

12.1.6. Master Dispensing Schedule

SPECIFIC 20/11/2017 (0.2ml) 25015

MASTER DISPENSING SCHEDULE

NUCLIDE	PRODUCT	No. OF DOSES	ACTIVITY (MBq)	VOL. (ml)	REF. TIME	REF. DATE	USER	GENERATOR No.	KIT No.	CALIBRATOR READING (MBq)	DISPENSED BY	DOSE No.
Tc99m	DMSA	1	50.00	2.0	10:00	09/11/17	AYR-NM					229550
Tc99m	DMSA	1	50.00	2.0	10:00	09/11/17	GGH-N M					229551
Tc99m	DMSA	1	50.00	2.0	10:00	09/11/17	ROYAL-N M	29958		56		229552
Tc99m	DMSA	1	80.00	3.0	12:00	09/11/17	AYR-NM	29958		108		229553
Tc99m	DMSA	1	80.00	3.0	12:00	09/11/17	ROYAL-N M	29958		108		229554
Tc99m	DMSA	1	80.00	3.0	13:00	09/11/17	GGH-N M					229555
Tc99m	PERT	3	3000.00	3.0	10:00	09/11/17	WIG-DISPENSARY			SPECIFIC 0.2ml		229556
Tc99m	PERT	1	50.00	0.5	11:00	09/11/17	AYR-NM					229559
Tc99m	PERT	1	50.00	0.5	11:00	09/11/17	GGH-N M					229560
Tc99m	PERT	1	50.00	0.5	11:00	09/11/17	ROYAL-N M	29958		02		229561
Tc99m	PERT	1	200.00	2.0	12:00	09/11/17	AYR-NM					229562
Tc99m	PERT	1	200.00	2.0	12:00	09/11/17	GGH-N M					229563
Tc99m	PERT	1	200.00	2.0	12:00	09/11/17	ROYAL-N M	29958		285		229564

Tc-99m 229558
 PENTECHINATE
 INTRAVENOUS INJECTION
 3000.00 MBq in 3.0 ml
 Ref. Time 10:00 hr on 09/11/2017
 Expiry 2 HOURS

(1.9 ml) 200014 25/11/2017

MASTER DISPENSING SCHEDULE

NUCLIDE	PRODUCT	No. OF DOSES	ACTIVITY (MBq)	VOL. (ml)	REF. TIME	REF. DATE	USER	GENERATOR No.	KIT No.	CALIBRATOR READING (MBq)	DISPENSED BY	DOSE No.
Tc99m	MDP	1	200.00	3.0	11:00	09/11/17	AYR-NM					229565
Tc99m	MDP	1	200.00	3.0	11:00	09/11/17	GGH-N M					229566
Tc99m	MDP 0.5ml	1	200.00	3.0	12:00	09/11/17	ROYAL-N M	29958		301		229567
Tc99m	MDP	1	200.00	3.0	13:00	09/11/17	AYR-NM					229568
Tc99m	MDP	1	200.00	3.0	13:00	09/11/17	GGH-N M					229569
Tc99m	MDP 0.2ml	1	200.00	3.0	13:00	09/11/17	ROYAL-N M	29958		218		229570

Figure 9 - Master Dispensing Schedule at [REDACTED]

12.1.7. Master Dispensing Schedule Checked

MASTER DISPENSING SCHEDULE

25015

NUCLIDE	PRODUCT	No. OF DOSES	ACTIVITY (MBq)	VOL. (ml)	REF. TIME	REF. DATE	USER	AT TIME OF CHECKING			
								TIME	CALIBRATOR READING (MBq)	CHECKED BY	DOSE No.
Tc99m	DMSA	1	30.00	2.0	10:00	09/11/17	AYR-NM	9.42			229530
Tc99m	DMSA	1	50.00	2.0	10:00	09/11/17	GGH-NM				229531
Tc99m	DMSA	1	30.00	2.0	10:00	09/11/17	ROYAL-NM	9.42	517		229532
Tc99m	DMSA	1	80.00	3.0	12:00	09/11/17	AYR-NM				229533
Tc99m	DMSA	1	30.00	3.0	12:00	09/11/17	ROYAL-NM	9.43	101		229534
Tc99m	DMSA	1	80.00	3.0	13:00	09/11/17	GGH-NM				229535
Tc99m	PBCT	3	3000.00	3.0	10:00	09/11/17	WIG-DISPENSARY		Stable counts		229536
Tc99m	PBCT	1	30.00	0.5	11:00	09/11/17	AYR-NM				229539
Tc99m	PBCT	1	50.00	0.5	11:00	09/11/17	GGH-NM				229540
Tc99m	PBCT	1	50.00	0.5	11:00	09/11/17	ROYAL-NM	9.44	58		229561
Tc99m	PBCT	1	200.00	2.0	12:00	09/11/17	AYR-NM				229562
Tc99m	PBCT	1	300.00	2.0	12:00	09/11/17	GGH-NM				229563
Tc99m	PBCT	1	200.00	2.0	12:00	09/11/17	ROYAL-NM	9.45	274		229564

