Best Practices in Mammography Quality Control

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COMP Mammography Workshop
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Standards and Literature Review

- Review of Canadian and international standards and guidance documents (English)
  - ACR DM QC manual (2016)
  - EFOMP mammography protocol (2015)
  - BreastCheck Ireland (2015)
  - EUREF Quality Assured Breast Screening and Diagnostic Services (2013)
  - NHS (2013)
  - Health Canada Safety Code 36 (2013)
  - ACPSEM (2012) + RANZCR
  - IAEA (2011)
  - CAR MAP (20??)
  - Quebec QC manuals (20??)
- Literature search (2003-2017). Yielded 12 references.

Best Practice
QC guidance document provides coherent and consistent QA guidance and standards and instructions.
Clear roles and responsibilities for technologists, medical physicists & radiologists.
Cycle of quality improvement by monitoring compliance, outcomes and QC results.
Programmatic/institutional support
Appropriate QC testing
Leverage connectivity

Guidance for Quality Control

- Roles and responsibilities
- Clear concise instructions for technologist QC tests
- Performance limits and corrective action timeline
- Documentation and reporting tools
- Standards for physicists
- Guidance for record keeping, radiation safety
- ***Standardization***

ACR
AMERICAN COLLEGE OF RADIOLOGY
QUALITY IS OUR IMAGE

2016 Digital Mammography

QUALITY CONTROL MANUAL

Radiologist's Section

Radiologic Technologist's Section

Medical Physicist's Section

3. In contact mode, place the phantom on the breast support so that it is centered laterally and aligned flush with the chest wall edge of the support (Figure 5).

4. Install the spot compression paddle (in contact mode).

   a. If a spot compression paddle is not available, use the smallest, non-flex compression paddle available.

   b. Be sure to turn off the flex function of the paddle if possible.

5. Apply a compression force of approximately 10 to 15 pounds (4.4 to 6.7 daN) to the phantom (Figure 6).

Figure 6. Position and compression of compression thickness indicator phantom using spot compression paddle.

6. Record the indicated thickness on the form (in cm or mm).

7. Release the compression device.

DATA ANALYSIS AND INTERPRETATION

1. Subtract the actual, measured thickness of the phantom from the indicated thickness.

2. Record the result on the form.

PRECAUTIONS AND CAVEATS

Many systems use the indicated compression thickness to drive the selection of initial kVp and filter under AEC. Omitting such a test may have an impact on image quality and patient dose, as suboptimal imaging techniques may be selected during imaging if the compression thickness is not accurate.

3. Compression Thickness Indicator

OBJECTIVES

To ensure that the indicated compression thickness is within tolerance.

FREQUENCY

Monthly, whenever inaccurate indicator performance is suspected, and upon installation of new equipment (before clinical use)

TEST EQUIPMENT

- An object to use as a compression thickness indicator phantom.
  - This can be any commonly available object that is 10 cm long by 10 cm wide (or less) and 4 to 6 cm in thickness. For example, 1 2-inch roll of medical tape or 2 1-inch rolls stacked on top of each other would work.
  - Do not use an object with sharp edges that would scratch the compression paddle or bucky.
  - If tape is used, cover the sides of the roll (by using a thin plastic bag or paper) to prevent adhesive from sticking to the equipment.
  - Be sure to set aside the compression thickness indicator phantom and label the object for use only for this test.
- A ruler with a mm/cm scale.
- Compression Thickness Indicator form.

TEST PROCEDURE

1. Record a description of the compression thickness indicator phantom (e.g., "2 rolls of 1-inch tape") on the form.

2. Measure the thickness of the phantom using the same units provided on the indicator (cm or mm) and record this value on the form (Figure 5).

Figure 5. Measuring the width of the compression thickness indicator phantom.

3. Compression Thickness Indicator

Monthly

Facility _____ **Room ID** _____

MAP ID-Unit# *(00000-00)* _____ - _____ **Unit Mfr & Model** _____

Year												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Date												
Tech Initials												
Description of compression thickness indicator phantom												
Actual thickness of phantom		☐ cm ☐ mm (Use the same unit displayed on the indicator)										
Indicated thickness												
Difference between indicated and actual thicknesses (Indicated - Actual)												
Overall Pass/Fail												

P = Pass **F = Fail**

Action Limits	**Required:**	Compression thickness indicator ***must*** be accurate to within ±0.5 cm (±5 mm) of the actual thickness.
	Timeframe:	Failures ***must*** be corrected within 30 days.

Table 2. Medical Physicist Involvement in Equipment Adjustments, Changes, or Repairs

Item	Component	Major Repair	Medical Physicist Involvement
Automatic Exposure Control (AEC)	***AEC replacement***	***Y***	***On-site***
	AEC recalibration that effects dose	***Y***	***On-site***
	AEC sensor replacement	***Y***	***On-site***
	AEC circuit board replacement	***Y***	***On-site***
	Density control - internal adjustment*	N	Oversight
	Thickness compensation internal* adjustment	N	Oversight
Bucky Replacement	***AEC sensor also replace***	***Y***	***On-site***
	AEC sensor not replaced	N	Oversight
	DM detector also replaced	***Y***	***On-site***
	DM detector not replaced	N	Oversight
Collimator	***Replacement***	***Y***	***On-site***
	Reassembly with blade replacement	***Y***	***On-site***
	Adjustment	N	Oversight
Compression Device	Pressure adjustment	N	Optional
	Thickness scale accuracy adjustment but only if it affects AEC performance	N	Oversight
	Repair of auto decompression	N	Optional
Compression Paddle	Paddle (new to facility)	N	Oversight
	Deflection adjustment	N	Oversight
	Adjustment due to extension beyond allowable limit, or visible on images	N	Oversight
X-ray Unit	***Installation***	***Y***	***On-site***
	Reassembly	***Y***	***On-site***
	X-ray tube replacement	***Y***	***On-site***
	High voltage generator replacement	***Y***	***On-site***
	Filter replacement	***Y***	***On-site***
	Manufacturer's software upgrade or modifications	***Y***	***On-site***
	DM detector replacement or repair	***Y***	***On-site***
	kVp, mA or time internal* adjustments	N	Oversight
Display Devices	***New installation or replacement***	***Y***	***On-site***
	New video card or software upgrade	***Y***	***On-site***
	Relocation	N	Oversight
Computed Radiography (CR) and Photostimulable Phosphor (PSP) Plates	***New installation or replacement of CR reader***	***Y***	***On-site***
	Replacement of all PSP plates	***Y***	***On-site***
	One or 2 new PSP plates	N	Oversight

**Internal adjustments refer to equipment adjustments that typically cannot be made by the operator.*

Medical Physicist's DM QC Test Summary

Facility Name _____ Room ID _____

Address _____ Survey Date _____

_____ Report Date _____

_____ Date of Previous Survey _____

MAP ID Unit# *(00000-00)* _____ - _____ Months Between Surveys _____ *(must be≤ 14)*

X-Ray Unit Manufacturer _____ X-Ray Unit Model _____

X-Ray Unit Control Serial # _____ Date of Manufacture _____

Date of Installation _____

CR Unit Mfr _____ CR Unit Model _____

CR Unit Serial # _____

Medical Physicist _____ Telephone _____

Signature _____

Quality Control Manual Used for Survey and Facility QC *2015 ACR Digital Mammography Quality Control Manual*

Survey Type:	☐	Mammography Equipment Evaluation (MEE) - Acceptance Testing					☐	Routine Annual Survey
Equipment Tested:	☐	DM Unit	☐	AW Monitor	☐	RW Monitor	☐	Viewbox ☐ Printer Other _____
MP Oversight Level:	☐	Medical Physicist On-Site			☐	Medical Physicist Oversight		
Unit Description:	☐	Digital radiography (DR)			☐	Computed Radiography (CR)	☐	Tomosynthesis (DBT)
Unit Use:	☐	Diagnostic & Screening			☐	Diagnostic Only	☐	Screening Only

Medical Physicist's QC Tests

("Pass" means all components of test passes; "Fail" means any or all components fail; if "CA" checked, see Corrective Action Summary)

Medical Physicists Tests	Overall Pass/Fail/NA	CA
1. Mammography Equip Eval (MEE)	Pass	
2. ACR DM Phantom Image Quality	Pass	
3. Spatial Resolution	Pass	
4. AEC System Performance	Pass	
5. Average Glandular Dose	Pass	
6. Unit Checklist	Pass	
7. Computed Radiography *(if app)*	Pass	
8. AW Workstation Monitor QC	Pass	
9. RW Monitor QC	Pass	
10. Film Printer QC *(if app)*	Pass	
11. Site's Tech QC Program	Pass	
12. Display Device Tech QC Program	Pass	

