RIVERSIDE MEDICAL CENTER, INC.

DR. PABLO O. TORRE MEMORIAL HOSPITAL

METRO PACIFIC HEALTH
THE HEART OF FILIPINO HEALTHCARE

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 1 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

PURPOSE:

1. To optimize the best practice in the area of radiation protection of both the patient and the staff.
2. To maintain the production of consistently high quality diagnostic radiographs.
3. To monitor the basic components of the imaging process at a low cost through use of simple, inexpensive tools and minimal staff time must be put in place.
4. To determine the adequacy in terms of production to all radiation protection practices.

DEFINITIONS:

Quality Control (QC) - these are specific actions designed to keep measurable aspects of the process involved in manufacturing a product or providing a service within specified limits. These actions typically involve measurement of a process variable, checking the measures value against a limit, and performing corrective action if the limit is exceeded.

Quality Assurance (QA) - these are planned and systematic actions that provide adequate confidence that a diagnostic x-ray facility will produce consistently high quality images with minimum exposure of the patients and healing arts personnel. The determination of what constitutes high quality will be made by the facility producing the images. Quality assurance actions include both quality control techniques and quality administration procedures.

Quality Assurance Program - is an organized entity designed to provide quality assurance for a diagnostic radiology facility. The nature and extend of this program will vary with the size and type of the facility, the type of examinations conducted, and other factors.

Optimization - optimization in the field of diagnostic radiology simply means any process or procedure which ensures that doses due to appropriate medical exposure for radiological purposes are kept as low as reasonably achievable consistent with obtaining the required diagnostic information, taking into account economic and social factors.

SIGNIFICANCE OF QUALITY CONTROL

1. It will monitor the imaging process from start to finish revealing potential problems that may otherwise go unrecognized and achieving reduction of dose to patient and consistent production of high – quality diagnostic radiographs.
2. It will also form a learning process for those taking part and will also provide them with tools and practical tools which can be used in the implementation of national quality control program in diagnostic radiology in future.
3. The overall cost – effectiveness of the department will be improved including:
   - 3.1 The number of repeated radiographs is reduced.
   - 3.2 The rate of flow of patients through the department is improved.

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: QUALITY CONTROL PROGRAM			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 2 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

3.3 The department's ability to meet the demands made upon its services is raised.
3.4 Quality of radiographs results produced is higher.
3.5 Standardization of the radiographic results is achieved and maintained.
3.6 The reliability efficiency of automatic processors and x – ray equipment is improved.

QUALITY CONTROL PROGRAM

According to Stewart (1993), essentially there are three (3) steps involved in a quality control program.

Acceptance Testing - these are test conducted on every new X - ray facilities e.g. the X - ray machine, cassettes, intensifying screens, grids, to name but a few. This test is carried out prior to its clinical usage to show if the equipment is performing within the manufacturer's specification. This test must be done by someone other than the manufacturer or his representative.
Routine Performance Evaluation - when in use, these X–ray equipment deteriorate. This necessitates the periodic quality control evaluation of these equipment. These are the quality control tests conducted on these equipment to see if the equipment will meet predestined requirements.
Error Corrections - when these equipment performances are not optimal or do not meet predetermined requirements, or errors found after the quality control test has been conducted, actions are taken to effect corrections on them.

General Consideration

An adequate quality control program for any individual facility will depend on a number of factors which include, but may not necessarily be limited to, items such as the type of procedures performed, type of equipment utilized and patient workload.

RESPONSIBILITY:
Radiologist, X-ray Technologists, Radiologic Technologists, Biomed Technicians

POLICY:

1. It is essential that one person, the QA Coordinator be in charge of maintaining the QA program and be allotted the time, equipment, and space necessary to carry out the duties that are required.
   1.1 The Coordinator should review the test results daily. If any test fall outside established

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 3 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

tolerances, repeat the test to validate the results, then take corrective action.

1.2 Should ensure that all tasks are performed in a timely manner regardless of assigned staff availability (e.g., vacation or illness).

