



GIG
CYMRU
NHS
WALES

Ymddiriedolaeth GIG
Prifysgol Felindre
Velindre University
NHS Trust

Ref: PP 10

Medical Gas Piped Systems Policy

Executive Sponsor & Function:	Chief Executive
Document Author:	Assistant Director of Estates, Environment & Capital Development
Approved by:	Quality, Safety and Performance Committee
Approval Date:	14 th March 2024
Date of Equality Impact Assessment:	9 th February 2024
Equality Impact Assessment Outcome:	Approved
Review Date:	March 2027
Version:	2

	Index	Page No
1.0	The Importance of a Managed Approach to Medical Gases	5
1.1	Risk Assessments	5
2.0	General Policy Statements	6
3.0	Scope of Policy	6
4.0	Responsibilities	6
4.1	Chief Executive	7
4.2	Authorising Engineer	7
4.3	Authorised Person (MGPS)	7
4.4	Competent Person (MGPS)	8
4.5	Quality Controller (MGPS)	9
4.6	Designated Medical/Nursing Officer (DMO)	9
4.7	Designated Persons	10
4.8	Medical Gases Committee	10
5.0	Training	11
6.0	The MGPS Structure	12
7.0	Signage	12
8.0	Cylinder Storage	12
9.0	Area Valve Service Units (AVSU's)	13
10.0	Access	13
11.0	Key Holders	13
12.0	Routine Procedures	14
13.0	Planned Interruption	14
13.1	HIGH Hazard Work	14
13.2	LOW Hazard Work	16
14.0	Actions in the Event of a Medical Gas Alarm	17
14.1	Example-Oxygen	18
15.0	Cylinder Management	19
15.1	Connecting Cylinder to the Manifold System	19
16.0	Shutdown of the MGPS for Maintenance, Extension etc.	19
17.0	Generator Operation on Mains Failure	19
18.0	Emergency Procedures	21
18.1	Oxygen System	21
18.2	Emergency Cylinder Ordering Procedure	21
18.3	Failure of Mains Electricity Supply	21
18.4	In the Event of Failure of Both Mains and Generator Supplies	22
18.5	A Serious Leak of Medical Gases	22
18.6	Total or Partial Failure of a Medical Gas Supply	23
18.7	Contamination of a Medical Gas Supply	24
18.8	Contamination of Medical Vacuum System	24
18.9	Failure of an Anaesthetic Gas Scavenging System (AGSS)	24
18.10	Over or Under Pressurisation of One or More Gas Systems	25
18.11	Fire	25
19	APPENDICES A – D ARE TO BE COMPLETED AT EACH SITE	
19.0	Appendix A – Policy Signatories	26
20.0	Appendix B – Policy Circulation List	27
21	Appendix C – Contacts	27
21.0	Authorised Persons (MGPS)	27

21.1	Competent Persons (MGPS)	27
21.2	Designated Medical / Nursing Officers	28
21.3	Other Important Telephone Numbers	28
22.0	Appendix D - Site Specific Information	28
22.1	Location of Oxygen supply	28
22.2	Location of Medical Vacuum	28
23.0	Appendix E - Statutory Requirements Relevant to MPGS	29
23.1	Other Guidance Applicable to Medical Gas Pipeline Systems	29

1.0 The Importance of a Managed Approach to Medical Gases

This policy is compliant with Health Technical Memorandum (HTM 02-01) and looks at the issues of operational management. The policy covers such issues as statutory requirements, functional responsibilities, operational procedures, training and communications, cylinder management, general safety, maintenance and risk assessment, control of exposure to anaesthetic agents, giving definitions and working practices throughout. This policy is intended for use by Operational Managers, Engineers, Quality Controllers, Technicians, Finance Officers and all Medical and Portering staff involved in the day to day running of a medical gas pipeline system. The primary objective of this policy is to ensure the provision of safe and reliable medical gas pipeline systems and their efficient operation and use. This objective will only be achieved if the medical and nursing users and Estates staff participate in the introduction of this operational policy designed to minimise the hazards likely to arise from misuse of the system.

It is not intended that this policy covers the use of small, manually portable gas cylinders.

At least 60% of patients are administered medical gases during their stay in hospital.

Not having safe and reliable gas supplies can be as life-threatening as not having electricity, yet responsibility for medical gases does not fit precisely into any one person's role.

According to Health Technical Memorandum (HTM) 02-01/EN737 and the National Minimum Care Standards & Regulations for Independent Health Care (NMCSR) 2002, all hospitals should at least have:

Effective system designs covering the capacity and capability of piped medical gases, including alarm systems and the siting of back-up systems.

Defined functional responsibilities requiring the nomination of an Authorised Person; Competent Person, Quality Controller and Designated Medical/Nursing Officer.

A hospital-wide medical gases operational policy based on comprehensive risk assessment and training carried out for clinical and non-clinical staff.

A demonstrable cylinder management programme in place.

1.1 Risk Assessments

Compliance by the Trust is essential to manage the risks to patients, visitors and staff.

Site based risk assessments have been carried out by British Oxygen Company (B.O.C.). These are held by the Works and Estate department and are available for inspection upon request to the relevant Authorised Person for Medical Gas Pipeline Systems.

2.0 General Policy Statements

This policy addresses the provision of a piped medical gas pipeline system (MGPS) at Velindre University NHS Trust.

The (MGPS) provides a safe, convenient and cost-effective supply of medical gases to points where these gases can be used by clinical and nursing staff for patient care.

