

Liquid Nitrogen Policy

(Safe Transport, Storage, Use and Disposal)

(HSP 010.6)

V5.0

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Summary

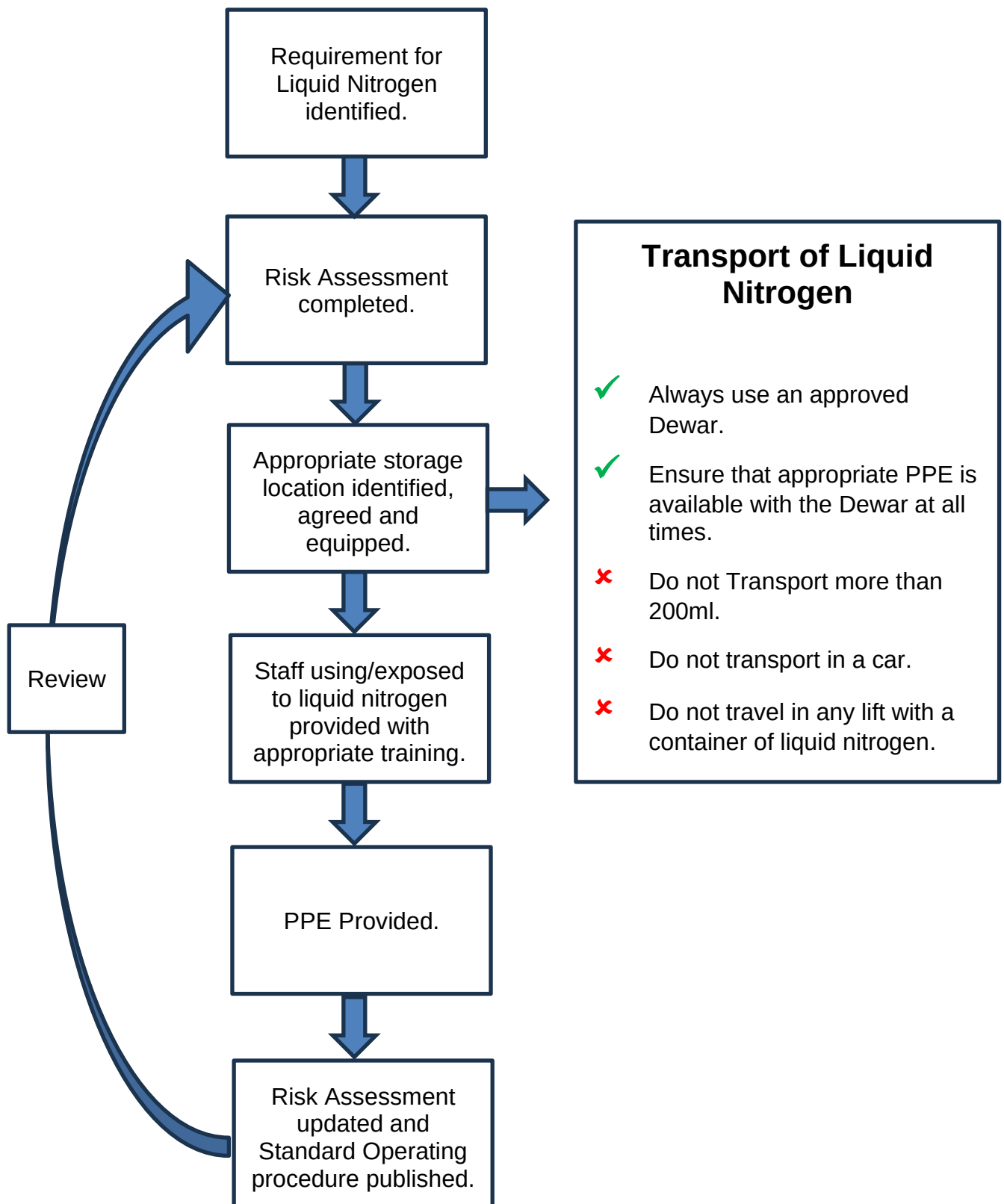


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For more information about your obligations under the Data Protection Act 2018 and UK General Data Protection Regulations 2016/679 please see the Information Use Framework Policy or contact the Information Governance Team.

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1. Introduction

- 1.1. The Royal Cornwall Hospitals NHS Trust recognises and is committed to meeting or exceeding its legal duties under the Health and Safety at Work etc. Act 1974 and the Control of Substances Hazardous to Health Regulations 2002 (as amended 2005).
- 1.2. This document is particularly concerned with the safe transport, storage, use and disposal of liquid nitrogen. This document must be read in conjunction with the Trust Health and Safety General. Hazardous Substances and the Incident Reporting policies.
- 1.3. The successful implementation of this policy requires the total co-operation and commitment of all members of the Trust's management and staff.
- 1.4. The special duties of staff detailed herein are in addition to those detailed in the Trust [Health and Safety Policy](#) and [The Management and Use of Hazardous Substances \(CoSHH\) Policy](#).
- 1.5. This version supersedes any previous versions of this document.

