Eskom	WORKING PROCEDURE	Allocation Centre 38A	Reference Number KWW-TES-011	Rev 5
NNR: NO No.:	ENCAPSULATION OF RADIOACTIVE CONCENTRATES IN CONCRETE DRUMS			PAGE 1

KORC	ACCESS	IMPORTANCE CATEGORY	NEXT REVIEW DATE	DATE AUTHORISED
NO	Nuclear Restricted	SR	2026-01-28	2021-01-28

COMPILED / REVISED	REVIEWED	AUTHORISED
(sgd) U PHILANDER	(sgd) X NOVEMBER	(sgd) C LE ROUX
U PHILANDER	X NOVEMBER	C LE ROUX
SENIOR TECHNICIAN RADWASTE	SUPERVISOR RADWASTE	SENIOR SUPERVISOR TECHNICAL RADWASTE
DATE 2021-01-28	**DATE** 2021-01-28	**DATE** 2021-01-28

THIS PROCEDURE HAS BEEN SEEN AND ACCEPTED BY:

U Philander	Document Custodian
I Philander	ALARA
M Minnaar	Senior Advisor (RP)

CATEGORY 2 – PROCEDURE AT THE JOB

FCA	ALARA REVIEW	SUPERSEDES
PROTECTION	YES 2020-12-03	KWW-TES-011, Rev 4 dd. 2017-08-16 FULL REVIEW

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8	x	x	x					
9	x	x	x					
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1.0 PURPOSE

1.1 To describe the operation of the TES system when encapsulating radioactive liquid effluent concentrates in concrete drums.

2.0 SCOPE

2.1 Applicable to the operation of the TES system situated in the NAB.

3.0 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

N/A

3.2 Abbreviations

3.2.1 **NAB** – Nuclear Auxiliary Building

3.2.2 **RP** – Radiation Protection

3.2.3 **RPC** – Radiation Protection Certificate

3.2.4 **RPM** – Radiation Protection Monitor

4.0 REFERENCES

4.1 Referenced Documents

4.1.1 335-2, Rev 5: Koeberg Nuclear Power Station Management Manual

4.1.2 KAA-500, Rev 13: The Process for Controlled Documents

4.1.3 KSA-011, Rev 14: The Requirements for Controlled Documents

4.2 Applicable Documents

4.2.1 VLP-WAC-001: Waste Acceptance Criteria

5.0 PREREQUISITES

	ACTIONS AND CHECKS	SIGN
5.1	The encapsulation of radioactive liquid effluent concentrates must be carried out by the Radwaste Section under a Work Request and a RPC.	
5.2	RPM must be in attendance for the duration of the encapsulation.	
5.3	Ensure that the solid radwaste treatment system (TES) is available.	
5.4	Ensure that the demineraliser water distribution system (SED) is available.	
5.5	Ensure that the drain and vent system (RPE) is available.	
5.6	Ensure that the alarm processing system (KSA) is available.	
5.7	Ensure that the general control system (KRG) is available.	
5.8	Ensure that the instrument air distribution system (SAR) is available.	

5.9 PRE-JOB PREPARATION

	ACTIONS AND CHECKS	SIGN
5.9.1	Generate and receive the Work Request and discuss contents with the section Vertical Planner.	
5.9.2	The Vertical Planner enters the drumming of concentrates on the Plan of the Day for a 7-day period. This time frame can be shortened or extended, as required.	
5.9.3	The batching plant operator to confirm availability of the batching plant, 7-ton forklift and sufficient consumables for concrete mixes.	
5.9.4	The batching plant operator to select 11 C1 concrete drums for the drumming campaign and complete section A of the Waste Transfer Form LLW13 (available electronically G:\Koeberg\Nuclear Services\Radiation Protection\Sharepoint Migration\RP Operations\Radwaste\LLW-13 Forms\LLW13 CONCRETE DRUMS)	
5.9.5	TES operators to confirm availability of the TES plant in the NAB.	
5.9.6	TES operators to check and confirm that the 9 TES 001 BA concentrate storage tank is at 65°C, or lower (minimum 50°C), and that the tank vent valve, 9 TEU 040 VA, is open.	
5.9.7	TES operators to check that the C1 blade is installed in TES mixer 9 TES 001 EG. If there is no blade, or the incorrect blade is installed, refer to Appendix 1 for installation of a new blade in the mixer.	
5.9.8	The batching plant operator to take a prepared C1 drum to the drum reception area of the NAB. This is to allow the TES operators to carry out a dry run to check TES system functionality, operating all major components, excluding valves. ***NOTE:*** *Pay particular attention to the movement of the chutes.*	

