UW Madison Accreditation and Regulatory Compliance: CT imaging

University of Wisconsin Madison

Department of Radiology

9/15/2017

Tim Szczykutowicz (UWSMPH Assistant Professor Radiology) and
Pete Wasmund (UWHC CT Imaging Manager)

Contact for this talk: tszczykutowicz@uwhealth.org or PWasmund@uwhealth.org
Primary contact in the event of an active audit: Pete Wasmund Phone 890.6993 Pager 265.7000 ext. 5914

This talk will be on the CT wiki under “compliance resources” for future reference

Overview of Slide Set

- This slide set contains elements of performance/regulations/requirements etc. provided by bodies including The Joint Commission, the American College of Radiology, and the State of Wisconsin.
- After each item, we will list how UWHC is in compliance, we will show an example of the compliance, and we will list contact names and # for individuals tasked with carry out the compliance if appropriate.

The Joint Commission

- Effective in July of 2015, TJC published a number of new requirements for diagnostic imaging services (MR, PET, CT)
  - https://www.jointcommission.org/diagnostic_imaging_standards/
- The document lists standards related to environment of care, human resources, provision/treatment/services, medical management, and performance improvement
  - Under each standard, there are "elements of performance"…these are the things TJC auditors will be checking for

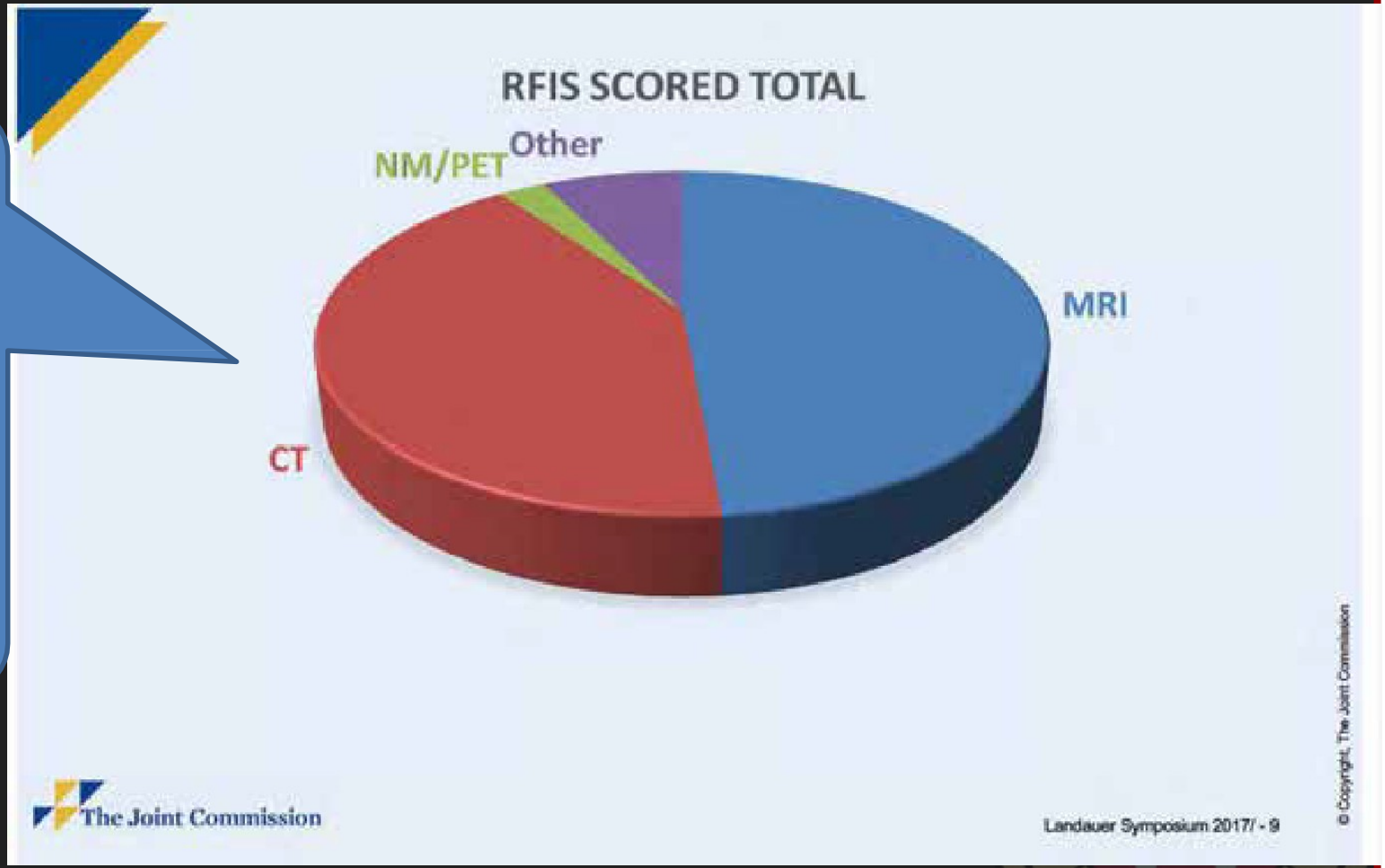

The Joint Commission

Prepublication Requirements

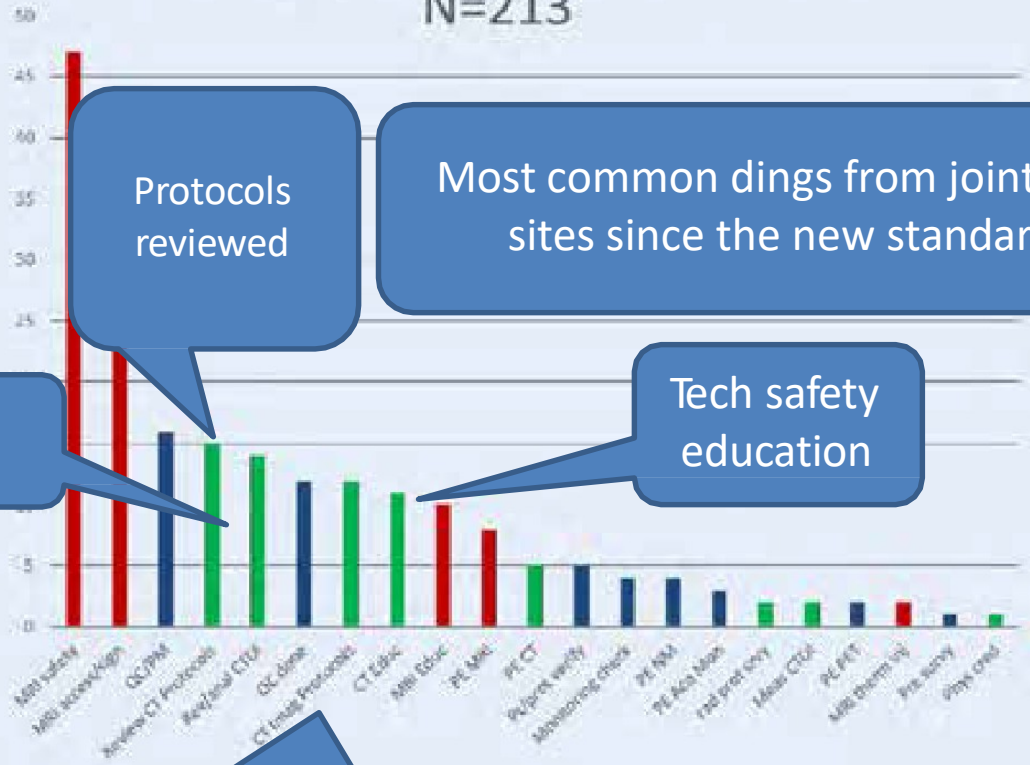
Revised Requirements for Diagnostic Imaging Services

Effective July 1, 2015

Yes, we need to worry about this stuff, CT makes up ~half the "dings" joint commission auditors find in radiology



Total RFIs Scored 7/1/15-3/1/17
N=213



Protocols reviewed

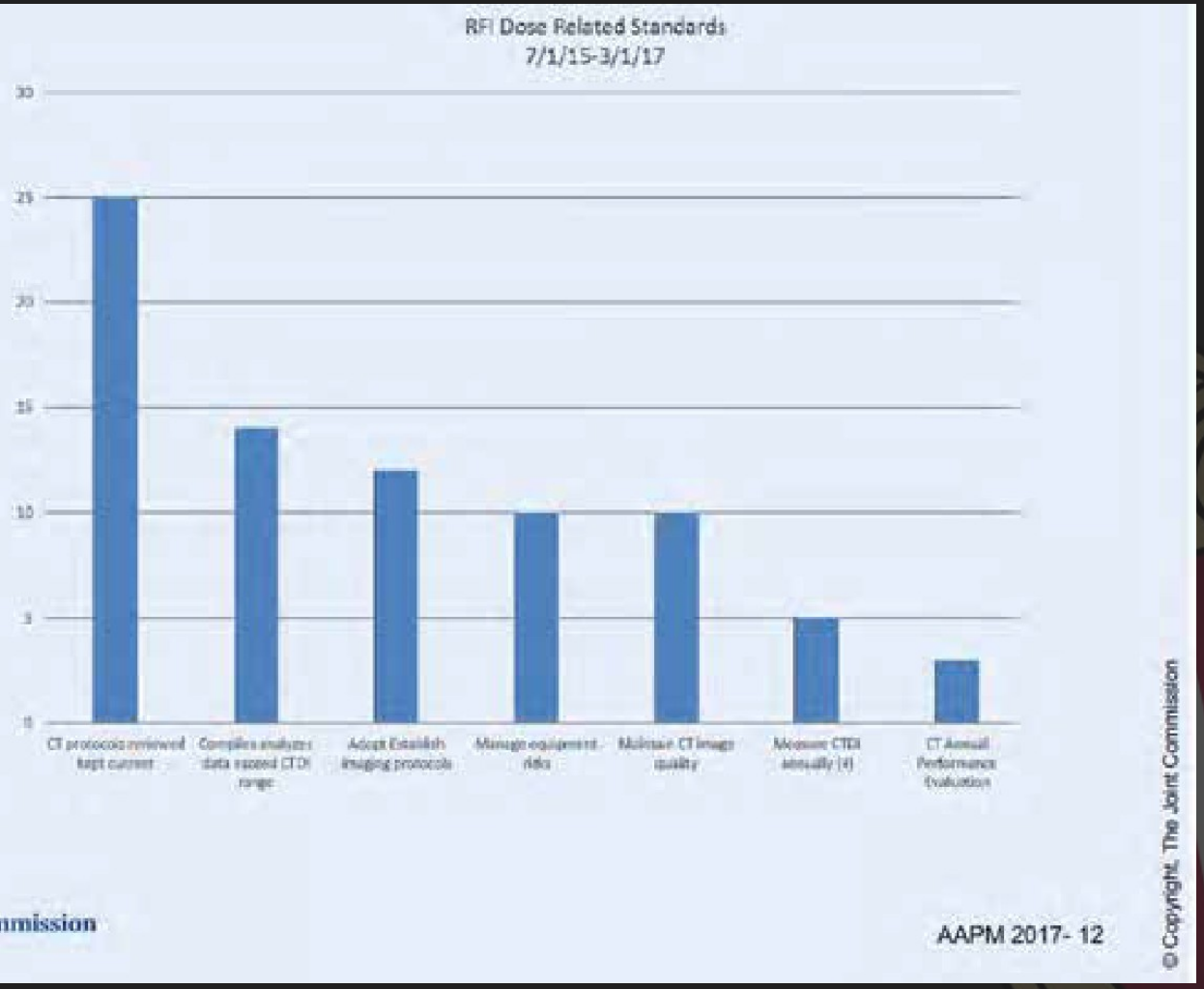
Most common dings from joint commission on sites since the new standards came out

