DEPARTMENT OF THE ARMY
MEDICAL DEPARTMENT ACTIVITY
Fort Huachuca, AZ 85613-7079

MEDDAC MEMORANDUM 06 March 2008
No. 710-3

Inventory Management
RECEIPT, STORAGE, AND ISSUE OF MEDICAL GASES

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Supplementation of this memorandum is prohibited. This memorandum is not subject to the requirements of AR 11-2, as it contains no internal control provisions.

1. HISTORY: This issue publishes a revision of this publication.

2. PURPOSE: This memorandum establishes policy, prescribes procedures, and assigns responsibilities for the procurement, storage, and administration of gases for medical purposes.

3. APPLICABILITY: This memorandum is applicable to all MEDDAC/DENTAC/VETCOM activities procuring medical materiel from the Logistics Division, U. S. Army Medical Department Activity, Fort Huachuca, AZ.

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* This memorandum supersedes MEDDAC Memo 710-3, dated 15 Nov 07.

4. REFERENCES:

4.1 AR 40-61, Medical Logistics Policies.

4.2 AR 700-68, Storage and Handling of Compressed Gases and Gas Cylinders.

4.3 TB MED 245, Warning Tag for Medical Oxygen Equipment (DD From 1191).

4.4 Compressed Gas Association, Inc., Color Code for pipelines and for compressed gas cylinders.

4.5 MEDDAC MEMO 750-4, Oxygen Purity Control Program.

4.6 AR 190-51, Security of unclassified Army Property (Sensitive and Non-sensitive).

4.7 MEDDAC MEMO 420-1, Life/Fire Safety Management Program.

4.8 MEDDAC MEMO 40-168, Prevention of Surgical Fires.

4.9 MIL-STD-101B, Military Standard 101B

5. RESPONSIBILITIES:

5.1 MEDDAC/DENTAC Commander. Designate, in writing, those personnel authorized to order, receive and test medical gases.

5.2 Chief, Equipment Management Branch.

5.2.1 Program, requisition and maintain sufficient stocks of medical gases to satisfy customer requirements.

5.2.2 Establish contingencies for emergency resupply of medical gases.

5.2.3 Ensure compressed gas cylinders and liquid reservoirs are stored in accordance with procedures in paragraph 5, this memorandum and AR 700-68.

5.2.4 Ensure gas levels in reservoirs are monitored in accordance with Appendix G, this memorandum.

5.2.5 Establish cylinder exchange program for MEDDAC/DENTAC/VETCOM customers. Ensure customers, other than MEDDAC/DENTAC/VETCOM activities, are charged for gases.

5.2.6 Report maintenance problems on liquid oxygen reservoir to Chief, Facilities Branch, Logistics Division, MEDDAC.

5.2.7 Ensure all gas cylinders are correctly marked and colored IAW Appendix B, this memorandum and MIL-STD-101B.

5.3 Quality Control Technician:

5.3.1 Implement testing and quality assurance procedures in accordance with MEDCOM directives and this memorandum.

5.3.2 Monitor the oxygen purity monitor located in the office of the Chief, Equipment Management Branch on a daily basis.

5.3.3 Submit medical gas replenishment requirements to Clinical Engineering, Supply Technician, weekly.

5.3.4 Ensure all cylinders have been hydrostatically tested within the past five years.

5.3.5 Serve as primary point of contact for all matters concerning Oxygen Quality Assurance.

5.3.6 Ensure all Oxygen Cylinders contain “Do Not Oil” tags as well as Green Full/In-Use Tags.

5.4 Chief, Resource Management Division: Establish and maintain an Account Processing Code (APC) for the purchase of medical gases for the MEDDAC. Funds are to be provided as part of the Logistics Division quarterly fund target.