6.0 PRECAUTIONS AND LIMITATIONS

	ACTIONS AND CHECKS	SIGN
6.1	**PRECAUTIONS**	
6.1.1	Ensure 9 TEU 040 VA is open before to commencement of drumming.	
6.1.2	Ensure movement of the chutes are not hindered. If movement of chutes are hindered do not proceed and raise notification to clean mixer.	
6.1.3	Ensure a clear pathway from station 1 to station 5 before concrete drum entering and exiting drumming tunnel to prevent equipment damage.	
6.2	**LIMITATIONS**	
6.2.1	This procedure can be performed in any unit state.	
6.2.2	Comply with Power Station Regulatory Safety Standards.	

7.0 INSTRUCTIONS

	ACTIONS AND CHECKS	IDENTIFICATION	COMMENTS	SIGN
7.1	**Encapsulating Radioactive Concentrates into Concrete Drums**			
7.1.1	Proceed to the filter floor and transfer the bogey of the overhead crane to operate on the rail through N505 and N510.	N 570 9 DMN 001 PR		
7.1.2	Open motorised hatch 9 DMN 010 CR to allow dry mix to be lifted to N505.	9 DMN 010 CR	Inform the NAB control room that DVN could be affected.	
7.1.3	Instruct the batching plant operators to prepare dry mix for concentrates into the C1 drum.			
7.1.4	When the dry mix hopper is delivered to N264, send cranage down to the 0 metre level.	9 DMN 001 PR		
7.1.5	Connect the crane hook to the dry mix hopper and raise the hopper to the filter floor level.	9 TES 003 DM	Use slow speed initially to restrict swinging of the hopper, and slow speed again when going through hatch 9 DMN 010 CR.	
7.1.6	Transport the dry mix hopper and place it on its support in N505. Connect an air hose to the hopper vibrator and open the air supply. Open the hopper discharge valve.	9 TES 003 DM TES 023 VS	Make sure that the limit switch is made on the support stand and light 057 LA is lit at TES control panel station 4.	
7.1.7	Carry out a final inspection of the C1 concrete container at the entrance to the TES drumming facility.		Container in sound condition with no cracks or chips, liner properly located and polycord in place.	
7.1.8	Lift the C1 container using the overhead crane and transfer it onto trolley 002 CX.	9 DMN 002 PR	C1 drum properly located on 002 CX trolley.	
7.1.9	Open door A, using pushbutton.	9 TES 009 TO	Signal light 010 LA is lit when door is open.	
7.1.10	Start the transfer of 002 CX trolley with C1 drum from station 1 to station 2, using pushbutton.	9 TES 011 TO	Signal light 009 LA is lit when 002 CX trolley is at station 2.	
7.1.11	At control station 2, select C1 drum.	9 TES 001 TO	“Drum C1” light 160 LA is lit.	

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
7.1.12	Close door A using pushbutton.	9 TES 010 TO	Signal light 011 LA is lit when door A is closed.	
7.1.13	Raise crab 001 CX to the high position, using pushbutton.	9 TES 013 TO	Signal light 013 LA is lit when 001 CX crab is in high position.	
7.1.14	Lower crab 001 CX to the transfer position, using pushbutton.	9 TES 014 TO	Signal light 014 LA is lit when 001 CX crab is in the transfer position.	
	CAUTION: *The operator must now go to station 3 control panel for the following operations.*			
7.1.15	Open door B, using pushbutton.	9 TES 028 TO	Signal light 018 LA is lit when door B is open.	
7.1.16	Start the transfer of crab 001 CX from station 2 to station 3, using pushbutton.	9 TES 017 TO	Signal light 024 LA is lit when 001 CX crab is at station 3.	
7.1.17	Close door B, using pushbutton.	9 TES 029 TO	Signal light 019 LA is lit when door B is closed.	
	CAUTION: *The operator must now go to station 4 control panel for the following operations.*			
7.1.18	Select “Drum” using key switch.	9 TES 004 CC	At station 4 control panel.	
7.1.19	Start the transfer of crab 001 CX from station 3 to station 4, using pushbutton.	9 TES 019 TO	Signal light 025 LA is lit when 001 CX crab is at station 4.	
7.1.20	Retract station 4 dip tray, using switch.	9 TES 022 CC	Signal light 073 LA is lit when the drip tray is in the fully retracted position.	
7.1.21	Put exhaust fan of 9 TES 001 EG mixer selector switch in auto position.	9 TES 046 CC		
7.1.22	Raise the crab 001 CX to the high position using switch.	9 TES 021 CC	Signal light 038 LA is lit when the drum is in the high position. Exhaust fan of 9 TES 001 EG will come on automatically and signal light 154 LA is lit.	
7.1.23	Switch on the camera and adjust the picture for a clear view of the inside of the C1 concrete container.	Remote Camera inside 9 TES 001 EG	Drumming of concentrates must not proceed if the camera is not functioning.	