Velindre University NHS Trust recognises its commitment to maintaining the MGPS to required standards and the training of all personnel associated with its operation.

It is the Trust policy that before work on the MGPS can commence a Permit to Work Form, signed by an Authorised Person (MGPS) MUST be completed.

3.0 Scope of Policy

This policy is intended for use by all staff involved with MGPS at Velindre University NHS Trust.

It applies throughout at Velindre University NHS Trust to all fixed medical gas pipeline systems and to the use and management of cylinders associated with the MGPS. It does not apply to the use of small portable cylinders used, for example, during the transportation of patients.

Compressed gas and vacuum supplies to general engineering workshops and Pathology Department equipment are separate from the general MGPS and are NOT included in this policy, although the general principles in this document should be followed for these departments.

MGPS terminal units define the limits of Estates' responsibility in this policy.

Equipment connected to the terminal units is NOT covered by this policy, other than where its mode of use may affect system operation or safety.

Medical equipment is the responsibility of the Electro Biomedical Engineering Department.

Medical gases should not be used for non-medical purposes, other than as a test gas for medical equipment.

Medical air should be used as the power source for ventilators; the routine use of oxygen as a driving gas is to be avoided.

The operational management responsibility for MGPS on Health Boards sites resides with the Estates Department and each site specific Estates Authorised Person is responsible for the completion of the site specific information to be detailed in Appendices A – D.

4.0 Responsibilities

The responsibilities detailed by job title or role in this section (section 4) are to be made specific to each site by the Authorised Person for that site. This will involve the separate completion of Appendices A – D for every location at which this policy applies.

4.1 Chief Executive

Ultimate management responsibility for MGPS rests with the Health Board's Chief Executive.

The Velindre University NHS Trust's Chief Executive is responsible for ensuring that an Authorising Engineer (AE) is appointed for MPGS. This function will be fulfilled by Welsh Health Estates.

4.2 Authorising Engineer

The duties and responsibilities of the Authorising Engineer are:

- 4.2.1** To recommend to the Estates Manager those persons who, through individual assessment, are suitable to be Authorised Persons (MGPS);
- 4.2.2** To ensure that all Authorised Persons (MGPS) have satisfactorily completed an appropriate training course;
- 4.2.3** To ensure that all Authorised Persons (MGPS) are re-assessed every three years and have attended a refresher or other training course prior to such re-assessment;
- 4.2.4** To review the management systems of the MGPS, including the Permit to Work System;
- 4.2.5** To monitor the implementation of the operational policy and procedures.

4.3 Authorised Person (MGPS)

The Authorised Person(s) (MGPS) are listed in Appendix C. The Authorised Persons (MGPS) assume effective responsibility for the day-to-day management and maintenance of the MGPS.

The Duties and Responsibilities of Authorised Persons (MGPS) are:

- 4.3.1** To ensure that the MGPS is operated safely and efficiently in accordance with the statutory requirements and guidelines;
- 4.3.2** To manage the Permit to Work System, including the issue of Permits to Competent Persons (MGPS) for all servicing, repair, alteration and extension work carried out on the existing MGPS;

- 4.3.3 To supervise the work carried out by Competent Persons (MGPS) and for the standard of that work (A Register of Competent Persons (MGPS) must be kept);
- 4.3.4 To ensure that the Health Board MGPS maintenance specification and schedule of equipment (including all plant, manifolds, pipe work, valves, terminal units and alarm systems) are kept up to date;
- 4.3.5 To liaise closely with Designated Nursing/Medical Officers, the Quality Controller (MGPS) and others, who need to be informed of any interruption, alteration and testing of the MGPS;
- 4.3.6 To provide technical advice to those responsible for the purchase of any medical equipment which will be connected to the MGPS, in order to avoid insufficient capacity and inadequate flow rates;
- 4.3.7 In accordance with the Velindre University NHS Trust's *policy* on provision of services, provide advice on the provision and or replacement of MGPS central plant and associated systems. The Estates Department will hold overall responsibility for the provision and maintenance of MGPS services within the Health Board;
- 4.3.8 To organise such training of Estates staff and/or transfer of MGPS information, as is needed for the efficient and safe operation of the MGPS.
- 4.3.9 To advise the Trust on any other training requirements, outside the Works and Estate department.

4.4 Competent Person (MGPS)

Competent Persons (MGPS) are Craft Persons, employed by Velindre University NHS Trust and are listed in Appendix C.

All Competent Persons (MGPS) shall be registered to BS EN ISO 9001 / BS EN ISO 13458, with clearly defined registration criteria.

Where sub contract labour is required to carry out the Competent Person duties then the same registration must be adhered to.

The Duties and Responsibilities of Competent Persons (MGPS) are:

- 4.4.1 To carry out work on the MGPS in accordance with the Health Board maintenance specification;
 - 4.4.2 To carry out repair, alteration or extension work, as directed by an Authorised Person (MGPS) in accordance with the Permit to Work System and HTM 02-01 (2005);
 - 4.4.3 To perform engineering tests appropriate to all work carried out and inform the Authorised Person (MGPS) of all test results.
-

4.4.4 To carry out system integrity tests under direct supervision of the Appointed Person;

4.4.5 To carry out all work in accordance with the Velindre University NHS Trust & Safety Policy.

4.5 Quality Controller (MGPS)

It is the responsibility of the Chief Executive or the designated Executive Director to appoint, in writing, on the recommendation of the Chief Pharmacist, a Quality Control Pharmacist with MGPS responsibilities.