Know your dose index ranges

Tech safety education

Protocols documented

The Joint Commission



The Joint Commission

AAPM 2017- 12

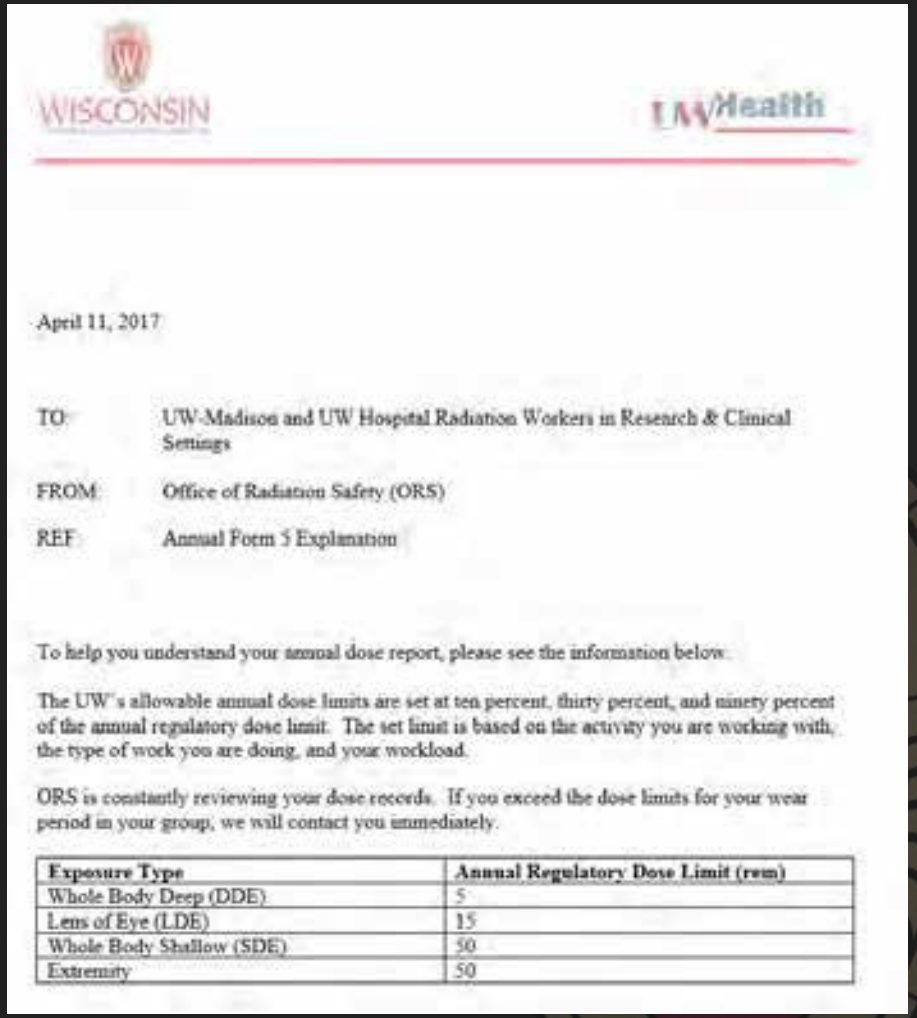
TJC – environment of care

Key Personel	Standards	TJC Requirements	UWHC Compliance
Radiation Health Physicist	EC.02.02.01 A. 17	For [critical access] hospitals that provide computed tomography (CT), positron emission tomography (PET), or nuclear medicine (NM) services: The results of staff dosimetry monitoring are reviewed at least quarterly by the radiation safety officer, diagnostic medical physicist, or health physicist to assess whether staff radiation exposure levels are “As Low As Reasonably Achievable” (ALARA) and below regulatory limits.	For radiation generating devices , it is 375mRem- deep dose, 1125mRem - lens dose and 3750mRem - skin or ring dose per wear period. If anyone exceeds these ALARA criteria, we contact the individual person to find how the exposure occurred. We do the investigation to find out the cause of elevated readings, whether the badge was left in procedure room or misplaced, if they did more procedures or were they exposed to radiation as patient, Do they wear a lead apron ? After the investigation is complete, we work closely with the individual to reduce future doses.

Badging at UW

- Badge Information can be found here
  - https://ehs.wisc.edu/dosimetry-2/
    - There is a video here that covers the different badge types (ring/whole body-chest/collar

- What do all the numbers mean…
  - Our radiation safety office has published a guide to your badge dosimetry report
  - Contact radiationsafety@wisc.edu for more information



WISCONSIN UWHealth

April 11, 2017

TO: UW-Madison and UW Hospital Radiation Workers in Research & Clinical Settings

FROM: Office of Radiation Safety (ORS)

REF: Annual Form 5 Explanation

To help you understand your annual dose report, please see the information below.

The UW's allowable annual dose limits are set at ten percent, thirty percent, and ninety percent of the annual regulatory dose limit. The set limit is based on the activity you are working with, the type of work you are doing, and your workload.

ORS is constantly reviewing your dose records. If you exceed the dose limits for your wear period in your group, we will contact you immediately.

Exposure Type	Annual Regulatory Dose Limit (rem)
Whole Body Deep (DDE)	5
Lens of Eye (LDE)	15
Whole Body Shallow (SDE)	50
Extremity	50

This is what our badging vendor returns to us after processing our badges

Our radiation safety folks will only send you a report **if your dose is over 0.1 rem**

EQUIVALENT FORM 5 - ANNUAL

OCCUPATIONAL DOSE RECORD FOR A MONITORING PERIOD

This form is for use in place of certain reports required by NRC licensees, OSHA and state regulations.
It reflects data provided to or by your account and contains information for NRC Form 5 and other equivalent forms.

PREPARED BY

LANDAUER®

Landauer, Inc., 2 Science Road, Glenwood, Illinois 60425-1586
Telephone: (708) 755-7000 Facsimile: (708) 755-7016

ACCOUNT NUMBER	SUBACCOUNT	SERIES CODE	PARTICIPANT NUMBER
103702	169885	RAD	00955

1. NAME (LAST, FIRST, MIDDLE INITIAL)	2. IDENTIFICATION NUMBER	3. ID TYPE	4. SEX	5. DATE OF BIRTH (MM/DD/YYYY)
BRIAN, ROBERT	355-38-1962	SSN	☒ MALE ☐ FEMALE	06/08/1955

6. MONITORING PERIOD (MM/DD/YYYY)	7. LICENSEE NAME	8. LICENSE NUMBER(S)	9A.	9B.
01/01/2006 - 12/31/2006	SAMPLE CUSTOMER		☒ RECORD ☐ ESTIMATE	☒ ROUTINE ☐ PSE

INTAKES

10A. RADIONUCLIDE	10B. CLASS	10C. MODE	10D. INTAKE IN µCi

DOSES (in rem)

DEEP DOSE EQUIVALENT	(DDE)	11. 0.410
LENS (EYE) DOSE EQUIVALENT	(LDE)	12. 0.410
SHALLOW DOSE EQUIVALENT, WHOLE BODY	(SDE, WB)	13. 0.410
SHALLOW DOSE EQUIVALENT, MAX EXTREMITY	(SDE, ME)	14. ND
COMMITTED EFFECTIVE DOSE EQUIVALENT	(CEDE)	15.
COMMITTED DOSE EQUIVALENT, MAXIMALLY EXPOSED ORGAN	(CDE)	16.
TOTAL EFFECTIVE DOSE EQUIVALENT (ADD BLOCKS 11 AND 15)	**(TEDE)**	17. 0.410
TOTAL ORGAN DOSE EQUIVALENT MAX ORGAN (ADD BLOCKS 11 AND 15)	**(TODE)**	18. 0.410

19. COMMENTS

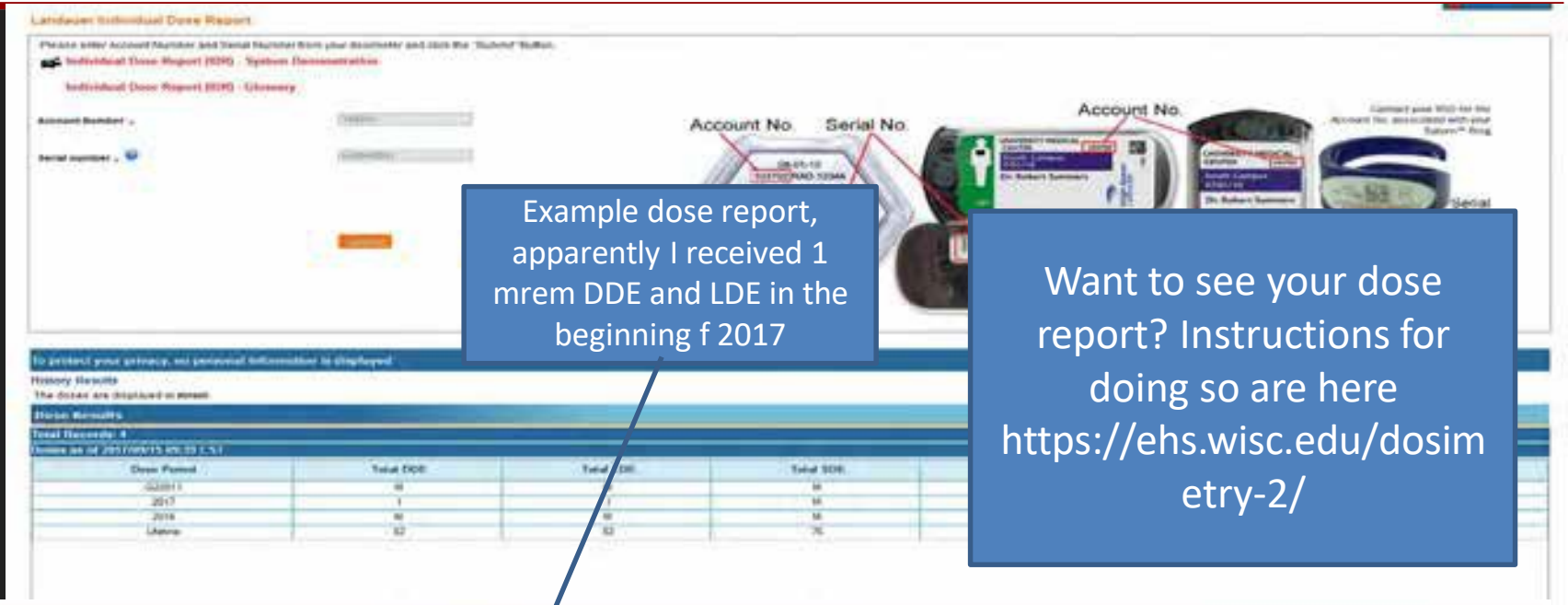
PERMANENT TO DATE (IN REM)

