

# The Radiological Physics Center

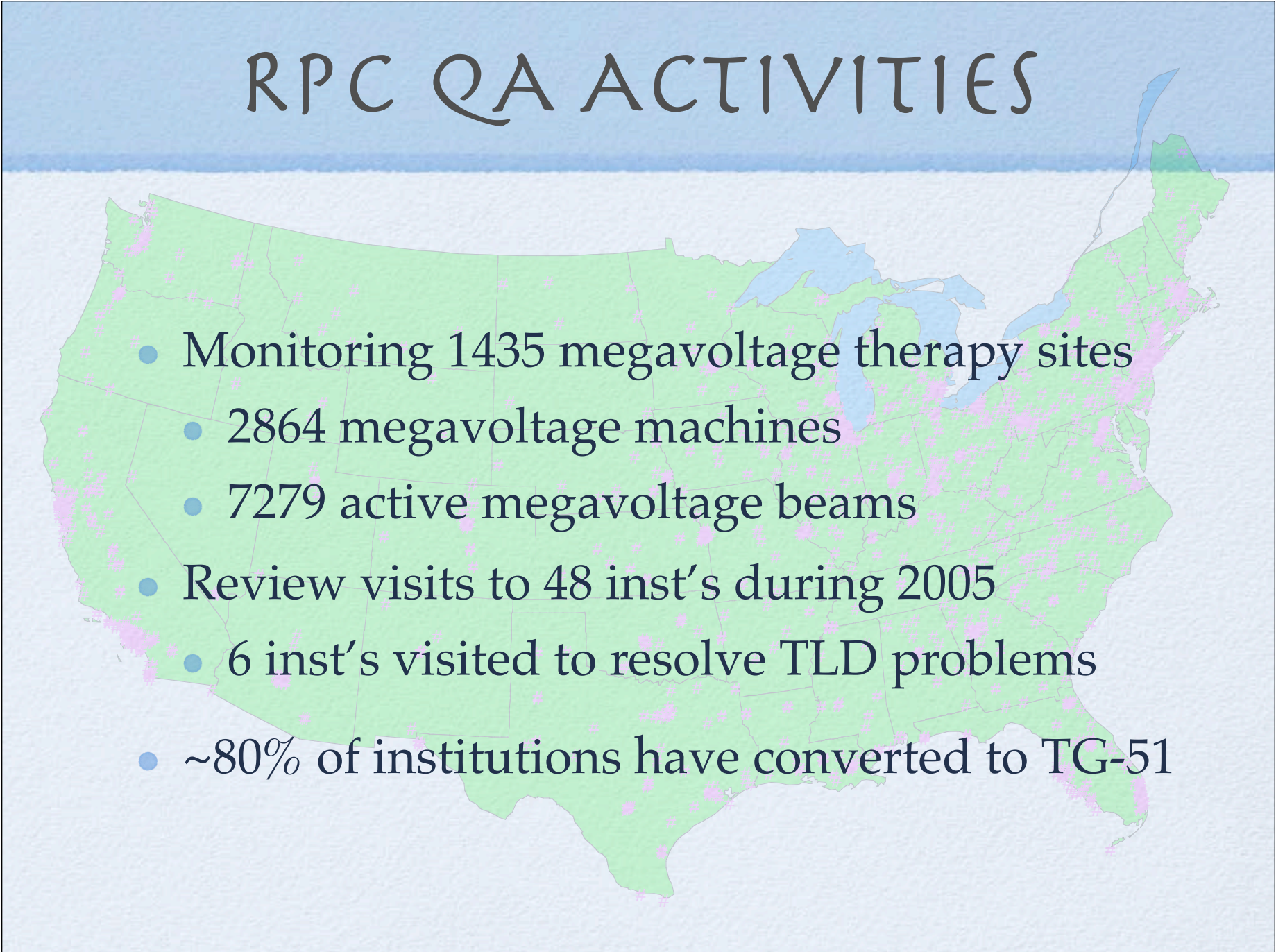
## Report to ATC Steering