1.3 Should be capable of identifying problems and be allowed enough time to resolve them as they arise.

2. An individual equipment log should be maintained on each x – ray unit in the department. This equipment log must be kept at some convenient location where anyone using the facility (physicians, technologist, physicist, service engineer) can get ready access.
   - 2.1 Equipment Data Specifications
     - 2.1.1 Technical Specifications, including tube loading charts.
     - 2.1.2 Equipment operating instructions.
     - 2.1.3 Detailed identification of major components of the system including name, serial number, and date of installation.
   - 2.2 An outline of the applicable quality control program.
   - 2.3 A log of the quality control test results.
   - 2.4 A record of service on the equipment including a description of system malfunctions and description of what service was carried out. The service record should also include identification of the individual performing the service and the date.

3. All quality control test data should be recorded on standardized forms.

4. Conditions of the X - ray Equipment should be observed.
   - 4.1 Mechanical Integrity - a general observation of the diagnostic system be made including the presence of loose or absent screws, bolts, or other structural elements that may have been improperly installed or have worked loose due to use. The functioning and operation of meters, dials, and other indicators like the pilot lights should be checked.
   - 4.2 Mechanical Stability – to obtain a diagnostic quality radiograph. It is important to minimize patient motion. The availability and adequacy of patient support devices such as the table or immobilizing devices should also be checked.
   - 4.3 Electrical Integrity – the external condition of the high voltage cables should also be observed.

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 4 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

PROCEDURE (SOP):

QUALITY CONTROL PROGRAM		
TEST	FREQUENCY	PROCEDURE
Warm – up Procedures	Daily and if idle for 2 hours	1
Visual Checklist	Quarterly, after service	5
Cassettes and Screens	Quarterly	8
Collimation Checks	Semiannually	9
Lead Apron Check	Quarterly	10
Radiographic Visual Checklist	Quarterly	Form 1
Repeat Analysis Form	Annually	Form 2

Procedure 1: X-RAY TUBE WARM UP

Objective:

To assure that the anode and other components of the x –ray machine do not experience shock and stress due to sudden and excessive heat load, which would shorten the useful life of the x-ray tube.

Frequency:

Daily warm up procedures should be performed prior to use and again when the unit has remained idle for 2 hours or more.

Steps:

Follow the x-ray system manufacturer's recommended "warm- up procedure". If no manufacturer's procedures are available, follow the procedure as directed below.

1. Turn system on and perform warm-up with room door closed and no one in the room.
2. Using the large focal spot, set machine techniques.
3. Wait about 1 minute between each exposure.
4. For the Shimadzu Flexa Vision Fluroscopy refer to its manufacturer's warm-up procedures.

Corrective Action:

In an unusual noise or event is noted, consult with the x – ray service engineer.

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 5 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

Procedure 2: RADIOGRAPHIC SYSTEM VISUAL CHECKLIST

Objective:

To assure that all components of the radiographic x – ray system indicator lights, displays, and mechanical locks and detents are working properly and that the mechanical rigidity and stability of the equipment is optimum.

Suggested Performance Criteria:

Each of the items listed in the QC Visual Checklist (Form 1) should pass or receive a check mark. Items not passing the visual check should be replaced or corrected as soon as possible.

Frequency:

1. Quarterly
2. After service or maintenance on the X –ray system

Steps:

1. Collimator light brightness and cleanliness. Determine if light is functioning and is clearly defined under normal operating conditions, without visible dust or foreign matter shadows.
2. Collimator filters in place. Some systems allow the operator to vary the amount of filtration in the useful x-ray beam. Assure that any filtration was not inadvertently removed from the beam.
3. Lock and detents operable.
4. Check to make sure all locks on tube, table and bucky are functioning properly
5. Check the accuracy of the detents by using a measuring tape for accurate distance, and visually check the centering detent. All position locking and centering devices on the system should function as intended.
6. Table, tube, and bucky smoothness of motion. Determine if x-ray tube tower, table top motion, and bucky all move easily and without catches or interruptions.
7. Grid condition and operation. Check that grid lines, grid cutoff, or grid damage has not been visible films. This should assure that grip is properly positioned, centered to the central ray and if a focused grid is being used the correct focal distance is being used.
8. Condition of cables. All cables should be inspected for frayed coverings, kinks, or if cables are catching on the other objects. Assure that ground lines are intact.
9. Cassettes and screens condition. Cassettes and screens should be cleaned regularly. Check screen condition for dust particles, scratches, and areas of discoloration. Assure screens are properly fitted and attached to cassettes. Check cassettes latches to make sure they are functioning