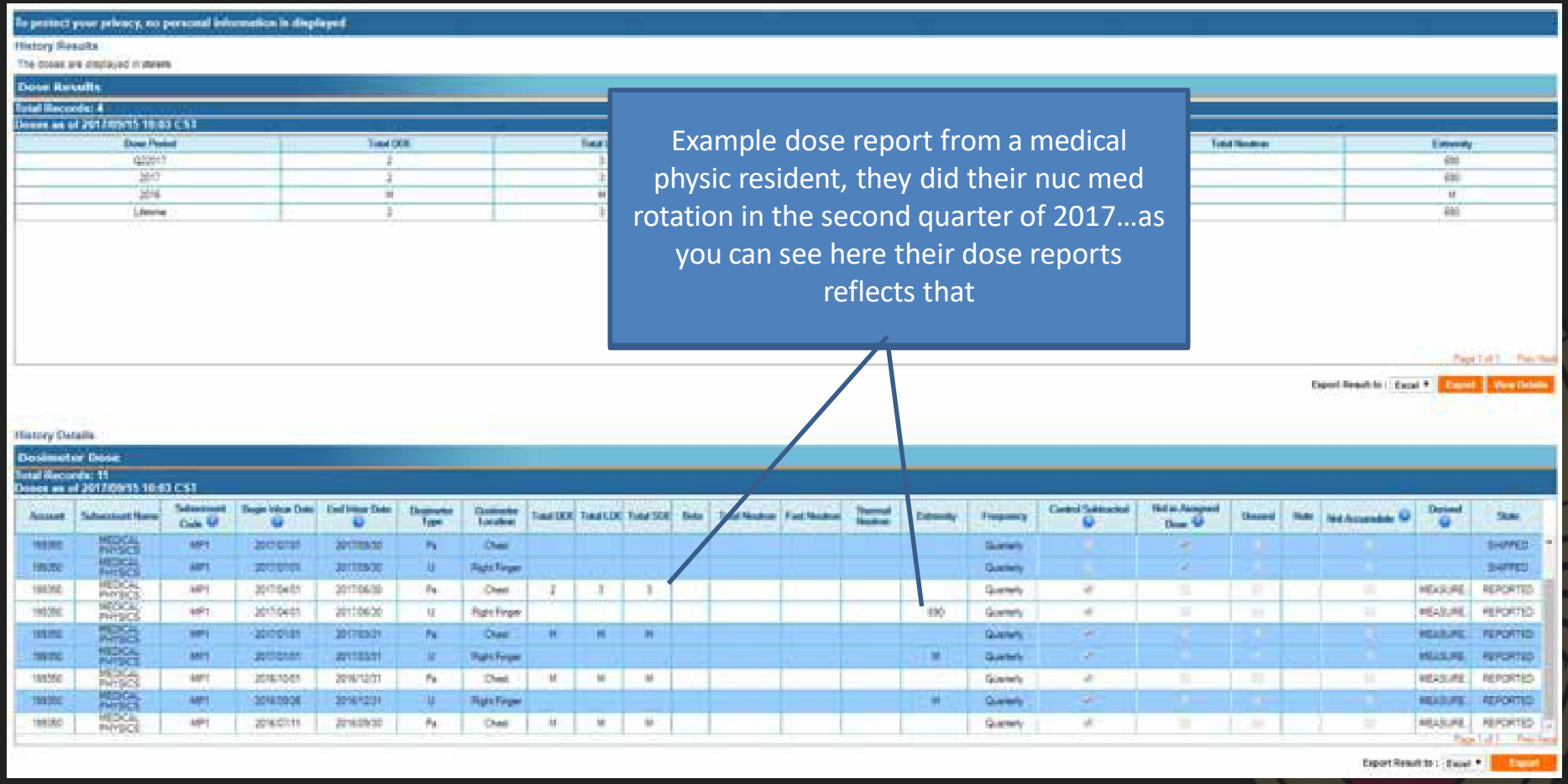
DDE	:	5.060
LDE	:	5.390
SDE, WB	:	5.160
SDE, ME	:	4.960
TEDE	:	5.060

20. SIGNATURE - LICENSEE	DATE SIGNED (MM/DD/YYYY)	21. DATE PREPARED (MM/DD/YYYY)
		02/07/2007

INCEPTION DATE: 01/01/1987

PAGE 1 of 1


Landauer Individual Dose Report
Account No.
Serial No.
Account No.
Serial
Example dose report, apparently I received 1 mrem DDE and LDE in the beginning f 2017
Want to see your dose report? Instructions for doing so are here https://ehs.wisc.edu/dosimetry-2/
History Details
Dosimeter Dose
Total Records: 8
Doses as of 2017/09/15 09:48 CST
Account
Subaccount Name
Subaccount Code
Begin Wear Date
End Wear Date
Dosimeter Type
Dosimeter Location
Total DDE
Total LDE
Total SDE
Beta
Total Neutron
Fast Neutron
Thermal Neutron
Extremity
Frequency
Control Subtracted
Not in Assigned Dose
Unused
Note
Not Accumulable
Derived
State
MEDICAL PHYSICS
MP1
2017/04/01
2017/06/30
Pa
Chest
M
M
M
Quarterly
MEASUR.
REPORTED
MEDICAL PHYSICS
MP1
2017/01/01
2017/03/31
Pa
Chest
1
1
M
Quarterly
MEASUR.
REPORTED
MEDICAL PHYSICS
MP1
2016/10/01
2016/12/31
Pa
Chest
M
M
M
Quarterly
MEASUR.
REPORTED
MEDICAL PHYSICS
MP1
2016/07/01
2016/09/30
Pa
Chest
M
M
M
Quarterly
MEASUR.
REPORTED
MEDICAL PHYSICS
MP1
2016/04/01
2016/06/30
Pa
Chest
M
M
M
Quarterly
MEASUR.
REPORTED
MEDICAL PHYSICS
MP1
2016/01/01
2016/03/31
Pa
Chest
M
M
M
Quarterly
MEASUR.
REPORTED
Export Result to : Excel


Example dose report from a medical physic resident, they did their nuc med rotation in the second quarter of 2017…as you can see here their dose reports reflects that

Dose report explained

- Dose equivalents below the minimum reportable dose for the current monitoring Period are recorded as “M.” The minimum reportable dose varies according to the dosimeter type and radiation quality.

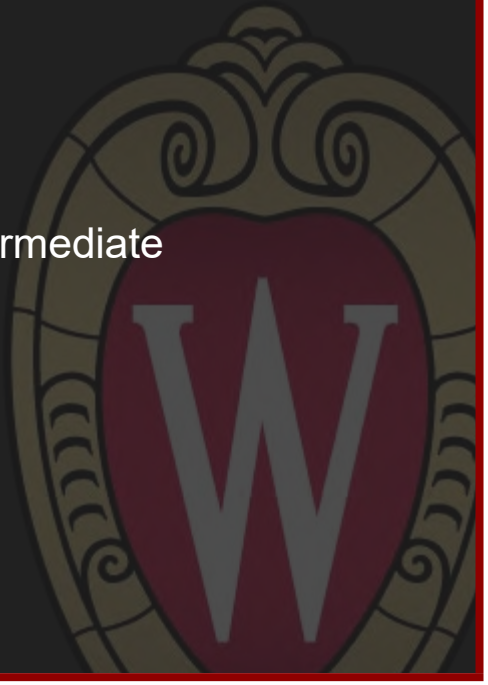
Photon (x or gamma ray): 1 mrem (10 μSv)

Beta: 10 mrem (100 μSv)

Neutron: 20 mrem (200 μSv) fast and 10 mrem (100 μSv) thermal/intermediate

Fetal: 1 mrem (10 μSv)

Ring: 30 mrem (300 μSv



TJC – environment of care

Key Personel	Standards	TJC Requirements	UWHC Compliance
CT Imaging Manager Radiology Engineering Program Coordinator	EC.02.04.01 A. 10	The [critical access] hospital identifies quality control and maintenance activities to maintain the quality of the diagnostic computed tomography (CT), positron emission tomography (PET), magnetic resonance imaging (MRI), and nuclear medicine (NM) images produced. The [critical access] hospital identifies how often these activities should be conducted. (See also EC.02.04.03, EP 15)	Process for manufacturer preventative maintenance is detailed in (http://ei-sharepoint/sites/SMPH/CTProtocols/_layouts/15/viewlsts.aspx), document 7.6 Control of equipment, Section 5.3 Calibration System. Reports of maintenance activities are available from Radiology Engineering or Program Coordinator

This is what GE sends us after we “i-link” something

Note – these GE invoices all say $0 since we pay a flat “premium” for parts and labor annually for each scanner. This does not cover parts we break though…like driving a patient transport into a CT scanner…

This is not an Invoice

GE Healthcare — ***Service Report***

Facility Name: UNIVERSITY OF WISCONSIN HOSPITAL & CLINICS
Service Request #: 1-214210797361
Equipment ID: 608263CT660
Serial #:
Service Type: Corrective
Product Description: OPTIMA CT660 GT1700 MKE2.5
Model: OPTIMA CT660 GT1700 MKE2.5
Initial Equip Status: Up
Contact Name:
Contact Phone:
Contact Email:
Problem Description: We were performing our weekly QA exam with the phantom, and when we got to our hi contrast resolution series 4 portion of the QA, the phantom looks off center, and the image is partially cut off. We ended, redid the exam, recentered the phantom, and when we got to series 4 of the weekly QA it still looks to be off center and the image is cut off. Is this of concern? Image 40026-4-4
Open Date/Time(GMT): 09-Aug-2017 22:42
Closed Date/Time(GMT): 10-Aug-2017 14:12

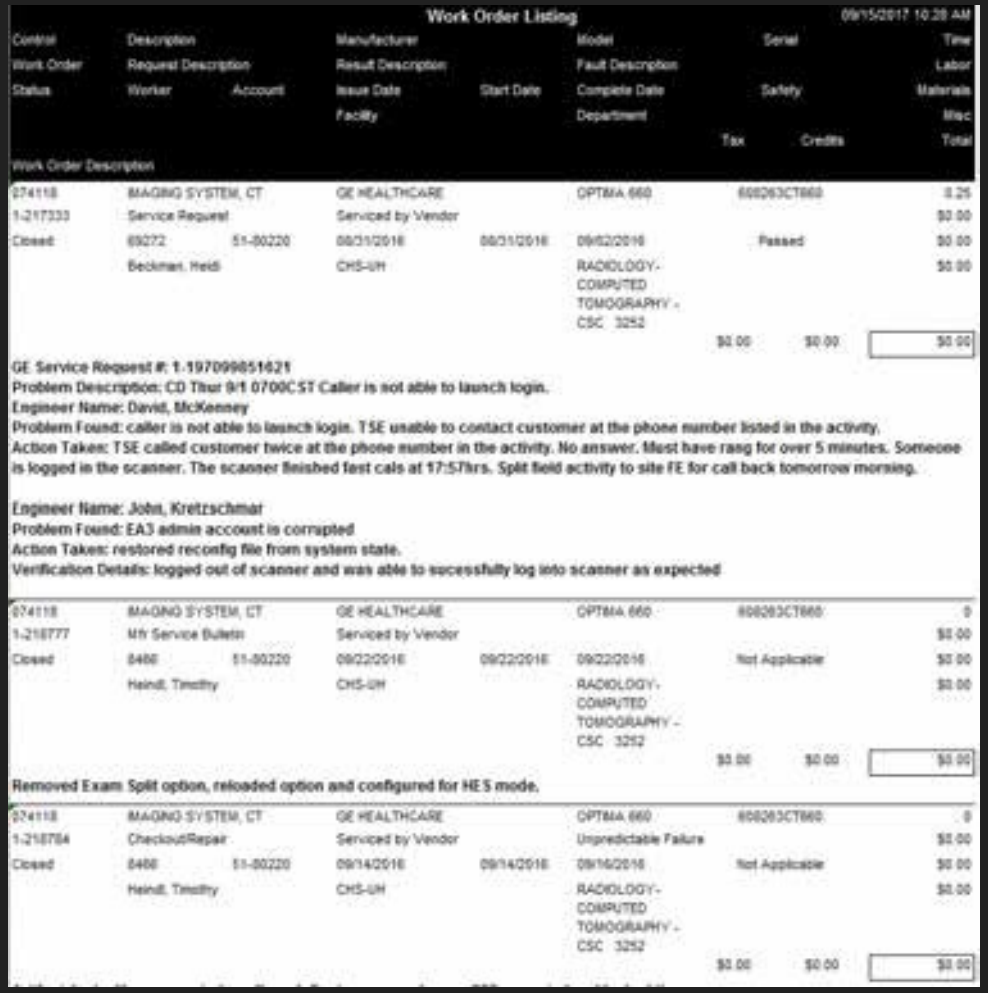
Labor:

Activity#	Date	Start Time (GMT)	End Time (GMT)	Total Hours	Billable Standard Hours	Billable Overtime Hours	Billable Premium Hours
1-214210797402	10-Aug-2017	10-Aug-2017 14:07	10-Aug-2017 14:11	0.07	0.00	0.00	0.00
			Total Activity Labor Hours:	0.07	0.00	0.00	0.00
			Total Service Request Labor Hours:	0.07	0.00	0.00	0.00

Travel:

Activity#	Date	Start Time (GMT)	End Time (GMT)	Total Hours	Billable Standard Hours	Billable Overtime Hours	Billable Premium Hours

GE Healthcare Proprietary & Confidential — Generated on: 15-Sep-2017 — Page 1 of 2



Work Order Listing 09/15/2017 10:28 AM

Control / Work Order / Status	Description / Request Description / Worker / Account	Manufacturer / Result Description / Issue Date / Facility	Start Date	Model / Fault Description / Complete Date / Department	Serial / Safety	Time / Labor / Materials / Misc / Tax / Credits / Total
074118	IMAGING SYSTEM, CT	GE HEALTHCARE		OPTIMA 660	6082630T660	0.25
1-217333	Service Request	Serviced by Vendor				$0.00
Closed	69272 51-80220	08/31/2016	08/31/2016	09/02/2016	Passed	$0.00
	Beckman, Heidi	CHS-UH		RADIOLOGY-COMPUTED TOMOGRAPHY - CSC 3252		$0.00
					$0.00 $0.00	$0.00

Work Order Description

GE Service Request #: 1-1970998516 21
Problem Description: CD Thur 9/1 0700CST Caller is not able to launch login.
Engineer Name: David, McKenney
Problem Found: caller is not able to launch login. TSE unable to contact customer at the phone number listed in the activity.
Action Taken: TSE called customer twice at the phone number in the activity. No answer. Must have rang for over 5 minutes. Someone is logged in the scanner. The scanner finished fast cals at 17:57hrs. Split field activity to site FE for call back tomorrow morning.

Engineer Name: John, Kretzschmar
Problem Found: EA3 admin account is corrupted
Action Taken: restored reconfig file from system state.
Verification Details: logged out of scanner and was able to sucessfully log into scanner as expected

074118	IMAGING SYSTEM, CT	GE HEALTHCARE		OPTIMA 660	6082630T660	0
1-216777	Mfr Service Bulletin	Serviced by Vendor				$0.00
Closed	8468 51-80220	09/22/2016	09/22/2016	09/22/2016	Not Applicable	$0.00
	Heindl, Timothy	CHS-UH		RADIOLOGY-COMPUTED TOMOGRAPHY - CSC 3252		$0.00
					$0.00 $0.00	$0.00

Removed Exam Split option, reloaded option and configured for HE 5 mode.

074118	IMAGING SYSTEM, CT	GE HEALTHCARE		OPTIMA 660	6082630T660	0
1-216784	Checkout/Repair	Serviced by Vendor		Unpredictable Failure		$0.00
Closed	8468 51-80220	09/14/2016	09/14/2016	09/16/2016	Not Applicable	$0.00
	Heindl, Timothy	CHS-UH		RADIOLOGY-COMPUTED TOMOGRAPHY - CSC 3252		$0.00
					$0.00 $0.00	$0.00

The last slide was GE sends us, here is how we record each of these events

1-200711248442 Clock is 5 minutes slow. Completed by GE SR Attached

1-199585200845 PM Completed by GE SR Attached

1-200867144240 IP address change and In Site Checkout Completed by GE SR Attached

1-188580046791 review logs Completed by GE SR Attached

In addition to service events, we also keep track of preventive maintenance events (PMs) for all our equipment

Note: at UWHC we get CT scanner PMs every 4 months and power injector PMs every year

Asset Last/Next Test Dates Report

Dates shown effective as of 09/15/2017 09:59 AM

Next Run is on 09/15/2017 10:29 AM

Control #	DeviceType	Model	Manufacturer	Sn#	InstallDate	LastCompleteDate	NextDueDate	Freq
Facility: CHS-UH								
236765	DEFIBRILLATOR, EXTERNAL	R-SERIES	ZOLL	AF14F037425	09/11/2014	09/13/2017	03/13/2018	Semia
271485	ELECTROSURGICAL UNIT, GENERAL	CERTUS 140	NEUWAVE MEDICAL	NM15NEA00371	10/13/2015	10/14/2015	ns	ns
074083	IMAGING SYSTEM, CT	OPTIMA CT580 W	GE HEALTHCARE	608263WBCT2	10/15/2012	07/24/2017	10/24/2017	Qtly
074117	IMAGING SYSTEM, CT	750HD	GE HEALTHCARE	608263CT750	06/15/2013	07/03/2017	07/03/2018	Annua
074118	IMAGING SYSTEM, CT	OPTIMA 660	GE HEALTHCARE	608263CT660	07/01/2013	07/14/2017	07/14/2018	Annua
074142	IMAGING SYSTEM, CT	OPTIMA 660	GE HEALTHCARE	608890ECCT	01/05/2015	06/29/2017	06/29/2018	Annua
074158	IMAGING SYSTEM, CT	REVOLUTION	GE HEALTHCARE	608263REVCT	10/16/2015	05/31/2017	9/30/2017	Qtly
074171	IMAGING SYSTEM, CT	750HD	GE HEALTHCARE		01/23/2016	04/26/2017	04/26/2018	Annua
064788	IMAGING SYSTEM, WORKSTATION	AW4.2	GE HEALTHCARE		04/01/2006	02/28/2010	ns	ns
074041	INSUFFLATOR, SURGICAL, CO2	6400	BRACCO	6400-80465	02/15/2005	01/28/2014	ns	99
029339	MONITOR, PHYSIOLOGICAL	3150	IVY BIOMEDICAL SYSTEMS	13010605	03/18/2013	05/28/2015	ns	ns
070921	POWER INJECTOR	ENVISION	MEDRAD	10959	01/01/1998	08/17/2017	08/17/2018	Annua
074043	POWER INJECTOR	STELLANT D	MEDRAD	27302	01/15/2007	12/09/2016	12/09/2017	Annua
074044	POWER INJECTOR	STELLANT D	MEDRAD	27298	01/15/2007	11/10/2016	11/10/2017	Annua
074045	POWER INJECTOR	STELLANT D	MEDRAD	25965	06/12/2007	12/05/2016	12/05/2017	Annua
074077	POWER INJECTOR	STELLANT D	MEDRAD	30325	02/15/2009	11/10/2016	11/10/2017	Annua
029349	POWER INJECTOR	STELLANT D	MEDRAD	10107	03/18/2013	11/15/2016	11/15/2017	Annua
040365	SURGICAL, NAVIGATION SYSTEM	CAS-One	MET Laboratories	120	01/04/2017	n/a	01/04/2018	Annua
				CHS-UH Total:	**18**			
				Grand Total:	**18**			

Parameters

Service Center :	4102 Clinical Engineering	Archived Records :	Not-included

TJC – environment of care

Key Personel	Standards	TJC Requirements	UWHC Compliance
Med Physics Radiology Engineering	EC.02.04.03 C. 15, A. 17 A. 19 & A. 23	The [critical access] hospital maintains the quality of the diagnostic computed tomography (CT), positron emission tomography (PET), magnetic resonance imaging (MRI), and nuclear medicine (NM) images produced.	RPS provides testing. Reports sent to Radiology Engineering for documentation storage.

Radiological Physics Services (Ranallo) provides testing for UWHC – Radiology and Meriter CT
UWSMPH-Radiology (Szczykutowicz) provides testing for UWHC Rad Onc, Madison VA, Fort Atkinson
All other community sites use a non UW affiliated physics provider

CT Scanner Annual QA: St. Mary's Janesville Hospital DHO (GE Optima RT 580)

Timothy P. Szczykutowicz, Ph.D., DABR

Report Date: 09 11 2017

Testing Date: 09 05 2017

Department of Radiology
1005 WIMR
1111 Highland Avenue
University of Wisconsin-Madison, WI 53705
tszczykutowicz@uwhealth.org
cell: 716-560-7751
office: 608-263-5729

Background of this scanner

Scanner testing was requested for this location via the physics team at Turville Bay Cancer
Wisconsin. A new BAA and service agreement was executed between the University of Wisc
Turville Bay before testing in 2016.

I arrived on site at 9 AM. Todd Meyers (local physics support for RO) performed a fast
I arrived. I finished testing around 2:45 PM. Before leaving, I verbally communicated to Tod
scanner was safe for clinical use and that a full report would follow. Todd Meyers ran three
tests in my presence at the start of the day, I used some of those results in my own report. I a
Meyers method for raising the noise limit due to the use of the flat table top. I agree with hi
and the new limit I find appropriate.

The testing performed was all compliant with AAPM task group report 66 (this report c
in the RT environment) as well as Joint Commission and American College of Radiology Req
note, that since there were no diagnostic protocols on the scanner, as this scanner will not b
diagnostic scanning, no diagnostic clinical protocols were reviewed and the ACR phantom prot
was not performed. All other tests were performed with the exception of the parts of TG-66 r

Last year (2016), the scanner had an improperly displayed x-ray sign outside the scan ro
upon my 2017 visit.

Last year (2016) the scanner's own external lasers were disabled. They are still disabled. T
LAP lasers were functional this year and were used for all testing of the laser to localizer to
testing.

1. OVERVIEW AND RECOMMENDATIONS

Todd Meyers and I had discussed the use of door interlocks in the CT sim environment. I do not advise door interlocks for any CT room in diagnostic or therapy setting. The following text is from NCRP Report 147 section 2.2.2.3 *Door Interlocks, Warning Lights, and Warning Signs. Door interlocks that interrupt x-ray production are not desirable since they may disrupt patient procedures and thus result in unnecessary repeat examinations.*

I showed Todd Meyers a few on line resources while on-site, the UW daily/monthly/weekly QA manual and accompanying resources, all found at https://www.radiology.wisc.edu/protocols/CT/resources.php. I also showed him and discussed briefly our dose check manual which can be found at the same location. We discussed the need and relevance of dose limits and alarms using the dose check feature for the RO environment. I advise you to set an alert value of 1 Gy. I also advise we schedule a t-conn or meeting to discuss some protocol tweaks to your CT sim protocols. I will elaborate on some suggestions in the protocol review section of this report.

I forgot to test the room intercom, this should be tested. It can be tested by making sure an operator can communicate with a person lying on the couch (they must be lying on the couch since the intercom is inside the scanner bore and likely will not work if the intercom is tested with a person simply inside the room but not on the couch). This should be tested monthly by local staff as well.

Table 1 lists all test performed and the outcome.

Table 1. Overview of tests performed

Test	Result
room safety features	Pass
scanner safety features	Pass
artifact check	Pass
low contrast detection	Pass
Spatial Resolution	Pass
Noise	Pass
CT Number Check	Pass
Dose (scanner output)	Pass
Actual beam width	Pass
Slice Thickness	Pass
Lasers	Pass
Table Movement	Pass
Lasers to scout to image consistency	Pass
Monitor luminance/uniformity	Pass
Geometric distortion	Pass
Spatial accuracy	Pass

No gantry tilt testing was performed, the tilt option on this system was disabled at the request of the local physics team. In this setting, that is a good idea.

Note, all images acquired during this testing were not sent to any external networks/databases. All data needed for this test was captured by TPS while on-site. However, if possible, I recommend saving the data for future reference. The protocol used for testing were stored under the "service" tab in location "service cat 7". Some scan time changes were made during the testing.