5.5 Installation Medical Supply Activity (IMSA) Customers (Appendix F):

5.6 Directorate of Installation Support (DIS).

5.6.1 Maintain vacuum systems in the Health Center on a recurring basis.

5.6.2 Perform work order maintenance on liquid oxygen reservoir and continuous gas supply system (Nitrous Oxide, Medical Compressed Air) (Under the supervision of the Chief, Medical Maintenance).

5.6.3 Maintain the piping system.

5.6.4 All services will be reimbursed through Base Operations.

5.7 MEDDAC Safety Officer will conduct a safety inspection of all medical gas storage locations and review all procedures associated with the handling of medical gases on a quarterly basis. Results of the inspection are to be provided to the Chief, Clinical Engineering for corrective action.

5.8 Clinical Engineering Section will perform routine scheduled services on medical equipment which utilizes medical gases based on the Defense Medical Logistics Support System (DMLSS) workorders.

5.9 Chief, Anesthesia Services will be the technical point of contact for the medical gas program.

5.10 Medical Company Commander will ensure the Administrative Officer of the Day (AOD) responsibilities in this memorandum are incorporated into the AOD Instruction Book.

5.11 Department of Anesthesia will provide training to those personnel authorized by the Commander to test oxygen.

5.12 Clinical personnel; Check gas cylinders daily before use to include:

5.12.1 Inspection of Oxygen Cylinders to ensure “Do Not Oil” warning tag is in place and that the tag is annotated with a test date and purity indicating it is safe for use.

5.12.2 Inspection of all cylinders to ensure “Green” In-Use /Empty tag is affixed and used in such a manner to accurately display the current condition/contents of the cylinder.

5.12.3 Inspection of all cylinders to ensure there is adequate remaining pressure before beginning daily clinical use.

5.12.4 Inspection of all cylinders to ensure they are properly stored. Empties must be segregated from full cylinders and well marked so as to not mistakenly be used in an emergency.

5.12.5 Medical Gases Emergency Shut-off valve locations (Drawing of records are at Appendices J and K:

5.12.5.1 Main Oxygen Shut-off: Shut-off is located on the East side next to rear warehouse entrance on the South-East side of the MTF.

5.12.5.2 Ground Floor Shut-off: The first shut-off valve into the building is located on the ground floor hallway in the rear of the building next to door B-6-B.

5.12.5.3 PACU/Shut-off: The shut-off valve for the PACU is located on the wall to the left of room A-13.

5.12.5.4 OR1/OR2 Shut-off: The shut-off valves for OR1 and OR2 are located on the wall to the left of room A-14.

5.12.5.5 Specialty Clinic Shut-off: The shut-off valve for the Specialty Clinic is located on the wall to the right of the hallway next to room D-30-3.

5.12.5.6 MMC Shut-off: The shut-off valve for the MMC is located inside clinic room M-43.

5.12.5.7 Weekend Clinic Shut-off: The shut-off valve for the Weekend Clinic is located on the first floor in the hallway near room M-44-1.

6. PROCEDURES:

6.1 Medical gases are procured by the Chief, Equipment Management Branch in support of authorized customers. See Appendix A for a listing of the gases and supported customers.

6.2 Clinical Engineering will verify invoices with gases received. Medical gases in compressed cylinders are to be checked at the time of delivery to ensure the cylinders are appropriately colored and marked, in accordance with Appendix B, this memorandum.

6.3 Testing will be performed in accordance with procedures in Appendix C, this memorandum. Only those individuals designated (in writing) by the MEDDAC Commander may test oxygen.

6.4 Compressed cylinders are to be stored as prescribed in Appendix D, this memorandum. Main storage locations are listed in Appendix E, this memorandum.

6.5 Customers will be issued compressed medical gases as prescribed in Appendix F, this memorandum.

6.6 Medical oxygen, medical air and nitrous oxide are delivered via a centralized continuous supply system. Description of the system and emergency actions to be implemented in the event of a malfunction are provided in Appendix G, this memorandum. Pressure levels, which activate the alarms are provided in Appendix H, this memorandum.