The Authorised Person (MGPS) will be responsible for liaising with the QC (MGPS) and organising attendance as required.

The Duties and Responsibilities of the QC (MGPS) are:

4.5.1 To assume responsibility for the quality control of the medical gases at the terminal units, i.e. the wall or pendant medical gas outlets;

4.5.2 To liaise with the Authorised Person (MGPS) in carrying out specific quality and identity tests on the MGPS in accordance with the Permit to Work System and relevant Pharmacopoeia Standards;

4.5.3 To organise MGPS training of Pharmacy staff who may deputise for the QC (MGPS);

4.5.4 They should have received training on the verification and validation of MGPS and be familiar with the requirements of this MGPS Operational Policy.

Pharmacy at Velindre University NHS Trust will;

Receive delivery notes for compressed gas cylinders, check against invoices received and pass invoices for payment;

Order and supply cylinders of medical gases and special gas mixtures for the hospital;

Maintain a record of cylinder rental charges and pass rental invoices for payment;

Ensure that cylinder gases comply with Ph Eur requirements;

Ensure that other gases and gas mixtures comply with manufacturers' product licences.

4.6 Designated Medical / Nursing Officer (DMO)

The Designated Medical / Nursing Officer in charge is the person, on each site, with whom the Authorised Person MGPS liaises on any matters, affecting the MGPS and who should give permission for a planned interruption to supply. These persons should have received training on MGPS relevant to their departments and on the action to be taken in the event of an emergency.

The Duties and Responsibilities of the Designated Medical / Nursing Officer (DMO) are:

- 4.6.1** To give permission for any interruption to the MGPS and should sign the appropriate part of the permit. However, in certain circumstances such permission may be given by the Senior Clinician in charge;
- 4.6.3** To ensure that all relevant staff are aware of the interruption to the MGPS and which terminal units cannot be used.

4.7 Designated Persons

The Designated Persons are the Portering staff. They will have undergone specialist training in the identification and safe handling and storage of medical gas cylinders, associated with MGPS, including relevant manual handling training. The Portering Manager will arrange this training.

The Duties and Responsibilities of the Designated Persons in Velindre University NHS Trust.

- 4.7.1** To assist with the delivery of gas cylinders by BOC Medical or designated gas supplier;
- 4.7.2** To transfer gas delivery notes from the delivery driver to the Pharmacy Department;
- 4.7.3** To attach to and remove from cylinders, medical equipment regulators (or regulator / flow meter combinations) and manifold tailpipes;
- 4.7.4** To identify and remove from service faulty (e.g. leaking) cylinders and subsequently notify Pharmacy of the location of such cylinders;
- 4.7.5** To perform a monthly check on cylinder stocks and report any deficiencies to the Pharmacy Department;
- 4.7.6** To ensure that all cylinder contents are used within the 3-year fill / refill timescale specified by the gas supplier;

The Designated Person must work safely at all times, using the appropriate Personal Protective and Manual Handling Equipment, damage to which must be reported immediately to the Operational Services Manager.

4.8 Medical Gases Committee

A Medical Gases Committee shall consist of the Chief Pharmacist and a Senior Authorised Person (MGPS), for the Health Board, a nominated designated Nursing / Medical Officer, the Portering Manager and the QC (MGPS).

MGPS Operational Policy Review

The MGPS Operational Policy should be reviewed annually. The Authorised Person (MGPS) shall convene the review meeting and be responsible for writing and distributing the minutes of the meeting. The Committee shall report to the Works and Estate Statutory Compliance Group, which in turn reports to the Health Board Health and Safety Committee.

MGPS Record Drawings and Documentation

The Authorised Person (MGPS) will maintain copies of the following:-

- Up-to-date and accurate 'as fitted' record drawings (including valve / key numbers/ TU identification) for all MGPS;
- Any necessary MGPS insurance / statutory documentation;
- MGPS safety valve replacement schedule (on a 5-yearly basis);
- New and completed Permit to Work books for work on the systems (for 10 years);
- Plant history / maintenance records;
- Manufacturer's technical data sheets / manuals for all MGPS components;
- Health Technical Memorandum 02-01, any associated supplements and NHS Model Engineering Specifications C11, all latest editions;
- MGPS contractors' service contracts and ISO 9001(or equivalent) certificates, staff training records, equipment calibration certificates (copies);
- A list of all personnel associated with the MGPS, especially the Permit to Work System;
- Emergency and other useful telephone numbers;
- MGPS staff training records;
- Calibration certificates of the hospital test equipment;
- The MGPS Operational Policy

Pharmacy will maintain copies of the following:

- Delivery notes – invoices V.I.E.
 - Delivery notes for medical gas cylinders;
 - Sales invoices for medical gas cylinders;
 - Delivery Summary Form (tracks cylinder stock information);
 - Cylinder rental invoices;
 - Cylinder Rental Reconciliation Form (Monitors trends in cylinder use over 6 months);
 - Delivery notes for special gas and industrial gas cylinders;
 - Sales invoices for special gas and industrial gas cylinders;
 - Rental invoices for special gas and industrial gas cylinders;
 - Calibration records of QC test equipment and records of all QC tests performed;
-

5.0 Training

It is essential for the safety of patients that NO PERSON should operate, or work on, any part of an MGPS unless adequately trained or supervised.