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 6 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

properly and are not broken. Cassettes and screens should be replaced if necessary.

10. Control Panel indicators. Assure all control panel switches, lights, and meters are functioning correctly.
11. Technique chart. Make sure technique charts are available, current, and appropriate for all procedures normally performed. The chart may include patient body part, size, thickness verses technique factors which may include patient body parts, size, thickness verses technique factors which may include kVP, mA, time, or mAs, source – to – image distance, use of bucky or grid, type and size of film – screen cassette to be used, and other pertinent information.
12. Patient visibility. Windows, mirrors, or an equivalent provided to permit continuous observation of the patient during the x-ray exposure should be free of obstructions.
13. Exposure switch placement. Assure the exposure switch is mounted in such a way that exposure can only be made with the operator in a protected area during the entire exposure. If unit is portable or mobile without a portable protective barrier, assure cable on exposure switch provides means for the operator using protective apparel to be at least 9 feet from the tube housing.
14. Lead aprons, gloves, collars, etc. Assure Proper items are available and stored correctly without bends or folds. If irregularities are noted, complete Procedure 10.

CORRECTIVE ACTION:

Missing items from the room should be replaced as soon as possible. Malfunctioning equipment should be reported to the Biomed Engineer for repair or replacement as soon as possible.

Procedure 3: REPEAT ANALYSIS

Objective:

To identify ways to minimize patient exposure and reduce cost by addressing higher than normal repeat rates.

Frequency:

Image Evaluation/Analysis

Steps:

1. Determine the reason for repeat as compared to the categories listed on the data sheet.
2. Record these numbers on the Repeat Analysis Form.
3. Determine the total number of images and the total number of exposed. The overall repeat rate

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 7 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

is the total of repeated images divided by the total number of exposed during the test period.

4. By dividing the number of repeats per category by the total number of repeated images, a facility can determine that repeated rate per category.

Corrective actions:

The percentage of repeats should guide the facility to focus their efforts to those areas needing the most attention. For example, images that are too light or too dark maybe due to processing problems, equipment problems that require repair or recalibration, or technique charts may need updating.

Procedure 4: X-RAY CASSETTES AND INTENSIFYING SCREEN CLEANING PROCEDURE

Objective:

To assure that screens and cassettes are free of dust and dirt particles that may degrade image quality.

Suggested Performance Criteria:

Minimize artifacts on films from screens or cassettes.

Frequency:

1. Quarterly or semiannually (depending on workload and amount of dust in the environment).
2. When a problem is noticed.

Required Equipment:

1. Screen cleaner (as recommended by manufacturer).
2. Lint – free gauze pad or cloth, or camel's hair brush.
3. Canned air* (available from photographic supply store)

Steps:

1. Visually inspect the condition of the intensifying screen.
2. Dust the screen with the camel's hair brush and canned air. *
3. If foreign material (e.g., dirt, developer solution) cannot be easily removed with the camel's hair brush, use liquid screen cleaner.
4. After cleaning with manufacturer approved cleaners, screens should be allowed to air-dry, standing vertically, before returning to cassette to use.

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 8 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

Corrective Action:

If the screen shows signs of cracking, fading, or discoloration, it should be evaluated for replacement.

Procedure 5: COLLIMATION TEST

Objective:

To assure that the light field accurately defines the x-ray field.

Suggestion Performance Criteria:

The light and X-ray field misalignment does not exceed 2% of the source- to- image distance (SID) in either the length or the width.