6.6.1 Clinical Engineering personnel will be responsible for all Medical Gas shut off valves. In the event of an Emergency such as a surgical fire, severe leak, ruptured gas pipe or blown hose any person is authorized to “shut off” their zone medical gas shut off valve and contact Clinical Engineering Branch at 533-3712 or after duty hours the AOD in turn will contact the on-call clinical engineering technician. Safety NCOs are to show their staff where the shut off valves are located in their areas and verbally instruct them how to do this.

6.7 Security: Access to Medical Supply Warehouse gas storage areas is restricted to Clinical Engineering personnel only. DEH and contract personnel may enter these areas only when accompanied by Clinical Engineering Section personnel. Security checks will be made by the AOD as instructed in Appendix I, this memorandum

6.8 Key Control.

6.8.1 Keys to the medical gas storage areas will be maintained in Chief, Logistics Division office as well as the Chief, Equipment Management Branch. The AOD will have a key to the oxygen storage area for emergency issue of cylinders and to allow for shut off of the main supply in case of fire or system becomes contaminated. Access to the key box is limited to personnel designated to receive, test, and maintain the medical gas supply.

6.8.2 Key control will be in accordance with AR 190-51.

The proponent of this memorandum is Logistics Division. Users are invited to send comments and suggested improvements on DA Form 2028 (Recommended Changes to Publications and Blank Forms) through channels to the Commander, U. S. Army Medical Department Activity, ATTN: MCXJ-LO, Fort Huachuca, Arizona 85613-7079.

FOR THE COMMANDER:

OFFICIAL:

GREGORY A. SWANSON
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Information Management Officer

DISTRIBUTION: E

APPENDIX A
MEDICAL GAS TYPES AND PURITIES

MEDICAL GAS	USP GRADE Purity	ACTIVITIES RWBACH	TMC	DMM	RDC	VET
Liquid Oxygen	99%	C	N/A	N/A	N/A	N/A
Gaseous Oxygen	99%	H/D/E	D/E	D/E	H/D/E	D/H
Liquid Nitrogen	99%	DWR	DWR	DWR	N/A	DWR
Compressed Nitrogen	99%	H				
Carbon Dioxide	99%	H				
Nitrous Oxide	97%	C/E				
Compressed Air	N/A	C/E				

LEGEND

C -Continuous type supply system. H/M/D/E cylinders serve as secondary source for the reservoir.
D - Cylinders holding 95 gallons.
E - Cylinders holding 165 gallons.
M - Cylinders holding 800 gallons.
H - Cylinders holding 1600 gallons.
DWR-Dewar

NOTE: The Fort Huachuca Fire Department receives oxygen in size E compressed cylinders.

APPENDIX B
COLOR CODING FOR CYLINDERS

TYPE CYLINDER	TOP A	BAND B	BAND C	BODY
Oxygen	White	Green	Green	Green
Nitrogen	Black	Black	Black	Black
Nitrous Oxide	Blue	Blue	Blue	Blue
Carbon Dioxide	Gray	Gray	Gray	Gray
Compressed Air	Yellow	Yellow	Yellow	Yellow
Helium	Brown	Brown	Brown	Brown

* Codes prescribed Compressed Gas Association, Inc., page 4

APPENDIX C
TESTING OXYGEN DURING DELIVERIES

1. PURPOSE: To establish procedures for testing the purity of oxygen when received from the vendor and for monitoring oxygen provided to Installation Medical Supply Activity customers.

2. RESPONSIBILITIES:

a. Chief, Equipment Management Branch oversees the Oxygen Quality Assurance program.

b. Quality Control Technician. Implement testing and quality assurance procedures in accordance with directives and this memorandum.

c. Chief, Equipment Management Branch will:

(1) Maintain maintenance records based on Defense Medical Logistics Standard Support (DMLSS).

(2) Perform scheduled maintenance on monitors.

(3) Ensure calibration of monitors is performed at scheduled frequencies.

