Functional Specification (FS) of Radwaste Tracking Program (RTP)

References:
Waste Transfer form LLW13 available in KWW-TES-025 Appendix 1

Creating and saving a drum

1. Drum arrives on site.
2. Radwaste operator inspects drum. Drum is accepted by
   1. Entering manufacturers' no. into mobile data logger and
   2. entering drum description (type) and
   3. let database (RMS) generate an Eskom no unique to drum type (C1-C4) as current (e.g. 540C4/16749) and print (bar coded) label.

Container	Type	Contents	ID number example
Steel			
Concrete	C1		
	C2		
	C3		
	C4		540C4/16749
Other			

Manufacturer number | Eskom number

Note: Characters of ID number must be alphanumerical

3. System also creates corresponding Waste Transfer Form (LLW13), which reflects the Eskom unique no of the drum and the correct barcode which identifies drum.
4. RW operator prints label/ codes e-tag and sticks it onto drum.
5. Drum kept in storage at LLW.

Upon request for drumming from Chemistry/OPS through SAP

6. RW operator/ admin downloads SAP notification
7. Request must specify the contact dose rate of said waste as well as indicate type of waste and drum needed as per KWH-S-033 Appendix 1. The request will indicate the type of waste and RP will select type of drum based on the following:
   Filters (dose rates), concentrates based on the gamma spectroscopy results

Input/ trigger	Unit	Comment
SAP number	Numerical (long)	Link to new drum

8. RP Select type of container to be used based on dose rates or gamma analysis
   1. With hand held scanner code link SAP number to drum
   2. RW operator retrieves drum and proceeds with inspection as per LLW13 Section A
   3. Drum is accepted
   4. Drum is scanned out of LLW storage
   5. Auto update of inspection date. Print form (optional) and perform inspection.
   6. Tick acceptable on section A.
   7. Save e-form LLW13. You may retain manual LLW13 on drum as physical and immediate confirmation for transporter that drum has been inspected and okayed.
   8. Transport to required location (NAB, Decon Workshop or Reactor Building)

Note: See Locator section below for location details

9. Stick drum label onto drum
10. Drum is sent to intended location by forklift.

At location

9. Drum is scanned in and RTP updated with location
10. Drum is filled

Surveys

11. At drumming site, whether for concentrates/ resins/ filters.

Survey	Survey type	Unit		Decimal	
Drumming	Dose rate	uSv/h	Top		
			Side		
			Bottom		
			1m		
	Contamination	ccpm			
Capping/ compacting	Dose rate	n/a	Top		
			Side		
			Bottom		
			1m		
	Contamination	ccpm			
Transfer	Dose rate	uSv/h	Top		
			Side		
			Bottom		
			1m		
	Contamination	ccpm			
Pre-shipment	Dose rate	uSv/h	Top		
			Side		
			Bottom		
			1m		
	Contamination	ccpm			
Shipment	Dose rate	uSv/h	Top		
			Side		
			Bottom		
			1m		
	Contamination	ccpm			

1. Instrument data logger saves survey data for each drum
2. RP downloads data onto RTP from data logger
3. RTP save survey data

Survey Table example

Field	Field Classification	Field type	Options	Comment
Survey number	(Auto generated)	Numerical		Sequence start to be confirmed
Survey type	Compulsory	Alphanumerical		
Drum ID	Compulsory	Alphanumerical		
Survey results	Compulsory	Numerical/alphanumerical		For all (t, s,

				b, 1m)
Survey instrument	Compulsory	Alphanumerical. Allow database to save instrument details e.g. instrument management		Drop down with options. Allow more than one instrument.
Survey instrument calibration date		numerical		yyyy-mm-dd
Calibration source		alphanumerical		

The survey table to be changed and look like below:

Survey ID	Survey Date	Performed by	Reviewed by	Survey type	Description

4. Save info on RTP
5. RP check that info downloaded correctly. SRPA can confirm this by viewing electronic LLW13 on RTP and check that Section C is correctly updated.
    1. Type of container and date of drumming should auto fill when scanned at 6) above
    2. using smart instrument survey top, side, base and 1m, transmit readings
    3. data should save in this order, as well as import download onto RTP version of LLW13 in this order.

12. Capping
    1. Scan drum again. Corresponding variation of LLW13 should come up.
    2. Capping date should auto fill
    3. Using smart instrument survey top and 1m,transmit readings
    4. data should save in this order, as well as import download onto Radpro version of LLW13 in this order.

13. Prep for transfer to LLW
    1. Swiping.

Survey	Unit	Decimal	
• Contamination/ swipe • Radiation	ccpm uSv/h	numerical	

    2. Once clean proceed to NAB exit
    3. Scan drum again as it exits NAB to LLW. Corresponding variation of LLW13 should auto update Transfer date.

14. On arrival at LLW.
    1. Scan drum.
    2. Arrival or storage date at LLW should auto update.
    3. Ensure all info on RTP LLW13 is complete. Allow for this retrieval of data to be possible with a scan of the hardcopy LLW13 barcode which would have been accompanying the drum. Store drum in dedicated location as per LLW board.
    4. Weigh drum, mass should manually update onto RTP.

Drum ID	Unit	Field check	Comment
Weight	kg	Filled Steel drum cannot be <180kg	
		Filled Concrete drum cannot be <6.5t	

15. Assign location. (i.e Locator section to see link with scanners.)
    Label consists of Drumming, Capping, transfer to LLW dates, mass of drum, highest contact dose rate, gamma readings, and final survey date. (Consult with RP/ RW)
16. Store drum in assigned location.