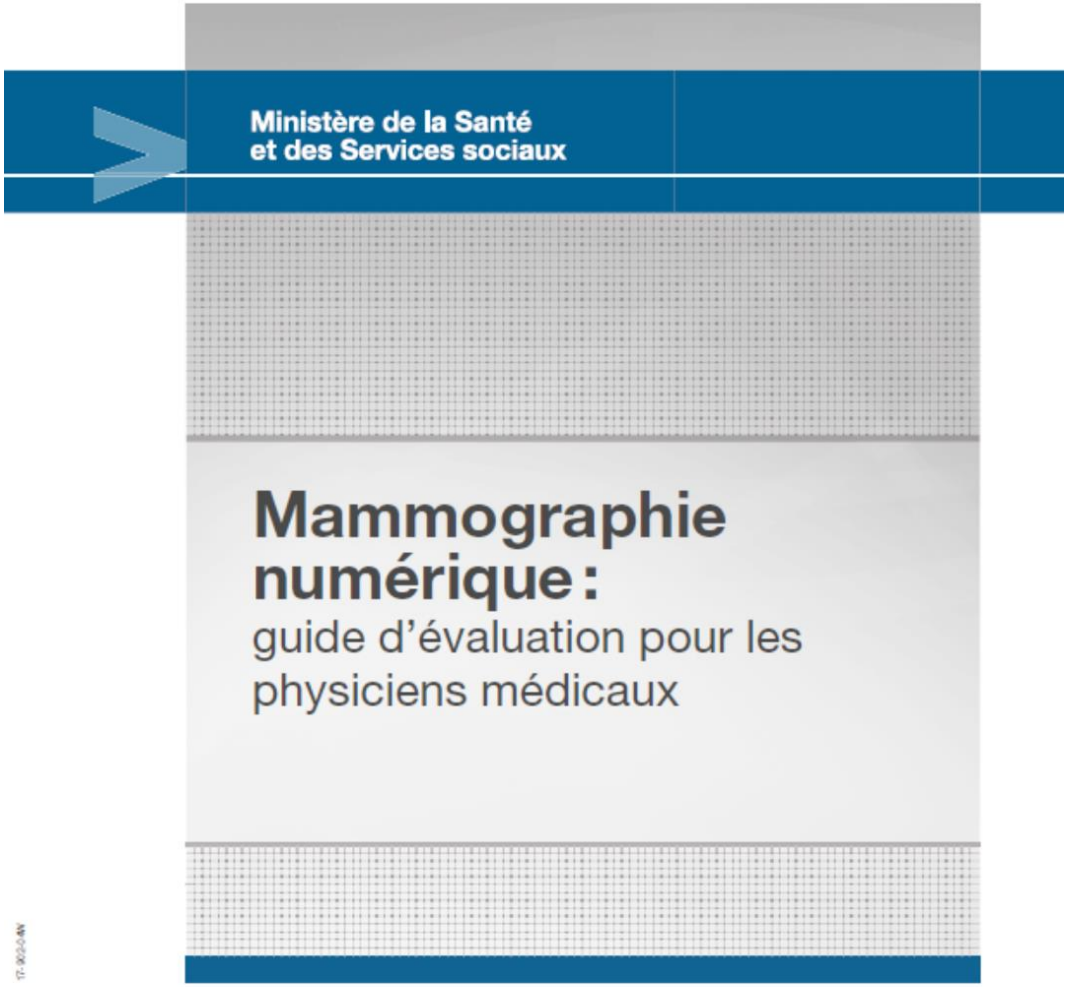
Tech QC Evaluation	Overall Pass/Fail/NA	CA
1. ACR DM Phantom Image Quality	Pass	
2. CR Cassette Erasure *(if app)*	Pass	
3. Comp Thickness Indicator	Pass	
4. Visual Checklist	Pass	
5. AW Monitor QC	Pass	
6. RW Monitor QC	Pass	
7. Film Printer QC *(if app)*	Pass	
8. Viewbox Cleanliness *(if app)*	Pass	
9. Facility QC Review	Pass	
10. Compression Force	Pass	
11. Mfr Detector Calibration *(if app)*	Pass	
Optional - Repeat Analysis	Pass	

MEE or Troubleshooting	Overall Pass/Fail/NA	CA
Beam Quality (HVL) Assessment	Pass	
kVp Accuracy and Reproducibility	Pass	
Collimation Assessment	Pass	
Ghost Image Evaluation	Pass	
Viewbox Luminance	Pass	

ACR DM Phantom Summary

	Value	Limit
Fiber score		≥2.0
Speck group score		≥3.0
Mass score		≥2.0
SNR		≥40.0
CNR		≥2.0
AGD (mGy)		≤3.0


NOUVEAUX TESTS DE CONTRÔLE
DE LA QUALITÉ EN MAMMOGRAPHIE NUMÉRIQUE
RÉALISÉS PAR LES TECHNOLOGUES
EN IMAGERIE MÉDICALE
PROGRAMME
QUÉBÉCOIS
DE DÉPISTAGE
DU CANCER
DU SEIN
Québec



ENSEMBLE on fait avancer le Québec

Québec

2.3.5 Recommandations et mesures correctives

1) Si les critères de performance pour les résultats de SDNR, exprimés au tableau 4, ne sont pas atteints, une intervention par le personnel qualifié de service doit être faite. Si le détecteur fonctionne correctement, il faut ajuster le SEA ou réviser la charte technique, selon les besoins. Les techniques choisies ne devraient pas entraîner un temps d'exposition supérieur à 4 s pour 70 mm de PMMA, et le temps d'exposition doit être inférieur à 2 s pour une feuille de PMMA de 45 mm d'épaisseur. Ces temps d'exposition ne s'appliquent pas à des systèmes à balayage (ex. : Philips MicroDose SI).
2) Si le contrôle de la densité ne fournit pas d'écarts d'exposition importants, il doit être ajusté.
3) Si le temps d'exposition dépasse la durée maximale acceptable, le débit d'exposition à la sortie du tube pourrait être faible, et une analyse en ce sens devra donc être faite.

2.3.6 Délai pour appliquer les mesures correctives

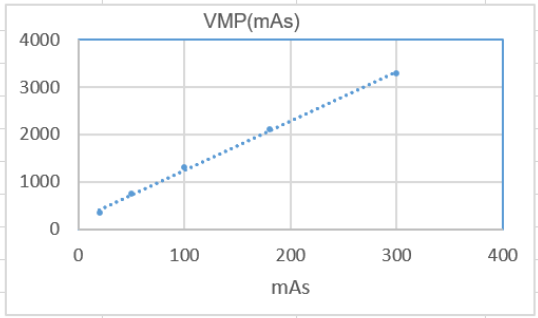
Pour tout échec relatif à la valeur des SDNR, des mesures correctives doivent être prises immédiatement.

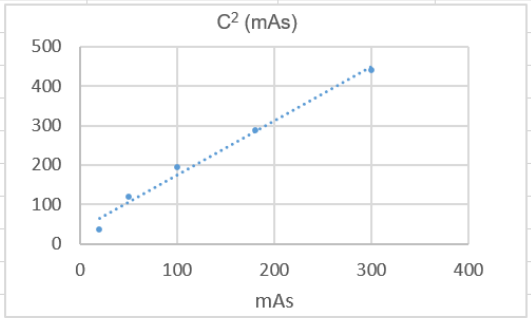
Pour l'ajustement du contrôle de la densité, des mesures correctives doivent être prises lors de la prochaine maintenance préventive. Le physicien médical peut juger de la gravité de l'écart et exprimer le besoin d'une action corrective plus rapide.

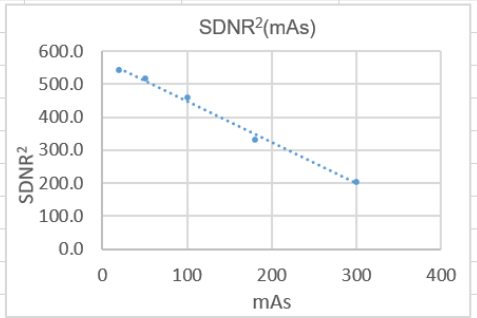
Test 4 : Réponse du détecteur, des récepteurs et analyse du bruit

	Mode	Compression (kg)	Anode/filtre	Grille	Réglage densité	DR (SEA)	Objet contraste		
	auto-time	15 kg	Mo/Mo	oui	0		0,2 mm Al		
	kV	PMMA	mAs (SEA)						
	30	45	100						
	mAs	VMP(ROI A)	VMP(ROI B)	C	IE	$SDNR^2$	1/mAs	C^2	Log (mAs)
~1/8 ref	20	200	340	6.0	1	544.4	0.050	36	1.30
~1/2 ref	50	500	750	11.0	2	516.5	0.020	121	1.70
ref (SEA)	100	1000	1300	14.0	3	459.2	0.010	196	2.00
~2 ref	180	1800	2110	17.0	5	332.5	0.006	289	2.26
~3 ref	300	3000	3300	21	8	204.1	0.003	441	2.48