3. PROCEDURES:

a. Oxygen is replenished via contract. Oxygen (liquid and compressed) delivered by commercial vendors will be at least 99% pure.

b. During delivery, the following actions are to be performed:

(1) The vendor is to verify purity of the oxygen and provide a statement certifying the purity of the oxygen on the delivery ticket.

(2) Utilizing calibrated oxygen analyzers, the Quality Control Technician will test all delivered oxygen.

(3) Testing the Bulk Oxygen System each time a delivery is made. This will consist of testing the oxygen in the delivery truck prior to discharge into our storage tank. Individual conducting test will notify Chief Anesthesia when oxygen concentration is less than 99%. When concentration is less than 99%, supplier will not be allowed to connect to the bulk tank until approved by the Chief, Anesthesia.

(a) Compressed oxygen cylinders less than 99% pure will be returned to the vendor and a discrepancy report submitted to Chief, Equipment Management Branch. Inspect each cylinder for a Green In-Use/Empty Tag, Test results for compressed oxygen cylinders are to be recorded on a Warning Tag for Medical Oxygen Equipment (DD Form 1191) and the form attached to the cylinders. Annotations to the DD Form 1191 will include: Julian date of quality check; Quality of oxygen (in percentage); Initials of individual accomplishing check

(b) For bulk liquid oxygen, readings are to be taken from the vendor's truck reservoir, not the MEDDAC bulk liquid oxygen system reservoir. This action prevents any possibility of impure oxygen entering the main oxygen system. Test results for liquid oxygen and the reserve oxygen reservoir are to be annotated as shown in Appendix C.

c. The Quality Control Technician will complete a Report of Discrepancies whenever the vendor delivers empty tanks or impure oxygen. These reports are to be provided to the Chief, Equipment Management Branch, on the same day, for appropriate action.

d. The Quality Control Technician will immediately notify the Chief, Anesthesia Department if readings taken on the bulk liquid oxygen reservoir become less than 96% pure.

LIQUID OXYGEN DELIEVERY

DATE	LIQUID LEVEL	O2%	RESERVE CYL (O2 Backup Main)	O2 CYL % (D/E/H POST)	INITIALS

APPENDIX D
STORAGE AND TRANSPORT PROCEDURES FOR MEDICAL GASES

1. PURPOSE. To provide National Fire Protection Association (NFPA) and Compressed Gas Association (CGA) recommendations for storage and transport of compressed gas cylinders.

2. STORAGE OF COMPRESSED GAS CYLINDERS:

a. Cylinders should be:

(1) Stored in areas where the rooms are dry, cool, and well ventilated. The storage facility should be fire resistant where practical. The storage area must be permanently posted.

(2) Grouped by content. Full cylinders must be segregated from empty cylinders while in storage. Those gases supporting combustion must be stored in a separate location from those that are combustible.

(3) Stored in an upright position.

(4) Protected from being tampered, punctured, cut, or abraded.

(5) Protected from extreme weather to prevent rusting, excessive temperatures and accumulations of snow and ice.

(6) Stored with protective caps in place. Valves should be kept closed on empty cylinders at all times.

(7) Tested and tagged at the time of receipt from the vendor. Tag should remain with the cylinder until returned to Clinical Engineering for refill.

b. Cylinders should not be stored:

(1) In areas where temperature exceeds 125 degrees Fahrenheit.

(2) Near flames, flammable substances or where readily combustible materials such as oil and grease may come in contact with them.

(3) In areas having continuous dampness or corrosive substances to prevent rusting of cylinders and valves.

(4) Below-ground.

3. TRANSPORTING COMPRESSED GAS CYLINDERS:

a. As a minimum, cylinders must be transported on an appropriate cart secured by a chain or strap. Cylinders must not be dropped, dragged, slid or allowed to strike each other violently. Protective valve caps should be utilized whenever cylinders are in transport. The Chief, EMB will ensure that all personnel who use, handle, maintain, recondition, transport and/or store compressed gases (liquefied or non-liquefied) contained in cylinders are aware of and comply with the provisions of AR 700-68.

b. Consult the MEDDAC Safety Officer prior to establishing or relocating storage areas for compressed gas cylinders.

