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Title: USER REQUIREMENT SPECIFICATION FOR THE ROAD TANKER TO BE USED FOR TRANSFER OF LA EFFLUENT TO LEMS AT P-2400	

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Revisions

This document has been revised according to the following schedule:

Revision	Date Approved	Nature of Revision	Prepared by
00	24/06/2024	First Issue	JH Lubbinge
01	12/07/2024	Section 10 updated with correct figure.	JH Lubbinge
02	See title page	Updated to address NNR comments in NIL41B0183 (Spelling in Section 1 and reference in Section 12.1 corrected)	JH Lubbinge

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1.0 PURPOSE

The purpose of this document is to define the user requirement specification (URS) for the LA road tanker to be obtained and licensed to transfer LA effluent from the Volume Reduction Facility (VRF) to the LAETF at P-2400.

The URS is compiled to provide design engineers with an understanding of the needs of the project, to design according to the needs.

2.0 SCOPE

This document defines the requirements for the LA effluent road tanker to transfer LA effluent from the generating facility to the LAETF at P-2400.

3.0 REFERENCES

[1]	LE-WAC-0001	LEMS waste acceptance criteria for liquid effluent
[2]	SHEQ-INS-5300	Written Safe Work Procedures, Instruction and Task Training
[3]	NLM-STU-24/001	Options Study for the Handling of LA Effluent Generated at VRF

4.0 DEFINITIONS

No definitions.

5.0 ABBREVIATIONS

ℓ	Liter
LA	Low Active (Effluent)
LAETF	Low Active Effluent Treatment Facility Facility situated at P-2400 operated by LEMS
LEMS	Liquid Effluent Management Services (Section of WM group)
NLM	Nuclear Liability Management
OHS	Occupational Health and Safety
P-2400	Building P-2400 on Pelindaba west (operated by LEMS)
PDO	Pre-disposal Operations
RP	Radiation Protection
SHEQ	Safety, Health, Environment, and Quality
URS	User Requirements Specification
VRF	Volume Reduction Facility

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WAC	Waste Acceptance Criteria
WM	Waste Management

6.0 RESPONSIBILITY

It is the responsibility of the project manager to ensure that SHEQ and regulatory requirements are met.

7.0 GENERAL REQUIREMENTS

Obtaining of a suitable road tanker for the transfer of LA effluent from the VRF to the LAETF in batches of maximum 3000 ℓ.

8.0 PROJECT DESCRIPTION

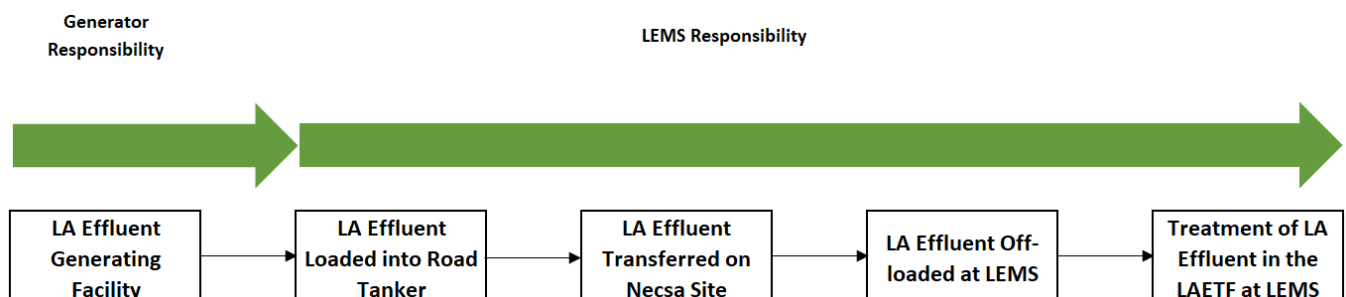
An options study for the handling of LA effluent generated at the VRF was conducted [3] and concluded that a road tanker shall be used to transfer LA effluent to LEMS. The existing LAETF is designed and constructed to treat LA received via dedicated pipelines from current facilities generating LA effluent on Necsa site. These facilities are located close to the LAETF. The VRF which is currently in the commissioning phase will generate LA once operational. The VRF is located on Pelindaba East and is thus far from the LAETF and therefore the most viable option is to transfer the LA via road tanker to the LAETF [3], as there are no existing pipelines between the two facilities. Other planned facilities on the Necsa site may also generate LA and need the removal of it via road tanker. The purpose of this project is thus to obtain and operate a road tanker to transfer LA effluent to the LA off-loading area at the P-2400.

9.0 PROJECT ASSUMPTIONS

- In the absence of applicable standards and/ or drawings, assumptions should be verified with the project manager.
- The effluent generating facility has an existing bund and flexible pipe for the filling of the tanker.

10.0 PROCESS FLOW

Below is the process flow diagram



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11.0 DESIGN REQUIREMENTS

- The design of the road tanker shall be in accordance with sound engineering and scientific practices, and appropriate technical standards to ensure intended performance.
- Safety, human factors, maintenance, and other interfaces must be considered when designing the road tanker.
- Adhere to Occupational Health and Safety Act 85.