					Selon mAs	Excentrement (B_0) VMP(mAs)	203	Conforme	
								Oui	Non
Norme :						R^2: VMP(mAs)	0.998	X	
▪ *R2 supérieur à 0,98.*						R^2:C^2(mAs)	0.984	X	
						R^2: $SDNR^2$(mAs)	0.994	X	







Clear Roles and Responsibilities

- Radiologists (chief, lead, responsible)
- Medical radiation technologist (QC technologist)
- Medical physicist (T3Q)
  - Testing
  - Technology expertise
  - Troubleshooting
  - Quality control oversight
  - Scientist on your side

Cycle of Quality Improvement

- Periodic review/evaluation of QC program and data
- Formalized feedback loop → documented changes/improvements
  - Quality assurance committee
  - Radiologist feedback
  - Physicist review
  - QC results tracking and monitoring
  - Program review

9. Facility QC Review

Quarterly

Facility _____ **Date of QC Mtg** _____

Reviewed

1. Review Medical Physics Surveys and Results ☐

	Room 1	Room 2	Room 3	Room 4	Room 5
Room ID					
Date of last Medical Physicist (MP) survey					
MP DM QC Test Summary reviewed by radiologist?					
All MP corrective actions completed?					
ACR DM Phantom Average Glandular Dose (mGy)					
Fiber Score					
Speck Score					
Mass Score					

2. Review Tech QC ☐

Test	*Frequency*	*Summary Comments from Last Quarter*	
1. ACR DM Phantom Image Quality	Weekly		☐

Scores of most recent phantom image:	Room 1	Room 2	Room 3	Room 4	Room 5
Date					
Fiber score					
Speck group score					
Mass score					

2. CR Cassette Erasure *(if app)*	Weekly		☐
3. Compression Thickness Indicator	Monthly		☐
4. Visual Checklist	Monthly		☐
5. AW Monitor QC	Monthly		☐
6. RW Monitor QC	Monthly		☐
7. Film Printer QC	Monthly		☐
8. Viewbox Cleanliness *(if app)*	Monthly		☐
9. Facility QC Review	Quarterly		☐
10. Compression Force	Semiannual		☐
11. Manufacturer Detector Calibration *(if app)*			☐
Optional - Repeat Analysis	As Needed	% Repeats ☐	☐

3. Review and verify completion of all "Corrective Action" ☐

4. Technique Chart review for each room (see MP report for recommendations) - (Annually) ☐

5. Infection Control procedures followed ☐

6. Offsite RW(s) & Film Printer(s) QC reviewed ☐

7. Past and future service or service upgrades discussed *(if app)* ☐

8. Past and future State and/or MQSA inspections discussed *(if app)* ☐

9. Past and future ACR Accreditation issues discussed *(if app)* ☐

9. Facility QC Review *(continued)*

Quarterly

Facility _____ **Date of QC Mtg** _____

10. Notable findings during QC meeting — **Follow-up Confirmed (If App.)**

11. Items for quality improvement from QC Meeting

12. Other QC Notes:

Overall Pass/Fail

Lead Interpreting Radiologist *signature*	Facility Manager (If App) *signature*	QC Technologist *signature*

Action Limit:	**Required:**	Supervising radiologist and facility manager must review QC quarterly. The test passes if meeting held.
	Recommended:	Technologist and supervising radiologist should review technique charts at least annually for each DM system.
	Timeframe:	Not applicable.

11. Evaluation of Site's Technologist QC Program

Facility Name _____ **MAP ID-Unit#** *(00000-00)* _____ - _____

Mfr & Model _____ **Room ID** _____

Survey Date _____

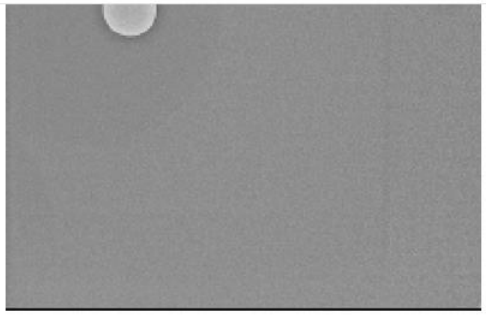
Radiologic Technologist's Quality Control Tests	Frequency	Test Performed, Analyzed & Documented	Missing Data	Incorrect Scoring or Calculations	Missing Corrective Action Documentation	Other	Comments
1. ACR DM Phantom Image Quality	Weekly						
Scores of latest phantom image:							
Latest QC Tech Score / Med Phys Score							
Fiber							
Speck group							
Mass							
2. CR Cassette Erasure *(if app)*	Weekly						
3. Comp Thickness Indicator	Monthly						
4. Visual Checklist	Monthly						
5. AW Monitor QC	Monthly						
9. Facility QC Review	Quarterly						
10. Compression Force	Semiannual						
11. Mfr Detector Calibration *(if app)*							
Optional - Repeat Analysis	As Needed						
Optional - System QC for Radiologist	NA						
Optional - Radiologist IQ Feedback	NA						
Corrective Action Log documentation adequate?	Yes						

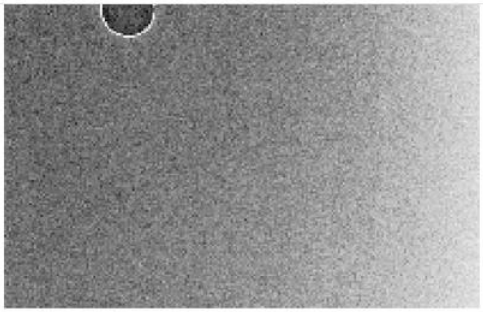
Overall Pass/Fail for Performance of Technologist QC Program

Additional Comments: _____

Action Limits	**Required:**	MQSA regulations [FDA Rule 900.12(d)(1)(iii) specify that "each facility shall have the services of a medical physicist available to survey mammography equipment and oversee the equipment-related quality assurance practices of the facility. " Completion of this "Evaluation of Site's Technologist QC Program" form documents that this oversight has been conducted. In order for the overall evaluation to pass, there must be a) no significant missing data, b) the tests must be analyzed without gross errors, and c) appropriate corrective action for failures must be taken (and documented). See test procedures for more information.
	Timeframe:	Failures must be corrected within 30 days.

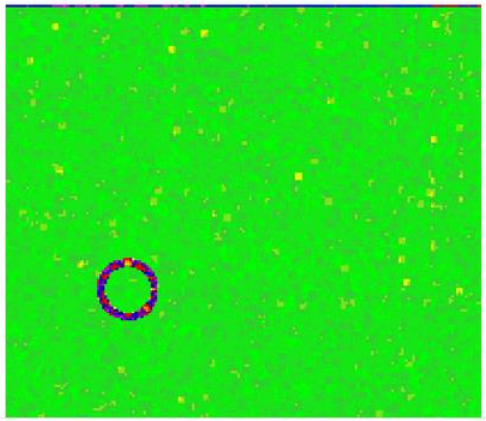
Room 14



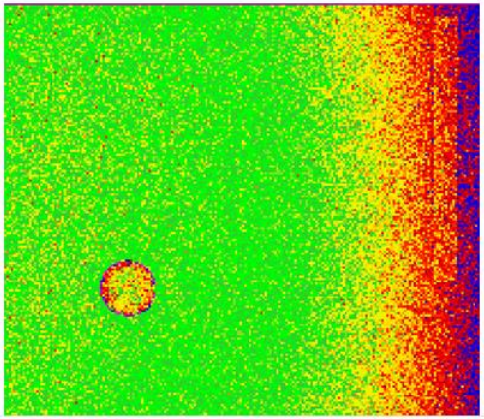


Intent Type	
Exposure Control Mode	AUTOMATIC
Detector Calibration Date	2019-05-14
Detector ID	YM864174
Software Version	AWS:1.9.0.632, ROS:2.10.4800.DRT10, M35:1.6.16.63, GIP2D:3.16.0-4.16.4, Filter:1.0.7.2, BP:1.0.2.1, CView:2.1.1.1, CadScience:1.0.0.20, GCal:1.2.0.0, Enhance:1.0.2.1, SNRCNR:1.0.0.0-1.0.1.0, PMC:1.9.0.94, DET:1.11.0.64, DTC:2.1.0.60, GCB:1.9.0.127, GEN:1.9.0.98, VTA:1.9.0.106, CRM:1.9.0.101, THD:1.9.0.93, CDI:1.9.0.101, AIO:1.9.0.35, BKY:1.9.0.98
Radiographer	AKB