Physics reports must meet a list of required testing criteria – determined by TJC and ACR

TJC – environment of care

Key Personel	Standards	TJC Requirements	UWHC Compliance
Project Manager RPS	EC.02.06.05 A.4 & A.6	For computed tomography (CT), positron emission tomography (PET), or nuclear medicine (NM) services: Prior to installation of new imaging equipment, replacement of existing imaging equipment, or modification to rooms where ionizing radiation will be emitted or radioactive materials will be stored (such as scan rooms or hot labs), a medical physicist or health physicist conducts a structural shielding design * assessment to specify required radiation shielding.	Preconstruction risk assessment will be completed by the facilities planning Project Manager to include shielding requirements.

Location	Occupancy Factor (T)	Design Goal (max. weekly dose / occupancy factor, P/T)	Distance from Isocenter	Unshielded Dose Per Patient	Unshielded Weekly Dose
A – Control Room Wall/Window	100%	100 µSv/week	4.9 m	42.7 µSv	6.8 mSv
B – CT Scanner Room E3/365	100%	100 µSv/week	3.9 m	66.6 µSv	10.7 mSv
C – Corridor	20%	100 µSv/week	2.6 m	165.1 µSv	26.4 mSv
D – Corridor Door	12.5%	100 µSv/week	3.2 m	175.4 µSv	28.1 mSv
E – Workroom	100%	20 µSv/week	4.2 m	22.0 µSv	3.5 mSv
F – Corridor	20%	100 µSv/week	4.4 m	79.7 µSv	12.8 mSv
G – Corridor Door	12.5%	100 µSv/week	4.8 m	58.4 µSv	9.3 mSv
Area Above the Scanner Room at Maximum CT Scatter Dose	100%	20 µSv/week	4.2 m	45.9 µSv	7.3 mSv
Area Below the Scanner Room at Maximum CT Scatter Dose	100%	20 µSv/week	5.0 m	32.4 µSv	5.2 mSv

DEPARTMENT OF
Medical Physics
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Radiation Shielding Evalua
CT Scanner Room E
At the University of Wiscon
600 Highland Ave
Madison, Wiscons...

John R. Vetter, PhD
A.B.R. Certified Diagnostic Radiolog
Medical Physics Departm
University of Wisconsin
August 14, 2017

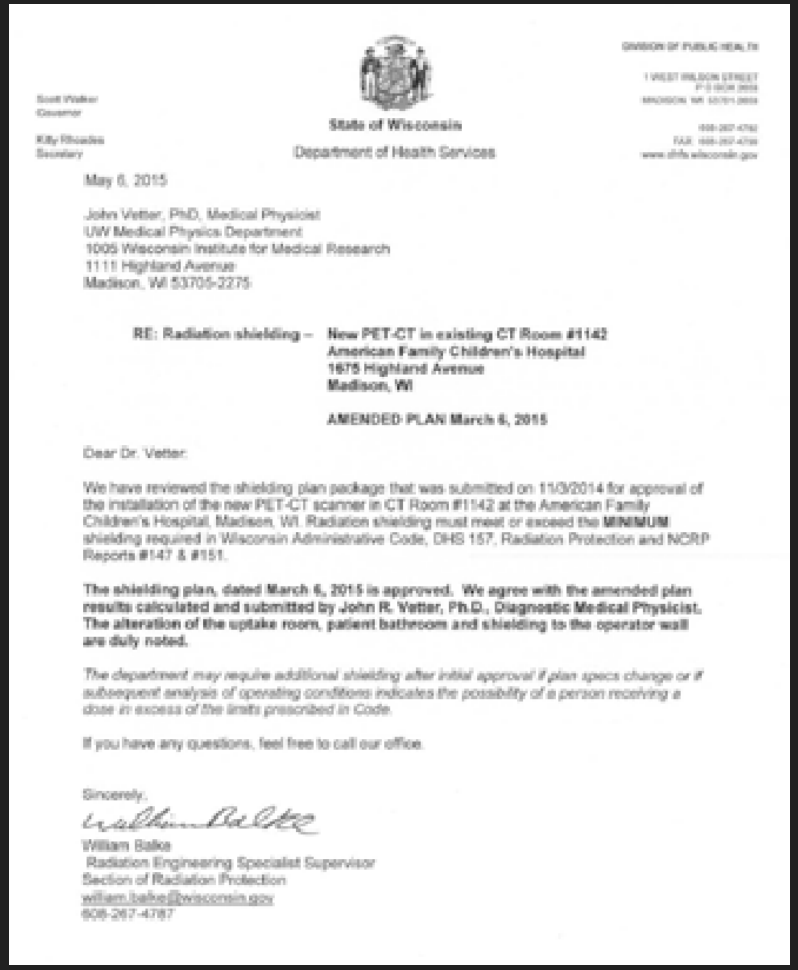
I. Introduction and Methods

This report provides an evaluation of the radiation prote
replacement of the CT Scanner in Room E3/365, at The Univ
Madison, Wisconsin. The General Electric 16 slice CT scanner cu
replaced with a General Electric 64 slice Revolution GSI scanner. The Revolution scanner has a longer
patient table, requiring expansion of the room by moving the control room wall outward into the
general control area. All other radiation shielding will remain in place. The existing walls and doors

Example shielding report. At every location one of you or a patient or an office work is going to be, physics calculates how much dose they will get

Difference between these to columns is what the lead/concrete/drywall/wood shielding does for us (reduces dose)

In Wisconsin, we have to send our shielding plans to the state to get approved



Scott Walker
Governor

Kitty Rhoades
Secretary

State of Wisconsin
Department of Health Services

DIVISION OF PUBLIC HEALTH
1 WEST WILSON STREET
P O BOX 2659
MADISON, WI 53701-2659
608-267-4792
FAX 608-267-4792
www.dhs.wisconsin.gov

May 6, 2015

John Vetter, PhD, Medical Physicist
UW Medical Physics Department
1005 Wisconsin Institute for Medical Research
1111 Highland Avenue
Madison, WI 53705-2275

RE: Radiation shielding – **New PET-CT in existing CT Room #1142**
American Family Children's Hospital
1675 Highland Avenue
Madison, WI

AMENDED PLAN March 6, 2015

Dear Dr. Vetter:

We have reviewed the shielding plan package that was submitted on 11/3/2014 for approval of the installation of the new PET-CT scanner in CT Room #1142 at the American Family Children's Hospital, Madison, WI. Radiation shielding must meet or exceed the **MINIMUM** shielding required in Wisconsin Administrative Code, DHS 157, Radiation Protection and NCRP Reports #147 & #151.

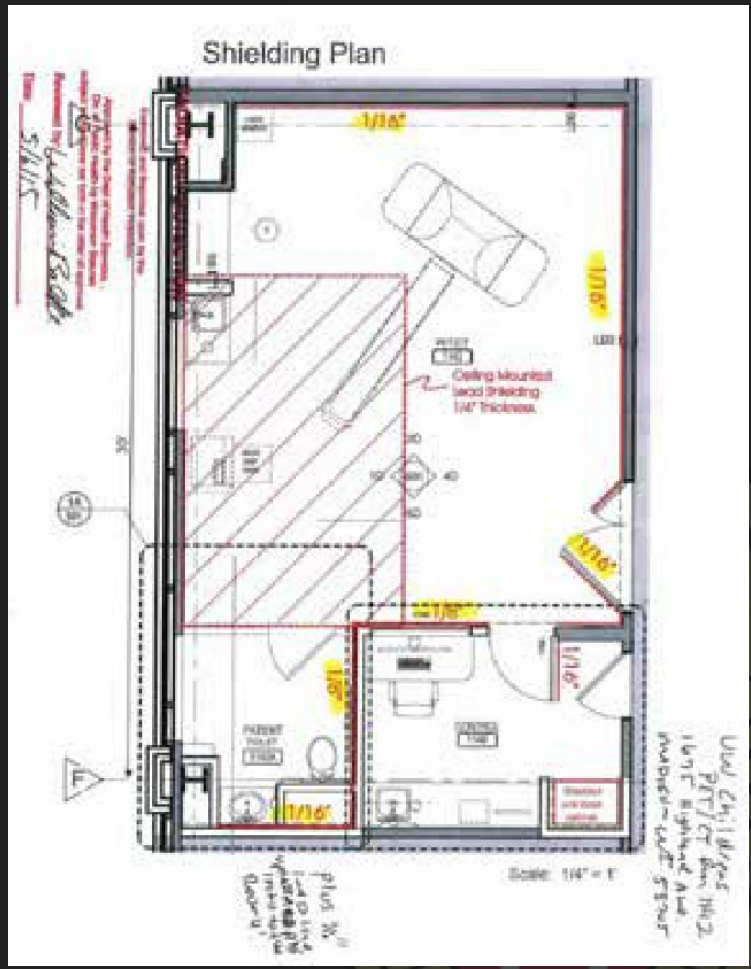
The shielding plan, dated March 6, 2015 is approved. We agree with the amended plan results calculated and submitted by John R. Vetter, Ph.D., Diagnostic Medical Physicist. The alteration of the uptake room, patient bathroom and shielding to the operator wall are duly noted.

The department may require additional shielding after initial approval if plan specs change or if subsequent analysis of operating conditions indicates the possibility of a person receiving a dose in excess of the limits prescribed in Code.

If you have any questions, feel free to call our office.

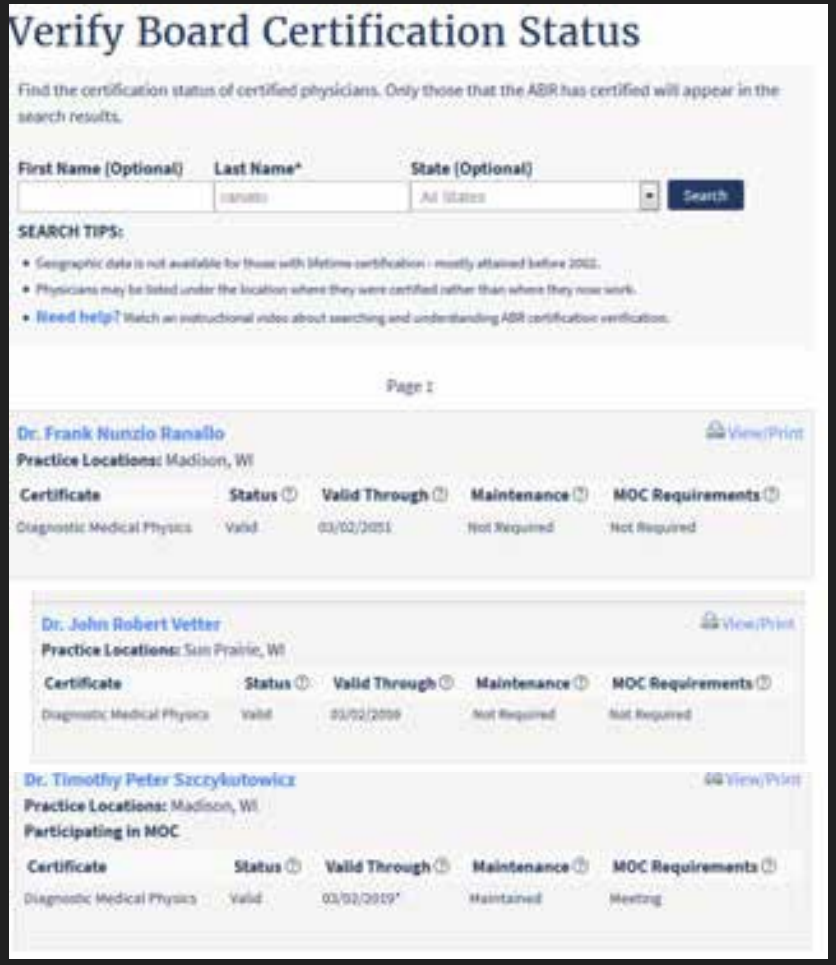
Sincerely,

William Balke
Radiation Engineering Specialist Supervisor
Section of Radiation Protection
william.balke@wisconsin.gov
608-267-4787



TJC – human resources

Key Personel	Standards	TJC Requirements	UWHC Compliance
Med Physics	HR.01.02.05 C. 20	The [critical access] hospital verifies and documents that diagnostic medical physicists who support computed tomography (CT) services have board certification in diagnostic radiologic physics or radiologic physics by the American Board of Radiology, or in Diagnostic Imaging Physics by the American Board of Medical Physics, or in Diagnostic Radiological Physics by the Canadian College of Physicists in Medicine, or meet all of the following requirements:	The credentials of our medical physics support can be verified online using the American Board of Radiology: http://www.theabr.org/find-a-radiologist?name=Ranallo&location=Madison WI



Verify Board Certification Status

Find the certification status of certified physicians. Only those that the ABR has certified will appear in the search results.