Committee



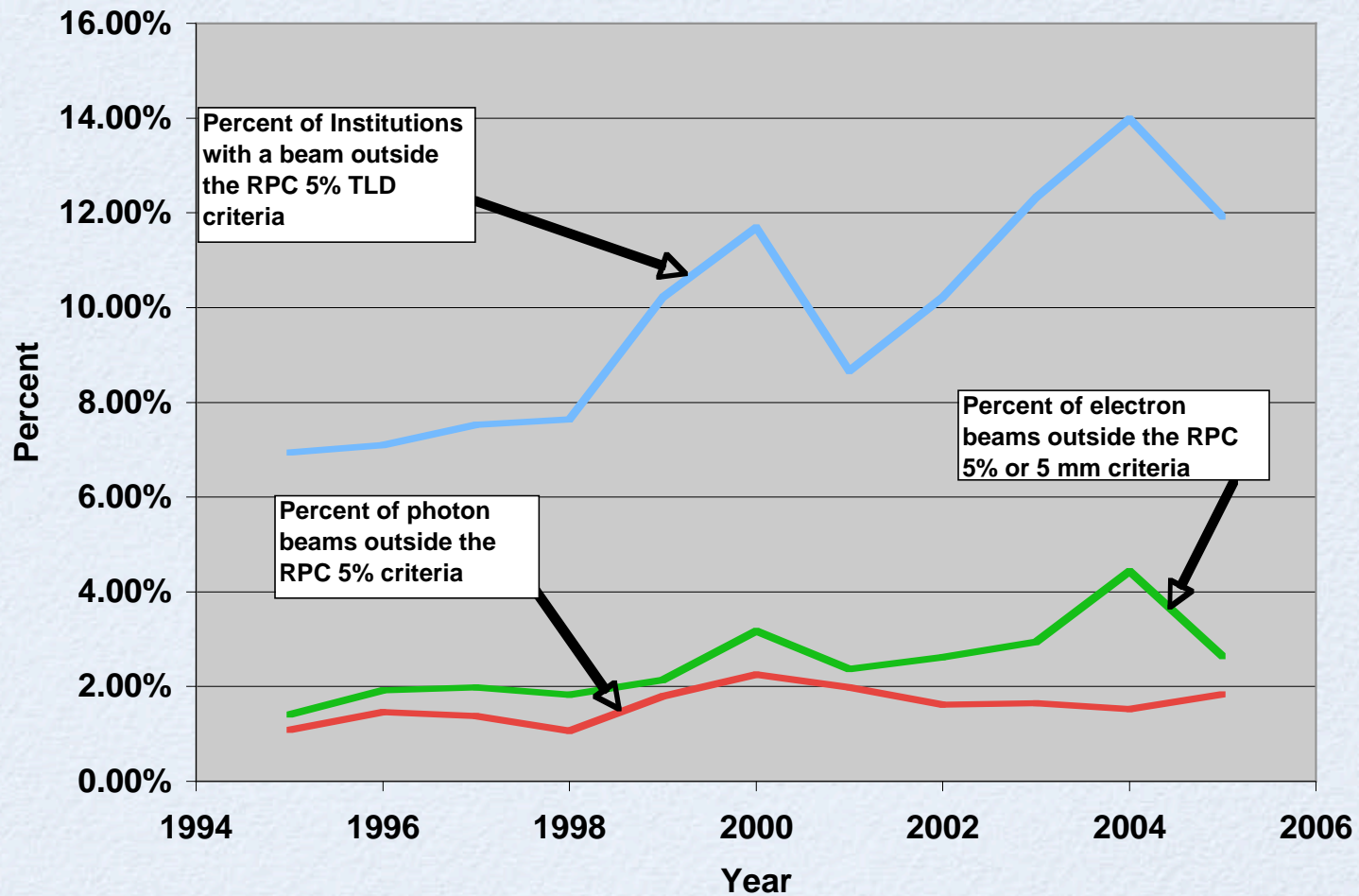
April 3, 2006  
Geoffrey S. Ibbott, Ph.D.

