

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 for Biological Engineering
Originator name	Carolyn Kavanagh
email address	c.l.kavanagh@lboro.ac.uk
Location	Route from Centre for Biological Engineering to Sir David Davies Building
Project / Activity / Task	Transport and Fill of Liquid Nitrogen Dewar from another location on University campus.
Supervisor Name	Mark Taylor

Risk Assessment

Reference

Location Originator

Project / Activity / Task

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

Category 1: Workplace	+
Slips/Trips/Falls on the level	x
Falling/moving objects/materials	x
Risk of asphixiation (Oxygen depetion)	x
Outdoor on campus	x
Localised cold surfaces	x
Category 2: Hazardous and/or Harmful substances	+
Liquid Nitrogen / Cryogenes	x
Substances under high pressure	x
Category 3: Activity	+
Awkward/Heavy lifting/Handling	x
Transport of Liquid Nitrogen in dewar across campus	x
Category 4: Organisation	+
	x

Explain the risks associated with these hazards

People / Groups at risk	<input type="text" value="Operator and people in proximity"/>			x
Enter risk details here:-	Impact	Probability	Risk Score	
<input type="text" value="Operator trips while transporting dewar spilling LN"/>	<input type="text" value="Harmful"/>	<input type="text" value="Highly Unlikely"/>	<input type="text" value="Low"/>	
What are the control measures?	Lowers Impact	Lowers Probability	+	
<input type="text" value="The Dewar is on a sturdy trolley so minimal chance of dewar tipping over."/>	<input type="text" value="Significantly"/>	<input type="text" value="Significantly"/>	x	
<input type="text" value="Operator will walk slowly and cautiously taking a direct smooth route while keeping two meters apart wearing face masks following social distancing guidelines."/>	<input type="text" value="Significantly"/>	<input type="text" value="Significantly"/>	x	
			Residual Risk	
			<input type="text" value="Low"/>	
People / Groups at risk	<input type="text" value="Operator and people in proximity"/>			x

Process Risk Assessment Form (Continued)

Enter risk details here:- Dewar topples over spilling liquid nitrogen	Impact Harmful	Probability Highly Unlikely	Risk Score 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	Operator and people in proximity		x
Enter risk details here:- Asphyxiation due to liquid nitrogen spill/enclosed area	Impact Very Harmful	Probability Highly Unlikely	Risk Score Medium
What are the control measures?	Lowers Impact	Lowers Probability	+
All operators are trained in handling liquid nitrogen and what to do in an emergency.	None	Moderately	x
Operators will take a smooth flat route (while keeping two meters apart wearing face masks following social distancing guidelines) and proceed slowly to avoid any risk of spilling the liquid nitrogen.	None	Moderately	x
Operators will carry Oxygen Monitors and evacuate area if monitor alarms but cordon off area.	Significantly	Significantly	x
The tank is in a well ventilated area and doors will be propped open so risk is reduced when transfer liquid nitrogen to dewar.	Significantly	Significantly	x
			Residual Risk Low
People / Groups at risk	Operator and people in proximity		x
Enter risk details here:- Transporting Liquid Nitrogen outside on campus	Impact Harmful	Probability Likely	Risk Score High
What are the control measures?	Lowers Impact	Lowers Probability	+
All operators are trained in handling liquid nitrogen and what to do in an emergency.	Significantly	Significantly	x
Operators will take a smooth flat route (while keeping two meters apart wearing face masks following social distancing guidelines) and proceed slowly to avoid any risk of spilling the liquid nitrogen.	Significantly	Moderately	x
Operators are trained to deal with spills and will have appropriate PPE and warning signage in case of spills.	Significantly	Significantly	x
Two person 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 the dewar (with lid) so limited chance of it escaping.	Significantly	Significantly	x

Process Risk Assessment Form (Continued)

			Residual Risk
			Low
People / Groups at risk	Operator 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 Closed 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
Awkward handling of dewar on uneven surfaces	Slightly Harmful	Likely	Medium
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
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	Operator 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

Process Risk Assessment Form (Continued)

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				

With these controls in place, the risk is:

The activity is LOW RISK - and is effectively controlled

Safety Method Statement

Reference SAF/MM6411

Location Route from Centre for Biological Engineering to Sir Dav Originator Carolyn Kavanagh

Project / Activity / Task Transport and Fill of Liquid Nitrogen Dewar from another location on University campus.

What equipment will be used in this activity?	+
25L dewar with trolley	X
500L Pressurised Liquid Nitrogen Tank	X
PPE	X
Oxygen Monitors	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.	+
<p>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.</p> <p>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.</p> <p>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.</p> <p>All incidents involving spillage of liquid nitrogen must be reported to your immediate supervisor or laboratory manager.</p> <p>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.</p> <p>Keep 2 meters apart</p>	X

Procedure in the event of an emergency. (How to leave the process in a safe condition in such an event)	+
<p>Ensure all decant valves on pressurised containers are closed.</p> <p>Oxygen depletion response</p>	

Safety Method Statement (Continued)

References.