MGPS Training at Velindre University NHS Trust's for all Estates staff is administered by the Works and Estates Department.

A record of those trained is kept in the Estates Department.

It is the duty of Departmental Managers to ensure that all staff using MGPS are appropriately trained and records kept.

The Authorised Person (MGPS) may request training records of contractors' staff.

Training on MGPS will be provided as follows:

Title	Training	Frequency
Authorised person	Specialist training	Refresher 3 years
Competent person	Specialist training	Refresher 3 years
Quality controller	Specialist training	Refresher 3 years
Designated Nursing/Medical Officer	On site knowledge	Annually
Portering staff	Specialist training	Refresher 3 years

6.0 The MGPS structure

The site specific locations and structure of MGPS can be found in Appendix D and is to be completed by the site Authorised Person for every site at which this policy applies, i.e. Oxygen, Medical Air 4 Bar, Surgical Air 7 Bar, Medical Vacuum, Nitrous Oxide and Entonox.

7.0 Signage

Appropriate identification and safety warnings should be displayed in accordance with current requirements.

A notice should state the location of the keys and be fixed to the Plant Room door.

8.0 Cylinder Storage

Accommodation for medical gas cylinders should comply with the following guidelines:-

8.0.1 Ventilation All cylinder stores should be well ventilated

8.0.2 Labelling All cylinder stores should be clearly labelled as appropriate with the type of cylinders contained

- 8.0.3 Emergency action** Details of emergency action procedures and location of keys together with no smoking signs should be clearly posted on the front of the cylinder store
- 8.0.4 Access** Clear access to all cylinder stores is required including adequate space for vehicular access and cylinder loading and unloading
- 8.0.5 Fire protection** All cylinder stores should be free from naked flames and all sources of ignition appropriate fire extinguishers should be readily available
- 8.0.6 Cylinder stores** for medical gasses should only contain medical gas cylinders
- 8.0.7 Industrial and pathology** gasses cylinders should be stored in a separate designated area
- 8.0.8 Cylinders in use in wards or departments** should be secured to ensure they cannot fall, topple or be pushed over, causing subsequent potential for personal injury and damage.

9.0 Area Valve Service Units (AVSUs)

Locked boxes, with breakable glass fronts and containing area valve service units (AVSUs), are provided at the entrance to wards and departments.

These valves provide facilities for both routine and emergency isolation of gas supplies.

These valve boxes contain an emergency inlet port (Non Interchangeable Service Terminal, or NIST)), which is gas specific. This may be used to supply gas to a ward when the main supply fails or is shut down for essential engineering work.

General Rules and Conditions for Control of Line Valve Assemblies LVAs

Pipeline valves (called lockable line valves assemblies LVAs) in ducts, risers ceiling spaces etc. shall be locked in the normal operating position.

Pipeline valves will normally be left unlocked if they are sited in a locked Plant Room. Estates will hold keys for these valves.

10.0 Access

Under normal events, only the Authorised Persons (MGPS) using the appropriate key from the Estates medical gases key cabinet, should access AVSUs and any other locked line valves, under control of a Permit to Work.

The key cabinet contains a list identifying all AVSUs and locked line valves, with corresponding key numbers.

11.0 Key Holders:

Any of the Authorised Persons listed in the site specific information in Appendix C will be key holders for that site.

In the event of an emergency, access to the valve boxes and AVSUs may be gained by smashing the breakable glass fronts.

A senior member of the medical or nursing staff will perform this action, after steps have been taken to ensure that no patient is compromised by isolation of the gas supply.

12.0 Routine and Planned Procedures (The MGPS Permit to Work System)

The aim of the MGPS Permit to Work System is to safeguard the integrity of the medical gas system, and therefore the safety of the patients.

It is the policy of Velindre University NHS Trust that, with the knowledge and permission of the Authorised Person (MGPS), a Permit must be raised before any work, except changing of manifold cylinders or emergency isolation by a member of the nursing staff, can be undertaken at any part of the hospital's medical gas system.

Granting of a Permit to Work and the way in which the work is carried out must follow the directions of HTM02-01, unless otherwise defined in this Policy.

Responsibilities for signing a Permit to Work is detailed in sections 13.1 and 13.2 of this policy.

Designated Medical / Nursing Officers, or exceptionally the Senior Clinician on duty, should ensure that colleagues are advised of the interruption to the gas supply, and its estimated duration. They should also ensure via the Estates Department that all affected terminal units are appropriately labelled.

13.0 Planned or Routine Interruption

A planned interruption will be needed for repair, extension or modification to the existing MGPS. An Authorised Person (MGPS) shall supervise any planned interruption in strict accordance with the Permit to Work System in HTM 02-01:2005. The QC (MGPS) Pharmacist shall be involved in any planned interruption from the initial planning stage.

The Authorised Person (MGPS) shall assess the hazard level of the work to be carried out in accordance with the definitions that are given in the following sections for High and Low Hazard work.

13.1 HIGH Hazard Work

Any work on the MGPS, such as cutting or brazing, that will introduce hazards of cross-connection and pollution, will be classified as HIGH HAZARD.

Cross-connection, performance, identity and quality tests shall be required before the MGPS is taken back into use.

High hazard work may require at least a planned interruption to a single ward or department, or, at worst, a major shutdown of a system to a whole site.

In such events, an Authorised Person (MGPS) must ensure that key personnel for each and every ward or department are informed; if necessary, holding a site meeting.