THE UNIVERSITY OF TEXAS  
MD ANDERSON  
CANCER CENTER  
*Making Cancer History®*

# RPC QA ACTIVITIES

- 
- Monitoring 1435 megavoltage therapy sites
  - 2864 megavoltage machines
  - 7279 active megavoltage beams
  - Review visits to 48 inst's during 2005
  - 6 inst's visited to resolve TLD problems
  - ~80% of institutions have converted to TG-51

# TLD Discrepancies



13 (of 69) institutions visited in last 2 yrs to resolve TLD problems

# ELECTRONIC TLD REVIEW

- Tech enters the TLD irradiation data into RADS database and reviews TLD readings and inst. parameters.
- Physicist review/edit TLD readings, inst. parameters, dose calculations and create repeat letters using RADS.
- Director reviews all TLD reports using RADS.
- Reports and letters are emailed to inst. from RADS.
- All final TLD data is stored in the RPC RADS database.
- Paper TLD documents are destroyed

Electron Checks - The TLD dose was evaluated using the AAPM TG-21 Dosimetry Calibrati...

**Beam Info**

Model: Mevatron MD    Serial #: 1705    In-House:   
Mach#: 151    Energy: 6 MeV electrons    Block: G028

**Institution Info**

Code: 527    Name: Mercy Medical Center    Location: Springfield, OH

Setup Info    Capsules    Calculations    Comparison    Results History    Final Results    Comments

**Results Info**

Session #: 6756    Irradiated By: Gary Shields    Batch: 9/98  
Date Read: 1/14/2000    TLD Type: NORMAL

**Irradiation Setup for Block**

Irradiation Date: 10/14/1999    Actual Timer Setting: 300  
Irradiated: Yes

**Dose Specification**

Output Determined From: Ion Chamber Measurement    Dose Specified To: WATER  
Inst Output: 1    Calibration Protocol: TG-21  
Institution Dose: 300  
Inst DDF @ DMax: 1  
Inst Depth for RPC DDF:   
Other Correction: 1

Setup

Type: SSD    SSD (cm): 100  
Field Size: 10    Depth Type: Dmax  
Depth (cm): 1.3