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
	***CAUTION**: Ensure switch, 9 TES 025 CC, is turned the correct way. Turn switch clockwise for lowering mixer blade and anti-clockwise to dislodge blade.*			
7.1.24	Start lowering the mixer blade to the mix position using switch.	9 TES 025 CC	Signal light 157 LA is lit. Observe the blade lowering sequence with the camera. Stop is automatic in the mix position.	
7.1.25	Start slow speed rotation of the mixer blade, using pushbutton.	9 TES 039 TO	Signal light 156 LA is lit.	
7.1.26	Position the resins and concentrates chutes using switch.	9 TES 045 CC	Signal lights 151 / 152 LA is on when the chutes are in the correct position for discharge into the drum. Authorisation to discharge resins and concentrates light TES 171 LA is lit.	
7.1.27	Check that 001 PM metering chamber vent valve is open.	9 TES 102 VA	Vent valve 102 VA is fully open in room ND403.	
7.1.28	Open 001 PM metering chamber inlet valve using switch.	9 TES 005 VB 9 TES 027 CC	Metering chamber filling time is 3 minutes ± 10 seconds once 9 TES 005 VB is open.	
7.1.29	Close 001 PM metering chamber inlet valve using switch.	9 TES 005 VB 9 TES 027 CC		
7.1.30	Open 001 PM metering chamber discharge valve using switch.	9 TES 006 VB 9 TES 028 CC	Metering chamber discharge time is 1 minute 30 seconds ± 10 seconds.	
7.1.31	Follow the product flow on the monitor. When the flow is over, close the metering chamber discharge valve using switch.	9 TES 006 VB 9 TES 028 CC		
	***NOTE:** Once metering chamber discharge valve 9 TES 006 VB closes, the drain is recorded and displayed on station 4 control panel on 9 TES 001 QD. In the case of a C1 drum being used, the previous operations from 7.1.28 to 7.1.31 will be carried out eight times until eight concentrate discharges are displayed on 9 TES 001 QD. After the 8 is displayed on 9 TES 001 QD, the authorisation light 171 LA will go out and the dry products signal light 170 LA will come on, authorising dry products discharge.*			

	ACTIONS AND CHECKS	IDENTIFICATION	COMMENTS	SIGN
	***CAUTION**: Ensure switch, 9 TES 025 CC, is turned the correct way. Turn switch clockwise for lowering mixer blade and anti-clockwise to dislodge blade.*			
7.1.32	Retract the concentrates and resins chutes using switch.	9 TES 045 CC	Signal lights 151 / 152 LA is not lit once the chutes are fully retracted.	
7.1.33	Position the dry products chute using switch.	9 TES 044 CC	Signal light 150 LA is lit when the dry products chute is in the correct position for discharge into the C1 drum.	
7.1.34	Start the dry products screw conveyor using switch.	9 TES 024 VS 9 TES 026 CC	Signal light 076 LA is lit when the screw conveyer starts.	
	***NOTE:** The operator must monitor the flow of dry products on the monitor. The discharge time for the entire dry products to enter the C1 drum is 35 to 45 minutes. After this time and when no more dry product is observed flowing on the monitor, proceed as follows.*			
7.1.35	Stop the dry products screw conveyor using switch.	9 TES 024 VS 9 TES 026 CC	Signal light 076 LA is not lit.	
7.1.36	Retract the dry products chute using switch.	9 TES 044 CC	Signal light 150 LA is not lit when the dry products chute is fully retracted.	
	***NOTE:** When utilising the last C1 concrete drum of the drumming campaign after emptying of 9 TES 001 BA proceed to Appendix 4 for flushing of discharge line and 9 TES 001 PM after drumming.*			
7.1.37	Carry on mixing the contents of the C1 drum for another 5 minutes ± 1 minute.		Any dry product lying on top of the mix will be drawn into the wet mix.	
	***NOTE:** Experience has shown that dry layers may be evident in the mix. Therefore, it is advisable to raise and lower the blade of the mixer at least twice to make sure that the mix is completely homogeneous, with no dry spots.*			
7.1.38	Start raising the mixer blade to the high position using pushbutton.	9 TES 153 TO	Signal light 157 LA is lit. Mixer is rising to the high position. Rising and rotation of the blade will stop automatically when the blade reaches the high position.	
	***CAUTION**: Ensure switch, 9 TES 025 CC, is turned the correct way. Turn switch clockwise for lowering mixer blade and anti-clockwise to dislodge blade.*			
7.1.39	Start lower the mixer blade to the mix position using switch.	9 TES 025 CC	Signal light 157 LA is lit. The mixer blade is lowering to the mix position.	

