Safety Documentation

Please select the forms you require by selecting the check boxes below.
You can select more than one.

☑ **Risk Assessment** ☑ **Method Statement** ☑ **Chemicals COSHH**

Once you have made your selections, scroll down and complete the forms.

Buttons: [+] will add a row to a list [X] will delete a row from a list

You may save this file to a local drive at any time.
When you have finished, save the file to a local drive and email it to your supervisor for authorisation.

Supervisors - There is a sign-off section at the end of the document set that must be completed.

Staff may "self authorise", (as a supervisor), but the forms must still be submitted to the DSO for approval.

IMPORTANT:

YOU ***MUST NOT*** START ANY PRACTICAL WORK UNTIL THESE FORMS HAVE BEEN RETURNED TO YOU WITH **BOTH** YOUR SUPERVISOR's AND DSO's APPROVAL SIGNATURES ATTACHED.

Please complete these fields

School or Service	Wolfson School of Mechanical, Electrical and Manufacturing Engineering
Department	Centre of Biological Engineering
Originator name	Kulvindar Sikand
email address	k.p.sikand@lboro.ac.uk
Location	Area GH, Garendon Wing, Holywell Park
Project / Activity / Task	Using liquid pressure vessels for liquid nitrogen top up.
Supervisor Name	Mark Taylor

Version : 2.19

Loughborough University
Centre of Biological Engineering

Risk Assessment

Reference: SAF/MM6415

Location: Area GH, Garendon Wing, Holywell Park

Originator: Kulvindar Sikand

Project / Activity / Task: Using liquid pressure vessels for liquid nitrogen top up.

Is this process risk assessment for a : ☑ Laboratory / Workshop ○ General use

Category 1: Machinery & work equipment:				
Design and Construction	Mechanical hazards	Electrical hazards	Radiation hazards	+
N/A	Crushing	Electrical test lables current	N/A	x

Category 2: Workplace	+
Risk of asphixiation (Oxygen depetion)	x
Outdoor on campus	x
Slips/Trips/Falls on the level	x
Falling/moving objects/materials	x
Localised cold surfaces	x
Category 3: Hazardous and/or Harmful substances	+
Liquid Nitrogen / Cryogens	x
Substances under high pressure	x
Category 4: Work activity	+
Awkward/Heavy lifting/Handling	x
Lone working out of hours	x
Transport of Liquid nitrogen in dewar into the courtyard of Garendon Wing.	x
Category 5: Work organisation	+
This will require 2 people, but will also have to adhere to social distancing.	x

Explain the risks associated with these hazards

People / Groups at risk: Operator and people in proximity — x

Enter risk details here:-	Impact	Probability	Risk Score
Operator trips while transporting dewar spilling LN	Harmful	Highly Unlikely	Low
What are the control measures?	Lowers Impact	Lowers Probability	+

the dewar is on a sturdy trolley so minimal chance of dewar tipping over. O2 monitor, decant outside, 2 people working keeping to social distancing rules.	Significantly	Significantly	x
Operators will walk slowly and cautiously taking a direct smooth route while keeping two meters apart wearing face masks following social distancing guidelines.	Slightly	Slightly	x

Residual Risk: Low

People / Groups at risk	Operators and people in proximity.		x
Enter risk details here:-	Impact	Probability	Risk Score
Dewar topples over spilling liquid nitrogen.	Harmful	Highly Unlikely	Low
What are the control measures?	Lowers Impact	Lowers Probability	+
Dewar in secure trolley so unlikely to tip over.	Significantly	Significantly	x
Operators will take the smoothest flat route (while keeping two meters apart wearing face masks following social distancing guidelines) possible to ensure even ground so minimal risk of dewar tipping over.	Significantly	Significantly	x

Residual Risk: Low

People / Groups at risk	Operators and people in proximity.		x
Enter risk details here:-	Impact	Probability	Risk Score
Asphixiation due to liquid nitrogen spill/enclosed area	Very Harmful	Highly Unlikely	Medium
What are the control measures?	Lowers Impact	Lowers Probability	+
All operators are trained in liquid nitrogen handling and what to do in an emergency.	None	Moderately	x
Operators will take the smoothest flat route (while keeping two meters apart wearing face masks following social distancing guidelines) possible to ensure even ground so minimal risk of dewar tipping over.	None	Moderately	x
Operators will carry oxygen monitors and evacuate area if monitor alarms and cordon off area.	Significantly	Significantly	x
The pressurised tank is in a well ventilated area and doors will be propped open so risk is reduced when transferring liquid nitrogen to dewar.	Significantly	Significantly	x

Residual Risk: Low

People / Groups at risk	Operators and people in proximity.		x
Enter risk details here:-	Impact	Probability	Risk Score
Transporting liquid nitrogen around Garendon Wing	Harmful	Likely	High
What are the control measures?	Lowers Impact	Lowers Probability	+

