



**INTEGRATED BIOREPOSITORY OF H3AFRICA UGANDA**

**MAKERERE UNIVERSITY  
COLLEGE OF HEALTH SCIENCES**

**STANDARD OPERATING PROCEDURE**

TITLE: <b>OPERATING LN2 TANKS</b>		PAGE 1 of 8
SOP #: <b>IBRH<sub>3</sub>AU-SOP-EQT-004.1</b>	Effective Date: <b>09/01/2014</b>	Next Rev: <b>DEC 2015</b>
Prepared by: _____	Reviewed by: _____	Approved by: _____
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**VALIDATION AND RETIREMENT**

	NAME	DATE
Validated by:		
Retired by:		

**ACKNOWLEDGEMENT OF READING AND UNDERSTANDING**

**I have received and understood the training on this SOP. If I have not understood the training I have asked the trainer to retrain me to ensure that I completely understand all the requirements.**

	NAME	SIGNATURE	DATE
1.			
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SOP#: IBRH <sub>3</sub> AU-SOP-EQT-004.1	Effective Date: 09/01/2014	Next Rev: DEC 2015

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#### 1. PURPOSE

To describe the procedures required to maintain Liquid Nitrogen tanks under correct operating conditions with enough liquid nitrogen levels.

#### 2. SCOPE

This SOP covers all operations of the IBRH<sub>3</sub>AU covering Liquid Nitrogen use.

#### 3. SAFETY

- 3.1 Before using any cryogenic freezer, read the Handle with care booklet provided with the unit. It details safety precautions that must be understood before using the equipment. If a replacement booklet is needed, order publication TW-10 Handle with care from your supplier.
- 3.2 The following are a few of the safety precautions described in the Handle with care booklet. **Please be sure to read the entire booklet.**
- 3.3 Store and use these containers only in well ventilated areas. In a confined area, nitrogen gas from these units may cause suffocation by displacing air needed for breathing (oxygen).
- 3.4 Install suitable oxygen monitors.
- 3.5 **Do not touch** liquid or cold metal surfaces with your bare skin or non cryogenic gloves. The liquid nitrogen refrigerant is extremely cold: -196°C (-320°F). Exposure to skin or eyes to liquid, cold gas or frosted parts could result in a severe frostbite like injury. Because of the extremely low temperature, a face shield and gloves must be worn when transferring liquid nitrogen and material into or out of these containers.
- 3.6 Use only the neck tube covers supplied with this unit or a listed replacement part. A tight fitting plug or stopper will cause a pressure increase in the container that may damage the container and/or cause personal injury.



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### 4. OPERATION

#### 4.1 Filling

- 4.1.1 Adding liquid nitrogen to a warm container may cause splashing and will generate a significant volume of nitrogen gas as cold liquid contacts warm refrigerator surfaces.
- 4.1.2 Add liquid slowly to minimize these effects. Be sure there is adequate ventilation.
- 4.1.3 Keep your head clear of the heavy volume of vapor that may be produced. It is extremely cold and could cause personal injury.

**WARNING: DO NOT OVERFILL.** Over-filling may result in personal injury due to liquid spillage.

#### 4.2 Determining Liquid Level

- 4.2.1 Liquid level must be checked at regular intervals- refrigeration depends on the pressure of liquid nitrogen.
- 4.2.2 The liquid level in the container can be determined with a dipstick. **OR** for automatic tanks ensure the rod is in LN2 and the power cable plugged on.
- 4.2.3 Insert the dipstick straight into the container so that it rests on the bottom of the unit.
- 4.2.4 After 5 to 10 seconds, withdraw the dipstick and wave it back and forth in the air. A frosted section will form representing the depth of the liquid in the container.

**WARNING:** Never use hollow rods or tubes as dipsticks. When a warm tube is inserted into liquid nitrogen, liquid will sprout from the top of the tube and may cause personal injury.

- 4.2.5 The liquid level chart shows volume of liquid nitrogen vs. depth for LS Series refrigerators.