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
7.1.40	Observe the lowering of the mixer blade, using the monitor, before the mixer blade enters the mix. Start the mixer blade rotation using pushbutton.	9 TES 039 TO	Signal light 136 LA is lit. The mixer blade must be rotating before entry into the mix to prevent undue torque on the mixer motor	
7.1.41	Check the entry of the mixer blade into the wet mix, using the monitor.			
7.1.42	Continue mixing for 5 minutes ± 1 minute, then repeat steps 7.1.38 to 7.1.40 one more time.			
	NOTE: *Close observations of all these actions and checks using the monitor will guide the operator when the mix is indeed homogeneous. No more dry patches will be brought to the surface of the mix by raising the mixer blade. The instruction sequence can now be carried out as follows.*			
7.1.43	Start raising the mixer blade to the high position using pushbutton.	9 TES 153 TO	Signal light 157 is lit. The mixer is rising to the high position. Rising and rotation of the mixer blade will stop automatically when the blade reaches the high position.	
7.1.44	Lower the crab 001 CX to the transfer position using switch.	9 TES 021 CC	Signal light 039 LA is lit. Crab 001 CX is in the transfer position. The mixer exhaust fan will stop automatically once the crab is in the transfer position. Signal light 9 TES 154 LA is not lit.	
7.1.45	Close the drip tray using switch.	9 TES 022 CC	Signal light 078 LA is lit when the drip tray is in the fully closed position.	
7.1.46	Start the transfer of crab 001 CX from station 4 to station 3 using pushbutton.	9 TES 036 TO	Signal light 040 LA is not lit. Station 4 control panel	
7.1.47	Check that crab 001 CX is at station 3.		Signal light 024 LA is lit Station 3 control panel	
7.1.48	Open door B using pushbutton.	9 TES 028 TO	Signal light 018 LA is lit.	
7.1.49	Once door B is fully open, start transfer of crab 001 CX from station 3 to station 2 using pushbutton.	9 TES 018 TO	Signal light 024 LA is not lit at station 3 when crab 001 CX is at station 2. Signal light 023 LA is lit at station 3 and signal light 012 LA is lit at station 2 control panel.	

	ACTIONS AND CHECKS	IDENTIFICATION	COMMENTS	SIGN
7.1.50	Close door B using pushbutton.	9 TES 029 TO	Signal light 019 LA is lit Station 3 control panel	
	CAUTION: *The operator must now go to station 2 control panel for the following operations.*			
7.1.51	Start crab 001 CX to go to the low position using pushbutton.	9 TES 015 TO	Signal light 015 LA is lit.	
7.1.52	When crab 001 CX is at the low position and the C1 drum is resting on trolley 002 CX, open door A using pushbutton.	9 TES 009 TO	Signal light 010 LA is lit when door A is open	
7.1.53	Start the transfer of trolley 002 CX with the C1 drum to station 1 using pushbutton.	9 TES 012 TO	Signal light 009 LA is lit when trolley 002 CX is at station 1.	
7.1.54	Close door A using pushbutton.	9 TES 010 TO	Signal light is lit when door A is closed.	
	CAUTION: *The operator must now go to station 1 control panel for* the *following operations.*			
7.1.55	Using the overhead crane, lift the C1 concrete drum clear of trolley 002 CX and move into the area for RP to survey the base, side and top of the finished drum.	9 DMN 002 PR		
7.1.56	RPM fill in the results of the survey on the Waste Transfer Form LLW13 (available electronically G:\Koeberg\Nuclear Services\Radiation Protection\Sharepoint Migration\RP Operations\Radwaste\LLW-13 Forms\LLW13 CONCRETE DRUMS).			
	CAUTION: *Before opening hydraulic doors to N030, the operator must check that 9 DMN 005 PR crane is in the HOME position. Hydraulic doors to N030 can now be opened and the drum transferred to N030 using the 9 DMN 002 PR crane. Once the drum is down in N030 and the crane is returned to the 0 metre level, the hydraulic doors can be shut. The operator can now go to the –6,7 metre level to move the drum to the temporary storage area for curing before final capping.*			
7.1.57	The TES operator can now transfer the finished drum to the N030 storage area for drying and final capping.			
	NOTE 1: *Finished, uncapped drums must not be stored directly under the hydraulic doors to N030 because of possible radiation and resulting risk of exposure to personnel working around the doors.* ***NOTE 2:*** *Radiation Protection Monitor to perform a radiation survey around the hatch area to verify the extent of any radiation emanating from N030.*			