2. Purpose of this Policy/Procedure

- 2.1. The Trust aims to achieve or exceed current statutory requirements and strive for excellence of best practice.
- 2.2. The aim of the policy is to establish roles and responsibilities for various levels of management compliance with statutory obligations and to promote timely reporting of relevant incidents.
- 2.3. These guidelines exist to inform all personnel involved in the transport, storage, use and disposal of liquid nitrogen.

3. Scope

- 3.1. This document covers the safe transport, storage, use and disposal of liquid nitrogen. It sets the standards expected within the Trust.
- 3.2. Specific clinical use methodology and any associated interaction with patients is outside the scope of this policy and will be contained in relevant treatment guidelines.
- 3.3. This document is applicable to all sites, Care Groups, departments and wards within the Trust.

4. Definitions / Glossary

For the purposes of this document the following terms will, unless otherwise stated, apply.

The Trust: The Royal Cornwall Hospitals NHS Trust.

Trust sites:	All areas, sites, buildings or premises owned, occupied or controlled by the Trust.
Dewar:	A specific cryogenic container / more than one specific cryogenic container into which liquid nitrogen is decanted. Also known as Dewar flask(s).
Cryogenic:	A cryogenic gas is a gas that has been cooled to a liquid state below 150 Kelvin. Liquid nitrogen is a cryogenic gas.
PPE:	Personal Protective Equipment.
SOP:	Standard Operating Procedure.
Anoxia:	A total depletion in the level of oxygen, an extreme form of hypoxia or "low oxygen".
Asphyxiate:	An Asphyxiate is a gas or vapour that can displace or dilute air.
Incident:	"An unplanned, uncontrolled event which has led to or could have led to injury to people, damage to plant, machinery or the environment and / or some other loss".
HSE:	The Health and Safety Executive. They are the enforcing authority for the Trust on Health and safety matters.
CoSHH:	Control of Substances Hazardous to Health Regulations 2002.

5. Ownership and Responsibilities

The Trust Board, managers and staff are responsible for establishing, maintaining and supporting a holistic approach to Health and safety management, in all areas of their responsibility. They must comply with the Trust Health and Safety Policies and Procedures and ensure effective risk management mechanisms are implemented in accordance with these. Some members of staff and committees have particular specialist functions in relation to Health and Safety management as described below.

5.1. Role of the Trust Board

The Trust Board is ultimately responsible for fulfilling all Health and Safety duties as an employer, including all statute Health and Safety Law requirements.

5.2. Role of the Chief Executive

The Chief Executive has overall responsibility to the Trust Board for ensuring that appropriate and effective Health and Safety management systems are in place.

5.3. Role of the Executive Director

The Chief Executive delegates responsibility for Health and Safety to the Chief Operating Officer. The Chief Operating Officer deals with matters of Health and Safety in close association with executive directors, clinical directors, senior managers and the Health and Safety Team.

5.4. Role of Care Group Managers (CGM)

- The Care Group Managers are responsible for ensuring that day-to-day activities of the Care Group are conducted in a safe and suitable manner and this policy is effectively and correctly employed within their own Care group.
- CGM's will ensure that suitable and sufficient equipment and resources are made available to staff handling or exposed to liquid nitrogen.

5.5. Role of Heads of Nursing (or Care Group Equivalent)

Heads of Nursing (or Care Group equivalents) are to:

- Be aware of the Trust's Health and Safety strategy and policies.
- Support the departmental manager in promoting a health and Safety culture within your working environment, ensuring participation and involvement when requested.
- Identify potential risks and health and safety issues that may impact on the Trust's ability to achieve its objectives, and report concerns through your line management structure.
- Are required to take due care at work, report any accidents, incidents or untoward occurrences and comply with the Trust's health and Safety Policies in order that the trust can fulfil its Health and Safety responsibilities.

5.6. Role of the Health and Safety Team

- The Trust Health and Safety Team are the designated safety management advisors for the Trust. They are responsible for advising all staff throughout the organisation on issues relating to areas of risk and adverse incident management.
- The Health and Safety Advisors have overall responsibility for liaising with relevant external agencies, including, but not restricted to, the Health and Safety Executive, Fire and Rescue Service, Local Authority, Environment Agency and other enforcement authorities etc. where their involvement is indicated in respect of adverse incident issues.

5.7. Role of the Managers

Heads of Department and Line Managers are responsible for:

- Establishing local procedural guidelines specific to own departments.

