	*22.98*
# of S-35 in-coming shipments	V	0	0	0	0	0.0	0	*0.3*	*1*
Total S-35 activity in mCi contained in the above shipments	V	0.00	0.00	0.00	0.00	0.00	0.00	*0.30*	*1.20*
14. Quarterly Review of Out-going Radionuclide/Return Package Records:									
# of times out-going records were missing pertinent info (e.g., survey/wipe results)	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
# of times out-going package problems noted (e.g., contamination)	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
# of out-coming shipments	V	0	0	0	0	0.0	0	0.0	0
15. Training (Include all staff if dealing with research use of radionuclides.): See Nuclear Medicine audits for support staff (e.g., EMS, Police, etc.)									
Total # of radiation safety training hours provided	V	3.00	1.25	20.92	17.25	10.61	42.42	2.00	8.00
# radiation safety training hours provided to Research staff	V	2.25	0.75	20.17	16.25	9.86	39.42	*1.63*	*6.50*
# radiation safety training hours provided as FYI training (e.g., Radiation Safety, Safety Office staff)	V	0.75	0.50	0.75	1.00	0.75	3.00	*0.38*	*1.50*
16. Radiation Safety Improvements and/or Additional Comments/Problems:									
Worked w/ Research Safety Manager to update safety training for all research staff & lab entrance poster (both included radiation safety)	N/A	N/A	in Apr	N/A	N/A	N/A	in Apr	*N/A*	*N/A*
Restocked replacement items (i.e., due in August) in the radiation spill kits	N/A	N/A	N/A	in Aug	N/A	N/A	in Aug	*N/A*	*in Aug*
Added annual radiation safety training for research administrative staff	N/A	N/A	N/A	N/A	in Nov	N/A	in Nov	*N/A*	*N/A*

D = Discrepancy/Problem Indicator V = Volume Indicator

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Radiographic-Fluoroscopic Use

Click on the links to the right for detailed Quarterly Radiographic-Fluoroscopic Use Radiation Safety Audits in 2009 with links to case-by-case breakdown - started preliminary data collection in Dec 2008.		1st Qtr 2009			2nd Qtr 2009			3rd Qtr 2009			4th Qtr 2009			Mon Ave	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Qtr Ave	2009 Total	2008 Dec
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
1. Patient radiation dose from CT (B152 only):																					
See reference tables/links at end of this audit related to patient effective doses.																					
Total # of CT exams	V	895	872	1051	1075	1094	1013	1063	1003	968	1050	987	1111	1015.2	2818	3182	3034	3148	3045.5	12182	992
Total # of CT procedures	V	47	52	44	54	47	48	43	46	54	51	47	46	48.3	58	60	57	62	59.3	58	52
# Exams/procedure (note: patient may have multiple procedures; dose may reflect all exams done)	V	19.0	16.8	23.9	19.9	23.3	21.1	24.7	21.8	17.9	20.6	21.0	24.2	21.0	48.6	53.0	53.2	50.8	51.4	210.0	19.1
A. Interventional CT Exams:																					
# of Interventional CT exams with CPRS documented ~ pt radiation dose (i.e., DLP)	V	11	18	11	12	11	9	16	15	15	15	11	9	12.8	40	32	46	35	38.3	153	19
% of total # of CT exams	V	1.2%	2.1%	1.0%	1.1%	1.0%	0.9%	1.5%	1.5%	1.5%	1.4%	1.1%	0.8%	1.3%	1.4%	1.0%	1.5%	1.1%	1.3%	1.3%	1.9%
Average patient effective dose (mSv) for these exams	V	10.3	13.4	7.1	7.6	10.5	6.7	9.2	11.6	7.8	10.1	12.0	10.8	9.9	10.8	8.4	9.5	10.9	9.9	9.9	17.4
# of these exams with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	5	8	2	2	4	0	5	6	3	4	5	5	4.1	15	6	14	14	12.3	49	9
% of exams with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	45%	44%	18%	17%	36%	0%	31%	40%	20%	27%	45%	56%	32%	38%	19%	30%	40%	32%	32%	47%
# of these exams with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
(1) Further broken down by CCTA Exams:																					
# of these Interventional CT exams that were for CCTA W/WO, QUAN CALCIUM	V	11	16	10	12	11	9	16	14	14	14	9	9	12.1	37	32	44	32	36.3	145	10
% of total # of CT exams	V	1.2%	1.8%	1.0%	1.1%	1.0%	0.9%	1.5%	1.4%	1.4%	1.3%	0.9%	0.8%	1.2%	1.3%	1.0%	1.5%	1.0%	1.2%	1.2%	1.0%
Average patient effective dose (mSv) for these CCTA exams	V	10.3	13.4	6.8	7.6	10.5	6.7	9.2	10.5	7.8	10.2	11.3	10.8	9.7	10.7	8.4	9.1	10.7	9.7	9.7	9.2
# of these exams with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	5	7	1	2	4	0	5	5	3	4	4	5	3.8	13	6	13	13	11.3	45	2
% of exams with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	45%	44%	10%	17%	36%	0%	31%	36%	21%	29%	44%	56%	31%	35%	19%	30%	41%	31%	31%	20%
# of these CCTA exams with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
B. High Volume Exams (Jan-Jun)/Cases (Jul-Dec) (different procedures reviewed each qtr):															← See Monthly						
(1) Broken down by Procedure Type:		CT HEAD W/O CONTRAST			CT ABDOMEN W/O CONTRAST			CT ABDOMEN & PELVIS W/CONTRAST			CT CHEST PULMONARY EMBOLISM PROTOCOL				← Breakdown For						
															← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	44	53	45	28	40	38	N/A	N/A	N/A	142	106	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	2	2	2	1	1	1	N/A	N/A	N/A	2	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	122	114	134	103	117	92	88	106	90	28	40	38	N/A	370	312	284	106	N/A	N/A	N/A
% of total # of CT exams	V	14%	13%	13%	10%	11%	9%	8%	11%	9%	3%	4%	3%	N/A	13%	10%	9%	3%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., 10% w/ 10min) for ~ pt radiation dose (i.e., DLP)	V	12	11	13	10	12	10	10	11	10	10	10	10	N/A	36	32	31	30	N/A	N/A	N/A
% of total # of CT exams	V	1.3%	1.3%	1.2%	0.9%	1.1%	1.0%	1.9%	2.2%	2.1%	1.0%	1.0%	0.9%	N/A	1.3%	1.0%	2.0%	1.0%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	2.2	2.2	2.1	17.4	17.0	21.7	29.6	33.1	36.4	16.2	16.6	17.0	N/A	2.1	18.6	33.0	16.6	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	0	0	0	8	8	8	9	11	10	10	8	9	N/A	0	24	30	27	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	0%	0%	0%	80%	67%	80%	90%	100%	100%	100%	80%	90%	N/A	0%	75%	97%	90%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A
(2) Broken down by Procedure Type:		CT CHEST W/O CONTRAST			CT PELVIS W/O CONTRAST			CT CHEST, ABDOMEN & PELVIS W/CONTRAST			CTA HEAD, NECK & CHEST				← See Monthly ← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	43	40	36	13	10	9	N/A	N/A	N/A	119	32	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	3	3	3	3	3	3	N/A	N/A	N/A	3	3	N/A	N/A	N/A
# of these CT exams documented as being performed	V	111	94	109	94	116	92	129	120	108	39	30	27	N/A	314	302	357	96	N/A	N/A	N/A
% of total # of CT exams	V	12%	11%	10%	9%	11%	9%	12%	12%	11%	4%	3%	2%	N/A	11%	9%	12%	3%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., 10% w/ 10min) for ~ pt radiation dose (i.e., DLP)	V	11	10	11	10	12	10	10	10	10	10	10	9	N/A	32	32	30	29	N/A	N/A	N/A
% of total # of CT exams	V	1.2%	1.1%	1.0%	0.9%	1.1%	1.0%	2.8%	3.0%	3.1%	2.9%	3.0%	2.4%	N/A	1.1%	1.0%	3.0%	2.8%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	16.4	18.7	11.6	12.6	20.0	17.3	37.6	46.0	45.3	18.9	19.3	19.7	N/A	15.4	16.8	43.0	19.3	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	9	7	3	6	9	7	10	10	10	10	10	9	N/A	19	22	30	29	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	82%	70%	27%	60%	75%	70%	100%	100%	100%	100%	100%	100%	N/A	59%	69%	100%	100%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A

Radiation Safety Committee

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Radiographic-Fluoroscopic Use

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		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
C. Average Volume Exams (Jan-Jun)/Cases (Jul-Dec) (different procedures reviewed each qtr):		CT SINUSES ENT PROTOCOL W/O CONTRAST			CT LUMBAR SPINE W/O CONTRAST			CT CHEST W/CONTRAST			CT CERVICAL SPINE W/O CONTRAST				← See Monthly ← Breakdown For ← Procedure Reviewed						
(1) Broken down by Procedure Type:																					
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	26	18	19	13	14	12	N/A	N/A	N/A	63	39	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	1	1	1	1	1	1	N/A	N/A	N/A	1	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	17	21	29	19	13	11	26	18	19	13	14	12	N/A	67	43	63	39	N/A	N/A	N/A
% of total # of CT exams	V	1.9%	2.4%	2.8%	1.8%	1.2%	1.1%	2.4%	1.8%	2.0%	1.2%	1.4%	1.1%	N/A	2.4%	1.4%	2.1%	1.2%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., 10% w/ 10min if possible) for ~ pt radiation dose (i.e., DLP)	V	10	10	10	10	10	10	10	10	10	10	10	10	N/A	30	30	30	30	N/A	N/A	N/A
% of total # of CT exams	V	1.1%	1.1%	1.0%	0.9%	0.9%	1.0%	0.9%	1.0%	1.0%	1.0%	1.0%	0.9%	N/A	1.1%	0.9%	1.0%	1.0%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	1.6	1.5	1.5	30.8	22.0	26.2	9.4	12.8	11.5	4.9	4.5	5.4	N/A	1.5	26.3	11.2	4.9	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	0	0	0	8	8	8	4	8	6	0	0	1	N/A	0	24	18	1	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	0%	0%	0%	80%	80%	80%	40%	80%	60%	0%	0%	10%	N/A	0%	80%	60%	3%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A
(2) Broken down by Procedure Type:		CTA AORTA W/RUNOFF			CT NECK SOFT TISSUE W/ CONTRAST			CT NECK SOFT TISSUE & CHEST W/CONTRAST			CT HEAD W&WO CONTRAST				← See Monthly ← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	11	8	5	11	9	18	N/A	N/A	N/A	24	38	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	2	2	2	1	1	1	N/A	N/A	N/A	2	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	23	20	22	18	26	22	22	16	10	11	9	18	N/A	65	66	48	38	N/A	N/A	N/A
% of total # of CT exams	V	2.6%	2.3%	2.1%	1.7%	2.4%	2.2%	2.1%	1.6%	1.0%	1.0%	0.9%	1.6%	N/A	2.3%	2.1%	1.6%	1.2%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., 10% w/ 10min if possible) for ~ pt radiation dose (i.e., DLP)	V	10	10	10	10	10	10	11	8	5	10	9	10	N/A	30	30	24	29	N/A	N/A	N/A
% of total # of CT exams	V	1.1%	1.1%	1.0%	0.9%	0.9%	1.0%	2.1%	1.6%	1.0%	1.0%	0.9%	0.9%	N/A	1.1%	0.9%	1.6%	0.9%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	42.9	32.9	33.2	2.7	2.8	3.1	16.3	32.3	27.1	4.2	4.1	4.2	N/A	36.3	2.8	23.9	4.2	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	10	10	10	0	0	0	8	8	5	0	0	0	N/A	30	0	21	0	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	100%	100%	100%	0%	0%	0%	73%	100%	100%	0%	0%	0%	N/A	100%	0%	88%	0%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A
D. Low Volume Exams (Jan-Jun)/Cases (Jul-Dec) (different procedures reviewed each qtr):		CT ABDOMEM ADRENAL ADENOMA			CT THORACIC SPINE W/O CONTRAST			CT CHEST PE PROTOCOL, ABD & PELVIS W/CONTRAST			CT ABD W&W/O (RENAL MASS PROTOCOL)				← See Monthly ← Breakdown For ← Procedure Reviewed						
(1) Broken down by Procedure Type:																					
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	3	3	3	7	7	4	N/A	N/A	N/A	9	18	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	3	3	3	1	1	1	N/A	N/A	N/A	3	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	2	5	4	5	5	3	9	9	9	7	7	4	N/A	11	13	27	18	N/A	N/A	N/A
% of total # of CT exams	V	0.2%	0.6%	0.4%	0.5%	0.5%	0.3%	0.8%	0.9%	0.9%	0	0	0	N/A	0.4%	0.4%	0.9%	0.6%	N/A	N/A	N/A
# of exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., all performed) for ~ pt radiation dose (i.e., DLP)	V	2	5	4	5	5	3	3	3	3	7	7	4	N/A	11	13	9	18	N/A	N/A	N/A
% of total # of CT exams	V	0.2%	0.6%	0.4%	0.5%	0.5%	0.3%	0.8%	0.9%	0.9%	0.7%	0.7%	0.4%	N/A	0.4%	0.4%	0.9%	0.6%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	17.6	10.8	3.2	33.0	15.6	37.9	65.2	62.4	72.4	37.3	45.1	40.0	N/A	9.3	27.5	66.7	40.9	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	2	3	0	5	5	2	3	3	3	7	7	4	N/A	5	12	9	18	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	100%	60%	0%	100%	100%	67%	100%	100%	100%	100%	100%	100%	N/A	45%	92%	100%	100%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A

Radiation Safety Committee

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		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
(2) Broken down by Procedure Type:		CT ABDOMEM W & W/O CONTRAST LIVER PROTOCOL			CT TRAUMA FACE			CT NECK SOFT TISSUE, CHEST, ABD & PELVIS W/CONTRAST			CT ORBIT SELLA P FOS OR TEMP BONE (W/O CONTRAST)				← See Monthly ← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	4	4	4	3	5	4	N/A	N/A	N/A	12	12	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	4	4	4	1	1	1	N/A	N/A	N/A	4	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	4	5	2	6	2	3	16	16	16	3	5	4	N/A	11	11	48	12	N/A	N/A	N/A
% of total # of CT exams	V	0.4%	0.6%	0.2%	0.6%	0.2%	0.3%	1.5%	1.6%	1.7%	0.3%	0.5%	0.4%	N/A	0.4%	0.3%	1.6%	0.4%	N/A	N/A	N/A
# of exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., all performed) for ~ pt radiation dose (i.e., DLP)	V	4	5	2	6	2	3	4	4	4	3	5	4	N/A	11	11	12	12	N/A	N/A	N/A
% of total # of CT exams	V	0.4%	0.6%	0.2%	0.6%	0.2%	0.3%	1.5%	1.6%	1.7%	0.3%	0.5%	0.4%	N/A	0.4%	0.3%	1.6%	0.4%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	33.7	56.0	30.3	2.0	1.9	1.8	44.4	56.3	60.4	2.4	2.2	1.7	N/A	43.3	1.9	53.7	2.1	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	4	5	2	0	0	0	4	4	4	0	0	0	N/A	11	0	12	0	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	100%	100%	100%	0%	0%	0%	100%	100%	100%	0%	0%	0%	N/A	100%	0%	100%	0%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A
2. Patient radiation dose from Interventional Fluoroscopy (Specials B180): See reference table/link at end of this audit related to patient skin doses.																					
# of Specials exams with documented ~ pt radiation dose (i.e., Air Kerma)	V	32	29	24	36	24	26	39	36	33	20	17	24	28.3	85	86	108	61	85.0	340	36
Average fluoro time (min) for these exams	V	7.0	4.7	3.6	10.3	3.3	5.3	9.2	7.6	5.4	4.2	3.2	7.4	6.3	5.3	6.8	7.5	5.1	6.3	6.3	7.0
Average total Air Kerma dose (Gy) for these exams	V	0.3	0.3	0.2	0.5	0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
# of these exams with total dose ≥ 3 Gy but < 10 Gy	D	0	0	0	0	0	0	0	0	1	0	0	1	0.2	0	0	1	1	0.5	2	1
% of cases with total dose ≥ 3 Gy but < 10 Gy compared to total	D	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	1%	0%	0%	1%	2%	1%	1%	3%
# of these exams with total dose ≥ 10 Gy but < 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
% of exams with total dose ≥ 10 Gy but < 15 Gy compared to total	D	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
# of these exams with total Air Kerma dose ≥ 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
3. Patient radiation dose from Cardiac Cath (A233 & A235): See reference table/link at end of this audit related to patient skin doses.																					
# of Cardiac Cath exams with documented ~ pt radiation dose (i.e., Dose = Air Kerma)	V	81	66	64	79	78	69	75	77	69	68	53	63	70.2	211	226	221	184	210.5	842	76
Average fluoro time (min) for these exams	V	14.6	14.5	13.9	19.4	12.9	12.3	14.1	16.7	15.2	17.0	16.5	20.1	15.6	14.3	15.0	15.3	17.9	15.6	15.6	12.8
Average estimated dose * (Gy) for these exams * Estimated dose based on recorded dose overestimation (i.e., 19.4% CCL & 19.6% EPL) Updated 2008-2009 data (i.e., from recorded dose to estimated dose).	V	2.1	1.9	1.8	2.4	1.9	2.0	2.1	2.1	2.2	2.4	2.6	3.0	2.2	1.9	2.1	2.2	2.7	2.2	2.2	1.7
# of these exams with estimated dose ≥ 3 Gy but < 10 Gy	D	21	13	11	19	18	14	20	20	21	18	17	27	18.3	45	51	61	62	54.8	219	14
% of exams with estimated dose ≥ 3 Gy but < 10 Gy compared to total	D	26%	20%	17%	24%	23%	20%	27%	26%	30%	26%	32%	43%	26%	21%	23%	28%	34%	26%	26%	18%
# of these exams with estimated dose ≥ 10 Gy but < 15 Gy	D	0	0	0	0	0	0	0	0	0	1	0	1	0.2	0	0	0	2	0.5	2	0
% of exams with estimated dose ≥ 10 Gy but < 15 Gy compared to total	D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	1.6%	0.2%	0.0%	0.0%	0.0%	1.1%	0.2%	0.2%	0.0%
# of these exams with estimated dose ≥ 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
A. Broken down by:																					
# of these exams that were in **A233 (EP Lab - EPL)**	V	31	25	26	28	20	23	31	28	26	27	15	24	25.3	82	71	85	66	76.0	304	28
Average fluoro time (min) for these exams	V	17.8	12.7	16.3	22.3	15.5	10.5	15.0	19.3	14.4	14.0	12.2	21.9	16.2	15.8	16.6	16.2	16.5	16.2	16.2	14.6
Average estimated dose (Gy) for these exams	V	2.0	1.2	1.6	1.4	1.6	1.5	1.9	1.6	1.6	1.7	1.4	2.8	1.7	1.6	1.5	1.7	2.0	1.7	1.7	1.0
# of these exams with estimated dose ≥ 3 Gy but < 10 Gy	D	11	2	4	2	4	2	8	5	4	6	2	7	4.8	17	8	17	15	14.3	57	1
% of exams with estimated dose ≥ 3 Gy but < 10 Gy compared to total	D	35%	8%	15%	7%	20%	9%	26%	18%	15%	22%	13%	29%	19%	21%	11%	29%	23%	19%	19%	4%
# of these exams with estimated dose ≥ 10 Gy but < 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	1	0.1	0	0	0	1	0.3	1	0
% of exams with estimated dose ≥ 10 Gy but < 15 Gy compared to total	D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.2%	0.3%	0.0%	0.0%	0.0%	1.5%	0.3%	0.3%	0.0%
# of these exams with estimated dose > 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

Radiographic-Fluoroscopic Use

Click on the links to the right for detailed Quarterly Radiographic-Fluoroscopic Use Radiation Safety Audits in 2009 with links to case-by-case breakdown - started preliminary data collection in Dec 2008.		1st Qtr 2009			2nd Qtr 2009			3rd Qtr 2009			4th Qtr 2009			Mon Ave	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Qtr Ave	2009 Total	2008 Dec
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
B. Broken down by:																					
# of these exams that were in **A235** (Cardiac Cath Lab - CCL)	V	50	41	38	51	58	46	44	49	43	41	38	39	44.8	129	155	136	118	134.5	538	*48*
Average fluoro time (min) for these exams	V	12.6	15.5	12.2	17.8	12.1	13.2	13.4	15.2	15.7	19.0	18.2	19.0	15.2	13.4	14.3	14.8	18.8	15.2	15.2	*11.8*
Average estimated dose (Gy) for these exams	V	2.2	2.4	1.9	2.9	1.9	2.2	2.2	2.4	2.6	2.9	3.1	3.1	2.5	2.2	2.3	2.4	3.0	2.5	2.5	*2.1*
# of these exams with estimated dose ≥ 3 Gy but < 10 Gy	D	10	11	7	17	14	12	12	15	17	12	15	20	13.5	28	43	44	47	40.5	162	*13*
% of exams with estimated dose ≥ 3 Gy but < 10 Gy compared to total	D	20%	27%	18%	33%	24%	26%	27%	31%	40%	29%	39%	51%	30%	22%	28%	32%	40%	30%	30%	*27%*
# of these exams with estimated dose ≥ 10 Gy but < 15 Gy	D	0	0	0	0	0	0	0	0	0	1	0	0	0.1	0	0	0	1	0.3	1	*0*
% of exams with estimated dose ≥ 10 Gy but < 15 Gy compared to total	D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.8%	0.2%	0.2%	*0.0%*
# of these exams with estimated dose > 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	*0*
4. Radiation Safety Improvements and/or Additional Comments/Problems:																					
Additional monitoring started (i.e., pt radiation dose from CT from high to low volume exams: 1.B.-D.)	N/A		in Jan-Mar				N/A			N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	in 1 Qtr	*N/A*
Special dose (i.e., air kerma) evaluation done on Specials & Cardiac Cath equipment	N/A			N/A			in Jun			N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	in Jun	*N/A*

D = Discrepancy/Problem Indicator V = Volume Indicator

References for Section 1 above

Table 1. Relative radiation level designations along with common example examinations for each classification

Relative Radiation Level*	Effective Dose Estimate Range	Example Examinations
None	0	Ultrasound, MRI
Minimal	<0.1 mSv	Chest radiographs, hand radiographs
Low	0.1-1 mSv	Pelvis radiographs, mammography
Medium	1-10 mSv	Abdomen CT, barium enema, nuclear medicine bone scan
High	10-100 mSv	Abdomen CT without and with contrast, whole body PET

*RRL assignments are not included for some examinations. These are designated as IP (in progress) or NS (not specified). The RRL assignments for the IP examinations will be available in future releases. The RRL assignments for the NS examinations cannot be made because the RRL depends on the region of the body exposed to ionizing radiation, and the body part will vary as a function of the clinical situation.

Taken from ACR Appropriateness Criteria® Radiation Dose Assessment Introduction (Relative Radiation Level Information)

Table 2

Adult Effective Doses for Various CT Procedures

Examination	Average Effective Dose (mSv)	Values Reported in Literature (mSv)
Head	2	0.9–4.0
Neck	3	..
Chest	7	4.0–18.0
Chest for pulmonary embolism	15	13–40
Abdomen	8	3.5–25
Pelvis	6	3.3–10
Three-phase liver study	15	..
Spine	6	1.5–10
Coronary angiography	16	5.0–32
Calcium scoring	3	1.0–12
Virtual colonoscopy	10	4.0–13.2

Taken from Mettler FA, Jr., Huda W, Yoshizumi TT, Mahesh M. Effective doses in radiology and diagnostic nuclear medicine: a catalog. Radiology 2008; 248(1):254-263.

Reference for Sections 2 & 3 above

Table II. Radiation-Induced Skin Injuries

Effect	Typical Threshold Absorbed Dose (Gy)*	Hours of Fluoroscopic "On Time" to Reach Threshold" at: Usual Fluoro. Dose Rate of 0.07 Gy/min (2 rad/min)	High-Level Dose Rate of 0.2 Gy/min (20 rad/min)	Time to Onset of Effect**
Early transient erythema	2	1.7	0.17	hours
Temporary epilation	3	2.5	0.25	3 wk
Main erythema	6	5.0	0.50	10 d
Permanent epilation	7	5.8	0.58	3 wk
Dry desquamation	10	8.3	0.83	4 wk
Invasive fibrosis	10	8.3	0.83	
Dermal atrophy	11	9.2	0.92	>14 wk
Telangiectasia	12	10.0	1.00	>52 wk
Moist desquamation	15	12.5	1.25	4 wk
Late erythema	15	12.5	1.25	6-10 wk
Dermal necrosis	18	15.0	1.50	>10 wk
Secondary ulceration	20	16.7	1.67	>6 wk

* The unit for absorbed dose is the gray (Gy) in the International System of units. One Gy is equivalent to 100 rad in the traditional system of radiation units.

† Time required to deliver the typical threshold dose at the specified dose rate.

** Time after single irradiation to observation of effect.

(Table adapted from Ref. 4.)

Taken from FDA's Avoidance of Serious X-ray Induced Skin Injuries to Patients During Fluoroscopically Guided Procedures

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

ALARA-Radiation Exposure

Click on the link to the right for the detailed Quarterly ALARA-Radiation Exposure Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed reviews.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
1. Personnel Exposure Records/ALARA Investigational Levels (see below):									
A. Radioactive Materials Use:									
a) Follow-up on previous quarter's review (see detailed reports above or summaries below)									
b) # of times ALARA Quarterly Investigational Level I (10% of ¼ annual limit) was exceeded	D	0	0	0	0	0.0	0	*1.8*	*7*
By Type: **# of times Whole Body Deep Dose Equivalent ALARA I @ 125 mrem was exceeded**	D	0	0	0	0	0.0	0	*0.8*	*3*
Then by Employee: Nuclear Medicine Technologist - Badge # 269 qtrly total in mrem	D	82	91	69	78	80	320	*141*	*565*
Nuclear Medicine Technologist - Badge # 1033 qtrly total in mrem	D	108	92	107	119	107	426	*118*	*473*
By Type: **# of times Extremity Shallow Dose Equivalent ALARA I @ 1,250 mrem was exceeded**	D	0	0	0	0	0.0	0	*1.0*	*4*
Then by Employee: Nuclear Medicine Technologist - Badge # 271 qtrly total in mrem	D	410	400	300	360	368	1,470	*863*	*3,450*
Nuclear Medicine Technologist - Badge # 1027 qtrly total in mrem	D	530	600	460	380	493	1,970	*1,778*	*7,110*
Nuclear Medicine Technologist - Badge # 1033 qtrly total in mrem	D	500	470	280	360	403	1,610	*793*	*3,170*
c) # of times ALARA Quarterly Investigational Level II (30% of ¼ annual limit) was exceeded	D	0	0	0		0.0	0	*0*	*0*
B. Radiographic-Fluoroscopic Use:									
a) Follow-up on previous quarter's review (see detailed reports above or summaries below)									
b) # of times ALARA Quarterly Investigational Level I (10% of ¼ annual limit) was exceeded	D	2	0	1	0	0.8	3	*2.5*	*10*
By Type: **# of times Whole Body Effective Dose Equivalent ALARA I @ 125 mrem was exceeded**	D	1	0	0	0	0.3	1	*0.8*	*3*
Then by Employee: RN/Cath Lab - Badge # 534 qtrly total in mrem	D	112	100	114	82	102	408	*119*	*476*
Cardiologist/Cath Lab - Badge # 984 qtrly total in mrem	D	107	82	85	94	92	368	*111*	*443*
Anesthesiologist/Pain Clinic - Badge # 1048 qtrly total in mrem	D	**130**	61	8	3	51	202	*83*	*332*
By Type: **# of times Lens Dose Equivalent ALARA I @ 375 mrem was exceeded**	D	1	0	1	0	0.5	2	*1.8*	*7*
Then by Employee: RN/Cath Lab - Badge # 534 qtrly total in mrem	D	372	334	**380**	274	340	1,360	*396*	*1,585*
Physician Assistant/Pain Clinic - Badge # 972 qtrly total in mrem	D	23	7	4	0	9	34	*102*	*407*
Cardiologist/Cath Lab - Badge # 984 qtrly total in mrem	D	360	275	284	316	309	1,235	*372*	*1,488*
Anesthesiologist/Pain Clinic - Badge # 1048 qtrly total in mrem	D	**434**	218	35	9	174	696	*290*	*1,158*
c) # of times ALARA Quarterly Investigational Level II (30% of ¼ annual limit) was exceeded	D	0	0	0		0.0	0	*0*	*0*
2. I-125/I-131 Bioassay Results:									
a) Nuclear Medicine									
# of employees having bioassays	V	2	1	1	1	1.3	5	*3.0*	*12*
# of times bioassays performed	V	4	1	1	1	1.8	7	*4.8*	*19*
# of administrations > 1 mCi of I-131 as NaI in solution	V	0	0	0	0	0.0	0	*0.5*	*2*
# of administrations > 10 mCi of I-131 as NaI in capsule	V	4	1	1	1	1.8	7	*2.8*	*11*
# of times bioassays not performed within 6-72 hours post administration	D	0	0	0	0	0.0	0	*0.3*	*1*
# of times bioassay results were > minimal detectable activity (MDA) of the counting system	D	0	0	0	0	0.0	0	*0.0*	*0*
# of times bioassay results required action and/or inclusion in Total Effective Dose Equivalent	D	0	0	0	0	0.0	0	*0.0*	*0*
b) Research - Not performing iodinations at this time - no bioassays done	V	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*	*N/A*

Radiation Safety Committee

Trending Quarterly Audit for 4th Qtr 2009

ALARA-Radiation Exposure

Click on the link to the right for the detailed Quarterly ALARA-Radiation Exposure Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed reviews.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
3. Pregnant Radiation Workers:									
# of declared pregnant radiation workers	V	0	0	0	0	0.0	0	*0.8*	*1*
4. Quarterly Area Monitors Involving Radioactive Materials:									
NM2 monitor - wall in main hallway outside Nuclear Medicine (i.e., outer wall of hot lab) qtrly total in mrem	V	8	6	10	1	6.3	25	*17.8*	*71*
NM3 monitor - wall in main hallway outside Nuclear Medicine (i.e., outer wall of hot lab) qtrly total in mrem	V	0	0	0	0	0.0	0	*0.0*	*0*
RES1 monitor - doorway of research radioactive waste storage room qtrly total in mrem	V	0	0	0	0	0.0	0	*0.0*	*0*
# of area monitors with readings > 100 mrem for the current calendar year (i.e., 2009)	D	N/A	N/A	N/A	0	N/A	0	*N/A*	*0*
5. Sanitary Sewer Disposal of Radioactive Material: none at this time	V	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*	*N/A*
6. Radiation Safety Improvements and/or Additional Comments/Problems:									
Compliant with NRC's constraint of radioactive air effluents for the current calendar year (i.e., 2009)	N/A	N/A	N/A	N/A	in 2009	N/A	N/A	*N/A*	*in 2008*

D = Discrepancy/Problem Indicator V = Volume Indicator

Quarterly ALARA Levels & Annual Limits are expressed in mrem	ALARA Quarterly Investigational Levels		
	Level I (10% of ¼ annual limits)	Level II (30% of ¼ annual limits)	Annual Limits*
Whole Body (WB) Deep Exposure (DDE = Deep Dose Equivalent) (if lead/lead equivalent apron **not** used)	125	375	5,000
Whole Body Effective Dose Equivalent (WB EDE) = 0.3 x DDE (due to use of lead/lead equivalent apron)	125	375	5,000
Lens of Eye Exposure (LDE = Lens Dose Equivalent)	375	1,125	15,000
WB Shallow (Skin) Exposure (SDE = Shallow Dose Equivalent)	1,250	3,750	50,000
Extremity Shallow Exposure (SDE = Shallow Dose Equivalent)	1,250	3,750	50,000

* Annual Occupational Dose Limits for Adults based on NRC Regulations

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Nuclear Medicine Service

1. Daily Radiation Surveys:

- Performed daily as required including weekend/holiday studies: Yes — If no, explain below.
- Any areas greater than trigger level (TL): Yes x1 — If yes, explain below.
  - Hot Lab - 0 times, Imaging Room - 1 time, Injection Room - 0 times:
    - 10/01 - Imaging Room: minor contamination found in stress area trash @ 0.06 mR/hr (TL >0.05 mR/hr); removed to radioactive waste for decay.
      - This initial reading although above trigger level was fairly low (i.e., <0.1 mR/hr) and was in area where increased radiation levels may be seen (e.g., from gauze removed from injection site & disposed of in trash) and that is monitored before removal by EMS. Prompt and appropriate action to lower this level was taken.
- If areas were greater than TL, was appropriate action taken to decrease radiation levels below TL: Yes — If no, explain below.