Process Risk Assessment Form (Continued)

All operators are trained in liquid nitrogen handling and what to do in an emergency.	Significantly	Significantly	x
Operators will take the smoothest flat route (while keeping two meters apart wearing face masks following social distancing guidelines) possible to ensure even ground so minimal risk of dewar tipping over.	Significantly	Moderately	x
Operators are trained in dealing with spills and have appropriate PPE and warning signage in case of spills.	Significantly	Significantly	x
Two people team to navigate route with least amount of contact with people. They will keep two meters apart wearing face masks following social distancing guidelines.	Significantly	Significantly	x
Liquid nitrogen is enclosed inside a dewar (with lid) so limited chance of escaping.	Significantly	Significantly	x

Residual Risk: Low

People / Groups at risk	Operators and people in proximity.		x
Enter risk details here:-	Impact	Probability	Risk Score
Risk of liquid nitrogen burn to skin	Very Harmful	Unlikely	High

What are the control measures?	Lowers Impact	Lowers Probability	+
Liquid Nitrogen is enclosed inside the dewar (with lid) so limited chance of it escaping.	Significantly	Significantly	x
Operators will take extra caution to reduce risk of dewar tipping and releasing liquid nitrogen.	Significantly	Significantly	x
All operators are trained in handling liquid nitrogen and what to do in an emergency.	Significantly	Significantly	x
Operators will wear PPE when handling hose on the tank and contact will be minimal . Sturdy enclosed shoes to be worn.	Significantly	Significantly	x

Residual Risk: Low

People / Groups at risk	Operators and people in proximity.		x
Enter risk details here:-	Impact	Probability	Risk Score
Awkward handling of dewar on uneven surfaces	Slightly Harmful	Highly Unlikely	

What are the control measures?	Lowers Impact	Lowers Probability	+
Operators will be in pairs to allow for guidance and help with approaching curbs. They will keeping two meters apart wearing face masks following social distancing guidelines	Significantly	Significantly	x
Operators will choose a smooth flat route and proceed slowly (while keeping two meters apart wearing face masks following social distancing guidelines).	Significantly	Significantly	x

Residual Risk: Low

Process Risk Assessment Form (Continued)

People / Groups at risk	Operator only		x
Enter risk details here:-	Impact	Probability	Risk Score
Risk of Liquid nitrogen splash to eyes	Very Harmful	Highly Unlikely	Medium
What are the control measures?	Lowers Impact	Lowers Probability	+
Operator will wear safety glasses/face shield when filling dewar from tank	Significantly	Significantly	x
		Residual Risk	Low

People / Groups at risk	Operators and people in proximity.		x
Enter risk details here:-	Impact	Probability	Risk Score
Injury from using the tank to fill dewar	Very Harmful	Highly Unlikely	Medium
What are the control measures?	Lowers Impact	Lowers Probability	+
All Operators are trained in the procedures required	Significantly	Significantly	x
Operators will wear PPE (blue cryogenic gloves, Safety goggles, visor). Closed toe shoes to be worn.	Significantly	Significantly	x
		Residual Risk	Low

People / Groups at risk	Operator and people in proximity		x
Enter risk details here:-	Impact	Probability	Risk Score
Risk of pressure build up in tank	Very Harmful	Highly Unlikely	Medium
What are the control measures?	Lowers Impact	Lowers Probability	+
Tanks inspected on annual basis for certification of use	None	Significantly	x
Ensure relief valves are not obstructed and regular venting occurs	None	Significantly	x
		Residual Risk	Low

+ Add another Risk

Who may be at risk as a result of this activity?

Personnel Group	Maximum (Task setup/ Re-configuration)	High (Performing the task)	Medium (Observing the task)	Low (Present, but not involved)	Lone Working (Out of hours)	No Exposure Permitted	Total
Academic Staff	0	0	0	0	1	0	1
Technical Staff	0	0	0	0	2	0	2
Research Staff (PDRA)	0	0	0	0	2	0	2
Research Students (PhD)	0	0	0	0	0	0	0
Students (Undergraduate / MSc)	0	0	0	0	0	0	0

Process Risk Assessment Form (Continued)

Personnel Group	Maximum (Task setup/ Re-configuration)	High (Performing the task)	Medium (Observing the task)	Low (Present, but not involved)	Lone Working (Out of hours)	No Exposure Permitted	Total
Visitors	0	0	0	0	0	0	0
Others - Over-type as needed	0	0	0	0	0	0	0
Total	0	0	0	0	5	0	5

With these controls in place, the risk is:

The activity is LOW RISK - and is effectively controlled

Loughborough University
Centre of Biological Engineering
Safety Method Statement

Loughborough University

Reference: SAF/MM6415

Location	Area GH, Garendon Wing, Holywell Park	Originator	Kulvindar Sikand
Project / Activity / Task	Using liquid pressure vessels for liquid nitrogen top up.		