Include this beam in final reports sent to institution

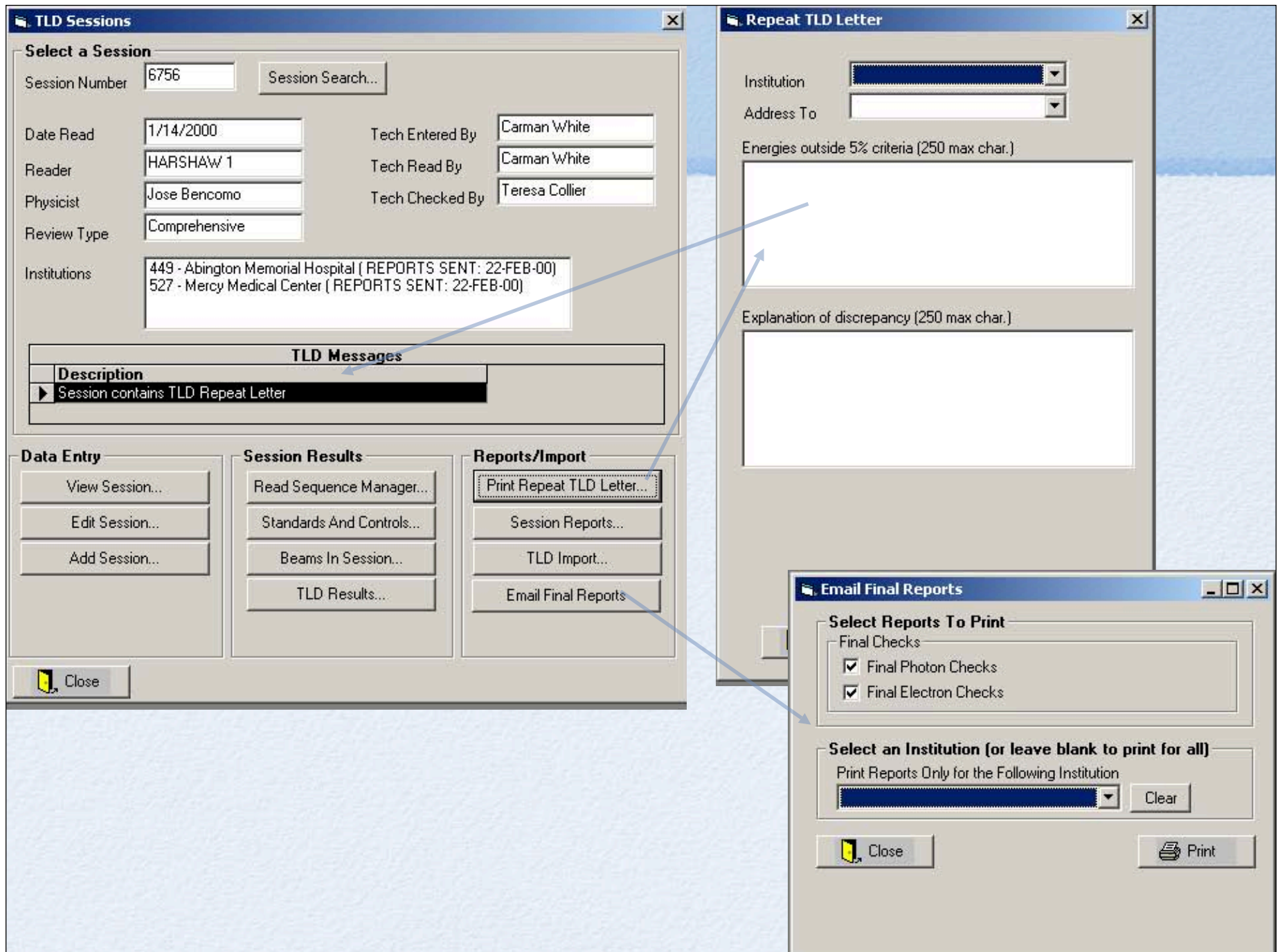
Close    Edit Block Info...    Electron Check Sheet...    Final Electron TLD Report...

◀ ▶ Beam 1 of 6 ▶▶    Mark as Checked

Close

Physicist can simply uncheck this and beam will not be included in e-mail of final reports.