The QC (MGPS) Pharmacist should be included in any discussions that may lead to an interruption of the MGPS.

Two weeks prior to the planned interruption, the Authorised Person (MGPS) shall liaise in person with the Designated Nursing / Medical Officer(s) of the ward(s) or department(s) concerned.

At the same time, the Authorised Person (MGPS) will complete Part 1 of the Permit to Work Form.

The Designated Medical / Nursing Officer(s) for the ward(s) or department(s) involved will be made aware that their signatures will be required on the date on which the work is due to take place.

The requirement for portable cylinders or vacuum units will be determined and confirmed, with details of the interruption, by a notification from Estates AP to the Designated Medical / Nursing Officer(s).

A copy of this memorandum will be sent to the ward(s) or departments(s) concerned. A further memorandum, requesting the services of a Quality Controller (MGPS) and detailing the requirements for portable cylinders shall be sent to Pharmacy.

It is the responsibility of the Authorised Person (MGPS) to arrange, through the Pharmacy Department, or an appropriate hire firm if necessary for portable cylinders and regulators (Stocks of regulators are held by Estates).

Any additional portable vacuum units to be supplied are the responsibilities of the Estates Department.

The Authorised Person (MGPS) will provide all details of the work to be carried out in Part 2 of the Permit to Work Form, including any other Permits, e.g. for hot works or for entry into confined spaces.

Work shall only commence when the Designated Medical / Nursing Officer or Senior Clinician(s) for the ward(s) or department(s) is / are satisfied that no patients will be put at risk by the shutdown of the MGPS and has / have signed Part 1 of the Permit to Work Form.

The Authorised Person (MGPS) will then supervise isolation of the AVSU(s). Isolation to be carried out by the Designated Medical / Nursing Officer.

Once the system(s) has / have been isolated and de-pressurised, the Competent Person (MGPS) will sign Part 2 of the Permit to Work Form and commence work.

The Competent Person (MGPS) will sign Part 3 of the Permit to certify that work has been completed, and contact the Authorised Person (MGPS), so that the installation may be examined and tested.

For all High Hazard work, the Authorised Person (MGPS) will determine and carry out, with the assistance of the Competent Person (MGPS), the necessary tests and examination of the system(s) in accordance with HTM 02-01 'Validation and Verification'.

When these tests have been completed satisfactorily, the Authorised Person (MGPS) will initial the relevant spaces and sign Part 4 of the Permit.

The Quality Controller Pharmacist (MGPS), with the assistance of the Authorised Person (MGPS) will carry out identity and quality tests on the system(s) in accordance with HTM 02-01 'Validation and Verification'.

When these tests have been completed with satisfactory results, both will initial the relevant spaces and sign Part 5 of the Permit.

The Quality Controller (MGPS), will receive the pink copy of the Permit to Work Form from the Authorised Person (MGPS).

Note: It should be the normal practice of Estates to retain the white copy along with the original (yellow) copy in the Permit to Work Book. Photocopies (signed and dated by the AP (MGPS) and the CP (MGPS)) of the white copy may be issued to the Competent Person (MGPS) on request.

The Designated Nursing / Medical Officer(s) will accept the system(s) back into service by signing Part 6 of the Permit and will undertake to notify his / her colleagues that the system is fit for use.

13.2 LOW Hazard Work

Any work on the MGPS which will not introduce any hazard of cross-connection or pollution.

A performance test will be required before the MGPS is taken back into use.

If there is any doubt as to the hazard level classification of a particular Permit to Work, advice should be sought from the Senior Authorised Person (MGPS), detailed in Appendix A.

Low hazard work on terminal units is normally the result of a leak on an individual terminal unit due to a faulty valve or seal but may also include work on plant, which does not interrupt gas supplies.

This type of work is usually carried out at short notice because of the need for minimum disruption in patient care. In such events, the Authorised Person

(MGPS) may have to arrange a portable cylinder or vacuum unit, so that the terminal unit can be taken out of service.

The Authorised Person (MGPS) will fill out the relevant section of Part 1 of the Permit to Work Form. The Authorised Person (MGPS) will liaise with, and fully brief, the Senior Clinician on duty within the ward / department who will then sign Part 1, if required.

The Authorised Person (MGPS) will provide all details of the work to be carried out in Part 1 of the Permit to Work Form

When satisfied with the extent of the work, the Competent Person (MGPS) will sign Part 2 and begin the work.

The Competent Person (MGPS) will sign Part 3 of the Permit to certify that the work has been completed and contact the Authorised Person (MGPS) for the installation to be examined and tested.

The Competent Person (MGPS), with the assistance of The Authorised Person (MGPS), if necessary, will carry out flow, pressure drop, mechanical function and gas specificity tests on the serviced terminal unit(s).

Other equipment function tests, e.g. on plant, will be made to the satisfaction of the Authorised Person (MGPS).

The Authorised Person (MGPS) Competent Person (MGPS) will initial the relevant spaces, and sign Part 4 of the Permit.

When satisfied with the test results, the Authorised Person (MGPS) will sign Part 5 of the Permit.

The Designated Medical / Nursing Officer or Senior Clinician on duty within the ward or department will accept the MGPS back into service by signing Part 6 of the Permit and will undertake to notify his / her colleagues that the system is fit for use.

14.0 Actions in the Event of a Medical Gas Alarm

The diagram on page 18 (Diagram 1) shows a typical medical gas panel and the actions that should be taken at each level of alarm.