2. Weekly Radiation Wipes:

- Performed weekly as required: Yes — If no, explain below.
- Any areas greater than trigger level (TL): Yes x0 — If yes, explain below.
  - Hot Lab - 0 time, Imaging Room - 0 times, Injection Room - 0 times:
- If areas were greater than TL, was appropriate action taken to decrease radiation levels below TL: Yes — If no, explain below

3. Mo-99/Tc-99m Assays (currently not using Mo-99/Tc-99m generators - last use was in 2008):

- Performed for each pt.-use elution of the Mo-99/Tc-99m generator: N/A — If no, explain below.
- Mo-99/Tc-99m concentrations were within required limits: N/A — If no, explain below.
  - This audit item will be dropped starting in 2010 until such time Mo-99/Tc-99m generators are used again since there are no immediate plans to re-start their use.

4. Daily Dose Calibrator Constancy Checks (for Capintec CRC-15R & CRC-35R dose calibrators):

- Performed daily if used for pts as required including weekend/holiday studies: No x1 — If no, explain below.
  - 12/17 - Daily constancy check was not completely done (i.e., only 1 of 5 settings documented as checked & it was within limits) on the non-Tc-99m dose calibrator (i.e., CRC-15R). Based on the patient schedule that day, only one patient assay involving Xe-133 was performed on that dose calibrator on that day. The RSO discussed this issue with the nuclear medicine technologist involved and her supervisor.
- Performed quarterly full constancy check: Yes — If no, explain below.
- Constancy checks were within established limits: Yes — If no, explain below.
  - During October, a few daily readings on the CRC-35R's Mo-99 setting were at ~5.2% which is at the ±5% review level (i.e., review if any service/correction needed) but well below action limit of ±10%. This same issue was noted in the last audit for September and the RSC Committee during their December 2009 meeting approved that this setting will not be required during the daily constancy checks starting in 2010 until such time Mo-99/Tc-99m generators are used again.

5. Quarterly Dose Calibrator Linearity Checks (for Capintec CRC-15R & CRC-35R dose calibrators):

- Performed quarterly (due 1st month of qtr) or after repair as required: Yes — If no, explain below.
- Linearity checks were within established limits: Yes — If no, explain below.

6. Annual Dose Calibrator Accuracy Checks (for Capintec CRC-15R & CRC-35R dose calibrators):

- Performed annually as required (due in Sept. or after repair): N/A — If no, explain below.
- Accuracy checks were within established limits: N/A — If no, explain below.

7. Dose Calibrator Geometry Checks (for Capintec CRC-15R & CRC-35R dose calibrators):

- Performed as required (after repair): N/A — If no, explain below.
- Accuracy checks were within established limits: N/A — If no, explain below.

8. Daily Thyroid Probe/Well Counter and Multi-Well Counter Constancy Checks:

- Performed daily as required (i.e., when used): Yes — If no, explain below.

- Constancy checks were within established limits: Yes If no, explain below.

9. Quarterly Thyroid Probe/Well Counter (MDA, chi-square) and Multi-Well Counter (normalized, chi-square) Checks:

- Performed quarterly (due 1st month of qtr) or after repair as required: Yes If no, explain below.
- Checks were within established limits: Yes If no, explain below.

10. Monthly Xenon Machine Quality Control Checks:

- Performed monthly/quarterly or after repair as required: Yes If no, explain below.
- Quality control checks were within established limits: Yes If no, explain below.

11. Semi-Annual Air Flow Measurements (AFM) & Xenon Spill Clearance Time Calculations/Annual Fume Hood Certification:

- Semi-annual AFM performed as required (due in Jun. & Dec.): Yes If no, explain below.
- Imaging room & hot lab under negative pressure & confirmed by smoke test: Yes If no, explain below.
- Xenon spill clearance times calculated and posted after AFM made: Yes If no, explain below.
- Annual fume hood certification performed (due in Feb.): N/A If no, explain below.
- Fume hood sash level noted after calibration made: N/A If no, explain below.

12. Annual Survey Meter Calibrations:

- Performed annually as required (due in Mar. or after repair): N/A If no, explain below.

13. Quarterly/Annual Radionuclide Sealed Source Inventory:

- Performed quarterly (due 1st month of qtr) as required: Yes If no, explain below.
- All sources accounted for: Yes If no, explain below.
  - 137 sealed sources.
- Performed monthly check of Cs-137 calibration source: Yes If no, explain below.
- Annual NHPP sealed source verification performed as required (due in Mar.) N/A If no, explain below.

14. Semi-Annual Radionuclide Sealed Source Leak Testing:

- Performed semi-annually as required (due in Jan. & Jul.): N/A If no, explain below.
- Any leakage detected above required limits: N/A If yes explain below.

15. Reportable or Recordable Events/Incidents:

- Any reported reportable or recordable events/incidents: No If yes, explain below.

16. Reported Radioactive Spills:

- Any reported radioactive spills: No If yes, explain below.

17. Quarterly Review of In-coming Radionuclide Receiving Records:

- Any receiving record missing pertinent info (e.g., survey/wipe results): No If yes, explain below.
- Any problems noted (e.g., contamination, wrong material): No If yes, explain below.
- 204 in-coming shipments with 183 being from local radiopharmacy.

Radionuclide	# of Shipments	# from local radiopharmacy	# w/ another primary local shipment (e.g., Tc-99m)	mCi
Ga-67	-	-	1 (w/Tc-99m)	4.0
I-131 (Capsule)	4	4	4 (w/Tc-99m)	39.9
In-111	3	2	-	8.9
Tc-99m	176	176	-	25,356.5
Tl-201	5	1	2 (w/Tc-99m)	41.1
Xe-133	16	-	-	631.2
Total	204	183	7 (w/Tc-99m)	N/A

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Nuclear Medicine Service

18. Quarterly Review of Out-going Radionuclide/Return Package Records:

- Any out-going record missing pertinent info (e.g., survey/wipe results): No If yes, explain below.
- Any problems noted (e.g., contamination): No If yes, explain below.
- 179 out-going packages:
  - 179 return packages to local radiopharmacy.
- Did return packages to local pharmacy equal the amount received: No x4 If no, explain below.
  - 11/05 - Return documentation not recorded for the late afternoon shipment (i.e., 4:35P, third shipment that day).
  - 12/09 - Two shipments that day but only one return documentation recorded.
  - 12/17 - Four shipments that day but only three return documentations recorded.
  - 12/18 - Four shipments that day but only three return documentations recorded.
    - This same issue was noted in the last audit for 3rd quarter (Jul-Sep) and the RSC Committee during their December 2009 meeting approved the corrective action taken:
      - In December 2009, the RSO discussed this issue about documentation problems with each nuclear medicine technologist.
      - In December 2009, combined local radiopharmacy shipment receipt and return documentation forms so there will be only one form and each shipment will have documentation of receipt and return on one line. RSO reviewed this new form with the nuclear medicine staff for first use in January 2010.
    - In February 2010, the RSO again discussed this issue about documentation problems with the nuclear medicine staff (i.e., individually and in the Nuclear Medicine staff meeting), setup a monthly review of the use of the new receipt/return form (no problems with the 64 shipments received & returned in January 2010), and staff reviewed radiation safety refresher presentation on this subject in February 2010 (see attached).

Nucl Med Refresher Training

19. Written Directive (WD) Audits for Nuclear Medicine: x5

Compared WD on file in Radiation Safety Office to radionuclide receipt and use records, and if applicable, Radiation Safety therapy patient file, and immediate/delayed patient release file.

Pt. ID	Isotope & Procedure	Date	WD mCi	Given mCi	Comments	* Problems
JB	I-131 Whole Body	10/19/09	5.0	5.4	N/A	None
PB	I-131 Whole Body	10/21/09	5.0	5.45	N/A	None
JS	I-131 Whole Body	11/04/09	5.0	5.28	N/A	None
RC	I-131 Whole Body	11/04/09	5.0	5.24	N/A	None
JH	I-131 HyperThy Tx	12/29/09	18.0	18.3	Pt. given required written radiation safety instructions.	None

*e.g., WD incomplete, patient identity not verified by two methods, dose not within ±10% of prescribed dose, etc.

- I-131 Thy Uptake - 0, I-131 Whole Body - 4, I-131 Hyper Thy Tx - 1, I-131 Thy CA Tx - 0, Sm-153 Bone Pain Tx - 0.
- Any problems noted. No If yes, explain below.

20. Training (Include all staff if dealing with clinical use of radionuclides.): Yes x149.00 If yes, attach list.

- DOT HAZMAT refresher training (i.e., every 3 yrs) for Nuclear Medicine staff is due by September 21, 2010 (i.e., last done on 09/21/07) or initial training for new staff within 90 days.

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Nuclear Medicine Service

21. Radiation Safety Improvements and/or Additional Comments/Problems: Yes x1 If yes, explain below.

- Oct/Nov - Updated the required annual radiation safety training for Nuclear Medicine (2: clinical & administrative), AOD, EMS, VA Police and Warehouse to include (see attachment for more details and links to training & tests):
  - Added additional slides (2-7) and test questions (0-2) as needed.
  - If test is done electronically, question hint slides can be easily viewed while in the test rather going back to the PowerPoint presentation and the % answered correctly is indicated at the end of the test.

Updates Made to 2009 RST

- Dec - Restocked replacement items in the radiation spill kit (1) in the hot lab and setup updated the mini-radiation spill kits (20) found throughout Nuclear Medicine that were later distributed in January 2010.

Audit performed by: Michael T. Hackett, MS, Radiation Safety Officer

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Nuclear Medicine Service

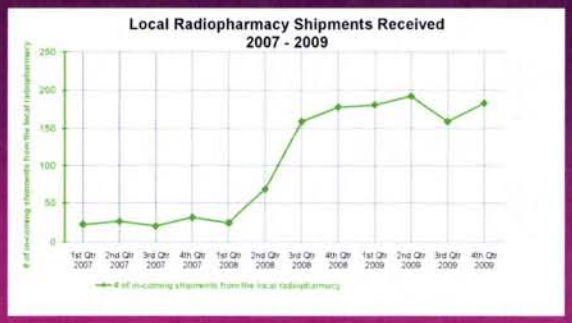
Radiation Safety Training:

#	Date	Time	# Staff	# hrs/ Staff	Total # hrs	Type	Section/Service	Training Title (click on the below links to view training)
N/A	Oct	N/A	2	1.00	2.00	PP/T	AOD/HAS	2009 Annual Radiation Safety Training - AOD
N/A	Oct	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - AOD
N/A	10/21/09	9:30 AM	30	1.00	30.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	10/28/09	3:30 PM	10	1.00	10.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	Oct	N/A	2	1.00	2.00	PP/T	Radiation Safety/ Nuclear Medicine	2009 Annual Radiation Safety Training - EMS
N/A	Nov	N/A	4	1.00	4.00	PP/T	AOD/HAS	2009 Annual Radiation Safety Training - AOD
N/A	11/18/09	9:30 AM	18	1.00	18.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	11/25/09	11:30 PM	12	1.00	12.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	Nov	N/A	3	1.00	3.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	Nov	N/A	7	1.00	7.00	PP/T	Nuclear Medicine	2009 Annual Radiation Safety Training - Nuclear Medicine
N/A	Nov	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - Nuclear Medicine
N/A	Nov	N/A	1	1.00	1.00	PP/T	Nuclear Medicine	2009 Annual Radiation Safety Training - Nuclear Medicine Administration
N/A	Nov	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - Nuclear Medicine Administration
N/A	Nov	N/A	31	1.00	31.00	PP/T	VA Police	2009 Annual Radiation Safety Training - VA Police
N/A	Nov	N/A	2	1.00	2.00	PP/T	Radiation Safety/ Safety Office	2009 Annual Radiation Safety Training - VA Police
N/A	Nov	N/A	10	1.00	10.00	PP/T	Warehouse/A&LS	2009 Annual Radiation Safety Training - Warehouse
N/A	Nov	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - Warehouse
N/A	Dec	N/A	9	1.00	9.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	Dec	N/A	3	1.00	3.00	PP/T	VA Police	2009 Annual Radiation Safety Training - VA Police
N/A	Dec	N/A	1	1.00	1.00	PP/T	Warehouse/A&LS	2009 Annual Radiation Safety Training - Warehouse
					149.0 0	Grand Total of # Training Hrs.		

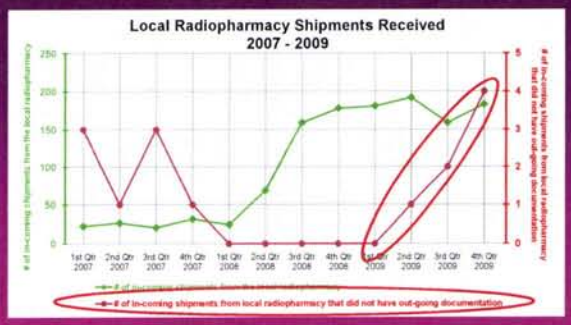
N/A = if not a RSO Lecture/Training Session (e.g., viewed video, special lecture, review material, or read article and took test)

Key:	Type of training	Key:	Type of training	Key:	Type of training
A/T =	Article & Test - Self Review	OST/PP =	Off Site Training PowerPoint presentation	PP/T =	PowerPoint presentation/Handout - Self Review with Test
H/T =	Handout & Test - Self Review	P/E =	Procedure and/or Equipment Review	R =	Review of Records and Procedures - Self Review
L =	Lecture with PowerPoint presentation/Handout	PP/H =	PowerPoint presentation/Handout - Self Review	V =	Video - Self Review

Increase in Local Pharmacy Shipments



What is the Problem Here?



The Problem

- In 2009, increasing # of in-coming shipments from local radiopharmacy that did **NOT** have out-going (empty package return) documentation

  1st Qtr = 0 2nd Qtr = 1 3rd Qtr = 2 4th Qtr = 4

- In 2008, there were **NO** problems associated with out-going documentation
  - There was a sharp rise in # of shipments rec'd starting in June 2008 due to implementation of revised USP <797> (could not meet new requirements; therefore, switched use to local radiopharmacy unit doses)

The Possible Causes & Solutions

- In December 2009, this problem along with possible causes & solutions were discussed with the nuclear medicine technical staff
  - **Possible Cause:** Since Local Radiopharmacy Courier should only pickup a return package labeled as such; return monitoring probably done but not documented
  - **Solution:** Staff should be more diligent about assuring that the required return documentation is done

The Possible Causes & Solutions

- In December 2009, this problem along with possible causes & solutions were discussed with the nuclear medicine technical staff
  - **Possible Cause:** Receipt & return documentation on separate forms making it difficult to assure that documentation had occurred
  - **Solution:** Combine receipt & return documentation into 1 form (shipment & its return on same line - put into use in January 2010)

Click on Document to Review & Print

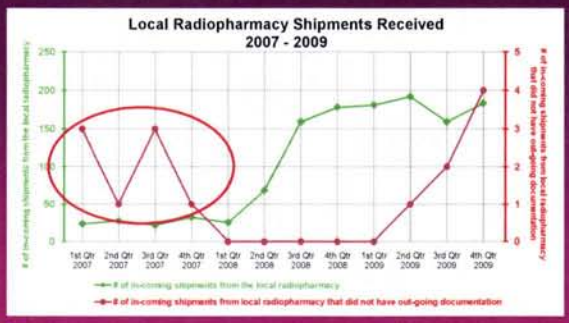
The Possible Causes & Solutions

- In December 2009, this problem along with possible causes & solutions were discussed with the nuclear medicine technical staff
  - **Possible Cause:** Multiple shipments & return pickups made throughout the day making it difficult to assure that documentation had occurred
  - **Solution:** #'ing receipt area to correspond to the new combined form (1 = 1st daily shipment rec'd, 2 = 2nd daily shipment rec'd, etc.)

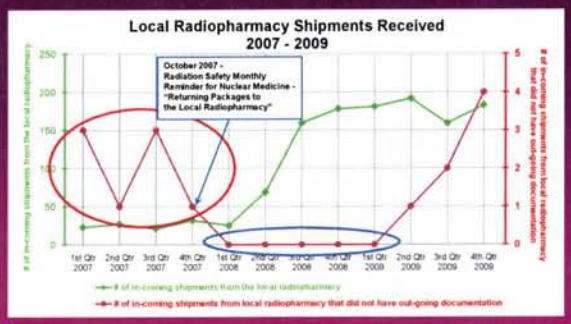
Were the Solutions Effective?

- In January 2010, the solutions (staff diligence, combined receipt-return form & #'ing of shipment placement) were put into effect
  - In January there were 64 shipments received & there were **NO** problems associated with out-going documentation
  - Good initial results but the year is young
  - Will monitor this monthly (normally on a quarterly monitor) to see if any other action is needed

Same Problem in 2007



What Did We Do Then?



Reminder Training

- In October 2007, reminder training was used to address the same problem as in 2009
  - From 1st Qtr 2008 to 1st Qtr 2009, there were **611** shipments received & there were **NO** problems associated with out-going documentation
  - Great results for 15 straight months
  - Re-review this required training to enhance the solutions that we already put into effect in January (Note: now using new return label/Nov 07 & form/Jan 10)

Training Credit

- Please complete the below training credit form & return it to the RSO for
  - 15 minutes of training for this presentation:

- Click here to e-mail the RSO a Question Concerning this Training
- Thank you

2009 Radiation Safety Training PowerPoint Presentation:

Additional slides when compared to 2008 radiation safety training presentation

	# of slides	Radiation Exposure Here at the VA One more additional radiation exposure slide: info on non-radiation worker & general public	Packages Containing Radioactive Materials One more additional package slide: info about other packages delivered by local radiopharmacy	General Safety Rules No smoking, eating, drinking, storing of food, applying cosmetics - same as any patient area	Security One more additional security slide: reporting suspicious individuals, areas locked	Lost and Found Report/turn in VA keys, swipes, ID badges, radiation badges	Damaged Package with Radioactive Materials One more additional damaged package slide: more info on what to do if touched damaged package	Possible Spill of Radioactive Materials One more additional possible spill slide: more info on what to do if touched a spill	Homeland Security Issues Three slides on nuclear medicine patients being detected as radioactive by law enforcement	Info on SharePoint Info added to VA Police SharePoint site: RS contact card, RS meter inventory, RS training
AOD	4			X	X	X	X			
EMS	3			X	X			X		
Nuclear Medicine	2	X		X						
Nuclear Medicine Administration	7			X	X	X	X		XXX	
VA Police	5			X	X	X	X			X
Warehouse	5		X	X	X	X	X			

2009 Radiation Safety Training Test:

Additional questions when compared to 2008 radiation safety training test

	# of questions	Radiation Exposure Here at the VA What is expected occupational radiation exposure to non-radiation worker staff (e.g., EMS, AOD, VA Police, warehouse, nursing, plus Nuclear Medicine administrative staff) who occasionally enter areas where radioactive materials are used and/or come into brief contact with radioactive materials?	General Safety Rules Which one of the following is not a general safety rule in areas where radioactive materials are used/stored?	Lost and Found What should you do if you found a VA key or swipe card?	Homeland Security Issues Most patients who have had a recent (i.e., 1-2 days ago for most pts with some pts up to weeks later depending on the radionuclide) nuclear medicine study involving the administration of radioactive materials could be detected by law enforcement outside of this VA (e.g., highway, airport) with the use of a radiation detector?
AOD	0				
EMS	2		X	X	
Nuclear Medicine	1	X			
Nuclear Medicine Administration	1				X
VA Police	0				
Warehouse	0				

Additional enhancements to each of the 6 radiation safety training tests:

If test is done electronically, the % answered correctly is indicated at the end of the test.

If test is done electronically, question hint slides can be easily viewed while in the test rather going back to the PowerPoint presentation

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Research Service

1. Monthly Radiation Surveys/Wipes of Core Labs, Waste, Common Areas done by Radiation Safety Office:

- Performed monthly: Yes — If no, explain below.
- Any areas greater than trigger level (TL): No — If yes, explain below.
- If areas were greater than TL, was appropriate action taken to decrease radiation levels below TL: N/A — If no, explain below.

2. Annual Radiation Surveys/Wipes of each Authorized User Lab/Room done by Radiation Safety Office:

- Performed in December: Yes — If no, explain below.
- Any areas greater than trigger level (TL): No — If yes, explain below.
- If areas were greater than TL, was appropriate action taken to decrease radiation levels below TL: N/A — If no, explain below.
- Number of Rooms: 11 Number of Authorized Users: 10

3. Quarterly Record Audit of Weekly Radiation Wipes Performed by each Authorized User Labs:

- Performed weekly if radioactivity is used: No — If no, explain below.
- Any areas greater than trigger level (TL): No — If yes, explain below.
- If areas were greater than TL, was appropriate action taken to decrease radiation levels below TL: N/A — If no, explain below.
- Number of Rooms: 14 Number of Authorized Users: 10
  (2 never activated, 1 deactivated in Dec)

4. Quarterly/Annual Radionuclide Sealed Source Inventory of Labs and Core Labs done by Radiation Safety Office:

- Performed quarterly as required: Yes — If no, explain below.
- All sources accounted for: Yes — If no, explain below.
  - 17 sealed sources.

5. Semi-Annual Radionuclide Sealed Source Leak Testing done by Radiation Safety Office:

- Performed semi-annually as required (due in Jan. & Jul.): N/A — If no, explain below.
- Any leakage detected above required limits: N/A — If yes explain below.

6. Quarterly Radionuclide (Unsealed) Inventory of each Authorized User Lab done by Radiation Safety Office:

- All sources accounted for: Yes — If no, explain below.
- All Authorized Users within possession limits: Yes — If no, explain below.
- Number of Authorized Users: 10 As of: October 1, 2009

7. Reported Radioactive Spills:

- Any reported radioactive spills: No — If yes, explain below.

8. Authorized User Lab Closings: Yes x1 — If yes, explain below.

- Dec - RSC reviewed closeout documentation for C304 via email and approved release of the lab through electronic voting.

9. Annual Survey Meter Calibrations:

- Performed annually as required (due in Mar. or after repair): Yes x1 — If no, explain below.
- Nov - New meter calibrated by manufacturer (June 2009) was put into use replacing another meter that was taken out of use and labeled as such.

10. Annual Beta Counter (2) Quench Curve and Gamma Counter (2) Calibration:

- Performed annually (due in Jan. or after repair): N/A — If no, explain below.

11. Monthly Beta Counter (2) Normalization, Chi-Square, and Constancy Checks and Gamma Counter (2) Peak, % Resolution, Chi-Square, Constancy, and Efficiency Checks:

- Performed monthly Yes — If no, explain below.
- All checks were within established limits: Yes — If no, explain below.

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Research Service

12. Authorized User Approvals by Radiation Safety Committee: No If yes, explain below.

- None to report.

13. Quarterly Review of In-coming Radionuclide Receiving Reports:

- Any shipments received that were not pre-approved by RSO: No If yes, explain below.
- Any receiving report missing pertinent info (i.e., survey/wipe results): No If yes, explain below.
- Any problems noted (i.e., contamination, wrong material): No If yes, explain below.
- 4 shipments with 4 orders

Isotope	# Shipments	mCi
I-125	2	5.95
P-32	2	0.67

14. Quarterly Review of Out-going Radionuclide Package Records:

- Any out-going record missing pertinent info (e.g., survey/wipe results): N/A If yes, explain below.
- Any problems noted (e.g., contamination): N/A If yes, explain below.
- None to report.

15. Training (Include all staff if dealing with research use of radionuclides.): Yes x17.25 If yes, list on last page.
See Nuclear Medicine audits for support staff (e.g., EMS, Police, etc.)

16. Radiation Safety Improvements and/or Additional Comments/Problems: No If yes, explain below.

Audit performed by: Michael T. Hackett, MS, Radiation Safety Officer

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Research Service

Radiation Safety Training:

#	Date	Time	# Staff	# hrs/ Staff	Total # hrs	Type	Section/Service	Training Title (click on the below links to view training)
N/A	Oct	N/A	2	0.25	0.50	PP/H	Research	Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Oct	N/A	3	0.25	0.75	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	Nov	N/A	2	0.25	0.50	PP/H	Research	Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Nov	N/A	1	0.25	0.25	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	Nov	N/A	3	1.00	3.00	PP/T	Research	2009 Annual Radiation Safety Training - Research Administration
1	11/10/09	2:00 PM	2	1.00	2.00	P/E	Research	New Lab - Radiation Safety Record Keeping
N/A	Nov	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - Research Administration
N/A	Dec	N/A	8	0.25	2.00	V	Research	Practicing Safe Science (Howard Hughes Medical Institute) ** (Counts for 2009 Annual Training)
N/A	Dec	N/A	8	0.25	2.00	V	Research	Radionuclide Hazards (Howard Hughes Medical Institute) (Counts for 2009 Annual Training)
N/A	Dec	N/A	4	0.25	1.00	PP/H	Research	Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Dec	N/A	5	0.25	1.25	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	Dec	N/A	1	0.25	0.25	V	Research	Initial Radiation Safety Training (pending completion of training in 2010): • Practicing Safe Science (Howard Hughes Medical Institute) **
N/A	Dec	N/A	1	0.25	0.25	V	Research	• Radionuclide Hazards (Howard Hughes Medical Institute)
N/A	Dec	N/A	1	0.25	0.25	PP/H	Research	• Research Emergency & Safety Procedures *
N/A	Dec	N/A	1	1.50	1.50	PP/H	Research	• 2007 Annual Radiation Safety Training - Research
N/A	Dec	N/A	1	0.75	0.75	PP/T	Research	• 2008 Annual Radiation Safety Training - Research

17.25 Grand Total of # Training Hrs.

* Note of the 60 minutes of this research safety training, about 15 minutes would pertain to radiation safety.
** Note of the 30 minutes of this research safety video, about 15 minutes would pertain to radiation safety.

