Safe transport, storage, use and disposal of Liquid Nitrogen (Policy and Guidance)

V3.1

January 2017
Summary

Requirement for Liquid Nitrogen identified

Risk Assessment completed

Appropriate storage location identified, agreed and equipped

Staff using/exposed to liquid nitrogen provided with appropriate training.

PPE provided

Risk Assessment updated and Standard Operating Procedure published

Transport of Liquid Nitrogen

- Always use an approved dewer
- Ensure that appropriate PPE is available with the dewer at all times
- Do not transport more than 200 ml.
- Do not transport in a car
- Do not travel in any lift with a container of liquid nitrogen
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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.

1.5. This policy and procedure will be reviewed bi-annually

1.6. 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. This document is applicable to all sites, divisions, departments and wards, within the Trust.

4. **Definitions / Glossary**

4.1. 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

Personnel 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 asphyxiant is a gas or vapour that can displace or dilute air

CoSHH

Control of Substances Hazardous to Health Regulations 2002 (as amended 2005)

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.

Note: Unless otherwise specified all references to the masculine must include the feminine and the singular and the plural.

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. Trust Board

5.1.1. 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. Chief Executive

5.2.1. 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. Executive Director

5.3.1. 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 Advisors.
5.4. Associate Directors (AD)
5.4.1. The Associate Directors are responsible for ensuring that day-to-day activities of the division are conducted in a safe and suitable manner and this policy is effectively and correctly employed within their own division.

5.4.2. AD’s will ensure that suitable and sufficient equipment and resources are made available to staff handling or exposed to liquid nitrogen.

5.5. Health and Safety Advisors
5.5.1. The Trust Health and Safety Advisors are the designated safety management advisor for the Trust. He is responsible for advising all staff throughout the organisation on issues relating to his areas of risk and adverse incident management.

5.5.2. 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.

5.6. Role of the Managers
5.6.1. Managers must establish local procedural guidelines specific to their own departments.

5.6.2. Managers must ensure that CoSHH and liquid nitrogen risk assessments and standard operating procedures (SOP) are in place.

5.6.3. Managers will ensure that all relevant staff receive training, commensurate with their responsibilities, at regular intervals.

5.7. Role of Individual Staff
All staff members are responsible for:

5.7.1. All employees are expected to take reasonable care to ensure the safety of themselves, their colleagues, patients and members of the public.

5.7.2. Staff must participate in and comply with all CoSHH/Risk assessments and local arrangements.

5.7.3. All 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 with a damaged neck, wall-trunnion support, base support or wheels
- 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 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. General Information

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 asphyxiant, contact with the liquid form may cause burns.

6.1.3. The boiling point of liquid nitrogen 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 CoSHH risk assessment.

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

6.2.1. The precautions that need to be taken will depend to some extent on individual circumstances of each department and must be decided following a risk assessment (as required by both the Management of Health and Safety at Work Regulations 1999 and the Control of Substances Hazardous to Health Regulations 2002 (as amended) (CoSHH). 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
6.3.1.1. 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.
6.3.1.2. Cryogenic liquids and vapour can damage the eyes.

6.3.1.3. 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.

6.3.1.4. 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.

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

6.3.1.6. 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 tissue 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 jewellery
- keeping the patient warm and at rest
- avoiding hot beverages and in keeping with existing Trust policy do not allow the injured person to smoke

6.3.2. Oxygen Deficiency/ Asphyxiation

6.3.2.1. Liquid Nitrogen rapidly vaporises 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.

6.3.2.2. 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 he is 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.

6.3.3. 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 effects.

6.3.4. 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. This 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.

6.3.5. Ice Plugs
6.3.5.1. 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.

6.3.5.2. 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 CoSHH risk assessment. Managers must ensure that the manufacturer examines the dewar before returning it to service.

6.3.5.3. Ice plugs can be prevented by diligent use of the correct dewar stopper.

6.4. Precautions
6.4.1. Safe Systems of Work & 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.

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

- **Eyes**: face visor (to protect both the eyes and face)
- **Hands**: loose fitting, non-absorbent, insulated gloves (leather or similar). Gauntlets are not recommended as liquid could collect in them.
- **Body**: overalls, lab coat or similar are recommended. In order to avoid collection of liquid, such clothing should preferably not have
pockets, and trousers should not be tucked into boots or have turn-ups.

