



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
WALTER REED ARMY MEDICAL CENTER  
WALTER REED HEALTH CARE SYSTEM  
WASHINGTON DC 20307-5001

MCHL-HP

16 July 2010

MEMORANDUM FOR U.S. NRC Region I (ATTN: Dr. Sandra Gabriel) 475 Allendale Road,  
King of Prussia, PA 19406-1415

SUBJECT: Cross-walk between root cause analysis and corrective actions; revised dose estimate.

1. REFERENCES.

a. Memorandum (and enclosures) for USNRC, 6 May 2010, subject: Incident report for loss of positive control of radioactive materials packages at Walter Reed Army Medical Center.

b. Memorandum for Deputy Commander of Clinical Services (MCHL-CDR), 6 May 2010, Radioactive materials (RAM) package incident (1-3 May 2010) root cause analysis and recommended corrective actions.

c. Memorandum for Deputy Commander for Clinical Services (MCHL-CDR), 14 June 2010, Revision of memorandum- Radioactive materials (RAM) package incident (1-3 May 2010) dose assessment.

d. Memorandum for Deputy Commander for Clinical Services (MCHL-CDR), 15 June 2010, Radioactive materials (RAM) package incident (1-3 May 2010) corrective actions.

2. This document is a supplement to documents already submitted to the NRC. This document will delineate a cross-walk between the root cause analysis and the corrective actions instituted (Refs 1b and 1d).

3. Each recommended corrective action (Ref. 1b) will be followed by the instituted corrective action (Ref. 1d) with explanation and reference to enclosures as necessary:

a. Reiterate the WRAMC policy outlining who is authorized to sign for packages with AOD (Administrative Officer of the Day) and concierge personnel. This should be posted in the AOD binder and become a part of the duty in-brief for both groups.

1. The training and SOPs for both affected groups has been updated.

2. Supporting documentation is enclosed (Encl 1, 2, 3, and 4)

b. Make every effort to coordinate the delivery of radioactive materials packages during the normal duty day. If this is not possible, carefully coordinate the delivery with all personnel

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to be involved on the anticipated date and time of delivery. This should include the manufacturer, delivery company, Nuclear Medicine and Concierge Desk duty personnel.

1. All RAM packages will be treated the same way, regardless of when they are delivered. All packages are to come through the AOD and secured in the Nuclear Pharmacy.

2. This is supported by the AOD guidance (encl 4) and the vendor package delivery instructions (encl 5).

c. Ensure that the package tracking number is provided to the personnel expected to receive packages to allow for identification of package status at any time throughout the process.

1. The package tracking number is not necessary, since the AOD has the ability to contact Nuclear Medicine personnel at any time.

2. The 24 hour telephone numbers are available in the AOD SOP, allowing communication with both Nuclear Medicine and Health Physics personnel (see encl 3).

d. Write and post radioactive package identification and receipt instructions in the AOD binder.

1. Guidance has been written and posted in both AOD and Concierge binders.

2. Supporting documentation is enclosed (see encl 3 and 4).

e. Update the Nuclear Pharmacy's radioactive package receipt SOP, to include a discussion of procedures to be followed in the event of a non-standard RAM package delivery and receipt.

1. The training and written guidance for the AOD and the Concierge personnel, in conjunction with the current Nuclear Pharmacy RAM package receipt SOP and the written guidance provided to the RAM vendors, precludes the necessity of special instructions covering non-standard delivery. All packages are treated in the same manner.

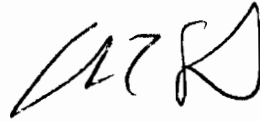
2. Supporting documentation is enclosed (see encls 1-6)

4. The dose estimates for the exposed individuals was revised downward based on the decay corrected measurements obtained at the time of RAM package receipt in Nuclear Medicine (0815, 3 May 2010). This is the only measurement taken at a known date/time, as opposed to the TI used previously, for which measurement the date/time were estimated. The revised and corrected exposure rates in and around the Information kiosk as well as the revised dose estimate are included in encls 8 and 9 respectively.

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5. The point of contact for this memorandum is the undersigned at 202-356-0061 or [andrew.scott1@us.army.mil](mailto:andrew.scott1@us.army.mil).



