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NHS Shetland

Gilbert Bain Hospital

Medical Gas Pipeline Systems (MGPS): Operational Policy Document

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Operational Policy Document:
Medical Gas Pipeline Systems (MGPS)

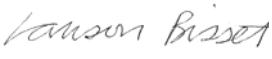
NHS Shetland: Gilbert Bain Hospital

This Operational Policy document has been prepared to assist in the safe management of those medical gas pipeline systems (MGPS) installed at the Gilbert Bain Hospital.

In accordance with the requirements of Scottish Health Technical Memorandum 2022: 2001 'Medical gas pipeline systems', the Chief Executive formally delegates the day-to-day responsibility for the management of the MGPS to the Authorised Person (MGPS) who will also have the delegated responsibility for the preparation, implementation, monitoring and review of this Operational Policy.

The document will be reviewed annually or when there is any significant change to either the MGPS or personnel involved with the management of these systems. Due consideration has been taken with respect to the requirements of SHTM 02-01 which is currently in draft form, however, this Operational Policy document will be reviewed once this standard is adopted within the NHS in Scotland. The formation of a Medical Gases Committee is proposed with suitable representation to facilitate the full implementation and future update of the Operational Policy document.

Issue 3: July 2011
Review Date: July 2013

Signed:		**Ralph Roberts**
Date:	27/03 / 2013 ……..	**Chief Executive**
Signed:	 ……	**John McBeath**
Date:	17 / 01 / 2013 ……	**Head of Estates and Facilities**
Signed:	 ……	**Lawson Bisset**
Date:	17 / 01 / 2013 ……	**Co-ordinating Authorised Person (MGPS)**

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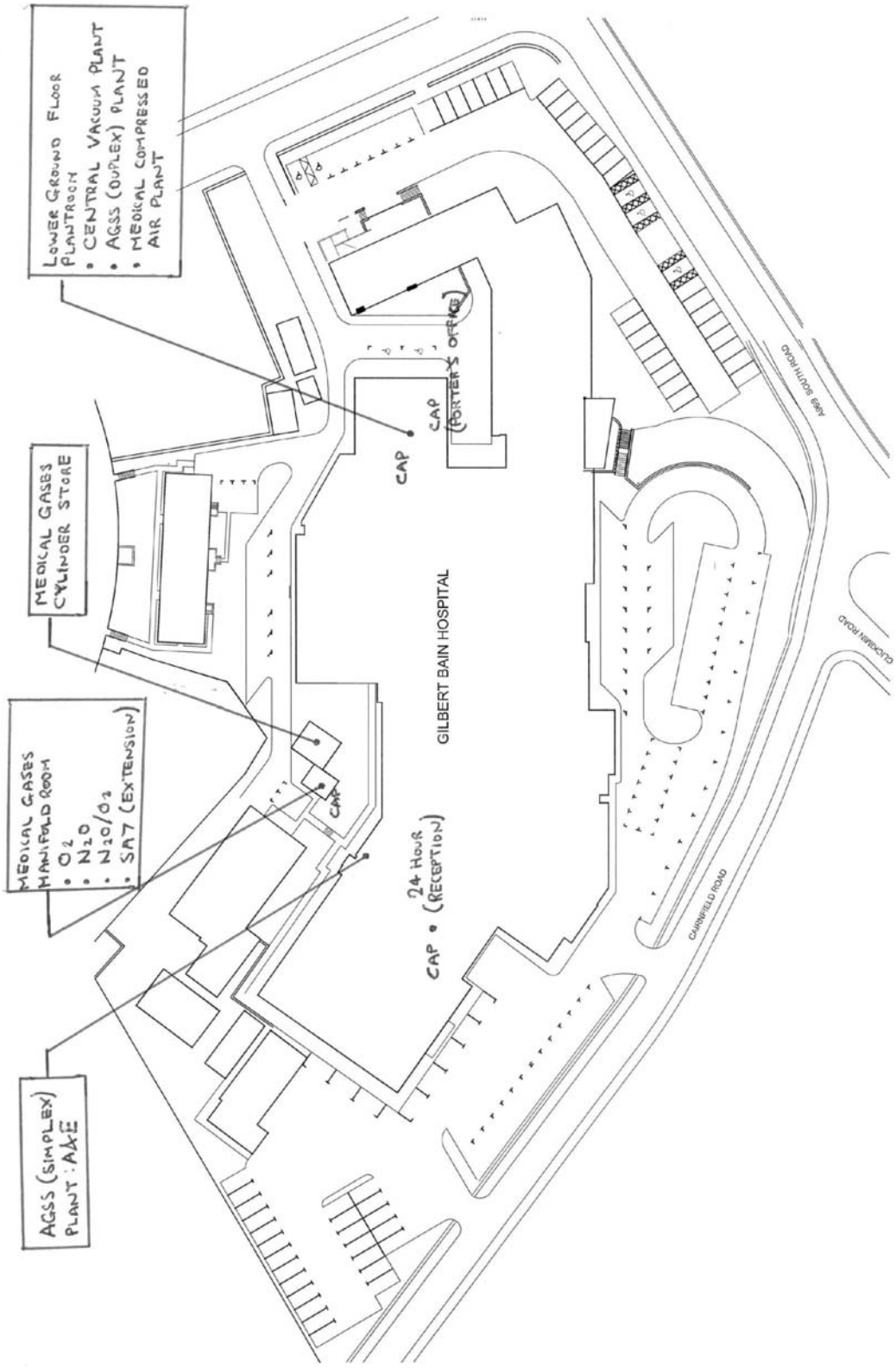
1.0 Aim and Scope

The aim of this Operational Policy is to provide those persons engaged in the day-to-day operation, maintenance and repair of medical gas pipeline systems (MGPS) with accurate and concise information with respect to the safe use of those systems and of the action to take in an emergency situation. Responsibility for the preparation, implementation, monitoring and review of this Operational Policy lies with the Coordinating Authorised Person (MGPS) who has the delegated day-to-day responsibility for the management of the MGPS at the Gilbert Bain Hospital.

The content of the Operational Policy is specific to those MGPS installed at the Gilbert Bain Hospital and is derived primarily from the operational management guidance contained within SHTM 2022: 2001 'Medical gas pipeline systems'. Other standards, such as British and European Standards, will be referred to as appropriate.

2.0 Site Plan

The site plan displays the location of the medical gases plant and cylinder stores. For individual systems, reference should be made to the relevant record drawings identified within Appendix 1.



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3.0 Description of Medical Gas Pipeline Systems Installed at the Gilbert Bain Hospital

The Authorised Person (MGPS) must be consulted prior to any new equipment being connected to the existing systems to ensure that system capacity / limitations of the MGPS are not exceeded.

3.1 Oxygen

Oxygen is supplied from a 2 x 8 J size cylinder manifold installation with a 2 x 1 emergency reserve manifold (ERM). These are installed within the medical gases manifold room situated to the rear of the Hospital. The automatic manifold panel is a Medaes MCS2 panel and the ERM is a Medaes HTM 02-01 assembly. A spare line valve has been left tee'd off the supply pipeline within the manifold room to facilitate any future connection to an alternative supply source.

3.2 Nitrous oxide

Nitrous oxide is supplied from a 2 x 2 G size cylinder manifold installation with a 2 x 1 emergency reserve manifold (ERM). These are installed within the medical gases manifold room situated to the rear of the Hospital. The automatic manifold panel is a Medaes MCS2 panel and the ERM is a Medaes HTM 02-01 assembly.

3.3 Nitrous oxide / Oxygen mixture

Nitrous oxide / oxygen mixture is supplied from a 2 x 2 G size cylinder manifold installation with a 2 x 1 emergency reserve manifold (ERM). These are installed within the medical gases manifold room situated to the rear of the Hospital. The automatic manifold panel is a Medaes MCS2 panel and the ERM is a Medaes HTM 02-01 assembly.

3.4 Medical / Surgical air

Medical / Surgical air is supplied from a MIM compressed air plant situated within the lower ground floor (RO) plantroom. The plant consists of two Mahle MGK 1001 N/BP screw compressors, a single receiver with no bypass facility and a duplex dryer / filtration module. The plant is supported by a 2 x 3 J size cylinder manifold installation with a 2 x 1 emergency reserve manifold (ERM) which are installed within the extension built onto the existing manifold room. The automatic manifold panel is a Medaes MCS2 panel and the ERM is a Medaes HTM 02-01 assembly. The pressure settings of the compressed air plant, automatic manifold panel and emergency reserve manifold are such that the supply will revert to the automatic manifold in the event of plant failure or non-availability of the plant during statutory inspection of the receiver. In the event that the automatic manifold becomes exhausted, the emergency reserve manifold will automatically pick up the supply. Medical air is supplied via a 7-4 bar duplex regulating set located within the lower ground floor plantroom.

3.5 Central Vacuum Plant

Vacuum is provided from central vacuum plant located within the lower ground floor (RO) plantroom. The plant is an MIM packaged plant – Model No. V02-01 DCC consisting of three Busch RA Type RA 100F vacuum pumps mounted on a single receiver.

3.6 Anaesthetic Gas Scavenging Systems (AGSS)

A duplex AGSS plant manufactured by MIM is located within the lower ground floor (RO) plantroom which serves the scavenging outlets within the following areas: Theatres, Theatre Recovery, Medical Physics, CT Scanner Suite and Dental Surgery 1.

A simplex AGSS plant manufactured by Medaes – Type SAH45 Part No. 2003205 - is located off the A&E department which serves the scavenging outlets within the A&E department – Resuscitation Room and Plaster Room.

3.7 Dental air and vacuum systems (DAVS)

Dental air and dental vacuum is provided to Dental Surgeries 1 and 2. Both the air and vacuum plants are located within the Store situated between the two surgeries. The dental air plant is a Cattani plant (Serial No. C2321290) producing air of dental air quality at 7 bar. The dental vacuum plant is a Durr Dental Vacuum Plant Type D-74321 (Ref. 7125-01/002) (Serial No. WO11696).

4.0 Operational Management Arrangements

4.1 Key Personnel – Functional Responsibilities

In order to maintain the four fundamental tenets (identity, adequacy, continuity and quality of supply) associated with a safe and reliable medical gas pipeline system, a management regime is required to ensure that the systems are operated correctly and for maintaining the integrity of the systems during repair or modification works. This requires the involvement of a number of personnel in differing roles with each having specific defined responsibilities. The key role is that of Authorised Person (MGPS) who has the delegated responsibility for seeing that the MGPS are operated safely and efficiently. The powers of the Authorised Person (MGPS) are such that only they can decide whether a MGPS should be taken into or out of use.

In addition to the Authorised Person (MGPS), the following personnel have specific responsibilities as defined within this Operational Policy.