Peak Variance Deviation



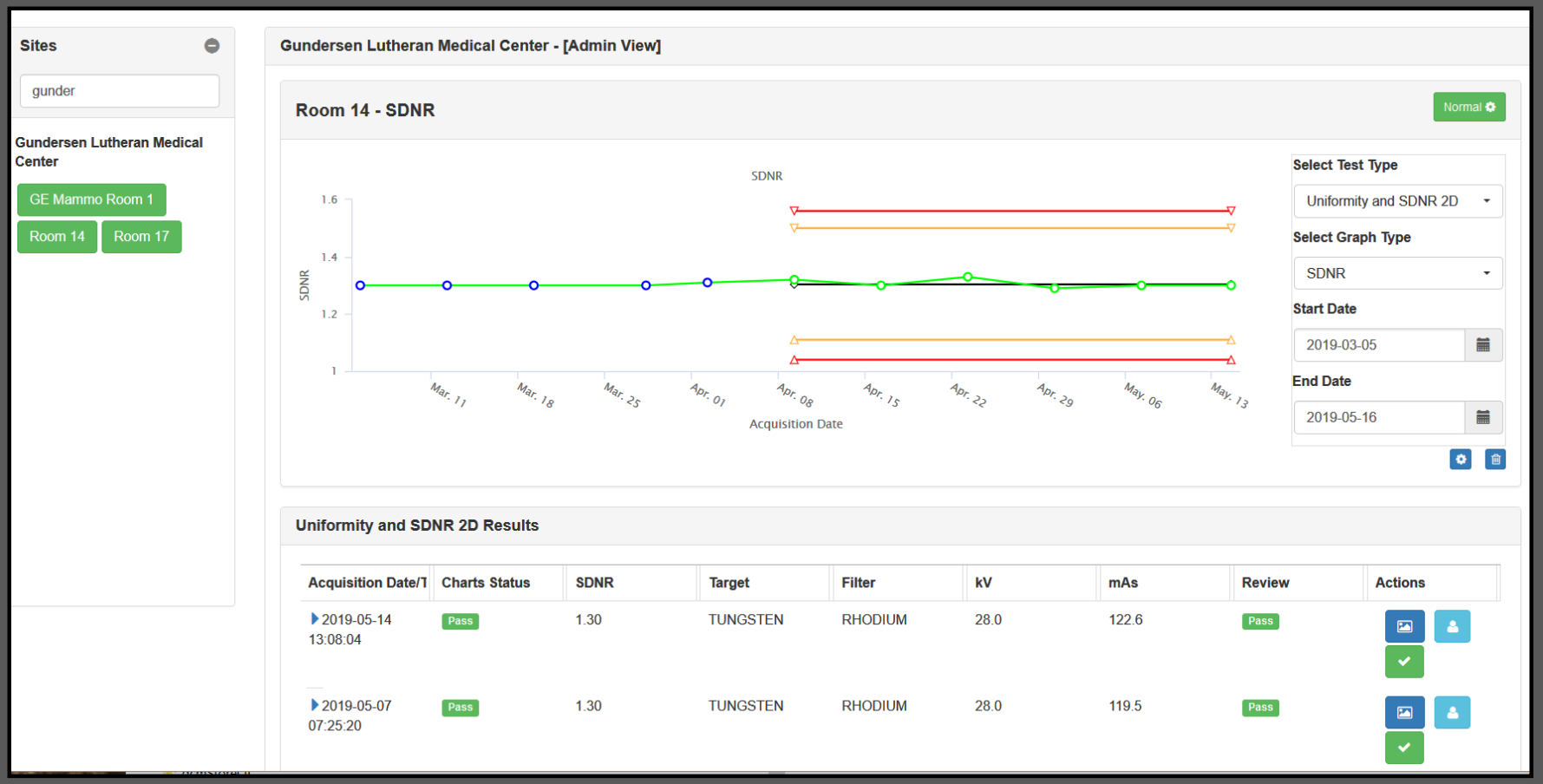
SNR Deviation



Window Width	4096
Window Level	2047
Exposure Control Mode Description	AutoFilter
Compression Thickness	45

Comment: (*mandatory for Marginal and Fail)

Courtesy of Gord Mawdsley



Courtesy of Gord Mawdsley

CQ-Mammo

*Contr*le de la qualit* en mammographie*

Accueil

Conditions d'utilisation

Foire aux questions

Densitomètre

Formation en ligne

Certificat d'attestation de la formation en ligne

Accès WEB

e site WEB est optimisé pour
re visualisé sous Chrome 4.0, IE 9.0, Firefox
.5, Safari 4.0 avec le module Flash Player.

ésolution minimale de (800X600) pixels.

Écrivez-nous!
Nous seront heureux de recueillir vos commentaires.

Accueil

NOUVEAU
Vous pouvez obtenir un certificat d'attestation pour la formation en ligne du logiciel CQ-Mammo. Consultez les instructions ici.

Bienvenue!

CQ-Mammo est un logiciel destiné aux technologues spécialisés en mammographie. Il assure la gestion du contrôle de la qualité en recueillant les données de tous les tests à réaliser en fonction de votre inventaire d'équipements. L'agenda du logiciel vous indique quels sont les tests à faire, à prévoir ainsi que les tests en retard. Chaque test enregistré se voit attribuer un statut conforme ou non conforme.

CQ-Mammo peut produire de nombreux rapports de gestion, tel que la liste des tests et leur statut ainsi que la demande d'agrément en mammographie (PAM).

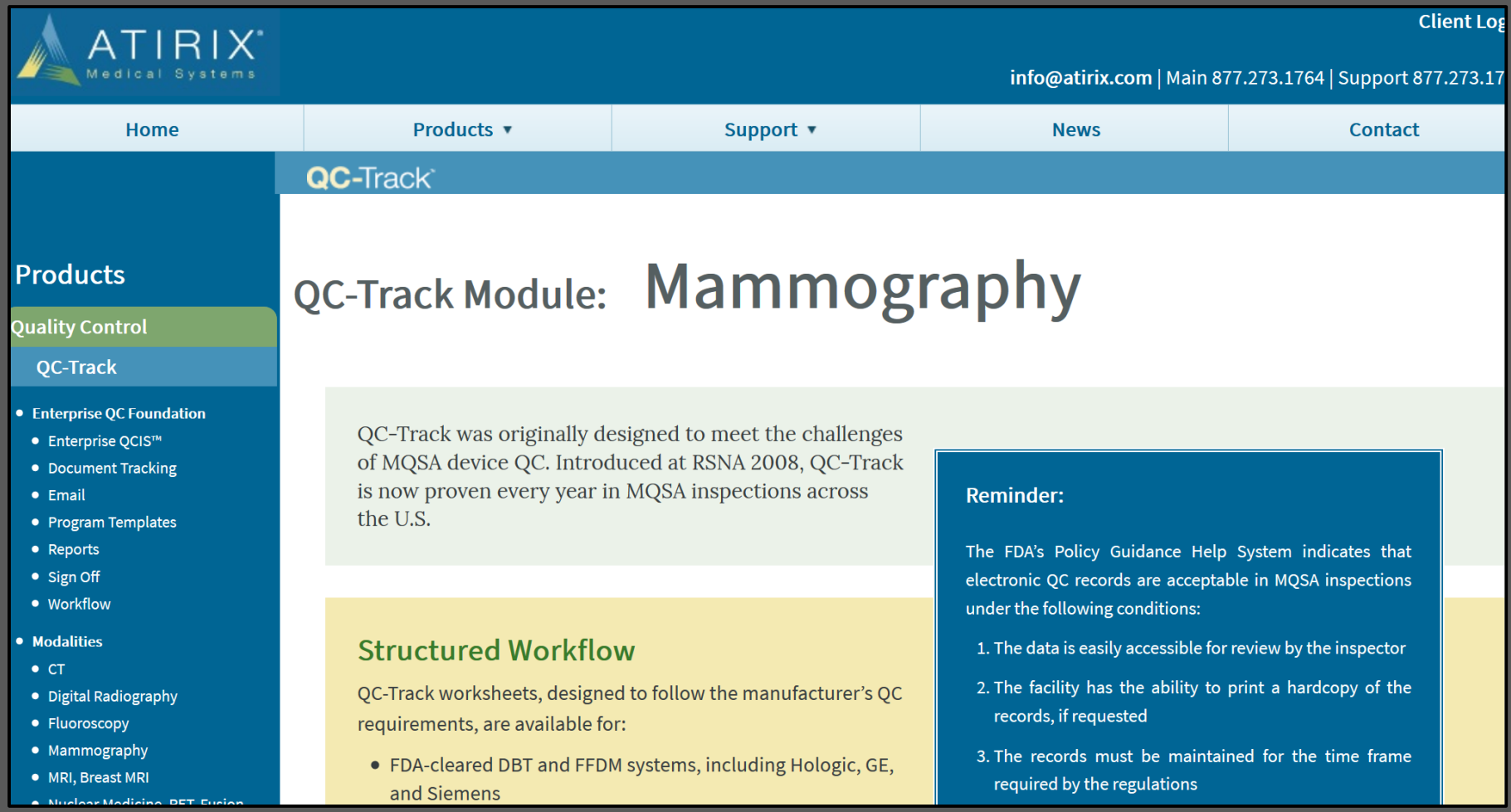
Formulaire de demande d'accès

Si votre centre est situé dans la province de Québec, votre accès au logiciel de contrôle de la qualité en mammographie est gratuit. Pour obtenir un accès, complétez le formulaire de demande d'accès au logiciel CQ-Mammo :

Demande d'accès au logiciel CQ-Mammo

Le formulaire doit être imprimé et télécopié au numéro indiqué dans ce dernier.