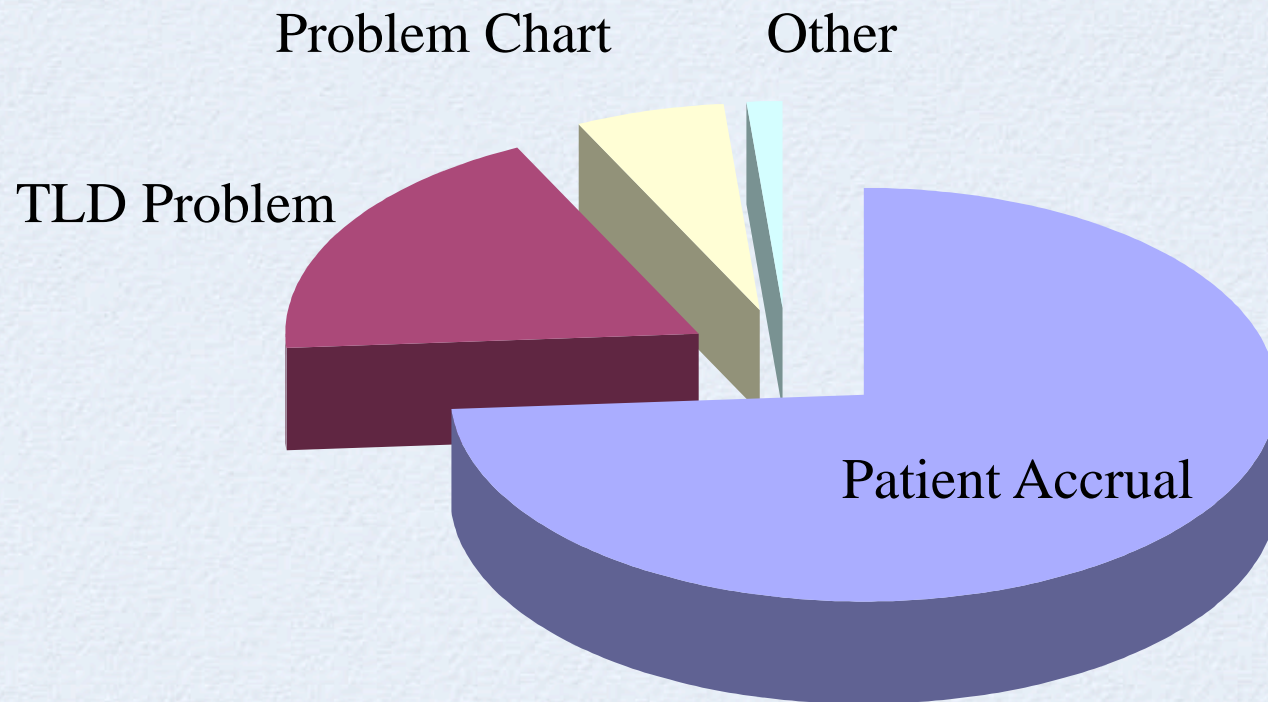
User can navigate through all electron beams in session. Another form for photons.



# BENEFITS OF ELECTRONIC TLD REVIEW

- ★ Reduced TLD processing time.
- ★ Less FTE effort directed towards TLD process.
- ★ Reduction in cost.
  - \* Paper, postage, printing supplies,
- ★ Remote verification of TLD reports.
- ★ Reduced delivery time of the reports.
- ★ Reduction in storage space needed for documents.

# PRIORITY FOR VISITS





# On-Site Dosimetry Review Visits

Selected discrepancies discovered during 2004

<u>Errors Regarding:</u>	<u>Percent of Institutions</u>
Review QA Program	(84%)
*Photon Depth Dose	(30%)
Switch to TG-51	(24%)
*Wedge Transmission	(24%)
*Photon Calibration & FSD	(24%)
*Electron Calibration	(22%)
*Off-axis Factors	(16%)

\*70% of institutions received at least one of the significant dosimetry recommendations.

# Chart Review Process

- Radiotherapy records, calculations & films received from study group



***Independent*** dose recalculation ( $\pm 5\%$ )



Resolve errors with institution



Discuss results with Group and Study Chair



Facilitate clinical review at meetings, RPC, HQ

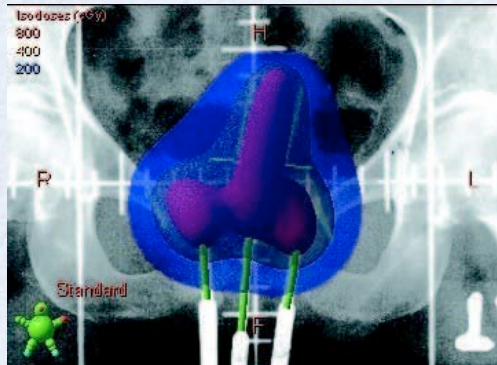
# New TPS at RPC

Eclipse (with BrachyVision)

