TASK/OPERATION:	**Magnetic Resonance Safety – System Breakdowns (SWP06)**		
Operating Procedure Developed by:	**Research Radiographer and IT Manager, with MRI Facility Committee**	**Approved:** COO	**Date:** 31st **January 2020**
Reviewed by: **Version:**	WHS & Clinical Consultant 1.0		

Purpose:

The purpose of this document is to outline the procedures used to deal with situations when the Magnetic Resonance (MR) scanner breaks down or regular scanning becomes interrupted. This will usually be done by the Research Radiographer or Philips Engineer.

Critical or emergency scenarios are covered under a separate procedure SWP04.

Rationale:

The downtime of the magnet needs to be kept to a minimum to ensure that service provision disruptions are kept to an acceptable level.

Procedures:

1) **System Logs:**

- System logs are saved automatically under the Console PC's G drive -> log -> devlogcurrent.log.
- Take note of the time to let the engineers know where to look.

2) **Software Errors**

- Computer malfunction, If the application software does not respond (hang-up), stop the application:
  1) On the main menu, click System, then Exit.

- To restart the computer:
  1) Press the Windows key on your keyboard to show the Windows taskbar.
  2) Click Start, then click the power button.
  3) Select Restart to reboot the computer.

- On occasion it may be necessary to reset the computer completely by switching the power supply off. To do this:
  1) In the equipment room, open the global Mains Distribution Unit (gMDU). The key to the equipment room is located in the same place for DVD Storage.
  2) Do NOT remove the red panel in the cabinet.
  3) Flip the DACC switch (check the service key sticker to locate the correct switch) to the off position.
  4) Wait 30 seconds and flip the switch back on again.
  5) Close the gMDU cabinet when finished.

- If the computer or application software still does not respond, notify your Philips service engineer: 1800 251 400 and have the Equipment Number ready (label on the monitor stand).

3) Hardware Errors

- If scans fail, look at the scanner status bar at the bottom of the screen for error messages to evaluate fault and take note of the time.

- Notify your Philips service engineer: 1800 251 400

- Suspected or Known Defective hardware:
  o WARNING: If any part of the equipment or system is known (or suspected) to be defective or incorrectly-adjusted, DO NOT USE the system until a repair has been made. Operation of the equipment or system with defective or incorrectly-adjusted components could expose the operator or the patient to safety hazards. This could lead to fatal or other serious personal injury, or to clinical misdiagnoses.
  o WARNING: Never use surface coils when coil or cables are damaged. A damaged cable or connector is hazardous because of high voltage across the cable during the transmit phase of the system which may cause burns to the participant. Sharp edges may cause injury to patient's skin. It may also cause further damage to the coil.

4) Image Reconstruction System Errors

- System logs are saved automatically under the Console PC's G drive -> log -> devlogcurrent.log.
- Take note of the time to let the Philips service engineers know where to look.
- Notify your Philips service engineer: 1800 251 400 and have the Equipment Number ready (label on the monitor stand).
- Await Philips service engineers' instructions.

- OR try the following in command prompt:

1) "permproc stopall"
2) "permproc startall"

- You can only reconstruct acquired data if you have selected "save raw data" under the Post processing tab, otherwise rescanning is needed.

5) Scanner Errors

- Take note of the error time.

- To shut down/start the computer:
  1) Press the Windows key on your keyboard to show the Windows taskbar.
  2) Click Start, then click the Power→Shut down button.
  3) Wait 5 minutes, go to the Equipment Room. You will need the key which is kept in the same place for DVD Storage.
  4) Find the correct Philips Tower called "DACC" and the computer hard drive called "MR CONSOLE." The tower will be the first beige tower closest to the door.
  5) Push the "ON" button which is labeled.

- On occasion it may be necessary to reset the computer by switching the power supply off. To do this:
  1) In the equipment room, open the global Mains Distribution Unit (gMDU).
  2) Do NOT remove the red panel in the cabinet.
  3) Flip the DACC switch (check the service key sticker to locate the correct switch) to the off position.
  4) Wait 30 seconds and flip the switch back on again.
  5) Close the gMDU cabinet when finished.

- If the computer or application software still does not respond, notify your Philips service engineer: 1800 251 400 and have the Equipment Number ready (label on the monitor stand).

6) MRI Table Malfunctions

- Press the Emergency Table Stop if there are any obstructions present and remove obstruction.
- Press the Manual mode button to pull the table out.
- Press Resume button to continue as per normal.

- If table controls fail due to power loss, manually move the table out and bring the system down and reboot as above.

- If there is power to the table but the emergency table stop buttons aren't working, turn off the filter box switch (SFB) on the gMDU.

- If unsuccessful, notify your Philips service engineer: 1800 251 400 and have the Equipment Number ready (label on the monitor stand).

Codes of Practice/Standards:

- The Royal Australian and New Zealand College of Radiologists:
  - https://www.ranzcr.com/search/ranzcr-mri-safety-guidelines
  - https://www.ranzcr.com/our-work/quality-standards
- Philips
  - Philips Instructions For Use: Ingenia CX/ Achieva dStream, Release 5, English, The Netherlands (2017)
  - Philips MR Engineer Practical Tutorial

Emergency Procedures:

- Magnetic Resonance Safety – Incidents (SWP03)
- Magnetic Resonance Safety – Emergencies (SWP04)
- NeuRA Incident Report & Investigation Procedure (WHS31)
  https://intranet.neura.edu.au/pages/viewpage.action?pageId=6848643&preview=%2F6848643%2F19824750%2FWHS31+Incident+Report+%26+Investigation+Procedure+v2.0.pdf
- NeuRA Online Accident & Reporting Tool https://forms.neura.edu.au/login
- NeuRA First Aid Procedure (WHS20)
  https://intranet.neura.edu.au/pages/viewpage.action?pageId=6848643&preview=%2F6848643%2F16450180%2FWHS20+FirstAid+Procedure.pdf
- Follow NeuRA Emergency Procedures Flipchart 2018 located near the MRI control room phone or on NeuRA Intranet
  https://intranet.neura.edu.au/download/attachments/6062404/Emergency%20Procedures%20Flipchart%20-%20Dec%202018.pdf?api=v2