Si votre centre est admissible, vous recevrez une fiche d'accès contenant les instructions pour accéder au logiciel CQ-Mammo dans les deux semaines suivant la date de votre demande.


ATIRIX
Medical Systems
Client Log
info@atirix.com | Main 877.273.1764 | Support 877.273.17
Home
Products
Support
News
Contact
QC-Track
Products
Quality Control
QC-Track
Enterprise QC Foundation
Enterprise QCIS™
Document Tracking
Email
Program Templates
Reports
Sign Off
Workflow
Modalities
CT
Digital Radiography
Fluoroscopy
Mammography
MRI, Breast MRI
QC-Track Module: Mammography
QC-Track was originally designed to meet the challenges of MQSA device QC. Introduced at RSNA 2008, QC-Track is now proven every year in MQSA inspections across the U.S.
Structured Workflow
QC-Track worksheets, designed to follow the manufacturer's QC requirements, are available for:
FDA-cleared DBT and FFDM systems, including Hologic, GE, and Siemens
Reminder:
The FDA's Policy Guidance Help System indicates that electronic QC records are acceptable in MQSA inspections under the following conditions:
1. The data is easily accessible for review by the inspector
2. The facility has the ability to print a hardcopy of the records, if requested
3. The records must be maintained for the time frame required by the regulations

NHS Publication No 40 (2000)
Guidelines for Quality Assurance Visits

. PROTOCOLS FOR ASSESSING PERFORMANCE

- 3.1 Assessment of radiological performance
- 3.2 Assessment of radiographic performance
- 3.3 Assessment of performance in breast screening pathology
- 3.4 Assessment of surgical performance
- 3.5 Assessment of the performance of the clinical nurse specialist in breast care (screening)
- 3.6 Assessment of administrative and clerical performance
- 3.7 The role of medical physics in QA visits and a protocol for the assessment of medical physics services
- 3.8 Assessment of programme management

Programmatic/institutional support

- QA experts
- Set/adopt standards
- Training and development
- Review and evaluations

Programmatic/institutional support

- Regional QA technologists
  - Public Health England
  - Ontario Breast Screening Program
- QA visits
  - Public Health England (every 3 years)
- BCCA (every year) QA support
  - BCCA provincial QA team
  - Ministry of Health and Human Services QA coordinators
  - BreastCheck Manitoba QC group (charge tech, program manager, service and physicist)
- Online review/monitoring
  - BCCA
  - Sunnybrook QCMonitor
  - Cqmammo.ca

Appropriate QC Testing

- QC Tests
  - Routine tests as recommended by various bodies + vendors
  - Testing or performance verification after equipment modifications
  - Performance criteria and corrective action timelines
  - Relevant tests – appropriate for technology
  - Appropriate QC tools

ACR Manual

Medical Physicist Tests		
1. Mammography Equipment Evaluation (MEE) - MQSA Requirements	MEE	Before clinical use
2. ACR DM Phantom Image Quality	MEE and Annual	Before clinical use
3. Spatial Resolution	MEE and Annual	Within 30 days
4. Automatic Exposure Control System Performance	MEE and Annual	Within 30 days
5. Average Glandular Dose	MEE and Annual	Before clinical use
6. Unit Checklist	MEE and Annual	Critical items: before clinical use; less critical items: within 30 days
7. Computed Radiography *(if applicable)*	MEE and Annual	Before clinical use
8. Acquisition Workstation (AW) Monitor QC	MEE and Annual	Within 30 days; before clinical use for severe defects
9. Radiologist Workstation (RW) Monitor QC	MEE and Annual	Within 30 days; before clinical use for severe defects
10. Film Printer QC *(if applicable)*	MEE and Annual	Before clinical use
11. Evaluation of Site's Technologist QC Program	Annual	Within 30 days
12. Evaluation of Display Device Technologist QC Program	Annual	Within 30 days
MEE or Troubleshooting - Beam Quality (Half-Value Layer) Assessment	MEE or Troubleshooting	Before clinical use
MEE or Troubleshooting - kVp Accuracy and Reproducibility	MEE or Troubleshooting	MEE: before clinical use; troubleshooting: w/in 30 days
MEE or Troubleshooting - Collimation Assessment	MEE or Troubleshooting	MEE: before clinical use; troubleshooting: w/in 30 days
Troubleshooting - Ghost Image Evaluation	Troubleshooting	Before clinical use
Troubleshooting - Viewbox Luminance	Troubleshooting	NA

E

F

M

P

Mammo Protocol

EFOMP

Mammo Working Group Protocol, March 2015

consistent with the set value) and reproducible. In digital mammography, dynamic ranges of detectors are much wider, and high voltage generators much more accurate and precise than they were in screen-film mammography. Possible miscalibration of peak voltage, however unlikely, would have a very modest effect on the final processed images. This is why kV_p measurements have been discarded from this protocol.


Serial Number

Leverage Connectivity

CQ-Mammo

Contr ◆le de la qualit ◆ en mammographie

Accueil

Conditions d'utilisation

Foire aux questions

Densitomètre

Formation en ligne

Certificat d'attestation de la formation en ligne

Accès WEB

e site WEB est optimisé pour
re visualisé sous Chrome 4.0, IE 9.0, Firefox
.5, Safari 4.0 avec le module Flash Player.

ésolution minimale de (800X600) pixels.

Écrivez-nous!
Nous seront heureux de recueillir vos commentaires.

Accueil

NOUVEAU
Vous pouvez obtenir un certificat d'attestation pour la formation en ligne du logiciel CQ-Mammo. Consultez les instructions ici.

Bienvenue!

CQ-Mammo est un logiciel destiné aux technologues spécialisés en mammographie. Il assure la gestion du contrôle de la qualité en recueillant les données de tous les tests à réaliser en fonction de votre inventaire d'équipements. L'agenda du logiciel vous indique quels sont les tests à faire, à prévoir ainsi que les tests en retard. Chaque test enregistré se voit attribuer un statut conforme ou non conforme.

CQ-Mammo peut produire de nombreux rapports de gestion, tel que la liste des tests et leur statut ainsi que la demande d'agrément en mammographie (PAM).

Formulaire de demande d'accès

Si votre centre est situé dans la province de Québec, votre accès au logiciel de contrôle de la qualité en mammographie est gratuit. Pour obtenir un accès, complétez le formulaire de demande d'accès au logiciel CQ-Mammo :

Demande d'accès au logiciel CQ-Mammo

Le formulaire doit être imprimé et télécopié au numéro indiqué dans ce dernier.

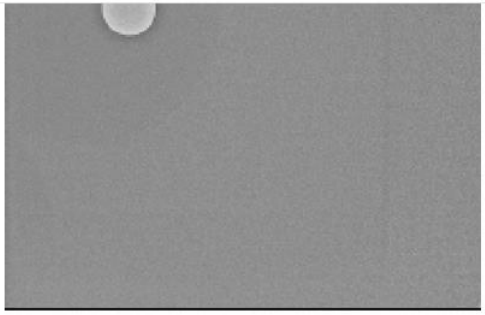
Si votre centre est admissible, vous recevrez une fiche d'accès contenant les instructions pour accéder au logiciel CQ-Mammo dans les deux semaines suivant la date de votre demande.