On detection of a local alarm indication e.g. in a ward area, the Senior Clinician on duty, or deputy, should contact the Switchboard to confirm that a fault has been signalled and that Estates has been informed.

In the event of an alarm condition on the central alarm panel, it is the responsibility of the Security control room to inform the appropriate staff.

Disabling the alarm system, other than when due authorisation has been obtained from an Authorised Person (MGPS), is absolutely forbidden as this may compromise patient safety.

There should always be a 'normal' light. If there is no 'normal' light, then there is a fault of some kind, possibly just with the alarm panel. However, Estates should investigate this fault.

Alarms should be tested weekly by a Competent Person (MGPS). Operation of the TEST button will confirm operation of all audible / visual indicators.

Nursing / Medical staff should be advised of this test.

The results of these tests should be recorded and stored by the Authorised Person.

14.1 Example – Oxygen

NWH = **Normal Working Hours**
ONWH = **Outside Normal Working Hours**

ALARM INDICATION	Action (Security to inform)
NORMAL	No action to be taken
PLANT FAULT	NWH - Estates ONWH - Estates (On-call rota)
PLANT EMERGENCY	NWH - Estates ONWH - Estates (On-call rota)
RESERVE LOW	NWH - Estates ONWH - Estates
PRESSURE FAULT	NWH - Estates ONWH - Estates (On-call rota)
Panel Indication (all alarm panels)	
Alarm Indication	ACTION (SECURITY TO INFORM)
Power On	No action to be taken
System Fault	NWH - Estates ONWH - Estates (On-call rota)

Diagram No. 1 Typical Medical Gas Alarm Panel

It is the responsibility of the AP (MGPS), to ensure that a procedure for each alarm indication is displayed next to the respective central alarm panel.

In the event of an Authorised Person not being available refer to M&M Medical 24hr Contact Details.

M&M Medical - Paul Sayer – 01443 227600 Mobile -07899997128

BOC – 0800 222888

15.0 Cylinder Management

15.1 Connecting Cylinders to the Manifold System (by Designated Persons)

15.1.1 Connect the cylinder to the equipment or manifold tail pipe and tighten firmly with the recommended key.

15.1.2 Ensure that no leaks are present at the junction between the cylinder valve and equipment and also between the valve spindle and gland nut.

15.1.3 The connection between the cylinder valve and equipment should be checked for leaks using an approved leak detector.

15.1.4 Regulators/manifolds or other equipment should only be used with the gas for which they are designed.

15.1.5 Prior to opening the cylinder valve, ensure the equipment flow control valves are closed.

15.1.6 When the cylinder is not being used the cylinder valve should be closed and the gas trapped within the regulator should be safely vented to atmosphere by opening the flow control valve and then closing it again.

16.0 Shutdown of the MGPS for Maintenance, Extension etc.

Pre-planned work on the MGPS requiring isolation of a plant, or part of the system, will be covered by the MGPS Permit to Work System.

No isolation should take place without full liaison between the Authorised Person (MGPS) and all other relevant disciplines.

All necessary emergency / additional gas supplies should be in place before the work starts. This may involve the provision of portable emergency supply systems and / or additional provision of cylinder regulators from the Estates Department.

Attempts should be made to reduce gas consumption during the work.

17.0 Generator Operation on Mains Failure

During changeover from electrical mains to emergency generator supplies, there is always a possibility that spurious MGPS alarms or changes in plant indications may be generated.

Consideration should be given to the statutory/planned generator tests that are planned to run every four weeks.

THESE ALARMS MUST BE INVESTIGATED IMMEDIATELY, as they could represent real, rather than false conditions. The status of equipment such as compressors should also be checked, to ensure they are operating as selected: on / on stand-by / on duty mode / off.

Additionally, it must be remembered that:

Failure of generator and mains supplies simultaneously will result in failure of the central medical vacuum system.

It is important that medical / nursing staff are aware of this risk to the vacuum system and any patients using it.

All relevant staff must undertake training in the use of emergency vacuum equipment.

In areas where vacuum supply is considered critical, locally generated vacuum will have to be provided. However, with a failed electricity supply this will not be possible using the normal electrically driven portable suction units.

An alternative would be a BATTERY DRIVEN suction unit, but it is important that, with this type of unit the battery is maintained in a FULLY CHARGED condition.

Medical Vacuum Units are located on every department.

Failure of both mains and electricity supplies will also mean that the medical air compressors will not function.

Estates staff must ensure that all plant equipment and alarms have reset to full operating conditions on restoration of power.

18.0 Emergency Procedures

Use of Emergency reserve manifolds.

Emergency supply manifolds are attached to all medical gas systems.

18.1 Oxygen System

In the event of failure of the primary VIE (Vacuum Insulated Evaporator) oxygen supply on applicable sites, back up VIE will automatically supply the hospital with gas through 2 x back up manifolds. In the event of such a failure, the Estates Department are to be contacted via the numbers in Appendix C.

Where manifold provides the secondary supply.

Important: Cylinder manifolds have limited capacity in relation to the normal hospital demand supplied from a VIE, so additional manpower may be required in an emergency situation of this kind, both to change the cylinders on the manifold and to bring the replacement cylinders to the manifold.

Measures to reduce gas consumption may also need to be taken.

It is the duty of the Portering/pharmaceutical staff to ensure that sufficient J size cylinders are available to maintain the gas supply and that there is an emergency procedure in place for handling these cylinders with support of the site Authorised Person.