Key:	Type of training	Key:	Type of training	Key:	Type of training
A/T =	Article & Test - Self Review	OST/PP =	Off Site Training PowerPoint presentation	PP/T =	PowerPoint presentation/Handout - Self Review with Test
H/T =	Handout & Test - Self Review	P/E =	Procedure and/or Equipment Review	R =	Review of Records and Procedures - Self Review
L =	Lecture with PowerPoint presentation/Handout	PP/H =	PowerPoint presentation/Handout - Self Review	V =	Video - Self Review

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Radiographic-Fluoroscopic Use

Use the links below for detailed case-by-case breakdown.

1. Patient radiation dose from CT (B152 only):

See reference tables/links at end of this audit related to patient effective doses.

CT Exams by Procedures:

Total	3148	Exams for 62 Procedures
Average	50.8	Exams/Procedure (note: patient may have multiple procedures; dose may reflect all exams done)

A. Interventional CT Exams:

Effective Dose	mSv
Average	10.9
Minimum	1.7
Maximum	33.3
Total # of Interventional CT Exams (B152) Reviewed	35
# exams over ≥10 mSv but ≤100 mSv	14
# of exams over >100 mSv	0

(1) Further broken down by CCTA W/WO, QUAN CALCIUM Exams:

Effective Dose	mSv
Average	10.7
Minimum	1.7
Maximum	33.3
Total # of CCTA Exams (B152) Reviewed	32
# of exams over ≥10 mSv but ≤100 mSv	13
# of exams over >100 mSv	0

B.-D. CT Case Review Selection:

B. High Volume Cases (Sampling of different procedures reviewed each qtr):

(1) Broken down by Procedure Type: CT CHEST PULMONARY EMBOLISM PROTOCOL

Effective Dose	mSv
Average	16.6
Minimum	6.8
Maximum	35.1
Total # of CT Cases (B152) Reviewed	30
# of cases over ≥10 mSv but ≤100 mSv	27
# of cases over >100 mSv	0

(2) Broken down by Procedure Type: CTA HEAD, NECK & CHEST

Effective Dose	mSv
Average	19.3
Minimum	15.9
Maximum	26.3
Total # of CT Cases (B152) Reviewed	29
# of cases over ≥10 mSv but ≤100 mSv	29
# of cases over >100 mSv	0

C. Average Volume Cases (Sampling different procedures reviewed each qtr):

(1) Broken down by Procedure Type: CT CERVICAL SPINE W/O CONTRAST

Effective Dose	mSv
Average	4.9
Minimum	1.7
Maximum	11.6
Total # of CT Cases (B152) Reviewed	30
# of cases over ≥10 mSv but ≤100 mSv	1
# of cases over >100 mSv	0

(2) Broken down by Procedure Type: CT HEAD W&WO CONTRAST

Effective Dose	mSv
Average	4.2
Minimum	3.9
Maximum	5.0
Total # of CT Cases (B152) Reviewed	29
# of cases over ≥10 mSv but ≤100 mSv	0
# of cases over >100 mSv	0

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Radiographic-Fluoroscopic Use

D. Low Volume Cases (Sampling different procedures reviewed each qtr):

(1) Broken down by Procedure Type: CT ABD W&W/O (RENAL MASS PROTOCOL)

Effective Dose	mSv
Average	40.9
Minimum	16.5
Maximum	65.0
Total # of CT Cases (B152) Reviewed	18
# of cases over ≥10 mSv but ≤100 mSv	18
# of cases over >100 mSv	0

(2) Broken down by Procedure Type: CT ORBIT SELLA P FOS OR TEMP BONE (W/O CONTRAST)

Effective Dose	mSv
Average	2.1
Minimum	0.9
Maximum	2.8
Total # of CT Cases (B152) Reviewed	12
# of cases over ≥10 mSv but ≤100 mSv	0
# of cases over >100 mSv	0

2. Patient radiation dose from Interventional Fluoroscopy (Specials B180):

See reference table/link at end of this audit related to patient skin doses.

Air Kerma (estimated entrance skin dose)		(mGy)	Fluoro Time (min)
1 Gy = 1,000 mGy	Average	306.9	5.1
	Minimum	1.0	0.0
	Maximum	6,260.6	63.5
Total # of Exams in Specials (B180) Reviewed		61	
# of exams over ≥3 Gy but <10 Gy		1	←
# of exams over ≥10 Gy but <15 Gy		0	
# of exams over ≥15 Gy		0	

3. Patient radiation dose from Cardiac Cath (A233 & A235):

See reference table/link at end of this audit related to patient skin doses.

Recorded Air Kerma (estimated entrance skin dose)		(mGy)	Estimated Dose * (mGy)	Fluoro Time (min)
1 Gy = 1,000 mGy	Average	3,306	2,663	17.9
	Minimum	1	1	0.0
	Maximum	13,754	11,086	76.1
Total # of Exams in A233 (EPL) & A235 (CCL) Reviewed		184	184	
# of exams over ≥3 Gy but <10 Gy		70	62	←
# of exams over ≥10 Gy but <15 Gy		7	2	←
# of exams over ≥15 Gy		0	0	

There were two patients who had estimated doses >10Gy:

Pt Review Greater Than 10Gy

A. Broken down by: A233 (EP Lab - EPL)

Recorded Air Kerma (estimated entrance skin dose)		(mGy)	Estimated Dose * (mGy)	Fluoro Time (min)
1 Gy = 1,000 mGy	Average	2,506	2,015	16.5
	Minimum	1	1	0.0
	Maximum	13,252	10,655	68.7
Total # of Exams in A233 (EPL) Reviewed		66	66	
# of exams over ≥3 Gy but <10 Gy		18	15	←
# of exams over ≥10 Gy but <15 Gy		2	1	←
# of exams over ≥15 Gy		0	0	

B. Broken down by: A235 (Cardiac Cath Lab - CCL)

Recorded Air Kerma (estimated entrance skin dose)		(mGy)	Estimated Dose * (mGy)	Fluoro Time (min)
1 Gy = 1,000 mGy	Average	3,754	3,026	18.8
	Minimum	17	14	0.2
	Maximum	13,754	11,086	76.1
Total # of Exams in A235 (CCL) Reviewed		118	118	
# exams over ≥3 Gy but <10 Gy		52	47	←
# exams over ≥10 Gy but <15 Gy		5	1	←
# exams over ≥15 Gy		0	0	

*** Estimated dose based on recorded dose (air kerma) overestimation (i.e., 19.4% CCL & 19.6% EPL)**

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
Radiographic-Fluoroscopic Use

4. Radiation Safety Improvements and/or Additional Comments/Problems: No If yes, explain below.

Audit performed by: Michael T. Hackett, MS, Radiation Safety Officer

References for Section 1 above

Table 1. Relative radiation level designations along with common example examinations for each classification

Relative Radiation Level*	Effective Dose Estimate Range	Example Examinations
None	0	Ultrasound, MRI
Minimal	<0.1 mSv	Chest radiographs, hand radiographs
Low	0.1-1 mSv	Pelvis radiographs, mammography
Medium	1-10 mSv	Abdomen CT, barium enema, nuclear medicine bone scan
High	10-100 mSv	Abdomen CT without and with contrast, whole body PET

*RRL assignments are not included for some examinations. These are designated as IP (in progress) or NS (not specified). The RRL assignments for the IP examinations will be available in future releases. The RRL assignments for the NS examinations cannot be made because the RRL depends on the region of the body exposed to ionizing radiation, and the body part will vary as a function of the clinical situation.

Taken from ACR Appropriateness Criteria® Radiation Dose Assessment Introduction (Relative Radiation Level Information)

Table 2

Adult Effective Doses for Various CT Procedures

Examination	Average Effective Dose (mSv)	Values Reported in Literature (mSv)
Head	2	0.9–4.0
Neck	3	...
Chest	7	4.0–18.0
Chest for pulmonary embolism	15	13–40
Abdomen	8	3.5–25
Pelvis	6	3.3–10
Three-phase liver study	15	...
Spine	6	1.5–10
Coronary angiography	16	5.0–32
Calcium scoring	3	1.0–12
Virtual colonoscopy	10	4.0–13.2

Taken from Mettler FA, Jr., Huda W, Yoshizumi TT, Mahesh M. Effective doses in radiology and diagnostic nuclear medicine: a catalog. Radiology 2008; 248(1):254-263.

Reference for Sections 2 & 3 above

Table II. Radiation-Induced Skin Injuries

Effect	Typical Threshold Absorbed Dose (Gy)*	Hours of Fluoroscopic "On Time" to Reach Threshold† at: Usual Fluoro Dose Rate of 0.02 Gy/min (2 rad/min)	High-Level Dose Rate of 0.2 Gy/min (20 rad/min)	Time to Onset of Effect**
Early transient erythema	2	1.7	0.17	hours
Temporary epilation	3	2.5	0.25	3 wk
Main erythema	6	5.0	0.50	10 d
Permanent epilation	7	5.8	0.58	3 wk
Dry desquamation	10	8.3	0.83	4 wk
Invasive fibrosis	10	8.3	0.83	
Dermal atrophy	11	9.2	0.92	>14 wk
Telangiectasis	12	10.0	1.00	>52 wk
Moist desquamation	15	12.5	1.25	4 wk
Late erythema	15	12.5	1.25	6-10 wk
Dermal necrosis	18	15.0	1.50	>10 wk
Secondary ulceration	20	16.7	1.67	>6 wk

* The unit for absorbed dose is the gray (Gy) in the International System of units. One Gy is equivalent to 100 rad in the traditional system of radiation units.

† Time required to deliver the typical threshold dose at the specified dose rate.

** Time after single irradiation to observation of effect.

(Table adapted from Ref. 4.)

Taken from FDA's Avoidance of Serious X-ray-Induced Skin Injuries to Patients During Fluoroscopically-Guided Procedures

3. Patient radiation dose from Cardiac Cath - A233 & A235 (EP & Cardiac Cath Labs - EPL & CCL)
Patients >10 Gy for the quarter.

Date & Time	Patient (see RSO file)	Procedure(s)	Lab & Room	Fluoro Time (min)	Dose (mGy)	Record DAP (cGy.cm2)	Fluoro DAP (cGy.cm2)	Total DAP (cGy.cm2)	Estimated Dose * (mGy)
OCT 6,2009@07:45	Patient # 1	SELECTIVE CORONARYS ONLY RADI WIRE	CCL A235	76.1	13,754	21,457	59,458	80,915	11,086

1 Gy = 1,000 mGy

*** Estimated dose based on recorded dose overestimation (i.e., 19.4% CCL & 19.6% EPL)**

Record Review (see CPRS for more details)

Patient # 1:

CARDIAC CATH PROCEDURE NOTE - CARDIAC DIAGNOSTIC AND THERPEUTIC PROCEDURE REPORT (DATE OF NOTE: OCT 06, 2009@10:42)
FINAL DIAGNOSIS
1. Significant RCA atherosclerotic disease (1 Vessel CAD)
RECOMMENDATIONS
Proceed with PCI of RCA lesion.

CARDIAC CATH PROCEDURE NOTE - PERCUTANEOUS CARDIAC INTERVENTION REPORT (DATE OF NOTE: OCT 06, 2009@13:42)
FINAL RESULTS
PCI of hemodynamically significant lesion (by FFR) in RCA using 1 Xience stent initially but then placing 2 Xience stents more proximally as described due to dissection. Unable to pass equipment after multiple attempts to treat the dissection in the vessel beyond the stented segment and patient taken to CABG emergently.

INTERFACILITY TRANSFER NOTE (DATE OF NOTE: OCT 07, 2009@08:55)
Mr. ..... was sent to UKMC on 10/06/09 for emergent heart surgery, he is currently in the ICU and on the ventilator. Will continue to follow.

CARDIOTHORACIC CASE MANAGEMENT NOTE (DATE OF NOTE: OCT 09, 2009@09:58)
Notified of plans to discharge from UK on Monday, 10-12-09, s/p emergent cabg on 10-6-09

@ ~4 weeks MEDICAL STUDENT SOAP NOTE (DATE OF NOTE: NOV 03, 2009@15:34)
A/P:60 yo male s/p CABG on 10/6/2009. Onset of Atrial Fibrilation post op. Otherwise recovering as expected.
11/03/2009 ADDENDUM STATUS: COMPLETED
Seen and examined the patient with medical student Mr. ....., discussed the assessment and plan and agree with note.Doing well after emergent CABG x1 with Free RIMA-PDA after RCA dissection during PCI attemp. Had post op afb after D/C to home requiring admission to Whitesburg hospital.

@ ~15 weeks HUNTINGTON VAMC:

01/25/2010 16:51 Local Title: SKIN ASSESSMENT-NURSING
CURRENT SKIN ASSESSMENT
Skin Color:
Color: Normal for ethnic group
Skin Temperature
Temp: Warm
Skin Moisture
Moisture: Dry
Skin Turgor
Turgor: Within normal limits
SKIN PROBLEMS
No wounds, pressure ulcers or other skin problems.

01/25/2010 17:02 Local Title: NURSING-PLAN OF CARE/GENERAL
INTEGUMENTARY SYSTEM:
Skin Temperature:
Warm to touch -
Moisture:
Dry -
Skin Color:
Pink:
Skin Turgor:
Good -
Skin Integrity:
All skin intact

01/26/2010 17:12 Local Title: NURSING-PLAN OF CARE/GENERAL
INTEGUMENTARY SYSTEM:
Skin Temperature:
Warm to touch -
Moisture:
Dry -
Skin Color:
Pink:
Skin Turgor:
Good -
Skin Integrity:
All skin intact

01/27/2010 05:18 Local Title: NURSING-PLAN OF CARE/GENERAL
INTEGUMENTARY SYSTEM:
Skin Temperature:
Warm to touch -
Moisture:
Dry -
Skin Color:
Pink:
Skin Turgor:
Good -
Skin Integrity:
All skin intact

3. Patient radiation dose from Cardiac Cath - A233 & A235 (EP & Cardiac Cath Labs - EPL & CCL)
Patients >10 Gy for the quarter.

Date & Time	Patient (see RSO file)	Procedure(s)	Lab & Room	Fluoro Time (min)	Dose (mGy)	Record DAP (cGy.cm2)	Fluoro DAP (cGy.cm2)	Total DAP (cGy.cm2)	Estimated Dose * (mGy)
DEC 28,2009@11:10	Patient # 2	SELECTIVE CORONARYS ONLY	EPL A233	56.2	13,252	69,499	27,822	97,321	**10,655**

1 Gy = 1,000 mGy *** Estimated dose based on recorded dose overestimation (i.e., 19.4% CCL & 19.6% EPL)**

Record Review (see CPRS for more details)

Patient # 2:	**CARDIAC CATH PROCEDURE NOTE - CARDIAC DIAGNOSTIC AND THERPEUTIC PROCEDURE REPORT (DATE OF NOTE: DEC 28, 2009@16:11)** FINAL DIAGNOSIS 1. obstructive RCA lesion with CTO of PDA filling via L to R collaterals 2. patent LAD stent RECOMMENDATIONS 1. PCI to RCA with BMS; please see other note
	CARDIAC CATH PROCEDURE NOTE - PERCUTANEOUS CORONARY INTERVENTION REPORT (DATE OF NOTE: DEC 28, 2009@15:38) FINAL RESULTS Moderate non-obstructive CAD of the LAD and LCx. Patent stents in the LAD and RCA. Severe stenosis of the distal RCA. CTO of the PD
within 24 hrs	**NURSING SKIN REASSESSMENT (DATE OF NOTE: DEC 29, 2009@05:44)** CURRENT SKIN ASSESSMENT Skin Color: Color: Normal for ethnic group Skin Temperature Temp: Warm Skin Moisture Moisture: Dry Skin Turgor Turgor: Within normal limits SKIN PROBLEMS No wounds, pressure ulcers or other skin problems.
@ ~3.5 weeks	**CARDIOLOGY POST STENT CLINIC PHYSICIAN NOTE (DATE OF NOTE: JAN 22, 2010@09:06) &** **CARDIOLOGY CLINIC NURSING INTAKE NOTE (DATE OF NOTE: JAN 22, 2010@13:12)** - Nothing noted about skin problems

Table II. Radiation-Induced Skin Injuries

Effect	Typical Threshold Absorbed Dose (Gy)*	Hours of Fluoroscopic "On Time" to Reach Threshold** at Usual Fluoro Dose Rate of 0.02 Gy/min (2 rad/min)	Hours of Fluoroscopic "On Time" to Reach Threshold** at High-Level Dose Rate of 0.1 Gy/min (10 rad/min)	Time to Onset of Effect**
Early transient erythema	2	1.7	0.17	hours
Temporary epilation	5	2.5	0.25	5 wk
Main erythema	6	5.0	0.50	10 d
Permanent epilation	7	5.8	0.58	3 wk
Dry desquamation	10	8.3	0.83	4 wk
Invasive fibrosis	10	8.3	0.83	
Dermal atrophy	11	9.2	0.92	>14 wk
Telangiectasia	12	10.0	1.00	>52 wk
Moist desquamation	15	12.5	1.25	4 wk
Late erythema	15	12.5	1.25	6-10 wk
Dermal necrosis	18	15.0	1.50	>10 wk
Secondary ulceration	20	16.7	1.67	>6 wk

* The unit for absorbed dose is the gray (Gy) in the International System of units. One Gy is equivalent to 100 rad in the traditional system of radiation units.
** Time required to deliver the typical threshold dose at the specified dose rate.
*** Time after single irradiation to observation of effect.

(Table adapted from Ref. 4.)

Taken from FDA's Avoidance of Serious X-ray-Induced Skin Injuries to Patients During Fluoroscopically-Guided Procedures

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
ALARA-Radiation Exposure

1. Personnel Exposure Records/ALARA Investigational Levels:

Quarterly ALARA Levels & Annual Limits are expressed in mrem	ALARA Quarterly Investigational Levels		Annual Limits*
	Level I (10% of ¼ annual limits)	Level II (30% of ¼ annual limits)	
Whole Body (WB) Deep Exposure (DDE = Deep Dose Equivalent) (if lead/lead equivalent apron **not** used)	**125**	**375**	**5,000**
Whole Body Effective Dose Equivalent (WB EDE) = 0.3 x DDE (due to use of lead/lead equivalent apron)	**125**	**375**	**5,000**
Lens of Eye Exposure (LDE = Lens Dose Equivalent)	**375**	**1,125**	**15,000**
WB Shallow (Skin) Exposure (SDE = Shallow Dose Equivalent)	**1,250**	**3,750**	**50,000**
Extremity Shallow Exposure (SDE = Shallow Dose Equivalent)	**1,250**	**3,750**	**50,000**

* Annual Occupational Dose Limits for Adults based on NRC Regulations

A. Radioactive Materials Use:

a) Follow-up on previous quarter's review: x0
- None to report.

b) Exceeded the ALARA Quarterly Investigational Level I (10% of ¼ annual limit): x0
- None to report.

c) Exceeding ALARA Quarterly Investigational Level II (30% of ¼ annual limit): x0
- None to report.

2009 Annual Review: During 2009, there were not any ALARA I or II levels exceeded for radioactive materials use. This is an improvement over 2008 when there were 7 times ALARA I levels (all Nuclear Medicine technologists with 3 WB DDE & 4 Extremity SDE) were exceeded (i.e., no ALARA II levels exceeded in 2008). Some of the reduction in radiation exposure primarily to the extremities can be contributed to the stoppage of in-house preparation of radiopharmaceuticals & Mo-99/Tc-99m generator use in June 2008 due to the revised USP <797> requirements and the start of purchasing unit dose radiopharmaceuticals. In 2009, the highest percentage obtained of the annual occupational limits was at 8.5% (i.e., Nuclear Medicine Technologist with 426 mrem WB DDE of the annual limit of 5,000 mrem) – **No one monitored exceeded 10% of the annual occupational limits**.

B. Radiographic-Fluoroscopic Use:

a) Follow-up on previous quarter's review: x1

Exceeded the lens dose equivalent of 375 mrem: x1

1) Badge #534, nurse in the cath lab exceeded the lens dose equivalent ALARA investigational level I of 375 mrem with a quarterly reading of 380 mrem in the 3rd calendar quarter of 2009. This employee was within this ALARA level for the 4th calendar quarter of 2009 with a quarterly reading of 274 mrem with 2009 annual total of 1,360 mrem which is only 9.1% of the annual occupational limit.

b) Exceeded the ALARA Quarterly Investigational Level I (10% of ¼ annual limit): x0
- None to report.

c) Exceeding ALARA Quarterly Investigational Level II (30% of ¼ annual limit): x0
- None to report.

2009 Annual Review: During 2009, there were only 3 times ALARA I levels (i.e., Cath Lab & Pain Clinic staff with 1 WB EDE & 2 LDE with no ALARA II levels exceeded) were exceeded for radiographic-fluoroscopic use. This is an improvement over 2008 when there were 10 times ALARA I levels (Cath Lab & Pain Clinic staff with 3 WB EDE & 7 LDE) were exceeded (i.e., no ALARA II levels exceeded in 2008). In 2009, the highest percentage obtained of the annual occupational limits was at 9.1% (i.e., nurse in the cath lab with 1,360 mrem LDE of the annual limit of 15,000 mrem) – **No one monitored exceeded 10% of the annual occupational limits**.

Radiation Safety Committee
Detailed Quarterly Audit for Oct - Dec 2009
ALARA-Radiation Exposure

2. I-125/I-131 Bioassay Results:

Were performed 6-72 hours post handling and each measured uptake was less than or equal to the minimal detectable activity (MDA) of the counting system on the day of counting. Radiopharmaceutical and research use records were reviewed to assure that each use requiring a bioassay had a documented bioassay.

a) Nuclear Medicine: Administration of ≥ 1 mCi in solution or ≥ 10 mCi in capsule form of I-131 as NaI or any problem/issue (e.g., spill, damaged capsule) with I-131 as NaI that may lead to intake even though based on past bioassays and our I-131 as NaI usage, it is unlikely that any staff member exceed 10% of the annual limit on intake (i.e., 5 μCi/year via inhalation with ALI of 50 μCi/year):
   - One employee (1 bioassay) after 1 NaI administration (i.e., 1: 18.3 mCi in capsule form) with MDA of ≤ 0.006 μCi.

b) Research: Use of ≥ 1 mCi in solution of I-125 as NaI or any problem/issue (e.g., spill) with I-125 as NaI that may lead to intake:
   - None to report.

Follow-up: None required.

3. Pregnant Radiation Workers:

- None to report.

4. Quarterly Area Monitors Involving Radioactive Materials:

Three areas are monitored with quarterly radiation badges (deep dose equivalent):

			QTR mrem	2009 mrem
a)	NM2	Wall in main hallway outside Nuclear Medicine, i.e., outer wall of hot lab	1	25
b)	NM3	Wall in main hallway outside Nuclear Medicine, i.e., outer wall of hot lab	M	M
c)	RES1	Doorway of research radioactive waste storage room	M	M

The minimal detectable (M) quantity is <1 mrem for x-ray and gamma rays, and <10 mrem for energetic beta particles). The 2009 annual readings for all the above areas were less than 100 mrem/area.

Follow-up: None required.

5. Sanitary Sewer Disposal of Radioactive Material:

- None to report.

6. Radiation Safety Improvements and/or Additional Comments/Problems:

- The medical center complied with the NRC's constraint of radioactive air effluents (<10 mrem) for 2009. Comply calculations were based on the possession limit method.

Audit performed by: Michael T. Hackett, MS, Radiation Safety Officer

Radiation Safety Committee (RSC)
Comprehensive Radiation Safety Program Annual Review for 2009

- The RSC met at least quarterly (see attached) to review the 2009 quarterly radiation safety audits and findings from these meetings have been/will be presented for review at the Environment of Care Council.

RSC Dates for 2009 Reviews

- Radiation safety training for radioactive materials (see attached) was available on the public drive. Some enhanced had been made but training materials for radiographic/fluoroscopic use still need to be developed.

2009 Radiation Safety Training

- In April 2009, received a Notice of Violation (NOV) (see attached) from the Nuclear Regulatory Commission (NRC) concerning the September 2007, VHA National Health Physics Program (NHPP) unannounced inspection which included several other NOVs. In May, a reply to NOV was sent to the NRC through NHPP outlining corrective action that had been already taken shortly after the NHPP inspection and NOVs.

NRC NOV 04.2009

NRC NOV Reply 05.2009

- Performance goals addressed in 2009 that have been completed:
  - Develop performance goals
  - Update patient instructions for I-131 therapies
  - Further develop radiographic-fluoroscopic use quarterly audit

- Performance goals addressed in 2009 that require completion in 2010:
  - Finalize closeout survey procedure for the Medical Center
  - Deactivation of several inactive labs in Research
  - Complete of the re-approval process of Authorized Users in Research
  - Further enhance radiation safety training to include radiographic-fluoroscopic use areas

- Performance goals addressed in 2009 that have not been completed & will no longer be addressed at this time (reason):
  - Develop core performance indicators (at this time, current trending reports provides adequate performance information)
  - Further develop access to radiation safety information (at this time, current access via the radiation safety public drive folder provides adequate radiation safety information)

- Additional performance goals in 2010:
  - Develop prostate brachytherapy (i.e., contracted services at local hospital) quarterly review
  - Develop a dose alert during cardiac cath procedures plus an automatic review of cases >10 Gy
  - Develop training for RSC concerning radiation emergency response

- Trending reports were used as part of this comprehensive radiation safety program annual review (see attached). Deficiency Summaries and Notable Changes & Updates for the year have been outlined in greater detail on pages 3-10 of this annual review.

Trending Report for 2009

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

- See the following 2009 deficiency detailed summaries for:
  - Nuclear Medicine Service
  - Research Service
  - Radiographic-Fluoroscopic Use
  - ALARA-Radiation Exposure

Deficiency Summary KEY:	
2009 deficiency with *no deficiency in 2008*; e.g.,	
1 time – 4Q	*(2008:0)*
2009 deficiency with no improvement when compared to *deficiency in 2008*; e.g.,	
1 time – 1Q	*(2008:1)*
2009 deficiency with improvement when compared to *deficiency in 2008*; e.g.,	
5 times – 1Q, 2Q, 4Q	*(2008:27)*

- See the following 2009 notable changes & update detailed summaries for:
  - Nuclear Medicine Service
  - Research Service
  - Radiographic-Fluoroscopic Use
  - ALARA-Radiation Exposure

Notable Changes & Updates Key:	
2009 notable change/update (i.e., no deficiency) *without issue in 2008*; e.g.,	
In Feb	*(2008:N/A)*
2009 notable change/update (i.e., no deficiency) when compared to same notable change/update in 2008; e.g.,	
In Dec	*(2008:In Dec)*
2009 notable change/update (i.e., no deficiency) when compared to *deficiency in 2008*; e.g.,	
2008: 0	*(2008:1)*

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

Nuclear Medicine Service		
Deficiency Summary: **Some deficiencies may include notable changes (i.e., decrease compared to 2008) as noted by the 2-color highlight (2009 in yellow with *2008 in green*).**		
Radiation Safety Issue	**Cause**	**Corrective Action & Any Other Notable Action Taken**
1. Daily Radiation Surveys: • Surveys greater than trigger level: 5 times – 1Q, 2Q, 4Q *(2008:27)*	Due to minor radioactive contamination. All initial readings although above trigger level (TL) were fairly low and were in areas where increased radiation levels may be seen.	• Prompt and appropriate action to lower these levels below TL was taken. **Special follow up from 2008 actions:** In 2007, contamination in the stress area regular trash (monitored before being removed by EMS) and/or the non-radioactive sharps container (before being disposed as routine biohazard waste) had increased. These were due to minor back flow into IV items that should not normally be contaminated with radioactivity (e.g., IV tubing, used syringes). In 2008, corrective action (disposal of IV line & added shielding to sharps container) was phased into use in 1Q and was added to the quarterly trending data. Additional staff training on this subject was performed in February 2008 and again in October 2008. ○ ***Surveys greater than trigger level within the Imaging Room - in regular trash and/or non-radioactive sharps:*** **2 times – 2Q, 4Q** ***(2008:6)*** In 2008, contamination on the injection table pad had increased; therefore, it was added to the quarterly trending data. Additional staff training on this subject was performed in October 2008 and was also discussed in the November 2008 staff meeting. ○ ***Surveys greater than trigger level within the Injection Room - on injection table pad*** **1 time – 1Q** ***(2008:11)*** • **In review of the improvements seen in the 2009 data compared to 2008, corrective action taken in 2008 was very successful.**
2. Weekly Radiation Wipes: • Wipes greater than trigger level: 4 times – 1Q, 2Q, 3Q *(2008:5)*	Due to minor radioactive contamination. All initial wipes although above trigger level (TL) were fairly low and were in areas where increased contamination levels may be seen.	• Prompt and appropriate action to lower these levels below TL was taken.