- Ensuring process (CoSHH assessments etc.) in accordance with the Trust Management and Use of Hazardous Substances(CoSHH) Policy are followed with regards to Liquid Nitrogen transport, storage and use.
- Ensuring that liquid nitrogen risk assessments and standard operating procedures (SOP) are in place.
- Ensure there are procedures to deal effectively with the foreseeable emergencies arising from use, storage and handling of liquid nitrogen. (see section 6.10)

5.8. Role of Staff

- All staff are expected to take reasonable care to ensure the safety of themselves, their colleagues, patients and members of the public.
- Staff must participate in and comply with all Risk Assessments and local arrangements.
- All staff and any other personnel involved in the filling, handling, use or transportation of liquid nitrogen, including transportation in dewars shall:
 - Be aware of, and trained in, the hazards of liquid nitrogen.
 - Wear appropriate hand, eye, feet and body protection when handling full or empty Dewars.
 - Not fill, use or transport any Dewar showing any signs of defect or damage.
 - Ensure that Dewars are correctly and clearly labelled for liquid nitrogen service before filling.
 - Only use Dewars which are correctly and clearly labelled.
 - Only transport Dewars which are correctly and clearly labelled for transport.
 - Be adequately trained in the handling of liquid nitrogen Dewars.
 - Know what actions to take in the event of a liquid nitrogen spillage.
 - Know what actions to take if an incident results in a cold burn or asphyxia casualty.

6. Standards and Practice

6.1. Liquid Nitrogen

- 6.1.1. Nitrogen is a non-toxic gas that exists naturally in the Earth's atmosphere. It is an inert gas which is colourless, odourless and tasteless. Liquid nitrogen is simply nitrogen in a liquid state. However, in its liquid state, the properties of nitrogen are altered and significantly, it becomes extremely cold.

- 6.1.2. Liquid nitrogen is nitrogen gas which has been refrigerated to the point where it is so cold it turns to liquid. However, liquid nitrogen is dangerous because it releases nitrogen gas which is an Asphyxiate. Contact with the liquid form may cause burns.
- 6.1.3. The boiling point of liquid nitrogen is minus 196 degrees centigrade (-196°C). It is not toxic and does not support life or combustion. The density changes with temperature and critically below 5.5°C, the gas is heavier than air. In its liquid form it rapidly vaporises to gas with about 700 times the liquid to gas volume.
- 6.1.4. All departments that use or store any Cryogenic gas or solids must carry out a confined space risk assessment for areas of use or storage (please reference Confined Space Management Policy).
- 6.1.5. All staff that use liquid nitrogen/cryogenic gases must receive appropriate training in its safe handling and use.
- 6.1.6. Cryogenic gases/solids are only to be used in well-ventilated areas, where this is not possible. Static oxygen depletion monitors must be present.
- 6.1.7. Remember, oxygen-deficient atmospheres are an invisible danger.

6.2. Risk Assessment

The precautions that need to be taken will depend to some extent on individual circumstances of each department. Each department should undertake its own task specific risk assessment as required by legislation and with reference to the Trust Management and Use of Hazardous Substances (CoSHH) Policy including need for CoSHH risk assessments (produced on the Alcumus system). As discussed below, some of the hazards and precautions are common to all users.

6.3. Hazards

Hazards of liquid nitrogen include Cold Burns and Frostbite, Oxygen Deficiency or Asphyxiation, Effect of cold on lungs, Oxygen enrichment or Ice Plugs.

6.3.1. Cold Burns and Frostbite

Extremely low temperatures can freeze flesh rapidly and this type of exposure to skin at very low temperatures can produce effects similar to a burn. Prolonged exposure to cold can result in frostbite.

6.3.2. Cryogenic liquids and vapour can damage the eyes

6.3.2.1. If unprotected skin must come into contact with a very cold surface it may stick fast as the natural moisture on the skin is frozen. This may result in injuries by flesh being torn whilst attempting to withdraw from the object, therefore appropriate Personal protective Equipment must always be worn.

6.3.2.2. When spilled onto a surface the liquid tends to cover it completely. The gas issuing from the liquid is also extremely cold. Delicate

tissue, such as eyes, can be damaged by exposure to cold gas alone. Prolonged inhalation of cold vapour or gas can damage the lungs.

6.3.2.3. Unprotected body parts contacting objects cooled by liquid nitrogen may stick fast.

6.3.3. All cold burns must be reported to a first-aider for treatment. Such treatment would include:

- For a severe burn calling an ambulance or attending the Emergency department.
- Flushing the area with tepid water but, in order to avoid damage, a forceful flow of water must not be used.
- Not applying direct heat.
- Moving the casualty to a warm place (approximately 22°C, 70°F).
- Continuing to flush the affected area of the skin with tepid water.
- Loosening the injured person's clothing and removing any tight jewelry.
- Keeping the person warm and at rest.
- Avoiding hot beverages and in keeping with existing Trust policy do not allow the injured person to smoke.

6.4. Oxygen Deficiency / Asphyxiation

6.4.1. Liquid nitrogen rapidly vaporizes to gas, by displacing air (oxygen). The gas may kill by asphyxiation. When the oxygen concentration in air is sufficiently low, a person can become unconscious without any warning symptoms. Remember the gas is odourless, colourless and tasteless.

6.4.2. Upon evaporation liquid nitrogen will expand to about 700 times its volume. It will cause asphyxiation if it is at a concentration sufficient to displace the oxygen in a room. Especially at risk are areas with little or no air movement, or enclosed spaces with little or no ventilation. There is little or no warning to the individual that they are in an oxygen deficient atmosphere. Asphyxiation will take one of two forms:

- Sudden Asphyxia – in sudden asphyxia i.e. inhalation of a gas containing practically no oxygen, unconsciousness is immediate. Death can follow in a few minutes unless immediate remedial action is taken.
- Gradual Asphyxia – Gradual asphyxia is the most common form encountered, but gradual asphyxia can occur as oxygen levels in the atmosphere decrease. Symptoms are shown in Appendix 3.