Training of three staff has been completed

Beginning commissioning

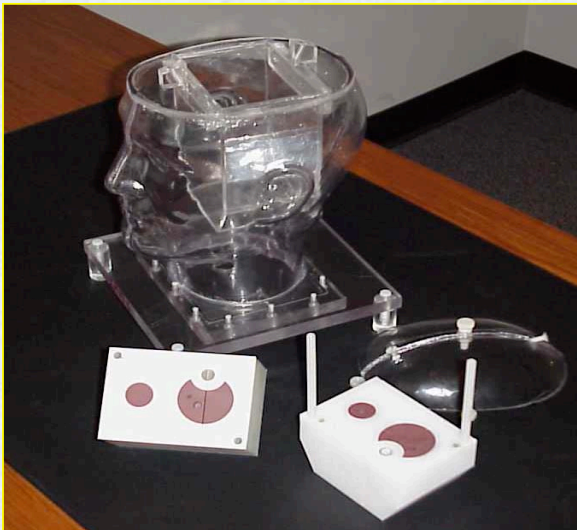
Need ability to receive plans electronically



*One of several steps in RPC's transition to electronic chart review*

# Credentialing Techniques

## Phantoms



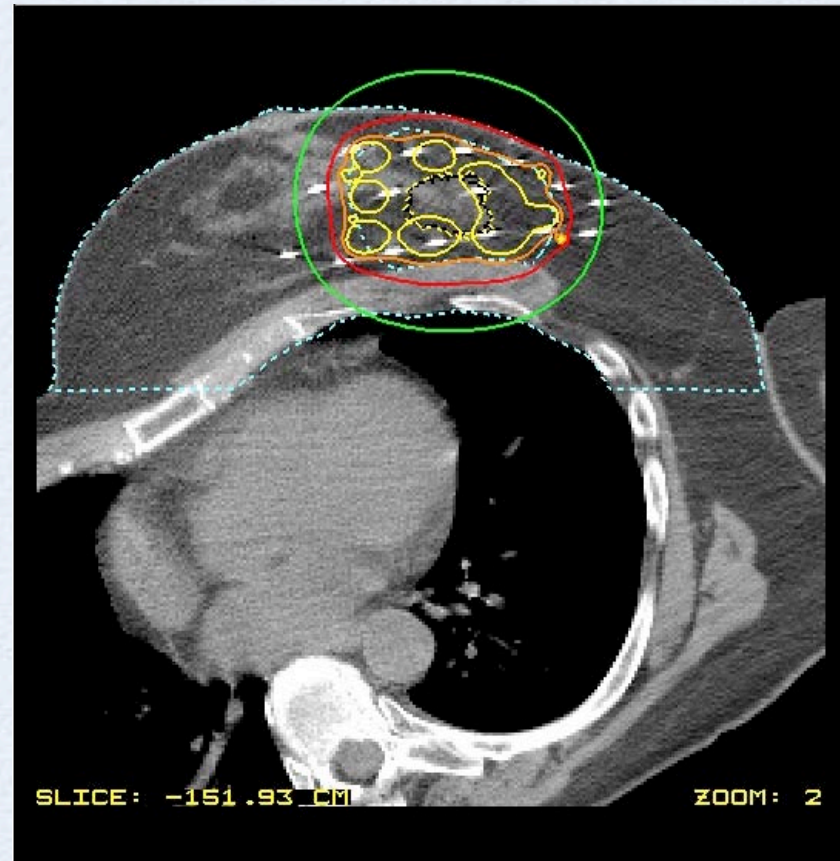
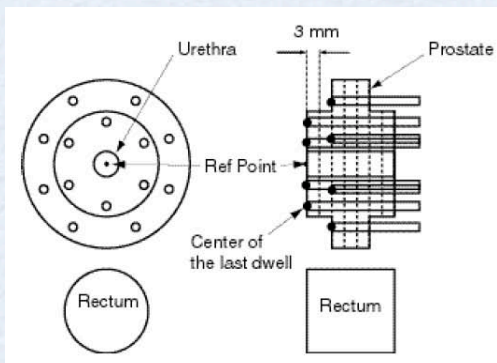
## Benchmarks