What equipment will be used in this activity?	+
240 L LN2 pressure vessel	x
25 L dewar flask with trolley	x
O2 monitor	x
PPE	x
Dipstick	x

What training must be completed to do this activity?	+
Liquid Nitrogen handling training including pouring documented in training files	x
Liquid nitrogen training as part of lab induction on how to deal with spills and medical emergencies.	x
Training to use the tanks and transfer of liquid nitrogen to dewars	x

What chemicals are being used? (These must be included in the COSHH Form)	+
Liquid nitrogen	x

Spill and accident procedures.	+
If the volume of liquid nitrogen spilled is < 100 ml (Minor Spill) and correct procedures have been followed; then spill will be in a well-ventilated area and may be allowed to evaporate. a. Move any other personnel away from the spill area. b. Prop open doors if additional ventilation is required (determined by oxygen monitor alarms, c. If oxygen monitors are alarming (<18 % O2) then immediately evacuate the area and contact the Laboratory Manager and Departmental Safety Officer. If the volume of liquid nitrogen spilled is ≥ 100 ml (Major External Spill) and external to the CBE laboratory then: a. Immediately evacuate the area. b. Cordon off the spill area and prevent any individual (whether staff member, student or general public) from accessing the spill area. c. Allow the liquid nitrogen to evaporate into the atmosphere. d. Contact the Laboratory Manager and Departmental Safety Officer. All incidents involving spillage of liquid nitrogen must be reported to your immediate supervisor or laboratory manager. It is University Policy that a full Incident Report must be written and submitted to the Area Safety Advisor immediately after the spillage is resolved. Keep 2 meters apart	x

Procedure in the event of an emergency. (How to leave the process in a safe condition in such an event)	+
Cap of or shut any tap of any vessel containing LN2. Make any emergency services aware of the presence of LN2. Do not try to mop up any spillage.	x

Safety Method Statement (Continued)

References.	+
Safe decanting of liquid nitrogen - gas safe consultants Ltd (pub.2013),	x
SOP013 Safe use and maintenance of Liquid Nitrogen Stores and Risk Assessment for Liquid Nitrogen SAFMM6408	x

Detailed sequential description of the process

Process step	Precautionary measures and comments	+
Wheel out LN2 pressure vessel into courtyard	Two people to wheel this out, have O2 monitor present, have phone to contact security in case required throughout whole process. Wear enclosed sturdy shoes.	x
Attach pipe work to pressure vessel for decanting	Do this in the courtyard, two people present. Need spanned to attach hose.	x
Wheel out LN2 dewar to transfer into, take through courtyard external gates. Two at a time - two people, one each.	Do this in the courtyard, two people, wear gloves and visor. Wear enclosed, sturdy shoes.	x
Place hose into neck of dewar, not too far down.	Two people present, person doing the transfer wearing gloves and visor. If the hose is placed too low in the dewar and freezes this may make it difficult to remove from the dewar.	x
Open tap from the pressurised dewar gently at first to allow cooling of the dewar. Then can open the tap a little more.	Two people present, person doing the transfer wearing gloves and visor. Outside in the courtyard. Ensure that the dewar doesn't get filled to the top.	x
Return dewars to gaspod 3 taking through courtyard gates ready for manual fill covered by SAF/MM6405.	Two people needed to carry this out.	x
Return pressurised dewar to cupboard for dewars next to lab and hook up liquid level gauge.	Two people needed to do this.	x

Loughborough University
Centre of Biological Engineering

COSHH Form

Reference: MEME541

Location: Area GH, Garendon Wing, Holywell Park

Originator: Kulvindar Sikand

Project / Activity / Task: Using liquid pressure vessels for liquid nitrogen top up.

CHEMICAL NAME

Liquid nitrogen

CAS No. 7727-37-9

W.E.L. (Itel / stel)

Hazard Rating: High

Amount used		Period of use (hrs)	The process is:	Physical State		Exposure Potential
50	l	0.5	Open	Non-Volatile Liquid	☐ Eyes ☐ Skin ☐ Inhaled ☐ Ingested	Low

OVERALL RISK: Low

Hazard Statement and Description	Precaution Statement and Description
H281 Contains refrigerated gas; may cause cryogenic burns or injury.	P282 Wear cold insulating gloves/face shield/eye protection.
	P336 Thaw frosted parts with lukewarm water. Do no rub affected area.
	P315 Get immediate medical advice/attention.
	P403 Store in a well-ventilated place.

How will the precautions listed above be implemented?