6.5. Effect of Cold on the Lungs

Inhalation of cold vapour or gas can damage the lungs. Short exposures produce discomfort in breathing whilst prolonged exposure can cause more serious side effects.

6.6. Oxygen Enrichment

The low temperature of liquid nitrogen can cause oxygen to condense out of atmospheric air. This can occur around cold pipe work, valves and in open Dewars. The oxygen enrichment may result in increased flammability and explosion risk. The oxygen enriched liquid must not be allowed to come into contact with oil, grease or flammable materials as spontaneous combustion can occur.

6.7. Ice Plugs

6.7.1 Ice plugs may form in the neck of open Dewar flasks and cause a build-up of pressure. As the pressure rises within the Dewar, the ice plug may be expelled at high velocity or in extreme cases the pressure may build up sufficiently to rupture the Dewar vessel. Serious injury can result.

6.7.2 If an ice plug is found, extreme caution must be exercised and the area immediately vacated. Advice on how to deal with an ice blockage must be sought from the gas supplier or Dewar manufacturer and held with your local SOP and risk assessment. Managers must ensure that the manufacturer examines the Dewar before returning it to service.

6.7.3 Ice plugs can be prevented by diligent use of the correct Dewar stopper.

6.8. Precautions

6.8.1. Safe Systems of Work and Risk Assessment

Equipment and systems of work must be designed, operated and maintained to reduce the risk of an accidental spillage. In the event of a spillage the quantity of liquid nitrogen that might be spilt using a safe system of work must be minimised. To this end a risk assessment of the dangers posed must be undertaken in each area where liquid nitrogen is either used, transported or stored.

6.8.2. Personal Protective Equipment

The following Personal Protective Equipment must be worn when handling liquid nitrogen:

- Eyes: When using or decanting liquid Nitrogen, a face visor covering both eyes and face must be worn.
- Hands: When using or decanting liquid Nitrogen or handling anything that has had immediate contact with same, gloves that are purpose designed for cryogenic use (insulated, loose fitting, non-absorbent, with ribbed fitted cuffs to prevent liquid entry or collection, rough to

give good grip) must be worn. Tongs should be used to handle objects that have been immersed in Liquid nitrogen which must be handled with care. Never put your hands (even in the best PPE gloves) into liquid nitrogen.

- Body: overalls, lab coat or similar are recommended. In order to avoid collection of liquid, such clothing should preferably not have pockets, legs must be covered and trousers should not be tucked into boots or have turn-ups.
- Feet: Footwear must cover all parts of the foot, have no openings or cutouts and be made from a non-porous material (e.g. leather).

6.9. Ventilation

- 6.9.1. Ventilation of liquid nitrogen storage areas depend on several factors e.g. the volume of the room, amount of liquid nitrogen stored and evaporation rates. For rooms above ground level with no special ventilation openings, natural ventilation will provide typically one air change per hour. With well-sealed windows e.g. double glazing, this will be less. Basement rooms may only average 0.4 changes per hour.
- 6.9.2. For general handling of liquid nitrogen vessels, in locations at or above ground level, natural ventilation is generally sufficient provided the room is large enough. An indoor location must have ventilation openings provided which are at least 1% of the floor area and positioned diagonally opposite with the main opening at ground level.
- 6.9.3. Cold nitrogen gas is heavier than air and will accumulate at low level. Where possible liquid nitrogen must not be handled in basement rooms, rooms with ventilation at high level only, and rooms where the gas can be trapped in gullies, ducts or pits.
- 6.9.4. Rooms must be adequately ventilated to allow normal evaporation of vessels and evaporation during filling without oxygen concentration falling below 19.5%. In addition, the complete spillage of the contents of the largest vessel must not allow the oxygen concentration fall below 18%. Personal Protective Equipment must be worn.
- 6.9.5. In assessing the ventilation requirements, advice must be sought from the liaison with the Health and safety Department and the Estates Department.

6.10. Emergency Procedures

The following must be considered when formulating such as procedure:

- Raising the alarm.
- Summoning help and emergency services.

- Isolating the source of leakage if appropriate and where it is safe to do so evacuation of persons from the danger area and preventing access. Remember persons in pits, basements, cellars, stairwells, lower floors etc.
- Ventilation of the area by opening exterior doors and windows where safe to do so. This will allow liquid nitrogen to evaporate naturally. Do not try to clean it up.
- Alerting neighbouring wards or departments to possible dangers from vapour clouds and evacuate where necessary.
- Preventing reoccupation of the area until all gas has dispersed. If necessary oxygen monitors must be used to check the atmosphere before re-occupation.
- After the liquid nitrogen spillage has been isolated, oxygen deficiency checks must also be carried out in any enclosed areas where the vapour cloud may have entered. This includes pits, basements and other confined spaces.
- Staff likely to be involved in cleaning up spillages must be clear about the actions required to minimise any adverse effects or risk to themselves.