Note that the medical vacuum system has no emergency reserve manifold system. Failure of the plant for any reason will result in total failure of the vacuum service.

18.2 Emergency Cylinder Ordering Procedure

See Medical Gas Cylinder Policy

18.3 Failure of Mains Electricity Supply

In the event of an electricity failure, medical gas supplies should be maintained by the emergency generator system (The 'Essential' supply).

The surgical compressed air plant, vacuum plant, oxygen system, all manifolds and medical gas alarm systems are connected to the 'essential' electricity supply and will continue to provide and monitor gas supplies as normal.

18.4 In the Event of Failure of Both Mains and Generator Supplies:

The oxygen system will continue to supply gas from it's VIE or secondary supply manifold system.

The vacuum plant will not operate and central vacuum service will be lost.

Alarm panels will display a 'System Failure' red warning light and give an audible alarm.

If the electricity supply to an alarm panel only is interrupted, the panel will display a 'System Failure' red warning light and emit an audible alarm; gas supplies will not be affected.

In any of these events:

The Authorised Person (MGPS) will be informed of the situation, via the Designated Medical / Nursing Officer / Nursing staff / Telephonist.

Portering and Estates will arrange for staff to monitor manifold gas consumption, replacing empty cylinders as necessary, until the electricity supply is restored.

The Authorised Person will arrange emergency cylinder / regulator supplies as necessary.

The Authorised Person (MGPS) will monitor the situation and confirm re-setting of compressor and vacuum plant and system alarms following restoration of supply.

18.5 A Serious Leak of Medical Gases

In these events:

The Duty Porter and the Authorised Person (MGPS) will be contacted by the Telephonist / Duty Nurse.

Details of the leak should be confirmed: i.e. the floor level, department, room number, the gas or gases involved and if patient ventilators are in use.

Outside normal working hours the On-call Engineer will notify the Authorised Person (MGPS) Estates Manager On call.

It is the responsibility of the Senior Clinician to carry out isolation of medical gases to the area, after ascertaining that no patients will be put at risk in any area(s) affected by the isolation.

The Senior Clinician will issue appropriate instructions to make the situation safe, such as to open windows in the affected area and close doors, in accordance with the hospital Fire Policy.

The Duty Porter will remain on standby to provide extra gas cylinders as required.

The Authorised Person (MGPS) will arrange for repairs to the system(s) affected to be carried out under the Permit to Work system.

18.6 Total or Partial failure of a Medical Gas Supply

In these events:

The person discovering the failure will inform the Telephonist and Duty Nurse immediately.

The Telephonist will inform the Duty Senior Manager, the Duty Porter and the Duty Authorised Person (MGPS) of the leak.

Details of the failure should be confirmed: i.e. floor level, department, room number(s), the gas or gases involved and if patient ventilators are in use.

As a precautionary measure, the Telephonist will also notify critical areas e.g. First Floor Ward Inpatients that a failure has occurred on part of the system, so that they are prepared in the event of the fault extending to their departments.

It is the responsibility of the Senior Clinician to check which patients may have been put at risk by the failure and, if necessary, to arrange immediate emergency medical action.

Depending on the reason for the failure and its possible duration, the Authorised Person (MGPS) will decide the most appropriate method of long-term emergency gas provision.

This may involve establishing locally regulated cylinder supplies at ward / department entrances.

Nursing and medical staff should attempt to reduce gas consumption to a minimum during the emergency.

Portering staff will be required to monitor / replenish cylinders at any emergency stations and at Plant Room emergency supply manifolds.

Pharmacy will arrange emergency cylinder deliveries as necessary.

The Authorised Person (MGPS) will liaise with the Competent Person (MGPS) to complete emergency repairs needed to re-instate the gas supply, using the Permit to Work system.

When the supply is fully restored, the Authorised Person (MGPS) will complete a Critical Incident Form and produce a full report, which will be given to the General Manager within 24 hours of the incident.

In situations where it is envisaged that there will be long term loss of oxygen, vacuum or medical air services, the Duty Senior Manager will liaise with clinical colleagues, including the Designated Medical / Nursing Officer, the Clinical Director and the Authorised Person (MGPS) on the need for transfer of critically ill patients to (premises), as department closure may be warranted in extreme events.

18.7 Contamination of a Medical Gas Supply:

It is not unusual for a smell to be noticed when using 'plastic' equipment hoses to deliver gas to a patient. This smell usually disappears rapidly after first use of the hose and will generally be familiar to operatives.

However, if either operatives or patients complain of any unusual or strong smells from equipment, the situation **MUST** be treated seriously and **IMMEDIATE** action taken to ascertain the cause.

Where it is obvious that the smell is coming from the pipeline rather than a piece of connected equipment, the **GAS SUPPLY MUST NOT BE USED**.

In such an event the fault should be treated as a complete gas failure to that area and the actions described above taken **IMMEDIATELY**.

It is very important that if such an incident occurs the Telephonist advises **ALL** departments of the problem, especially those involved with critical care.

18.8 Contamination of Medical Vacuum System

Contamination of the medical vacuum system will usually be detected during routine maintenance inspection and evidenced by the presence of liquid in the on-line bacteria filter drain flask. The Consultant Microbiologist should be informed immediately and should advise on any additional precautions to effect filter change safely.