Chief Executive
The Chief Executive or 'Executive Manager' has the ultimate management responsibility for those MGPS installed at the site. This includes the responsibility for the allocation of resources and the appointment of personnel involved in the use, installation and maintenance of the MGPS. With regard to the Authorised Person (MGPS), this appointment must be in writing based on the recommendation of the Authorising Engineer (MGPS) who has specialist knowledge of MGPS – refer to the Authorising Engineer (MGPS) role.

The nominated 'Executive Manager' for the purpose of this Operational Policy is:

Mr Ralph Roberts, Chief Executive – NHS Shetland

Head of Estates
The Head of Estates generally has the responsibility for the integrity of the MGPS installed at this site. This can be achieved through the implementation of proper work procedures and the appointment of competent contractors. In most cases, the Authorised Person (MGPS) will be a member of the Estates Department and will report to the Head of Estates on a daily basis.

The nominated Head of Estates for the purpose of this operational Policy is:

Mr John McBeath, Head of Estates – NHS Shetland

Authorised Person (MGPS)

The Authorised Person (MGPS) is defined as that person designated by the Chief Executive / Executive Manager to be responsible for the day-to-day management of the MGPS at a particular site. The Authorised Person (MGPS) should be appointed in writing by the Chief Executive / Executive Manager on the recommendation of the Authorising Engineer (MGPS). This recommendation would normally be made following an assessment of the competency, knowledge of the MGPS on the site and of the overall suitability of the individual proposed for this role. The appointment of a Coordinating Authorised Person (MGPS) with overall responsibility for the site is proposed for the Gilbert Bain Hospital who will act as the focal point for MGPS issues including receiving / issuing communications from / to the Authorising Engineer (MGPS) and for disseminating information to the other Authorised Persons (MGPS) for the site.

The main responsibilities of the Authorised Person (MGPS) include the following:

- Day-to-day management of the MGPS;
- Management and implementation of the MGPS Permit-to-Work procedure including liaison with contractors and all relevant nursing / medical staff (Refer to Section 4.3);
- To liaise closely with other professionals in various disciplines on all matters relating to MGPS including the purchase of new equipment which may be connected to the MGPS;
- To assess the competency of all Competent Persons (MGPS) employed directly by the Estates Department and for maintaining a list of all registered Competent Persons (MGPS). The individual appointment of Competent Persons (MGPS) will be reviewed at intervals not exceeding three years;
- To ensure that work on the MGPS is carried out only by approved specialist contractors registered to BS EN ISO 9001: 2008 with the scope of registration defined as design, installation, commissioning and maintenance of MGPS as appropriate;
- For the Coordinating Authorised Person (MGPS), to act as the point of contact for MGPS issues including receiving / issuing communications from / to the Authorising Engineer (MGPS) and for disseminating information to the other Authorised Persons (MGPS) for the site;
- To provide all necessary assistance to the Competent Person (Pressure Systems) for the purposes of statutory inspections on relevant parts of the MGPS;
- To provide advice on the suitability of existing MGPS to be extended or modified as required for new projects or refurbishment works;
- To update all relevant records relating to the MGPS and to amend MGPS drawings as systems are modified or extended;
- To monitor, review and update this Operational policy.

The Authorised Persons (MGPS) for this Hospital are detailed as follows:

Coordinating Authorised Person (MGPS):	**Mr Lawson Bisset**
Authorised Person (MGPS):	**Mr Mark Ward***
Authorised Person (MGPS):	**Mr Scott Arthur***

* The recommendation for appointment as Authorised Person (MGPS) currently restricts activity to low hazard permits only.

Competent Person (MGPS)

The Competent Person (MGPS) should be assessed and appointed by the Coordinating Authorised Person (MGPS) when employed directly by the Estates Department. When this is the case, the Coordinating Authorised Person (MGPS) will maintain a register of Competent Persons

(MGPS). Where the Competent Person (MGPS) is a member of the specialist MGPS contractor's staff, the contractor will be responsible for assessing the competence of the individual and for maintaining a register of Competent Persons (MGPS). The Competent Person (MGPS) is required to participate in the MGPS Permit-to-Work procedure for all relevant activity or work on the MGPS and to take instruction from the Authorised Person (MGPS) with respect to the works in hand.

The Competent Persons (MGPS) for this Hospital are detailed as follows:

Competent Person (MGPS): Mr Scott Wylie

Quality Controller (QC)
The Quality Controller (QC) is the person designated with the responsibility for the quality control of medical gases at the terminal unit and plant. The responsibilities will extend to performing the relevant tests for gas quality and identity following new works and extensions to existing systems. For the Gilbert Bain Hospital, the services of a Quality Controller (QC) will be obtained from the NHS Grampian Pharmacy Department. The Co-ordinating Authorised Person (MGPS) will liaise with the Quality Controller as appropriate.

The Quality Controller (MGPS) for the Gilbert Bain Hospital is provided though NHS Grampian and is:

Mrs. Vivienne MacLeod NHS Grampian – Pharmacy Department, Foresterhill

Designated Medical or Nursing Officer
The Authorised Person (MGPS) is required to liaise with an individual within each ward / department on matters affecting the MGPS within that ward / department. SHTM 2022 describes this person as the Designated Medical or Nursing Officer. This individual is required to participate in the MGPS Permit-to-Work procedure and would give permission for a planned interruption to the supply. The Designated Medical or Nursing Officer is required to ensure that no patients within the ward / department under their control are connected to or dependent upon the MGPS prior to giving the Authorised Person (MGPS) permission to interrupt the supply. The Designated Medical or Nursing Officer is also required to ensure that all relevant medical and nursing staff are aware of the interruption to the MGPS and for informing them of which MGPS terminal units cannot be used. The provision of emergency cylinders and action to take in the event of an emergency falls within this remit and all Designated Medical or Nursing Officers will receive training on the MGPS relevant to their ward / department. A list of all Designated Medical or Nursing Officers is contained within Section 8 of this Operational policy.

Authorising Engineer (MGPS)
The main duties of the Authorising Engineer (MGPS) are to assess individuals nominated for the role of Authorised Person (MGPS) and to provide a technical advisory service for all aspects of MGPS.

The Authorising Engineer (MGPS) for the Gilbert Bain Hospital is provided though Atkins and is:

Mr. Graeme Dunn Authorising Engineer (MGPS)

4.2 Record of Appointments and Training

The Chief Executive / Executive Manager will maintain a record of all Authorised Persons (MGPS) appointed for the Gilbert Bain Hospital including date of commencement of appointment and when refresher training and re-appointment is required. The Co-ordinating Authorised Person (MGPS)

will maintain a record of all Competent Persons (MGPS) employed directly by the Estates Department and through continued liaison with all relevant wards and departments, will maintain the list of the Designated Medical or Nursing Officers for the relevant areas. Competent Persons (MGPS) employed by a specialist contractor, will have a record of their appointment and training maintained by the contractor which will be made available to the Authorised Person (MGPS) upon request.

All MGPS training received by staff will be recorded in the individual's training file. Prior to being considered for appointment as an Authorised Person (MGPS) and Competent Person (MGPS), all persons must have satisfactorily completed an appropriate training course. The assessment will then focus on the persons knowledge of the content of SHTM 2022 and of their familiarity with the MGPS installed at the Gilbert Bain Hospital.

Authorised Persons (MGPS) are required to attend a suitable refresher course every three years prior to be being re-assessed by the Authorising Engineer (MGPS).

Competent Persons (MGPS) employed directly by the Estates Department will receive suitable refresher training at intervals determined by the Authorised Person (MGPS).

The Quality Controller (QC) will receive specific training relevant to their responsibilities and to ensure familiarity with the requirements of SHTM 2022.

The Designated Medical or Nursing Officers will receive specific training in relation to emergency procedures relevant to the ward or department under their control. All medical and nursing staff will be trained in the safe use of MGPS with refresher training being arranged annually.

Portering Staff / Maintenance Assistants with the responsibility for changing cylinders on manifold installations will receive training in correct cylinder handling and management.

4.3 Permit-to-Work Procedure

The Permit-to-Work procedure for MGPS as detailed within SHTM 2022 will be followed rigorously to ensure that the integrity and performance of the system is maintained. The Authorised Person (MGPS) will be responsible for the implementation of the permit-to-work procedure and will assign the hazard level appropriate to the works concerned. **Note:** The following guidance has been based on the HTM 02-01 form of permit as this will shortly be adopted once the current HTM 2022 permit book has been fully used. The specific responsibilities of the key personnel involved in the permit-to-work procedure are detailed as follows:

Authorised Person (MGPS)

- To obtain the permission of the Designated Medical or Nursing Officer for the ward / department concerned for interrupting the MGPS supply to that ward / department and obtaining their signature on the permit (Part 1). The Authorised Person (MGPS) will endeavour to give as much advance notice as possible for all pre-planned work;
- To assist the Designated Medical or Nursing Officer in making alternative arrangements for providing MGPS through temporary supplies etc.
- Affixing prohibition notices to affected terminal units / outlets;
- Preparing the permit and any additional documentation which may be required i.e. safety method statements;
- Supervising the isolation of the MGPS on the section of the system on which the work is to be carried out;

- Describing and explaining the specific work procedures to the Competent Person (MGPS) and obtaining their signature on the permit (Part 2 upon commencement and Part 3 upon completion of the works);
- Providing 'as-fitted' or record drawings of the MGPS installation as required for the work concerned;
- Supervising the relevant tests on the completed work;
- Supervising purging with the working gas(es);
- Final testing in conjunction with the Quality Controller (QC) where the permit has been assigned a high hazard level;
- Final testing where the permit has been assigned a low hazard level;
- Restoring service to the ward / department affected;
- Supervising or making the final connection to any extension;
- Notifying the Designated Medical or Nursing Officer for the ward / department concerned that the works are complete and obtaining their signature on the permit (Part 5);
- Removal of prohibition notices fitted to terminal units etc.;
- Obtaining any corrected copies of drawings and supervising any amendments required to existing as-fitted drawings;
- Retaining the original copy of the permit.

Competent Person (MGPS)

- Signing Part 2 of the permit to acknowledge responsibility and understanding the instructions for the work involved;
- Isolating the MGPS for the section to be worked on under the direct supervision of the Authorised Person (MGPS);
- Carrying out the prescribed work in a safe manner;
- Carrying out the system integrity tests on completed work under direct supervision of the Authorised Person (MGPS);
- Signing Part 3 of the permit to declare that the work as described on the permit has been completed;
- Retain the Yellow copy of the permit.

Designated Medical or Nursing Officer

- Signing Part 1 of the permit agreeing that the MGPS for the ward / department concerned can be taken out of use;
- Advising other clinical and nursing staff within the ward / department concerned that the system is not available for use;
- Signing Part 5 of the permit upon completion of the works accepting the system back into use;
- Advising other clinical and nursing staff within the ward / department concerned that the system is now available for use.

Quality Controller (QC)

- Carry out the required gas quality and identity tests upon the completion of works which were assigned a high hazard level and to liaise with the Authorised Person (MGPS) in carrying out the same;
- Signing Part 4 of the permit to declare that the testing has been satisfactorily completed;
- Retain the Pink copy of the permit.