12.0 USER REQUIREMENT SPECIFICATIONS

12.1 EFFLUENT TRAILER REQUIREMENTS

The tanker trailer shall comply with the below requirements:

- 3000 l capacity.
- Braked Automatic brake system.
- Allow gravity emptying at LA off-loading area.
- Leakage to the environment shall be prevented. This includes prevention of accidental opening of drain opening by installing for example a locking mechanism.
- Resistant to compounds listed in Section 13.0.
- Sealable filling and draining opening.
- Level indicator on side of tank.
- Jockey wheel installed with mechanism for lifting and lowering.
- Handbrake installed.
- All statutory markings/ lights/ reflectors/ license included.
- Road worthy certificate.
- The top filling hole/inspection hole shall be at least 250 mm diameter.
- The tanker shall have a mechanism to tightly secure it onto the towing vehicle.
- Stabilizer legs to prevent tipping while not connected to vehicle.
- Operating platform, for the operator on the trailer when loading/off-loading of LA for the operator.

12.2 SHEQ REQUIREMENTS

The below SHEQ-INS documents must be implemented and complied with

- SHEQ-INS-5300 Written Safe Work Procedures, Instruction and Task Training [2]

12.3 RADIOLOGICAL REQUIREMENTS

The road tanker shall be able to handle the effluent with the effluent classification and limits mentioned in Section 13.0.

12.4 MATERIALS OF CONSTRUCTION

The materials of construction shall be compatible with compounds listed in Tables 1 and 2, durable and allow for easy cleaning.

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12.5 SAFETY REQUIREMENTS AND HUMAN FACTORS ENGINEERING

- The road tanker shall comply with the OHS Act and all applicable regulations.
- Enough space shall be provided for maintenance activities.
- Ergonomics must be considered during the design of the equipment.
- All applicable safety and radiological signs and markings shall be installed.

12.6 SPARES LIST REQUIREMENTS

- Spares lists for assemblies listed in the materials catalogue as well as parts lists for equipment locations.
- Spares and assemblies which are not stocked.
- Special tools.
- Manufacturer's manuals shall be provided.
- Links to important information, such as drawings, manuals and engineering data.
- Other useful maintenance information, such as alternative parts.

12.7 TESTING REQUIREMENTS

All testing (Factory Acceptance Test and Site acceptance Test) done should be accompanied with the relevant standard certificates and proof of accreditation.

13.0 EFFLUENT CLASSIFICATION AND ACCEPTANCE CRITERIA

Below tables indicate the radiological and chemical limits of the liquid to be transferred. The materials selected for this project should be able to handle these [1].

13.1 TABLE 1: RADIOLOGICAL CLASSIFICATION

Classification	Description	Radioactivity criteria	
		α -activity (Bq/l)	β -activity (Bq/l)
LA	Effluent from radioactive processes with a low radioactivity content	< 100	< 4000 and Tritium < 3E05 Bq/l

13.2 TABLE 2: EFFLUENT CHEMICAL LIMITS

CHEMICAL DETERMINATE	ACCEPTANCE LEVELS
Ammonia – Ionized and un-ionized (as N)	≤ 6.0 mg/l
Boron (as B)	≤ 1.0 mg/l
Chemical Oxygen Demand (COD)	≤ 75 mg/l

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Chlorine-Residual (as free Cl)	≤ 0.25 mg/l
Dissolved Arsenic (as As)	≤ 0.02 mg/l
Dissolved Cadmium (as Cd)	≤ 0.005 mg/l
Dissolved Chromium-Hexavalent (as Cr)	≤ 0.05 mg/l
Dissolved Copper (as Cu)	≤ 0.01 mg/l
Dissolved Cyanides (as Cn)	≤ 0.02 mg/l
Dissolved Iron (as Fe)	≤ 0.3 mg/l
Dissolved Lead (Pb)	≤ 0.01 mg/l
Dissolved Manganese (as Mn)	≤ 0.1 mg/l
Dissolved Selenium (as Se)	≤ 0.02 mg/l
Dissolved Zinc (as Zn)	≤ 0.1 mg/l
Electrical Conductivity	≤ 100 mS/m
Faecal Coliforms	≤ 1000 counts/100 ml
Fluoride (as F)	≤ 5.0 mg/l
Mercury and its compounds (as Hg)	≤ 0.005 mg/l
Nitrate/Nitrite (as N)	≤ 15 mg/l
Ortho-phosphate (as P)	≤ 1.0 mg/l
pH	≥ 5.5 ≤ 9.5
Soap/oil/grease	≤ 2.5 mg/l
Sulphate (as SO ₄)	≤ 200 mg/l
Suspended solids	≤ 25 mg/l
Temperature	Within 3°C of the ambient water temperature
Colour, odour or taste	Shall not contain any substance in concentrations capable of producing any colour, odour or taste
Sodium Absorption Rate (SAR)	-
Sulphides (as S)	≤ 1.0 mg/l
Sodium (as Na)	≤ 130 mg/l
Dissolved Oxygen	≤ 75% saturation
Oxygen Absorbed	≤ 10 mg/l (Potassium Permanganate method)
Trichloroethylene (TCE)	≤ 50 µg/l
No other constituents in concentrations which are detrimental to health and safety of humans, animals, fish other than trout, or other forms of aquatic life, or which are deleterious to agricultural.	

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14.0 RECORDS

No records applicable.