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

Nuclear Medicine Service		
Deficiency Summary: **Some deficiencies may include notable changes (i.e., decrease compared to 2008) as noted by the 2-color highlight (2009 in yellow with *2008 in green*).**		
Radiation Safety Issue	**Cause**	**Corrective Action & Any Other Notable Action Taken**
4. Daily Dose Calibrator (DC) Constancy Checks (2 dose calibrators):		
• Constancy checks not performed daily if used for pts as required: 1 time – 4Q *(2008:0)*	Daily constancy check was not completely done (i.e., only 1 of 5 settings documented as checked & it was within limits) on the non-Tc-99m dose calibrator (i.e., CRC-15R). Procedures were not followed.	• Based on the patient schedule that day, only one patient assay involving Xe-133 was performed on that dose calibrator on that day. The RSO discussed this issue with the nuclear medicine technologist involved and her supervisor. **Special follow up from 2008 actions:** In 2008, several times on the non-Tc-99m dose calibrator which is used infrequently (i.e., not every day for patient doses), the constancy checks had not been performed or partially done on days not used for patients. Added reminder labels to the dose calibrator & L-shield concerning daily constancy checks in October 2008. Additional staff training concerning constancy checks was performed in November 2008. Tracking of this issue was added to the quarterly trending data to check how effective the above action was. • ***# of times constancy checks on non-Tc-99m DC not performed daily but not used for patients:*** **1 time – 2Q** ***(2008:3)***
16. Reported Radioactive Spills:		
• Reported radioactive spill occurred: 1 time – 1Q *(2008:1)*	While disposing of a changed needle from a patient dose prior to its use, 1-2 drops of Tc-99m fell from the needle hub onto the edge of the counter top, cabinet drawer and floor by baseboard. The primary cause of this minor spill was the position of the shielded sharps container in reference to the L-shield where the needle change occurred. The counter top in front of the shielded sharps container is covered with an absorbent pad but the drops just missed this pad during the transfer process.	• The mini-spill kit that was available in the area was used and the staff immediately put on shoe covers and monitoring occurred of the staff and spill area. No staff contamination or contamination outside of immediate spill area was found via surveys and wipes. The spill area was decontaminated as much as possible then labeled after it was covered and shielded to background levels to allow for decay. • Spill was minor and well contained. Good and prompt response to the spill (e.g., use of mini-spill kits). • The position of the shielded sharps container was changed so it is closer to the L-shield, thus minimizing the possibility of contamination of uncovered area (e.g., cabinets or floor). This spill and the corrective action was discussed during the February staff meeting and was reviewed by the staff in April/May as part of the monthly radiation safety reminder presentation.

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

Nuclear Medicine Service		
Deficiency Summary: Some deficiencies may include notable changes (i.e., decrease compared to 2008) as noted by the 2-color highlight (2009 in yellow with *2008 in green*).		
Radiation Safety Issue	**Cause**	**Corrective Action & Any Other Notable Action Taken**
17. Quarterly Review of In-coming Radionuclide Receiving Records:		
• # of times receiving records were missing pertinent info (e.g., survey/wipe results): 1 time – 1Q *(2008:0)*	Tc-99m shipment did not have wipe test results documented. Procedures were not followed.	• External surveys were well within limits and typical for this package. The return package's (i.e., empty dose containers) external wipes and surveys done that same day again were well within limits and typical for this package. RSO spoke with technologist involved about verifying that all pertinent info has been recorded.
• # of times package receiving problems noted (e.g., contamination, wrong material): 6 times – 1Q *(2008:3)*	• 3 shipments from local radiopharmacy were delivered very minor contamination noted for the inner package (i.e., foam securing the doses in place) although the external wipes and surveys were well within limits and typical for these packages.	• The return packages' (i.e., empty dose containers) external wipes and surveys again were well within limits and typical for those packages. The local radiopharmacy will handle these packages as contaminated depending on their monitoring.
	• 2 Tc-99m shipments from local radiopharmacy were delivered on the federal holiday in error.	• Local radiopharmacy promptly delivered new radioactive material for our use while the doses from the 2 shipments sent in error were held for decay.
	• 1 In-111 shipment was delivered in error by the courier to local radiopharmacy.	• Local radiopharmacy repackaged the radionuclide and promptly delivered the radioactive material for our use.
18. Quarterly Review of Out-going Radionuclide/Return Package Records:		
• # of in-coming shipments from local radiopharmacy that did not have out-going documentation: 7 times – 2Q, 3Q, 4Q *(2008:0)*	Return documentation not recorded. Procedures were not followed.	• In December 2009, the RSO discussed this issue about documentation problems with each nuclear medicine technologist. Combined local radiopharmacy shipment receipt and return documentation forms so there will be only one form and each shipment will have documentation of receipt and return on one line. RSO reviewed this new form with the nuclear medicine staff for first use in January 2010. • In February 2010, the RSO again discussed this issue about documentation problems with the nuclear medicine staff (i.e., individually and in the Nuclear Medicine staff meeting), setup a monthly review of the use of the new receipt/return form (no problems with the 64 shipments received & returned in January 2010), and staff reviewed radiation safety refresher presentation.

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

Nuclear Medicine Service		
Notable Changes & Updates: **Some notable changes may be on the Deficiency Summary as noted by the 2-color highlight.**		
Radiation Safety Issue	**Notable Change/Update**	**Any Other Notable Action Taken**
1. Daily Radiation Surveys: • Surveys not performed daily as required:	2009: 0 *(2008:1)*	• Additional staff training concerning performing surveys daily was performed in October 2008.
3. Mo-99/Tc-99m Assays (discontinued use in June 2008 due revised USP <797>):		
	Mo-99/Tc-99m generators are not currently being used; therefore, this audit item will be dropped in 2010.	
4. Daily Dose Calibrator (DC) Constancy Checks (2 dose calibrators):		
	Mo-99 setting is not currently being used clinically; therefore, will no longer be checked daily starting 2010.	**Special follow up from 2008 actions:** In 2008, several times on the non-Tc-99m dose calibrator which is used infrequently (i.e., not every day for patient doses), the constancy checks had not been performed or partially done on days not used for patients. Added reminder labels to the dose calibrator & L-shield concerning daily constancy checks in October 2008. Additional staff training concerning constancy checks was performed in November 2008. Tracking of this issue was added to the quarterly trending data to check how effective the above action was. • ***# of times constancy checks on non-Tc-99m DC incompletely performed daily but not used for patients:*** 2009: 0 *(2008:2)*
10. Monthly Xenon Machine Quality Control Checks: • Quality control checks not within limits :	2009: 0 *(2008:1)*	• In 2008, xenon trap alarm's actual activation distance was not within the excepted limits. The xenon trap was removed and imaged to check to see if the trap needed to be replaced (i.e., 8 distinct spots seen). Two of the 8 chambers could be barely seen; therefore, the xenon trap replacement was not indicated. Troubleshooting guide suggested replacement of the detector board or the GM tube if the trap replacement was not needed. A new replacement xenon system had been received; therefore, repair of the old system's alarm was not warranted since its use would be limited (i.e., until activation of the new system pending testing & training which occurred in January 2009).

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

Nuclear Medicine Service			
Notable Changes & Updates: Some notable changes may be on the Deficiency Summary as noted by the 2-color highlight.			
Radiation Safety Issue	**Notable Change/Update**		**Any Other Notable Action Taken**
18. Quarterly Review of Out-going Radionuclide/Return Package Records:			
• # of times out-going records were missing pertinent info (e.g., survey/wipe results):	2009: 0	*(2008:1)*	
21. Radiation Safety Improvements and/or Additional Comments/Problems:			
	in Feb	*(2008: N/A)*	• Modified the position of the Tc-99m shielded sharps container in the hot lab & added splash guard to help prevent spills.
	in Feb	*(2008: N/A)*	• Replaced Cs-137 dose calibrator standard's shielding and labeling.
	in May	*(2008: N/A)*	• Raised & modified the position of the Tc-99m shielded sharps container in the hot lab to reduce radiation exposure.
	in Jun	*(2008: N/A)*	• Mounted locked shielded sharps container in the imaging room (1) to the wall to better secure radioactive/biohazard waste.
	in Jul	*(2008: N/A)*	• Mounted locked shielded sharps containers (2) in the injection & imaging rooms to the wall to better secure.
	in Oct/Nov	*(2008: N/A)*	• Updated required annual radiation safety training (e.g., added slides & questions, electronic test with question hint slides & % correct).
	in Dec	*(2008: in Dec)*	• Restocked replacement items in the radiation spill kit and setup updated mini-radiation spill kits that were later distributed in Jan .

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

Research Service		
Deficiency Summary: Some deficiencies may include notable changes (i.e., decrease compared to 2008) as noted by the 2-color highlight (2009 in yellow with *2008 in green*).		
Radiation Safety Issue	**Cause**	**Corrective Action & Any Other Notable Action Taken**
N/A		

Research Service			
Notable Changes & Updates: Some notable changes may be on the Deficiency Summary as noted by the 2-color highlight.			
Radiation Safety Issue	**Notable Change/Update**		**Any Other Notable Action Taken**
3. Quarterly Record Audit of Weekly Radiation Wipes Performed by each Authorized User Labs:			
• Wipes not been performed as required:	2009: 0	*(2008:4)*	
• Wipes greater than trigger level:	2009: 0	*(2008:2)*	
13. Quarterly Review of In-coming Radionuclide Receiving Reports:			
• # of times package receiving problems noted (e.g., contamination, wrong material):	2009: 0	*(2008:1)*	
16. Radiation Safety Improvements and/or Additional Comments/Problems:			
	in Apr	*(2008: N/A)*	• Worked w/ Research Safety Manager to update safety training for all research staff & lab entrance poster (both included radiation safety).
	in Aug	*(2008: in Aug)*	• Restocked replacement items (i.e., due in August) in the radiation spill kits.
	in Nov	*(2008: N/A)*	• Added annual radiation safety training for research administrative staff.

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

Radiographic-Fluoroscopic Use

Deficiency Summary:

Some deficiencies may include notable changes (i.e., decrease compared to 2008) as noted by the 2-color highlight (2009 in yellow with *2008 in green*).

Radiation Safety Issue	Cause	Corrective Action & Any Other Notable Action Taken
2. Patient radiation dose from Interventional Fluoroscopy (Specials B180):		
• # of these exams with total dose > 3 Gy but < 10 Gy: 2 times – 3Q, 4Q *(2008:1 Dec Only)*	Patient dose is dependent on length and complexity of the case.	• Out of the 340 cases in Specials, only 2 cases (0.6%) had estimated doses > 3 Gy but < 10 Gy. This estimate assumes there was no movement of the x-ray beam during the procedure which in most cases there is beam movement; therefore, the dose in most cases is a conservative overestimation of the actual patient skin dose.
3. Patient radiation dose from Cardiac Cath (A233 & A235):		
• # of these exams with total dose > 3 Gy but < 10 Gy: 219 times – 1Q, 2Q, 3Q, 4Q *(2008:14 Dec only)*	Patient dose is dependent on length and complexity of the case.	• Out of the 842 cases for cardiac cath, 219 cases (26%) had estimated doses > 3 Gy but < 10 Gy. This estimate assumes there was no movement of the x-ray beam during the procedure which in most cases there is beam movement; therefore, the dose in most cases is a conservative overestimation of the actual patient skin dose.
• # of these exams with estimated dose > 10 Gy but < 15 Gy: 2 times – 4Q *(2008:0 Dec only)*	Patient dose is dependent on length and complexity of the case.	• Reviewed patient records and no reported skin injury at ~4 weeks post procedure. Working with Cardiology to institute sometime in 2010 a dose alert (e.g., "3-6-9" in Gy) during procedures plus an automatic review of cases >10 Gy (e.g., follow up with pt at ~4 & 14 wks).

Radiographic-Fluoroscopic Use

Notable Changes & Updates:

Some notable changes may be on the Deficiency Summary as noted by the 2-color highlight.

Radiation Safety Issue	Notable Change/Update	Any Other Notable Action Taken
1. Patient radiation dose from CT (B152 only): B. High Volume Exams (J-J)/Cases (J-D) C. Average Volume Exams (J-J)/Cases (J-D) D. Low Volume Exams (J-J)/Cases (J-D)	Changed from exam review (Jan-Jun) to case review (Jul-Dec)	
3. Patient radiation dose from Cardiac Cath (A233 & A235): • Average estimated dose * (Gy) for these exams:	Updated 2008-2009 data (i.e., from recorded dose to estimated dose).	* Estimated dose based on recorded dose overestimation (i.e., 19.4% CCL & 19.6% EPL)
4. Radiation Safety Improvements and/or Additional Comments/Problems:		
	in 1 Qtr *(2008: N/A)*	• Additional monitoring started (i.e., pt radiation dose from CT from high to low volume exams: 1.B.-D.).
	in Jun *(2008: N/A)*	• Special dose (i.e., air kerma) evaluation done on Specials & Cardiac Cath equipment.

Radiation Safety Committee (RSC)

Comprehensive Radiation Safety Program Annual Review for 2009

ALARA-Radiation Exposure

Deficiency Summary:

Some deficiencies may include notable changes (i.e., decrease compared to 2008) as noted by the 2-color highlight (2009 in yellow with *2008 in green*).

Radiation Safety Issue	Cause	Corrective Action & Any Other Notable Action Taken
1. Personnel Exposure Records/ALARA Investigational Levels:		
B. Radiographic-Fluoroscopic Use:		
• Exceeded the ALARA Quarterly Investigational Level I (10% of ¼ annual limit): 3 times – 1Q, 3Q *(2008:10)*	Occupational radiation exposure from clinical use of x-rays.	• These levels of exposure are not unusual in areas where radiographic/ fluoroscopic procedures are performed. **No one monitored exceeded 10% of the annual occupational limits.**

ALARA-Radiation Exposure

Notable Changes & Updates:

Some notable changes may be on the Deficiency Summary as noted by the 2-color highlight.

Radiation Safety Issue	Notable Change/Update	Any Other Notable Action Taken
1. Personnel Exposure Records/ALARA Investigational Levels:		
A. Radioactive Materials Use:		
• Exceeded the ALARA Quarterly Investigational Level I (10% of ¼ annual limit):	2009: 0 *(2008:7)*	• Some of the reduction in radiation exposure primarily to the extremities can be contributed to the stoppage of in-house preparation of radiopharmaceuticals & Mo-99/Tc-99m generator use in June 2008 due to the revised USP <797> requirements and the start of purchasing unit dose radiopharmaceuticals.
2. I-125/I-131 Bioassay Results:		
• Bioassays not performed within 6-72 hours post administration:	2009: 0 *(2008:1)*	
4. Quarterly Area Monitors Involving Radioactive Materials:		
• NM2 monitor - wall in main hallway outside Nuclear Medicine (i.e., outer wall of hot lab) qtrly total in mrem:	2009: 25 *(2008:71)*	
• # of area monitors with readings > 100 mrem for the current calendar year:	2009: 0 *(2008:0)*	
6. Radiation Safety Improvements and/or Additional Comments/Problems:		
	in 2009 *(in 2008)*	• Compliant with NRC's constraint of radioactive air effluents for the current calendar year.

Radiation Safety Committee (RSC)
Comprehensive Radiation Safety Program Annual Review for 2009

Recommend Approval / ~~Disapproval~~ Michael T. Hackett, M.S., Radiation Safety Officer	Recommend Approval / ~~Disapproval~~ Cheryl D. Baker, M.D. Chief of Radiology/RSC Chair
Recommend Approval / ~~Disapproval~~ Donna K. Jacobs, FACHE, Associate Director/RSC Management Representative	Approved / Disapproved Sandy J. Nielsen, FACHE, Director

Radiation Safety Committee Dates and Attendance Record for 2009 Reviews

Time period being reviewed at the Radiation Safety Committee (RSC) meeting (i.e., during 2009)		2009 Jan-Mar	2009 Apr-Jun	2009 Jul-Sep	2009 Oct-Dec	2009 Review	Total # of RSC Meetings	P = Present	R^{AMR} = Represented By Alternate Management Representative (voting member)	R = Represented By	E = Excused	A = Absent
Scheduled Date of Radiation Safety Committee meeting (i.e., set up for the 4th Thursday of 2nd month of the quarter following the review period & as needed)		Scheduled for 05/28/09; Rescheduled for 06/04/09	Scheduled for 08/27/09	11/26/09 = Holiday; Rescheduled for 12/30/09	Scheduled for 02/25/10; Rescheduled for 03/04/10							
Actual Date of Radiation Safety Committee meeting		**06/04/09**	**08/27/09**	**12/30/09**	**03/04/10**							
Scheduled Date above RSC minutes presented to Environment of Care Council (i.e., set up for the 2nd Thursday of 1st month of the quarter following the above mentioned RSC meeting & as needed - e.g., annual review presented at the following Environment of Care Council meeting)		Scheduled for 07/09/09	Scheduled for 10/08/09	Scheduled for 01/14/10	Scheduled for 04/08/10	Scheduled for 03/11/10						
Actual Date above RSC minutes presented to Environment of Care Council		**07/09/09**	**10/08/10**	**01/14/10**	**TBA**	**03/11/10**						
Radiation Safety Committee (RSC) Membership		**RSC Attendance**										
Representing Service	Member Name/Title											
Chair, Member from Radiology Service (physician)	**Cheryl D. Baker, M.D.** Chief of Radiology Service	P	P	P	P		4	4	N/A	0	0	0
Radiation Safety Officer	**Michael T. Hackett, MS** Radiation Safety Officer	P	P	P	P		4	4	N/A	0	0	0
Member from Management	**Donna Jacobs, FACHE** Associate Director (AD)	R^{AMR} by W. Divers, MD, Chief of Staff **	P	R^{AMR} by J. Pellecchia, MD, Chief of Staff **	P		4	2	2	0	0	0
Member from Nuclear Medicine Service (physician)	**Wei-Jen Shih, M.D.** Service Chief, Clinical Authorized User	P	P	P	E		4	3	N/A	0	1	0
Member from Nuclear Medicine Service (technical staff)	**Vickie Kiefer, CNMT** Chief Technologist	P	P	P	P		4	4	N/A	0	0	0
Member from Patient Care Services (Nursing)	**Shannon Hardin, R.N.** Nurse Manager for 2 South/ Cardiac Cath	P	P	P	P		4	4	N/A	0	0	0
Member from Research Service	**Steve Brown, Ph.D.** Research: Chemist, Safety Manager, Authorized User	P	P	P	P		4	4	N/A	0	0	0
Member from Radiology Service (technical staff)	**Bert D. Morgan, R.T.** Administrative Officer	P	E	E Note: No longer in this position, new member needed.	E Note: No longer in this position, new member will added when position filled.		4	1	N/A	0	3	0
Member from NAGE	**Jon Jones** NAGE Safety Officer	A	A	A	A		4	0	N/A	0	0	4
# of RSC members present (P & R^{AMR})		8	7	7	6							
# of RSC members represented by (R)		0	0	0	0							
# of RSC members excused (E)		0	1	1	2							
# of RSC members absent (A)		1	1	1	1							
Total # of RSC members		9	9	9	9							
Was a quorum* present?		Yes	Yes	Yes	Yes							

* Quorum: at least one-half of the committee membership is in attendance and must include the Chair (or designee), Radiation Safety Officer and a management representative (or designee).

** Alternate Management Representative (AMR)

2009 Radiation Safety Training Review - By Service/Section

Section/Service	Training Title - Links are available for PowerPoint (PP) training	Type	# of Staff	Expected # of Staff for 2009 Annual Training	% Cmplt'd in 2009	# RSO Lectures/ Training Sessions	# staff/ RSO Lecture/ Training Session	# hrs/ Training	# training hrs done by RSO via Lecture/ Training Sessions	Total # Training hrs for staff
AOD/HAS	**2009 Annual Radiation Safety Training - AOD (included 2 new AOD)**	**PP/T**	**6**	**6**	**100%**	**N/A**	**N/A**	**1.00**	**N/A**	**6.00**
EMS	2008 Annual Radiation Safety Training - EMS	PP/T	22			N/A	N/A	0.75	N/A	16.50
	2009 Annual Radiation Safety Training - EMS	**PP/T**	**82**	**83**	**99%**	**N/A**	**N/A**	**1.00**	**N/A**	**82.00**
	EMS Grand Totals:		104			N/A	N/A	1.75	N/A	98.50
Nuclear Medicine	2008 Annual Radiation Safety Training - Nuclear Medicine Administration	PP/T	1			N/A	N/A	1.00	N/A	1.00
	Pulmonex Xenon System - Hands-On-Training	P/E	5			N/A	N/A	0.50	N/A	2.50
	Radiation Safety - Nuclear Medicine Problem Solving Using Time, Distance and Shielding	OST/PP	4			1	4.0	1.00	1.00	4.00
	Monthly Reminders for Nuclear Medicine - 2009: Jan - Pulmonex Xenon System	PP/H	6			N/A	N/A	0.50	N/A	3.00
	Monthly Reminders for Nuclear Medicine - 2009: Feb - Radiation Spill Prevention	PP/H	6			N/A	N/A	0.25	N/A	1.50
	Monthly Reminders for Nuclear Medicine - 2009: Mar - Patient Instructions for I-131 Therapy	PP/H	6			N/A	N/A	0.25	N/A	1.50
	Monthly Reminders for Nuclear Medicine - 2009: Apr - Pulmonex Xenon System Update	PP/H	6			N/A	N/A	0.25	N/A	1.50
	2009 Annual Radiation Safety Training - Nuclear Medicine	**PP/T**	**7**	**7**	**100%**	**N/A**	**N/A**	**1.00**	**N/A**	**7.00**
	2009 Annual Radiation Safety Training - Nuclear Medicine Administration	**PP/T**	**1**	**1**	**100%**	**N/A**	**N/A**	**1.00**	**N/A**	**1.00**
	Nuclear Medicine 2009 Annual Training Totals:		**8**	**8**	**100%**	**N/A**	**N/A**	**2.00**	**N/A**	**8.00**
	Nuclear Medicine Grand Totals:		42			1	4.0	5.75	1.00	23.00
Research	2008 Annual Radiation Safety Training - Research	PP/T	3			N/A	N/A	0.75	N/A	2.25
	New Lab - Radiation Safety Record Keeping	P/E	2			1	2.0	1.00	1.00	2.00
	Practicing Safe Science (Howard Hughes Medical Institute) ** (FYI for Other Research Staff)	V	1			N/A	N/A	0.25	N/A	0.25
	Radionuclide Hazards (Howard Hughes Medical Institute) (FYI for Other Research Staff)	V	1			N/A	N/A	0.25	N/A	0.25
	Research Emergency & Safety Procedures * (FYI for Other Research Staff)	PP/H	24			N/A	N/A	0.25	N/A	6.00
	Initial Radiation Safety Training (2 New Authorized Users, 2 New Staff & 1 pending completion of training in 2010):									
	• **Practicing Safe Science (Howard Hughes Medical Institute) ** (4 Counts for 2009 Annual Training)**	**V**	**5**	**See Below**	**See Below**	**N/A**	**N/A**	**0.25**	**N/A**	**1.25**
	• **Radionuclide Hazards (Howard Hughes Medical Institute) (4 Counts for 2009 Annual Training)**	**V**	**5**	**See Below**	**See Below**	**N/A**	**N/A**	**0.25**	**N/A**	**1.25**
	• **Research Emergency & Safety Procedures * (4 Counts for 2009 Annual Training)**	**PP/H**	**5**	**See Below**	**See Below**	**N/A**	**N/A**	**0.25**	**N/A**	**1.25**
	• 2007 Annual Radiation Safety Training - Research	PP/H	5			N/A	N/A	1.50	N/A	7.50
	• 2008 Annual Radiation Safety Training - Research	PP/T	5			N/A	N/A	0.75	N/A	3.75
	• Initial Radiation Safety Training - Research	L	4			2	2.0	1.42	2.83	5.67
	2009 Annual Radiation Safety Training - Research:									
	• **Practicing Safe Science (Howard Hughes Medical Institute) ****	**V**	**8**	**See Below**	**See Below**	**N/A**	**N/A**	**0.25**	**N/A**	**2.00**
	• **Radionuclide Hazards (Howard Hughes Medical Institute)**	**V**	**8**	**See Below**	**See Below**	**N/A**	**N/A**	**0.25**	**N/A**	**2.00**
	• **Research Emergency & Safety Procedures ***	**PP/H**	**9**	**See Below**	**See Below**	**N/A**	**N/A**	**0.25**	**N/A**	**2.25**
	2009 Annual Radiation Safety Training - Research (in 3 parts for each - see above for breakdown)	**see above**	**25**	**27**	**93%**	**N/A**	**N/A**	**0.25**	**N/A**	**6.25**
	2009 Annual Radiation Safety Training - Research Administration	**PP/T**	**3**	**3**	**100%**	**N/A**	**N/A**	**1.00**	**N/A**	**3.00**
	Reseach 2009 Annual Training Totals:		**28**	**30**	**93%**		**N/A**	**1.75**	**N/A**	**9.25**
	Research Grand Totals:		88			3	2.0	8.67	3.83	40.67
VA Police	2008 Annual Radiation Safety Training - VA Police	PP/T	1			N/A	N/A	1.00	N/A	1.00
	2009 Annual Radiation Safety Training - VA Police (included 5 new Police Officers)	**PP/T**	**34**	**34**	**100%**	**N/A**	**N/A**	**1.00**	**N/A**	**34.00**
	VA Police Grand Totals:		35			N/A	N/A	2.00	N/A	35.00
Warehouse/A&LS	**2009 Annual Radiation Safety Training - Warehouse (included 3 new warehouse staff)**	**PP/T**	**11**	**11**	**100%**	**N/A**	**N/A**	**1.00**	**N/A**	**11.00**

2009 Radiation Safety Training Review - By Service/Section

Section/Service	Training Title - Links are available for PowerPoint (PP) training	Type	# of Staff	Expected # of Staff for 2009 Annual Training	% Cmplt'd in 2009	# RSO Lectures/ Training Sessions	# staff/ RSO Lecture/ Training Session	# hrs/ Training	# training hrs done by RSO via Lecture/ Training Sessions	Total # Training hrs for staff
	Monthly Reminders for Nuclear Medicine/1st Qtr 2008 (Jan - Radiation Detectors: Gas-Filled; Feb - Stress Area IV Setup; Mar - Mo-99/Tc-99m Concentration)	PP/H	1			N/A	N/A	1.00	N/A	1.00
	Monthly Reminders for Nuclear Medicine/Oct 2008 (Oct - Daily Close Out Survey plus Feb - Stress Area IV Setup Disposal)	PP/H	1			N/A	N/A	0.50	N/A	0.50
	Monthly Reminders for Nuclear Medicine/Nov 2008 (Nov - Daily Dose Calibrator Constancy Checks)	PP/H	1			N/A	N/A	0.25	N/A	0.25
	2008 Annual Radiation Safety Training - AOD	PP/T	1			N/A	N/A	1.00	N/A	1.00
	2008 Annual Radiation Safety Training - EMS	PP/T	1			N/A	N/A	0.75	N/A	0.75
	2008 Annual Radiation Safety Training - Nuclear Medicine	PP/T	2			N/A	N/A	1.00	N/A	2.00
	2008 Annual Radiation Safety Training - Nuclear Medicine Administration	PP/T	1			N/A	N/A	1.00	N/A	1.00
	2008 Annual Radiation Safety Training - Research	PP/T	1			N/A	N/A	0.75	N/A	0.75
	2008 Annual Radiation Safety Training - VA Police	PP/T	1			N/A	N/A	1.00	N/A	1.00
	2008 Annual Radiation Safety Training - Warehouse	PP/T	1			N/A	N/A	1.00	N/A	1.00
	Monthly Reminders for Nuclear Medicine - 2009: Jan - Pulmonex Xenon System	PP/H	4			N/A	N/A	0.50	N/A	2.00
	Monthly Reminders for Nuclear Medicine - 2009: Feb - Radiation Spill Prevention	PP/H	4			N/A	N/A	0.25	N/A	1.00
FYI Training (e.g., Radiation Safety, Safety Office)	Monthly Reminders for Nuclear Medicine - 2009: Mar - Patient Instructions for I-131 Therapy	PP/H	3			N/A	N/A	0.25	N/A	0.75
	Monthly Reminders for Nuclear Medicine - 2009: Apr - Pulmonex Xenon System Update	PP/H	2			N/A	N/A	0.25	N/A	0.50
	Pulmonex Xenon System - Hands-On-Training	P/E	1			N/A	N/A	0.50	N/A	0.50
	Radiation Safety - Nuclear Medicine Problem Solving Using Time, Distance and Shielding	OST/PP	1			N/A	N/A	1.00	N/A	1.00
	Practicing Safe Science (Howard Hughes Medical Institute) **	V	2			N/A	N/A	0.25	N/A	0.50
	Radionuclide Hazards (Howard Hughes Medical Institute)	V	1			N/A	N/A	0.25	N/A	0.25
	Research Emergency & Safety Procedures *	PP/H	2			N/A	N/A	0.25	N/A	0.50
	REAC-TS Hospital - 1018596 (Emergency Management of Radiation Accident Victims)	OST/PP	2			N/A	N/A	8.10	N/A	16.20
	Radiological Emergencies (part of VHA Decontamination Train-the Trainer Course)	L	14			1	14.0	1.00	1.00	14.00
	2009 Annual Radiation Safety Training - AOD	PP/T	1			N/A	N/A	1.00	N/A	1.00
	2009 Annual Radiation Safety Training - EMS	PP/T	2			N/A	N/A	1.00	N/A	2.00
	2009 Annual Radiation Safety Training - Nuclear Medicine	PP/T	1			N/A	N/A	1.00	N/A	1.00
	2009 Annual Radiation Safety Training - Nuclear Medicine Administration	PP/T	1			N/A	N/A	1.00	N/A	1.00
	2009 Annual Radiation Safety Training - Research Administration	PP/T	1			N/A	N/A	1.00	N/A	1.00
	2009 Annual Radiation Safety Training - VA Police	PP/T	2			N/A	N/A	1.00	N/A	2.00
	2009 Annual Radiation Safety Training - Warehouse	PP/T	1			N/A	N/A	1.00	N/A	1.00
	FYI Training (e.g., Radiation Safety, Safety Office) Grand Totals:		56			N/A	N/A	27.85	N/A	55.45
	2009 Annual Training Totals:		**169**	**172**	**98%**	**N/A**	**N/A**	**7.75**	**N/A**	**150.25**
	Grand Totals:		**342**			**5**	**4.8**	**48.02**	**5.83**	**269.62**

* Note of the 60 minutes of this research safety training, about 15 minutes would pertain to radiation safety.