Permit books will be retained by the Coordinating Authorised Person (MGPS) with only one book being in use at any one time. Used permit books will be archived for future reference with a new book only being taken into use once the old book is completely used and all permits accounted for. Any errors on the permit will be corrected and initialled by the Authorised Person (MGPS). The extent of work specified in Part 1 of the permit should not be amended. If any changes to the work are required, a new permit should be issued with the old one clearly marked as being 'cancelled'.

The Authorised Person (MGPS) will also be responsible for arranging other permits as required for the works, such as hot work permits, permits for working in confined spaces, permits for isolating sections of the fire alarm system etc.

4.4 Appointment and Control of Specialist Contractors

Work on the MGPS will only be carried out by specialist contractors registered to BS EN ISO 9001: 2008 with the scope of registration defined as design, installation, commissioning and maintenance of MGPS. The Authorised Person (MGPS) will verify the appointment prior to any works commencing by sight of the contractor's registration certificate.

The Authorised Person (MGPS) will be responsible for monitoring the work of specialist contractors which will be carried out through close supervision on site and inspection of completed works. The specialist contractor will only be contacted by the Authorised Person (MGPS) to attend site with any faults or emergencies being reported by clinical or nursing staff via the Hospital's on-call arrangements.

The specialist contractors will receive copies of the NHS Shetland Estates Department's Contractors' Health & Safety Guidance – the contractor will be required to comply with all such guidance and must instruct his staff in the requirements of the relevant documents.

4.5 Key Security and Control

All keys for lockable line valves (LLVs) and area valve service units (AVSUs) will be kept within a locked key cabinet situated within the Estates Department with access to the key cabinet itself restricted to the Authorised Persons (MGPS). All MGPS plantrooms will be locked with the keys made available when appropriate through the Estates Department signing in / out procedure. Reference should be made to the AVSU and line valve register displayed in Appendix 2 for further information.

4.6 Record Keeping

Up-to-date drawings and records of the MGPS are required not only to satisfy the operational management arrangements of SHTM 2022 but also the statutory requirements of the Pressure Systems Safety Regulations 2000. All MGPS record drawings and Operation & Maintenance Manuals will be kept within the Estates Department and be available for reference by all Authorised Persons (MGPS). The Coordinating Authorised Person (MGPS) will have the responsibility for arranging and verifying the updating of all drawings as MGPS are modified, extended or removed. The Coordinating Authorised Person (MGPS) will also be responsible for ensuring that all documentation relevant to the MGPS are suitably filed within the Estates Department.

4.7 Maintenance Arrangements

All planned and reactive maintenance on the MGPS will be carried out under the responsibility of the Coordinating Authorised Person (MGPS). Planned preventative maintenance (PPM) will generally be undertaken on all relevant MGPS plant and system components as per the manufacturer's recommendations. All work will be carried out in strict accordance with the relevant technical standards and will come under the remit of the permit-to-work procedure even when no interruption to the service is anticipated. For maintenance work on individual items of central plant is required i.e. a single compressor or vacuum pump, then the signature of a Designated Medical / Nursing Officer will not be required for the permit.

Maintenance work will only be carried out by approved specialist contractors registered to BS EN ISO 9001: 2008 or by suitably trained Hospital staff such as appointed Competent Persons (MGPS). Specialist contractors are required to comply with the Estates Department signing in/out procedures and are required to give sufficient notice (at least one week) to the Coordinating Authorised Person (MGPS) prior to scheduled visits. Appropriate contractors identification as well as the contractors pass issued by the Estates Department must be displayed by the contractors staff at all times. Specialist contractors will receive copies of the NHS Shetland Estates Department's Contractors' Health & Safety Guidance – the contractor will be required to comply with all such guidance and must instruct his staff in the requirements of the relevant documents. In the event that the specialist contractor has to use sub-contract staff, prior permission should be obtained from the Co-ordinating Authorised Person (MGPS). In this case, the specialist contractor must ensure that any sub-contract staff are at least as competent as his own and have received appropriate training and experience. Where the contractor has provided test equipment, calibration certificates should be made available to the Coordinating Authorised Person (MGPS) upon request.

The Co-ordinating Authorised Person (MGPS) will be responsible for monitoring the maintenance work carried out by both the specialist contractor and in-house staff. When requested, the contractor must provide the Co-ordinating Authorised Person (MGPS) with documentary evidence of competence and training of their staff. All planned maintenance activity will be arranged to minimise disruption to the day-to-day running of the Hospital and may involve particular arrangements to ensure continuity of supply and patient safety where required. Where necessary, work will be planned outwith peak times such as evenings and weekends. All maintenance activity will be suitably recorded with the records kept on site – the Co-ordinating Authorised Person (MGPS) will be responsible for collating, updating and filing of all maintenance records relevant to MGPS plant and components.

Reference should be made to the Medical Gases – Maintenance Activity Schedule displayed in Appendix 4 for further information. This schedule is intended to represent a typical maintenance regime for the plant and components installed and should be used as a guide only. Further advice should be sought from the various manufacturer's recommendations and should be assessed against actual plant / component operating experience.

4.8 Statutory Examinations – Pressure Systems Safety Regulations 2000

The Pressure Systems Safety Regulations 2000 are applicable to systems in which the gas pressure exceeds 0.5 bar gauge. All relevant parts of the MGPS will, therefore, be included within a written scheme of examination and be subject to examination at the prescribed intervals by the appointed Competent Person (Pressure Systems). Note - this is not the same person as the Competent Person (MGPS). The Coordinating Authorised Person (MGPS) will receive the reports

produced by the Competent Person (Pressure Systems) and will instigate any actions arising within the timescales specified.

The duties of 'Competent Person (Pressure Systems)' for the relevant parts of the MGPS at the Gilbert Bain Hospital are undertaken by Zurich.

4.9 Cylinder Management

All aspects of cylinder management will follow the guidance contained within Scottish Health Technical Memorandum 2022 – Part 2: Operational Management, which incorporates the guidance given previously in HEI 163 and WKO(85)1. The following arrangements apply for cylinder management at the Gilbert Bain Hospital.

Classification of gas cylinders – Medical and non-medical gas cylinders must never be mixed, either in storage or in use.

Accommodation for medical gas cylinders – Medical gas cylinder stores for medical gases must only contain medical gas cylinders. At the Gilbert Bain Hospital, the medical gas cylinder store is located to the rear of the Hospital adjacent to the medical gases manifold room. The design and construction of all medical gas cylinder stores will meet the requirements of SHTM 2022 in terms of being adequately ventilated, having a suitable floor and hard standing, suitable access for cylinder trolleys to facilitate manual handling of cylinders, clear segregation of full and empty gas cylinders, separate storage areas for different gases, adequate means of securing large cylinders and racking of small cylinders. Stores will also be identified with the correct safety warning signs and notices. Parking is prohibited within the store delivery and storage area, other than for loading and unloading cylinders.

Handling of cylinders – All personnel involved in the handling of cylinders will be trained in correct handling techniques and of the potential hazards which can exist. Protective clothing will be worn by personnel when loading and unloading cylinders as required by the particular risk assessment. Suitable trolleys are provided and must be used for transporting and securing heavy and bulky cylinders whenever they are moved. Care must be taken at all times when handling cylinders which must not be dropped, knocked, used as 'rollers' or be permitted to strike each other violently. All cylinders must be kept free from oil, grease and other debris. Cylinders must not be marked by any means other than a tie-on label to indicate the content state. Manufacturer / supplier labels and markings must not be defaced or removed. Cylinder safety devices, including pressure relief devices, valves and connectors should not be altered or by-passed and no repairs, alterations or modifications to cylinders should be undertaken. Cylinder valves should always be closed after use and when cylinders are empty with keys for this purpose being readily available.

Smoking and naked lights are prohibited in the vicinity of all cylinders.

Transportation of cylinders with equipment attached – The cylinder valve should be closed and any gas contained in the equipment or regulator safely vented to atmosphere before transporting the cylinder **unless** it is essential for a patient being transferred to continue receiving a supply of gas.

Preparation of cylinders for use – The following procedure applies to the preparation of cylinders for use:

- The cylinder label and colour code should be checked to ensure that the correct gas has been supplied;

- Check that the tamper-evident seal is intact and then remove it and any plastic outlet cap – this should be left attached to the valve for re-fitting after use;
- Do not use any lubricants, sealing or joining compounds when connecting cylinders to pressure reducing regulators – the cylinder valve, regulator and associated equipment should always be clean and free from oil, grease and other debris;
- Inspect the cylinder and equipment connection interface and their washers / O-ring seals to ensure they are in good condition – damaged sealing washers and O-ring seals should be replaced.

Preparation of nitrous oxide / oxygen mixture cylinders prior to use – Particular precautions are required for nitrous oxide / oxygen mixture cylinders prior to use as it is possible for the constituent gases to separate where the temperature falls below 0^{o}C. Portable nitrous oxide / oxygen mixture cylinders should be stored at temperatures above 10^{o}C prior to use, however, in the event that nitrous oxide / oxygen mixture cylinders have been stored at temperatures lower than 0^{o}C for long periods prior to use, they should either be inverted at least three times or stored at temperatures above 10^{o}C for 24 hours prior to use. In no circumstances should cylinders be immersed in water prior to use. For G-size cylinders, these should be stored upright within the manifold room at a minimum temperature of 10^{o}C for a period of 24 hours prior to being connected to the manifold.

Connecting cylinders to manifolds - The following procedure applies to the connection of cylinders to manifolds:

- Do not use any lubricants, sealing or jointing compounds between the valve and the manifold connection;
- The manifold tailpipe and connection yoke should be checked to ensure that these are not damaged;
- The seal in the cylinder yoke should be inspected and any other sealing washers – these should be changed if necessary;
- Connect the cylinder to the manifold. **Do not twist or use excessive force on the tailpipe** - depending on the type of valve used, the connection will be made firmly by hand, or correct tool. For bull-nosed and pin-indexed valves the connection should need not be more than hand-tight. Where a handle is attached to the manifold tailpipe, this should be held during tightening to steady the tailpipe and to stop it turning;
- The cylinder valve should be opened slowly to its fullest extent using the correct cylinder key – this should be in an anti-clockwise direction, then turn the valve key back in the clockwise direction for approximately a quarter of a turn;
- Check that the joint between the cylinder and equipment tailpipe does not leak – this can usually be heard. Check also that there are no leaks from between the valve spindle and the gland nut. A proprietary leak detection fluid may be used to establish the presence and position of a leak – the leak detection fluid should then be wiped off with a clean damp cloth after use. If the leak is between the spindle and gland nut, the gland nut should be tightened just enough to stop the leak;
- Ensure that all cylinders in the exhausted bank are changed at the same time and that all cylinder valves are left in the open position;
- Check that the contents gauge on the manifold panel is reading **FULL** or the respective full cylinder pressure;
- Record the cylinder changes and gauge readings in the manifold log book, which should be kept within the manifold room.

