ansto **OHSE Form**

Risk Management – Risk Assessment

Safe Work Method Statement and Environmental Protection Plan

Preliminary

SWMS file No.:	TBA	**WO No.:**	TBA	**Site specific induction req'd:**	Yes ☒ No ☐
Location: building/area:	B81 Control (room 0043) and the Cyclotron Vault room (0053)			**Environmental risk assessment req'd:**	Yes ☒ No ☐
Planned start date:	TBA			**Potential ionising radiation exposure:**	Yes ☒ No ☐
Activity description:	Clear cyclotron vault (Room 0053)			**Radiation survey performed:**	Yes ☒ No ☐
Responsible Officer:	Gary Simms			**Radiation dose constraints specified:**	Yes ☒ No ☐
Company performing work:	ANSTO			**Recommended dosimetry:**	EPD ☒ TLD ☐ Extremity ☐
ANSTO personnel:	TBA			**Radiation Protection Advisor:**	
Contractors personnel:	TBA				

Licences:	**Chemicals:**
Rigger's ticket; mechanical and trades certificate	None
Permits required:	**Equipment:**
Safe Work Permit	Existing 400kg overhead crane. Mobile working platforms. Electrical meters. Material handling equipment. Lifting equipment. Mandatory – EPD, TLD dosimetry PPE - latex gloves, sacrificial boots, riggers gloves, tyvek coveralls (where required), P3 masks (where required), hardhats (where required)
Planning:	**Abbreviations:**
Gary Simms / Algis Lencus / Alec Kimber	LH-Lucas Heights ELCB earth leakage circuit breaker EPD electronic portable dosimeter

	RPA Radiation Protection Adviser HPS Health Physics Surveyor

Notes:

This is a preliminary SWMS only – final details are dependent on selected staff and equipment.

This SWMS is for the removal of equipment from the cyclotron vault and control room. It is a preliminary SWMS and final detailed SWMS will be prepared with the involvement of the work crews.

The removal of equipment from the cyclotron vault room involves a number of common hazards. These include:

- Electrical hazards. There is a significant quantity of power and instrumentation cabling throughout the vault. These are to be controlled by:
  - ANSTO Authorised Isolator to lock out and tag out all HV supply.
  - Electrician will be present to prove dead all circuits that are to be dismantled.
  - Use of separate power board and lighting in the cyclotron vault for to allow for complete disconnection of power once the cyclotron is closed for the final time.
- Radiation hazards. There are sources of radiation throughout the vault due to activated materials. These hazards are to be controlled by:
  - The cyclotron vault contains radiation hazards and will be monitored at all times whilst work is carried out.
  - All staff working in the vault room and all blue areas of the Camperdown facility to wear EPDs.
  - Radiation monitors to be positioned as advised by ANSTO Radiation Protection Adviser (RPA).
  - Health Physics Surveyor (HPS) to be present for dismantling work, as agreed and communicated with dismantling staff.
  - Surveys to be conducted regularly and when required to notify staff of changed radiological conditions as vault components are dismantled.
  - Work shall follow advice by RPA and as set out in the Decommissioning Radiation Protection Plan.
- Manual handling hazards. The dismantling will involve removal of components of different weights, sizes and sometimes involve removal that would involve difficult reaching if performed inappropriately. These hazards will be controlled by:
  - Staff with to be trained in manual handling.
  - Ensuring work is performed in comfortable environment by keeping surrounding areas cleared where possible through good housekeeping.
  - Use of work platforms.
  - Two person lift operations for 10kg – 30kg loads.
  - Use of certified lifting equipment for heavy loads.
  - Use of qualified dogman and rigger.
  - Use of trolleys for material handling (moving material out of vault).
- Work at heights. Some work will involve work on top of cyclotron, or at height (over 2 metres). This hazard is to be controlled by:
  - Use of stable work platforms.
  - No use of ladders except where specifically approved by OHS Advisor.
  - Ensuring there is no personnel standing under other work being carried out or loads.
  - Use of working at heights trained personnel where otherwise required.
- Restricted spaces. Some work is to be carried out in the vault trench, which is a restricted space. This hazard is to be controlled by:
  - Completing a confined space risk assessment and ensuring any equipment or qualified staff recommended by assessment are available.
  - Edge protection of open trenches through use of marked barriers.
- Contamination. Although the vault has been assessed as not containing any contamination, the dismantling work shall assume that contamination is possible through dispersal of activated materials. This hazard to be controlled by:
  - Dismantling methods that do not involve friction or breaking up of materials.
  - Bagging of dismantled components.