** Note of the 30 minutes of this research safety video, about 15 minutes would pertain to radiation safety.

Key: Type of training

A/T	=	Article & Test - Self Review
H/T	=	Handout & Test - Self Review
L	=	Lecture
OST/PP	=	Off Site Training PowerPoint presentation
P/E	=	Procedure and/or Equipment Review
PP/H	=	PowerPoint presentation/Handout - Self Review
PP/T	=	PowerPoint presentation/Handout - Self Review with Test
R	=	Review of Records and Procedures - Self Review
V	=	Video - Self Review

N/A = if not a RSO lecture/training session (e.g., viewed video, special lecture, review material, or read

2009 Radiation Safety Training Review - By Date

#	Date	Time	# of Staff	# hrs/ Staff	Total # hrs	Type	Section/Service	Training Title - Links are available for PowerPoint (PP) training
N/A	Jan	N/A	1	0.50	0.50	PP/H	Safety Office	Monthly Reminders for Nuclear Medicine/Oct 2008 (Oct - Daily Close Out Survey plus Feb - Stress Area IV Setup Disposal)
N/A	Jan	N/A	1	0.25	0.25	PP/H	Safety Office	Monthly Reminders for Nuclear Medicine/Nov 2008 (Nov - Daily Dose Calibrator Constancy Checks)
N/A	Jan	N/A	22	0.75	16.50	PP/T	EMS	2008 Annual Radiation Safety Training - EMS
N/A	Jan	N/A	1	1.00	1.00	PP/T	Nuclear Medicine	2008 Annual Radiation Safety Training - Nuclear Medicine Administration
N/A	Jan	N/A	3	0.75	2.25	PP/T	Research	2008 Annual Radiation Safety Training - Research
N/A	Jan	N/A	1	1.00	1.00	PP/T	VA Police	2008 Annual Radiation Safety Training - VA Police
N/A	Jan	N/A	5	0.50	2.50	P/E	Nuclear Medicine	Pulmonex Xenon System - Hands-On-Training
N/A	Jan	N/A	1	0.50	0.50	P/E	Radiation Safety	Pulmonex Xenon System - Hands-On-Training
N/A	Jan	N/A	6	0.50	3.00	PP/H	Nuclear Medicine	Monthly Reminders for Nuclear Medicine - 2009: Jan - Pulmonex Xenon System
N/A	Jan	N/A	1	0.50	0.50	PP/H	Radiation Safety	Monthly Reminders for Nuclear Medicine - 2009: Jan - Pulmonex Xenon System
N/A	Feb	N/A	1	1.00	1.00	PP/T	Safety Office	2008 Annual Radiation Safety Training - AOD
N/A	Feb	N/A	1	0.75	0.75	PP/T	Safety Office	2008 Annual Radiation Safety Training - EMS
N/A	Feb	N/A	2	1.00	2.00	PP/T	Safety Office	2008 Annual Radiation Safety Training - Nuclear Medicine
N/A	Feb	N/A	1	1.00	1.00	PP/T	Safety Office	2008 Annual Radiation Safety Training - Nuclear Medicine Administration
N/A	Feb	N/A	1	0.75	0.75	PP/T	Safety Office	2008 Annual Radiation Safety Training - Research
N/A	Feb	N/A	1	1.00	1.00	PP/T	Safety Office	2008 Annual Radiation Safety Training - VA Police
N/A	Feb	N/A	1	1.00	1.00	PP/T	Safety Office	2008 Annual Radiation Safety Training - Warehouse
N/A	Feb	N/A	2	0.50	1.00	PP/H	Safety Office	Monthly Reminders for Nuclear Medicine - 2009: Jan - Pulmonex Xenon System
N/A	Mar	N/A	1	1.00	1.00	PP/H	Safety Office	Monthly Reminders for Nuclear Medicine/1st Qtr 2008 (Jan - Radiation Detectors: Gas-Filled; Feb - Stress Area IV Setup; Mar - Mo-99/Tc-99m Concentration)
1	03/28/09	11:30A	4	1.00	4.00	OST/PP	Nuclear Medicine	Radiation Safety - Nuclear Medicine Problem Solving Using Time, Distance and Shielding
N/A	03/28/09	11:30A	1	1.00	1.00	OST/PP	Radiation Safety	Radiation Safety - Nuclear Medicine Problem Solving Using Time, Distance and Shielding
N/A	Apr	N/A	5	0.25	1.25	PP/H	Nuclear Medicine	Monthly Reminders for Nuclear Medicine - 2009: Feb - Radiation Spill Prevention
N/A	Apr	N/A	1	0.25	0.25	PP/H	Radiation Safety	Monthly Reminders for Nuclear Medicine - 2009: Feb - Radiation Spill Prevention
N/A	May	N/A	1	0.25	0.25	PP/H	Nuclear Medicine	Monthly Reminders for Nuclear Medicine - 2009: Feb - Radiation Spill Prevention
N/A	May	N/A	1	0.50	0.50	PP/H	Safety Office	Monthly Reminders for Nuclear Medicine - 2009: Jan - Pulmonex Xenon System
N/A	May	N/A	3	0.25	0.75	PP/H	Safety Office	Monthly Reminders for Nuclear Medicine - 2009: Feb - Radiation Spill Prevention
N/A	May	N/A	3	0.25	0.75	PP/H	Nuclear Medicine	Monthly Reminders for Nuclear Medicine - 2009: Mar - Patient Instructions for I-131 Therapy
N/A	May	N/A	3	0.25	0.75	PP/H	Radiation Safety/ Safety Office	Monthly Reminders for Nuclear Medicine - 2009: Mar - Patient Instructions for I-131 Therapy
N/A	May	N/A	2	0.25	0.50	PP/H	Nuclear Medicine	Monthly Reminders for Nuclear Medicine - 2009: Apr - Pulmonex Xenon System Update
N/A	May	N/A	2	0.25	0.50	PP/H	Radiation Safety/ Safety Office	Monthly Reminders for Nuclear Medicine - 2009: Apr - Pulmonex Xenon System Update
N/A	May	N/A	1	0.25	0.25	PP/H	Research	Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	May	N/A	2	0.25	0.50	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	May	N/A	2	0.25	0.50	PP/H	Radiation Safety/ Safety Office	Research Emergency & Safety Procedures *
N/A	Jun	N/A	3	0.25	0.75	PP/H	Radiation Safety/ Safety Office	Monthly Reminders for Nuclear Medicine - 2009: Mar - Patient Instructions for I-131 Therapy
N/A	Jun	N/A	4	0.25	1.00	PP/H	Nuclear Medicine	Monthly Reminders for Nuclear Medicine - 2009: Apr - Pulmonex Xenon System Update
N/A	Jul	N/A	4	0.25	1.00	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	Aug	N/A	2	0.25	0.50	V	Research	Initial Radiation Safety Training: • Practicing Safe Science (Howard Hughes Medical Institute) ** (Counts for 2009 Annual Training)
N/A	Aug	N/A	2	0.25	0.50	V	Research	• Radionuclide Hazards (Howard Hughes Medical Institute) (Counts for 2009 Annual Training)
N/A	Aug	N/A	3	0.25	0.75	PP/H	Research	• Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Aug	N/A	2	1.50	3.00	PP/H	Research	• 2007 Annual Radiation Safety Training - Research
N/A	Aug	N/A	2	0.75	1.50	PP/T	Research	• 2008 Annual Radiation Safety Training - Research
2	08/26/09	2:00 PM	2	1.50	3.00	L	Research	• Initial Radiation Safety Training - Research
N/A	Aug	N/A	2	0.25	0.50	V	Radiation Safety/ Safety Office	Practicing Safe Science (Howard Hughes Medical Institute) **
N/A	Aug	N/A	1	0.25	0.25	V	Radiation Safety	Radionuclide Hazards (Howard Hughes Medical Institute)
N/A	Sep	N/A	2	0.25	0.50	V	Research	Initial Radiation Safety Training: • Practicing Safe Science (Howard Hughes Medical Institute) ** (Counts for 2009 Annual Training)
N/A	Sep	N/A	2	0.25	0.50	V	Research	• Radionuclide Hazards (Howard Hughes Medical Institute) (Counts for 2009 Annual Training)
N/A	Sep	N/A	1	0.25	0.25	PP/H	Research	• Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Sep	N/A	2	1.50	3.00	PP/H	Research	• 2007 Annual Radiation Safety Training - Research
N/A	Sep	N/A	2	0.75	1.50	PP/T	Research	• 2008 Annual Radiation Safety Training - Research
3	09/08/09	1:00 PM	2	1.33	2.67	L	Research	• Initial Radiation Safety Training - Research
N/A	Sep	N/A	2	0.25	0.50	PP/H	Research	Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Sep	N/A	4	0.25	1.00	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	09/09/09	8:00 AM	2	8.10	16.20	OST/PP	Radiation Safety/ Radiology	REAC-TS Hospital - 1018596 (Emergency Management of Radiation Accident Victims)
4	09/29/09	4:00 PM	14	1.00	14.00	L	DECON Team	Radiological Emergencies (part of VHA Decontamination Train-the Trainer Course)

#	Date	Time	# of Staff	# hrs/ Staff	Total # hrs	Type	Section/Service	Training Title - Links are available for PowerPoint (PP) training
N/A	Oct	N/A	2	1.00	2.00	PP/T	AOD/HAS	2009 Annual Radiation Safety Training - AOD
N/A	Oct	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - AOD
N/A	10/21/09	9:30 AM	30	1.00	30.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	10/28/09	3:30 PM	10	1.00	10.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	Oct	N/A	2	1.00	2.00	PP/T	Radiation Safety/ Nuclear Medicine	2009 Annual Radiation Safety Training - EMS
N/A	Oct	N/A	2	0.25	0.50	PP/H	Research	Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Oct	N/A	3	0.25	0.75	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	Nov	N/A	4	1.00	4.00	PP/T	AOD/HAS	2009 Annual Radiation Safety Training - AOD
N/A	11/18/09	9:30 AM	18	1.00	18.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	11/25/09	11:30 PM	12	1.00	12.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	Nov	N/A	3	1.00	3.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	Nov	N/A	7	1.00	7.00	PP/T	Nuclear Medicine	2009 Annual Radiation Safety Training - Nuclear Medicine
N/A	Nov	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - Nuclear Medicine
N/A	Nov	N/A	1	1.00	1.00	PP/T	Nuclear Medicine	2009 Annual Radiation Safety Training - Nuclear Medicine Administration
N/A	Nov	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - Nuclear Medicine Administration
N/A	Nov	N/A	2	0.25	0.50	PP/H	Research	Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Nov	N/A	6	0.25	1.50	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	Nov	N/A	3	1.00	3.00	PP/T	Research	2009 Annual Radiation Safety Training - Research Administration
5	11/10/09	2:00 PM	2	1.00	2.00	P/E	Research	New Lab - Radiation Safety Record Keeping
N/A	Nov	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - Research Administration
N/A	Nov	N/A	31	1.00	31.00	PP/T	VA Police	2009 Annual Radiation Safety Training - VA Police
N/A	Nov	N/A	2	1.00	2.00	PP/T	Radiation Safety/ Safety Office	2009 Annual Radiation Safety Training - VA Police
N/A	Nov	N/A	10	1.00	10.00	PP/T	Warehouse/A&LS	2009 Annual Radiation Safety Training - Warehouse
N/A	Nov	N/A	1	1.00	1.00	PP/T	Radiation Safety	2009 Annual Radiation Safety Training - Warehouse
N/A	Dec	N/A	9	1.00	9.00	PP/T	EMS	2009 Annual Radiation Safety Training - EMS
N/A	Dec	N/A	8	0.25	2.00	V	Research	Practicing Safe Science (Howard Hughes Medical Institute) ** (FYI for Other Research Staff)
N/A	Dec	N/A	8	0.25	2.00	V	Research	Radionuclide Hazards (Howard Hughes Medical Institute) (FYI for Other Research Staff)
N/A	Dec	N/A	4	0.25	1.00	PP/H	Research	Research Emergency & Safety Procedures * (Counts for 2009 Annual Training)
N/A	Dec	N/A	5	0.25	1.25	PP/H	Research	Research Emergency & Safety Procedures * (FYI for Other Research Staff)
N/A	Dec	N/A	1	0.25	0.25	V	Research	Initial Radiation Safety Training (pending completion of training in 2010): • Practicing Safe Science (Howard Hughes Medical Institute) **
N/A	Dec	N/A	1	0.25	0.25	V	Research	• Radionuclide Hazards (Howard Hughes Medical Institute)
N/A	Dec	N/A	1	0.25	0.25	PP/H	Research	• Research Emergency & Safety Procedures *
N/A	Dec	N/A	1	1.50	1.50	PP/H	Research	• 2007 Annual Radiation Safety Training - Research
N/A	Dec	N/A	1	0.75	0.75	PP/T	Research	• 2008 Annual Radiation Safety Training - Research
N/A	Dec	N/A	3	1.00	3.00	PP/T	VA Police	2009 Annual Radiation Safety Training - VA Police
N/A	Dec	N/A	1	1.00	1.00	PP/T	Warehouse/A&LS	2009 Annual Radiation Safety Training - Warehouse

Grand Total of # of Staff: 342 **269.62 Grand Total of # Training Hrs.**

* Note of the 60 minutes of this research safety training, about 15 minutes would pertain to radiation safety.
** Note of the 30 minutes of this research safety video, about 15 minutes would pertain to radiation safety.

N/A = if not a RSO Lecture/Training Session (e.g., viewed video, special lecture, review material, or read article and took test)

Key: Type of training
A/T = Article & Test - Self Review
H/T = Handout & Test - Self Review
L = Lecture
OST/PP = Off Site Training PowerPoint presentation
P/E = Procedure and/or Equipment Review
PP/H = PowerPoint presentation/Handout - Self Review
PP/T = PowerPoint presentation/Handout - Self Review with Test
R = Review of Records and Procedures - Self Review
V = Video - Self Review

DEPARTMENT OF VETERANS AFFAIRS

Memorandum

Date: APR 27 2009

From: Director, VHA National Health Physics Program (NHPP) (115HP/NLR)

Subj: Nuclear Regulatory Commission (NRC) Inspection Report (EA-09-014, dated April 15, 2009)

To: Director (596/00), VA Medical Center, Lexington, Kentucky

1. I am attaching subject NRC inspection report for your review and response. The report cites a Severity Level IV violation for a failure to provide the Radiation Safety Officer adequate time to perform required duties.

2. You must respond to the four questions in the NRC Notice of Violation (NOV) to include providing a statement of the reason for the violation, corrective steps, and the date of full compliance. Since the circumstances for a similar violation and corrective steps were previously resolved during the NHPP inspection process, the response must address the status for the previous NHPP inspection results, this new NRC violation, and evaluation of the radiation safety program and performance of duties by the Radiation Safety Officer as currently viewed by executive management.

3. Your response should be received by NHPP not later than May 12, 2009, to be forwarded to NRC. The response may refer to previously submitted correspondence.

4. Please note the NOV must be posted for five working days per 10 CFR 19.11.

5. Please contact Gary E. Williams at 501-257-1572, if you have any questions or comments about the NRC inspection report or required response.

E. Lynn McGuire

Attachment

cc: Chair, National Radiation Safety Committee
Network Director, VISN 9 (10N9)

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

April 15, 2009

04-24-09 A10:07 IN

EA-09-014

Mr. E. Lynn McGuire, Director
National Health Physics Program (115HP/NLR)
Department of Veterans Affairs
Veterans Health Administration
2200 Fort Roots Drive
North Little Rock, AR 72114

SUBJECT: NRC REVIEW OF NHPP INSPECTION REPORT AND NOTICE OF VIOLATION DATED JANUARY 24, 2008 – DEPARMENT OF VETERANS AFFAIRS MEDICAL CENTER, LEXINGTON KY AND NRC INVESTIGATION REPORT 3-2008-013

Dear Mr. McGuire:

This letter refers to the inspection conducted by the Department of Veterans Affairs (DVA) National Health Physics Program (NHPP) on September 17, 2007, with continued in-office review through December 21, 2007, at the DVA Medical Center in Lexington Kentucky. On January 24, 2008, the NHPP reported the Severity Level III violation to the NRC, in accordance with the NRC Master Materials License, Letter of Understanding, Condition No. 23. In addition, on January 24, 2008, the DVA issued an Inspection Report and Notice of Violation. The Notice of Violation documented a Severity Level III problem for the willful failure of the Radiation Safety Officer to perform required duties.

Because the DVA concluded that the violation involved wrong-doing, the NRC followed its internal processes and conducted an investigation by the NRC Office of Investigations (OI). The OI completed its investigation and issued its conclusion in an investigation report dated December 18, 2008. A factual summary of the results of their investigation is included in Enclosure 2. On April 8, 2009, a telephone exit meeting was held between you and Patricia Pelke, Chief, Materials Licensing Branch, to discuss the result of NRC's review.

The NRC evaluated the information provided in your inspection report, the information obtained from the OI investigation and the information provided by the permitee in response to your inspection report. The NRC concluded that the violations were correctly categorized as a Severity Level III problem, as stated in the inspection report, although the violation cited against 10 CFR 71 and 49 CFR 172.704 would have been more correctly cited against 10 CFR 71.5 invoking 49 CFR 172.704(c)(2).

Additionally, based on the results of the investigation, the NRC has determined that a Severity Level IV violation of NRC requirements occurred. The violation was evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at (http://www.nrc.gov/about-nrc/regulatory/enforcement/enforc-pol.pdf). The violation is cited in the enclosed Notice of Violation (Notice). The violation is being cited in the

Notice because it was identified by the NRC during our review of your inspection and the OI investigation results.

The violation involved the non-willful failure of the permitee to ensure that the Radiation Safety Officer had sufficient time and resources to perform his NRC-required duties as required by 10 CFR 35.24(g) when the collateral duty of Controlled Substance Coordinator was assigned to him and when the duties associated with that position expanded in 2005.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. For your consideration and convenience, an excerpt from NRC Information Notice 96-28, "Suggested Guidance Relating to Development and Implementation of Corrective Action," is enclosed. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

Steven A. Reynolds, Director
Division of Nuclear Materials Safety

Docket No. 030-34325
License No. 03-23853-01VA
Permit No. 16-08896-04

Enclosures:
1. Notice of Violation
2. Summary of Office of Investigations Report 3 2008 013
3. Excerpt from NRC Information Notice 96-28

cc: State of KY

NOTICE OF VIOLATION

Department of Veterans Affairs
Lexington, Kentucky

Docket No. 030-34325
License No. 03-23853-01VA

As a result of an NRC investigation documented in Investigation Report 3-2008-013, dated December 18, 2008, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

> Title 10 of the Code of Federal Regulations (CFR) Section 35.24(g) requires the licensee to provide the Radiation Safety Officer sufficient authority, organizational freedom, time, resources, and management prerogative, to (1) Identify radiation safety problems; (2) Initiate, recommend, or provide corrective actions; (3) Stop unsafe operations; and, (4) Verify implementation of corrective actions.
>
> Contrary to the above, the licensee did not provide the Radiation Safety Officer sufficient authority, time, and resources to identify radiation safety problems; initiate, recommend, or provide corrective actions; stop unsafe operations; and verify implementation of corrective actions, in that, around September 2005, the licensee assigned a collateral duty to the RSO (Controlled Substance Coordinator) which compromised his ability to successfully perform radiation safety responsibilities from September 2005 until September 2007.

This is a Severity Level IV violation (Supplement VI)

Pursuant to the provisions of Title 10 of the Code of Federal Regulations (CFR) 2.201, the Department of Veterans Affairs is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555- 0001, with a copy to the Regional Administrator, Region III, 2443 Warrenville Road, Lisle IL 60532, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html to the extent possible, it should not

include any personal privacy, proprietary or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 15th day of April, 2009

SUMMARY OF OFFICE OF INVESTIGATIONS REPORT 3-2008-013

The Office of Investigations report involves a radiation safety officer (RSO) who acknowledged that, over the course of approximately two years, he deliberately failed to (1) perform required annual reviews of the radiation safety program; (2) hold required periodic Radiation Safety Committee meetings for approximately a two year period; and (3) provide required Hazardous Material (HAZMAT) training to Nuclear Medical Technicians involved in the transportation of radioactive materials.

During an inspection conducted by the National Health Physics Program (NHPP) under the Department of Veterans Affairs (DVA) Master Material license (MML), the RSO admitted to the NHPP inspector that he had not been performing all of the duties required of an RSO. On January 24, 2008, the NHPP issued its inspection report which included a Severity Level III violation for the RSO's willful failure to perform his required duties.

The Office of Investigations interviewed the RSO and his supervisor. The RSO acknowledged that, in his duties as the RSO, he was responsible for conducting annual reviews of the radiation safety program, holding periodic Radiation Safety Committee meetings, and conducting required HAZMAT training for Nuclear Medical Technicians involved in the transportation of radioactive materials. He also acknowledged that he failed to perform these duties for approximately a two-year period because of other workload and that he did not inform his management that required RSO duties were not being performed. The RSO stated that he knew that the required duties were NRC requirements and that he was not meeting those requirements, but thought that he could get "caught up" on the duties.

EXCERPT FROM INFORMATION NOTICE (IN) 96-28, "SUGGESTED GUIDANCE RELATING TO DEVELOPMENT AND IMPLEMENTATION OF CORRECTIVE ACTION"

The corrective action process should involve the following three steps:

1. Conduct a complete and thorough review of the circumstances that led to the violation. Typically, such reviews include:

    1. Interviews with individuals who are either directly or indirectly involved in the violation, including management personnel and those responsible for training or procedure development/guidance. Particular attention should be paid to lines of communication between supervisors and workers.

    2. Tours and observations of the area where the violation occurred, particularly when those reviewing the incident do not have day-to-day contact with the operation under review. During the tour, individuals should look for items that may have contributed to the violation as well as those items that may result in future violations. Reenactments (without use of radiation sources, if they were involved in the original incident) may be warranted to better understand what actually occurred.

    3. Review of programs, procedures, audits, and records that relate directly or indirectly to the violation. The program should be reviewed to ensure that its overall objectives and requirements are clearly stated and implemented. Procedures should be reviewed to determine whether they are complete, logical, understandable, and meet their objectives (i.e., they should ensure compliance with the current requirements). Records should be reviewed to determine whether there is sufficient documentation of necessary tasks to provide an auditable record and to determine whether similar violations have occurred previously. Particular attention should be paid to training and qualification records of individuals involved with the violation.

2. Identify the root cause of the violation.

    Corrective action is not comprehensive unless it addresses the root cause(s) of the violation. It is essential, therefore, that the root cause(s) of a violation be identified so that appropriate action can be taken to prevent further noncompliance in this area, as well as other potentially affected areas. Violations typically have direct and indirect cause(s). As each cause is identified, ask what other factors could have contributed to the cause. When it is no longer possible to identify other contributing factors, the root causes probably have been identified. For example, the direct cause of a violation may be a failure to follow procedures; the indirect causes may be inadequate training, lack of attention to detail, and inadequate time to carry out an activity. These factors may have been caused by a lack of staff resources that, in turn, are indicative of lack of management support. Each of these factors must be addressed before corrective action is considered to be comprehensive.

3. Take prompt and comprehensive corrective action that will address the immediate concerns and prevent recurrence of the violation.

   It is important to take immediate corrective action to address the specific findings of the violation. For example, if the violation was issued because radioactive material was found in an unrestricted area, immediate corrective action must be taken to place the material under licensee control in authorized locations. After the immediate safety concerns have been addressed, timely action must be taken to prevent future recurrence of the violation. Corrective action is sufficiently comprehensive when corrective action is broad enough to reasonably prevent recurrence of the specific violation as well as prevent similar violations.

In evaluating the root causes of a violation and developing effective corrective action, consider the following:

1. Has management been informed of the violation(s)?

2. Have the programmatic implications of the cited violation(s) and the potential presence of similar weaknesses in other program areas been considered in formulating corrective actions so that both areas are adequately addressed?

3. Have precursor events been considered and factored into the corrective actions?

4. In the event of loss of radioactive material, should security of radioactive material be enhanced?

5. Has your staff been adequately trained on the applicable requirements?

6. Should personnel be re-tested to determine whether re-training should be emphasized for a given area? Is testing adequate to ensure understanding of requirements and procedures?

7. Has your staff been notified of the violation and of the applicable corrective action?

8. Are audits sufficiently detailed and frequently performed? Should the frequency of periodic audits be increased?

9. Is there a need for retaining an independent technical consultant to audit the area of concern or revise your procedures?

10. Are the procedures consistent with current NRC requirements, should they be clarified, or should new procedures be developed?

11. Is a system in place for keeping abreast of new or modified NRC requirements?

12. Does your staff appreciate the need to consider safety in approaching daily assignments?

13. Are resources adequate to perform, and maintain control over, the licensed activities? Has the radiation safety officer been provided sufficient time and resources to perform his or her oversight duties?

14. Have work hours affected the employees' ability to safely perform the job?

15. Should organizational changes be made (e.g., changing the reporting relationship of the radiation safety officer to provide increased independence)?

16. Are management and the radiation safety officer adequately involved in oversight and implementation of the licensed activities? Do supervisors adequately observe new employees and difficult, unique, or new operations?

17. Has management established a work environment that encourages employees to raise safety and compliance concerns?

18. Has management placed a premium on production over compliance and safety? Does management demonstrate a commitment to compliance and safety?

19. Has management communicated its expectations for safety and compliance?

20. Is there a published discipline policy for safety violations, and are employees aware of it? Is it being followed?

The complete Information Notice may be found on the NRC's web site in the Electronic Reading Room, Collections of Documents by Type, Generic Communications, Information Notices, 1996 or directly from http://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/1996/ and then selecting the Information Notice.

Department of Veterans Affairs

Memorandum

Date: May 11, 2009

From: Director (596/00), VA Medical Center, Lexington, Kentucky

Subj: Reply to a Notice of Violation, Docket No. 030-34325

To: Director, VHA National Health Physics Program (115HP/NLR)

Below provides our written response to the Nuclear Regulatory Commission investigation and Notice of Violation dated April 15, 2009.

(1) The reason for the violation:
The administrative controls and policies governing the Radiation Safety Officer (RSO) and Radiation Safety Committee (RSC) during the period from September 2005 until September 2007 were not strict enough to provide the RSO sufficient authority, time, and resources to successfully perform all of his radiation safety responsibilities which in part was due to the RSO's assigned collateral duty as the Controlled Substance Coordinator.

(2) The corrective steps that have been taken and the results achieved:

(a) The RSO was relieved from his collateral duties as the Controlled Substance Coordinator (CSC) effective at the end of September 2007. This has provided the RSO the time to successfully perform all of his radiation safety responsibilities which has included performing required annual reviews of the radiation safety program, holding required periodic RSC meetings and providing required DOT Hazardous Materials training to Nuclear Medicine staff involved in the transportation of radioactive materials. The CSC duties were removed from the RSO's position description and performance plan.

(b) The RSO was re-assigned from the Chief of Nuclear Medicine Service to report to the Associate Director in July 2007. Since the hiring of the Chief of Radiology Service, the RSO has been re-assigned effective April 2009 to report to the Chief of Radiology who also is the current RSC Chair.

(c) The RSC was re-established in September 2007 which included the appointment of the Associate Director as the management representative. The Chief of Staff was appointed as the interim Chair effective November 2007 and the Chief of Radiology was made the Chair effective May 2008. The policy governing the Committee was re-defined effective October 2007. This policy clarified the responsibilities of the RSO and the RSC along with other reporting requirements (e.g., meetings scheduled on a recurring date each quarter, minutes to be presented at a higher level safety committee, i.e., Environment of Care). As of today, the RSC has met at least quarterly since September 2007 and has reviewed the required annual reviews of the radiation safety program.

(d) The Environment of Care Committee (ECC) has updated its committee policy effective January 2008 which now includes the RSO responsibility to present the RSC minutes to the ECC. As of today, the RSC minutes since September 2007 have been presented to the ECC at least quarterly.