ANDREW L. SCOTT  
MAJ, MS  
Radiation Safety Officer

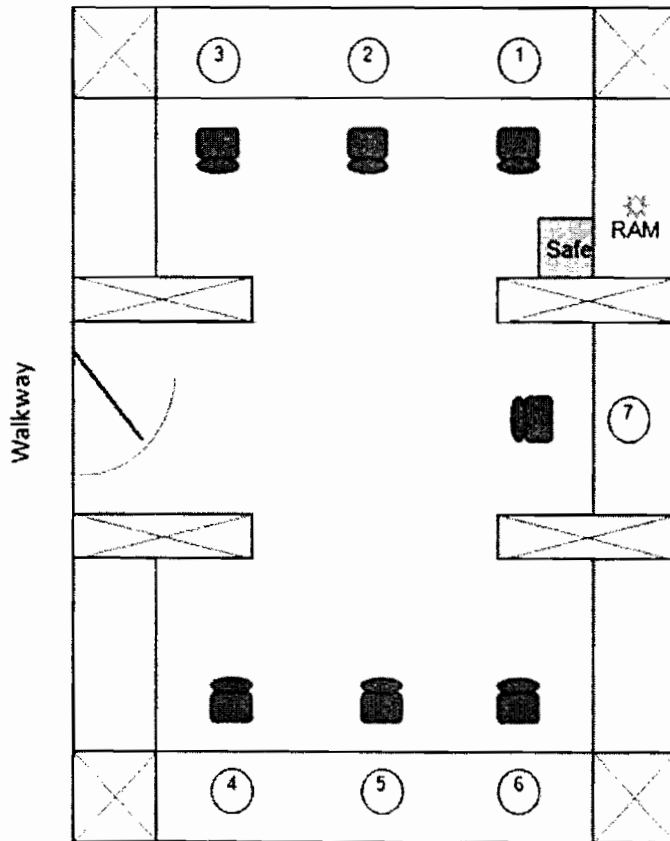
9 Encls

1. Concierge training slide
2. E-mail: AOD briefing update
3. AOD RAM package SOP
4. Concierge RAM package instruction
5. RAM vendor delivery instructions
6. Nuclear Medicine SOPs
7. Health Physics SOP
8. Revised and corrected Exposure rates at kiosk
9. Revised Dose Estimate

*Previously  
submitted  
copies not  
repeated  
here*

Revised and corrected exposure rates

Patient Waiting Area



Dunkin' Donuts

Source Distance		Exp rate at receipt	Exp rate at diag. loc.
Diagram Location	Distance (in)	(mR/hr @ 1m)*	(mR/hr)**
1	36	1.6	1.98
2	80	1.6	0.40
3	120	1.6	0.18
4	168	1.6	0.09
5	162	1.6	0.10
6	156	1.6	0.11
7	66	1.6	0.59
Center of Walkway (near RAM)	48	1.6	1.11
Walkway (closest accessible surface)	12	1.6	17.78
Patient Waiting Area (nearest seat)	154	1.6	0.11

\* receipt is 1249, 1 May 10;  
decay corrected based on measurements performed at 0815, 3 May 10

\*\* none of the exposures are modified for attenuation of intervening materials

Final

Revised dose estimate

ID	Position	Total time exposed (hrs)	Diagram location	Distance from source (m)	Exposure rate at 1 m (mR/hr)	Estimated Max Dose (mrem)
Person 1	AOD (Sat)	19.18	6	3.9	1.6	2.0
Person 2	AAOD (Sat)	19.18	6	3.9	1.6	2.0
Person 3	Duty Soldier (Sat)	19.18	6	3.9	1.6	2.0
Person 4	AOD (Sun)	24.00	6	3.9	1.6	2.5
Person 5	AAOD (Sun)	24.00	6	3.9	1.6	2.5
Person 6	Concierge (Sat)	2.68	1	0.9	1.6	5.3
Person 7	Concierge (Sat)	2.68	1	0.9	1.6	5.3
Person 8	Concierge (Sat & Sun)	17.00	1	0.9	1.6	33.6
Highest exposed (max)	Concierge (Sat & Sun)	22.68	1	0.9	1.6	44.8
Highest exposed (likely)**	Concierge (Sat & Sun)	20.68	2	2	1.6	8.3
Person 10	Concierge (Sat & Sun)	17.00	1	0.9	1.6	33.6
Person 11	Concierge (Sat)	8.50	1	0.9	1.6	16.8
Person 12	Concierge (Sun)	8.50	1	0.9	1.6	16.8
Person 13	Concierge (Sun)	8.50	1	0.9	1.6	16.8
Person 14	Concierge (Sun)	8.50	1	0.9	1.6	16.8
Person 15	Concierge (Sun)	8.50	1	0.9	1.6	16.8
Person 16	Concierge (Mon)	1.25	1	0.9	1.6	2.5
Person 17	Concierge (Mon)	1.25	1	0.9	1.6	2.5
Person 18	Concierge (Mon)	1.25	1	0.9	1.6	2.5
Person 19	Civ- AOD Asst. (Mon)	1.75	6	3.9	1.6	0.2
Person 20*	IAP- AOD Asst. (Sat & Sun)	16.00	6	3.9	1.6	1.7
Nearest member of public	Waiting area	8.00	N/A	3.85	1.6	0.9