Portable suction units may be used in areas where there is a possibility of the vacuum system being contaminated. (The need for portable suction units should be discussed with the Consultant Microbiologist).

It is the responsibility of the Competent Person (MGPS) to change the filter in accordance with the procedure described in HTM 02-01 and any additional advice from the Consultant Microbiologist.

If the contamination is due to system misuse, the Authorised Person (MGPS) must complete an Incident Report Form. The form is to be sent to the General Manager so that the appropriate Clinical Manager can be informed, and remedial action taken.

Decontamination of pipework (if necessary) should be carried out in accordance with the procedure described in HTM 02-01 BEFORE filters are changed.

18.9 Failure of an Anaesthetic Gas Scavenging System (AGSS)

Failure of an anaesthetic gas scavenging system results in spillage of gaseous/vaporised anaesthetic agents into the area of use of the system.

In Theatres it is likely that staff exposed to the spilled gases will exceed the COSHH recommendations for exposure when working in the area for extended periods, even though ventilation rates are high.

A local alarm 'System fail' warning and failure of the air receiver flow indicator will indicate failure of the system. Both should be inspected by Operating Department staff on a regular basis.

The Authorised Person (MGPS) and the Theatre Manager will be informed of the failure by the Theatre Technician and all attempts should be made to reduce staff exposure, if operations continue with a failed system.

When repairs have been completed (under a Permit to Work signed by the Theatre Nurse Manager, or their nominated deputy) Theatre staff should be made aware (by the person signing off the Permit to Work) that the system is back in use.

18.10 Over or Under Pressurisation of One or More Gas Systems

Local alarms are designed to indicate when system pressure is more than 20% above or below its norm.

Excessively high or low pressures may cause medical equipment to malfunction.

The Senior Clinician should report all instances of local alarm operation to the Telephonist. The Telephonist will then inform the Duty Senior Manager, the Duty Porter and the Authorised Person (MGPS).

18.11 Fire

Procedures in accordance with the hospital Fire Policy should be followed in the event of a fire involving, or likely to involve the MGPS.

During a fire the Senior Brigade Officer will assume full control of the area(s) affected.

Under no circumstance should medical gas supplies be isolated until the senior clinician has confirmed that all patients likely to be affected have been evacuated and/or have alternative gas provision.

Appendix A

19.0 Policy Signatories

This policy has been prepared and will be implemented and monitored by:

Name: Signature: Date:

This policy will be monitored and reviewed on a bi-annual basis.

Training needs associated with the policy will be co-ordinated by.

The Senior Authorised Person (MGPS) for medical gas systems within the Health Board is.

This policy is accepted by:

Chief Executive

Name: Signature: Date:

Authorised Person (MGPS)

Name: Signature: Date:

Name: Signature: Date:

Name: Signature: Date:

QC Pharmacist

Name: Signature: Date:

Signature: Date:

Senior Designated Nursing / Medical Officer

Name: Signature: Date:

Security and Portering Manager

Name: Signature: Date:

Infection Control Officer

Name: Signature: Date:

Signature: Date:

Fire / Safety Officer

Name: Signature: Date:

Assistance with the interpretation of this policy, or additional copies, can be obtained by contacting (Works and Estates Manager ***** Hospital).

Appendix B

20.0 Policy Circulation List for Velindre Cancer Centre.

Title	Name	MGPS Role	Contact number (Ward)
Head of Maintenance and Operations		N/A	
Estates Manager for the site		Authorised Person	
Estates Technician		Authorised Person	
Chief Pharmacist		Chief Pharmacist	
Head of Nursing		Designated Nursing Officer	
Pharmacist		QC Pharmacist	
Portering Manager		Designated Person	
On Call M+M Medical		On call Authorised Person	

Appendix C

Contacts for Velindre Cancer Centre.

21.0 Authorised Persons (MGPS)

Name	Contact number

21.1 Competent Persons (MGPS)

Name	Contact number

21.2 Designated Medical / Nursing Officers

Name	Title	Contact Number

21.3 Other Important Telephone Numbers

Name	Contact number	Out of hours contact number
Portering	Switchboard	
Pharmacy	Switchboard	
Gas Supplier (Emergency number)	BOC	

Appendix D

22.0 Site Specific Information for Velindre Cancer Centre.

22.1 Location of Oxygen supply for the Hospital

Main supply VIE. Located opposite Cancer Research Wales entrance
Back up supply located in manifold room opposite Cancer Research
Wales.

22.2 Location of Medical Vacuum for the Hospital.

Located in plant room bunker 7+8.

Appendix E

23.0 Statutory Requirements Relevant to Medical Gas Pipeline Systems

Medical Gas Pipeline Systems are regulated by the Health and Safety at Work etc. Act, 1974 and all the relevant delegated legislation, such as regulations and statutory instruments enabled by the Act.

23.1 Other Guidance Applicable to Medical Gas Pipeline Systems

- Health Technical Memorandum (HTM) 02-01 'Medical Gas Pipeline Systems', 2005
- Volume 1, Design, Installation, Validation and Verification
- Volume 2, Operational Management
- Supplement No 1 'Dental Compressed Air and Vacuum Systems' 2003
- Supplement No 2 'Piped Medical Gases in Ambulance Vehicles' 1997
- National Health Service Model Engineering Specification, C11, 'Medical Gases', 1999
- European Pharmacopoeia Standards for medical gases, including medical compressed air
- Premises Health and Safety Policy
- Premises Fire Policy
- Any other relevant local guidance