DEPARTMENT OF VETERANS AFFAIRS
Veterans Health Administration
National Health Physics Program
2200 Fort Roots Drive
North Little Rock, AR 72114

MAY 14 2009

In Reply Refer To: 598/115HP/NLR

Nuclear Regulatory Commission (NRC)
Attn: Document Control Desk
Washington, DC 20555-0001

Re: NRC License No. 03-23853-01VA; NRC Docket No. 030-34325; EA-09-014

Dear Sir or Madame:

This letter is a response to your letter dated April 15, 2009, and includes a "Reply to a Notice of Violation."

Our response is provided by the enclosed memorandum dated May 11, 2009, from VA Medical Center, Lexington, Kentucky. The memorandum has specific details to address the questions in the Notice of Violation.

We accept the violation as cited. We consider the corrective actions and the current status for the radiation safety program as stated in the memorandum to be adequate to close the violation. We will confirm continued compliance during future inspections.

If you have any questions, please contact Gary E. Williams at 501-257-1572.

Sincerely,

E. Lynn McGuire
Director, National Health Physics Program

Enclosure

cc: Regional Administrator, NRC Region III

DEPARTMENT OF VETERANS AFFAIRS

Memorandum

Date: AUG 26 2008

From: Director, VHA National Health Physics Program (115HP/NLR)

Subj: Radiation Safety Program Inspection - Inspection Report 596-08-I01

To: Director (596/00), VA Medical Center, Lexington, Kentucky

1. Gary E. Williams, VHA National Health Physics Program, inspected the radiation safety program at VA Medical Center, Lexington, Kentucky, on August 21, 2008.

2. The inspection report is attached and consists of an NHPP Form 591 with no violations cited and a decommissioning worksheet completed during this inspection.

3. You are not required to respond to this memorandum or return a signed NHPP Form 591.

4. Please contact Mr. Williams at (501) 257-1572, if you have any questions or comments about the inspection.

E. Lynn McGuire

Attachment

cc: Chair, National Radiation Safety Committee
Network Director, VISN 9 (10N9)

(3) The corrective steps that have been taken to avoid further violations:
As noted above the RSC and ECC policies have been updated to provide stricter control over the RSO as it pertains to his radiation safety responsibilities. Both committees now include tracking measures to assure that these duties are being performed (e.g., RSC meeting timetables, quarterly trending reports, DOT training due dates, ECC reporting matrix)

(4) The date when full compliance will be achieved:
We were in full compliance as of August 28, 2008 based on our last unannounced VHA National Health Physics Program (NHPP) that occurred on that date when no violations were identified and the previous violations (i.e., from September 2007 NHPP inspection) were closed. See attached NHPP inspection report.

For questions regarding this response, please contact Michael. T. Hackett, MS, Radiation Safety Officer, at (859) 381-5929 or via e-mail at michael.hackett@va.gov.

Sandy J. Nielsen, FACHE

Attachment

NHPP FORM 591
(1-2008)

VHA National Health Physics Program

SAFETY INSPECTION REPORT AND COMPLIANCE INSPECTION

1. PERMITTEE/PERMIT NUMBER:	2. LOCATION(S) INSPECTED:
VA Medical Center Lexington, Kentucky 16-08896-04	1101 Veterans Drive Lexington, Kentucky 40502-2236
3. INSPECTION DATES: August 21, 2008	4. INSPECTION REPORT NUMBER: 596-08-I01

PERMITTEE:
The inspection was an examination of activities under your permit as they relate to radiation safety and compliance with Nuclear Regulatory Commission rules and regulations and your permit conditions. The inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and performance-based observations by the inspector. The inspection findings are as follows:

☒ 1. Based on the inspection findings, no violations were identified.

☒ 2. Previous violation(s) closed.

☐ 3. The violation(s), specifically described to you by the inspector as non-cited, are not being cited because they were self-identified, non-repetitive, corrective action was or is being taken, and the remaining criteria in the NRC Enforcement Policy, NUREG-1600, to exercise discretion, were satisfied.

Non-cited violation(s) were discussed involving the following requirement(s) and corrective action(s):

☐ 4. During this inspection certain of your activities, as described below and/or attached, were in violation of Nuclear Regulatory Commission requirements and are being cited. This form is a NOTICE OF VIOLATION, which may be subject to posting per 10 CFR 19.11. The violations and corrective actions are as follows:

STATEMENT OF CORRECTIVE ACTIONS

I hereby state that, within 30 days, the actions described by me to the inspector will be taken to correct the violations identified. This statement of corrective actions is made per 10 CFR 2.201 (corrective steps already taken, corrective steps which will be taken, date when full compliance will be achieved). I understand no further written response to the VHA National Health Physics Program will be required, unless specifically requested.

TITLE	PRINTED NAME	SIGNATURE	DATE
PERMITTEE			
NHPP INSPECTOR	Gary E. Williams		August 22, 2008

Decommissioning Review

Permittee: Lexington, Kentucky (August 21, 2008)

Decommissioning Issue	Yes	No
General decommissioning files (per 10 CFR 30.35(g)(1) and (2))		
Does the permittee have records of spills, or other occurrences, where residual contamination remains or has spread to inaccessible areas? (spills have not occurred where residual contamination remains)	NA	
Does the permittee have records of as-built diagrams/modifications of structures/equipment in locations of use?	X	
Specific decommissioning files and updated documents (per 10 CFR 30.35(g)(3))		
Does the permittee have locations of use where sealed sources leaked and residual contamination remains? (no leaking sources)		X
Does the permittee have locations of use and adjacent areas for radioactive material with $T^{1/2}$ = 65 days?	X	
Does the permittee have a document listing these locations of use and adjacent areas that require approval for unrestricted use?	X	
Is the permittee's document updated at least every two years? (in process of being updated)	X	
Footprint management (for changes to locations of use since the last inspection, not involving a permit action)		
Has the permittee's footprint changed (i.e., added or deleted a location of use)?		X
Have principal activities ceased in a location of use for a period approaching 24 months (10 CFR 30.36(d)(4))?	X	
Has the permittee begun decommissioning, or closeout surveys of, locations of use in which principal activities have ceased for a period greater than 24 months (10 CFR 30.36(d))?		X
Has the permittee conducted closeout surveys to release locations of use for which a permit action is not required, but is subject to review during inspections (10 CFR 20.1501 and 30.36(j)(2))?		X
Has the Radiation Safety Committee approved footprint changes, closeout surveys results, or a pending notification for 10 CFR 35.100 or 35.200 locations of use?		X
Is a permit action required, but not yet submitted, for any footprint change?		X

Note: Facility in process of reviewing research locations of use to complete closeout surveys; RSO agreed to consult with NHPP for best practices.

Radiation Safety Committee
Trending Report for 2009
Deficiency Summary

Click on the highlighted area links below for more information concerning these deficiencies via the area trending and/or detailed audits. Some deficiencies may include notable changes (i.e., decrease compared to 2008) as noted by the 2-color highlight (2009 in yellow with *2008 in green*).		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
Deficiency Summary KEY:									
2009 deficiency with *no deficiency in 2008* ; e.g.,	D	0	0	0	1	0.3	1	*0.0*	*0*
2009 deficiency with no improvement when compared to *deficiency in 2008* ; e.g.,	D	1	0	0	0	0.3	1	*0.3*	*1*
2009 deficiency with improvement when compared to *deficiency in 2008* ; e.g.,	D	2	2	0	1	1.3	5	*6.8*	*27*
Nuclear Medicine Service									
1. Daily Radiation Surveys:									
# of times surveys greater than trigger level	D	2	2	0	1	1.3	5	*6.8*	*27*
Within the Imaging Room - in regular trash and/or non-radioactive sharps	D	*0*	*1*	*0*	*1*	*0.5*	*2*	*1.5*	*6*
Within the Injection Room - on injection table pad	D	*1*	*0*	*0*	*0*	*0.3*	*1*	*2.8*	*11*
2. Weekly Radiation Wipes:									
# of times wipes greater than trigger level	D	2	1	1	0	1.0	4	*1.3*	*5*
4. Daily Dose Calibrator (DC) Constancy Checks (2 dose calibrators):									
# of times constancy checks not performed daily if used for pts as required	D	0	0	0	1	0.3	1	*0.0*	*0*
# of times constancy checks on non-Tc-99m DC not performed daily but not used for patients	D	*0*	*1*	*0*	*0*	*0.3*	*1*	*0.8*	*3*
16. Reported Radioactive Spills:									
# of times a reported radioactive spill occurred	D	1	0	0	0	0.3	1	*0.3*	*1*
17. Quarterly Review of In-coming Radionuclide Receiving Records:									
# of times receiving records were missing pertinent info (e.g., survey/wipe results)	D	1	0	0	0	0.3	1	*0.0*	*0*
# of times package receiving problems noted (e.g., contamination, wrong material)	D	6	0	0	0	1.5	6	*0.8*	*3*
18. Quarterly Review of Out-going Radionuclide/Return Package Records:									
# of in-coming shipments from local radiopharmacy that did not have out-going documentation	D	0	1	2	4	1.8	7	*0.0*	*0*
Research Service									
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*	*N/A*
Radiographic-Fluoroscopic Use									
2. Patient radiation dose from Interventional Fluoroscopy (Specials B180):									
# of these exams with total dose ≥ 3 Gy but < 10 Gy	D	0	0	1	1	0.5	2	*N/A*	*1 Dec Only*
3. Patient radiation dose from Cardiac Cath (A233 & A235):									
# of these exams with estimated dose ≥ 3 Gy but < 10 Gy	D	45	51	61	62	54.8	219	*N/A*	*14 Dec Only*
# of these exams with estimated dose ≥ 10 Gy but < 15 Gy	D	0	0	0	2	0.5	2	*N/A*	*0 Dec Only*
ALARA-Radiation Exposure									
1. Personnel Exposure Records/ALARA Investigational Levels (see below):									
B. Radiographic-Fluoroscopic Use:									
b) # of times ALARA Quarterly Investigational Level I (10% of ¼ annual limit) was exceeded	D	2	0	1	0	0.8	3	*2.5*	*10*

D = Discrepancy/Problem Indicator V = Volume Indicator

Radiation Safety Committee
Trending Report for 2009
Notable Changes & Updates

Click on the highlighted area links below for more information concerning these notable changes & updates via the area trending and/or detailed audits. Some notable changes may be on the Deficiency Summary as noted by the 2-color highlight (2009 in yellow with *2008 in green*).		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
Notable Changes & Updates KEY:									
2009 notable change/update (i.e., no deficiency) *without any issue in 2008* ; e.g.,	N/A	in Feb	N/A	N/A	N/A	N/A	in Feb	*N/A*	*N/A*
2009 notable change/update (i.e., no deficiency) when compared to *same notable change/update in 2008* ; e.g.,	N/A	N/A	N/A	N/A	in Dec	N/A	in Dec	*N/A*	*in Dec*
2009 notable change/update (i.e., no deficiency) when compared to *deficiency in 2008* ; e.g.,	D	0	0	0	0	0.0	0	*0.3*	*1*
Nuclear Medicine Service									
1. Daily Radiation Surveys:									
# of times surveys not performed daily as required	D	0	0	0	0	0.0	0	*0.3*	*1*
3. Mo-99/Tc-99m Assays (discontinued use in June 2008 due revised USP <797>):									
* Mo-99/Tc-99m generators are not currently being used; therefore, this audit item will be dropped in 2010						* (see Oct-Dec detailed audit)			
4. Daily Dose Calibrator (DC) Constancy Checks (2 dose calibrators):									
* Mo-99 setting is not currently being used clinically; therefore, will no longer be checked daily starting 2010						* (see Jul-Sep detailed audit)			
# of times constancy checks on non-Tc-99m DC incompletely performed but not used for patients	*D*	*0*	*0*	*0*	*0*	*0.0*	*0*	*0.5*	*2*
10. Monthly Xenon Machine Quality Control Checks:									
# of times quality control checks not within limits	D	0	0	0	0	0.0	0	*0.3*	*1*
18. Quarterly Review of Out-going Radionuclide/Return Package Records:									
# of times out-going records were missing pertinent info (e.g., survey/wipe results)	D	0	0	0	0	0.0	0	*0.3*	*1*
21. Radiation Safety Improvements and/or Additional Comments/Problems:									
Modified the position of the Tc-99m shielded sharps container in the hot lab & added splash guard to help prevent spills	N/A	in Feb	N/A	N/A	N/A	N/A	in Feb	*N/A*	*N/A*
Replaced Cs-137 dose calibrator standard's shielding and labeling	N/A	in Feb	N/A	N/A	N/A	N/A	in Feb	*N/A*	*N/A*
Raised & modified the position of the Tc-99m shielded sharps container in the hot lab to reduce radiation exposure	N/A	N/A	in May	N/A	N/A	N/A	in May	*N/A*	*N/A*
Mounted locked shielded sharps container in the imaging room (1) to the wall to better secure radioactive/biohazard waste	N/A	N/A	in Jun	N/A	N/A	N/A	in Jun	*N/A*	*N/A*
Mounted locked shielded sharps containers (2) in the injection & imaging rooms to the wall to better secure radioactive/biohazard waste	N/A	N/A	N/A	In Jul	N/A	N/A	in Jul	*N/A*	*N/A*
Updated required annual radiation safety training (e.g., added slides & questions, electronic test with question hint slides & % correct)	N/A	N/A	N/A	N/A	in Oct/Nov	N/A	in Oct/Nov	*N/A*	*N/A*
Restocked replacement items in the radiation spill kit and setup updated mini-radiation spill kits that were later distributed in January	N/A	N/A	N/A	N/A	in Dec	N/A	in Dec	*N/A*	*in Dec*
Research Service									
3. Quarterly Record Audit of Weekly Radiation Wipes Performed by each Authorized User Labs:									
# of times wipes not performed weekly as required	D	0	0	0	0	0.0	0	*1.0*	*4*
# of times wipes greater than trigger level	D	0	0	0	0	0.0	0	*0.5*	*2*
13. Quarterly Review of In-coming Radionuclide Receiving Records:									
# of times package receiving problems noted (e.g., contamination, wrong material)	D	0	0	0	0	0.0	0	*0.3*	*1*
16. Radiation Safety Improvements and/or Additional Comments/Problems:									
Worked w/ Research Safety Manager to update safety training for all research staff & lab entrance poster (both included radiation safety)	N/A	N/A	in Apr	N/A	N/A	N/A	in Apr	*N/A*	*N/A*
Restocked replacement items (i.e., due in August) in the radiation spill kits	N/A	N/A	N/A	in Aug	N/A	N/A	in Aug	*N/A*	*in Aug*
Added annual radiation safety training for research administrative staff	N/A	N/A	N/A	N/A	in Nov	N/A	in Nov	*N/A*	*N/A*

Radiation Safety Committee
Trending Report for 2009
Notable Changes & Updates

Click on the highlighted area links below for more information concerning these notable changes & updates via the area trending and/or detailed audits. Some notable changes may be on the Deficiency Summary as noted by the 2-color highlight (2009 in yellow with *2008 in green*).		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
Notable Changes & Updates KEY:									
2009 notable change/update (i.e., no deficiency) *without any issue in 2008* ; e.g.,	N/A	in Feb	N/A	N/A	N/A	N/A	in Feb	*N/A*	*N/A*
2009 notable change/update (i.e., no deficiency) when compared to *same notable change/update in 2008* ; e.g.,	N/A	N/A	N/A	N/A	in Dec	N/A	in Dec	*N/A*	*in Dec*
2009 notable change/update (i.e., no deficiency) when compared to *deficiency in 2008* ; e.g.,	D	0	0	0	0	0.0	0	*0.3*	*1*
Radiographic-Fluoroscopic Use									
1. Patient radiation dose from CT (B152 only):									
B. High Volume Exams (Jan-Jun)/Cases (Jul-Dec)						Changed from exam review (Jan-Jun) to case review (Jul-Dec)			
C. Average Volume Exams (Jan-Jun)/Cases (Jul-Dec)									
D. Low Volume Exams (Jan-Jun)/Cases (Jul-Dec)									
3. Patient radiation dose from Cardiac Cath (A233 & A235):									
Average estimated dose * (Gy) for these exams									
* Estimated dose based on recorded dose overestimation (i.e., 19.4% CCL & 19.6% EPL) Updated 2008-2009 data (i.e., from recorded dose to estimated dose).	V	1.9	2.1	2.2	2.7	2.2	2.2	*N/A*	*1.7*
4. Radiation Safety Improvements and/or Additional Comments/Problems:									
Additional monitoring started (i.e., pt radiation dose from CT from high to low volume exams: 1.B.-D.)	N/A	in Jan-Mar	N/A	N/A	N/A	N/A	in 1 Qtr	*N/A*	*N/A*
Special dose (i.e., air kerma) evaluation done on Specials & Cardiac Cath equipment	N/A	N/A	in Jun	N/A	N/A	N/A	in Jun	*N/A*	*N/A*
ALARA-Radiation Exposure									
1. Personnel Exposure Records/ALARA Investigational Levels (see below):									
A. Radioactive Materials Use:									
b) # of times ALARA Quarterly Investigational Level I (10% of ¼ annual limit) was exceeded	D	0	0	0	0	0.0	0	*1.75*	*7*
2. I-125/I-131 Bioassay Results:									
# of times bioassays not performed within 6-72 hours post administration	D	0	0	0	0	0.0	0	*0.3*	*1*
4. Quarterly Area Monitors Involving Radioactive Materials:									
NM2 monitor - wall in main hallway outside Nuclear Medicine (i.e., outer wall of hot lab) qtrly total in mrem	V	8	6	10	1	6.3	25	*17.8*	*71*
# of area monitors with readings > 100 mrem for the current calendar year (i.e., 2009)	D	N/A	N/A	N/A	0	N/A	0	*N/A*	*0*
6. Radiation Safety Improvements and/or Additional Comments/Problems:									
Compliant with NRC's constraint of radioactive air effluents for the current calendar year (i.e., 2009)	N/A	N/A	N/A	N/A	in 2009	N/A	N/A	*N/A*	*in 2008*

D = Discrepancy/Problem Indicator V = Volume Indicator

Radiation Safety Committee
Trending Report for 2009
Nuclear Medicine Service

Click on the links to the right for the detailed Quarterly Nuclear Medicine Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	2008 Qtrly Average	2008 Total
1. Daily Radiation Surveys:									
# of times surveys not performed daily as required	D	0	0	0	0	0.0	0	0.3	1
# of times surveys greater than trigger level	D	2	2	0	1	1.3	5	6.8	27
By area: Hot Lab	D	0	0	0	0	0.0	0	0.0	0
Imaging Room	D	0	2	0	1	0.8	3	3.8	15
Within the Imaging Room - in regular trash and/or non-radioactive sharps	D	0	1	0	1	0.5	2	1.5	6
Injection Room	D	2	0	0	0	0.5	2	3.0	12
Within the Injection Room - on injection table pad	D	1	0	0	0	0.3	1	2.8	11
# of times appropriate action was not taken to decrease levels below trigger level	D	0	0	N/A	0	0.0	0	0.0	0
2. Weekly Radiation Wipes:									
# of times wipes not performed weekly as required	D	0	0	0	0	0.0	0	0.0	0
# of times wipes greater than trigger level	D	2	1	1	0	1.0	4	1.3	5
By area: Hot Lab	D	1	1	0	0	0.5	2	0.8	3
Imaging Room	D	1	0	1	0	0.5	2	0.3	1
Injection Room	D	0	0	0	0	0.0	0	0.3	1
# of times appropriate action was not taken to decrease levels below trigger level	D	0	0	0	N/A	0.0	0	0.0	0
3. Mo-99/Tc-99m Assays (discontinued use in June 2008 due revised USP <797>):									
* Mo-99/Tc-99m generators are not currently being used; therefore, this audit item will be dropped in 2010						* (see Oct-Dec detailed audit)			
# of times Mo-99m/Tc-99m assays not performed for each pt.-use elution	D	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0
# of times Mo-99m/Tc-99m concentration not within limits	D	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0
# of Tc-99m elutions	V	N/A	N/A	N/A	N/A	N/A	N/A	67.0	134
Total Tc-99m activity in mCi from all elutions	V	N/A	N/A	N/A	N/A	N/A	N/A	51,786.4	103,572.7
4. Daily Dose Calibrator (DC) Constancy Checks (2 dose calibrators):									
* Mo-99 setting is not currently being used clinically; therefore, will no longer be checked daily starting 2010						* (see Jul-Sep detailed audit)			
# of times constancy checks not performed daily if used for pts as required	D	0	0	0	1	0.3	1	0.0	0
# of times constancy checks on non-Tc-99m DC not performed daily but not used for patients	D	0	1	0	0	0.3	1	0.8	3
# of times constancy checks on non-Tc-99m DC incompletely performed but not used for patients	D	0	0	0	0	0.0	0	0.5	2
# of times quarterly full constancy check not performed	D	0	0	0	0	0.0	0	0.0	0
# of times constancy checks not within limits	D	0	0	0	0	0.0	0	0.0	0
5. Quarterly Dose Calibrator Linearity Checks (2 dose calibrators):									
# of times linearity checks not performed quarterly/post repair as required	D	0	0	0	0	0.0	0	0.0	0
# of times linearity checks not within limits	D	0	0	0	0	0.0	0	0.0	0
6. Annual Dose Calibrator Accuracy Checks (2 dose calibrators):									
# of times accuracy checks not performed annually (Sep)/post repair as required	D	N/A	N/A	0	N/A	0.0	0	0.0	0
# of times accuracy checks not within limits	D	N/A	N/A	0	N/A	0.0	0	0.0	0
7. Dose Calibrator Geometry Checks (2 dose calibrators):									
# of times geometry checks not performed post repair as required	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
# of times geometry checks not within limits	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8. Daily Thyroid Probe/Well & Multi-Well Counters Constancy Checks:									
# of times constancy checks not performed daily (i.e., when used) as required	D	0	0	0	0	0.0	0	0.0	0
# of times constancy checks not within limits	D	0	0	0	0	0.0	0	0.0	0
9. Quarterly Thyroid Probe/Well Counter & Multi-Well Counter Checks:									
# of times quarterly checks not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of times quarterly checks not within limits	D	0	0	0	0	0.0	0	0.0	0
10. Monthly Xenon Machine Quality Control Checks:									
# of times monthly/quarterly quality control checks not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of times quality control checks not within limits	D	0	0	0	0	0.0	0	0.3	1

Radiation Safety Committee
Trending Report for 2009
Nuclear Medicine Service

Click on the links to the right for the detailed Quarterly Nuclear Medicine Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	2008 Qtrly Average	2008 Total
11. Semi-Annual Air Flow Measurements (AFM) & Xenon Spill Clearance Time Calculations/ Annual Fume Hood Certification									
# of times semi-annual (Jun & Dec) AFM not performed as required	D	N/A	0	N/A	0	0.0	0	0.0	0
# of times imaging room & hot lab found not to be under negative pressure based on above AFM	D	N/A	0	N/A	0	0.0	0	0.0	0
# of times smoke test did not confirm that the room was under negative pressure	D	N/A	0	N/A	0	0.0	0	0.0	0
# of times Xenon spill clearance times not calculated and not posted for above AFM	D	N/A	0	N/A	0	0.0	0	0.0	0
# of times annual (Feb) fume hood certification not performed as required	D	0	N/A	N/A	N/A	0.0	0	0.0	0
# of times fume hood sash level not noted for above certification	D	0	N/A	N/A	N/A	0.0	0	0.0	0
12. Annual Survey Meter Calibrations:									
# of times annual calibration (Mar)/post repair not performed as required	D	0	N/A	N/A	N/A	0.0	0	0.0	0
# of survey meters calibrated	V	6	N/A	N/A	N/A	6.0	6	3.5	7
13. Quarterly/Annual Radionuclide Sealed Source Inventory:									
# of times quarterly inventories not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of unaccounted for sealed sources	D	0	0	0	0	0.0	0	0.0	0
# of sealed sources on inventory	V	138	137	137	137	137.3	N/A	136.0	N/A
# of sealed sources added to inventory during the quarter (may/may not be in above total due to when received)	V	0	0	0	0	0.0	0	0.3	1
# of sealed sources removed from inventory during the quarter (may/may not be in above total due to when shipped)	V	1	0	0	0	0.3	1	1.5	6
# of times monthly check of Cs-137 calibration source not performed	D	0	0	0	0	0.0	0	0.0	0
# of times annual (Mar) NHPP sealed source verification not performed as required	D	0	N/A	N/A	N/A	N/A	0	N/A	0
# of sealed sources on NHPP inventory	V	2	N/A	N/A	N/A	N/A	2	N/A	4
14. Semi-Annual Radionuclide Sealed Source Leak Testing:									
# of times semi-annual (Jan & Jul) leak test not performed as required	D	0	N/A	0	N/A	0.0	0	0.0	0
# of sealed sources leak tested	V	4	N/A	3	N/A	3.5	N/A	6.0	N/A
# of leak tests with leakage detected above required limits	D	0	N/A	0	N/A	0.0	0	0.0	0
15. Reportable or Recordable Events/Incidents:									
# of times a reportable or recordable event/incident occurred	D	0	0	0	0	0.0	0	0.0	0
16. Reported Radioactive Spills:									
# of times a reported radioactive spill occurred	D	1	0	0	0	0.3	1	0.3	1
# of times appropriate action to the spill was not taken	D	0	0	0	0	0.0	0	0.0	0
17. Quarterly Review of In-coming Radionuclide Receiving Records:									
# of times receiving records were missing pertinent info (e.g., survey/wipe results)	D	1	0	0	0	0.3	1	0.0	0
# of times package receiving problems noted (e.g., contamination, wrong material)	D	6	0	0	0	1.5	6	0.8	3
Total # of in-coming shipments (note some non-Tc-99m may be included within Tc-99m shipments - see detailed audit)	V	200	237	195	204	209.0	836	132.5	530
# of in-coming shipments noted above that were from the local radiopharmacy	V	181	192	159	183	178.8	715	107.5	430
# of C-14 in-coming shipments	V	0	0	0	0	0.0	0	0.3	1
# of C-14 in-coming shipments noted above that were from the local radiopharmacy	V	0	0	0	0	0.0	0	0.3	1
Total C-14 activity in mCi contained in the above shipments	V	0.000	0.000	0.000	0.000	0.0000	0.000	0.0005	0.002
# of Co-57 in-coming shipments	V	0	0	0	0	0.0	0	0.3	1
Total Co-57 activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	3.8	15.0
# of Ga-67 in-coming shipments	V	1	0	2	0	0.8	3	2.0	8
# of Ga-67 transfers from UK (i.e., not included as a shipment)	V	0	0	0	0	0.0	0	0.3	1
Total Ga-67 activity in mCi contained in the above shipments/transfers	V	12.2	0.0	31.7	4.0	12.0	47.9	27.3	109.3
# of I-123 in-coming shipments	V	0	0	0	0	0.0	0	0.3	1
Total I-123 activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.6