# Credentialing

## IMRT, 3D CRT and Brachytherapy

- Evaluate
  - Implant technique
  - Dosimetry
  - Documentation
  - Protocol compliance





# Credentialing

## 3D Conformal Radiation Therapy (3D CRT)

- Innovative high-technology radiation technique where multiple beams are shaped to treat only the tumor
- Evaluate 3D treatment planning process and ability to provide documentation
- North Central Cancer Treatment Group (NCCTG) – October 1, 2004
- 42 institutions credentialed to date

# IMRT BENCHMARK PLANS

- RPC has received 4 so far
- Evaluating in same fashion as QARC

RTF#	Institution
1413	Fairview Southdale
3105	Moore's UCSD Cancer Center
2590	Univ. of Colorado Ca Ctr
2396	St John's Reg Ca Ctr

# 0413 PBI Credentialing

Modality	Institutions Credentialed	Patients Enrolled
3D Conformal	278	387
Mammosite	180	93
Multi catheter	37	40
WBI	0	520
Total Institutions Credentialed		274+

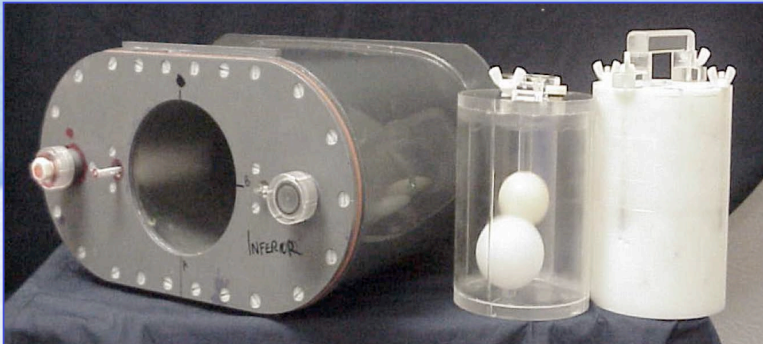
As of mid-March



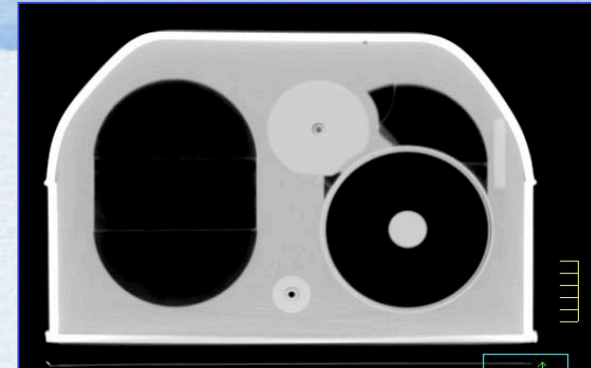
# Credentials Awarded (based on benchmarks)

	<u>Credentials</u>	<u>Institutions</u>
Prostate LDR (0232)	66	59
Prostate HDR (0321)	11	7
Breast 3D CRT (0413)	510	278
Breast Mammosite®	283	180
Breast Multicatheter	71	37
Other 3D CRT (NCCTG)	42	42
Cervix (GOG)	55	46
<b>TOTAL</b>	<b>1,038</b>	<b>649</b>