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
7.2	**Release of 9 TES 001 EG Mixer Blade**			
	NOTE 1: *Reasons for removal of the mixer blade are:* • *Change of drum size* • *Wear and tear of the mixer blade* ***NOTE 2****: From a radiological and economic point of view, it is advantageous to release the blade in a full drum, normally the last one in a drumming campaign.*			
7.2.1	Once the mixing is complete and homogeneously mixed in the drum selected for blade release, stop the blade rotation using pushbutton.	9 TES 040 TO	Signal lights 156 LA / 155 LA is lit.	
7.2.2	Check that the pressure indicated by the pressure gauge of the hydraulic control system is 5 bar and that the valves to the gauge and pressure switch are open.	9 TES 011 SP		
7.2.3	Order the mixer to the unlock position using switch.	9 TES 025 CC	Signal light 157 LA is lit	
7.2.4	The automatic stop of the mixer is controlled by the pressostat or safety overload relay.	9 TES 011 SP	± 4000 kPa	
7.2.5	Raise the mixer shaft using pushbutton.	9 TES 153 TO	Signal light 157 LA is lit.	
7.2.6	Check on the monitor that the mixer blade is released and stays in the drum as the mixer shaft goes to the high position.			
7.2.7	Check that the mixer shaft stops in the high position.	9 TES 157 LA 9 TES 102 ID	High position ON. The pilot light of the blade corresponding to the type of drum selected is extinguished.	
	NOTE: *Removal and storage of the finished drum with released blade is carried out in steps 7.1.44 to 7.1.57.*			

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
7.3	**Fitting a New Blade into 9 TES 001 EG Mixer**			
	NOTE: *When a new blade locked into the mixer 9 TES 001 EG, either due to wear and tear on the existing blade, or a different type of blade need to be used, the procedure instructions are the same.*			
7.3.1	Instruct the Outside Plant Operators to select a new drum and blade, and deliver them to the TES drum reception area.			
7.3.2	Carry out a final inspection of the drum and new mixer blade at the TES drum reception area.		Drum is in sound condition with no cracks or chips. The liner is properly located and polycord is in place. Blade in good condition with no marks or burrs on machined faces.	
7.3.3	Set up the new blade in the concrete drum as indicated in Appendix 1. By adjusting the threaded bar, the blade can be centralised in the drum.			
7.3.4	Once the blade is centralised and secure, the whole unit, drum, liner and blade is sent to station 4 in the drumming tunnel, using steps 7.1.8 to 7.1.22.			
7.3.5	Switch on the camera and adjust the picture for a clear view of the inside of the concrete container.	Remote camera inside 9 TES 001 EG	Locking of mixer blade must not continue if the camera is not operational.	
7.3.6	Check that the pressure indicated on the pressure gauge of the mixer hydraulic control system is 5 bar and that valves to the gauge and pressure switch are both open.	9 TES 011 SP		
7.3.7	Start lowering of the mixer shaft to the approach position using switch.	9 TES 025 CC	Signal light 157 LA is lit. Observe the mixer lowering sequence with the camera.	
7.3.8	As the mixer shaft head approaches the blade, slow on and off rotation of the mixer shaft head is achieved using switch.	TES 023 CC	Close observation with the camera will show when the square on the blade head is engaged in the mixer head.	