First Name (Optional) **Last Name*** **State (Optional)**

Search

SEARCH TIPS:

- Geographic data is not available for those with lifetime certification - mostly attained before 2002.
- Physicians may be listed under the location where they were certified rather than where they now work.
- Need help? Watch an instructional video about searching and understanding ABR certification verification.

Page 1

Dr. Frank Nunzio Ranallo View/Print

Practice Locations: Madison, WI

Certificate	Status	Valid Through	Maintenance	MOC Requirements
Diagnostic Medical Physics	Valid	03/02/2051	Not Required	Not Required

Dr. John Robert Vetter View/Print

Practice Locations: Sun Prairie, WI

Certificate	Status	Valid Through	Maintenance	MOC Requirements
Diagnostic Medical Physics	Valid	03/02/2059	Not Required	Not Required

Dr. Timothy Peter Szczykutowicz View/Print

Practice Locations: Madison, WI

Participating in MOC

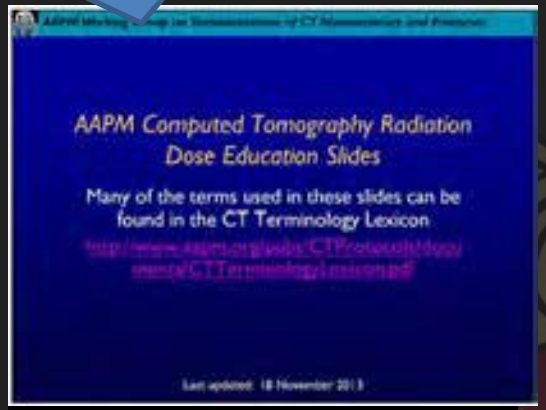
Certificate	Status	Valid Through	Maintenance	MOC Requirements
Diagnostic Medical Physics	Valid	03/02/2019*	Maintained	Meeting

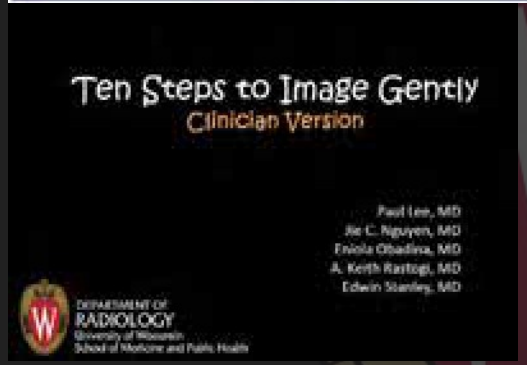
TJC – human resources

Key Personel	Standards	TJC Requirements	UWHC Compliance
Radiology Manager	HR.01.05.03 C. 14	The [critical access] hospital verifies and documents that technologists who perform diagnostic computed tomography (CT) examinations participate in ongoing education that includes annual training on the following: Radiation dose optimization techniques and tools for pediatric and adult patients addressed in the Image Gently® and Image Wisely® campaigns Safe procedures for operation of the types of CT equipment they will use	GE has produced a PPT for Computed Tomography dose which will be loaded to UWHC- Learning and Development System (LDS). Technologist will be alerted annually to complete this review and post test. All compliance will also be tracked through LDS.

Official slide set we have on LDS (this is the one you need to review annually and attest to)

Other training options





TJC – provision of care/treatment/services

Key Personel	Standards	TJC Requirements	UWHC Compliance
Radiology CT manager CT Lead Technologist Radiology CT Physicist	PC.01.02.15 C. 5, A. 10,& A. 12	The [critical access] hospital documents in the patient's record the radiation dose index (CTDIvol, DLP, or size-specific dose estimate [SSDE]) on every study produced during a diagnostic computed tomography (CT) examination. The radiation dose index must be exam specific, summarized by series or anatomic area, and documented in a retrievable format.	Compliance with this standard is met through sending CT dose slides to our PACS system. This is retrievable by patient through the same system. Use this link to access the UW DoseWatch install. http://10.112.5.81:8080/DoseWatch/ Alerts from this systems are sent out to the CT Protocol Optimization Team list serv.

Please remember always to send dose slides, sometime people forget, especially on split exams!

As a back up, we have dose watch which saves all irradiation event data and can be searched by patient ID

-we also use dose watch for all quality control monitoring of dose, technologist workflow, technologist compliance with protocols, etc.

Exam Description: CT ABDOMEN PELVIS W IV

Dose Report

Series	Type	Scan Range (mm)	CTDIvol (mGy)	DLP (mGy-cm)	Phantom cm
1	Scout	-	-	-	-
200	Axial	168.750-168.750	20.83	20.80	Body 32
2	Helical	14.500-1475.125	17.57	879.96	Body 32
			Total Exam DLP:	900.76	

1/1

TJC – provision of care/treatment/services

Key Personel	Standards	TJC Requirements	UWHC Compliance
CT Protocol Optimization team	PC.01.03.01 A. 25 & A. 26	The [critical access] hospital establishes or adopts diagnostic computed tomography (CT) imaging protocols based on current standards of practice, which address key criteria including clinical indication, contrast administration, age (to indicate whether the patient is pediatric or an adult), patient size and body habitus, and the expected radiation dose index range.	Here is a link to our Quality management system. (http://ei-sharepoint/sites/SMPH/CTProtocols/_layouts/15/viewlsts.aspx) Here is a citation to the quality management system we employ to fulfill this aim. Szczykutowicz, Timothy P., et al. "Compliance with AAPM Practice Guideline 1. a: CT Protocol Management and Review—from the perspective of a university hospital." Journal of Applied Clinical Medical Physics 16.2 (2015).

At UW, we review our protocols using a multi specialty in house team and also bring in external physics, technologists, and radiologist advisors from around the world. Full details at https://www.radiology.wisc.edu/protocols/CT/advisory_boards.php

Physicist Advisory Board

The initial Physicist Advisory Board meeting occurred as part of the 2016 AAPM Annual Meeting in Washington DC, with six clinical medical physicists from around the United States collaborating and sharing their unique expertise for improving the UW CT protocols. The board members were from many different practice areas including academic centers, a children's hospital, consulting firms, and a consortium. This effort is in addition to the CT physics input the project receives from the GE CT Work headquarters located a one hour drive from Madison in Waukesha, Wisconsin. The UW CT team also has multiple ongoing research projects with the GE CT scientists.

July 30, 2016 Meeting

Zubair Abbasi , M.S., DABR, DABPP
Vice President of Technical Operations
West Physics

Emmanuel Christodoulou, PhD
Diagnostic Physicist
Radiology Dept.
Univ Michigan Medical Center
Ann Arbor , MI

Jessica B Clements, MS
Assistant Professor
Radiology Dept.
Univ Michigan Medical Center
Ann Arbor , MI

Technologist Advisory Board

Five clinical CT technologists from two locations within the UW Health network and two individuals from the GE Applications team met on February 7, 2017 to review the scanning instructions of the protocols to make them more universally applicable outside of the UW Health system. The board member's backgrounds included working at rural sites having one technologist to sites covering multiple modalities, as well as working at trauma centers and academic institutions.

February 7, 2017 Meeting

Collaborators

Carrie Bartels, RT(R)(CT)
Imaging Specialist (CT) Senior
Department of Radiology
UWHC

Amanda Ciano, RT(R)(CT), BS
Global Clinical Applications Leader CT, MICT
GE Healthcare

Dan Hallmark, RT(R)(CT)

Medical Advisory Boards

The CT Protocol Optimization team regularly enlists the help of clinical radiologists from across the country with CT expertise in the areas of body, chest and cardiovascular, musculoskeletal, neuroradiology, and pediatrics. The first iteration of the group met in 2015 to collaborate and share their unique expertise for improving upon the first generation of CT protocols.

May 12, 2017 Meeting

Body

Vincent M. Mellnick, MD
Assistant Professor, Radiology
Mallinckrodt Institute of Radiology, Washington University
St. Louis, MO

Ravi K. Kaza, MD
Associate Professor of Radiology
University of Michigan Hospitals
Ann Arbor, MI

JOURNAL OF APPLIED CLINICAL MEDICAL PHYSICS, VOLUME 16, NUMBER 2, 2015

Compliance with AAPM Practice Guideline 1.a: CT Protocol Management and Review — from the perspective of a university hospital

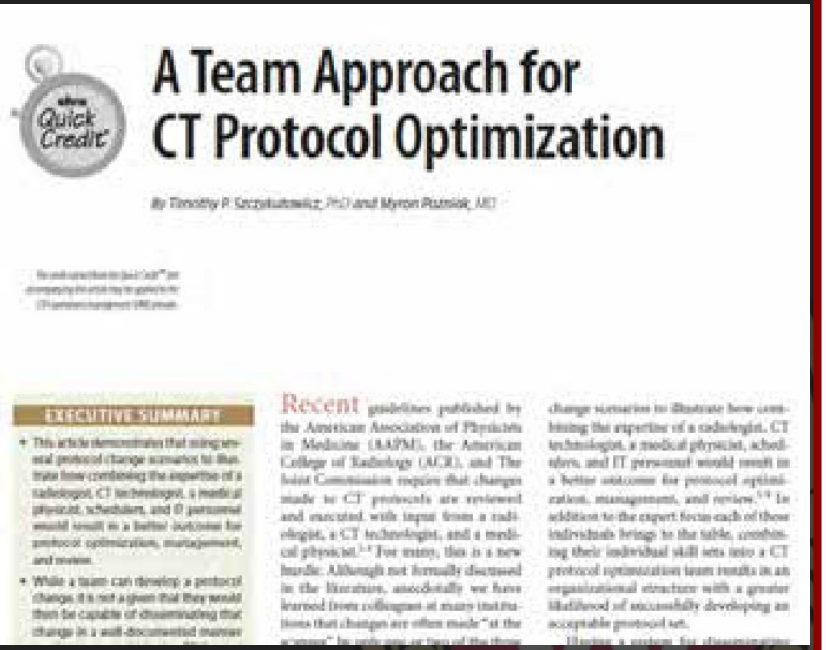
Timothy P. Szczykutowicz,[1,2a] Robert K. Bour,[1] Myron Pozniak,[1] Frank N. Ranallo[1,2]

Department of Radiology,[1] University of Wisconsin Madison School of Medicine and Public Health, Madison; Department of Medical Physics,[2] University of Wisconsin Madison School of Medicine and Public Health, Madison, WI, USA

tszczykutowicz@uwhealth.org

Received 16 April, 2014; accepted 3 November, 2014

The purpose of this paper is to describe our experience with the AAPM Medical Physics Practice Guideline 1.a: "CT Protocol Management and Review Practice Guideline". Specifically, we will share how our institution's quality management system addresses the suggestions within the AAPM practice report. We feel this paper is needed as it was beyond the scope of the AAPM practice guideline to provide specific details on fulfilling individual guidelines. Our hope is that other institutions will be able to emulate some of our practices and that this article would encourage other types of centers (e.g., community hospitals) to share their methodology for approaching CT protocol optimization and quality control. Our



Quick Credit

A Team Approach for CT Protocol Optimization

By Timothy P. Szczykutowicz, PhD and Myron Pozniak, MD

EXECUTIVE SUMMARY

- This article demonstrates that using several protocol change scenarios to illustrate how combining the expertise of a radiologist, CT technologist, a medical physicist, schedulers, and IT personnel would result in a better outcome for protocol optimization, management, and review.
- While a team can develop a protocol change, it is not a given that they would then be capable of disseminating that change in a well-documented manner

Recent guidelines published by the American Association of Physicists in Medicine (AAPM), the American College of Radiology (ACR), and The Joint Commission require that changes made to CT protocols are reviewed and executed with input from a radiologist, a CT technologist, and a medical physicist.[1-3] For many, this is a new hurdle. Although not formally discussed in the literature, anecdotally we have learned from colleagues at many institutions that changes are often made "at the scanner" by only one or two of the three

change scenarios to illustrate how combining the expertise of a radiologist, CT technologist, a medical physicist, schedulers, and IT personnel would result in a better outcome for protocol optimization, management, and review.[1-3] In addition to the expert focus each of these individuals brings to the table, combining their individual skill sets into a CT protocol optimization team results in an organizational structure with a greater likelihood of successfully developing an acceptable protocol set.