A daily log sheet is provided within each manifold room for the Portering staff to record cylinder details – this is done on a twice daily basis.

Connecting cylinders to other equipment – The procedure for connecting cylinders to equipment is essentially the same as connecting to a manifold except that, instead of connecting to a manifold tailpipe, the equipment will be connected to the cylinder via a pressure regulator, high pressure flexible hose and cylinder yoke. The following procedure will generally apply once cylinders have been prepared for use as previously detailed:

- The sealing washer at the valve / connector interface should be checked prior to connection;
- Connect the cylinder to the equipment and tighten firmly by hand or with the correct tool. **Do not use excessive force;**
- Check that the equipment flow control valves are turned off and for two-stage regulators, turn the outlet pressure control to off (usually fully anti-clockwise);
- The cylinder valve should be opened slowly using the correct key, fully anti-clockwise and then back a quarter of a turn;
- Check for leaks;
- Adjust the pressure regulator to the correct setting and open the equipment flow control valve slowly, checking for correct equipment operation.

Preparation of empty cylinders for return to store – Before returning an empty cylinder to the store, the cylinder valve should be closed and any equipment connected, should be detached – this may be done after closing the cylinder valve by opening the flow control mounted on the equipment and venting trapped gas off. The equipment may now be detached safely. Any cylinder valve protective caps should now be refitted and a label identifying the cylinders as empty should be attached.

Reporting defective cylinders – defective cylinders are classified as being either 'Faulty' where the fault may be a damaged valve outlet or minor leaks from the valve, or 'Incident' where the cylinder is incorrectly labelled, contaminated or has a serious cylinder valve leak.

A defective cylinder label must be completed giving the following information: Hospital, name of the Authorised Person (MGPS), batch number, filling date, expiry date, cylinder size code and gas for each affected cylinder as well as a description of the fault.

The defective cylinder(s) must be stored away from all other cylinders and have a defective cylinder label attached. **Note: the defective cylinder must be identified by a label and not by writing with chalk or crayon on the cylinder body.**

Cylinder stock control – Stock control is the responsibility of the Pharmacy Department and is required to maintain cylinder numbers to the minimum required since these usually attract a rental charge (even when empty) until they have been returned to the supplier. Effective procedures will be in place for:

- **Receipt of cylinders into stock** - this will include checking for the product identity label and batch label, checking that the cylinder is generally in good condition and can be identified by the colour code. Finally that the tamper evident seal is in place over the valve seal and is intact.

- **Requisitioning cylinders from the store** – the following information will be recorded: the name of the gas, cylinder size, date of issue, expiry date, number of cylinders issued and the ward / department / recipient.

- **Returning cylinders to the main store** – empty cylinders will be clearly identified with a label recording the same information as when requisitioned on their return back to the store.

4.10 Medical Equipment Purchase

The Coordinating Authorised Person (MGPS) must be consulted prior to the purchase of any medical equipment which will be connected to the Hospital's MGPS to ensure that the particular system to which the equipment will be connected (Oxygen, Medical air etc.) has sufficient capacity and can deliver the required flow rate at the specified pressure.

4.11 Emergency Call-Out Arrangements

Outwith normal working hours, the on call estates person will be contacted through the Estates Departments' on-call function. After an initial assessment, the Authorised Person (MGPS) should be contacted who will be required to assess the particular situation and arrange for either the Competent Person (MGPS) or specialist contractor to attend site for any required remedial works to be carried out. Contact with the specialist contractor will only be made by the Authorised Person (MGPS). In the event that the particular problem will cause a department to be taken out of use for a prolonged period or will require cancellation of patient lists etc., the Authorised Person (MGPS) will notify the relevant Head of Department at the earliest possible opportunity.

4.12 Hazard / Safety Action Notices

Scottish Healthcare Supplies may occasionally issue a Hazard / Safety Action Notice to the NHS in Scotland. Where this affects a particular practice or type of plant or component in use at the Gilbert Bain Hospital, the Coordinating Authorised Person (MGPS) will assess the implications and possible actions required. Further advice on the content of the Notice should be obtained from the Authorising Engineer (MGPS).

4.13 Dental Air and Vacuum Systems

The Authorised Person (MGPS) will have the day-to-day responsibility for the dental air and vacuum systems (DAVS) installed for Dental Surgeries 1 and 2. Any work on the DAVS will be subject to the MGPS permit-to-work procedure to protect the MGPS from inadvertent interruption.

5.0 Activation of Area and Central Alarms

Area and central medical gas alarms provide both visual and audible indication and are required for all medical gas and vacuum systems.

5.1 Area Alarms

Area alarms are normally situated at staffed areas within those Wards and Departments with medical gases / vacuum provision. They provide staff with a 'local' alarm which announces either high or low pressure for the stated gas service and low vacuum within that ward / department. Note: they do not provide any warning for cylinder replenishment or plant function. The action to be taken by ward / department staff in the event of a high or low pressure alarm occurring is detailed in Section 6.3 of this Operational Policy.

At the Gilbert Bain Hospital, area alarms are located at the following wards / departments:

Ward / Department	Location	Manufacturer / Model
Pharmacy	Pharmacy corridor (vacuum only)	Mimplex
Medical Physics workshop (old)	At AVSUs (panel disconnected)	Mimplex
Day Surgery Recovery (6-bed)	Nurse Station	Medaes Medipoint 26
Theatre Recovery (4-bed)	Nurse Station	Medaes Medipoint 26
Theatre 1	Theatre Corridor (at AVSUs)	Medaes Medipoint 26
Theatre 2	Theatre Corridor (at AVSUs)	Medaes Medipoint 26
CT Scanner Suite	Control Room	Medaes Medipoint 26
Out-Patients Department	Reception Desk	Medaes Medipoint 26
Dental Surgery 1	Surgery	Medaes Medipoint 26
Ward 1	Nurse Station	Shire SA6/12
Ronas Ward	Nurse Station	Medaes Medipoint 26
Maternity - Ward	Nurse Station	Medaes Medipoint 26
Maternity – Delivery Rooms	Lobby (between Birthing Rooms)	Medaes Medipoint 26
Ward 3	Nurse Station	Medaes Medipoint 26

5.2 Central Alarms

Central or plant alarms are generally for the attention of Estates Technical and Portering staff and have three broad functions:

- To indicate normal function of the plant;
- To warn that routine replacement of cylinders on a manifold installation is required;
- To advise of plant failure requiring engineering action.

At the Gilbert Bain Hospital, central alarms are located at the following locations:

Location	Manufacturer / Model
Plantroom – Lower ground floor	Medaes Medipoint 125
Porter's Office – at door to office	Medaes Medipoint 125
Medical gases manifold room	Medaes Medipoint 125
Reception at Main Entrance	Medaes Medipoint 125 (2 off)

A summary of the alarm conditions and actions to be taken for those medical gas systems present at the Gilbert Bain Hospital, is provided as follows:

Oxygen manifold	Legend / Alarm Condition	Action to be Taken
1st. Stage Alarm	**'Change cylinders'**: Duty bank empty, standby bank running.	Receptionist to advise Portering staff who will replace cylinder bank, check for any leakage as per procedure and verify clearance of alarm.
2nd. Stage Alarm	**'Change cylinders immediately'**: Standby bank below 10% capacity.	Receptionist to advise Portering staff who will ensure that an adequate number of cylinders are available and to check the capacity of the reserve manifold. Authorised Person (MGPS) to investigate.
3rd. Stage Alarm	**'Reserve Low'**: Reserve < 68 bar.	Receptionist to advise the on-call Estates Person (MGPS) who will check contents of reserve manifold bank and change cylinders to maintain continuity of supply. Supply will require to be continually monitored at this stage.
4th. Stage Alarm	**'Pressure Fault'**: Pipeline pressure has risen / fallen 20% from normal working pressure.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS) who will liaise with the specialist contractor if necessary.

Nitrous oxide manifold	Legend / Alarm Condition	Action to be Taken
1st. Stage Alarm	**'Change cylinders'**: Duty bank empty, standby bank running.	Receptionist to advise Portering staff who will replace cylinder bank, check for any leakage as per procedure and verify clearance of alarm.
2nd. Stage Alarm	**'Change cylinders immediately'**: Standby bank low < 14 bar.	Receptionist to advise Portering staff who will ensure that an adequate number of cylinders are available and to check the capacity of the reserve manifold. Authorised Person (MGPS) to investigate.
3rd. Stage Alarm	**'Reserve Low'**: Reserve < 14 bar.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS) who will check contents of reserve manifold bank and change cylinders to maintain continuity of supply. Supply will require to be continually monitored at this stage.
4th. Stage Alarm	**'Pressure Fault'**: Pipeline pressure has risen / fallen 20% from normal	Receptionist to advise the on-call Estates Officer / Authorised Person

	working pressure.	(MGPS) who will liaise with the specialist contractor if necessary.

Entonox manifold	Legend / Alarm Condition	Action to be Taken
1st. Stage Alarm	**'Change cylinders'**: Duty bank empty, standby bank running.	Receptionist to advise Portering staff who will replace cylinder bank, check for any leakage as per procedure and verify clearance of alarm.
2nd. Stage Alarm	**'Change cylinders immediately'**: Standby bank below 10% capacity.	Receptionist to advise Portering staff who will ensure that an adequate number of cylinders are available and to check the capacity of the reserve manifold. Authorised Person (MGPS) to investigate.
3rd. Stage Alarm	**'Reserve Low'**: Reserve < 68 bar.	Receptionist to advise the on-call Estates Person (MGPS) who will check contents of reserve manifold bank and change cylinders to maintain continuity of supply. Supply will require to be continually monitored at this stage.
4th. Stage Alarm	**'Pressure Fault'**: Pipeline pressure has risen / fallen 20% from normal working pressure.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS) who will liaise with the specialist contractor if necessary.