APPENDIX E
MAIN GAS STORAGE LOCATIONS

TYPE GAS	LOCATION
Liquid Oxygen (Reservoir) (Bulk)	Bldg 45030
Continuous Oxygen Supply System (Backup)	Bldg 45030
Compressed Gas Cylinder Room (Full Cylinders)	Room C-12, Bldg 45001
Compressed Gas Cylinder Room (Empty Cylinders)	Room 105, Bldg 45022
Nitrous Oxide	Room C-12, Bldg 45001
Carbon Dioxide	Room C-12, Bldg 45001
Air (cylinders)	Room C-12, Bldg 45001
Nitrogen (cylinders)	Room C-12, Bldg 45001

APPENDIX F
CUSTOMER ISSUES

1. PURPOSE: To provide Installation Medical Supply Activity (IMSA) customers with procedures for obtaining medical gases.

2. PROCEDURES:

a. MEDDAC/DENTAC/VETCOM Customers:

(1) Activities that have a requirement to exchange Oxygen, Nitrogen, Nitrous Oxide and Compressed Air, and Carbon Dioxide cylinders are to coordinate with the Chief, Equipment Management Branch during normal duty hours to have their empty cylinders exchanged for charged cylinders.

(2) Activities not having cylinders with which to exchange must submit a requisition to Equipment Management Branch (EMB). EMB will provide a full cylinder from warehouse assets and use the requisition submitted to order a replacement cylinder.

(3) The Quality Control Technician will prepare the order and submit the requirement to EMB to replenish the supply of cylinders.

(4) MEDDAC/DENTAC activities exchanging medical gases will not be billed except when cylinders are purchased. The Chief, Resource Management Division provides EMB with a centralized fund used to operate the exchange program.

(5) If an activity has an emergency requirement after duty hours or on weekends, the Administrative Officer of the Day (AOD) is to be notified. AOD instructions (Appendix I) provide procedures for the emergency issue of oxygen.

b. IMSA Customers (Except MEDDAC/DENTAC/VETCOM).

(1) IMSA customer activities will deliver their empty cylinders to EMB following the same procedures as MEDDAC/DENTAC/VETCOM.

(2) Non MEDDAC/DENTAC/VETCOM activities must provide EMB with a requisition for the gas. This will facilitate billing the unit for gas issued. The requesting unit is responsible for ensuring gas cylinders turned in to be recharged are correctly colored for the appropriate gas and meet Department of Transportation (DOT) specifications.

APPENDIX G
EMERGENCY PREPAREDNESS PLAN FOR MEDICAL GASES

1. PURPOSE: To describe the MEDDAC medical gas systems and provide procedures to be implemented in the event of a natural disaster or disruption of medical gases.

2. RESPONSIBILITIES:

a. Chief, EMB will ensure that sufficient quantities of H cylinders with regulators are maintained to provide continuous supplies of medical gases.

b. Quality Control Technician will monitor oxygen levels and order oxygen (liquid) whenever the level reaches 50 inches.

3. CONTINUOUS OXYGEN SUPPLY SYSTEM:

a. The primary supply for oxygen to the MEDDAC is the liquid oxygen tank. At maximum capacity, the liquid oxygen tank holds 120 inches. A piping system delivers the oxygen from the reservoir to areas located throughout the Health Center. A pressure alarm is programmed to sound whenever a level of 30 inches of oxygen is reached. To preclude reaching this level, the Quality Control Technician will reorder at 50 inches.

b. The Quality Control Technician will read the liquid oxygen reservoir daily. These readings will be taken at 0800 hours Monday through Friday. As the level reaches 50 inches, the Quality Control Technician will submit a request for replenishment to the EMB.

c. The oxygen reservoir is backed with a reserve consisting of 2 banks of 7 oxygen cylinders (1600 lbs each). These cylinders are also connected to an alarm system. The alarm system is located in RM B6 (Clinical Engineer).