6.11. Transport

- 6.11.1. Only use closed 'transport' Dewars when moving liquid nitrogen. When transporting larger quantities of liquid nitrogen and when using lifts, this task must be undertaken by two members of staff.
- 6.11.2. Keep the Dewar flask upright at all times. Tipping the container or laying it on its side can cause spillage of liquid nitrogen. It may also damage the container and any materials stored in it.
- 6.11.3. Rough handling can cause serious damage to Dewars. Dropping the container, allowing it to fall over onto its side, or subjecting it to sharp impact or severe vibration can result in partial or complete loss of vacuum. To protect the vacuum insulation system, handle containers carefully.
- 6.11.4. Do not 'walk', roll or drag Dewars across a floor. Large units are heavy enough to cause personal injury or damage to equipment, if proper lifting and handling techniques are not used.
- 6.11.5. Avoid transport on vehicles where the load space is not separated from the driver's compartment (e.g. a car). Ensure the vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.
- 6.11.6. Before transporting product containers, ensure that they are firmly secured.

6.11.7. Transporting around a Building

When transporting containers of liquid nitrogen care must be taken to ensure they are not left, even temporarily, in an enclosed space, due to the risk of oxygen depletion. Do not drag Dewars along the floor. Trolleys must be used for larger Dewars.

6.11.8. Transporting in Passenger Lifts

Procedures must be in place to ensure that no-one travels in a lift with liquid nitrogen; the unexpected evaporation of relatively small quantities of liquid nitrogen can reduce the available oxygen to a dangerous level. In a standard passenger lift.

6.11.9. Where lifts have to be used, either:

- Use a lift which can remotely controlled i.e. key controlled lifts;
- or
- One person places the Dewar in the lift whilst another meets the lift at the designated floor (if this procedure is used a suitable qualified person must be at every floor, if the lift covers multiple floors, to ensure no person can enter lift whilst liquid nitrogen being transported).
- In both cases the dewar travels unaccompanied. This activity must be supervised by competent persons who are aware of the potential hazards and the appropriate emergency action.

6.11.10. Transporting in a vehicle

Liquid Nitrogen must never be transported by car for the following reasons:

- Spillage of liquid nitrogen in a car (or other unsuitable vehicle) could result in asphyxiation through oxygen depletion.
- Spillage can cause serious damage to the car's interior. For example; contact with the spare wheel will make the tyre lethally dangerous if subsequently fitted to the car.
- The drivers are unlikely to be covered by their own motor insurance arrangements, even with business use cover. For carriage by other vehicles the following precautions must be adhered to.
- The maximum quantity of liquid nitrogen carried in any vehicle, without meeting the full demands of the carriage of dangerous goods regulations, must not exceed 200 ml in total.
- Vehicles use for the transport of liquid nitrogen must be designed to prevent a build-up of nitrogen gas in the event of leak or spill. This can be achieved by provision of adequate high and low level

vents to encourage a free-flow of air through the load compartment. The load compartment must be separated from the driver/passenger compartment by a sealed bulkhead, or similar, to prevent escaped gas reaching that compartment.

- If the load compartment is unventilated then the cargo door shall be marked with the following in letters not less than 25mm high:
 - WARNING.
 - NO VENTILATION.
 - OPEN WITH CAUTION.
- The load compartment door must also be labelled indicating that liquid nitrogen is being transported and to require the area be allowed to ventilate prior to being entered.
- Vehicles must also be equipped with means of securing the Dewar.
- Dewar caps may become loose during transportation. A retaining device must be fitted which keeps the cap in place but does not seal the Dewar e.g. a short piece of chain or wire.
- In the case of a road accident the emergency services must be advised that liquid nitrogen is being carried. However, Dewars must be labelled adequately in case the driver is unable to communicate with them following the accident.
- Drivers must be adequately trained regarding the hazards of liquid nitrogen.

6.12. Storage

The location for the storage and use of liquid nitrogen must be chosen in the following order of preference:

- In a ventilated room sealed from other areas of normal occupancy at, or above, ground level adjacent to an outside wall as far as possible from normal workstations.
- Above, ground level, as far as possible from normal workstations.
- Liquid nitrogen must not be stored or used below ground level or in corridors.
- All pipework and valves must be labelled or marked for functions.
- All vessels and equipment must be commissioned and handed over by a competent person.
- Any area being considered for storage of Liquid nitrogen must be assessed by Estates/ Health and Safety to ensure there is no residual risk of Liquid

Nitrogen leaking from the space into service voids, other room, basements etc.

- All storage spaces must be adequately ventilated to allow normal evaporation of vessels and evaporation during filling without oxygen concentration falling below 19.5%. In addition, the complete spillage of the contents of the largest vessel must not allow the oxygen concentration fall below 18%. Personal Protective Equipment must be worn.

6.13. Workplace Storage

All vessels, work equipment, furniture and other items must be organized in such a way to allow staff, and other users of the space, adequate means of access and egress.