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
7.3.9	Check that lowering of the mixer shaft has stopped in the APPROACH position.		Signal light 157 LA is not lit.	
7.3.10	Start lowering the mixer shaft to the LOCK position using switch.	9 TES 025 CC	Signal light 157 LA is lit and the mixer is lowering to the locking position.	
7.3.11	The automatic stop of the mixer shaft is controlled by the pressostat or the safety overload relay.	9 TES 011 SP	± 4000 kPa	
7.3.12	Raise the mixer shaft to the high position using pushbutton.	9 TES 153 TO	Signal light 157 LA is lit.	
7.3.13	Check with the camera that the mixer blade is locked in the mixer shaft head and is being raised to the high position.			
7.3.14	Check that the mixer shaft stops in the high position and the type of blade is indicated on.	9 TES 102 ID	"Presence of Blade C1" or "Presence of Blade C2" or "Presence of Blade C3"	
7.3.15	Press the SEQUENCE END button on station 4 control panel.			
	CAUTION: *SEQUENCE END indicated will allow the drum to be moved back to station 2. This in turn will allow the TES operators access to the drumming tunnel for removal of the threaded bar from the new blade.* ***Access into the drumming tunnel will be done under RP supervision. Pre-entry radiological survey is required before entry. The entry must be discussed and confirmed with the Duty SRPA before commencement.***			
7.3.16	Movement of the drum back to station 2 is achieved by following the instructions given in steps 7.1.43 to 7.1.53.			
	CAUTION: *Entry into the drumming tunnel will only be done under RPM instruction. An RPM to monitor dose rates while the TES operators remove the threaded bar from the blade. Once the threaded bar is removed, the drumming logics can be reset and drumming can commence.*			

8.0 ACCEPTANCE CRITERIA

N/A

9.0 RECORDS

9.1 All records generated must be retained as permanent records.

10.0 ATTACHMENTS

Appendix 1 – Centralising New Blade in Concrete Drum

Appendix 2 – Line-up of 9 TES 001 BA Post Maintenance

Appendix 3 – Heating-up of 9 TES 001 BA

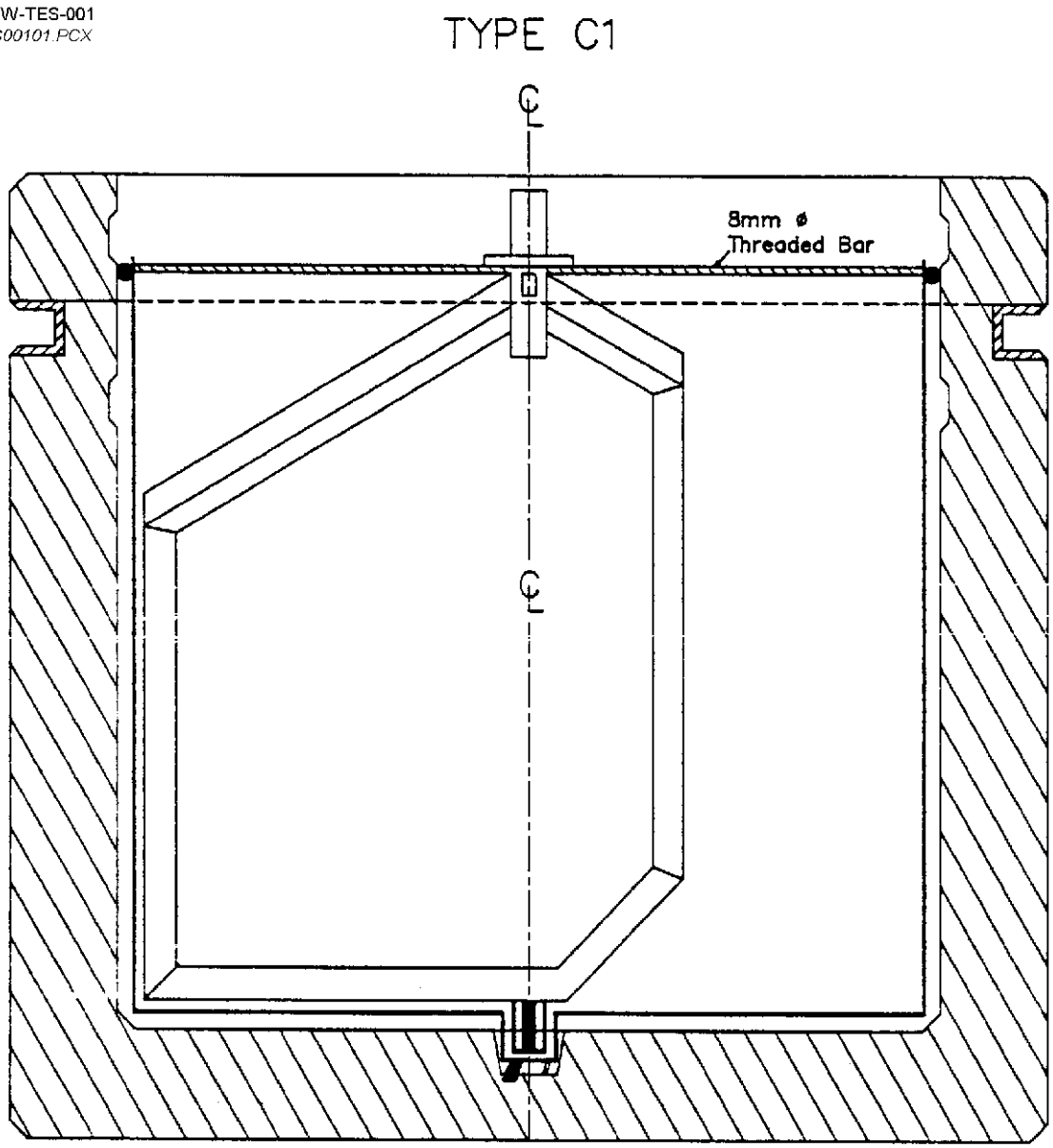
Appendix 4 – Flushing of Discharge Line and 9 TES 001 PM After Drumming