- Overshoes (or sacrificial safety shoes), gowns (or Tyvek coveralls) and gloves as mandatory PPE.
- Use of existing barrier procedures to ensure any contamination is maintained within the existing “Blue” areas.
- Regular checks of areas by HPS staff for contamination. Any contamination found to be decontaminated.

- Slips, Trips and Falls. The vault is a relatively small and cramped working environment. This hazard to be controlled by:
  - Good housekeeping, designated tool & staging areas, designated temporary storage of dismantled component areas.
  - Regular housekeeping checks and contamination surveys.
  - Immediately mop up any spills.
  - Maintain clear areas.
- Pressure. There are some gas and compressed air lines in the vault. Introduced lifting equipment may have hydraulic lines. Sudden release of pressure from pressurised lines could cause an embolism or injury through thrashing lines. This hazard to be controlled by:
  - Safely identifying any leaks.
  - Review of all lifting equipment prior to use.
  - Not testing for leaks by touching lines.
  - Isolating all pressurised lines as soon as they are no longer required.
- Fire. There is very minimal fire load in the vault. There are oils contained in pumps and potentially release as a mist through compressed air lines. These hazards will be controlled by:
  - Draining pump oil from redundant pumps prior to work.
  - Isolating compressed air lines as soon as this service is not required.
  - Checking all introduced hydraulic equipment for leaks.
  - No gas tanks or flammables to be introduced to the vault room.

Activity List the tasks required to perform the job in the sequence they are carried out	**Hazard** Against each task, list the hazards present when the task is being performed	**Risk Rating** Use AG 2395 risk assessment matrix to calculate the risk rating	**Controls** Record the safety controls that will be implemented to reduce the risk associated with each hazard	**Risk Rating** Calculate risk after control in place	**Responsible** List those responsible to implement the control measure
Preparation					
Health Physics survey of work area	N/A				HPS
Acquire SWP	N/A				RO
Installation of temporary power to vault and control room	Electric Shock Trips Manual handling	High	Cable stands RCD Two person operation	Low	Electrician
Isolate RF Amplifier	Electric Shock	High	Tag / lock-out Test after Isolation, Discharge capacitors	Low	Authorised Electrical Isolator
Isolate the Ion Source and Main Coil Power Supply and disconnect magnet cables at coil.	Electric Shock	High	Tag / lock-out Test after Isolation, Discharge capacitors	Low	Authorised Electrical Isolator
Vent tank via SCADA	Asphyxiation (very low risk)	Low	Dissipate evacuated gases by fan.	Very Low	Cyclotron Engineer
All activities	Local minor emergency response	N/A	Prepare specific emergency procedure with current phone lists etc	N/A	Works Coordinator
Implementation					
Open Cyclotron and Disconnect Services					
Remove vacuum valves to switching magnets and blank	Manual handling Radiation	Low	Manual handling training 2 person operation	V. Low	HPS Fitters
Open tank (insertion of spacers)	Manual handling (reaching) Pinch hazard Radiation	Low	Use standard operating procedures to open tank Manual handling training Low access platform	V. Low	Cyclotron Engineer Fitter HPS
Remove stripper rod sleeves and	Manual handling	Low	Plan work in advance to	Low	Fitters