- Open footwear must not be worn, and legs should be covered

6.4.2.2. Never put your hands (even in the best PPE gloves) into liquid nitrogen.

6.4.2.3. When using or decanting liquid nitrogen, a face visor must be worn. Always wear appropriate gloves when handling anything that is, or may have been, in immediate contact with liquid nitrogen. Use tongs to withdraw objects immersed in the liquid, and handle the object carefully.

6.4.2.4. Appropriate gloves are thermal protective gloves which are specifically designed for cryogenic use, with close fitting ribbed cuffs to prevent liquid nitrogen from spilling inside the glove. When decanting liquid nitrogen, a splash resistant apron may be appropriate.

6.4.3. Ventilation

6.4.3.1. Ventilation of liquid nitrogen storage areas depends 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.

6.4.3.2. 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.

6.4.3.3. 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.

6.4.3.4. Rooms must be adequately ventilated to allow normal evaporation of vessels and evaporation during filling without the 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. In liaison the Safety, Fire & Security Management Dept., assistance with assessing these levels will be obtained from the Estates department.

6.5. Emergency Procedures

Emergency procedures must be prepared by the Department Head, taking into account possible spillages and venting/leaking dewars.

6.5.1. Writing an Emergency Procedure:

The following must be considered when formulating such a 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.

6.5.2. 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.

6.5.3. 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.

6.6. **Transport**

6.6.1. 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.

6.6.2. 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.

6.6.3. 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.

6.6.4. 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.

6.6.5. 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.

6.6.6. Before transporting product containers, ensure that they are firmly secured

6.6.7. **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 vessels of 25 litres and above.

6.6.8.  **Transporting in Passenger Lifts**

6.6.8.1. 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.

6.6.8.2. Where lifts have to be used, either:

(i) use a lift which can be remotely controlled i.e. key controlled lifts; or

(ii) 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 is being transported).

(iii) 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.

6.7.  **Transporting in a Vehicle**

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

6.7.1.1. Spillage of liquid nitrogen in a car (or other unsuitable vehicle) could result in asphyxiation through Oxygen depletion.

6.7.1.2. 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.

6.7.1.3. 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 always be adhered to.

6.7.1.4. 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.

6.7.1.5. Vehicles used for the transport of liquid nitrogen must be designed to prevent a build-up of Nitrogen gas in the event of a 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 and to prevent escaped gas reaching the driver / passenger compartment.

6.7.1.6. Vehicles must also be equipped with means of securing the dewar.
6.7.1.7. Dewar caps may come 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.

6.7.1.8. 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.

6.7.1.9. Drivers must be adequately trained regarding the hazards of liquid nitrogen.

6.8. Storage

6.8.1.1. 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

6.8.1.2. Liquid nitrogen must not be stored or used below ground level or in corridors.

6.8.1.3. All pipe-work and valves must be labelled or marked for functions.

6.8.1.4. All vessels and equipment must be commissioned and handed over by a competent person.

6.9. Workplace Storage

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

6.10. Storage of Dewars in Rooms

6.10.1. 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.

6.10.2. 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 may require additional precautions to be taken. In these circumstances consideration must be given to:

   - the size of the room;
   - the storage conditions and ventilation levels;
   - and the possible use of alarms which trigger, due to low oxygen level.
6.11. **Containers**

6.11.1. Only use containers designed for low-temperature liquids. Cryogenic 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.

6.11.2. Even so, these special containers must be filled slowly to minimise the internal stresses that occur when any material is cooled:

- Do not cover or plug the entrance opening of any liquid nitrogen dewar.
- Do not use any stopper or other device that would interfere with venting gas.

6.11.3. 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 accumulated ice or frost.

6.12. **Bulk Storage Facilities**

6.12.1. 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.

6.13. **Labelling**

6.13.1. Liquid nitrogen dewars shall be clearly and adequately labelled. The Label includes:

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

6.14. **Periodic Inspection and Maintenance**

6.14.1. All large capacity storage equipment (25 litres or larger) must be subject to annual maintenance checks.

6.14.2. Smaller dewars must be visually inspected on a regular basis.

6.14.3. Alarms installed for low oxygen levels must also subject to regular maintenance checks.

6.15. **Disposal**

6.15.1. 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. Laboratory plumbing is a common example.
6.15.2. 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.