Radiation Safety Committee
Trending Report for 2009
Nuclear Medicine Service

Click on the links to the right for the detailed Quarterly Nuclear Medicine Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	2008 Qtrly Average	2008 Total
# of I-131 (C = capsule) in-coming shipments	V	10	5	2	4	5.3	21	10.8	43
# of I-131 (C) in-coming shipments noted above that were from the local radiopharmacy	V	10	5	2	4	5.3	21	10.8	43
Total I-131 (C) activity in mCi contained in the above shipments	V	304.2	175.6	19.5	39.9	134.8	539.2	260.4	1,041.5
# of I-131 (S = solution) in-coming shipments	V	0	0	0	0	0.0	0	0.3	1
# of I-131 (S) in-coming shipments noted above that were from the local radiopharmacy	V	0	0	0	0	0.0	0	0.3	1
Total I-131 (S) activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	1.3	5.1
# of In-111 in-coming shipments	V	1	5	3	3	3.0	12	1.0	4
# of In-111 in-coming shipments noted above that were from the local radiopharmacy	V	1	1	2	2	1.5	6	0.8	3
Total In-111 activity in mCi contained in the above shipments	V	6.5	11.8	3.2	8.9	7.6	30.4	3.2	12.8
# of Mo-99 in-coming shipments	V	0	0	0	0	0.0	0	5.5	22
Total Mo-99 activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	10,080.0	40,320.0
# of Sm-153 in-coming shipments	V	0	0	0	0	0.0	0	0.5	2
Total Sm-153 activity in mCi contained in the above shipments	V	0.0	0.0	0.0	0.0	0.0	0.0	54.9	219.5
# of Tc-99m in-coming shipments	V	168	192	151	176	171.8	687	94.0	376
# of Tc-99m in-coming shipments noted above that were from the local radiopharmacy	V	168	192	151	176	171.8	687	94.0	376
Total Tc-99m activity in mCi contained in the above shipments	V	24,578.6	27,402.7	19,425.3	25,356.3	24,190.7	96,762.9	14,367.2	57,468.6
# of Tl-201 in-coming shipments	V	6	15	27	5	13.3	53	3.5	14
# of Tl-201 in-coming shipments noted above that were from the local radiopharmacy	V	2	5	4	1	3.0	12	1.5	6
Total Tl-201 activity in mCi contained in the above shipments	V	76.8	228.2	788.6	41.1	283.7	1134.7	42.2	168.7
# of Xe-133 in-coming shipments	V	14	20	10	16	15.0	60	14.3	57
# of Xe-133 in-coming shipments noted above that were from the local radiopharmacy	V	0	1	0	0	0.3	1	0.0	0
Total Xe-133 activity in mCi contained in the above shipments	V	632.7	763.3	376.1	631.2	600.8	2,403.3	561.8	2,247.3
18. Quarterly Review of Out-going Radionuclide/Return Package Records:									
# of times out-going records were missing pertinent info (e.g., survey/wipe results)	D	0	0	0	0	0.0	0	0.3	1
# of times out-going package problems noted (e.g., contamination)	D	0	0	0	0	0.0	0	0.0	0
# of out-coming shipments	V	169	203	158	179	177.3	709	114.8	459
# of out-coming shipments noted above that were Mo-99/Tc-99m used generator returns	V	0	0	0	0	0.0	0	6.3	25
# of out-coming shipments noted above that were return packages to local radiopharmacy	V	168	203	158	179	177.0	708	107.5	430
# of out-coming shipments noted above that were sealed sources returns	V	1	0	0	0	0.3	1	1.0	4
# of in-coming shipments from local radiopharmacy that did not have out-going documentation	D	0	1	2	4	1.8	7	0.0	0
19. Written Directive (WD) Audits for Nuclear Medicine:									
# of total written directives used for the quarter	V	8	5	2	5	5.0	20	9.3	37
# of written directives that were for I-131 thyroid uptake	V	0	0	0	0	0.0	0	0.3	1
# of written directives that were for I-131 whole body imaging	V	3	4	1	4	3.0	12	4.8	19
# of written directives that were for I-131 therapy for hyperthyroidism	V	3	0	1	1	1.3	5	2.5	10
# of written directives that were for I-131 therapy for thyroid cancer	V	2	1	0	0	0.8	3	1.5	6
# of written directives that were for Sm-153 therapy for bone pain	V	0	0	0	0	0.0	0	0.3	1
# of problem noted	D	0	0	0	0	0.0	0	0.0	0
20. Training (Include all staff if dealing with clinical use of radionuclides.):									
Total # of radiation safety training hours provided	V	39.50	6.25	30.20	149.00	56.24	224.95	34.25	137.00
# radiation safety training hours provided to Nuclear Medicine staff	V	10.50	3.50	0.00	8.00	5.50	22.00	6.31	25.25
# radiation safety training hours provided to AOD staff	V	0.00	0.00	0.00	6.00	1.50	6.00	1.25	5.00
# radiation safety training hours provided to EMS staff	V	16.50	0.00	0.00	82.00	24.63	98.50	12.19	48.75
# radiation safety training hours provided to VA Police staff	V	1.00	0.00	0.00	34.00	8.75	35.00	8.44	33.75
# radiation safety training hours provided to Warehouse staff	V	0.00	0.00	0.00	11.00	2.75	11.00	2.38	9.50
# radiation safety training hours provided as FYI training (e.g., Radiation Safety, Safety Office staff)	V	11.50	2.75	30.20	8.00	13.11	52.45	3.69	14.75
# of times DOT HAZMAT training not done as required (i.e., new staff w/i 90 days; 3yr refresher due by 9/21/10 - last done 9/21/07)	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Radiation Safety Committee
Trending Report for 2009
Nuclear Medicine Service

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21. Radiation Safety Improvements and/or Additional Comments/Problems:									
Modified the position of the Tc-99m shielded sharps container in the hot lab & added splash guard to help prevent spills	N/A	in Feb	N/A	N/A	N/A	N/A	in Feb	*N/A*	*N/A*
Replaced Cs-137 dose calibrator standard's shielding and labeling	N/A	in Feb	N/A	N/A	N/A	N/A	in Feb	*N/A*	*N/A*
Raised & modified the position of the Tc-99m shielded sharps container in the hot lab to reduce radiation exposure	N/A	N/A	in May	N/A	N/A	N/A	in May	*N/A*	*N/A*
Mounted locked shielded sharps container in the imaging room (1) to the wall to better secure radioactive/biohazard waste	N/A	N/A	in Jun	N/A	N/A	N/A	in Jun	*N/A*	*N/A*
Mounted locked shielded sharps containers (2) in the injection & imaging rooms to the wall to better secure radioactive/biohazard waste	N/A	N/A	N/A	In Jul	N/A	N/A	in Jul	*N/A*	*N/A*
Updated required annual radiation safety training (e.g., added slides & questions, electronic test with question hint slides & % correct)	N/A	N/A	N/A	N/A	in Oct/Nov	N/A	in Oct/Nov	*N/A*	*N/A*
Restocked replacement items in the radiation spill kit and setup updated mini-radiation spill kits that were later distributed in January	N/A	N/A	N/A	N/A	in Dec	N/A	in Dec	*N/A*	*in Dec*

D = Discrepancy/Problem Indicator V = Volume Indicator

Radiation Safety Committee
Trending Report for 2009
Research Service

Click on the links to the right for the detailed Quarterly Research Service Radiation Safety Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed audits.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	2008 Qtrly Average	2008 Total
1. Monthly Radiation Surveys/Wipes of Core Labs, Waste, Common Areas done by RSO:									
# of times surveys/wipes not performed monthly as required	D	0	0	0	0	0.0	0	0.0	0
# of times surveys/wipes greater than trigger level	D	0	0	0	0	0.0	0	0.0	0
# of times appropriate action was not taken to decrease levels below trigger level	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2. Annual Radiation Surveys/Wipes of each Authorized User Lab/Room done by RSO:									
# of times surveys/wipes not performed annually (Dec) as required	D	N/A	N/A	N/A	0	N/A	0	N/A	0
# of times surveys/wipes greater than trigger level	D	N/A	N/A	N/A	0	N/A	0	N/A	1
# of times appropriate action was not taken to decrease levels below trigger level	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0
# of rooms monitored	V	N/A	N/A	N/A	11	N/A	11	N/A	12
# of Authorized Users	V	N/A	N/A	N/A	10	N/A	10	N/A	9
3. Quarterly Record Audit of Weekly Radiation Wipes Performed by each Authorized User Labs:									
# of times wipes not performed weekly as required	D	0	0	0	0	0.0	0	1.0	4
By Authorized User: AM	D	0	0	N/A	N/A	0.0	0	1.0	4
# of times wipes greater than trigger level	D	0	0	0	0	0.0	0	0.5	2
By Authorized User-Room: FB/DV-D427	D	0	0	0	0	0.0	0	0.5	2
# of times appropriate action was not taken to decrease levels below trigger level	D	N/A	N/A	N/A	N/A	N/A	N/A	0.0	0
# of rooms monitored	V	12	12	12	14	12.5	N/A	12.0	N/A
# of labs Authorized Users	V	9	9	8	10	9.0	N/A	9.0	N/A
4. Quarterly/Annual Radionuclide Sealed Source Inventory of Labs and Core Labs done by RSO:									
# of times quarterly inventories not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of unaccounted for sealed sources	D	0	0	0	0	0.0	0	0.0	0
# of sealed sources on inventory	V	17	17	17	17	17.0	N/A	17.0	N/A
# of sealed sources added to inventory during the quarter (may/may not be in above total due to when received)	V	0	0	0	0	0.0	0	0.0	0
# of sealed sources removed from inventory during the quarter (may/may not be in above total due to when shipped)	V	0	0	0	0	0.0	0	0.0	0
# of times annual (Mar) NHPP sealed source verification not performed as required	D	0	N/A	N/A	N/A	N/A	0	N/A	0
# of sealed sources on NHPP inventory	V	2	N/A	N/A	N/A	N/A	2	N/A	2
5. Semi-Annual Radionuclide Sealed Source Leak Testing by RSO:									
# of times semi-annual (Jan & Jul) leak test not performed as required	D	0	N/A	0	N/A	0.0	0	0.0	0
# of sealed sources leak tested	V	2	N/A	2	N/A	2.0	N/A	2.0	N/A
# of leak tests with leakage detected above required limits	D	0	N/A	0	N/A	0.0	0	0.0	0
6. Quarterly Radionuclide (Unsealed) Inventory of each Authorized User Lab done by RSO:									
# of times quarterly inventories (based on first date of quarters possession) not performed as required	D	0	0	0	0	0.0	0	0.0	0
# of unaccounted for unsealed sources	D	0	0	0	0	0.0	0	0.0	0
# of times Authorized User was over their possession limits	D	0	0	0	0	0.0	0	0.0	0
# of Authorized Users	V	9	9	8	10	9.0	N/A	9.0	N/A
7. Reported Radioactive Spills:									
# of times a reported radioactive spill occurred	D	0	0	0	0	0.0	0	0.0	0
# of times appropriate action to the spill was not taken	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
8. Authorized User Lab Closings:									
# of labs closed out (i.e., monitored and released for general use)	V	0	0	0	1	0.3	1	0.0	0
9. Annual Survey Meter Calibrations:									
# of times annual calibration (Mar)/post repair not performed as required	D	0	N/A	N/A	N/A	0.0	0	0.0	0
# of survey meters calibrated	V	3	N/A	N/A	1	2.0	4	5.0	5
10. Annual Beta Counter (2) Quench Curve and Gamma Counter (2) Calibration:									
# of times Quench Curve and Gamma Calibration not performed annually (Jan)/post repair as required	D	0	N/A	N/A	N/A	0.0	0	0.0	0

Radiation Safety Committee
Trending Report for 2009
Research Service

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11. Monthly Beta Counter (2) Normalization, Chi-Square, and Constancy Checks and Gamma Counter (2) Peak, % Resolution, Chi-Square, Constancy, and Efficiency Checks:									
# of times above checks not performed monthly as required	D	0	0	0	0	0.0	0	*0.0*	*0*
# of times above checks not within limits	D	0	0	0	0	0.0	0	*0.0*	*0*
12. Authorized User Approval by the RSC:									
# of authorized user approvals by the RSC	V	0	0	2	0	0.5	2	*0.3*	*1*
13. Quarterly Review of In-coming Radionuclide Receiving Records:									
# of times shipments received that were not pre-approved by the RSO	D	0	0	0	0	0.0	0	*0.0*	*0*
# of times receiving records were missing pertinent info (e.g., survey/wipe results)	D	0	0	0	0	0.0	0	*0.0*	*0*
# of times package receiving problems noted (e.g., contamination, wrong material)	D	0	0	0	0	0.0	0	*0.3*	*1*
By Problem: Shipping label did reflect RSO as delivery point	D	0	0	0	0	0.0	0	*0.3*	*1*
Total # of in-coming shipments	V	1	1	1	4	1.8	7	*2.5*	*10*
# of C-14 in-coming shipments	V	0	0	0	0	0.0	0	*0.3*	*1*
Total C-14 activity in mCi contained in the above shipments	V	0.00	0.00	0.00	0.00	0.00	0.00	*0.06*	*0.25*
# of Cr-51 in-coming shipments	V	0	0	0	0	0.0	0	*0.3*	*1*
Total Cr-51 activity in mCi contained in the above shipments	V	0.00	0.00	0.00	0.00	0.00	0.00	*1.88*	*7.50*
# of H-3 in-coming shipments	V	0	1	0	0	0.3	1	*0.5*	*2*
Total H-3 activity in mCi contained in the above shipments	V	0.00	5.00	0.00	0.00	1.25	5.00	*0.31*	*1.25*
# of I-125 in-coming shipments	V	0	0	0	2	0.5	2	*0.0*	*0*
Total P-32 activity in mCi contained in the above shipments	V	0.00	0.00	0.00	5.95	1.49	5.95	*0.00*	*0.00*
# of P-32 in-coming shipments	V	1	0	1	2	1.0	4	*1.3*	*5*
Total P-32 activity in mCi contained in the above shipments	V	1.27	0.00	0.32	0.67	0.57	2.26	*5.75*	*22.98*
# of S-35 in-coming shipments	V	0	0	0	0	0.0	0	*0.3*	*1*
Total S-35 activity in mCi contained in the above shipments	V	0.00	0.00	0.00	0.00	0.00	0.00	*0.30*	*1.20*
14. Quarterly Review of Out-going Radionuclide/Return Package Records:									
# of times out-going records were missing pertinent info (e.g., survey/wipe results)	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
# of times out-going package problems noted (e.g., contamination)	D	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
# of out-coming shipments	V	0	0	0	0	0.0	0	0.0	0
15. Training (Include all staff if dealing with research use of radionuclides.): See Nuclear Medicine audits for support staff (e.g., EMS, Police, etc.)									
Total # of radiation safety training hours provided	V	3.00	1.25	20.92	17.25	10.61	42.42	2.00	8.00
# radiation safety training hours provided to Research staff	V	2.25	0.75	20.17	16.25	9.86	39.42	*1.63*	*6.50*
# radiation safety training hours provided as FYI training (e.g., Radiation Safety, Safety Office staff)	V	0.75	0.50	0.75	1.00	0.75	3.00	*0.38*	*1.50*
16. Radiation Safety Improvements and/or Additional Comments/Problems:									
Worked w/ Research Safety Manager to update safety training for all research staff & lab entrance poster (both included radiation safety)	N/A	N/A	in Apr	N/A	N/A	N/A	in Apr	*N/A*	*N/A*
Restocked replacement items (i.e., due in August) in the radiation spill kits	N/A	N/A	N/A	in Aug	N/A	N/A	in Aug	*N/A*	*in Aug*
Added annual radiation safety training for research administrative staff	N/A	N/A	N/A	N/A	in Nov	N/A	in Nov	*N/A*	*N/A*

D = Discrepancy/Problem Indicator V = Volume Indicator

Radiation Safety Committee
Trending Report for 2009
Radiographic-Fluoroscopic Use

Click on the links to the right for detailed Quarterly Radiographic-Fluoroscopic Use Radiation Safety Audits in 2009 with links to case-by-case breakdown - started preliminary data collection in Dec 2008.		1st Qtr 2009			2nd Qtr 2009			3rd Qtr 2009			4th Qtr 2009			Mon Ave	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Qtr Ave	2009 Total	2008 Dec
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
1. Patient radiation dose from CT (B152 only):																					
See reference tables/links at end of this audit related to patient effective doses.																					
Total # of CT exams	V	895	872	1051	1075	1094	1013	1063	1003	968	1050	987	1111	1015.2	2818	3182	3034	3148	3045.5	12182	992
Total # of CT procedures	V	47	52	44	54	47	48	43	46	54	51	47	46	48.3	58	60	57	62	59.3	58	52
# Exams/procedure (note: patient may have multiple procedures; dose may reflect all exams done)	V	19.0	16.8	23.9	19.9	23.3	21.1	24.7	21.8	17.9	20.6	21.0	24.2	21.0	48.6	53.0	53.2	50.8	51.4	210.0	19.1
A. Interventional CT Exams:																					
# of Interventional CT exams with CPRS documented ~ pt radiation dose (i.e., DLP)	V	11	18	11	12	11	9	16	15	15	15	11	9	12.8	40	32	46	35	38.3	153	19
% of total # of CT exams	V	1.2%	2.1%	1.0%	1.1%	1.0%	0.9%	1.5%	1.5%	1.5%	1.4%	1.1%	0.8%	1.3%	1.4%	1.0%	1.5%	1.1%	1.3%	1.3%	1.9%
Average patient effective dose (mSv) for these exams	V	10.3	13.4	7.1	7.6	10.5	6.7	9.2	11.6	7.8	10.1	12.0	10.8	9.9	10.8	8.4	9.5	10.9	9.9	9.9	17.4
# of these exams with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	5	8	2	2	4	0	5	6	3	4	5	5	4.1	15	6	14	14	12.3	49	9
% of exams with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	45%	44%	18%	17%	36%	0%	31%	40%	20%	27%	45%	56%	32%	38%	19%	30%	40%	32%	32%	47%
# of these exams with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
(1) Further broken down by CCTA Exams:																					
# of these Interventional CT exams that were for CCTA W/WO, QUAN CALCIUM	V	11	16	10	12	11	9	16	14	14	14	9	9	12.1	37	32	44	32	36.3	145	10
% of total # of CT exams	V	1.2%	1.8%	1.0%	1.1%	1.0%	0.9%	1.5%	1.4%	1.4%	1.3%	0.9%	0.8%	1.2%	1.3%	1.0%	1.5%	1.0%	1.2%	1.2%	1.0%
Average patient effective dose (mSv) for these CCTA exams	V	10.3	13.4	6.8	7.6	10.5	6.7	9.2	10.5	7.8	10.2	11.3	10.8	9.7	10.7	8.4	9.1	10.7	9.7	9.7	9.2
# of these exams with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	5	7	1	2	4	0	5	5	3	4	4	5	3.8	13	6	13	13	11.3	45	2
% of exams with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	45%	44%	10%	17%	36%	0%	31%	36%	21%	29%	44%	56%	31%	35%	19%	30%	41%	31%	31%	20%
# of these CCTA exams with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
B. High Volume Exams (Jan-Jun)/Cases (Jul-Dec) (different procedures reviewed each qtr):															← See Monthly						
(1) Broken down by Procedure Type:		CT HEAD W/O CONTRAST			CT ABDOMEN W/O CONTRAST			CT ABDOMEN & PELVIS W/CONTRAST			CT CHEST PULMONARY EMBOLISM PROTOCOL				← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	44	53	45	28	40	38	N/A	N/A	N/A	142	106	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	2	2	2	1	1	1	N/A	N/A	N/A	2	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	122	114	134	103	117	92	88	106	90	28	40	38	N/A	370	312	284	106	N/A	N/A	N/A
% of total # of CT exams	V	14%	13%	13%	10%	11%	9%	8%	11%	9%	3%	4%	3%	N/A	13%	10%	9%	3%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., 10% w/ 10min) for ~ pt radiation dose (i.e., DLP)	V	12	11	13	10	12	10	10	11	10	10	10	10	N/A	36	32	31	30	N/A	N/A	N/A
% of total # of CT exams	V	1.3%	1.3%	1.2%	0.9%	1.1%	1.0%	1.9%	2.2%	2.1%	1.0%	1.0%	0.9%	N/A	1.3%	1.0%	2.0%	1.0%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	2.2	2.2	2.1	17.4	17.0	21.7	29.6	33.1	36.4	16.2	16.6	17.0	N/A	2.1	18.6	33.0	16.6	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	0	0	0	8	8	8	9	11	10	10	8	9	N/A	0	24	30	27	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	0%	0%	0%	80%	67%	80%	90%	100%	100%	100%	80%	90%	N/A	0%	75%	97%	90%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A
(2) Broken down by Procedure Type:		CT CHEST W/O CONTRAST			CT PELVIS W/O CONTRAST			CT CHEST, ABDOMEN & PELVIS W/CONTRAST			CTA HEAD, NECK & CHEST				← See Monthly ← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	43	40	36	13	10	9	N/A	N/A	N/A	119	32	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	3	3	3	3	3	3	N/A	N/A	N/A	3	3	N/A	N/A	N/A
# of these CT exams documented as being performed	V	111	94	109	94	116	92	129	120	108	39	30	27	N/A	314	302	357	96	N/A	N/A	N/A
% of total # of CT exams	V	12%	11%	10%	9%	11%	9%	12%	12%	11%	4%	3%	2%	N/A	11%	9%	12%	3%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., 10% w/ 10min) for ~ pt radiation dose (i.e., DLP)	V	11	10	11	10	12	10	10	10	10	10	10	9	N/A	32	32	30	29	N/A	N/A	N/A
% of total # of CT exams	V	1.2%	1.1%	1.0%	0.9%	1.1%	1.0%	2.8%	3.0%	3.1%	2.9%	3.0%	2.4%	N/A	1.1%	1.0%	3.0%	2.8%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	16.4	18.7	11.6	12.6	20.0	17.3	37.6	46.0	45.3	18.9	19.3	19.7	N/A	15.4	16.8	43.0	19.3	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	9	7	3	6	9	7	10	10	10	10	10	9	N/A	19	22	30	29	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	82%	70%	27%	60%	75%	70%	100%	100%	100%	100%	100%	100%	N/A	59%	69%	100%	100%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A

Radiation Safety Committee
Trending Report for 2009
Radiographic-Fluoroscopic Use

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		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
C. Average Volume Exams (Jan-Jun)/Cases (Jul-Dec) (different procedures reviewed each qtr): **(1) Broken down by Procedure Type:**		CT SINUSES ENT PROTOCOL W/O CONTRAST			CT LUMBAR SPINE W/O CONTRAST			CT CHEST W/CONTRAST			CT CERVICAL SPINE W/O CONTRAST				← See Monthly ← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	26	18	19	13	14	12	N/A	N/A	N/A	63	39	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	1	1	1	1	1	1	N/A	N/A	N/A	1	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	17	21	29	19	13	11	26	18	19	13	14	12	N/A	67	43	63	39	N/A	N/A	N/A
% of total # of CT exams	V	1.9%	2.4%	2.8%	1.8%	1.2%	1.1%	2.4%	1.8%	2.0%	1.2%	1.4%	1.1%	N/A	2.4%	1.4%	2.1%	1.2%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., 10% w/ 10min if possible) for ~ pt radiation dose (i.e., DLP)	V	10	10	10	10	10	10	10	10	10	10	10	10	N/A	30	30	30	30	N/A	N/A	N/A
% of total # of CT exams	V	1.1%	1.1%	1.0%	0.9%	0.9%	1.0%	0.9%	1.0%	1.0%	1.0%	1.0%	0.9%	N/A	1.1%	0.9%	1.0%	1.0%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	1.6	1.5	1.5	30.8	22.0	26.2	9.4	12.8	11.5	4.9	4.5	5.4	N/A	1.5	26.3	11.2	4.9	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	0	0	0	8	8	8	4	8	6	0	0	1	N/A	0	24	18	1	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	0%	0%	0%	80%	80%	80%	40%	80%	60%	0%	0%	10%	N/A	0%	80%	60%	3%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A
(2) Broken down by Procedure Type:		CTA AORTA W/RUNOFF			CT NECK SOFT TISSUE W/ CONTRAST			CT NECK SOFT TISSUE & CHEST W/CONTRAST			CT HEAD W&WO CONTRAST				← See Monthly ← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	11	8	5	11	9	18	N/A	N/A	N/A	24	38	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	2	2	2	1	1	1	N/A	N/A	N/A	2	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	23	20	22	18	26	22	22	16	10	11	9	18	N/A	65	66	48	38	N/A	N/A	N/A
% of total # of CT exams	V	2.6%	2.3%	2.1%	1.7%	2.4%	2.2%	2.1%	1.6%	1.0%	1.0%	0.9%	1.6%	N/A	2.3%	2.1%	1.6%	1.2%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., 10% w/ 10min if possible) for ~ pt radiation dose (i.e., DLP)	V	10	10	10	10	10	10	11	8	5	10	9	10	N/A	30	30	24	29	N/A	N/A	N/A
% of total # of CT exams	V	1.1%	1.1%	1.0%	0.9%	0.9%	1.0%	2.1%	1.6%	1.0%	1.0%	0.9%	0.9%	N/A	1.1%	0.9%	1.6%	0.9%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	42.9	32.9	33.2	2.7	2.8	3.1	16.3	32.3	27.1	4.2	4.1	4.2	N/A	36.3	2.8	23.9	4.2	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	10	10	10	0	0	0	8	8	5	0	0	0	N/A	30	0	21	0	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	100%	100%	100%	0%	0%	0%	73%	100%	100%	0%	0%	0%	N/A	100%	0%	88%	0%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A
D. Low Volume Exams (Jan-Jun)/Cases (Jul-Dec) (different procedures reviewed each qtr): **(1) Broken down by Procedure Type:**		CT ABDOMEM ADRENAL ADENOMA			CT THORACIC SPINE W/O CONTRAST			CT CHEST PE PROTOCOL, ABD & PELVIS W/CONTRAST			CT ABD W&W/O (RENAL MASS PROTOCOL)				← See Monthly ← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	3	3	3	7	7	4	N/A	N/A	N/A	9	18	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	3	3	3	1	1	1	N/A	N/A	N/A	3	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	2	5	4	5	5	3	9	9	9	7	7	4	N/A	11	13	27	18	N/A	N/A	N/A
% of total # of CT exams	V	0.2%	0.6%	0.4%	0.5%	0.5%	0.3%	0.8%	0.9%	0.9%	0	0	0	N/A	0.4%	0.4%	0.9%	0.6%	N/A	N/A	N/A
# of exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., all performed) for ~ pt radiation dose (i.e., DLP)	V	2	5	4	5	5	3	3	3	3	7	7	4	N/A	11	13	9	18	N/A	N/A	N/A
% of total # of CT exams	V	0.2%	0.6%	0.4%	0.5%	0.5%	0.3%	0.8%	0.9%	0.9%	0.7%	0.7%	0.4%	N/A	0.4%	0.4%	0.9%	0.6%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	17.6	10.8	3.2	33.0	15.6	37.9	65.2	62.4	72.4	37.3	45.1	40.0	N/A	9.3	27.5	66.7	40.9	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	2	3	0	5	5	2	3	3	3	7	7	4	N/A	5	12	9	18	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	100%	60%	0%	100%	100%	67%	100%	100%	100%	100%	100%	100%	N/A	45%	92%	100%	100%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A

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		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
(2) Broken down by Procedure Type:		CT ABDOMEM W & W/O CONTRAST LIVER PROTOCOL			CT TRAUMA FACE			CT NECK SOFT TISSUE, CHEST, ABD & PELVIS W/CONTRAST			CT ORBIT SELLA P FOS OR TEMP BONE (W/O CONTRAST)				← See Monthly ← Breakdown For ← Procedure Reviewed						
# of CT cases (case = 1 or more exams) documented as being performed	V	N/A	N/A	N/A	N/A	N/A	N/A	4	4	4	3	5	4	N/A	N/A	N/A	12	12	N/A	N/A	N/A
# of CT exams per case	V	N/A	N/A	N/A	N/A	N/A	N/A	4	4	4	1	1	1	N/A	N/A	N/A	4	1	N/A	N/A	N/A
# of these CT exams documented as being performed	V	4	5	2	6	2	3	16	16	16	3	5	4	N/A	11	11	48	12	N/A	N/A	N/A
% of total # of CT exams	V	0.4%	0.6%	0.2%	0.6%	0.2%	0.3%	1.5%	1.6%	1.7%	0.3%	0.5%	0.4%	N/A	0.4%	0.3%	1.6%	0.4%	N/A	N/A	N/A
# of exams (Jan-Jun)/cases (Jul-Dec) reviewed (i.e., all performed) for ~ pt radiation dose (i.e., DLP)	V	4	5	2	6	2	3	4	4	4	3	5	4	N/A	11	11	12	12	N/A	N/A	N/A
% of total # of CT exams	V	0.4%	0.6%	0.2%	0.6%	0.2%	0.3%	1.5%	1.6%	1.7%	0.3%	0.5%	0.4%	N/A	0.4%	0.3%	1.6%	0.4%	N/A	N/A	N/A
Average patient effective dose (mSv) for these exams (Jan-Jun)/cases (Jul-Dec)	V	33.7	56.0	30.3	2.0	1.9	1.8	44.4	56.3	60.4	2.4	2.2	1.7	N/A	43.3	1.9	53.7	2.1	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv	V	4	5	2	0	0	0	4	4	4	0	0	0	N/A	11	0	12	0	N/A	N/A	N/A
% of exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose ≥ 10 mSv but ≤ 100 mSv compared to total	V	100%	100%	100%	0%	0%	0%	100%	100%	100%	0%	0%	0%	N/A	100%	0%	100%	0%	N/A	N/A	N/A
# of these exams (Jan-Jun)/cases (Jul-Dec) with pt effective dose > 100 mSv	D	0	0	0	0	0	0	0	0	0	0	0	0	N/A	0	0	0	0	N/A	N/A	N/A
2. Patient radiation dose from Interventional Fluoroscopy (Specials B180): See reference table/link at end of this audit related to patient skin doses.																					
# of Specials exams with documented ~ pt radiation dose (i.e., Air Kerma)	V	32	29	24	36	24	26	39	36	33	20	17	24	28.3	85	86	108	61	85.0	340	36
Average fluoro time (min) for these exams	V	7.0	4.7	3.6	10.3	3.3	5.3	9.2	7.6	5.4	4.2	3.2	7.4	6.3	5.3	6.8	7.5	5.1	6.3	6.3	7.0
Average total Air Kerma dose (Gy) for these exams	V	0.3	0.3	0.2	0.5	0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.5	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
# of these exams with total dose ≥ 3 Gy but < 10 Gy	D	0	0	0	0	0	0	0	0	1	0	0	1	0.2	0	0	1	1	0.5	2	1
% of cases with total dose ≥ 3 Gy but < 10 Gy compared to total	D	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	4%	1%	0%	0%	1%	2%	1%	1%	3%
# of these exams with total dose ≥ 10 Gy but < 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
% of exams with total dose ≥ 10 Gy but < 15 Gy compared to total	D	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
# of these exams with total Air Kerma dose ≥ 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
3. Patient radiation dose from Cardiac Cath (A233 & A235): See reference table/link at end of this audit related to patient skin doses.																					
# of Cardiac Cath exams with documented ~ pt radiation dose (i.e., Dose = Air Kerma)	V	81	66	64	79	78	69	75	77	69	68	53	63	70.2	211	226	221	184	210.5	842	76
Average fluoro time (min) for these exams	V	14.6	14.5	13.9	19.4	12.9	12.3	14.1	16.7	15.2	17.0	16.5	20.1	15.6	14.3	15.0	15.3	17.9	15.6	15.6	12.8
Average estimated dose * (Gy) for these exams * Estimated dose based on recorded dose overestimation (i.e., 19.4% CCL & 19.6% EPL) Updated 2008-2009 data (i.e., from recorded dose to estimated dose).	V	2.1	1.9	1.8	2.4	1.9	2.0	2.1	2.1	2.2	2.4	2.6	3.0	2.2	1.9	2.1	2.2	2.7	2.2	2.2	1.7
# of these exams with estimated dose ≥ 3 Gy but < 10 Gy	D	21	13	11	19	18	14	20	20	21	18	17	27	18.3	45	51	61	62	54.8	219	14
% of exams with estimated dose ≥ 3 Gy but < 10 Gy compared to total	D	26%	20%	17%	24%	23%	20%	27%	26%	30%	26%	32%	43%	26%	21%	23%	28%	34%	26%	26%	18%
# of these exams with estimated dose ≥ 10 Gy but < 15 Gy	D	0	0	0	0	0	0	0	0	0	1	0	1	0.2	0	0	0	2	0.5	2	0
% of exams with estimated dose ≥ 10 Gy but < 15 Gy compared to total	D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	1.6%	0.2%	0.0%	0.0%	0.0%	1.1%	0.2%	0.2%	0.0%
# of these exams with estimated dose ≥ 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0
A. Broken down by:																					
# of these exams that were in **A233 (EP Lab - EPL)**	V	31	25	26	28	20	23	31	28	26	27	15	24	25.3	82	71	85	66	76.0	304	28
Average fluoro time (min) for these exams	V	17.8	12.7	16.3	22.3	15.5	10.5	15.0	19.3	14.4	14.0	12.2	21.9	16.2	15.8	16.6	16.2	16.5	16.2	16.2	14.6
Average estimated dose (Gy) for these exams	V	2.0	1.2	1.6	1.4	1.6	1.5	1.9	1.6	1.6	1.7	1.4	2.8	1.7	1.6	1.5	1.7	2.0	1.7	1.7	1.0
# of these exams with estimated dose ≥ 3 Gy but < 10 Gy	D	11	2	4	2	4	2	8	5	4	6	2	7	4.8	17	8	17	15	14.3	57	1
% of exams with estimated dose ≥ 3 Gy but < 10 Gy compared to total	D	35%	8%	15%	7%	20%	9%	26%	18%	15%	22%	13%	29%	19%	21%	11%	29%	23%	19%	19%	4%
# of these exams with estimated dose ≥ 10 Gy but < 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	1	0.1	0	0	0	1	0.3	1	0
% of exams with estimated dose ≥ 10 Gy but < 15 Gy compared to total	D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.2%	0.3%	0.0%	0.0%	0.0%	1.5%	0.3%	0.3%	0.0%
# of these exams with estimated dose > 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	0