Wear appropriate PPE - cold insulating gloves , face shield. Must wear enclosed, sturdy shoes.
Use of oxygen monitors- check if it is working before starting work, will alarm if there is an oxygen depletion.
Filling of dewars will always be done in pairs keeping social distancing, this will enable for the alarm to be raised if something goes wrong.

Special Storage and Containment Measures	Disposal Method
The dewars are kept in gas pod 3 which is locked, key available in first change of the lab. The pressurised LN2 dewars are kept in a specially designed cupboard next to the lab.	Any disposal of liquid nitrogen is done by allowing it to evaporate into the atmosphere which is done in a well ventilated area. If this is done in the lab a sign must be visible stating the hazards along with the presence of an oxygen monitor. Larger volumes are disposed of outside (gas pod 3).

How will spillages be dealt with?

Please note: any material used to clean up a spill of hazardous material must also be disposed of as hazardous material.
Click here to see spill procedures

If the volume of liquid nitrogen spilled is < 100 ml (Minor Spill) and correct procedures have been followed; then spill will be in a well-ventilated area outside and may be allowed to evaporate.
a. Move any other personnel away from the spill area.
b. If oxygen monitors are alarming (<18 % O2) then immediately evacuate the area and contact the Laboratory Manager and Departmental Safety Officer.

If the volume of liquid nitrogen spilled is ≥ 100 ml (Major External Spill):
a. Immediately evacuate the area.
b. Cordon off the spill area and prevent any individual (whether staff member, student or general public) from accessing the spill area.
c. Allow the liquid nitrogen to evaporate into the atmosphere.
d. Contact the Laboratory Manager and Departmental Safety Officer.
During the process outlined in this risk assessment any spillage would be outside and so relatively low risk.

All incidents involving spillage of liquid nitrogen must be reported to your immediate supervisor or laboratory manager.

It is University Policy that a full Incident Report must be written and submitted to the Area Safety Advisor immediately after the spillage is resolved.

COSHH Form (Continued)

+ Add another chemical

Statement of work (Process to be undertaken)

Topping up of dewars from pressurised liquid nitrogen vessels. The dewars are kept in gas pod 3 at the back of Garendon Wing. The pressurised dewars 2x 240L are kept in a cupboard next to the lab and these will be wheeled through the high bay area GV to the courtyard of Garendon Wing were the transfer of liquid nitrogen will take place. The small 25 L dewars are kept in gas pod 3 and will be wheeled 2 at a time (2 people) around the outside of Garendon Wing. This is something that will be done only if the delivery of liquid nitrogen from BOC is disrupted and is a contingency plan.

Show image

Personal protection requirements not covered in the precaution statements above.

Two people required for work.
Check O2 monitor prior to starting procedure and keep this close during procedure.
Ensure that the dewar is not overfilled and make sure that the hose is not too low in the dewar.
When opening the tap to fill dewar do this slowly at first to allow dewar to cool down slowly and prevent spitting.

Sources of information and references

Safe decanting of liquid nitrogen (gas safe consultants Ltd Jan 2013)
sds for liquid nitrogen (BOC) attached with this risk assessment.

Reference to **existing approved** Risk Assessment

SAF/MM6405

With the current controls, the risk of using these chemicals is: Low

Supervisor to check that the process involving the safe use of these chemicals has been satisfactorily evaluated

Supervisor and Departmental Safety Office (DSO) Sign-off.

Supervisors

Please check the documents above and if you want to approve them:

1) Electronically sign this document
2) Save it to a local drive (You will be prompted to do this)
3) eMail the signed document to the DSO.

DSO

Please review the documents above and if you want to approve them:

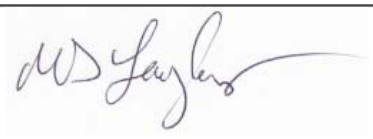
1) Enter the reference numbers as appropriate
2) Electronically sign this document
3) Save it to a local drive (You will be prompted to do this)
3) eMail the signed document to the originator

IF YOU DO NOT WANT TO AUTHORISE THE FORMS,

Please do not sign the form, but click the "Not Approved" check-box and return it to the originator by email stating why and what you expect them to do to put it right in the comments box below.

Not Approved ☐

Supervisors Signature



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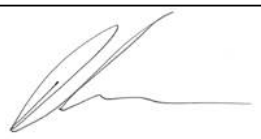
Form Reference Numbers

Risk Assessment	Method Statement	COSHH Assessment
SAF/MM6415	SAF/MM6415	MEME541

DSO Signature



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This document set must be reviewed and re-approved at the following times:

1) After the first occurrence of the activity described above (Review only)
2) After any change to the procedure or reagents used
3) After any incident resulting from this activity
4) At least annually from the date of approval

Next Review:

Review comments