6.16. First Aid
6.16.1. Skin / Eye Contact

Immediately flush thoroughly with copious quantities 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 patient to a warm place (22°C).
- The aim is to slowly raise the temperature of the affected area 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 to get the person to the Emergency department.
- **DO NOT** permit smoking, alcohol consumption or give analgesics (aspirin, paracetamol etc.).

6.16.2. Anoxia
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.

6.17. Summary of Recommendations for Managers
6.17.1. Carry out a risk-assessment in accordance with the Management of Health & Safety at Work Regulations (8) and, where necessary, the Confined Spaces Regulations (1).

6.17.2. Carry out actions resulting from risk assessments.

6.17.3. Ensure that all employees are adequately trained in the handling of liquid nitrogen and decanting into dewars. Ensure the staff are aware of the hazards of liquid nitrogen and that standard operating procedures are in place and followed.

6.17.4. Ensure that adequate ventilation is provided in areas dewars are used or stored.

6.17.5. 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.

6.17.6. Ensure that manual handling assessments have been carried out on all activities involving dewars.

6.17.7. Ensure that labelling meets all regulatory requirements.
6.17.8. Ensure that dewars are adequately maintained and that they are in good condition.

6.17.9. Ensure that adequate emergency procedures are in place in the event of a liquid spillage.

6.17.10. Ensure that a sufficient number of personnel are trained in First Aid to ensure treatment of asphyxia and cold burns.

### 6.18. Training

6.18.1. Training will be facilitated by the Learning and Development and be accessible to all employees handling liquid nitrogen.

6.18.2. 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 procedures. The training must be arranged to cover those aspects and potential hazards that the particular person is likely to encounter. 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 with refresher training undertaken periodically.

### 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. Upon publication, awareness to all staff will be raised by notification within the Trust “Daily Bulletin” and through Health and Safety Committee feedback from both management and staff representatives.

7.3. Divisional General Managers will ensure that the contents of this document are highlighted to staff though regular divisional meetings.
8. Monitoring compliance and effectiveness

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</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>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.</td>
</tr>
</tbody>
</table>

9. Updating and Review

9.1. This document will be reviewed bi-annually and/or in the event of any significant change with the organisational structure/management arrangements and subject to consultation via the Trust Health and Safety Committee.

9.2. Appendices and the associated documentation regarding this policy may be reviewed / revised in consultation with the Health and Safety Team without formally being undertaken by the Health and Safety Committee, provided that the amendments do not impact upon the general arrangements made within the policy.

10. Equality and Diversity

This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement.

10.1. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.
Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>HSP 10.3 Safe transport, storage, use and disposal of Liquid Nitrogen (Policy and Guidance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>January 2017</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>01 February 2017</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>31 January 2020</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>J. Robin Gatenby Head of Safety, Fire &amp; Security Management</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872 25 2266</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>Trust management arrangements for the safe transport, storage, use and disposal of Liquid Nitrogen (Policy and Guidance)</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Liquid Nitrogen, CoSHH, gas, health, safety, dewars, emergency, oxygen.</td>
</tr>
<tr>
<td>Target Audience</td>
<td>RCHT CFT KCCG</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Chief Operating Officer</td>
</tr>
<tr>
<td>Date revised:</td>
<td>December 2016</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>HSP10.3 Operational Health and Safety Policy on the Control of Liquid Nitrogen. Version 3.0</td>
</tr>
<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Health and Safety Committee</td>
</tr>
<tr>
<td>Divisional Manager confirming approval processes</td>
<td>Chief Operating Officer</td>
</tr>
<tr>
<td>Name and Post Title of additional signatories</td>
<td>‘Not Required’</td>
</tr>
<tr>
<td>Name and Signature of Divisional/Directorate Governance Lead confirming approval by specialty and divisional management meetings</td>
<td>{Original Copy Signed}</td>
</tr>
<tr>
<td>Name:</td>
<td></td>
</tr>
<tr>
<td>Signature of Executive Director giving approval</td>
<td>{Original Copy Signed}</td>
</tr>
<tr>
<td>Publication Location (refer to Policy on Policies – Approvals and Ratification):</td>
<td>Internet &amp; Intranet ✓ Intranet Only</td>
</tr>
<tr>
<td>Document Library Folder/Sub Folder</td>
<td>Health &amp; Safety</td>
</tr>
<tr>
<td>Related Documents:</td>
<td>Governance Team can advise</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Health and Safety General Policy</td>
<td></td>
</tr>
<tr>
<td>Control of Substances Hazardous to Health Policy and Guidance</td>
<td></td>
</tr>
<tr>
<td>Health &amp; Safety Policy &amp; Procedure for the Movement, Handling and Management of Dangerous Goods by Road</td>
<td></td>
</tr>
<tr>
<td>Driving at Work Health and Safety Policy and Guidance</td>
<td></td>
</tr>
<tr>
<td>First Aid Policy And Guidance</td>
<td></td>
</tr>
</tbody>
</table>