Frequency:

1. Annually
2. After service or maintenance on the x-ray system (e.g., changing the light bulb)

Required Equipment:

1. 8 coins
2. Measuring Tape

Steps:

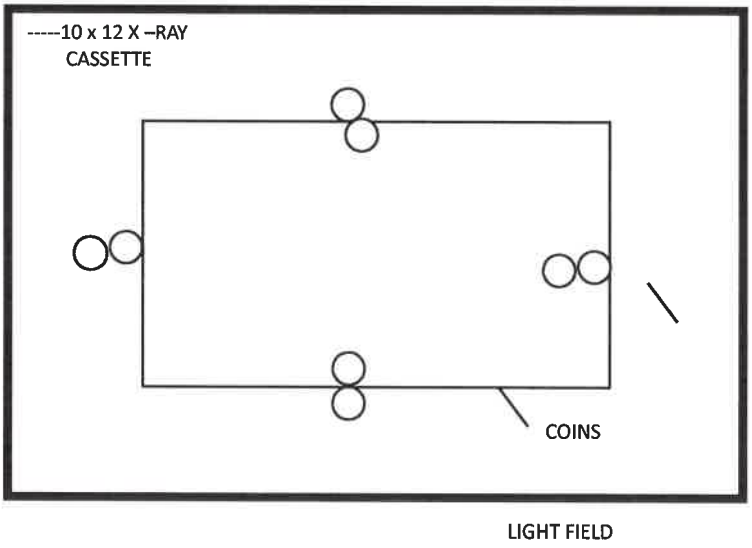
1. Place a 10 x 12 inch (24 x 30 cm) loaded cassette in the bucky and set the SID at 40 inches (100 cm).
2. If possible, adjust the field size to 6 x 8 inches (15 x 20 cm). The field must be smaller than the film.
3. Place the coins as shown in Figure 2.
4. Expose and develop the film. If field edges are not well defined, adjust techniques accordingly and repeat this step.
5. Measure the distance between the light (where the coins touch) and x - ray fields for all coin locations.
6. Percentage differences greater than 2.0% in either direction should be corrected as soon as possible.

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 9 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

Corrective Action:

Malfunctioning equipment should be reported to the x – ray service engineer to correct the problem.

Figure 2. Setup for collimator accuracy test.



Procedure 6: LEAD APRON, GLOVE, GONADAL, AND THYROID SHIELD INTEGRITY CHECK

Objective:

To assure that the lead aprons, gloves, gonadal shields, and thyroid collars provide optimal protection when positioned appropriately.

Suggested Performance Criteria:

No breaks in load lining of protective garments.

Frequency:

Annually

Required Equipment:

Lead aprons, Gloves, Gonadal, and Thyroid shields

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 10 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

Steps:

Option 1: If an image intensified fluoroscopy units is available, This is the preferred way to inspect the lead aprons, gloves, and collars:

1. Layout the item to be checked on the table.
2. Examine the entire item using the fluoroscope.
3. Record results on the Visual Checklist (Form 1).

Option 2: If an image intensified fluoroscopy unit is not available.

1. Closely inspect each item for kinks and irregularities.
2. Take a radiograph of suspect areas.
3. Process the film and look for breaks in the lead lining.
4. Record results on the visual Checklist (Form 1)

Corrective Action:

Any item displaying breaks in the lead lining should be replaced.