components	Radiation (~1mSv/hr dose rate at contact)		minimise work time (arrange correct tools and clear instructions) Use standard operating procedures		HPS
Remove switching magnets	Manual handling Radiation	Low	Manual handling training 2 person operation Lifting Devices as req'd Radiation controls listed above	Low	Fitters HPS
Remove internal RF components	Manual handling Radiation	Low	Manual handling training 2 person operation Lifting Devices as req'd Radiation controls listed above	Low	Fitters HPS
Close tank (removal of spacers)	Manual handling (reaching) Pinch hazard Radiation Crushing	Medium	Manual handling training Use standard operating procedures to close tank 2 person operation Low access platform Radiation controls listed above	Low	Cyclotron Engineer Fitters HPS
Disconnect all electrical, water and pneumatic connections to vacuum chamber, VAT valves, collimators, cubes (fingers) and Faraday cups.	Electric Shock Radiation Slips Manual handling strains	Medium	Authorised isolators (Double?) Tagged out/locked out → refer elect isolation controls Radiation controls listed above	Low	Authorised Isolator HPS Fitters
Remove All Beam Lines (applicable to PET and north and south SPECT beam lines)					
Remove vacuum pump	Manual handling Radiation Pinch hazard	Low	Use 400kg vault crane Manual handling training 2 person operation Radiation controls listed above	Low	Fitters HPS
Remove cubes and Faraday Cup assemblies	Manual handling Radiation Crushing injury	Low	Manual handling training 2 person operation Heavy assemblies to be slung and held by crane Lifting Devices as req'd	Low	Fitter Dogman HPS

			Radiation controls listed above		
Remove quadrupoles & collimators	Manual handling Radiation	Low	Manual handling training 2 person operation Lifting Devices as req'd Radiation controls listed above	V. Low	HPS Fitters
Remove beam stands	Manual handling Radiation	Low	Manual handling training 2 person operation Lifting Devices as req'd Radiation controls listed above	V. Low	HPS Fitters
Remove Equipment to Side of Cyclotron					
Remove stripper rod assemblies	Manual handling Trips slips falls. Radiation Heavy Load	Medium	Keep areas clear 2 person operation Use 400kg vault crane Radiation controls listed above	V. Low	Fitters HPS
Remove cooling coil lines	Manual handling Radiation Spills	Low	Manual handling training 2 person operation Lifting Devices as req'd Mop area as req'd Radiation controls listed above	V. Low	HPS Fitters
Remove Equipment to Top of Cyclotron & Overhead Target Transfer System					
Remove cryo and vac pumps	Manual handling Radiation	Low	Manual handling training 2 person operation Lifting Devices as req'd Radiation controls listed above	V. Low	HPS Fitters
Remove ion source and injection assembly and Install blanks to all penetrations	Manual handling Radiation	Low	Manual handling training 2 person operation Lifting Devices as req'd Radiation controls listed above	V. Low	HPS Fitters
Remove overhead target transfer system	Working at height - falls Radiation Manual handling Heavy loads	Medium	Cyclotron floor opening to have edge protection HPS survey Two man lift	Low	Fitters HPS Dogman

	Crushing Dropped items (from workers above others) Potential contamination – dust laying on pipe top-side		Use of overhead crane. Plan work in advance Radiation controls listed above Raised work safety platform – wheels locked No working below other work at height (clear area)		
Remove cyclotron platform	Heavy load Working at height - falls Radiation Manual handling Dropped items (from workers above others)	Medium	Mobile work platform Manual handling training 2 person operation No working below other work at height (clear area) Radiation controls listed above	Low	Fitters HPS Dogman
Remove cyclotron hydraulic jacks	Manual handling Radiation Spills	Low	Manual handling training 2 person operation Lifting Devices as req'd Radiation controls listed above Mop area as req'd	V. Low	HPS Fitters
Remove Cooling Manifolds					
Remove cooling manifolds	Flooding slips and falls isolation overflow trade waste Radiation	Low	Isolate service lines Mop up any spills Radiation controls listed above	V. Low	Fitter HPS
Removal of equipment from under side of cyclotron (work inside service trench)					
Remove cryopumps, helium pumps and plumbing	Restricted space Difficult injured person recovery. Heavy manual handling in small space Minor head injury – low headroom Radiation Falls into trench Spills	Medium	Use small scissor lift table. Two person lift Pumps to be secured to lift table Hands to be kept clear Edge protection to trench Complete confined space risk assessment. Trench rescue plan to be implemented should the need arise.	Low	Fitters HPS Dogman