229554

Tc99m
DMSA
INTRAVENOUS INJECTION

80.00 MBq in 3.0 ml

Ref. Time 12:00 hr on 09/11/2017

Expiry 2 HOURS

229564

Tc99m
PERTECHINATE
INTRAVENOUS INJECTION

200.00 MBq in 2.0 ml

Ref. Time 12:00 hr on 09/11/2017

Expiry 2 HOURS

229552

Tc99m
DMSA
INTRAVENOUS INJECTION

50.00 MBq in 2.0 ml

Ref. Time 10:00 hr on 09/11/2017

Expiry 2 HOURS

229561

Tc99m
PERTECHINATE
INTRAVENOUS INJECTION

50.00 MBq in 0.5 ml

Ref. Time 11:00 hr on 09/11/2017

Expiry 2 HOURS

MASTER DISPENSING SCHEDULE

200014

NUCLIDE	PRODUCT	No. OF DOSES	ACTIVITY (MBq)	VOL. (ml)	REF. TIME	REF. DATE	USER	AT TIME OF CHECKING			
								TIME	CALIBRATOR READING (MBq)	CHECKED BY	DOSE No.
Tc99m	MDP	1	200.00	3.0	11:30	09/11/17	AYR-NM				229565
Tc99m	MDP	1	200.00	3.0	11:30	09/11/17	GGH-NM				229566
Tc99m	MDP	1	200.00	3.0	12:00	09/11/17	ROYAL-NM	9.46	283		229567
Tc99m	MDP	1	260.00	3.0	13:30	09/11/17	AYR-NM				229568
Tc99m	MDP	1	260.00	3.0	13:30	09/11/17	GGH-NM				229569
Tc99m	MDP	1	260.00	3.0	13:30	09/11/17	ROYAL-NM	9.47	299		229570

229567

Tc99m
METHYL DIPHOSPHONATE
INTRAVENOUS INJECTION

200.00 MBq in 3.0 ml

Ref. Time 12:00 hr on 09/11/2017

Expiry 2 HOURS

229570

Tc99m
METHYL DIPHOSPHONATE
INTRAVENOUS INJECTION

200.00 MBq in 3.0 ml

Ref. Time 13:00 hr on 09/11/2017

Expiry 2 HOURS

Figure 10 - Master Dispensing Schedule Checked at [REDACTED]

12.1.8. Consignor Certificate for delivery of packages



SAMPLE PORTFOLIO



Figure 11 - Consignor certificate for delivery of packages

12.1.9. Radiochemical Purity

Figure 12 - Example of Tc^{99m}-DMSA radiochemical purity at [REDACTED]

12.1.10. Labels for transport



Figure 13 - Labels used for transport

12.1.11. Daily Clean Form (Dispensary - [REDACTED])

SAMPLE PORTFOLIO

Figure 14 - Dispensary daily clean form at [REDACTED]

12.1.12. Contamination Monitoring Form



SAMPLE PORTFOLIO

Figure 15 - Contamination monitoring form at [redacted] – Part 1

[REDACTED]

SAMPLE PORTFOLIO

[REDACTED]

Figure 16 - Contamination monitoring form at [REDACTED] – Part 2

12.2. Imaging Acquisition and non-imaging equipment

12.2.1. Competencies Form

[REDACTED]

[REDACTED]

[REDACTED]

SAMPLE PORTFOLIO

[REDACTED]

[REDACTED]

Figure 17 - Competency assessment form – Part 1

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

SAMPLE PORTFOLIO

Figure 18 - Competency assessment form – Part 2

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

SAMPLE PORTEFOLIO

Figure 19 - Competency assessment form – Part 3



SAMPLE PORTECO



Figure 20 - Competency assessment form – Part 4

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

SAMPLE PORTFOLIO

[Redacted]