Model	Liquid Level Equivalent
LS750	1.0 in. = 2.6 liters (1cm = 1.0 liters)
LS3000, LS4800, LS6000	1.0 in. = 6.6 liters (1cm = 2.6 liters)



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**Note:** These values are approximate and are based on a standard condition with no stored material in the container. With no store material, the liquid volume will be slightly less than the value of chart.

#### 4.3 Inserting or Removing Racks

- 4.3.1 To prevent unnecessary loss of liquid nitrogen and accumulation of ice, the neck tube core (the stopper) should remain in the container when the stored material is not being accessed.
- 4.3.2 When accessing stored material, the neck tube should be removed as briefly as possible.
- 4.3.3 When removing material from the racks, withdraw the rack just far enough to remove contents.
- 4.3.4 Completely withdrawing the rack will unnecessarily expose the stored material to warm room temperature conditions.  
**WARNING:** Some boxes have liquid drain openings, some do not. If racks are completely removed from the container, liquid nitrogen may remain in the either rack or boxes, or simply drain from the either racks, stop briefly at the neck tube to allow liquid to drain completely, and then handle the rack carefully to prevent personal injury.
- 4.3.5 Proper personal protective gear is strongly urged cryogenic gloves, face shield and gown to protect against splashing.
- 4.3.6 When room temperature is added, slowly lower the rack into the refrigerator to reduce the boiling of refrigerant and the surge of cold nitrogen gas.
- 4.3.7 When inserting the rack, tilt the bottom of the rack in the direction of the index ring notch.
- 4.3.8 The numbers and colors on the rack handles are a convenient aid to inventory control.



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#### 4.4 Securing Contents

4.4.1 The contents of all models may be secured with as seal or lock through tabs on the edge of the lid opposite the hinge.

#### 4.5 Routine Care and Maintenance

4.5.1 If ice accumulates inside the neck tube, a general cleaning of the refrigerator should be scheduled as soon as the stored material can be conveniently to another refrigerator.

4.5.2 To clean he unit, first remove stored material, and then pour out the liquid, disposing of it out of doors where the cold liquid will damage driveways and other surfaces.

4.5.3 Warm the container by purging of it with even after the container has warmed to room temperature to evaporate any collected moisture.

4.5.4 When the container is ice free and dry, rinse the inner vessel with household bleach

4.5.5 Wash the inner vessel with a 40 to 1 ratio of water to laundry detergent solution. Rinse and dry inside and out thoroughly before placing the container back into service.

4.5.6 Do not use sharp instruments of chip ice; DO NOT attempt to fasten any service to the container will cause permanent damage.

4.5.7 Refrigeration depends on the presence of liquid nitrogen inner refrigerator. Be sure to maintain correct refrigerant levels to prevent loss of stored material.

4.5.8 Check liquid levels regularly. If high evaporation rates are apparent under normal operating conditions, the formation of frost on outer casing is an indication that the vacuum integrity of refrigerator is not normal. All necessary steps should be taken to protect the refrigerator contents.



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4.5.9 If these conditions persist, contact your supplier or 1-8000-TW-TANKS 398-2657) or email us at [cryotanks@tayllorwharton.com](mailto:cryotanks@tayllorwharton.com) for information on how to conduct a normal evaporation rate (NER) test in the field.

#### 4.6 Sources of Liquid Nitrogen

4.6.1 MRC (contact person Mr. Kizito Dennison, +256 772 445920)

4.6.2 UVRI plant as secondary backup (Contact Person: Mr. Makko, +256 774 973535).

4.6.3 Makerere University Walter Reed Project

#### 5. ATTACHMENTS

5.1 Liquid Nitrogen Maintenance log; refer to **IBRH3AU-FORM-003**.



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#### 6. REVISION HISTORY

Revision No	Effective Date	Description of Changes Made from Preceding Revision	Approved by/ Date

#### ANNEX 1: DOCUMENTATION OF SUGGESTED CHANGES TO THIS SOP

CLAUSE	SUGGESTION	BY	DATE