Assumptions:

Package arrived at 1249 on Sat

Package was removed at 0815 Mon

Dose rate equals decay corrected exposure rate measurement from both packages at time of receipt (0815 3 May 2010)= 1.6 mR/h @ 1m

AOD is relieved at 0800

All Concierge personnel sat in the chair nearest the package for their whole shift

\*\*Likely dose for highest exposed individual assumes 1 hr away from desk per shift (bathroom and lunch) and a mean location in the center chair (assuming person moves around a bit)

All the AOD personnel sat in the chair nearest the package on the Dunkin' Donuts side of the kiosk for the whole shift

Encl 9

NRC RECALCULATION OF EXPOSURE RATES AROUND KIOSK

Source Distance		Exp rate at receipt (mR/hr @ 1m)*	Exp rate at diag. loc. (mR/hr)**
Diagram Location	Distance (in)		
1	36	1.67	2.06
2	80	1.67	0.42
3	120	1.67	0.19
4	168	1.67	0.09
5	162	1.67	0.10
6	156	1.67	0.11
7	66	1.67	0.61
Center of Walkway (near RAM)	48	1.67	1.16
Walkway (closest accessible surface)	12	1.67	18.56
Patient Waiting Area (nearest seat)	154	1.67	0.11

\* receipt is 1249, 1 May 10;  
decay corrected based on measurements performed at 0815, 3 May 10

\*\* none of the exposures are modified for attenuation of intervening materials

NRC RECALCULATION OF DOSE TO INDIVIDUALS

Name	Position	Total time exposed (hrs)	Diagram location	Distance from source (m)	Exposure rate at 1 m (mR/hr)	Estimated Max Dose (mrem)
Person 1	AOD (Sat)	19.18	6	3.9	1.67	2.1
Person 2	AAOD (Sat)	19.18	6	3.9	1.67	2.1
Person 3	Duty Soldier (Sat)	19.18	6	3.9	1.67	2.1
Person 4	AOD (Sun)	24	6	3.9	1.67	2.6
Person 5	AAOD (Sun)	24	6	3.9	1.67	2.6
Person 6	Concierge (Sat)	2.68	1	0.9	1.67	5.5
Person 7	Concierge (Sat)	2.68	1	0.9	1.67	5.5
Person 8	Concierge (Sat & Sun)	17	1	0.9	1.67	35.0
Highest exposed (max)	Concierge (Sat & Sun)	22.68	1	0.9	1.67	46.8
Highest exposed (likely)**	Concierge (Sat & Sun)	20.68	2	2	1.67	8.6
Person 10	Concierge (Sat & Sun)	17	1	0.9	1.67	35.0
Person 11	Concierge (Sat)	8.5	1	0.9	1.67	17.5
Person 12	Concierge (Sun)	8.5	1	0.9	1.67	17.5
Person 13	Concierge (Sun)	8.5	1	0.9	1.67	17.5
Person 14	Concierge (Sun)	8.5	1	0.9	1.67	17.5
Person 15	Concierge (Sun)	8.5	1	0.9	1.67	17.5
Person 16	Concierge (Mon)	1.25	1	0.9	1.67	2.6
Person 17	Concierge (Mon)	1.25	1	0.9	1.67	2.6
Person 18	Concierge (Mon)	1.25	1	0.9	1.67	2.6
Person 19	Civ-AOD Asst (Mon)	1.75	6	3.9	1.67	0.2
Person 20*	IAP-AOD Asst (Sat&Sun)	16	6	3.9	1.67	1.8
Nearest member of public	Waiting area	8	N/A	3.85	1.67	0.9

Assumptions

Package arrived at 1249 on Sat

Package was removed at 0815 Mon

Dose rate equals decay corrected TI from both packages = 1.67 mR/h @ 1m

AOD is relieved at 0800

All Concierge personnel sat in the chair nearest the package for their whole shift

\*\*Likely dose for highest exposed individual assumes 1 hr away from desk per shift (bathroom and lunch) and a mean location in the center chair (assuming person moves around a bit)

All the AOD personnel sat in the chair nearest the package on the Dunkin' Donuts side of the kiosk for the whole shift