Figure 21 - Competency assessment form – Part 5

12.3. Equipment Management System

12.3.1. Equipment Inventory System

Table 9 - Equipment Inventory System at [REDACTED]

Equipment	Name of manufacturer	Model	Serial number	Year of manufacture	Year of installation
Gamma camera	GE	Optima 640	00162NUC11 HP 6600, 6601,6602	2013	2013
Gamma camera	Siemens	Symbia T	NMS0011919 HP 009608	2007	2007
Bone Densitometer	Hologics	Horizon A QDR series	HP xxxx 200846	2016	2016
Isotope calibrator	Capintec	CRC-25R	253213	2015	2015
Sample counter	Wizard 3"	1480	4800615	2007	2007
Centrifuge	MSE	Centaur 2	MSE MO 627	2013	2013
Smartvent Generator	Diagnostic Imaging	Smartvent		2005	2005
Amercare cabinet	Amercare		A1115	2016	2016
Isotope calibrator	Capintec In Amercare	CRC-25R	253373	2015	2016
Computing System	GE	Xeleris	C2C2300DCZ	2013	2013
Computing System	Nuclear Diagnostics	Hermes	-	2005 Updated 2015	2005
Radiation Monitor	Tracerco	PED Blue		2015	2015
Radiation Monitor (Wall mounted)	Berthold	LB124	HP 6899	2014	2014
Radiation Monitor (wall)	Berthold	LB123	6578	2007	2007

mounted)					
Radiation Monitor (wall mounted)	Berthold	LB123	6578	2007	2007
Radiation Monitor (wall mounted)	Berthold	LB123	6578	2007	2007
Radiation Monitor	HandHound	RadHound	HP 5395	2012	2012
Radiation Monitor (wall mounted)	Berthold	LB123	6578	2007	2007
Radiation Monitor	Mini Instruments	900	5273 HP 5383	2011	2011
Dose Rate Meter	Smartlon		L000762	1997	1997
Theatre Probe	Navigator GPS	GPS	200412003	2004	2004
Theatre Probe	NeoProbe	2000	073864228 Probe: 110-02149	2007	2007
Laser printer	Xerox	Phaser 8550	WYP146165	2007	2007
Technegas Generator	Imaging Equipment Ltd		TP 093602	2011	2011
Uptake counter	Ortec	Digibase NAI(TI) detector	13066788 60013-01299-I	2013	2013
Water Bath	Grant		80916	unknown	unknown

12.3.3. Co⁵⁷ Flood and CT Check Up

A Co 57 flood and a CT warm up should be performed daily.

When performing these tests please follow the manufacturers procedures.

Once a test is performed please put your initials in the box to show system is acceptable for use.