(1) The first alarm will sound when the reserve comes on, this is to let you know that the reserve is in use.

(2) The second alarm will sound when the second set of cylinders come on, this will let you know that you are about to run out of oxygen.

d. Reserve tanks are to be rotated with full tanks maintained in the bulk oxygen storage room.

4. MEDICAL AIR AND NITROUS OXIDE CONTINUOUS SUPPLY SYSTEMS:

a. The Nitrous Oxide Medical Air continuous supply systems have primary and secondary supply sources consisting of compressed gas bottles. The Nitrous Oxide Medical Air primary supply source consists of five 1100 PSI cylinders as does the secondary bank on the manifold. When the primary supply bank is exhausted, the EMB will exchange the empty bottles with backup full bottles held in the compressed gas cylinder room (C-12).

b. As a bank is exhausted, the system will automatically switch to the secondary manifold until the primary supply source is exchanged. An alarm is programmed to sound whenever a bank of Nitrous Oxide Medical Air switches. See Appendix I for AOD instructions during evening hours, on weekends, and holidays.

c. The Quality Control Technician will submit a request for replenishment to the EMB Supply Technician.

5. CONTINUOUS MEDICAL GAS SUPPLY SYSTEM FAILURE:

a. In the event of a failure with the continuous medical gas supply system, notification will be made in the following order (Notification of the DCCS, the Chief, DCN, and the Chief, Department of Anesthesia will be made only after the Chief, Logistics Division has investigated the situation and determined the situation to be critical.):

(1) Chief, Equipment Management Branch.

(2) Deputy Commander for Clinical Services.

(3) Chief, Department of Anesthesia.

b. Emergency actions are as follows:

(1) For Oxygen:

(a) Compressed gas cylinders will be provided to patient care activities having immediate need for oxygen in excess of that physically available in the activity.

(b) Activities will use regulators on crash carts.

(2) For Nitrous Oxide and Medical Air:

(a) Nitrous Oxide Medical Air will be issued in compressed gas cylinders. Activities will be provided with a regulator.

(b) Compressed gas cylinders on the manifold will be closed to conserve nitrous oxide medical air until the system is repaired.

6. CONTINUOUS MEDICAL GAS ALARM SYSTEM:

a. There is one master alarm system within the MEDDAC. The system is located in the Equipment Management Branch, room B-4. The system monitors oxygen, nitrous oxide, surgical vacuum, and medical air.

b. A Servomex Oxygen Monitor, Model 1800 monitors the purity of oxygen from the bulk reservoir, located in the Equipment Management Branch, room B-6, with alarm located in the waiting room Weekend Clinic. Zone alarms are located in the following areas:

(1) PACU

(2) Scope Room

(3) Recovery Room

c. These alarms are activated if the system pressure falls below 45 PSI.

APPENDIX H

PRESSURE LEVELS THAT ACTIVATE ALARMS

	LOW	HIGH
Liquid Oxygen (Reservoir)	30 PSI	N/A
Oxygen Reserve to Piping System	40 PSI	60 PSI
Nitrous Oxide	45 PSI	65 PSI
Medical Air	45 PSI	60 PSI
Surgical Vacuum	18 HHG	25 HHG

APPENDIX I
ADMINISTRATIVE OFFICER OF THE DAY (AOD) RESPONSIBILITIES

1. PURPOSE: To establish procedures for the AOD in conducting security checks and handling emergency requirements for medical gases or malfunction of equipment.

2. PROCEDURES:

a. The AOD will check the security of medical gas storage areas daily between 1900 and 2200 hours. See Appendix E for locations.

b. Notify Clinical Engineering Branch whenever a compressed air or vacuum line alarm sounds in any zone of the Health Center or from the system monitoring station. If the alarm sounds for Oxygen Purity, the AOD will call the Clinical Engineering representative listed in the AOD Instruction Book.

c. When an activity has an emergency requirement to exchange gas cylinders, the AOD will contact the Clinical Engineering representative for instructions.