Appendix 5 – Justification

APPENDIX 1

CENTRALISING NEW BLADE IN CONCRETE DRUM

KWW-TES-001
TES00101.PCX



APPENDIX 2

LINE-UP OF 9 TES 001BA POST MAINTENANCE

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
10.1.1	Close water supply	9 SED 107 VA		
10.1.2	Close inlet valve	9 TES 001 VB		
		9 TEU 032 VB	Request NAB SNPO to confirm as this valve is operated by NAB SNPO	
10.1.3	Close steam supply	9 TES 305 VV		
		9 TES 306 VV		
		9 TES 308 VV		
		9 TES 310 VV		
10.1.4	Open level column	9 TES 200 VA		
		9 TES 202 VA		
10.1.5	Close drain valves	9 TES 005 VB		
		9 TES 006 VB		
		9 TES 008 VB		
		9 TEU 033 VB	Request NAB SNPO to confirm as this valve is operated by NAB SNPO	
10.1.6	Close vent valves	9 TEU 040 VA	Request NAB SNPO to confirm as these valves are operated by NAB SNPO	
		9 TEU 041 VA	Request NAB SNPO to confirm as these valves are operated by NAB SNPO	

APPENDIX 3

HEATING UP OF 9 TES 001 BA

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
10.2.1	Open the following steam supply valves	9 TES 310 VV	Operating will normally request to heat up tank before transfer of evaporator loop	
		9 TES 306 VV		
		9 TES 308 VV		
10.2.2	When desired temperature is reached close steam supply valves	9 TES 310 VV	Operating will inform when desired temperature is reached	
		9 TES 306 VV		
		9 TES 308 VV		

APPENDIX 4

FLUSHING OF DISCHARGE LINE AND 9 TES 001 PM AFTER DRUMMING

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
NOTE	*Utilising the last C1 concrete drum in the drumming campaign after emptying of 9 TES 001 BA*			
10.3.1	Position the resins and concentrates chutes using switch.	9 TES 045 CC	Signal lights 151 / 152 LA is on when the chutes are in the correct position for discharge into the drum. Authorisation to discharge resins and concentrates light TES 171 LA is lit.	
10.3.2	Carry on mixing the contents of the C1 drum.		Any dry product lying on top of the mix will be drawn into the wet mix.	
10.3.3	Open flushing valve for 30 seconds	9 TES 107 VD		
10.3.4	Close flushing valve	9 TES 107 VD		
10.3.5	Open 001 PM metering chamber discharge valve using switch.	9 TES 006 VB 9 TES 028 CC	Metering chamber discharge time is 1 minute 30 seconds ± 10 seconds.	
10.3.6	Monitor flow of water and sludge into C1 concrete drum			
10.3.7	When the flow has stopped, close the metering chamber discharge valve using switch.	9 TES 006 VB 9 TES 028 CC		
10.3.8	Retract the concentrates and resins chutes using switch.	9 TES 045 CC	Signal lights 151 / 152 LA is not lit once the chutes are fully retracted.	
10.3.9	Start raising the mixer blade to the high position using pushbutton.	9 TES 153 TO	Signal light 157 is lit. The mixer is rising to the high position. Rising and rotation of the mixer blade will stop automatically when the blade reaches the high position.	