# RPC Phantoms



**prostate IMRT: 3, incl. prosthesis**



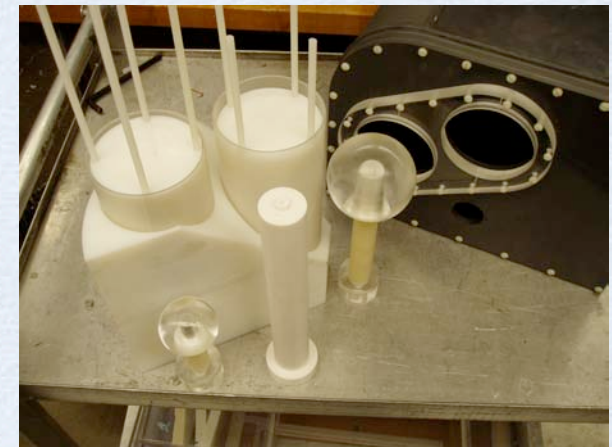
**thorax SBRT: 3 phantoms**



**H&N IMRT: 8 in service, 10 under constr.**



**SRS encouraged for RTOG & NCCTG**



**liver SBRT: 3, incl. motion**

# Phantom Results

Phantom	H&N	Prostate	Thorax	Liver
<b>Irradiations</b>	<b>217</b>	<b>58</b>	<b>28</b>	<b>4</b>
<b>Pass</b>	<b>135</b>	<b>35</b>	<b>14</b>	<b>3</b>
<b>Fail</b>	<b>52</b>	<b>12</b>	<b>4</b>	<b>-</b>
<b>Under analysis or at institution</b>	<b>12</b>	<b>11</b>	<b>4</b>	<b>1</b>
<b>Unevaluable</b>	<b>12</b>	<b>6</b>	<b>4</b>	<b>-</b>
<b>Institutions</b>	<b>154</b>	<b>42</b>	<b>21</b>	<b>4</b>
<b>Year introduced</b>	<b>2001</b>	<b>2004</b>	<b>2004</b>	<b>2005</b>

**\* 34% of institutions failed on the first attempt**

# Results of Credentialing

## (closed studies)

Study	Major Deviations	Minor Deviations	Number of Patients
GOG 165 HDR Cervix Credentialed inst	0	15	70
RTOG 95-17 HDR & LDR Breast (all)	0	4	100
RTOG 0019 LDR Prostate (values for dose only)	0	6	117 reviewed (total 129 eligible)

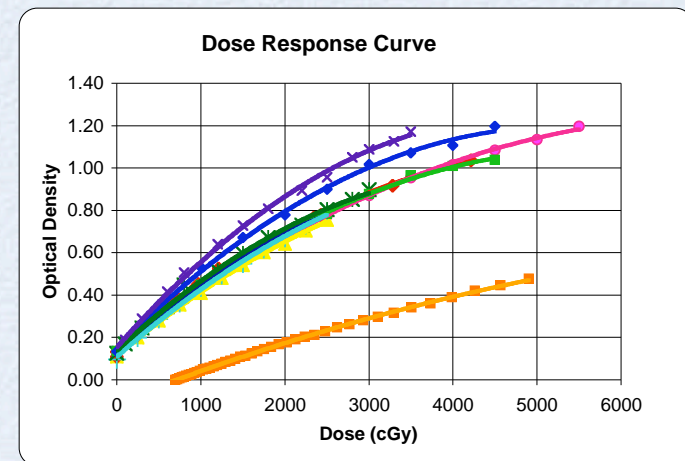
# Results of Credentialing

## (closed studies)

Study	Major Deviations	Minor Deviations	Number of Patients
<b>GOG 165 HDR Cervix Credentialed inst</b>	<b>0</b>	<b>15</b>	<b>70</b>
<b>Non-credentialed</b>	<b>57</b>	<b>87</b>	<b>275</b>
<b>RTOG 95-17 HDR &amp; LDR Breast (all)</b>	<b>0</b>	<b>4</b>	<b>100</b>
<b>RTOG 0019 LDR Prostate (values for dose only)</b>	<b>0</b>	<b>6</b>	<b>117 reviewed (total 129 eligible)</b>

# PROTONS

- Completed evaluation:
  - MD-55 film
  - EBT film
- Conducting evaluation:
  - TLD
  - Presage 3D dosimeter
  - Normoxic gel dosimeter



# THE END