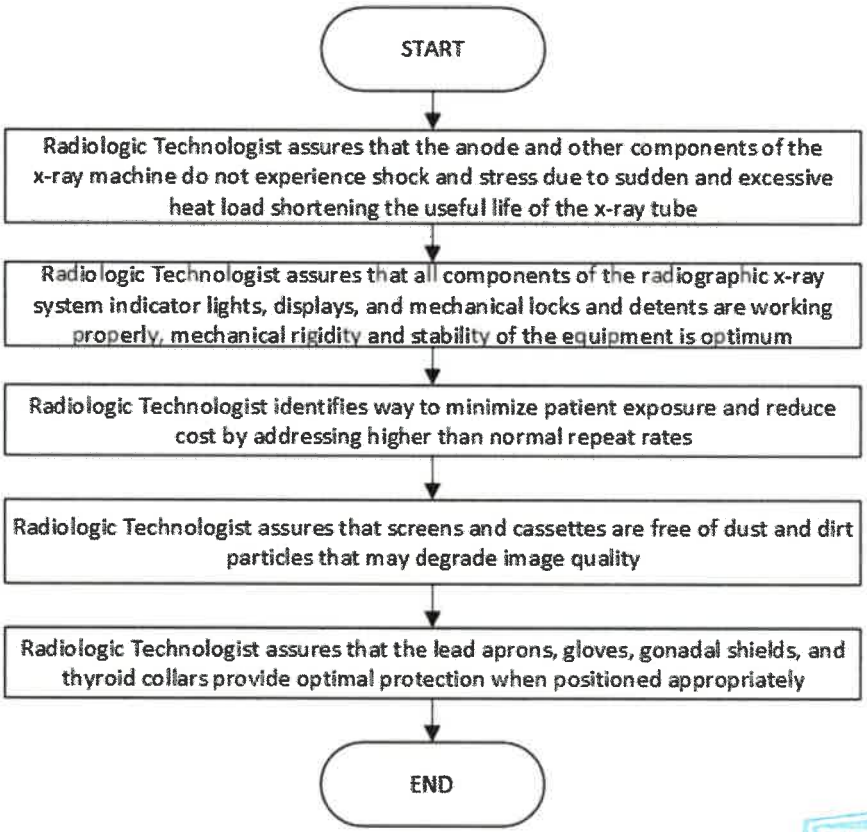
DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 11 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

WORK INSTRUCTION:

KEY TASK	PERSON RESPONSIBLE
1. Assures that the anode and other components of the x-ray machine do not experience shock and stress due to sudden and excessive heat load shortening the useful life of the x-ray tube.	Radiologic Technologist
2. Assures that all components of the radiographic x–ray system indicator lights, displays, and mechanical locks and detents are working properly, mechanical rigidity and stability of the equipment is optimum.	
3. Identify ways to minimize patient exposure and reduce cost by addressing higher than normal repeat rates.	
4. Assures that screens and cassettes are free of dust and dirt particles that may degrade image quality.	
5. Assures that the lead aprons, gloves, gonadal shields, and thyroid collars provide optimal protection when positioned appropriately.	

DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 12 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

WORK FLOW:



DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 13 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

FORMS: N/A

EQUIPMENT: N/A

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DEPARTMENT: Ancillary Division		**POLICY NUMBER:** DPOTMH-IPP-DIS-P002-(01)	
TITLE/DESCRIPTION: **QUALITY CONTROL PROGRAM**			
EFFECTIVE DATE: February 28, 2025	**REVISION DUE:** February 27, 2028	**REPLACES NUMBER:** DPOTMH-E-63-P02	**NO. OF PAGES:** 14 of 14
APPLIES TO: Department of Imaging Sciences		**POLICY TYPE:** Internal	

APPROVAL:

	Name/Title	Signature	Date	TQM Stamp
Prepared by:	**JOEY BRYAN G. JULOM** Department of Imaging Sciences Supervisor		3/4/25	TQD
Reviewed by:	**WENDY MAE D. GOMEZ** Accreditation & Documentation Manager		3/4/25	
Approved by:	**CHERYL O. TRINIDAD** Department of Imaging Sciences Manager		3/4/25	
	ROSARIO D. ABARING Ancillary Division Head		08.18.2025	
	JOSE PEPITO B. MALAPITAN, MD Medical Director		03.18.25	
	MA. ANTONIA S. GENSOLI, MD VP-Chief Medical Officer		3-20-25	
Final Approved by:	**GENESIS GOLDI D. GOLINGAN** President and Chief Executive Officer		08/29/25	

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