Week Commencing	Co57 Flood					CT Warm Up					Comments
	Mon	Tues	Wed	Thurs	Fri	Mon	Tues	Wed	Thurs	Fri	
02/01/2017	n/a	n/a	AS	AS	AS	n/a	n/a	AS	AS	AS	
09/01/2017	AS	AS	AS	AS	AS	AS	AS	AS	AS/CR	AS	
16/01/2017	AS	AS	AS	AS	AS	AS	AS	BM	BM	BM	
23/01/2017	AS	AS	AS	AS	AS	AS	AS	AS	AS	BM	
30/01/2017	AS	AS	AS	AS	AS	CR	CR	CR	CR	CR	
06/02/2017	AS	AS	AS	AS	AS	CR	CR	CR	CR	CR	
13/02/2017	AS	AS	dw	dw	dw	AS	AS	dw	dw	dw	
20/02/2017	AS	AS	AS	AS	AS	AS	AS	AS	BM	BM	
27/02/2017	AS	*	JG	AS	BM	AS	*	BM	BM	BM	Siemens engineer in all day - service
06/03/2017	AS	DW	DW	JG	JG		RSM	RSM	BM	BM	
13/03/2017	AS	AS	AS	AS	AS	RSM	CR	CR/BM	CR	CR	
20/03/2017	AS	AS	AS	AS	JG	RSM	CR	CR	BM	BM	
27/03/2017	AS	AS	AS	AS	AS	AS	AS	AS	CR	CR	
03/04/2017	AS	AS	AS	AS	AS	AS	*	*	*	AS	*ct not working
10/04/2017	DW	RSM	AS	DW	PH	RSM	RSM	DW	CR	PH	t
17/04/2017	PH	AS	*	*	*	PH	RSM	*	*	*	*Siemens carrying out head
24/04/2017	*	*	*	*	*	*	*	*	*	*	*Siemens carrying out head
01/05/2017	*	**	AS	AS	AS	*	**	BM	BM	GEServ	** Accept Test
08/05/2017	AS	AS	AS	DW	AS	AS	AS	AS	CR	CR	
15/05/2017	AS	AS	AS	AS	AS	AS	AS	CR	AS	AS	
22/05/2017	AS	AS	AS	AS	*	RSM	RSM	DW	BM	*	* Not in Use due to error
29/05/2017	*	*	*	AS	AS	*	*	*	BM	BM	* Not in use due to fault
05/06/2017	AS	AS	AS	AS	AS	DW	DW	Dw	DW	DW	
12/06/2017	SERVICE	AS	AS	AS	AS	SERVICE	RSM	CR	Cr	BM	
19/06/2017	AS	AS	DW	AS	AS	RSM	CR	CR	Cr	CR	
26/06/2017	AS	AS	AS	*	*	CR	CR	CR	*	*	* Not in use to Fault
03/07/2017	*	*	CR	FH	FH	*	*	FH	FH*	FH*	* Siemens Engineer in
10/07/2017	CR	CR	CR	CR		RSM	RSM	BM	BM		
17/07/2017	*	AS	FH	AS	AS	*	FH	FH	CR	CR	* Siemens Engineer in
24/07/2017	CP	*	*	*	*	FH	*	*	*	*	* Siemens Engineer in
31/07/2017	*	*	*	*	CR	*	*	*	*	CR	* Siemens Engineer in
07/08/2017	DW	AS	AS	DW	FH	DW	AS	AS	DW	FH	
14/08/2017	FH	AS	AS	DW	DW	RSM	RSM	BM	BM	BM	
21/08/2017	DW	DW	AS	AS	AS	RSM	RSM	RSM	BM	BM	
28/08/2017	AS	AS	AS	AS	AS	AS	CR	CR	DW	CR	
04/09/2017	AS	AS	AS	AS	DF	AS	AS	DW/CR	AS	AS	
11/09/2017	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	
18/09/2017	AS	AS	AS	AS	AS	AS	AS	AS	AS	AS	
25/09/2017	PH	*	as	as	as**	*	*	*	*	**	* Ct Broken ** Engineer In
02/10/2017	AS	*	DW	DW	AS	CR	*	RSM	BM	BM	*Seimens Engineer
09/10/2017	AS	AS	AS	AS	CR	CR	CR	CR	DW	CR	
16/10/2017	AS	AS	AS	AS		CR	FH	RSM	CR		
23/10/2017	AS	FH	AS	AS	AS	AS	FH	FH	FH	AS	
30/10/2017	AS	AS	AS	AS	AS	AS	AS	FH	AS	AS	
06/11/2017	AS	AS	AS	AS	AS	RSM	RSM	BM	BM	BM	
13/11/2017	AS	FH				RSM	RSM				
20/11/2017	AS	AS	AS	JG	CR	CR	FH	AS	CR	CR	
27/11/2017	AS	AS	AS	AS	AS	CR	FH	RSM	BM	CR	
04/12/2017	AS	AS	n/a	AS	AS	AS	AS	n/a	AS	AS	
11/12/2017	CR	AS	DW	AS	AS	AS	AS	AS	AS	AS	
18/12/2017	AS	FH	DW	AS	DW	RSM	DW	BM	BM	BM	
25/12/2017			DW	BM	DW			BM/DW	BM	BM	

Colour Key	
Red	No entry in book
Yellow	Entry but no initials

Figure 24 - Record of Daily CO⁵⁷ flood and CT check up for Siemens Symbia T at [REDACTED]

12.3.5. Weekly Checks dose calibrator [REDACTED]



SAMPLE PORTFOLIO



Figure 26 - Record of weekly dose calibrator QC at [REDACTED]

12.4. Legislation and Radiation Control

12.4.1. Protocol used In the event of a Radiation Accident and/or Spill

In all accidents involving radioactive materials the radiation protection supervisor must be informed as soon as possible.

In the event of a spill of radioactive materials, the order of priorities is as follows:

1. Protection of other personnel
2. Confinement of contamination
3. Decontamination of personnel
4. Decontamination of the area involved.

All non-contaminated staff should be evacuated and re-entry forbidden. These persons should inform the RPS regarding the incident. The RPA should also be informed where the count-rate cannot be reduced below the action levels given on the calibration certificate for the contamination monitor.