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	+
Two operators remove empty Liquid Nitrogen Dewar from Gas Pod 3	Operators must be wearing closed toe sturdy shoes and take with them a pair of blue cryogenic gloves and a face shield/safety glasses. They also must take a danger sign in case of a spill . ** TWO PERSONS REQUIRED*** „Manual handling procedures should be observed. The two operators must keep 2 meters apart and wear masks and follow social distancing guidelines.	X
The two operators will make there way along the road (road is quiet and has less uneven surfaces/curbs to contend with than the pavement and is likely to encounter a pedestrian).Where the pavement can be used it will be but care will be taken when passing pedestrians. The operators will take the smoothest, direct , safest route towards the W building car park behind Sir David Davies Building or Clyde Williams Building. Any awkward curbs will be negotiated by the two operators as a team.The two operators must keep 2 meters apart and wear maths and follow social distancing guidelines.	It is appreciated that Clyde Williams Building is some distance from the CBE and this tank will only be used in extreme circumstances due to the distance that needs to be traveled with the dewar.It is appreciated that the longer the journey the more risk of spillage but all precautions would be taken.	X
Once at the location of the tank in either location one of the operators will stay with the dewar while the other goes to collect the key/sign in.		X
The Operator will place on the blue gloves and safety visor/glasses. The operator will note and record the level on the dial so we will know how much has been taken.		X
Wearing PPE the operator will remove the lid from the dewar and place down. The operator will then place the decant hose into neck of dewar.	The task will take place outdoors in the LN2 compound.	X
(For W building Car Park Tank)Check the pressure level on the tank.	Safest decanting is at 5-10psi. If the pressure is too high open the vent valve to reduce pressure to the desired level.	X
Slowly open the decant valve and allow the cold gas to cool the inside of the dewar to be filled. This will reduce loss from boil off.		X
Open the decant valve further to allow the flow of liquid to the dewar.	Do not open the decant valve all the way. Decant rates are achieved at less than half open. Opening the valve all the way will mean it will take you longer to close the valve to stop the flow when the vessel is full or if there is an emergency.	X
Check the level of fill periodically using a combination of the dipstick and the readout from the fill guage on the pressurised tanks.	Dewars should not be filled to more than 90% of total volume. This could cause issues in transport.	X
Once the dewar is filled to the desired level close the decant valve and carefully remove the decant hose.	Beware there will be still a volume of liquid nitrogen in the hose which will continue to boil off- the vapour will continue to vent from the end of the hose. Ensure you wear PPE when holding the hose.	X
Replace lid/bung in the dewar		X

Safety Method Statement (Continued)

Process step	Precautionary measures and comments	+
<p>Once everything is secure and switched off with the tank and hose stowed away one of the operators will stay with the dewar. The other operator will return the key and note how much liquid nitrogen has been taken in the office.</p>		X
<p>The two operators will make there way back to the CBE taking the smoothest and flattest route possible. The journey will be slow and steady so not to spill any liquid nitrogen.</p>	<p>Ensure you use the safest possible route, avoiding enclosed spaces and highly populated areas. (Avoid doing this procedure at times when students will be in large numbers moving between lecture rooms)</p>	X
<p>For Clyde Williams Tank - The 500 litre nitrogen storage cylinder is stored in a purpose built storage area. This area must be well ventilated to avoid the build-up of nitrogen gas. The liquid nitrogen dispensing must take place near to the entrance of the cylinder store. The door to the cylinder store must remain open at all times. The vented area in the wall of the cylinder store must not be obstructed.</p> <p>The volume remaining in the tank is shown on the square digital display sticking up from the centre top. The amount is displayed constantly on the front. It shows the volume in percent values. Eg 100% full. The values change down in 5% steps.</p> <p>Personal protective equipment should be worn at all times when handling liquid nitrogen. Face shield and cryogenic gloves . Appropriate shoes (not open toes sandals or similar) must be worn too, in addition to attire that fully covers the legs.</p> <p>There is a big lever fitted on the top to turn to the 'open' position. This lever is inline from the attached hose . The end of the hose would be placed into the vessel to be filled. The lever should be opened slowly and slightly so that the Nitrogen can begin to be released through the hose. At first, it will be Nitrogen gas, but as the hose begins to cool down the liquid Nitrogen will begin to flow through. The flow of Nitrogen into the vessel needs to be monitored so that it is not flowing too quickly causing it to overflow and splash. Once the flow is established the lever can be opened up more fully to increase the flow rate is desired. When the dewar has been filled to desired level turn the lever to off. Remove the hose carefully wearing PPE and store in safe position. Replace the lid on the dewar.</p> <p>I Warning: (a) vapour will be produced; (b) all pipes and connections will be extremely cold. DO NOT TOUCH COLD SURFACES OR LIQUID WITH BARE SKIN, the extremely cold metal on the pipes, if touched with bare skin, will cause the skin to stick. Make a note of the amount taken and inform the responsible person.</p> <p>The two operators will make there way back to the CBE taking the smoothest and flattest route possible. The journey will be slow and steady so not to spill any liquid nitrogen. The two operators must keep 2 meters apart and wear masks and follow social distancing guidelines.</p>	<p>Always work in a well ventilated area.</p>	X