17. Shipment Prep
    1. Determine consignment for shipment
        1. Rules/ Tools

Tools	limit	Comments
Decay calculator	<	To be provided by RP
Activity	<	To be provided by RP

ACTIVITY LIMITS FOR TRANSPORT

Drum Type Long-lived Alpha Emitters

(TRU) Limit (GBq)

C 1 Concrete 5,61 E-1

C 2 Concrete 2,34 E-1

C 3 Concrete 9,45 E-2

C 4 Concrete 1,15 E-1

C 2 F Concrete 2,84 E-1

210 L Steel (TRASH) 7,77 E-2

210 L Steel (RESIN) 8,16 E-2

***NOTE:** If this is exceeded, do not ship waste.*

LSA II ACTIVITY LIMIT

C1 Resin = 20 000 GBq

C2 Resin = 12 400 GBq

C3 Resin = 5 000 GBq

C2F Filter = 15 200 GBq

C4 Filter = 17 800 GBq

C1 Concentrate = 20 000 GBq

C1 NCW = 20 000 GBq

C1 Sludge = 20 000 GBq

2. Final survey by RP. Using smart instrument survey top, side, base and 1m (Refer to surveys above).
3. Data should save in this order, as well as import download onto RMS version of LLW13 in this order.
4. Transmit readings to RMS.
5. Import Chemistry gamma report from Lims/Apex.
    1. Auto populate Isotopes
6. Calculate shipment activity, and print relevant shipment forms
7. Print final label and paste onto drum. Label should consist of Nuclides, Type of shipment and activity.
8. Ensure all fields are populated

18. Shipping Checks
    1. On drum
    2. Final labels attached and correctly filled with no empty fields
    3. All paperwork corresponds to what is labelled on the drum
    4. When scanning drum and or related LLW13, ALL information corresponds including physical drum description
    5. On the Radwaste Management System
    6. When scanning drum and or related LLW13, ALL information corresponds including physical drum description
    7. Use the graphic trend feature/ pictogram to get a graphic view of all your critical data.
    8. E.g. expectation is that your data trends downwards or stays the same. See Graphic Example 1 below. Don't expect any obvious sharp shoots upward and or downward etc

Graphic example 1

9. The trend should start from first sample of contact dose rate before drumming (This will help us in the long run to work in a dose rate "predictor" as DSRC indicated).
10. Check that maximum radiation level as calculated by RWMP is correct for the shipping category, as in Transport Category Determination Appendix 3 of KWH-S-037.
11. If the above is true, ensure that drum is labelled accordingly and "Exclusive Use" the paperwork is correct for this special consignment.
12. Basically ensure that everything on KWH-S-033 Appendix 12 is met before truck leaves LLW.

Locator functionality

On acceptance from supplier

1. Scan drum into mobile data logger
2. Enter storage location

Location	Physical Description	Parameter
A-P/ 1-28 (matrix)	Drums can be stacked in 3s	Stack can reach 4.5 m

3. Save

On retrieval for drumming campaign

1. Scan drum out of LLW
2. Scan and update at possible locations

Location	Entrance point	Movement within the same area signifying different stages of ops
LLW	Approx. 6x4 m door	Inside in storage
N030	Lift/ normal door	Storage
		Drumming tunnel
Decontamination Workshop	Garage size door	
Vaalputs	As per the measurement and acceptance procedure of Vaalputs	On acceptance of drum, system to update RTP.

FUNCTIONAL SPECIFICATIONS FOR RADWASTE TRACKING PROGRAM (RTP) PART II

Design requirements

- The developer shall make changes to the RTP database as detailed below:

- Changes to the database structure in terms of calculations shall be carried out as it is to reflect correct information

- Allowance shall be made to allow for the addition of 10 function points that are currently not defined

- Reports that will be impacted by this development shall be verified to reflect correct information

Software Specifications

1. **Inventory Management**
   a. Drum management
      - Empty/ full status to be added for drums
      - To be able to load locations on drums arriving on site and the dropdown function for existing locations

   b. Low Level Waste (LLW) board
      - Replace the current LLW board with the electronic equipment, to display drum location, drum number, highest contact dose rates

2. **Instrument Management**
   a. Be able to connect new smart Teletectors to the RTP database for data loading
   b. Be able to have an instrument profile where instruments can be pre-loaded to be available for Radiation and Contamination surveys of drums
   c. Load and unload instrument as required

3. **Radiological and Contamination Surveys**
   a. Be able to view which surveys have been reviewed
   b. To be able to write the survey results once if the survey was performed on the same day
   c. To view the trend of the dose rates per drum and per shipment

4. **Chemistry results**
   a. To link the tritium results to the RTP database

5. **Shipment data**
   a. Facility to provide drum that is ready for shipment by using decay
   b. Print the radioactive labels for I-White, II-Yellow, III-Yellow
   c. Create electronic shipment package to send to Vaalputs

6. **Vaalputs**
   a. Provide a pc at Vaalputs with the RTP database (limited access)
   b. Be able to record Vaalputs dose rates in RTP

7. **Reporting**
   a. Generate electronic reports for surveys, shipments and monthly reports
   b. Send notifications and confirmation after sending a shipment package

8. **Query Builder**
   a. Generate query for any required data field and send information to excel

9. SITE ACCEPTANCE TESTS

a. Functional tests:

- Site acceptance tests are to be carried out at the Koeberg site. The developer is to provide a full test procedure prior to installation, for approval by Eskom. This procedure shall include, as a minimum, tests to verify the functionality of all aspects of the RTP. All test procedures and test results are to be documented.
- Eskom will provide a test platform consisting of a file server and a PC. This platform will be used to test all modifications.
- The developer shall provide a procedure which will detail the operations required to implement the modifications. The procedure will contain a sign off sheet and checklist and will be approved by Eskom prior to implementation.
- All tests that were performed on the test platform will be redone on the live system after implementation and prior to handing over the system.