With respect to the NMD, there are two categories of spillage:

For *serious spillage* which involve the breakage of a dose vial containing either therapeutic or diagnostic radionuclide. In this case the area should be cleared of staff not directly involved and personnel checked for contamination. The RPS and senior scientific staff should be contacted **immediately**.

For smaller *spills including drips etc*, the spillage should be contained and personnel checked for contamination. If contamination is found, procedures for removing it should be instituted immediately. The spillage should be cleaned up utilising protective clothing and possibly remote handling tools. Waste materials should be double-bagged and placed in the storage area for radioactive waste. Any areas of floor or bench still contaminated after cleaning procedures should be covered with Benchcote secured with radioactive warning tape. The RPS should be informed.

Decontamination procedures

- Hands and other skin areas: - Wash thoroughly with soap and water. Do not use detergents, abrasive materials etc. Take great care not to injure the skin. Even if contamination has not been sufficiently reduced, do not proceed to the stage of breaking the skin.

- Eyes, cuts: - Irrigate with water, but take great care to prevent the spread of contamination to or from other areas.
- Clothing: - Contaminated garments should be removed immediately and placed in a sealed container. They should not be removed from the room until the contamination has been monitored.
- Working surface: - The surplus liquid should be mopped up with absorbent tissues, and then the area washed with detergent and water. Place all contaminated materials in a separate sealed container and keep till monitored. Entry to the area must be restricted until monitoring has been carried out and the radiation level has been assessed. The radiation protection supervisor will arrange monitoring.