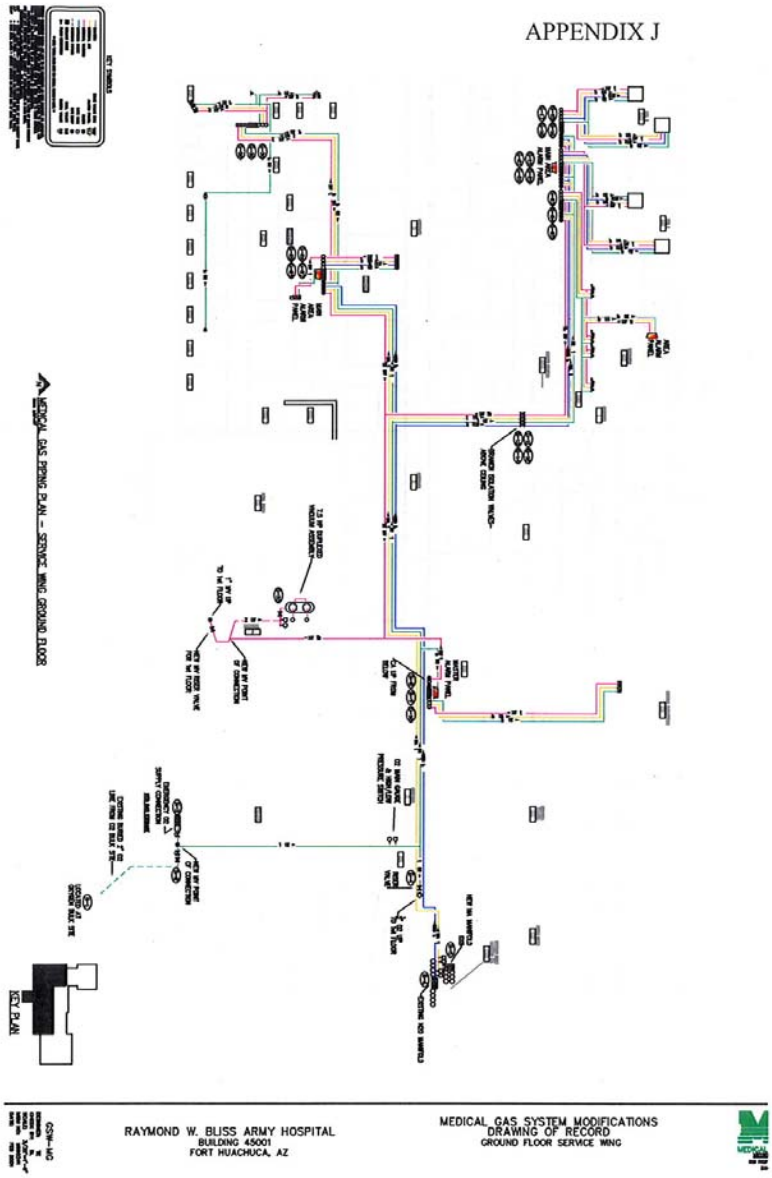
d. In the event of a failure with the continuous medical gas supply system, notification will be made in the following order (Notification to the DCCS, the Chief, DCN and the Chief, Department of Anesthesia will be made only after the Chief, Logistics Division has investigated the situation and determined the situation to be critical.):

(1) Chief, Equipment Management Branch.

(2) Deputy Commander for Clinical Services.

(3) Chief, Department of Anesthesia.

APPENDIX J


RAYMOND W. BLISS ARMY HOSPITAL
BUILDING 45001
FORT HUACHUCA, AZ
MEDICAL GAS SYSTEM MODIFICATIONS
DRAWING OF RECORD
GROUND FLOOR SERVICE WING