We document all non trivial changes to UW protocols and record these changes using corrective and preventative action (CAPA) forms

Corrective and Preventive Action (CAPA) Database

1	7/15/2013	Myron Pozniak	Large Body Protocols	Tim Szczykotowicz	Noise index changed to adjust for increase in dose		9/3/2013
2	7/15/2013	Myron Pozniak	HCC Liver Modifications	Tim Szczykotowicz/Myron Pozniak	Added a 3 minute delay series to the Biphasic protocol according to a regulation		12/18/2013
3	7/15/2013	Myron Pozniak	Trauma CAP	Myron Pozniak	Adjusting the Chest MIP reformat from a 2.5x1.25 to 1.25 x1.25		9/11/2013
4	8/6/2013	Frank Ranallo	Smart Prep on Peds Patients	Tim Szczykotowicz	Adjusting all size pediatric patients mA on smart preps		9/12/2013
5	8/7/2013	Myron Pozniak	Adding Pelvis to Renal Donor	Myron Pozniak	this protocol change is on hold		12/18/2013
6	8/28/2013	Myron Pozniak	Small Body Protocols	Tim Szczykotowicz	Dose rasied in all small body protocols and tech education		10/10/2013
7	8/30/2013	Kara Gill	2 Largest Pediatric Body Sizes	Tim Szczykotowicz	2 largest pediatric body sizes decreased in dose		10/1/2013
8	9/9/2013	Myron Pozniak	660 Protocols	Tim Szczykotowicz	Optimized each sections protocols to suit the new scanner.		11/13/2013
9	9/17/2013	Tim Szczykutowicz	Error found on VCT neuro protocols	Tim Szczykutowicz	Errors fixed.		9/18/2013
10	9/23/2013	Ken Schriebman	Need Higher kVp for spine with metal protocols	Tim Szczykutowicz	New higher kV protocols were made.		12/18/2013
11	9/30/2013	Myron Pozniak	Protocol 6.62	Tim Szczykutowicz	Dose rasied for the parch phase.		3/7/2014
12	10/4/2013	Myron Pozniak	Protocol 6.44	Tim Szczykutowicz	Parenchymal phase was too noisy so dose was increased to lower noise		3/7/2014
13	10/4/2013	Ken Schriebman	Increasing kVp on MSK extremity work	Tim Szczykutowicz/Frank Ranallo	Increasing the kVp on some extremity work to compenstate for metal.		11/11/2013
14	10/8/2013	Frank Ranallo	ww/wl incorrect for body protocols	Tim Szczykutowicz	Rads were using wrong WW/WL to view images which were seen as noisy		3/7/2014

Protocol Change Checklist

(For adding, deleting, or changing protocols)

Protocol Name(s)	
Scanner(s)	
CAPA No.	
Date	

X

Lead Technologist

Task	Responsible Party	Form No.	Date Complet
Complete CAPA sheet (attached). DO NOT sign Protocol Release Authorization sheet until the protocol change has been entered and checked.	Carrie Bartels	F201	
Update CAPA database	Carrie Bartels	F202	
Update Protocol Revision History file	Carrie Bartels	—	
Update Master Protocol list (for adding or deleting a protocol only)	Lisa Aumann	—	
Update Design Philosophy document (if applicable)	Lisa Aumann (or Section Lead)	F736	
Change Epic protocoling processor if applicable	Carrie Bartels	—	
Notify Billing Department (only if affected by protocol change)	Carrie Bartels & Pete Wasmund	—	
Update Master Protocol Physics worksheet if applicable	Tim Szczykutowicz	—	
Update validation worksheets, including the following information: - Last Revision Date - Master Protocol No.	Tim Szczykutowicz & Rob Blour	F403	
Evaluate potential impact on validation and validation	Tim Szczykutowicz & Rob Blour	F403	
Update Master Protocol Derivation list	Tim Szczykutowicz & Rob Blour	F03	
Notify Technicians of change and train as appropriate (consult once a month if NOT urgent)	Carrie Bartels	—	
Update protocol word document if needed	Tim Szczykutowicz	—	
Notify Faculty and Residents of change	Myron Pozniak	—	
When all above are complete, enter protocol in scanner and document in Protocol Release sheet	Carrie Bartels	F200	
Check protocol entry for accuracy and document in Protocol Release sheet	Tim Szczykutowicz	F201	
Release this document for signatures	Carrie Bartels	F201	

*Complete this checklist and the CAPA sheet **BEFORE** the protocol change gets loaded on the scanner. Then enter the protocol, have physics check, fill out the Protocol Release sheet and then have everyone sign the workbook.

Corrective and Preventive Action (CAPA) Worksheet

Issue Number	
Type	
Source	
Originator	
Date Initiated	
Assignee	Carrie and Tim
Date Assigned	
Problem Statement	
Investigation	
Root Cause	
Design Philosophy Update	
Containment Actions	
Corrective Actions	
Preventive Actions	
Effectiveness Check	Quarterly nonconformance review
Planned Implementation Start Date	ASAP
Planned Implementation and Effectiveness Check Completion Date	Within 3 months of the implementation of this action

Protocol Name	
Revision	
Date	
Description	

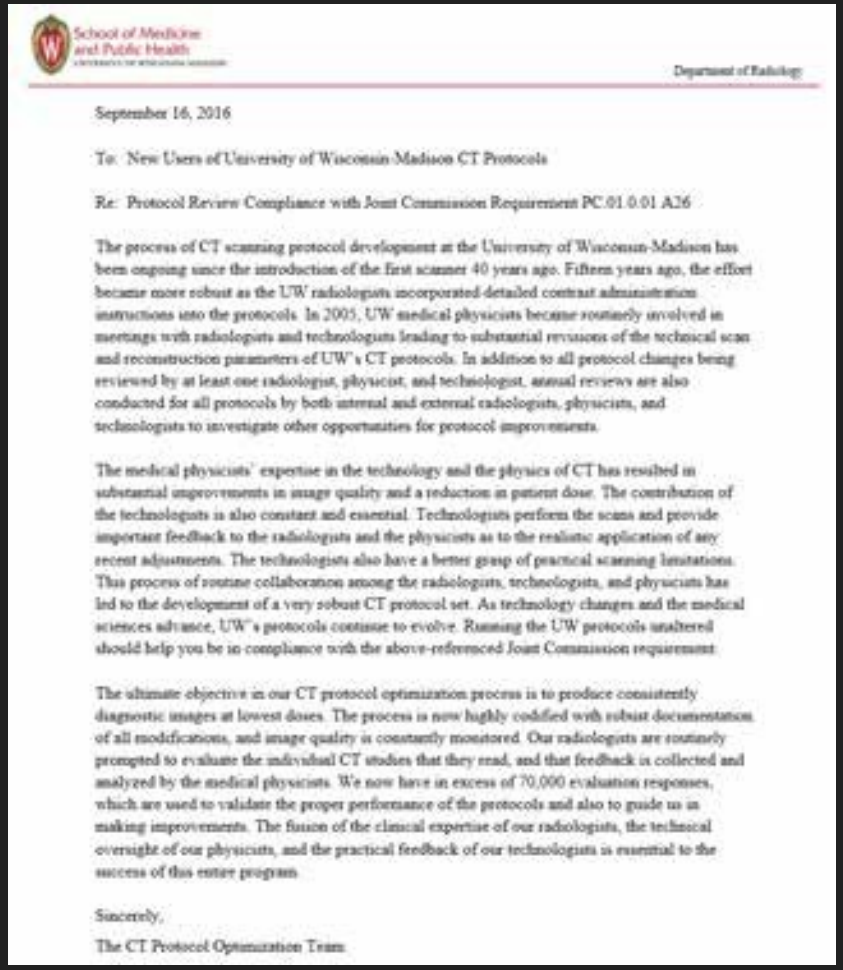
X	X
Lead Radiologist	Clinical Section CT - Lead Radiologist
X	X
Medical Physics	Lead Technologist

File provided to Document Control Coordinator	
Controlled documents were updated	

Scanner Name	Protocol Entered	Check Complete
CT1		
CT2		
CT3		
CT4		
ED		
TAC		
AFCH		
DHC		
ISP		
RP		

Note: you may need to email the community about any changes made to the wiki or to the UW protocol set.

Letter on our public website detailing how we meet the protocol review requirement from TJC



School of Medicine and Public Health

Department of Radiology

September 16, 2016

To: New Users of University of Wisconsin-Madison CT Protocols

Re: Protocol Review Compliance with Joint Commission Requirement PC.01.0.01 A26

The process of CT scanning protocol development at the University of Wisconsin-Madison has been ongoing since the introduction of the first scanner 40 years ago. Fifteen years ago, the effort became more robust as the UW radiologists incorporated detailed contrast administration instructions into the protocols. In 2005, UW medical physicists became routinely involved in meetings with radiologists and technologists leading to substantial revisions of the technical scan and reconstruction parameters of UW's CT protocols. In addition to all protocol changes being reviewed by at least one radiologist, physicist, and technologist, annual reviews are also conducted for all protocols by both internal and external radiologists, physicists, and technologists to investigate other opportunities for protocol improvements.

The medical physicists' expertise in the technology and the physics of CT has resulted in substantial improvements in image quality and a reduction in patient dose. The contribution of the technologists is also constant and essential. Technologists perform the scans and provide important feedback to the radiologists and the physicists as to the realistic application of any recent adjustments. The technologists also have a better grasp of practical scanning limitations. This process of routine collaboration among the radiologists, technologists, and physicists has led to the development of a very robust CT protocol set. As technology changes and the medical sciences advance, UW's protocols continue to evolve. Running the UW protocols unaltered should help you be in compliance with the above-referenced Joint Commission requirement.