SAMPLE PORTEFOLIO

12.4.2. Leak Test Sealed Sources

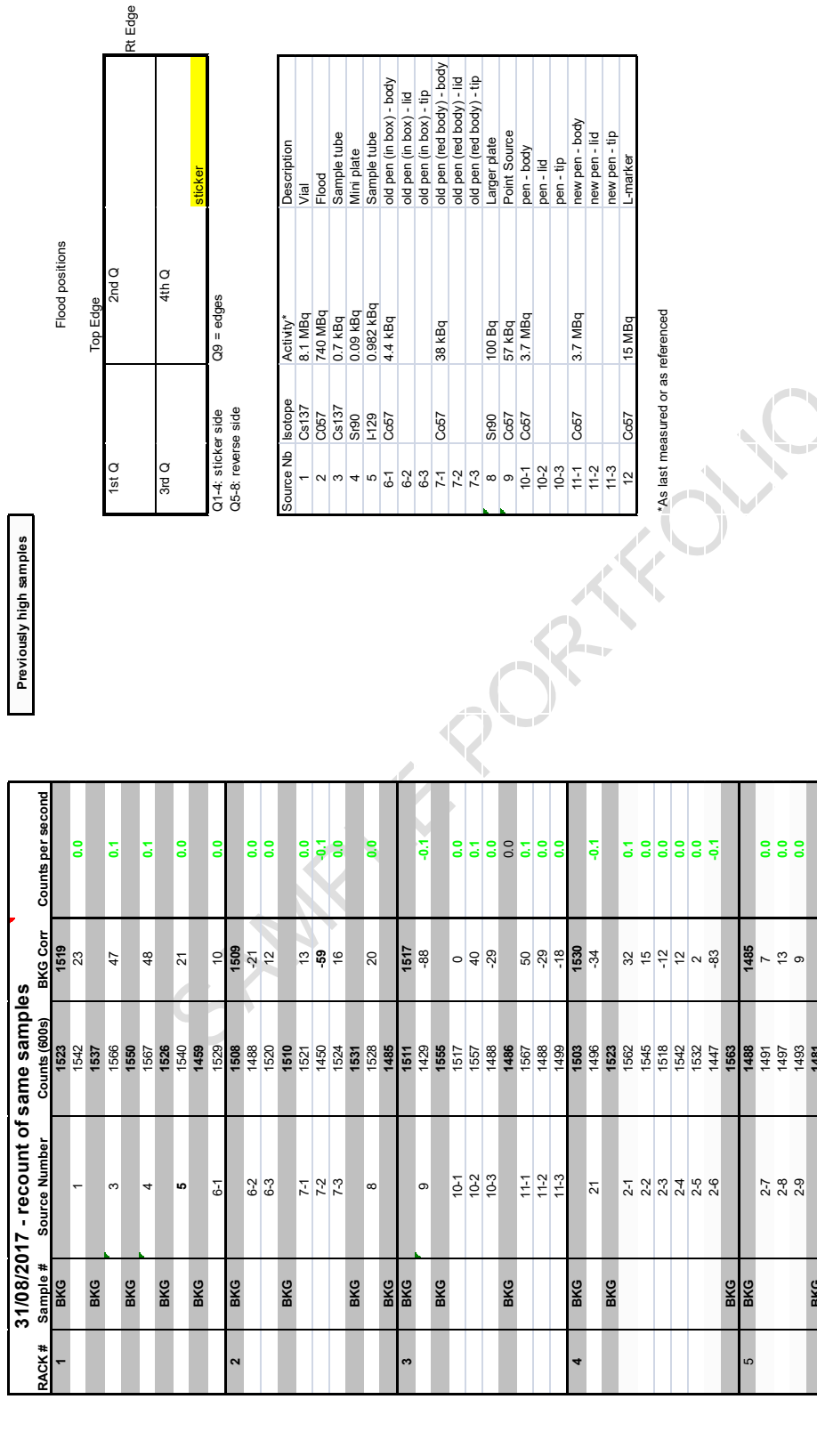


Figure 27 - Record of leak test sealed sources results at [redacted]

12.4.3. Consignor Note to Return Packages

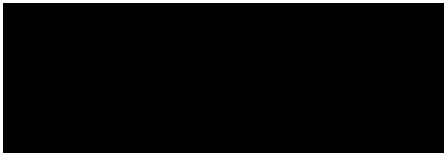
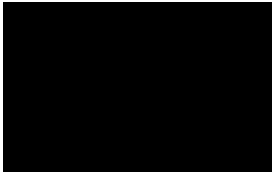


SAMPLE PORTFOLIO

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Figure 28 - Consignor note to return Krypton Generator



SAMPLE PORTFOLIO



Figure 29 - Consignor note to return tins and drums with empty lead pots

12.5. Clinical Audit - BSLN

This aim of this audit was to determinate the reasons for the discrepancy between the results from both sites for successful visualisation of the BSLN, comparing demographics, clinical status and imaging outcome of patients imaged at [REDACTED] and imaging outcomes at both sites against EANM/BNMS standards¹⁸. The CRIS reports and minimum of 60 images were reviewed for this audit. The data for the audit was recorded in 2015 in 30 patients per site (total of 60 patients) and all patients are females. Investigation of results found that Sentinel Node (SLN) were only visualised in approximately 80% of the patients at [REDACTED] whilst SLN were visualised in approximately 94% of patients attending at [REDACTED] which means the results at the [REDACTED] were falling short of this target.

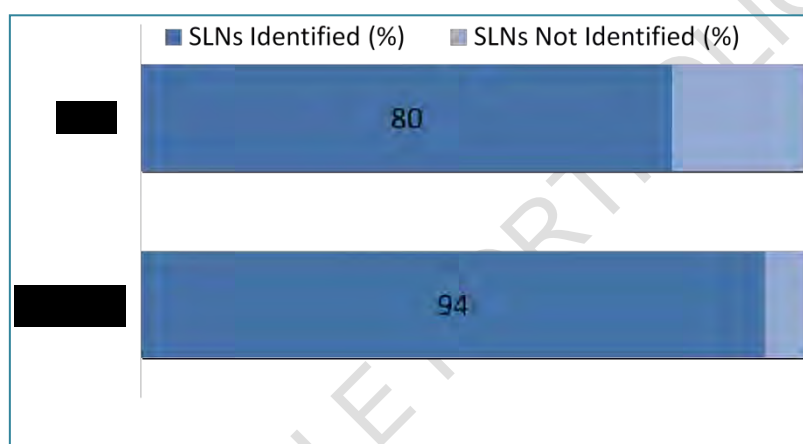


Figure 30 - Results of SLN identified and not identified between [REDACTED]

In order to determine why the [REDACTED] site was not hitting the 95% target, all literature for SLN imaging and imaging technique at each site was investigated. Initially demographics and clinical history of the patients (age of patients, tumour stage, date of imaging)¹⁹ and procedure performed (SACH only performs day surgery and [REDACTED] more complex cases) were investigated and compared.

The reviewed literature recommend to acquire an anterior image (patient in supine), lateral image (patient on side) and anterior oblique image (patient propped at 45 degrees). The images must be acquired at 15-30 minutes post injection and at 1 & 2-4 hours as

¹⁸ EANM/BNMS Standards – SLNs should be identified in 95% of patients and 20-30% of SLNs should contain metastatic cells.

¹⁹ To determine whether the two groups were significantly different.