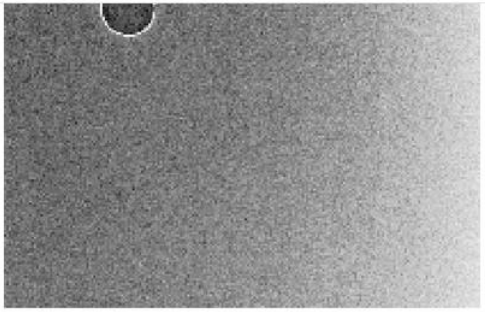
Cégep de Sainte-Foy

Soutien t◆l◆phonique diff◆r◆ : 418-872-3636
(sans frais : 1-866-286-3136)

Santé et Services sociaux Québec

Room 14

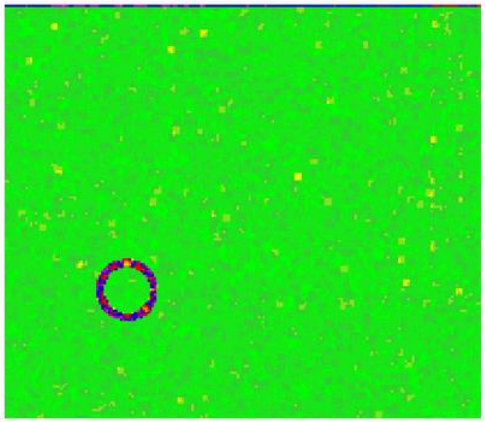


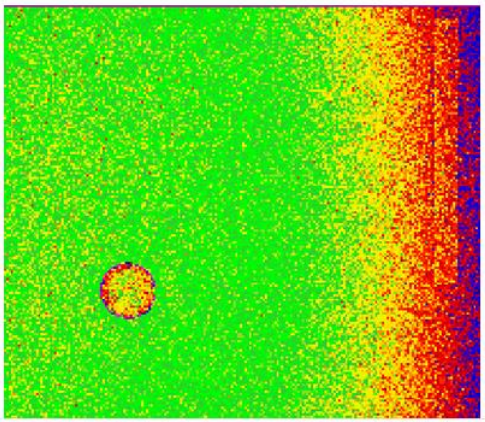


Intent Type	FOR PRESENTATION
Exposure Control Mode	AUTOMATIC
Detector Calibration Date	2019-05-14
Detector ID	YM864174
Software Version	AWS:1.9.0.632, ROS:2.10.4800.DRT10, M35:1.6.16.63, GIP2D:3.16.0-4.16.4, Filter:1.0.7.2, BP:1.0.2.1, CView:2.1.1.1, CadScience:1.0.0.20, GCal:1.2.0.0, Enhance:1.0.2.1, SNRCNR:1.0.0.0-1.0.1.0, PMC:1.9.0.94, DET:1.11.0.64, DTC:2.1.0.60, GCB:1.9.0.127, GEN:1.9.0.98, VTA:1.9.0.106, CRM:1.9.0.101, THD:1.9.0.93, CDI:1.9.0.101, AIO:1.9.0.35, BKY:1.9.0.98
Radiographer	AKB

Peak Variance Deviation

SNR Deviation





Window Width	4096
Window Level	2047
Exposure Control Mode Description	AutoFilter
Compression Thickness	45

Comment: (*mandatory for Marginal and Fail)

Courtesy of Gord Mawdsley

Best Practice	Manitoba Practice
Appropriate QC tests	Vendor QC tests CAR test list RMI SDNR test
Clear instructions for QC tests	Vendor QC manual No SDNR test instructions
Quality improvement cycle tools for documentation, tracking and reporting	CAR checklists Automated Vendor QC tool (no tracking)
Clear roles and responsibilities for technologists, MPs, Rads, administrators and regional programs	CAR accreditation package Informal understanding
Cycle of quality improvement	QC working group Frequent communications Imaging, service and QC in house Techs don't always report issue
Leverage connectivity	PACS not used for QC

Manitoba

+ Vendor Tests!

Full Field Digital

TEST	Minimum Frequency	Corrective Action Timeframe
Monitor Inspection, Cleaning, Viewing Conditions	Daily	Immediately, before checked component is used for clients
Daily Checklist	Daily	See checklist
Review Monitor QC	Weekly	Immediately: workstation-before client images interpreted; acquisition station monitor-before clients imaged
Acquisition Monitor QC	Weekly	Within 30 days of the test date
QC Test Image Evaluation (CNR/SDNR)	SDNR Weekly, 45 mm PMMA D phantom with disc	Immediately
MAP Phantom Image	Monthly, recommended	Immediately
Full Field Artifacts	Weekly	Immediately
Mechanical Inspection	Monthly	
Compression	Semi-Annually	Immediately
Repeat Analysis	Quarterly	Within 30 days of the test date
Physicist Survey	Annual	As specified by physicist

Digital Mammography Quality Control Checklist

Please photocopy this document to submit 12 consecutive months of Daily/Weekly Tests *(6 months for new applicants or unit replacements)*

Daily /Weekly Tests

Room: _____ Year: _____

Checkmark (√)=Pass/Adequate; X=Fail; Initial when complete

MONTH																															
DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
INITIALS																															
MONITOR CLEANING (DAILY)																															
DAILY CHECKLIST (DAILY)																															
REVIEW MONITOR QC (WEEKLY)																															
ACQUISITION MONITOR QC (WEEKLY)																															
QC TEST IMAGE EVALUATION (CNR/SDNR) (WEEKLY)																															
FULL FIELD ARTEFACT (WEEKLY)																															
Printer Quality Control (if applicable)																															
LASER PRINTER SENSITOMETRY (WEEKLY)																															
VIEWBOX CLEANLINESS (WEEKLY)																															

Digital Daily Checklist

Please photocopy this document to submit 12 consecutive months of Daily Checks *(6 months for new applicants or unit replacements)*

Room: _____ Year: _____

Checkmark (√)=Pass/Adequate; X=Fail; Initial when complete

MONTH																															
DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
INITIALS																															
NO LOOSE PARTS																															
OVERALL INTEGRITY																															
CLEANLINESS																															
NO CRACKS IN PADDLES																															
HOUSING AND CABLING UNOBSTRUCTED																															
Additional CR Quality Control (if applicable)																															
CR READER CLEANLINESS																															
IMAGING PLATE ERASURE																															

MAP ID #: _____

Digital Mammography Quality Control Checklist

Monthly/Quarterly/Semi-annual Tests

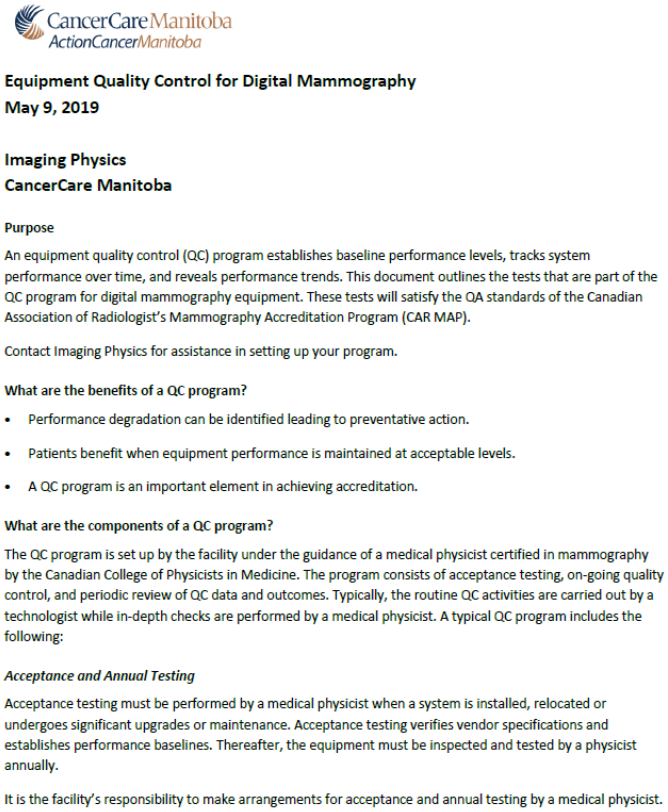
Please photocopy this document to submit 12 consecutive months of QC checks (6 months for new applicants or unit replacements).

Room: _____ Year: _____

Checkmark (√)=Pass/Adequate; X=Fail; Initial when complete

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
INITIALS												
MAP PHANTOM IMAGE (MONTHLY; RECOMMENDED)												
MECHANICAL INSPECTION (MONTHLY)												
CHIEF RADIOLOGIST QC REVIEW (MONTHLY)												
REPEAT ANALYSIS ≤2% CHANGE (QUARTERLY)												
COMPRESSION 25-45 LB (SEMI-ANNUAL)												
MEDICAL PHYSICIST SURVEY (ANNUAL)												
MEDICAL PHYSICIST QC REVIEW (ANNUAL)												
Additional CR Quality Control (if applicable)												
CR PLATE ARTIFACTS (MONTHLY)												
MTF (QUARTERLY FOR SCANNED IMAGE ACQUISITION UNITS/CR)												
CR PLATE SENSITIVITY MATCHING (SEMI-ANNUAL)												
Additional Printer Quality Control (if applicable)												
LASER PRINTER ARTIFACTS												
PRINTED IMAGE QUALITY												
FILM DIGITIZER (QUARTERLY)												

Imaging Physics Department
www.cancercare.mb.ca/imagingphysics



CancerCare Manitoba
ActionCancerManitoba

Equipment Quality Control for Digital Mammography
May 9, 2019

Imaging Physics
CancerCare Manitoba

Purpose

An equipment quality control (QC) program establishes baseline performance levels, tracks system performance over time, and reveals performance trends. This document outlines the tests that are part of the QC program for digital mammography equipment. These tests will satisfy the QA standards of the Canadian Association of Radiologist's Mammography Accreditation Program (CAR MAP).

Contact Imaging Physics for assistance in setting up your program.

What are the benefits of a QC program?

- Performance degradation can be identified leading to preventative action.
- Patients benefit when equipment performance is maintained at acceptable levels.
- A QC program is an important element in achieving accreditation.