APPENDIX 4 (Continue)

FLUSHING OF DISCHARGE LINE AND 9 TES 001 PM AFTER DRUMMING

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
10.3.10	Lower the crab 001 CX to the transfer position using switch.	9 TES 021 CC	Signal light 039 LA is lit. Crab 001 CX is in the transfer position. The mixer exhaust fan will stop automatically once the crab is in the transfer position. Signal light 9 TES 154 LA is not lit.	
10.3.11	Close the drip tray using switch.	9 TES 022 CC	Signal light 078 LA is lit when the drip tray is in the fully closed position.	
10.3.12	Start the transfer of crab 001 CX from station 4 to station 3 using pushbutton.	9 TES 036 TO	Signal light 040 LA is not lit. Station 4 control panel	
10.3.13	Check that crab 001 CX is at station 3.		Signal light 024 LA is lit Station 3 control panel	
10.3.14	Open door B using pushbutton.	9 TES 028 TO	Signal light 018 LA is lit.	
10.3.15	Once door B is fully open, start transfer of crab 001 CX from station 3 to station 2 using pushbutton.	9 TES 018 TO	Signal light 024 LA is not lit at station 3 when crab 001 CX is at station 2. Signal light 023 LA is lit at station 3 and signal light 012 LA is lit at station 2 control panel.	
10.3.16	Close door B using pushbutton.	9 TES 029 TO	Signal light 019 LA is lit Station 3 control panel	
CAUTION: *The operator must now go to station 2 control panel for the following operations.*				
10.3.17	Start crab 001 CX to go to the low position using pushbutton.	9 TES 015 TO	Signal light 015 LA is lit.	
10.3.18	When crab 001 CX is at the low position and the C1 drum is resting on trolley 002 CX, open door A using pushbutton.	9 TES 009 TO	Signal light 010 LA is lit when door A is open	
10.3.19	Start the transfer of trolley 002 CX with the C1 drum to station 1 using pushbutton.	9 TES 012 TO	Signal light 009 LA is lit when trolley 002 CX is at station 1.	

APPENDIX 4 (Continue)

FLUSHING OF DISCHARGE LINE AND 9 TES 001 PM AFTER DRUMMING

ACTIONS AND CHECKS		IDENTIFICATION	COMMENTS	SIGN
10.3.20	Close door A using pushbutton.	9 TES 010 TO	Signal light is lit when door A is closed.	
CAUTION: *The operator must now go to station 1 control panel for* the *following operations.*				
10.3.21	Using the overhead crane, lift the C1 concrete drum clear of trolley 002 CX and move into the area for RP to survey the base, side and top of the finished drum.	9 DMN 002 PR		
10.3.22	RPM fill in the results of the survey on the Waste Transfer Form LLW13 (available electronically G:\Koeberg\Nuclear Services\Radiation Protection\Sharepoint Migration\RP Operations\Radwaste\LLW-13 Forms\LLW13 CONCRETE DRUMS).			
CAUTION: *Before opening hydraulic doors to N030, the operator must check that 9 DMN 005 PR crane is in the HOME position. Hydraulic doors to N030 can now be opened and the drum transferred to N030 using the 9 DMN 002 PR crane. Once the drum is down in N030 and the crane is returned to the 0 metre level, the hydraulic doors can be shut. The operator can now go to the –6,7 metre level to move the drum to the temporary storage area for curing before final capping.*				
10.3.23	The TES operator can now transfer the finished drum to the N030 storage area for drying and final capping.			
NOTE 1: *Finished, uncapped drums must not be stored directly under the hydraulic doors to N030 because of possible radiation and resulting risk of exposure to personnel working around the doors.*				
NOTE 2: *Radiation Protection Monitor to perform a radiation survey around the hatch area to verify the extent of any radiation emanating from N030.*				

APPENDIX 5

JUSTIFICATION

Revision 3

1. Full review to comply with requirements of KSA-011.

2. Page 6, 6.1.3 Instruction “Ensure a clear pathway from station 1 to station 5 before concrete drum entering and exiting drumming tunnel to prevent equipment damage” added to address CA 33097.

   Safety Screening S2014/0499

Revision 4

1. Page 3, 10: Appendices updated to include Line up of 9 TES 001 BA, Heating up of 9 TES 001 BA and Flushing of discharge line and 9 TES 001 PM after Drumming.

2. Page 16, 10: Attachment list updated to include Line up of 9 TES 001 BA, Heating up of 9 TES 001 BA and Flushing of Discharge Line and 9 TES 001 PM after Drumming.

3. Page 18: Appendix 2 added to provide the line-up procedure for 9 TES 001 BA.

4. Page 19: Appendix 3 added to provide the heating up procedure for 9 TES 001 BA.

5. Page 19: Appendix 4 added to provide the procedure for flushing the discharge line and 9 TES 001 PM after drumming completion to address CR 96564-001 GA.

   Safety Screening S2017-0338

Revision 3

1. Scheduled review.

   Safety Screening S11339