6.14. Storage of Dewars in Rooms

- 6.14.1. Dewars must not be stored in sealed rooms (e.g. walk in refrigerated rooms) because the reduced ventilation may be inadequate to mitigate against spillage and general evaporation.
- 6.14.2. Storing single Dewars of up to 25L in rooms is considered acceptable with adequate ventilation. However, the storage of large numbers of small Dewars or Dewars over 25 litre capacity will require assessment by Estates/Health and Safety and a specific risk assessment to be undertaken. In these circumstances consideration must be given to:
 - The size of the room.
 - The storage conditions and ventilation level.
 - The use of alarms which trigger due to low oxygen level.

6.15. Containers

- 6.15.1. Only use containers designed for low-temperature liquids.
- 6.15.2. Containers (e.g. Dewar flasks) are specifically designed and made of materials that can withstand the rapid changes and extreme temperature differences encountered in working with liquid nitrogen.
- 6.15.3. Even so, these special containers must be filled slowly to minimise the internal stresses that occur when any material is cooled.
- 6.15.4. Do not cover or plug the entrance opening of any liquid nitrogen Dewar.
- 6.15.5. Do not use any stopper or other device that would interfere with venting gas.
- 6.15.6. Cryogenic liquid containers are generally designed to operate with little or no internal pressure, inadequate venting can result in excessive gas pressure which could damage or burst the container. Check the unit periodically to be sure that the venting is not restricted by accumulate

ice or frost.

6.16. Bulk Storage Facilities

6.16.1 Bulk tanks over 500 litre capacity must be situated outside in a location that is acceptable to the gas supplier. The location must be exclusively for the storage of liquid nitrogen, at above ground level and away from ducts, drains and other ground depressions. It must also be designated a 'No Parking' area.

6.16.2 Any area being considered for the location of bulk storage of Liquid nitrogen must be assessed by Estates/Health and Safety to ensure there is no residual risk of Liquid nitrogen leaking from the space into service voids, other room, basements etc.

6.17. Labelling

Liquid nitrogen Dewars shall be clearly and adequately labelled. The label includes:

- Basic safety information.
- Transport labelling information.
- Gas supplier contacts.

6.18. Periodic Inspection and Maintenance

- All large capacity storage equipment (25 litres or larger) must be subject to annual maintenance checks by a suitably competent person.
- Smaller Dewars must be visibly inspected on a regular basis.
- Alarms installed for low oxygen levels must also subject to regular maintenance checks.
- Maintenance and inspections must be recorded by care groups and reviewed/updated as required.

6.19. Disposal

6.19.1. Never dispose of liquid nitrogen down the drain and it must never be poured down a sink, as waste pipes will crack offering the potential for gas leaks into occupied areas. Ordinary materials may not be able to withstand cryogenic temperatures without failure.

6.19.2. Unwanted liquid nitrogen must be allowed to evaporate in well ventilated areas, preferably outside, pour the liquid slowly onto gravel or bare earth, from which other people are excluded, where it can evaporate without causing damage or allow waste liquid nitrogen to evaporate naturally in a fume hood. Do not pour the liquid on the pavement.

6.20. First Aid

6.20.1. Skin/Eye Contact

- Immediately flush thoroughly with copious amounts of tepid water (the water must not be hotter than 44°C).
- DO NOT apply any form of direct heat.
- DO NOT rub affected parts either before or after warming.
- Move the patient to a warm place (22°C).
- The aim is to slowly raise the temperature of the affected areas back to normal. For minor injuries make the injured person comfortable and loosen any clothing that may restrict blood circulation. Do not pull clothes away from burned or frozen area.
- Use a sterile burn dressing to protect the injury and arrange for the person to be transported to the emergency department without delay, ensuring full incident details are exchanged with emergency responders.
- DO NOT permit smoking, alcohol consumption or give analgesics (aspirin, paracetamol etc.).

6.20.2. Anoxia

6.20.2.1. If a person seems to become dizzy or loses consciousness while working with liquid nitrogen, move to a well-ventilated area immediately. In contained areas, self-contained breathing apparatus must be worn unless the atmosphere is proved to be safe.

6.20.2.2. Summary of Recommendations for Managers;

- Carry out a risk-assessment of the activity in accordance with Trust Policy which must take account of emergency procedures in the event of an uncontrolled release of material.
- Where the work activity occurs in an enclosed space then this shall be reviewed against the requirements of the Confined Spaces Regulations.
- Carry out actions resulting from risk assessments.
- Ensure that all employees are adequately trained in the handling of liquid nitrogen and decanting into Dewars.
- Ensure all staff are aware of the hazards of liquid nitrogen and that standard operating procedures are in place and followed.

- Ensure that adequate ventilation is provided in areas Dewars are stored.
- Ensure that adequate procedures are in place for the transportation of Dewars within the premises, particularly in respect to the use of lifts and stairs.
- Ensure that manual handling assessments have been carried out on all activities involving Dewars.
- Ensure that labelling meets all regulatory requirements.
- Ensure that Dewars are adequately maintained and that they are in good condition.
- Ensure that adequate emergency procedures are in place in the event of a liquid spillage.
- Ensure that a sufficient number of personnel are trained in First Aid to ensure treatment of asphyxia and cold burns.