What are the components of a QC program?

The QC program is set up by the facility under the guidance of a medical physicist certified in mammography by the Canadian College of Physicists in Medicine. The program consists of acceptance testing, on-going quality control, and periodic review of QC data and outcomes. Typically, the routine QC activities are carried out by a technologist while in-depth checks are performed by a medical physicist. A typical QC program includes the following:

Acceptance and Annual Testing

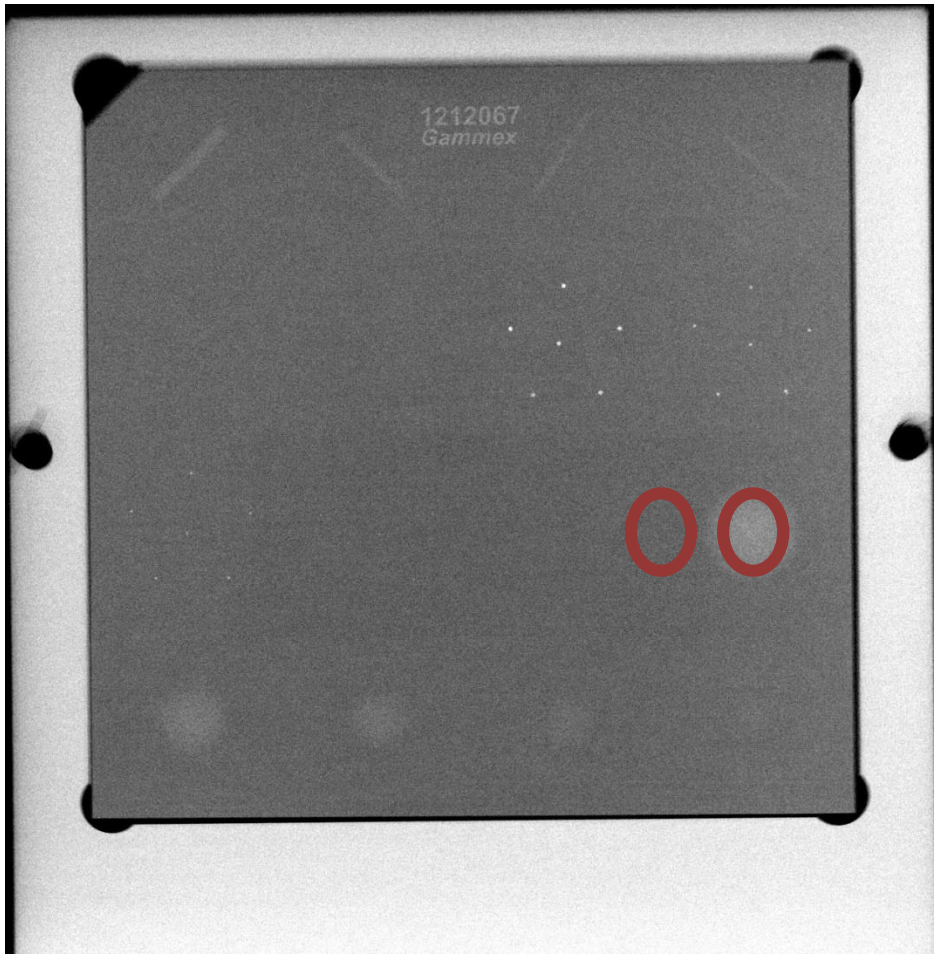
Acceptance testing must be performed by a medical physicist when a system is installed, relocated or undergoes significant upgrades or maintenance. Acceptance testing verifies vendor specifications and establishes performance baselines. Thereafter, the equipment must be inspected and tested by a physicist annually.

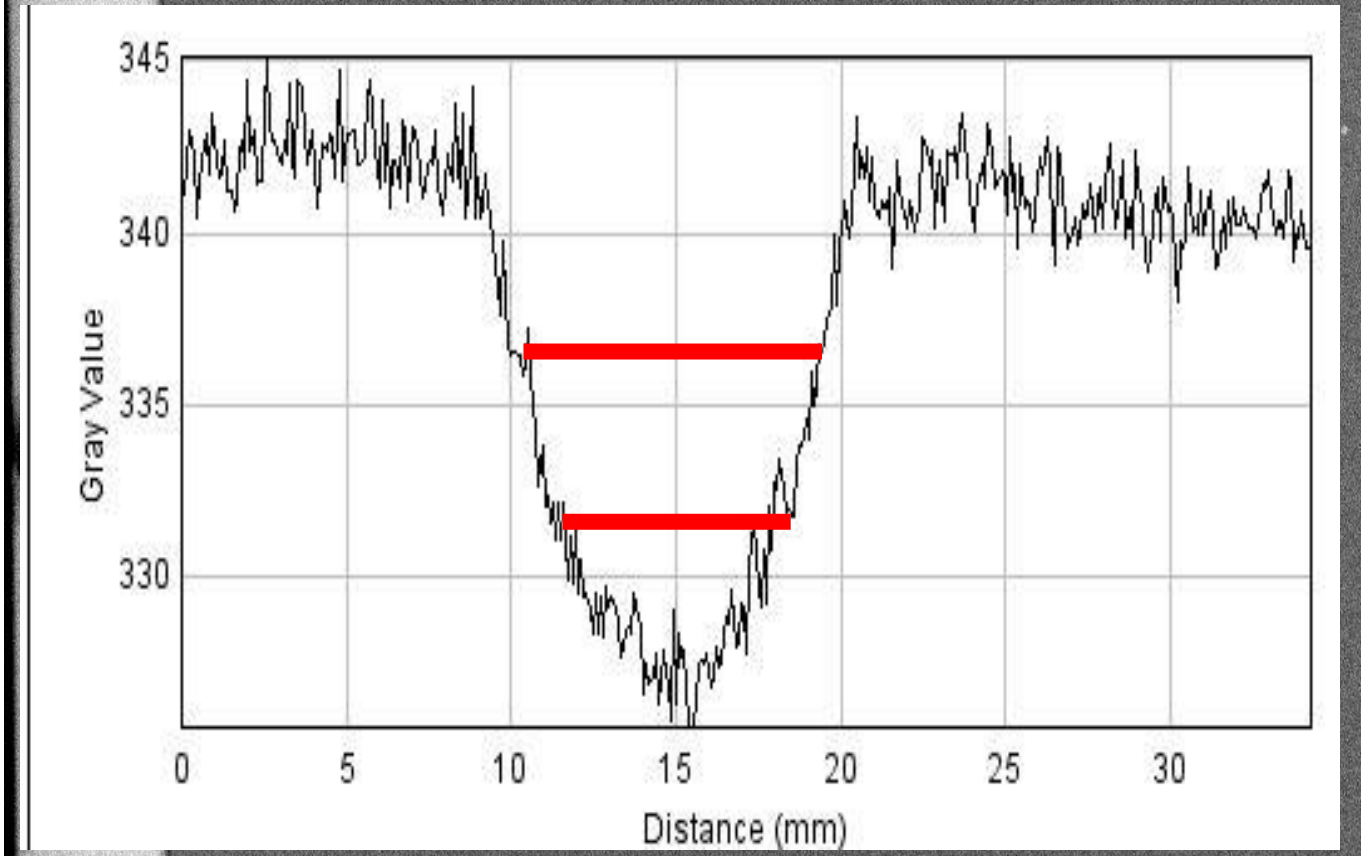
It is the facility's responsibility to make arrangements for acceptance and annual testing by a medical physicist.