| Training Need Identified? | Yes |

**Version Control Table**

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by (Name and Job Title)</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 October 2006</td>
<td>V1.0</td>
<td>Original</td>
<td>Len Welch</td>
</tr>
<tr>
<td>20 December 2009</td>
<td>V2.0</td>
<td>Minor changes to sentences to add clarity and change from directorate to divisional structure. Removal of the paper system of risk assessment and the including of the Datix Risk Module</td>
<td>Len Welch</td>
</tr>
<tr>
<td>December 2013</td>
<td>V3.0</td>
<td>Total revision of the whole document</td>
<td>J. Robin Gatenby Health and Safety Manager</td>
</tr>
</tbody>
</table>

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

This document is to be retained for 10 years from the date of expiry.

This document is only valid on the day of printing

**Controlled Document**

This document has been created following the Royal Cornwall Hospitals NHS Trust Policy on Document Production. It should not be altered in any way without the express permission of the author or their Line Manager.
## Appendix 2. Initial Equality Impact Assessment Form

<table>
<thead>
<tr>
<th>Name of the strategy / policy / proposal / service function to be assessed (hereafter referred to as <strong>policy</strong>)</th>
<th>Provide brief description: HSP10.03 Safe transport, storage, use and disposal of Liquid Nitrogen (Policy and Guidance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directorate and service area: Safety Fire &amp; Security Management</td>
<td>Is this a new or existing Policy? Replacement for HSP10.03 Operational Health and Safety Policy on The Control of Liquid Nitrogen</td>
</tr>
<tr>
<td>Name of individual completing assessment: J Robin Gatenby</td>
<td>Telephone: 01872 25 2266</td>
</tr>
</tbody>
</table>

1. **Policy Aim**
   - Who is the strategy / policy / proposal / service function aimed at?
   - To outline the Trust’s position for the management of its statutory compliance with the control of substances hazardous to health (CoSHH) with regard to specific substances (Liquid Nitrogen)

2. **Policy Objectives**
   - Establish a uniform approach toward the management and control of substances hazardous to health (COSHH) throughout the Trust with regard to specific substances (Liquid Nitrogen)

3. **Policy – intended Outcomes**
   - Ensure a safe environment for all staff, patients, visitors and contractors in relation to the Control of Substances Hazardous to Health with regard to specific substances (Liquid Nitrogen)

4. **How will you measure the outcome?**
   - Through incident reporting, monitoring existing health and safety committee reports. Periodic audit of the completion of local CoSHH Risk Assessments.

5. **Who is intended to benefit from the policy?**
   - All Trust stakeholders

6a) **Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?**
   - Yes

   b) **If yes, have these *groups been consulted?**
   - Yes

   C). **Please list any groups who have been consulted about this procedure.**
   - Health and Safety Committee
   - Trust Management Committee
7. The Impact
Please complete the following table.

Are there concerns that the policy **could** have differential impact on:

<table>
<thead>
<tr>
<th>Equality Strands:</th>
<th>Yes</th>
<th>No</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sex (male, female, trans-gender / gender reassignment)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Race / Ethnic communities / groups</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Disability -</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Learning disability, physical disability, sensory impairment and mental health problems</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Religion / other beliefs</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Marriage and civil partnership</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation - this **excludes** any policies which have been identified as not requiring consultation. or
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended.  

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

9. If you are not recommending a Full Impact assessment please explain why.

<table>
<thead>
<tr>
<th>Signature of policy developer / lead manager / director</th>
<th>Date of completion and submission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>January 2017</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Names and signatures of members carrying out the Screening Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
</tr>
<tr>
<td>2.</td>
</tr>
</tbody>
</table>

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust’s web site.

Signed ____________________  
Date ____________________