6.21. Training

- 6.21.1 Training will be facilitated by the Trust supplier of Liquid Nitrogen and managers must ensure it is accessible to all employees handling liquid nitrogen.
- 6.21.2 Training for the clinical use of Liquid Nitrogen is outside the scope of this policy.
- 6.21.3 All personnel handling liquid nitrogen and those directly involved in the commissioning, operation and maintenance of liquid nitrogen storage systems must be fully informed regarding the hazards; in particular oxygen deficient atmospheres, cold burns and emergency procedure. The training must be arranged to cover those aspects and potential hazards that the particular person is likely to encounter.
- 6.21.4 Training must cover, but not necessarily be confined to, the following subjects for all personnel:
- Potential hazards of liquid nitrogen.
 - Site and safety rules.
 - Handling procedures e.g. method of dispensing, sample retrieval, transportation.
 - Use of protective clothing/apparatus including breathing sets where applicable.
 - Emergency procedures.
 - First aid treatment for cryogenic burns.

- All training must be formally recorded by the Care Group with refresher training undertaken as advised by the training provider.

7. Dissemination and Implementation

- 7.1. Once consultation has been undertaken the final published document will be held centrally within the online Document Library and be available to staff.
- 7.2. Care group General Managers will ensure that the contents of this document are highlighted to staff through regular Care Group meetings.

8. Monitoring compliance and effectiveness

Information Category	Detail of process and methodology for monitoring compliance
Element to be monitored	Compliance with the undertaking Liquid Nitrogen Risk Assessments.
Lead	Health and Safety Team.
Tool	Care Group reports to Health and Safety Team.
Frequency	Quarterly.
Reporting arrangements	Reports received by the Health and safety Team as detailed above and reported in accordance with the Committee Terms of Reference.
Acting on recommendations and Lead(s)	Health and Safety Team will request action from Care Group Representatives; and escalate to Governance Committee as required.
Change in practice and lessons to be shared	Where issues are identified within reports; all such comments will be fed back to the relevant area by the appropriate representative on the committee within a timeframe identified by the Committee.

9. Updating and Review

- 9.1. This document will be reviewed every 3 years and/or in the event of any significant change with the organizational structure/management arrangements and subject to consultation via the Trust Health, Safety, Security and Moving and Handling Team.
- 9.2. Appendices and the associated documentation regarding this policy may be reviewed/revised in consultation with the Health, safety, security and Moving and Handling Team without formally being undertaken by the Health, Safety, Security and Moving and Handling Team, provided that the amendments do not impact upon the general arrangements made within the policy.

10. Equality and Diversity

10.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the [Equality Diversity And Inclusion Policy](#) or the [Equality and Diversity website](#).

10.2. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.

Appendix 1. Governance Information

Information Category	Detailed Information
Document Title:	Liquid Nitrogen Policy (Safe Transport, Storage, Use and Disposal) (HSP 10.6) V5.0
This document replaces (exact title of previous version):	Liquid Nitrogen Policy (Safe Transport, Storage, Use and Disposal) (HSP 10.6) V4.0.
Date Issued / Approved:	September 2024
Date Valid From:	September 2024
Date Valid To:	September 2027
Author / Owner:	G. Griffiths, Head of Health and Safety.
Contact details:	01872 25 2266
Brief summary of contents:	Trust management arrangements for the safe transport, storage, use and disposal of Liquid Nitrogen (Policy and Guidance).
Suggested Keywords:	Liquid Nitrogen, confined, gas, health, safety, Dewars, emergency, oxygen.
Target Audience:	RCHT: Yes CFT: No CIOB ICB: No
Executive Director responsible for Policy:	Chief Operating Officer.
Approval route for consultation and ratification:	Health and Safety Committee.
Manager confirming approval processes:	G. Griffiths, Head of Health and Safety.
Name of Governance Lead confirming consultation and ratification:	G. Griffiths, Head of Health and Safety.
Links to key external standards:	Health and Safety at Work etc. Act 1974 Management of health and Safety Regulations 1999. Control of Substances Hazardous to Health Regulations 2002. The Confined Spaces Regulations 1997. CQC Regulations.

Information Category	Detailed Information
Related Documents:	Health and Safety General Policy. The Management and Use of Hazardous Substances (CoSHH) Policy. Health and Safety Policy and Procedure for the Movement, Handling and Management of Dangerous Goods by Road. Driving at Work Health and Safety Policy and Guidance. First Aid Policy and Guidance. Confined Space Management Policy.
Training Need Identified:	Yes.
Publication Location (refer to Policy on Policies – Approvals and Ratification):	Internet and Intranet
Document Library Folder/Sub Folder:	Chief Operating Officer/Health and Safety.