Surgical / medical air manifold	Legend / Alarm Condition	Action to be Taken
1st. Stage Alarm	**'Change cylinders'**: Duty bank empty, standby bank running.	Receptionist to advise Portering staff who will replace cylinder bank, check for any leakage as per procedure and verify clearance of alarm. Receptionist to advise the on-call Estates Person (MGPS) who will investigate the condition of the compressed air plant.
2nd. Stage Alarm	**'Change cylinders immediately'**: Standby bank below 10% capacity.	Receptionist to advise Portering staff who will ensure that an adequate number of cylinders are available and to check the capacity of the reserve manifold. Authorised Person (MGPS) to investigate.
3rd. Stage Alarm	**'Reserve Low'**: Reserve < 68 bar.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS) who will check contents of reserve manifold bank and change cylinders to maintain continuity of supply. Supply will require to be

		continually monitored at this stage.
4th. Stage Alarm	**'Pressure Fault'**: Pipeline pressure has risen / fallen 20% from normal working pressure.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS) who will liaise with the specialist contractor if necessary.
Medical air plant	**Legend / Alarm Condition**	**Action to be Taken**
1st. Stage Alarm	**'Plant Fault'**: Various fault conditions generated by plant including compressor and dryer faults	Receptionist to advise the on-call Estates Person (MGPS) who will investigate and bring compressor / dryer back on line if possible – if not possible, check to ensure standby compressor / dryer are operational.
2nd. Stage Alarm	**'Plant Emergency'**: High moisture content or receiver pressure outwith stated limits.	Receptionist to advise the on-call Person (MGPS) who will investigate and liaise with the specialist contractor if necessary. The condition and contents of the air manifold should also be verified at this stage.
3rd. Stage Alarm	**'Reserve Low' Alarm condition is not active – this is covered by the Air manifold panel.**	
4th. Stage Alarm	**'Pressure Fault'**: Pipeline pressure has risen / fallen 20% from normal working pressure.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS) who will investigate and liaise with the specialist contractor if necessary. Check that the air manifold comes on line as required.

Vacuum plant	**Legend / Alarm Condition**	**Action to be Taken**
1st. Stage Alarm	**'Plant Fault'**: Various fault conditions generated by plant including pumps and other safety devices.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS) who will investigate plant fault and bring pump back on-line if possible. Check to ensure other pumps are available.
2nd. Stage Alarm	**'Plant Emergency'**: Receiver vacuum has fallen by 50mm Hg below pump cut-in setting.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS) who will investigate – if unable to reinstate normal supply and rectify fault, the use of portable suction devices to be implemented. Authorised Person (MGPS) to contact specialist contractor if necessary.
3rd. Stage Alarm	**'Pressure Fault'**: Pipeline vacuum < 360 mmHg.	Receptionist to advise the on-call Estates Officer / Authorised Person (MGPS). Authorised Person (MGPS) to advise that pipeline

		vacuum will not be available and to distribute portable suction devices to essential areas in conjunction with Medical Physics and Nursing management.

6.0 Emergency Procedures

6.1 Major Gas Leak within Ward / Department

In the event of a major medical gas leak within a particular Ward / Department, the senior medical / nursing staff within that department should attempt to identify which gas is leaking if possible i.e. if leakage is directly from a terminal unit. Prompt action is required to ensure that any patient, who may be dependent on this particular gas, is provided with the same gas from a portable cylinder. After ensuring that there are no patients now dependant on the piped gas supply, the supply to the Ward / Department should now be isolated at the specific Area Valve Service Unit (AVSU) serving this area – these are generally located at the entrance to wards / departments or adjacent to the staff base with each valve clearly marked with the gas identity. This decision must only be made by senior medical / nursing staff. The gas supply can be isolated by breaking the glass or plastic panel on the valve box and turning the valve handle through 90^{o} to the vertical position. **Note: Breaking this panel will not result in injury to the operator.** On valves more recently installed, this may be by means of pulling a ring on a plastic panel to remove the same and provide access to the valve. The Ward / Department Manager should then contact the Authorised Person (MGPS) through the Estates Department or via the Hospital's on-call arrangements.

In the event that there is more than one gas supplied to the Ward / Department i.e. Oxygen, Nitrous oxide, Medical air, Surgical air and the source of the leak cannot readily be determined, each AVSU serving the area should in turn be closed off, again ensuring that any patients who may be dependent on the supply are provided for via a portable cylinder. The Authorised Person (MGPS) should again be contacted as a matter of urgency. Under the guidance of the Authorised Person (MGPS), as specific AVSUs are closed and this has no effect on reducing the leak then it may be possible to reinstate this service until the particular system is identified.

For any gas leakage, other than medical air and surgical air, the concentration of gas should be lowered within the Ward / Department in question by opening windows and doors where possible and smoking strictly prohibited.

The investigation into the cause of the leakage and the implementation of remedial measures will be co-ordinated by the Authorised Person (MGPS).

Note: Routine and non-urgent isolation of medical gases and vacuum at the AVSU must only be carried out by the Authorised Person (MGPS) in strict accordance with the Permit-to-Work procedure.

6.2 Isolation of Gases in the event of Fire

In the event of fire within a particular Ward / Department, the gas supply or supplies should be isolated at the Area Valve Service Units (AVSU) serving this area – procedure as detailed within section 6.1. This should only be performed by senior medical / nursing staff once patients have been evacuated from this area. Where vacuum services are present, there is no need to isolate this at the AVSU. The Authorised Person (MGPS) must be informed at the earliest opportunity once a gas supply has been isolated in an emergency situation.

6.3 High / Low Pressure on Ward / Department Area Alarm

In the event of either a High or Low pressure alarm on any gas service or Low Vacuum alarm being displayed on an area alarm panel within a Ward / Department, the Authorised Person (MGPS) must be informed immediately. Ward / Department staff should assess if patients are dependent on the gas under the alarm condition and arrange for such patients to receive the

same gas direct from a portable cylinder. Portable suction pumps should be provided if required in the event of a Low Vacuum alarm occurring. Further advice should be sought from the Authorised Person (MGPS) who will confirm when the systems have been returned to normal operation.

6.4 Failure / Interruption to the Hospital Electrical Supply

Medical gases plant and equipment will be supplied from the emergency generator in the event of interruption to the mains electricity supply. Should the emergency generator system fail for any reason, medical gases will continue to be available for a period of time as systems are designed for this event. Vacuum services will only be available for a short period of time following complete power failure until the level of vacuum stored within the receiver is used up. Medical air will continue to be provided via the cylinder manifold system, with the Authorised Person (MGPS) required to monitor and arrange to replace cylinders as required. Area and central alarms have an internal battery which will allow the alarm panel to continue to function for a limited period of time (typically 4 hours). In the extremely unlikely event that all electrical power is lost, the senior medical / nursing staff should liaise with the Estates Department as to ongoing contingency arrangements.

6.5 Contamination of Gas Supply

In the unlikely event that any of the gas services are, or are suspected to be contaminated, the instructions of the Authorised Person (MGPS) must be followed – this may result in certain gas services being unavailable. Such an occurrence is likely to be a Hospital wide issue and will be urgently addressed by the Authorised Person (MGPS) in conjunction with the Quality Controller (QC). Re-use of the particular gas service in question must not commence until the Authorised Person (MGPS) has confirmed that it is safe to do so. The Authorised Person (MGPS) will also liaise with Ward / Department staff to provide temporary supplies where this is required.

6.6 Contamination of Vacuum Pipelines / Services

In the event that a suction jar / vacuum regulator overflows and contaminated fluids are drawn into the vacuum pipeline, the Authorised Person (MGPS) must be advised at the earliest opportunity. In conjunction with the Infection Control staff, the Authorised Person (MGPS) will initiate the procedure for cleaning decontaminated vacuum systems as detailed within the Operational Management volume of SHTM 2022: 'Medical gas pipeline systems'. This will be subject to the permit-to-work procedure and the Authorised Person (MGPS) will advise all affected Wards / Departments when the system is ready to be taken back into use. In the event that the bacterial filter / flask(s) on the vacuum plant become contaminated, these must be treated and disposed off as clinical waste in accordance with the Hospital's Clinical Waste Policy and Procedures. Personal protective equipment (PPE) as determined by risk assessment must worn by operatives during this procedure. For such work, the additional permit for changing bacteria filters must be utilised by the Authorised Person who will adopt the general procedure outlined within Appendix D of HTM 02-01 Part B.

6.7 Application of the Emergency Kits for Medical Gas Provision

A total of six Emergency kits for Oxygen and two for Medical air are stored within the Estates Department for emergency use or for facilitating the ongoing provision of supplies during planned shut-downs. The deployment of the kits will be determined only by the Authorised Person (MGPS)

and will generally be connected to the downstream NIST connector of the relevant AVSU. The emergency kits should be checked over annually for correct functioning.

7.0 Communication – Contact Details

Chief Executive / Executive Manager	Ralph Roberts	*Tel. Number*
Head of Estates	John McBeath	01595 743029
Maintenance Manager	Graham Malcolmson	01595 743684 07824 527656
Co-ordinating Authorised Person (MGPS)	Lawson Bisset	01595 743002 07919 306228 Mobile
Authorised Person (MGPS)	Mark Ward	01595 *743028*
	Scott Arthur	01595 743308 07881 841896 Mobile
Competent Persons (MGPS)	Sandy Fraser	01595 743028
Quality Controller (QC)	Vivienne MacLeod, NHS Grampian	01224 553222
Authorising Engineer (MGPS)	Graeme Dunn, Atkins	0141 220 2078 07979 964066 Mobile
Specialist Contractor	Medaes - Ronnie Higgins - Ian Emslie	0191 417 3394 07977 585825 Mobile 07917 628531 Mobile
Competent Person (Pressure Systems)	Zurich – Iain Gourlay	07801 135829
Portering Department	Lindsay Sangster	01595 74 3132
Pharmacy Department	Chris Nicolson	01595 74 3372
Control of Infection	Tina Bokor Ingram	01595 74 3693
Nominated officer Fire	Lawson Bisset	Tel. Number
Linde (Gas Cylinders)	To be advised	01595 74 3029
Designated Medical / Nursing Officers	Janice McMahon Kathleen Carolan	01595 74 3020 01595 74 3188

8.0 Distribution

This document will be available for reference through the NHS Shetland intranet.

Appendix 1: Medical Gases – Schematic Drawings

The following record drawings have been produced and are considered to be reflective of the MGPS as installed at the Hospital as at September 2010. The drawings are considered to be generally accurate, however, due to the absence of previous record drawings and the inability to fully survey the systems in their entirety, it is suggested that individual areas are subject to visual inspection and / or engineering testing where appropriate prior to carrying out individual isolations.