			Mop up any spills Radiation controls listed above		
Blank penetrations	Restricted space Difficult injured person recovery. Minor head injury – low headroom Radiation Falls into trench	Medium	Edge protection to trench Complete confined space risk assessment. Trench rescue plan to be implemented should the need arise. Radiation controls listed above	Low	Fitters HPS
Wiring and piped services					
Remove wiring and services from cyclotron	Electric shocks Working at height and falls Trips/slips Radiation Dropped items (from workers above others)	Medium	Temporary power installation Refer to previous isolation Raised work platform No working below other work at height (clear area) Radiation controls listed above	Low	Fitters HPS
Enter service trench un-clip all services sequentially i.e. all control all power, all ¼" pressure pipe, all vac etc and tape together	Restricted space Impact injuries Difficult injured person retrieval	Low	Complete confined space assessment and rescue plan Confined space trained staff Continuous air quality monitoring & maintain adequate ventilation	Low	Confined space trained fitters OHS Adviser HPS
Remove taped Cable looms sequentially, neatly and place into provided box remove from vault	Restricted space Impact injuries Difficult injured person retrieval	Medium	Complete confined space assessment and rescue plan Confined space trained staff Continuous air quality monitoring & maintain adequate ventilation	Low	Confined space trained fitters OHS Adviser HPS
Remove ladder cable tray	Cuts Restricted space Impact injuries Difficult injured person retrieval	Medium	Complete confined space assessment and rescue plan Confined space trained staff Continuous air quality monitoring & maintain adequate ventilation	Low	Confined space trained fitters OHS Adviser HPS

Cyclotron tank preparation for removal					
All openings to be blanked with pre-made blank off plates.	Working at height - falls Radiation Manual handling Dropped items (from workers above others)	Medium	Cyclotron Platform Good house keeping required Keep areas clean do one job at a time. Radiation controls listed above	Low	Fitters HPS Dogman
Assemble cyclotron tank lifting cradle using 400kg crane.	Heavy load Working at height - falls Radiation Manual handling Dropped items (from workers above others)	Medium	Mobile work platform Radiation controls listed above	Low	Fitters HPS Dogman
Wrap cyclotron fully in plastic	Working at height Radiation	Medium	Mobile work platform Radiation controls listed above	Low	Fitters HPS
Remove Interwall Quadrupole					
Disconnect from beam vault side.	Radiation Manual handling	Low	Radiation controls listed above Plan work in advance Two person operation	Low	Fitters HPS
Remove quadrupole	Heavy loads Manual handling Crushing Pinches Radiation Potential contamination (low risk)	Medium	Install special-to-type roller carriage Two person operation Use of overhead crane to tilt quadrupole assembly HPS Survey (for potential contamination) Radiation controls listed above	Low	Fitters HPS Dogman
Clear Control Room					
Remove small/miscellaneous equipment & furniture	Manual handling	Medium	Two man operation Materials handling equipment	Low	Labourers
Disconnect all power and control wiring from Control room cabinets.	Shock	Medium	(isolations previously arranged) Prove all circuits dead	Low	Electrician

Remove cabinets	Falls Manual handling Cuts	Low	Edge protection Two man operation Materials handling equipment	V. Low	Labourers
Clear sub floor service trench	Restricted space	Low	Complete confined space risk assessment Confined space trained staff	Low	Labourers
Conclusion					
All removed components shall be accompanied by a Radiation Contamination Control Certificate (RCCC) whether to basement or off site					Contractor Supervisor HPS Waste Operations staff
The Safe work Permit (SWP) shall be signed off at the Completion of works					RO HPS Waste Operations staff

The SWMES is to be signed by all participants in the work. Signing acknowledges that the work methods proposed will be followed.

Prepared by:		
Name	**Signature**	**Date**
Gary Simms.		21-06-10
Reviewed by:		
Name	**Signature**	**Date**