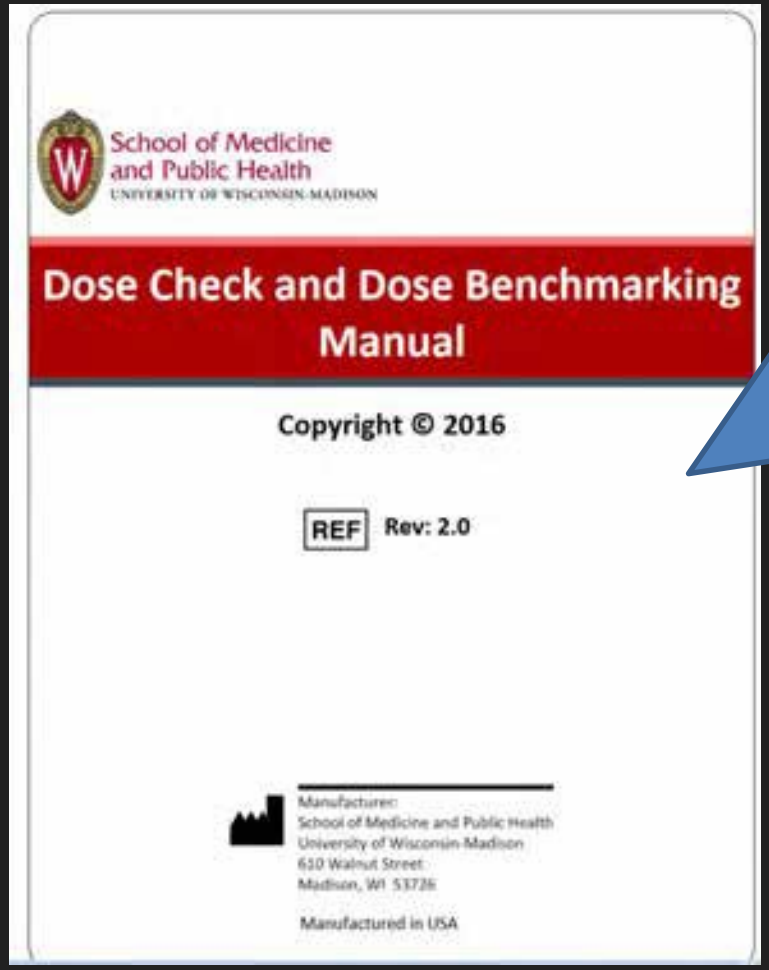
The ultimate objective in our CT protocol optimization process is to produce consistently diagnostic images at lowest doses. The process is now highly codified with robust documentation of all modifications, and image quality is constantly monitored. Our radiologists are routinely prompted to evaluate the individual CT studies that they read, and that feedback is collected and analyzed by the medical physicists. We now have in excess of 70,000 evaluation responses, which are used to validate the proper performance of the protocols and also to guide us in making improvements. The fusion of the clinical expertise of our radiologists, the technical oversight of our physicists, and the practical feedback of our technologists is essential to the success of this entire program.

Sincerely,

The CT Protocol Optimization Team

TJC – performance improvement

Key Personel	Standards	TJC Requirements	UWHC Compliance
CT Protocol Optimization team	PI.02.01.01 A. 6	The [critical access] hospital reviews and analyzes incidents where the radiation dose index (CTDIvol, DLP, or size-specific dose estimate [SSDE]) from diagnostic CT examinations exceeded expected dose index ranges identified in imaging protocols. These incidents are then compared to external benchmarks.	RPS (Medical Physics) and Radiology CT physics are responsible for providing notification and alert values to UWHC Radiology to enter onto the scanner. Additionally, these alerts will be entered onto DW. When patient exams trigger these thresholds, an email will be sent from the DoseWatch server to the CT Protocol Optimization Team and will be addressed using the CAPA system outlined in our quality management system. When the thresholds are exceeded on the scanner, the technologist will notify the imaging manager or authorized exceeding user to proceed with the study and then notify the CT Protocol Optimization team such that an investigational action can be taken. The action will be documented using the quality management system. A link to our quality management system is (http://ei-sharepoint/sites/SMPH/CTProtocols/_layouts/15/viewlsts.aspx)



This manual is a 1 stop shop for TJC compliance. It lists our expected dose index ranges, it lists out alarm values, it lists external dose values for comparison. It also describes the rationale behind how we set up dose check and how it meets TJC requirements for capturing dose events.

Note, we also have a tool to capture dose events. Here is a screen shot of it. It can be found on the CT wiki under the side bar listing for “dose event documentation”.

Dose Event Documentation

UW CT Protocols
UWMF (1 S. Park/WIMR) CT Protocols
3D Lab TOC
Turbo Button Instructions
UWHC Miscellaneous Instructions
Protocol Design Philosophy
Protocoling Assistance Document
FAQ
Scanner Status
Comments and Help

Radiologists Resources
Neuro Resource Page
AutoQA and ExamQA Training slides
CV indication guidance
Trauma Protocoling Guide

Compliance Resources
Daily Weekly Monthly Tech QA
Dose Event Documentation
TJC Resources
DoseWatch
MITA-XR-29 Certificates

Community Resources
Community contact Page

Click this link to log a dose event

```
http://ctwiki.uwhealth.org/mediawiki/dosealarm/doseqeAlarm.php
```

Compliance definition: To provide guidelines for technologists to notify when a dose alert event occurs on the CT scanner over defined limits. These limits are either set on a series/group level and referred to as Notification levels, or set at a study level and are referred to as Alert levels. This nomenclature is used by MITA XR 25.

PROCESS FLOW OF DOSE CHECK ALERTS

1. RPS (Medical Physics) and Radiology CT physics are responsible for providing notification and alert values to UW Health Radiology/ Medical Imaging to enter onto the scanner. Currently these values are available for free public download at https://www.radiology.wisc.edu/protocols/CT/resources.php as listed in the DoseCheck manual.
2. When the thresholds are exceeded on the scanner, scanner will notify the technologists via a pop-up error message. This message will require the technologists to comment on the reason for the dose alarm going off. If the event is over the alert value, the technologist will be asked to enter the admin password. Some sites will not provide all technologists with this password, please consult your local imaging manager for your sites policy on this. Detailed instructions for entering a dose event on this webpage are found below.

Notifying the CT protocol optimization team when a dose event occurs [edit]

You will need the following information

- Accession Number
- Comment (why do you think the alarm went off)
- Your name (if you want to be kept in the loop as to the resolution for this event)

After you enter this information on the link provided above, the CT protocol optimization team will be notified and take further action. If you want to additionally email you manager/physics/attending radiologist feel free to do so.

Dose Events and UW Madison

- Note, when UW protocols are used and there are no scan time changes made, our dose check values should NEVER be tripped. We have been running over 2 years without 1 reportable dose incident for TJC review. This is possible because we setup our protocols to have inherent dose limits using the scanner maximum mA settings.
  - This will not settle well with auditors who expect to have you show them a log of dozens/hundreds of dose events. Again, our ability to mitigate the presence of dose events is explained in the introduction section of our UW DoseCheck manual.

American College of Radiology

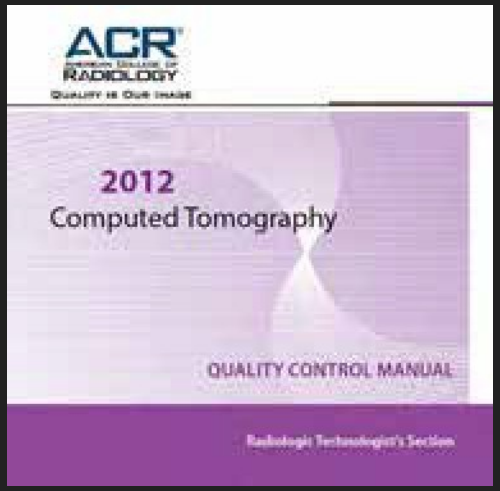


Table 1. Technologist's QC Tests: Minimum Frequencies

PROCEDURE	MINIMUM FREQUENCY	APPROXIMATE TIME IN MINUTES
Water CT Number and Standard Deviation	Daily	5
Artifact Evaluation	Daily	5 (or less)
Wet Laser Printer Quality Control	Weekly (if film is used for primary interpretation)	10
Visual Checklist	Monthly	5
Dry Laser Printer Quality Control	Monthly (if film is used for primary interpretation)	10
Display Monitor Quality Control	Monthly	5

- Daily/Monthly/Weekly QA
  - Our QA manual is on the wiki (link on side bar under compliance section)
  - All daily and weekly scanner tests are pre-built on the scanner
  - Log forms are available in a binder near scanner
    - CT Manager responsible for storing these

Daily, Weekly, & Monthly QA Testing on UW CT Scanners

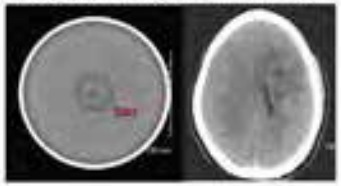
Scanning & Analysis of Phantom Scans

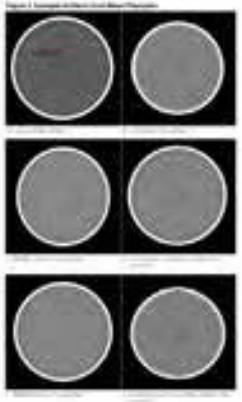
Procedure for Daily QA:

Scanning & Acquiring Images:

1. Set up the QA phantom:
   a. Place it on the phantom holder and level it. (see the image below regarding positioning)
   b. The phantom holder has some "slop" in it. You can move the phantom to so that it angles to the right or to the left. Different holders have different amounts of "slop".
   c. You need to adjust the phantom so that it is straight and not angled. To do this use the lasers to align the phantom properly as shown in the images below. First move the phantom into/out of the bore until the laser light is just skiming the phantom edge as shown below. Then move the phantom holder with your hand until the edge of the phantom looks like the middle image below, with the laser just toughing the back edge of the phantom EQUALLY from right to left. The left image shows improper positioning with the laser light only shinning on the left side of the edge and the right image shows improper positioning with the laser light only shinning on the right side of the edge

Various types of artifacts may appear on these images. The most common is a ring artifact. Below is an example of a ring artifact and the effect it can have on a clinical image:





Procedure for when a test fails:

Water center mean CT #: Contact physics if the measurement is outside of specifications.

Water center standard deviation: Contact physics if the measurement is: (1) outside of specifications for more than 1 day in a week or (2) if the measurement is more than 0.2 HU outside of the tolerance. This means that the measurement is greater than 5.0 or less than 3.6.

Visual artifacts: If any artifacts are observed with either the centered or uncentered phantom images in either axial or helical mode: run a fast calibration and then re-run the artifact test. If any artifacts remain, **CONTACT GE SERIVCE IMDEIATLEY** and also notify physics and the CT manager. The scanner should not be used for clinical imaging if an artifact is present.

Low contrast resolution: Contact physics if the measurement is: outside of specifications for more than 1 day in a week or (2) more than 0.2 HU outside the tolerance. This means that the measurement is greater than 5.5.

Difference Plexiglas/water: Contact physics if the measurement is outside of specifications.

High contrast resolution (1.6, 0.8, and 0.6 bar sizes): Contact physics if the measurement is: outside of specifications.

Slice thickness (5, 2.5, and 1.25 mm): Contact physics if the measurement is outside of specifications.

Laser light accuracy (internal, 90/270 degree, 0 degree): Contact physics if the measurement is: outside of specifications for more than 1 day in a week (2) more than 1 mm out of bounds for any single day.

Monthly Visual Checklist – Gantry Checks & Checks of Control Console: **CONTACT GE SERVICE IMMEDIATLY** if any feature of the scanner is not working. Notify the CT manager and physics as well. The CT manager and physic can determine if the scanner is safe to use until the issue with the scanner is repaired.

Full manual is on the wiki, it covers all aspects of daily, weekly, and monthly QA program

Role of individual technologist in UW Health's Compliance with TJC and ACR rules

- All techs must report dose check events
- All techs expected to perform daily/weekly/monthly QA must run the scans and fill out the required forms
- All techs must complete required annual CT safety training
  - And ensure that training was documented (use LDS system if at UWHC)
- A tech (lead CT tech) must be involved in the review of all CT protocols
  - Not needed individually for all scanners/sites, the team at the main hospital at UWHC does this for all UW affiliated sites
  - But if your site changes a protocol, it needs to be reviewed and documented
- All techs must send dose screen shots to PACS for every order (i.e. the same dose sheet may have to be sent >1 time when we exam split)
- All techs must be aware of the items in this document, we don't want any deer in headlight moments when an auditor is on site…