Drawing No.	Rev.	Date	Title
M_L_54_0001	A	September 2010	NHS Shetland: Gilbert Bain Hospital Oxygen: Schematic Diagram
M_L_54_0002	A	September 2010	NHS Shetland: Gilbert Bain Hospital Nitrous oxide: Schematic Diagram
M_L_54_0003	A	September 2010	NHS Shetland: Gilbert Bain Hospital Nitrous oxide / Oxygen mixture: Schematic Diagram
M_L_54_0004	A	September 2010	NHS Shetland: Gilbert Bain Hospital Medical air: Schematic Diagram
M_L_54_0005	A	September 2010	NHS Shetland: Gilbert Bain Hospital Surgical air: Schematic Diagram
M_L_54_0006	A	September 2010	NHS Shetland: Gilbert Bain Hospital Medical Vacuum: Schematic Diagram
M_L_54_0007	A	September 2010	NHS Shetland: Gilbert Bain Hospital AGSS: Schematic Diagram

Appendix 2: Medical Gases – AVSU and Line Valve Register

Gas Service	Valve Type / Number	Location	Area Served	Valve Key Number
Oxygen	AVSU/01	First Floor – within Ward 1 entrance.	Ward 1.	1
Vacuum	AVSU/02	First Floor – within Ward 1 entrance.	Ward 1.	2
Oxygen	AVSU/03	Second Floor – opposite Nurses Station.	Ronas Ward.	3
Vacuum	AVSU/04	Second Floor – opposite Nurses Station.	Ronas Ward.	4
Oxygen	AVSU/05	Second Floor – within Ward 3 entrance.	Ward 3.	5
Vacuum	AVSU/06	Second Floor – within Ward 3 entrance.	Ward 3.	6
Oxygen	AVSU/07	First Floor – within Maternity entrance.	Maternity (all areas) and Renal Dialysis.	7
Vacuum	AVSU/08	First Floor – within Maternity entrance.	Maternity (all areas) and Renal Dialysis.	8
Entonox	AVSU/09	First Floor – within Maternity entrance.	Maternity – Delivery Rooms 1 and 2.	9
Nitrous oxide	AVSU/10	First Floor – within Maternity entrance.	Pipeline is cut and capped within ceiling space above AVSU.	10
Oxygen	AVSU/11	Ground Floor – A&E Department.	A&E including Radiology Rooms 1 and 2.	11
Vacuum	AVSU/12	Ground Floor – A&E Department.	A&E including Radiology Room 2.	12
Nitrous oxide	AVSU/13	Ground Floor – A&E Department.	A&E.	13
Oxygen	AVSU/14	Ground Floor – Radiology Corridor.	Isolating / Fire valve for entire Hospital.	14
Entonox	AVSU/15	Ground Floor – Radiology Corridor	Isolating / Fire valve for entire Hospital.	15
Nitrous oxide	AVSU/16	Ground Floor – Radiology Corridor.	Isolating / Fire valve for entire Hospital.	16
Oxygen	AVSU/17	Ground Floor – outside CT Scanner Suite.	CT Scanner Room and Patient Preparation.	17
Vacuum	AVSU/18	Ground Floor – outside CT Scanner Suite.	CT Scanner Room and Patient Preparation.	18
Nitrous oxide	AVSU/19	Ground Floor – outside CT Scanner Suite.	CT Scanner Room.	19
Medical air	AVSU/20	Ground Floor – outside CT Scanner Suite.	CT Scanner Room.	20
			Door Access Key for Medaes Alarm Panels.	21
Oxygen	AVSU/22	Ground Floor – Theatre Department valve.	Theatres 1 and 2; 6-Bed Recovery (Day Surgery) and Theatre Recovery.	22

Gas Service	Valve Type / Number	Location	Area Served	Valve Key Number
Vacuum	AVSU/23	Ground Floor – Theatre Department valve.	Theatres 1 and 2; 6-Bed Recovery (Day Surgery) and Theatre Recovery.	23
Nitrous oxide	AVSU/24	Ground Floor – Theatre Department valve.	Theatres 1 and 2; 6-Bed Recovery (Day Surgery) AVSUs (capped).	24
Medical air	AVSU/25	Ground Floor – Theatre Department valve.	Theatres 1 and 2; 6-Bed Recovery (Day Surgery) and Theatre Recovery.	25
Surgical air	AVSU/26	Ground Floor – Theatre Department valve.	Theatres 1 and 2	26
Oxygen	AVSU/27	Ground Floor – (LHS) at entrance to the 6-Bed Recovery (Day Surgery).	Isolates oxygen to the two bed spaces on the left hand side upon entry i.e. backing on to the main Hospital corridor.	27
Vacuum	AVSU/28	Ground Floor – (LHS) at entrance to the 6-Bed Recovery (Day Surgery).	Isolates vacuum to the two bed spaces on the left hand side upon entry i.e. backing on to the main Hospital corridor.	28
Nitrous oxide	AVSU/29	Ground Floor – (LHS) at entrance to the 6-Bed Recovery (Day Surgery).	Downstream pipeline has been cut and capped.	29
Medical air	AVSU/30	Ground Floor – (LHS) at entrance to the 6-Bed Recovery (Day Surgery).	Isolates medical air to the two bed spaces on the left hand side upon entry i.e. backing on to the main Hospital corridor.	30
Oxygen	AVSU/31	Ground Floor – (RHS) at entrance to the 6-Bed Recovery (Day Surgery).	Isolates oxygen to the four bed spaces on the right hand side upon entry.	31
Vacuum	AVSU/32	Ground Floor – (RHS) at entrance to the 6-Bed Recovery (Day Surgery).	Isolates vacuum to the four bed spaces on the right hand side upon entry.	32
Nitrous oxide	AVSU/33	Ground Floor – (RHS) at entrance to the 6-Bed Recovery (Day Surgery).	Downstream pipeline has been cut and capped.	33
Medical air	AVSU/34	Ground Floor – (RHS) at entrance to the 6-Bed Recovery (Day Surgery).	Isolates medical air to the four bed spaces on the right hand side upon entry.	34
Oxygen	AVSU/35	Ground Floor – at entrance to Theatre 1.	Theatre 1 including the anaesthetic room.	35

Gas Service	Valve Type / Number	Location	Area Served	Valve Key Number
Vacuum	AVSU/36	Ground Floor – at entrance to Theatre 1.	Theatre 1 including the anaesthetic room.	36
Nitrous oxide	AVSU/37	Ground Floor – at entrance to Theatre 1.	Theatre 1 including the anaesthetic room.	37
Medical air	AVSU/38	Ground Floor – at entrance to Theatre 1.	Theatre 1 including the anaesthetic room.	38
Surgical air	AVSU/39	Ground Floor – at entrance to Theatre 1.	Theatre 1.	39
Oxygen	AVSU/40	Ground Floor – at entrance to Theatre 2.	Theatre 2 including the anaesthetic room.	40
Vacuum	AVSU/41	Ground Floor – at entrance to Theatre 2.	Theatre 2 including the anaesthetic room.	41
Nitrous oxide	AVSU/42	Ground Floor – at entrance to Theatre 2.	Theatre 2 including the anaesthetic room.	42
Medical air	AVSU/43	Ground Floor – at entrance to Theatre 2.	Theatre 2 including the anaesthetic room.	43
Surgical air	AVSU/44	Ground Floor – at entrance to Theatre 2.	Theatre 2.	44
Oxygen	AVSU/45	Ground Floor – at entrance to ‘old’ Medical Physics Workshop.	Pipeline is cut and capped within ceiling space above AVSU. Served ‘old’ workshop.	45
Vacuum	AVSU/46	Ground Floor – at entrance to ‘old’ Medical Physics Workshop.	Pipeline is cut and capped within ceiling space above AVSU. Served ‘old’ workshop.	46
Nitrous oxide	AVSU/47	Ground Floor – at entrance to ‘old’ Medical Physics Workshop.	Pipeline is cut and capped within ceiling space above AVSU. Served ‘old’ workshop.	47
Medical air	AVSU/48	Ground Floor – at entrance to ‘old’ Medical Physics Workshop.	Pipeline is cut and capped within ceiling space above AVSU. Served ‘old’ workshop.	48
Surgical air	AVSU/49	Ground Floor – at entrance to ‘old’ Medical Physics Workshop.	Pipeline is cut and capped within ceiling space above AVSU. Served ‘old’ workshop.	49
Surgical air	AVSU/50	Ground Floor – CDU Dirty Returns Area.	Isolates surgical air to the single outlet within the CDU dirty Returns Area.	50
Oxygen	AVSU/51	Ground Floor – Dental Waiting Area.	Dental Surgery 1 and OPD.	51
Vacuum	AVSU/52	Ground Floor – Dental Waiting Area.	OPD.	52
Oxygen	AVSU/53	Ground Floor - (LHS) at entrance to Theatre Recovery.	Isolates oxygen to the three outlets on the left hand side upon entry.	53
Vacuum	AVSU/54	Ground Floor - (LHS) at	Isolates vacuum to the three	54

Gas Service	Valve Type / Number	Location	Area Served	Valve Key Number
		entrance to Theatre Recovery.	outlets on the left hand side upon entry.	
Medical air	AVSU/55	Ground Floor – (LHS) at entrance to Theatre Recovery.	Isolates medical air to the three outlets on the left hand side upon entry.	55
Oxygen	AVSU/56	Ground Floor - (RHS) at entrance to Theatre Recovery.	Isolates oxygen to the two outlets on the right hand side upon entry.	56
Vacuum	AVSU/57	Ground Floor - (RHS) at entrance to Theatre Recovery.	Isolates vacuum to the two outlets on the right hand side upon entry.	57
Medical air	AVSU/58	Ground Floor – (RHS) at entrance to Theatre Recovery.	Isolates medical air to the two outlets on the right hand side upon entry.	58
Oxygen	AVSU/59	Lower Ground Floor – at entrance to Department.	Medical Physics.	59
Vacuum	AVSU/60	Lower Ground Floor – at entrance to Department.	Medical Physics.	60
Nitrous oxide	AVSU/61	Lower Ground Floor – at entrance to Department.	Medical Physics.	61
Medical air	AVSU/62	Lower Ground Floor – at entrance to Department.	Medical Physics.	62
Nitrous oxide	AVSU/63	Ground Floor – Dental Waiting Area.	Dental Surgery 1.	63
Vacuum	AVSU/64	Lower Ground Floor – Pharmacy Corridor.	Pipeline possibly cut and capped – no evidence of a vacuum outlet within Pharmacy.	64
Oxygen	LV/101	Ground Floor. Plantroom directly opposite Hospital Reception.	Line Valve isolates oxygen to Dental Surgery 1, OPD, A&E incl. Radiology Rooms 1 and 2; Maternity, Renal Dialysis and Ward 3.	101
Nitrous oxide	LV/102	Ground Floor. Plantroom directly opposite Hospital Reception.	Line Valve isolates nitrous oxide to Dental Surgery 1, A&E and Maternity AVSU.	102
Entonox	LV/103	Ground Floor. Plantroom directly opposite Hospital Reception.	Line Valve isolates entonox to Maternity.	103
Vacuum	LV/104	Ground Floor. Plantroom directly opposite Hospital Reception.	Line Valve isolates vacuum to OPD, A&E incl. Radiology Room 2; Maternity, Renal Dialysis and Ward 3.	104
Oxygen	LV/105	Ground Floor - Ceiling space above dental	Line Valve isolates oxygen to Dental Surgery 1 and OPD.	105