Radiation Safety Committee
Trending Report for 2009
Radiographic-Fluoroscopic Use

Click on the links to the right for detailed Quarterly Radiographic-Fluoroscopic Use Radiation Safety Audits in 2009 with links to case-by-case breakdown - started preliminary data collection in Dec 2008.		1st Qtr 2009			2nd Qtr 2009			3rd Qtr 2009			4th Qtr 2009			Mon Ave	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Qtr Ave	2009 Total	2008 Dec
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
B. Broken down by:																					
# of these exams that were in **A235** (Cardiac Cath Lab - CCL)	V	50	41	38	51	58	46	44	49	43	41	38	39	44.8	129	155	136	118	134.5	538	*48*
Average fluoro time (min) for these exams	V	12.6	15.5	12.2	17.8	12.1	13.2	13.4	15.2	15.7	19.0	18.2	19.0	15.2	13.4	14.3	14.8	18.8	15.2	15.2	*11.8*
Average estimated dose (Gy) for these exams	V	2.2	2.4	1.9	2.9	1.9	2.2	2.2	2.4	2.6	2.9	3.1	3.1	2.5	2.2	2.3	2.4	3.0	2.5	2.5	*2.1*
# of these exams with estimated dose ≥ 3 Gy but < 10 Gy	D	10	11	7	17	14	12	12	15	17	12	15	20	13.5	28	43	44	47	40.5	162	*13*
% of exams with estimated dose ≥ 3 Gy but < 10 Gy compared to total	D	20%	27%	18%	33%	24%	26%	27%	31%	40%	29%	39%	51%	30%	22%	28%	32%	40%	30%	30%	*27%*
# of these exams with estimated dose ≥ 10 Gy but < 15 Gy	D	0	0	0	0	0	0	0	0	0	1	0	0	0.1	0	0	0	1	0.3	1	*0*
% of exams with estimated dose ≥ 10 Gy but < 15 Gy compared to total	D	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.4%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.8%	0.2%	0.2%	*0.0%*
# of these exams with estimated dose > 15 Gy	D	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0	0	0	0	0.0	0	*0*
4. Radiation Safety Improvements and/or Additional Comments/Problems:																					
Additional monitoring started (i.e., pt radiation dose from CT from high to low volume exams: 1.B.-D.)	N/A		in Jan-Mar				N/A			N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	in 1 Qtr	*N/A*
Special dose (i.e., air kerma) evaluation done on Specials & Cardiac Cath equipment	N/A			N/A			in Jun			N/A			N/A	N/A	N/A	N/A	N/A	N/A	N/A	in Jun	*N/A*

D = Discrepancy/Problem Indicator V = Volume Indicator

References for Section 1 above

Table 1. Relative radiation level designations along with common example examinations for each classification

Relative Radiation Level*	Effective Dose Estimate Range	Example Examinations
None	0	Ultrasound, MRI
Minimal	<0.1 mSv	Chest radiographs, hand radiographs
Low	0.1-1 mSv	Pelvis radiographs, mammography
Medium	1-10 mSv	Abdomen CT, barium enema, nuclear medicine bone scan
High	10-100 mSv	Abdomen CT without and with contrast, whole body PET

*RRL assignments are not included for some examinations. These are designated as IP (in progress) or NS (not specified). The RRL assignments for the IP examinations will be available in future releases. The RRL assignments for the NS examinations cannot be made because the RRL depends on the region of the body exposed to ionizing radiation, and the body part will vary as a function of the clinical situation.

Taken from ACR Appropriateness Criteria® Radiation Dose Assessment Introduction (Relative Radiation Level Information)

Table 2

Adult Effective Doses for Various CT Procedures

Examination	Average Effective Dose (mSv)	Values Reported in Literature (mSv)
Head	2	0.9–4.0
Neck	3	--
Chest	7	4.0–18.0
Chest for pulmonary embolism	15	13–40
Abdomen	8	3.5–25
Pelvis	6	3.3–10
Three-phase liver study	15	--
Spine	6	1.5–10
Coronary angiography	16	5.0–32
Calcium scoring	3	1.0–12
Virtual colonoscopy	10	4.0–13.2

Taken from Mettler FA, Jr, Huda W, Yoshizumi TT, Mahesh M. Effective doses in radiology and diagnostic nuclear medicine: a catalog. Radiology 2008; 248(1):254-263.

Reference for Sections 2 & 3 above

Table II. Radiation-Induced Skin Injuries

Effect	Typical Threshold Absorbed Dose (Gy)*	Hours of Fluoroscopic "On Time" to Reach Threshold** at: Usual Fluoro. Dose Rate of 0.02 Gy/min (2 rad/min)	High-Level Dose Rate of 0.2 Gy/min (20 rad/min)	Time to Onset of Effect***
Early transient erythema	2	1.7	0.17	hours
Temporary epilation	3	2.5	0.25	3 wk
Main erythema	6	5.0	0.50	10 d
Permanent epilation	7	5.8	0.58	3 wk
Dry desquamation	10	8.3	0.83	4 wk
Invasive fibrosis	10	8.3	0.83	
Dermal atrophy	11	9.2	0.92	>14 wk
Telangiectasia	12	10.0	1.00	>52 wk
Moist desquamation	15	12.5	1.25	4 wk
Late erythema	15	12.5	1.25	6-10 wk
Dermal necrosis	18	15.0	1.50	>10 wk
Secondary ulceration	20	16.7	1.67	>6 wk

* The unit for absorbed dose is the gray (Gy) in the International System of units. One Gy is equivalent to 100 rad in the traditional system of radiation units.
** Time required to deliver the typical threshold dose at the specified dose rate.
*** Time after single irradiation to observation of effect.

(Table adapted from Ref. 4.)

Taken from FDA's Avoidance of Serious X-ray-Induced Skin Injuries to Patients During Fluoroscopically-Guided Procedures

Radiation Safety Committee
Trending Report for 2009
ALARA-Radiation Exposure

Click on the link to the right for the detailed Quarterly ALARA-Radiation Exposure Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed reviews.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
1. Personnel Exposure Records/ALARA Investigational Levels (see below):									
A. Radioactive Materials Use:									
a) Follow-up on previous quarter's review (see detailed reports above or summaries below)									
b) # of times ALARA Quarterly Investigational Level I (10% of ¼ annual limit) was exceeded	D	0	0	0	0	0.0	0	*1.8*	*7*
By Type: **# of times Whole Body Deep Dose Equivalent ALARA I @ 125 mrem was exceeded**	D	0	0	0	0	0.0	0	*0.8*	*3*
Then by Employee: Nuclear Medicine Technologist - Badge # 269 qtrly total in mrem	D	82	91	69	78	80	320	*141*	*565*
Nuclear Medicine Technologist - Badge # 1033 qtrly total in mrem	D	108	92	107	119	107	426	*118*	*473*
By Type: **# of times Extremity Shallow Dose Equivalent ALARA I @ 1,250 mrem was exceeded**	D	0	0	0	0	0.0	0	*1.0*	*4*
Then by Employee: Nuclear Medicine Technologist - Badge # 271 qtrly total in mrem	D	410	400	300	360	368	1,470	*863*	*3,450*
Nuclear Medicine Technologist - Badge # 1027 qtrly total in mrem	D	530	600	460	380	493	1,970	*1,778*	*7,110*
Nuclear Medicine Technologist - Badge # 1033 qtrly total in mrem	D	500	470	280	360	403	1,610	*793*	*3,170*
c) # of times ALARA Quarterly Investigational Level II (30% of ¼ annual limit) was exceeded	D	0	0	0		0.0	0	*0*	*0*
B. Radiographic-Fluoroscopic Use:									
a) Follow-up on previous quarter's review (see detailed reports above or summaries below)									
b) # of times ALARA Quarterly Investigational Level I (10% of ¼ annual limit) was exceeded	D	2	0	1	0	0.8	3	*2.5*	*10*
By Type: **# of times Whole Body Effective Dose Equivalent ALARA I @ 125 mrem was exceeded**	D	1	0	0	0	0.3	1	*0.8*	*3*
Then by Employee: RN/Cath Lab - Badge # 534 qtrly total in mrem	D	112	100	114	82	102	408	*119*	*476*
Cardiologist/Cath Lab - Badge # 984 qtrly total in mrem	D	107	82	85	94	92	368	*111*	*443*
Anesthesiologist/Pain Clinic - Badge # 1048 qtrly total in mrem	D	**130**	61	8	3	51	202	*83*	*332*
By Type: **# of times Lens Dose Equivalent ALARA I @ 375 mrem was exceeded**	D	1	0	1	0	0.5	2	*1.8*	*7*
Then by Employee: RN/Cath Lab - Badge # 534 qtrly total in mrem	D	372	334	**380**	274	340	1,360	*396*	*1,585*
Physician Assistant/Pain Clinic - Badge # 972 qtrly total in mrem	D	23	7	4	0	9	34	*102*	*407*
Cardiologist/Cath Lab - Badge # 984 qtrly total in mrem	D	360	275	284	316	309	1,235	*372*	*1,488*
Anesthesiologist/Pain Clinic - Badge # 1048 qtrly total in mrem	D	**434**	218	35	9	174	696	*290*	*1,158*
c) # of times ALARA Quarterly Investigational Level II (30% of ¼ annual limit) was exceeded	D	0	0	0		0.0	0	*0*	*0*
2. I-125/I-131 Bioassay Results:									
a) Nuclear Medicine									
# of employees having bioassays	V	2	1	1	1	1.3	5	*3.0*	*12*
# of times bioassays performed	V	4	1	1	1	1.8	7	*4.8*	*19*
# of administrations > 1 mCi of I-131 as NaI in solution	V	0	0	0	0	0.0	0	*0.5*	*2*
# of administrations > 10 mCi of I-131 as NaI in capsule	V	4	1	1	1	1.8	7	*2.8*	*11*
# of times bioassays not performed within 6-72 hours post administration	D	0	0	0	0	0.0	0	*0.3*	*1*
# of times bioassay results were > minimal detectable activity (MDA) of the counting system	D	0	0	0	0	0.0	0	*0.0*	*0*
# of times bioassay results required action and/or inclusion in Total Effective Dose Equivalent	D	0	0	0	0	0.0	0	*0.0*	*0*
b) Research - Not performing iodinations at this time - no bioassays done	V	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*	*N/A*

Radiation Safety Committee
Trending Report for 2009
ALARA-Radiation Exposure

Click on the link to the right for the detailed Quarterly ALARA-Radiation Exposure Audits in 2009 or the Trending Report for 2008 (on far right) which includes links to 2008 detailed reviews.		Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	2009 Qtrly Average	2009 Total	*2008 Qtrly Average*	*2008 Total*
3. Pregnant Radiation Workers:									
# of declared pregnant radiation workers	V	0	0	0	0	0.0	0	*0.8*	*1*
4. Quarterly Area Monitors Involving Radioactive Materials:									
NM2 monitor - wall in main hallway outside Nuclear Medicine (i.e., outer wall of hot lab) qtrly total in mrem	V	8	6	10	1	6.3	25	*17.8*	*71*
NM3 monitor - wall in main hallway outside Nuclear Medicine (i.e., outer wall of hot lab) qtrly total in mrem	V	0	0	0	0	0.0	0	*0.0*	*0*
RES1 monitor - doorway of research radioactive waste storage room qtrly total in mrem	V	0	0	0	0	0.0	0	*0.0*	*0*
# of area monitors with readings > 100 mrem for the current calendar year (i.e., 2009)	D	N/A	N/A	N/A	0	N/A	0	*N/A*	*0*
5. Sanitary Sewer Disposal of Radioactive Material: none at this time	V	N/A	N/A	N/A	N/A	N/A	N/A	*N/A*	*N/A*
6. Radiation Safety Improvements and/or Additional Comments/Problems:									
Compliant with NRC's constraint of radioactive air effluents for the current calendar year (i.e., 2009)	N/A	N/A	N/A	N/A	in 2009	N/A	N/A	*N/A*	*in 2008*

D = Discrepancy/Problem Indicator V = Volume Indicator

Quarterly ALARA Levels & Annual Limits are expressed in mrem	ALARA Quarterly Investigational Levels: Level I (10% of ¼ annual limits)	Level II (30% of ¼ annual limits)	Annual Limits*
Whole Body (WB) Deep Exposure (DDE = Deep Dose Equivalent) (if lead/lead equivalent apron **not** used)	125	375	5,000
Whole Body Effective Dose Equivalent (WB EDE) = 0.3 x DDE (due to use of lead/lead equivalent apron)	125	375	5,000
Lens of Eye Exposure (LDE = Lens Dose Equivalent)	375	1,125	15,000
WB Shallow (Skin) Exposure (SDE = Shallow Dose Equivalent)	1,250	3,750	50,000
Extremity Shallow Exposure (SDE = Shallow Dose Equivalent)	1,250	3,750	50,000

* Annual Occupational Dose Limits for Adults based on NRC Regulations

Hackett, Michael

From: Hackett, Michael
Sent: Tuesday, March 09, 2010 10:51 AM
To: Baker, Cheryl D.; Jacobs, Donna K.; Shih, Wei-Jen; Kiefer, Vickie; Hardin, Shannon B.; Brown, Stephen A.; Jones, Jon; Hackett, Michael
Subject: RSC Review of Unfinished Agenda Items

Importance: High

Radiation Safety Committee (RSC) members,

Due to time limitations and amount of material for review during the meeting on March 4, we were not able to complete the entire agenda.

1. Highlights from Quarterly & Annual Review sections:
   Quarterly Radiation Safety Audits for Oct-Dec 2009 (see links to area qtrly detailed reports)
   Comprehensive Radiation Safety Program Annual Review for Calendar Year 2009
   - NM package documentation deficiencies. Changes put in place late Dec with no further incidents in January.
   - ALARA review within no one exceeding 10% of the annual occupational limits for the year
   - RSC met at least qtrly for 2009 reviews with a quorum present which included the required members
   - Training completed during 2009
   - Performance goals discussed. Will add radiation emergency response for RSC members

   Any further comments, questions, actions and/or further review is desired by the Committee of the Quarterly Audit and/or the 2009 Annual Review, please indicate them now before the minutes are prepared.

2. Item 3 & 4 (Clinical Authorized User Approval & Research Authorized User Amendments) of new business will be deferred to the next RSC meeting since there is no immediate need.

3. Item 6 (Ni-63 Source Disposal) of new business, the RSO requests the RSC approval to properly dispose of 2 Ni-63 ECD sources that are no longer in use (~ cost $300-1000).

4. Additional new business that was not on the agenda:

Request to discontinue 100% review of all Interventional CT cases. Of the 153 interventional CT cases in 2009, 145 (95%) were for cardiac CTA with an average patient effective dose (mSv) of 9.7 mSv which is within reported values in the literature, non-Cardiac patient doses were much lower:

Table 2

Adult Effective Doses for Various CT Procedures

Examination	Average Effective Dose (mSv)	Values Reported in Literature (mSv)
Head	2	0.9–4.0
Neck	3	...
Chest	7	4.0–18.0
Chest for pulmonary embolism	15	13–40
Abdomen	8	3.5–25
Pelvis	6	3.3–10
Three-phase liver study	15	...
Spine	6	1.5–10
Coronary angiography	16	5.0–32
Calcium scoring	3	1.0–12
Virtual colonoscopy	10	4.0–13.2

Taken from Mettler FA, Jr., Huda W, Yoshizumi TT, Mahesh M. Effective doses in radiology and diagnostic nuclear medicine: a catalog. Radiology 2008; 248(1):254-263.

Please review the above 4 items. Reply to all if you have any changes/comments/etc.

If you have no changes/comments/etc, use the voting button above to approve all items.

Please respond by COB March 15. No response will be assumed in agreement with the above items.

Thank you,
Michael Hackett, MS
Radiation Safety Officer

Tracking:

Recipient	Response
Baker, Cheryl D.	Approve: 3/12/2010 11:21 AM
Jacobs, Donna K.	Approve: 3/9/2010 8:40 PM
Shih, Wei-Jen	
Kiefer, Vickie	Approve: 3/12/2010 8:12 AM
Hardin, Shannon B.	
Brown, Stephen A.	
Jones, Jon	
Hackett, Michael	Approve: 3/9/2010 10:51 AM

Hackett, Michael

From: Brown, Stephen A.
Sent: Wednesday, March 17, 2010 7:57 AM
To: Hackett, Michael
Subject: Approve: RSC Review of Unfinished Agenda Items

Hackett, Michael

From: Hardin, Shannon B.
Sent: Monday, March 15, 2010 2:42 PM
To: Hackett, Michael
Subject: Approve: RSC Review of Unfinished Agenda Items

Hackett, Michael

From: Wierzbinski, Rebecca
Sent: Monday, March 01, 2010 7:16 AM
To: Dillon, Debra; Hackett, Michael
Subject: FW: Workplace Initiative Project Plan for VISN 9 Leadership Institute

I'm delighted the project was approved. When you have time, I'd like to get your input. Thanks.

From: Jacobs, Donna K.
Sent: Saturday, February 27, 2010 4:25 PM
To: Nielsen, Sandy J. (SES); Hall, Barbara; VHALEX Quad; Duke, Mary B
Cc: Wierzbinski, Rebecca
Subject: Re: Workplace Initiative Project Plan for VISN 9 Leadership Institute

Excellent project that will enhance our emergency readiness!

From: Nielsen, Sandy J. (SES)
To: Hall, Barbara; VHALEX Quad; Duke, Mary B
Cc: Wierzbinski, Rebecca
Sent: Sat Feb 27 13:59:38 2010
Subject: RE: Workplace Initiative Project Plan for VISN 9 Leadership Institute

Thank you for forwarding. Suggest you work with subject matter experts Debra Dillon (Area Emergency Manager) and Mike Hackett (Radiation Safety Officer) as you develop this.

From: Hall, Barbara
Sent: Tuesday, February 23, 2010 8:09 AM
To: VHALEX Quad; Duke, Mary B
Cc: Hall, Barbara; Wierzbinski, Rebecca
Subject: FW: Workplace Initiative Project Plan for VISN 9 Leadership Institute

Below is a brief description of the Workplace Initiative Becky Wierzbinski will be working on for the VISN 9 Leadership Institute.

Barbara J. Hall
Employee Development Specialist
VAMC Lexington, KY
(859) 233-4511 ext. 4134

From: Wierzbinski, Rebecca
Sent: Monday, February 22, 2010 5:02 PM
To: Hall, Barbara
Subject: Workplace Initiative Project Plan for VISN 9 Leadership Institute

Workplace Initiative Project Plan

Project: Tabletop exercise on Radiological Emergency Response

Proposal: I propose to plan and conduct a tabletop exercise on Radiological Emergency Response. This project will improve the quality of our preparation to quickly recognize and respond to incidents involving radioactive material. It will help identify areas in which we are proficient and areas which need improvement. A Table Top exercise is a group discussion guided by a simulated disaster. Emphasis will be placed upon a low stress group problem solving process.

Discussion: Radioactive materials are increasingly used in agriculture, industry, and medicine. The transportation of these materials for manufacture, use, and disposal increases the potential to encounter an incident involving some type of radioactive material.

On line I have found the following checklist for preparing the project which looked pretty good to me. Give me your thoughts.

Becky Wierzbinski, CNMT, BHS
Nuclear Medicine Service

Appendix 4

Tabletop Exercise Checklist and Timeline

(This checklist and timeline is intended to provide the Tabletop Exercise Planner with an organizational tool to manage the exercise planning process from beginning to end. The timeline provided along the side of the table is a rough estimate based on NYC DOHMH experience with actual hospital tabletop exercises. Your experience may vary.)

Task	Start Date	End Date	Staff Assigned	Status
1. Early Development				
Determine/recruit members of Planning Committee and Evaluation Team				
Establish target date(s) for exercise.				
2. Planning the Exercise				
Schedule planning meetings				
Establish purpose				
Establish scope				
Develop objectives				
Review all scenarios				
Obtain most recent version of hospital's Emergency Management Plan (EMP)				
Distribute copies of EMP to members of planning committee				
Choose a scenario				
Determine which tabletop model to use				
Determine Moderator and 3-4 Facilitators (if breakout model is to be used)				
Identify participants for exercise (invitee list)				
Invite proposed participants/distribute flyers/advertisements for exercise, if applicable				
Identify and reserve room (including electronic equipment, e.g. projector, screen) for exercise. Consider space for registration/ beverages and breakout rooms, if applicable)				
Identify observer/media area, if applicable				

3. Exercise Development
Revise scenario to reflect facility features and SOPs
Modify and finalize chosen scenario slides and associated materials
Develop agenda for the exercise
Finalize After-Exercise Survey
Finalize Agent Fact Sheet
Finalize Participant Narrative
Copy each inject onto separate sheets of paper for distribution during exercise
Make copies of all handouts
Distribute advance materials for exercise to participants, if desired
Develop attendance/sign–in form
Create name tags, if desired
4. Preparing for the Exercise
Test electronic equipment (projector/screen, video camera, 2-way radios), if applicable
Procure flip charts, markers, pens, and paper.
Provide radio/phone directories (if applicable)
Order refreshments
Provide entire scenario packet (narrative, slides, injects, generic and post-modular questions) to Moderator for review
Review responsibilities with Moderator and Facilitators
Conduct an abbreviated "dry-run" of the exercise presentation
5. Conducting the Exercise
Review exercise ground rules with participants
Discuss scope of the tabletop
Review safety and security precautions
Conduct the exercise
Conduct a hotwash
Distribute and collect After-Exercise Survey

6. Evaluate the Exercise
Conduct post-exercise debriefing session
Compile survey results and debriefing session notes
Develop report of results
Share results with participants and other appropriate staff

7. Post Exercise Activities
Develop Corrective Action Plan
Track Corrective Actions
Track Lessons Learned
Recognition

Radiation Safety Committee Sign-in Sheet

March 4, 2010 @ 1:00 PM

Representing Service	Member Name/Title	Signature
Chair Member from Radiology Service (physician)	**Cheryl Baker, M.D.** Service Chief	
Radiation Safety Officer	**Michael T. Hackett, MS** Radiation Safety Officer	
Member from Management	**Donna Jacobs, FACHE** Associate Director	
Member from Nuclear Medicine Service (physician)	**Wei-Jen Shih, M.D.** Service Chief, Clinical Authorized User	**Excused**
Member from Nuclear Medicine Service (technical staff)	**Vickie Kiefer, CNMT** Chief Technologist	Vickie Kiefer
Member from Patient Care Services (Nursing)	**Shannon Hardin, R.N.** Nurse Manager for 2-South/ Cardiac Cath	Shannon Hardin RN
Member from Research Service	**Steve Brown, Ph.D.** Research Chemist, Research Safety Manager, Research Authorized User	Steve Brown
Member from Radiology Service (technical staff)	**Vacant**	
Member from NAGE	**Jon Jones** NAGE Safety Officer	
RECORDER:		
GUESTS:		

Radiation Safety Committee Dates and Attendance Record for 2009 Reviews

Time period being reviewed at the Radiation Safety Committee (RSC) meeting (i.e., during 2009)	2009 Jan-Mar	2009 Apr-Jun	2009 Jul-Sep	2009 Oct-Dec	2009 Review
Scheduled Date of Radiation Safety Committee meeting (i.e., set up for the 4th Thursday of 2nd month of the quarter following the review period & as needed)	Scheduled for 05/28/09; Rescheduled for 06/04/09	Scheduled for 08/27/09	11/26/09 = Holiday; Rescheduled for 12/30/09	Scheduled for 02/25/10; Rescheduled for 03/04/10	
Actual Date of Radiation Safety Committee meeting	**06/04/09**	**08/27/09**	**12/30/09**	**03/04/10**	
Scheduled Date above RSC minutes presented to Environment of Care Council (i.e., set up for the 2nd Thursday of 1st month of the quarter following the above mentioned RSC meeting & as needed - e.g., annual review presented at the following Environment of Care Council meeting)	Scheduled for 07/09/09	Scheduled for 10/08/09	Scheduled for 01/14/10	Scheduled for 04/08/10	Scheduled for 03/11/10
Actual Date above RSC minutes presented to Environment of Care Council	**07/09/09**	**10/08/10**	**01/14/10**	**TBA**	**03/11/10**

Radiation Safety Committee (RSC) Membership

Representing Service	Member Name/Title	RSC Attendance					Total # of RSC Meetings	P = Present	R^{AMR} = Represented By Alternate Management Representative (voting member)	R = Represented By	E = Excused	A = Absent
Chair, Member from Radiology Service (physician)	**Cheryl D. Baker, M.D.** Chief of Radiology Service	P	P	P	P		4	4	N/A	0	0	0
Radiation Safety Officer	**Michael T. Hackett, MS** Radiation Safety Officer	P	P	P	P		4	4	N/A	0	0	0
Member from Management	**Donna Jacobs, FACHE** Associate Director (AD)	R^{AMR} by W. Divers, MD, Chief of Staff **	P	R^{AMR} by J. Pellecchia, MD, Chief of Staff **	P		4	2	2	0	0	0
Member from Nuclear Medicine Service (physician)	**Wei-Jen Shih, M.D.** Service Chief, Clinical Authorized User	P	P	P	E		4	3	N/A	0	1	0
Member from Nuclear Medicine Service (technical staff)	**Vickie Kiefer, CNMT** Chief Technologist	P	P	P	P		4	4	N/A	0	0	0
Member from Patient Care Services (Nursing)	**Shannon Hardin, R.N.** Nurse Manager for 2 South/ Cardiac Cath	P	P	P	P		4	4	N/A	0	0	0
Member from Research Service	**Steve Brown, Ph.D.** Research: Chemist, Safety Manager, Authorized User	P	P	P	P		4	4	N/A	0	0	0
Member from Radiology Service (technical staff)	**Bert D. Morgan, R.T.** Administrative Officer	P	E	E Note: No longer in this position, new member needed.	E Note: No longer in this position, new member will added when position filled.		4	1	N/A	0	3	0
Member from NAGE	**Jon Jones** NAGE Safety Officer	A	A	A	A		4	0	N/A	0	0	4
# of RSC members present (P & R^{AMR})		8	7	7	6							
# of RSC members represented by (R)		0	0	0	0							
# of RSC members excused (E)		0	1	1	2							
# of RSC members absent (A)		1	1	1	1							
Total # of RSC members		9	9	9	9							
Was a quorum* present?		Yes	Yes	Yes	Yes							

* Quorum: at least one-half of the committee membership is in attendance and must include the Chair (or designee), Radiation Safety Officer and a management representative (or designee).

** Alternate Management Representative (AMR)