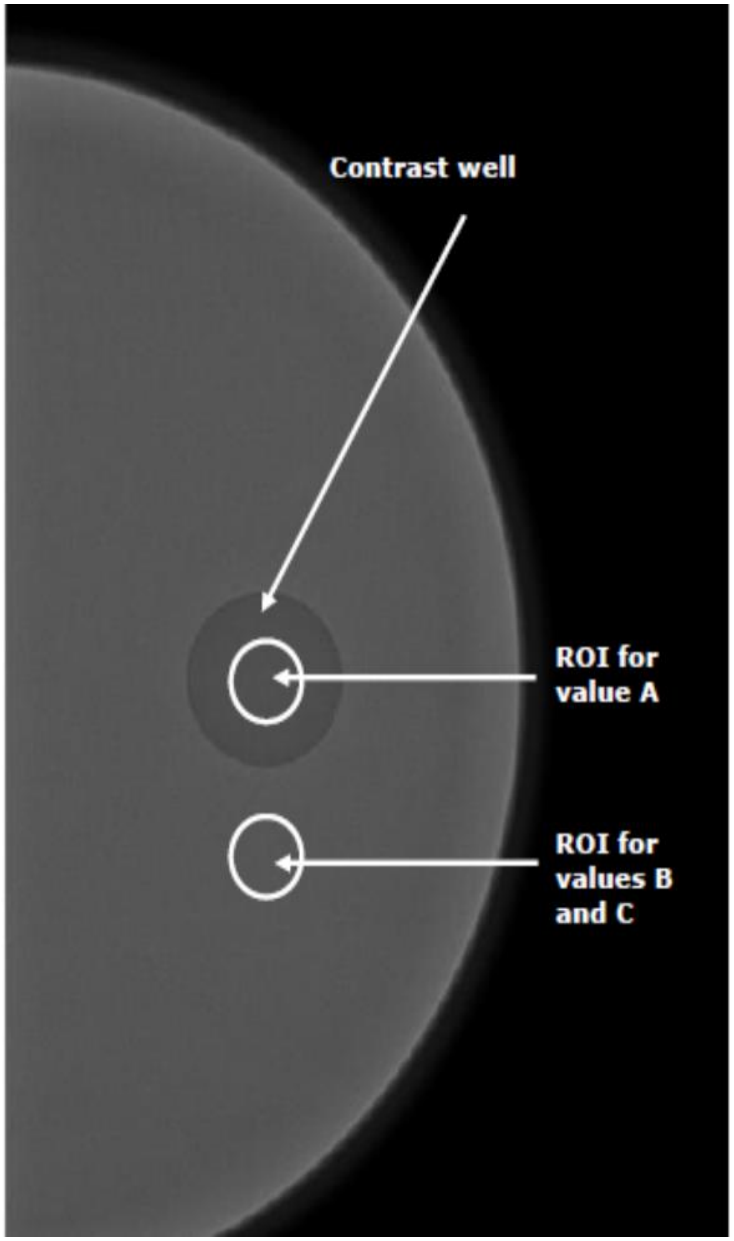
Guidance for Quality Control

To assist diagnostic imaging sites with the development and impler
various imaging modalities, the Imaging Physics Department has d
documents. The documents provide a broad outline of the compon
detail. Actual QC programs may differ depending on the diagnostic
resources.

- **New** - Computed Tomography
- Magnetic Resonance Imaging
- Nuclear Medicine
- **New** - Digital and Computed Radiography Systems - Radiogı
  - DRCR QA spreadsheet
- **New** - Film Radiography Systems
- **New** - Fluoroscopy Systems
  - Flouro QA spreadsheet
- Diagnostic Ultrasound Scanner Quality Assurance
- **New** - Clinical Displays - Definitions and Specifications
- Equipment Quality Control for Primary Displays
- Modality display QC instructions
- **New** - Display Cleaning


1212067
Gammex


345
340
335
330
Gray Value
0
5
10
15
20
25
30
Distance (mm)


Contrast well
ROI for value A
ROI for values B and C

Technologists QC Tests

Table 2 provides a listing of technologist QC tests required by the CAR MAP and Medical Physics in Manitoba.

All QC activity must be documented using CAR digital QC forms and additional forms approved by medical physics. Most of the tests are already familiar to mammography technologist. In what follows, we elaborate on tests that go beyond the CAR MAP requirements.

Table 2: List of Technologist QC Tests

Test	Frequency	CAR	MB	Corrective Action Timeline
Visual Check/Daily Checklist	Daily	√	√	N/A
AWS Cleaning	Daily	√	√	Before clinical use.
RWS Cleaning and viewing conditions	Daily	√	√	Before clinical use.
Artefact Evaluation (Flat Field)	Weekly	√	√	Before clinical use.
AWS Monitor QC	Weekly	√	√	Before clinical use for gross defects, otherwise within 30 days.
RWS Monitor QC	Weekly	√	√	Before clinical use.
D Phantom AEC Check (SDNR)	Weekly	√	√	Before clinical use.
Mechanical Inspection	Monthly	√	√	Before clinical use for any items that compromise patient safety, image quality or dose. Otherwise within 30 days.
MAP Phantom Image Quality	Monthly	√	√	Before clinical use.
Radiologist QC Review	Monthly	√	√	Within 30 days.
Artefact Evaluation (all targets)	Monthly		√	Before clinical use.
Breast Thickness Indicator	Monthly		√	Before clinical use.
Repeat/reject Analysis	Quarterly	√	√	Within 30 days.
Compression Force	Semi-annually	√	√	Before clinical use.
Detector Calibration	Per the manufacturer's protocol		√	Before clinical use.
Mobile QC	SDNR after moving		√	Before clinical use.

Weekly D Phantom AEC Check (SDNR)

This test provides a tool to monitor system performance over time and to ensure the system meets quantitative image quality and dose performance levels. It involves tracking the signal-difference-to-noise rati (SDNR) under imaging conditions mimicking those of an average breast. Sometimes this test is referred to as the contrast-to-noise ratio (CNR).

Please note that the vendor tests using the MAP phantom is not appropriate because the results are sensitive to the exact placement of the ROI in the largest mass. You must use the D phantom for this test.

SDNR Test Instructions

1. Create a QC study/patient and give it an appropriate name.
2. The study category should be QC-raw.
3. Use the OPDOSE AEC option.
4. Use the non-deflecting compression paddle. Use the same paddle very week.
5. Place the D phantom with its flat side aligned along the chest wall edge of the bucky, centered right tc left, and the 1 mm disc on top. Use care to position the phantom consistently every time the test is performed. Figure 1. D Phantom positioningFigure 11 illustrates proper phantom positioning.

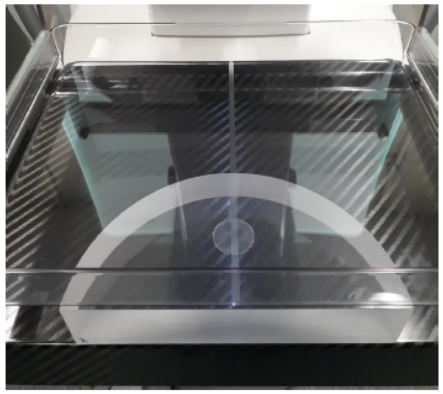
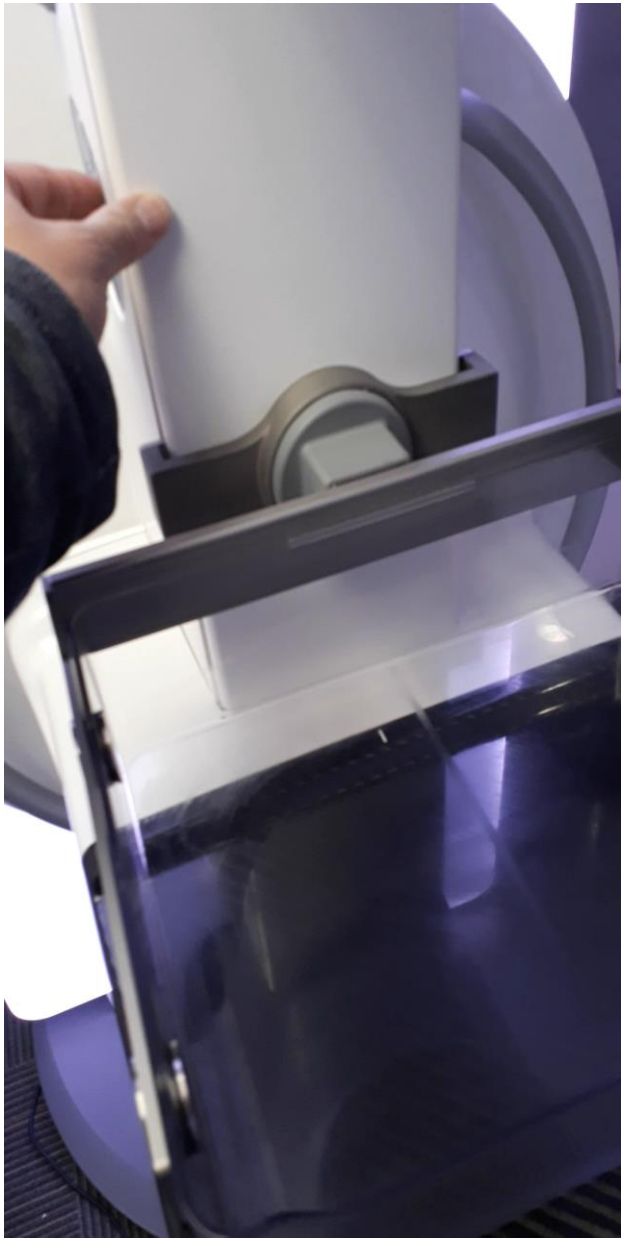


Figure 1. D Phantom positioning

6. Apply compression to the phantom in the range of 50-60 N. The phantom thickness is at the edge of values that can cause the kVp to change. You may have to use the manual compression fine adjustment to ensure that the system reads a thickness of 40 mm.

Cycle of Quality Improvement

- Quality mindset
- Shared responsibility
- Quality is not a chore, it’s a value
- Report problems
- Don’t just “accept” tests
- What’s a baseline for?



Thank you!