Gas Service	Valve Type / Number	Location	Area Served	Valve Key Number
		waiting area.		
Nitrous oxide	LV/106	Ground Floor - Ceiling space above dental waiting area.	Line Valve isolates nitrous oxide to Dental Surgery 1	106
Vacuum	LV/107	Ground Floor - Ceiling space above dental waiting area / Hospital corridor.	Line Valve isolates vacuum to OPD.	107
Oxygen	LVA/108	First Floor Maternity – above ceiling space within Scanner Room	Line Valve isolates oxygen to Delivery Rooms 1 and 2; Resus. and Admissions Room.	108
Vacuum	LV/109	First Floor Maternity – above ceiling space within Scanner Room	Line Valve isolates vacuum to Delivery Rooms 1 and 2; Resus. and Admissions Room.	109
Oxygen	LV/110	Second Floor – above ceiling space within Day Room.	Line Valve isolates oxygen to Ward 3.	110
Vacuum	LV/111	Second Floor – above ceiling space within Day Room.	Line Valve isolates vacuum to Ward 3.	111
Oxygen	LV/112	Ground Floor – ceiling space within Theatre Dept. entrance and adjacent to the 6-Bed Recovery entrance.	Line Valve isolates oxygen to the 6-Bed Recovery (Day Surgery).	112
Nitrous oxide	LV/113	Ground Floor – ceiling space within Theatre Dept. entrance and adjacent to the 6-Bed Recovery entrance.	Line Valve isolates nitrous oxide to the 6-Bed Recovery (Day Surgery) AVSUs (capped).	113
Medical air	LV/114	Ground Floor – ceiling space within Theatre Dept. entrance and adjacent to the 6-Bed Recovery entrance.	Line Valve isolates medical air to the 6-Bed Recovery (Day Surgery).	114
Vacuum	LV/115	Ground Floor – ceiling space within Theatre Dept. entrance and adjacent to the 6-Bed Recovery entrance.	Line Valve isolates vacuum to the 6-Bed Recovery (Day Surgery).	115
Oxygen	LV/116	Ground Floor – ceiling space opposite entrance to Theatre 2.	Line Valve isolates oxygen to Theatre Recovery.	116
Medical air	LV/117	Ground Floor – ceiling space opposite entrance to Theatre 2.	Line Valve isolates medical air to Theatre Recovery.	117
Vacuum	LV/118	Ground Floor – ceiling	Line Valve isolates vacuum	118

Gas Service	Valve Type / Number	Location	Area Served	Valve Key Number
		space opposite entrance to Theatre 2.	to Theatre Recovery.	
Oxygen	LV/119	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Line Valve isolates oxygen to Medical Physics (new and old), Ward 1 and Ronas Ward.	119
Oxygen	LV/120	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Old B9 type valve – isolates oxygen to Medical Physics (new and old).	120
Nitrous oxide	LV/121	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Line Valve isolates nitrous oxide to Medical Physics (new and old).	121
Nitrous oxide	LV/122	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Old B9 type valve – isolates nitrous oxide to Medical Physics (new and old).	122
Medical air	LV/123	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Line Valve isolates medical air to Medical Physics (new and old).	123
Surgical air	LV/124	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Line Valve isolates surgical air to 'old' Medical Physics.	124
Vacuum	LV/125	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Isolates vacuum on riser to Wards 1 and 2.	125
Vacuum	LV/126	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Valve is located on a redundant section of vacuum pipeline which runs to the riser at Ward 1 where the pipeline has been capped.	126
Vacuum	LV/127	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Line Valve isolates vacuum to Medical Physics (new and old).	127
Vacuum	LV/128	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Line Valve isolates vacuum to all areas other than Medical Physics (new and old), Ward 1 and Ronas Ward.	128
AGSS	LV/129	Lower Ground Floor – undercroft accessed via Pharmacy corridor.	Line Valve isolates AGSS to Medical Physics (new and old).	129
Oxygen	LV/130	Lower Ground Floor – above ceiling space within Pharmacy corridor.	Isolates oxygen to 'new' Medical Physics Workshop.	130
Nitrous oxide	LV/131	Lower Ground Floor – above ceiling space within Pharmacy	Isolates nitrous oxide to 'new' Medical Physics Workshop.	131

Gas Service	Valve Type / Number	Location	Area Served	Valve Key Number
		corridor.		
Medical air	LV/132	Lower Ground Floor – above ceiling space within Pharmacy corridor.	Isolates medical air to 'new' Medical Physics Workshop.	132
Vacuum	LV/133	Lower Ground Floor – above ceiling space within Pharmacy corridor.	Isolates vacuum to 'new' Medical Physics Workshop.	133
AGSS	LV/134	Lower Ground Floor – above ceiling space within Pharmacy corridor.	Isolates AGSS to 'new' Medical Physics Workshop.	134
Oxygen	LV/135	Second Floor – above ceiling space opposite Nurses Station.	Line Valve isolates oxygen to Ronas Ward.	135
Vacuum	LV/136	Second Floor – above ceiling space opposite Nurses Station.	Line Valve isolates vacuum to Ronas Ward.	136
Oxygen	LV/137	Manifold Room.	For future use – possible connection to oxygen concentrator system.	137
Surgical air	LV/138	Lower Ground Floor – RO Plantroom.	Isolates distribution pipeline from the air plant. Note: this is not the original plant isolating valve.	138
Surgical air	LV/139	Lower Ground Floor – RO Plantroom.	Isolates surgical air to the CDU – Dirty Returns Area.	139
Surgical air	LVA/140	Lower Ground Floor – RO Plantroom.	Isolates the supply from the air manifold.	140
Surgical air	LVA/141	Ground Floor – above ceiling space at main entrance to Theatre / Hospital corridor.	Spare valve for possible future use.	141

Note: Line valves installed within the manifold room as part of the cylinder manifold installations and on the air and vacuum plants have been excluded from this register. These valves will not require to be padlocked as they are located within a locked plantroom / manifold room with restricted access.

Abbreviations:
AVSU – Area valve service unit.
LV – Line Valve.
LVA – Line valve assembly (complete with NISTs).

Valve Coding:
The following valve coding system has been applied:

The AVSU / LV / LVA number will be the same as the actual key number for that valve. The corresponding valve number will be displayed on the respective schematic drawing and will be displayed at or adjacent to the actual valve itself either by an identification label or key type tag.

AVSUs will be numbered in the range 1 – 99.
LVs and LVAs will be numbered in the range 101 - 199

Appendix 3: Medical Gases – Terminal Unit Schedule

Room / Dept. / Ward	O_2	N_2O	Ent	MA4	SA7	Vac	AGSS
Lower Gnd. Floor: Medical Physics	1	1		1		1	1
Gnd. Floor: Dental Surgery 1	1	1					1
Gnd. Floor: Out-Patients Department	3					3	
Gnd. Floor: A&E Plaster Room	1	1				1	1
Gnd. Floor: A&E Resus Room	4	4				4	2
Gnd. Floor: A&E Exam./Treat. Rooms	3					3	
Gnd. Floor: Radiology Room	1						
Gnd. Floor: Radiology Room	1					1	
Gnd. Floor: CT Scanner Suite	2	1		1		2	1
Gnd. Floor: Day Surgery Recovery	6			6		6	
Gnd. Floor: Theatre 1 Anaesthetic Room	1	1		1		1	1
Gnd. Floor: Theatre 1	1	1		3	2	3	1
Gnd. Floor: Theatre 2 Anaesthetic Room	1	1		1		1	1
Gnd. Floor: Theatre 2	1	1		3	2	3	1
Gnd. Floor: Theatre Recovery	5			5		5	5
Gnd. Floor: CDU Dirty Returns Area					1		
1st. Floor: Maternity Delivery Room 1	1		1			2	
1st. Floor: Maternity Delivery Room 2	1		1			2	
1st. Floor: Maternity Resus. Bay	1					1	
1st. Floor: Maternity Admissions Room	1					1	
1st. Floor: Maternity Single Rooms	5					5	
1st. Floor: Renal Dialysis	3					3	
1st. Floor: Ward 1	28					28	
2nd. Floor: Ronas Ward	18					18	
2nd. Floor: Ward 3	22					22	
Totals	**112**	**12**	**2**	**20**	**5**	**116**	**15**

Note: Test points forming part of the plant / manifold installation have not been included in the above schedule. The vast majority of outlets are the Medaes Gem 10 type with some of these having been converted from earlier BOC types.

Appendix 4: Medical Gases – Maintenance Activity Schedule

This schedule is intended to represent a typical maintenance regime for the plant and components installed and should be used as a guide only. Further advice should be sought from the various manufacturers' recommendations and should be assessed against actual plant / component operating experience. Reference should also be made to the respective manufacturer's Operating and Maintenance Instructions which contain detailed recommendations with respect to maintenance activity and frequencies and to the general guidance contained within Section 10 of HTM 02-01 Part B. The MGPS permit-to-work system must be implemented where required.

Plant / Component	Maintenance Activity / Task	Frequency
Terminal Units (Medaes Gem 10) *Note: Refer to the Medaes O&M document for further guidance for testing terminal units which have been converted from BOC types.*	Check the terminal unit is complete and has the correct gas identification / colour coding is in place.	Quarterly *Estates*
	Check the mechanical function of the terminal unit using the test probes: check the terminal unit is free from leaks; check that the terminal unit retains the test probe and that the terminal unit seals the gas flow; check that the terminal unit smoothly releases the test probe.	Quarterly *Estates*
	Using the MEC test kit, check all gas and vacuum terminal units for correct flow rate and pressure	Quarterly *Estates*
Area Alarm Panels (Medaes MP 26)	Press the TEST button on each panel – check that all LED displays illuminate (flashing) and audible warning sounds.	Quarterly *Estates*
	Isolate the power supply to the panel – check that the POWER ON LED is extinguished and the SYSTEM ALARM LED is illuminated (flashing) accompanied by an audible warning. Reinstate the power supply and check that all indications return to NORMAL.	Six monthly *Medaes*
	Line Contact Monitoring – Check Open Circuit. Disconnect the input plug from a gas service channel on the power supply pcb. Check that the respective gas service channel indicates NORMAL and both HIGH and LOW PRESSURE conditions are steady illuminations. Check that the SYSTEM ALARM LED illuminates (flashing) accompanied by an audible warning. Press the TEST button and check that both HIGH and LOW PRESSURE LEDs flash at a slower rate than other displays. Reconnect the input plug to the gas channel and repeat with the other inputs.	Six monthly *Medaes*
	Line Contact Monitoring – Check Short Circuit. Using a shorting link, short out terminals (C and either H or L as applicable) and check that the respective gas service display indicates NORMAL and that the respective HIGH and LOW PRESSURE LED illuminates (steady). Check that the SYSTEM ALARM LED illuminates (flashing) accompanied by an audible warning. Press the TEST button and check that the respective HIGH and LOW PRESSURE LEDs flash at a faster rate than other displays. Remove the shorting	Six monthly *Medaes*