Safety Method Statement (Continued)

References taken from SOP-ti-027 Liquid Nitrogen Dispensing (SSEHS) .
Reference from School of Science Risk Assessment Approved by Stephen Elliot ' Liquid Nitrogen Pressurised decanting 'PHRA372a
Reference from School of Science Risk Assessment approved by Stephen Elliot PH Liquid Nitrogen Transport and Storage PHRA369a.


X

COSHH Form

Reference

Location Originator

Project / Activity / Task

CHEMICAL NAME					Hazard Rating	<input type="text" value="High"/>	OVERALL RISK: Low
<input type="text" value="Liquid Nitrogen"/>	Amount used	Period of use (hrs)	The process is:	Physical State	<input type="checkbox"/> Eyes <input type="checkbox"/> Skin <input type="checkbox"/> Inhaled <input type="checkbox"/> Ingested	Exposure Potential	
CAS No. <input type="text" value="7727-37-9"/>	<input type="text" value="40"/>	<input type="text" value="1"/>	<input type="text" value="0.5"/>	<input type="text" value="Open"/>	<input type="text" value="Non-Volatile Liquid"/>	<input type="text" value="Low"/>	
W.E.L. (Itel / stel) <input type="text"/>							

Hazard Statement and Description	Precaution Statement and Description	+
<input type="text" value="H281 Contains refrigerated gas; may cause cryogenic burns or injury."/>	<input type="text" value="P282 Wear cold insulating gloves/face shield/eye protection."/>	x
<input type="text"/>	<input type="text" value="P336 Thaw frosted parts with lukewarm water. Do no rub affected area."/>	x
<input type="text"/>	<input type="text" value="P315 Get immediate medical advice/attention."/>	x
<input type="text"/>	<input type="text" value="P403 Store in a well-ventilated place."/>	x
How will the precautions listed above be implemented?		
<p>Wear appropriate PPE - cold insulating gloves (nitrile gloves will not be worn under cold insulating gloves), face shield, lab coat. Use of oxygen monitors- check if it is working before starting work, will alarm if there is an oxygen depletion. Storage dewars are stored in Gas Pod 3, which is very well insulated. Operators are trained how to deal with cold burns to skin using lukewarm water but PPE should prevent skin coming into contact with liquid nitrogen. Operators are trained on emergency procedures.</p>		
Special Storage and Containment Measures	Disposal Method	+
<input type="text" value="Storage dewars are to be kept in Gas Pod 3, the cryobanks are kept within 3 areas of the CBE lab. The cryobanks are kept locked at all times unless in use."/>	<input type="text" value="Place in a very well ventilated area and allow to evaporate into atmosphere.(Large amounts should be done outside)."/>	x
How will spillages be dealt with?		
<i>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</i>		

COSHH Form (Continued)

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.

- Move any other personnel away from the spill area.
- Prop open doors if additional ventilation is required (determined by oxygen monitor alarms,
- 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:

- Immediately evacuate the area.
- Cordon off the spill area and prevent any individual (whether staff member, student or general public) from accessing the spill area.
- Allow the liquid nitrogen to evaporate into the atmosphere.
- 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.

[+ Add another chemical](#)

Statement of work (Process to be undertaken)

Transporting an empty 25L dewar from Centre for Biological Engineering, Holywell Park (Gas Pod 3) to Sir Davis Davies Building (W building) car park or to Clyde Williams building gas store (0.16) to collect Liquid Nitrogen from one of the 500L tanks in either of the locations listed above. Training will be provided by the responsible persons for the tanks. PPE and all safety precautions will be taken. This will be done in pairs. Once the dewar has been filled it will be transported back to the Centre for Biological Engineeing Gas Pod 3. The journey will take the operators along university footpaths and roads but the safest smoothest route will be taken avoiding pedestrians where possible.

[Show image](#)

Personal protection requirements not covered in the precaution statements above.

Check Oxygen Monitor is working correctly , ensure area is well ventilated and if not prop doors open. Wear PPE (blue cryo gloves) enclosed shoes and safety glasses/face shield.

Sources of information and references

SOP013 Safe use and maintenance of Liquid Nitrogen stores and Risk Assessment for Liquid Nitrogen SAFMM6408

Reference to **existing approved** Risk Assessment

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

Form Reference Numbers

Risk Assessment

SAF/MM6411

Method Statement

SAF/MM6411

COSHH Assessment

MEME540

DSO Signature

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:

03/04/2021

Review comments