Version Control Table

Date	Version Number	Summary of Changes	Changes Made by
October 2006	V1.0	Initial issue.	Len Welsh
December 2009	V2.0	Minor changes to sentences to add clarity and change from directorate to divisional structure. Removal of the paper system of risk assessment.	Len Welsh
December 2013	V3.0	Total revision of the whole document.	J. Robin Gatenby Health and Safety Manager
December 2016	V3.1	Review of full document.	J. Robin Gatenby head of Safety, Fire and Security Management.
December 2020	V3.2	Review of full document.	Malcolm Irving Safety Advisor/Auditor
February 2021	V4.0	Full 3 year review.	Malcolm Irving Safety Advisor/Auditor

Date	Version Number	Summary of Changes	Changes Made by
July 2024	V5.0	Full 3-year review. Addition of requirements under the Management and Use of Hazardous Substances (CoSHH) Policy. Minor corrections made to policy for clarity and conformity.	Rob Harris, Senior Safety Advisor. Oliver Niles, Safety Advisor (Developmental).

All or part of this document can be released under the Freedom of Information Act 2000.

All Policies, Strategies and Operating Procedures, including Business Plans, are to be kept for the lifetime of the organisation plus 6 years.

This document is only valid on the day of printing.

Controlled Document.

This document has been created following the Royal Cornwall Hospitals NHS Trust [The Policy on Policies \(Development and Management of Knowledge Procedural and Web Documents Policy\)](#). It should not be altered in any way without the express permission of the author or their Line Manager.

Appendix 2. Equality Impact Assessment

Section 1: Equality Impact Assessment (EIA) Form

The EIA process allows the Trust to identify where a policy or service may have a negative impact on an individual or particular group of people.

For guidance please refer to the Equality Impact Assessment Policy (available from the document library) or contact the Equality, Diversity, and Inclusion Team
rcht.inclusion@nhs.net

Information Category	Detailed Information
Name of the strategy / policy / proposal / service function to be assessed:	Liquid Nitrogen Policy (Safe transport, Storage, Use and Disposal) (HSP 10.6) V4.0
Department and Service Area:	Chief Operating Officer/ Health and Safety.
Is this a new or existing document?	Existing.
Name of individual completing EIA (Should be completed by an individual with a good understanding of the Service/Policy):	Rob Harris, Senior Safety Advisor.
Contact details:	01872 25 2144

Information Category	Detailed Information
1. Policy Aim - Who is the Policy aimed at? (The Policy is the Strategy, Policy, Proposal or Service Change to be assessed)	To outline the Trust's position for the management of its statutory compliance with the control of cryogenic Asphyxiant substances specifically Liquid Nitrogen
2. Policy Objectives	Establish a uniform approach toward the management and control of s cryogenic Asphyxiant substances specifically Liquid Nitrogen.
3. Policy Intended Outcomes	Ensure a safe environment for all staff, patients, visitors and contractors in relation to the management of cryogenic Asphyxiant substances specifically Liquid Nitrogen.
4. How will you measure each outcome?	Through incident reporting, monitoring existing health and safety committee reports. Periodic audit of the completion of local Risk Assessments.

Information Category	Detailed Information
5. Who is intended to benefit from the policy?	All Trust stakeholders.
6a. Who did you consult with? (Please select Yes or No for each category)	- Workforce: Yes - Patients/ visitors: No - Local groups/ system partners: No - External organisations: No - Other: No
6b. Please list the individuals/groups who have been consulted about this policy.	Please record specific names of individuals/ groups: Health and Safety Committee.
6c. What was the outcome of the consultation?	Approved
6d. Have you used any of the following to assist your assessment?	National or local statistics, audits, activity reports, process maps, complaints, staff, or patient surveys: None

7. The Impact

Following consultation with key groups, has a negative impact been identified for any protected characteristic? Please note that a rationale is required for each one.

Where a negative impact is identified without rationale, the key groups will need to be consulted again.

Protected Characteristic	(Yes or No)	Rationale
Age	No	This policy does not impact on age.
Sex (male or female)	No	This Policy does not impact on Sex.
Gender reassignment (Transgender, non-binary, gender fluid etc.)	No	This Policy does not impact on gender reassignment.
Race	No	This Policy does not impact on race.
Disability (e.g. physical or cognitive impairment, mental health, long term conditions etc.)	No	This Policy does not impact on disability.
Religion or belief	No	This Policy does not discriminate with any religious or cultural beliefs.

Protected Characteristic	(Yes or No)	Rationale
Marriage and civil partnership	No	This Policy does not impact on marriage/ civil partnership.
Pregnancy and maternity	No	This Policy does not impact on pregnancy / maternity.
Sexual orientation (e.g. gay, straight, bisexual, lesbian etc.)	No	This Policy does not impact on sexual orientation.

A robust rationale must be in place for all protected characteristics. If a negative impact has been identified, please complete section 2. If no negative impact has been identified and if this is not a major service change, you can end the assessment here.

I am confident that section 2 of this EIA does not need completing as there are no highlighted risks of negative impact occurring because of this policy.

Name of person confirming result of initial impact assessment: Rob Harris, Senior Safety Advisor.

If a negative impact has been identified above OR this is a major service change, you will need to complete section 2 of the EIA form available here:
[Section 2. Full Equality Analysis](#)