Plant / Component	Maintenance Activity / Task	Frequency
	link and repeat with all other inputs. Check that all indications are NORMAL on completion.	
	Create an alarm condition and press the MUTE button – check that the audible re-sounds after approximately 15 minutes.	Six monthly *Medaes*
	Prove the correct settings of each pressure switch – refer to the Medaes O&M instruction – Section 2 Commissioning 2.3 to 2.8 inclusive. *Suggest that the low pressure switch setting is verified depending on opportunity to carry this out.*	Annual *Medaes*
Central Alarm Panels (Medaes MP 125)	Press the TEST button on each panel – check that all LED displays illuminate (flashing) and audible warning sounds.	Quarterly *Estates*
	Isolate the power supply to the panel – check that the POWER ON LED is extinguished and the SYSTEM ALARM LED is illuminated (flashing) accompanied by an audible warning. Reinstate the power supply and check that all indications return to NORMAL.	Six monthly *Medaes*
	Line Contact Monitoring – Check Open Circuit. Disconnect the input plug from a gas service channel on the power supply pcb. Check that the respective gas service channel indicates NORMAL and all 'alarm conditions' are steady illuminations. Check that the SYSTEM ALARM LED illuminates (flashing) accompanied by an audible warning. Press the TEST button and check that all 'alarm conditions' flash at a slower rate than other displays. Check that all repeater panels which display that input indicate all input 'alarm conditions' and SYSTEM ALARM in a flashing mode. Reconnect the input plug to the gas channel and repeat with the other inputs.	Six monthly *Medaes*
	Line Contact Monitoring – Check Short Circuit. Using a shorting link, short out terminals (C and either 1, 2, 3 or 4 as applicable) and check that the respective gas service display indicates NORMAL and that the respective 'alarm condition' LED illuminates (steady). Check that the SYSTEM ALARM LED illuminates (flashing) accompanied by an audible warning. Press the TEST button and check that all 'alarm conditions' flash at a faster rate than other displays. Remove the shorting link and repeat with all other inputs. Check that all indications are NORMAL on completion.	Six monthly *Medaes*
	Create an alarm condition and press the MUTE button – check that the audible re-sounds after approximately 15 minutes.	Six monthly *Medaes*
	Prove the correct settings of each plant – refer to the Medaes O&M instruction – Section 2 Commissioning 2.2 to 2.12 inclusive. Specialist contractor activity.	Annual *Medaes*
Area Valve Service Units (Various)	Under the MGPS permit-to-work procedure, obtain the key for the respective AVSU. Check that the lock	Six monthly *Estates*

Plant / Component	Maintenance Activity / Task	Frequency
	operates satisfactorily. Examine the AVSU assembly for correct assembly, security, corrosion and freedom of leaks. Depending on the opportunity for isolating the valve, exercise the valve by selecting fully OPEN to fully CLOSED twelve times to ensure that the valve will operate satisfactorily in an emergency.	
	Check that the NIST check valves are free from leaks and that the blanking nuts are correctly fitted and also free from leaks.	Six monthly *Estates*
	Check that the Ring Pull (or similar) is securely attached to the plastic panel and that the valve box is free from dirt and debris.	Six monthly *Estates*
	Check that the blanking gasket and 'O' ring seal assembly is stowed in the box in its packaging,	Six monthly *Estates*
Automatic Manifold Panel (Medaes MCS2)	Check manifold panel for leakage and general operation and any significant change in gas consumption. *Manufacturer recommends a complete overhaul of the panel and components at five yearly intervals.*	Weekly *Estates / Porters*
	Check and adjust pressure settings as necessary. Specialist contractor activity.	Six monthly *Medaes*
	Check Non-return valve for correct operation. Specialist contractor activity.	Six monthly *Medaes*
Emergency Reserve Manifold (Medaes)	Check for general condition, leakage and check cylinder pressure gauges to verify that ERM is not in operation.	Daily *Estates / Porters*
	Check for unusual noises or vibrations.	Daily *Estates / Porters*
	Check that cylinders are in date and that they are properly secured.	Weekly *Estates / Porters*
	Check cylinder contents via both pressure gauges and verify that no alarms are present. Specialist contractor activity.	Six monthly *Medaes*
	Close the isolating valve on the ERM and confirm there is no effect on the line pressure to the Hospital. Specialist contractor activity.	Six monthly *Medaes*
	Open the 'closed' high pressure isolation valve and verify that the safety valve is not passing. Specialist contractor activity.	Six monthly *Medaes*
	Check for leakage from tail-pipes and soundness of the manifold non-return valve. Specialist contractor activity.	Six monthly *Medaes*
	Check the static pressure of the regulator and check for regulator creepage. Specialist contractor activity.	Six monthly *Medaes*
	Check the 'reserve low' contact gauge and alarm condition for both cylinders. Specialist contractor activity.	Six monthly *Medaes*

Plant / Component	Maintenance Activity / Task	Frequency
	Check the operation of the non-return valve.	Six monthly *Medaes*
Compressed Air Plant	Check after-coolers and receiver drains.	Weekly *Estates*
	Check dryer function / cycle.	Weekly *Estates*
	Manually drain any water from the receiver.	Weekly *Estates*
	Visually check each compressor for security and any sign of oil leakage.	Weekly *Estates*
	Check oil levels on compressors – maintain the correct level.	Weekly *Estates*
	Check and record hours run for each compressor.	Weekly *Estates*
	Record running current for each compressor and record compressor cut-in / out pressures.	Weekly *Estates*
	Inspect and clean the air intake filter elements	Six monthly *Medaes*
	Remove any dust and dirt from the cooler.	Six monthly *Medaes*
	Check tightness of all electrical connections.	Six monthly *Medaes*
	Carry out air quality tests in conjunction with the Quality Controller.	Quarterly *Estates / QC*
	Annual PPM activity as per manufacturer's recommendations. Specialist contractor activity.	Annual *Medaes*
Pressure Reducing Set (Duplex)	Check the condition of both pressure regulators and the security of the safety valves regulator mounting locking devices,	Weekly *Estates*
	Check regulators for correct settings to ensure that creep is not present.	Weekly *Estates*
Medical Vacuum Plant	Vacuum pumps - check oil levels are half way up the sight glasses. Stop the pump and oil if necessary. **Do not overfill the pump with oil.**	Weekly *Estates*
	Visually check the bacterial filter flask – remove and autoclave if contaminated. PPE and risk assessment required.	Weekly *Estates*
	Check pump exhaust drain traps – empty if necessary.	Weekly *Estates*
	Check vacuum receiver drain for liquid presence.	Weekly *Estates*
	Clean plant of dust and oil spillage.	Weekly *Estates*
	Check and record hours run for each pump.	Weekly *Estates*
	Record running current for each pump and record pump cut-in / out pressures.	Weekly *Estates*
	Check tightness of electrical connections within the control panel.	Six monthly *Medaes*
	Change oil and replace oil filter cartridge on each	Annual

Plant / Component	Maintenance Activity / Task	Frequency
	pump.	*Medaes*
	Check bacteria filter elements – change filter elements if required.	Annual *Medaes*
	Check exhaust for oil / smoking – replace exhaust filters if required.	Annual *Medaes*
	Check inlet screen on each pump – clean and replace.	Annual *Medaes*
AGSS Plant	Visually inspect the exhauster unit and remove any accumulated dust from the casing surrounding area. Check that the motor air inlet and exhaust ports are free from obstruction. Run the pump and check for smooth operation and excessive noise. Drain and clean the drain assembly as necessary.	Monthly *Estates*
	Check that the air inlet to the vacuum / flow regulating valves are free from obstruction. Check AGSS terminal units for cleanliness and freedom from damage.	Monthly *Estates*
	Check AGSS terminal units for cleanliness and freedom from damage.	Monthly *Estates*
	Visually inspect the vacuum / flow regulating valves for security and freedom from damage and check that the silencer air inlet is not obstructed.	Monthly *Estates*
	AGSS outlets: Dismantle and check for cleanliness and freedom of movement of the nylon valve plug and spring – clean and replace as necessary. Specialist contractor activity.	Six Monthly *Medaes*
	Check and tighten pump mounting bolts. Specialist contractor activity.	Six Monthly *Medaes*
	Check plant controls by selecting HAND / OFF / AUTO and from all plant remote switches.	Six Monthly *Medaes*
	Duplex plant – check both pumps and the changeover facility. Specialist contractor activity.	Six Monthly *Medaes*
	Visually inspect the drain valve assembly for serviceability and check that the drain flask is clean. Specialist contractor activity.	Six Monthly *Medaes*
	Examine all flexible pipework for signs of stress or damage and check for earth continuity. Specialist contractor activity.	Six Monthly *Medaes*
	Carry out a system performance test on one terminal unit at a time. Specialist contractor activity.	Six Monthly *Medaes*
	Remove the pump inlet and outlet filters, clean the mesh disc and replace filters as necessary.	Annual *Medaes*
	Carry out a system performance test including a full system flow test.	Annual *Medaes*

Appendix 5: Revision Record

Issue	Date	Amendments
1	February 2009	
2	September 2010	Amendments reflect the new MGPS plant which has since been installed and further extension / refurbishment of the existing MGPS. Also for changes to the provision of Authorised Persons (MGPS) for the site. Inclusion of valve key numbers.
3	July 2011	New personnel details added. Appendix 4 – Maintenance Activity Schedule modified.
4	July 2011	Format changes made to match NHS Shetland corporate template
5	Dec 2012	Minor changes following Staff Governance

1. Rapid Impact Checklist

NHS Shetland

An Equality and Diversity Impact Assessment Tool: Medical Gas Pipeline Systems (MGPS)

Which groups of the population do you think will be affected by this proposal? • Minority ethnic people (incl. Gypsy/travellers, refugees & asylum seekers) • Women and men • People with mental health problems • People in religious/faith groups • Older people, children and young people • People of low income • Homeless people • Disabled people • People involved in criminal justice system • Staff • Lesbian, gay, bisexual and transgender people	Other groups: No impact anticipated
N.B The word proposal is used below as shorthand for any policy, procedure, strategy or proposal that might be assessed	What positive and negative impacts do you think there may be? Which groups will be affected by these impacts?
What impact will the proposal have on lifestyles? **For example, will the changes affect:** • Diet and nutrition • Exercise and physical activity • Substance use: tobacco, alcohol and drugs? • Risk taking behaviour? • Education and learning or skills?	No impact

Will the proposal have any impact on the social environment? Things that might be affected include: • Social status • Employment (paid or unpaid) • Social/Family support • Stress • Income	No impact
Will the proposal have any impact on the following? • Discrimination? • Equality of opportunity? • Relations between groups?	No impact
Will the proposal have an impact on the physical environment? For example, will there be impacts on: • Living conditions? • Working conditions? • Pollution or climate change? • Accidental injuries or public safety? • Transmission of infectious disease?	No impact
Will the proposal affect access to and experience of services? For example, • Health care • Transport • Social services • Housing services • Education	No impact

Rapid Impact Checklist: Summary Sheet

Positive Impacts (Note the groups affected)	**Negative Impacts (Note the groups affected)**
No impact	No impact.
Additional Information and Evidence Required	None
Recommendations	None
From the outcome of the RIC, have negative impacts been identified for race or other equality groups? Has a full EQIA process been recommended? If not, why not? .	No impact.