

ORDER FOR SUPPLIES OR SERVICES (FINAL)

1. CONTRACT NO. N00178-04-D-4048		2. DELIVERY ORDER NO. EJG9		3. EFFECTIVE DATE 2014 Sep 26		4. PURCH REQUEST NO. ACQR 3799957		5. PRIORITY Unrated			
6. ISSUED BY Naval Facilities Engineering and Expeditionary Warfare Center Code ACQ- Naval Base Ventura County 1100 23rd Ave-Bldg 1100 PORT HUENEME CA 93043-4301			CODE N39430		7. ADMINISTERED BY DCMA SAN DIEGO 7675 DAGGET STREET, SUITE 200 SAN DIEGO CA 92111-2241			CODE S0514A		8. DELIVERY FOB DESTINATION OTHER <i>(See Schedule if other)</i>	
9. CONTRACTOR Epsilon Systems Solutions 9242 Lightwave Ave., Suite 100 San Diego CA 92123-6404			CODE IHQ30		FACILITY		10. DELIVER TO FOB POINT BY (Date) See Schedule		11. X F BUSINESS IS SMALL SMALL DISADVANTAGED WOMEN-OWNED		
14. SH P TO See Section D			CODE		15. PAYMENT W LL BE MADE BY DFAS Columbus Center, West Entitlement P.O. Box 182381 Columbus OH 43218-2381			CODE HQ0339		MARK ALL PACKAGES AND PAPERS WITH IDENTIFICATION NUMBERS IN BLOCKS 1 AND 2.	
16. TYPE OF ORDER	DELIVERY/ CALL	x	This delivery order/call is issued on another Government agency or in accordance with and subject to terms and conditions of numbered contract.								
	PURCHASE		Reference your _____ furnish the following on terms specified herein. ACCEPTANCE. THE CONTRACTOR HEREBY ACCEPTS THE OFFER REPRESENTED BY THE NUMBERED PURCHASE ORDER AS IT MAY PREVIOUSLY HAVE BEEN OR IS NOW MODIFIED, SUBJECT TO ALL OF THE TERMS AND CONDITIONS SET FORTH, AND AGREES TO PERFORM THE SAME.								
Epsilon Systems Solutions				John Murdock Vice President - Contracts East							
NAME OF CONTRACTOR			SIGNATURE			TYPED NAME AND TITLE			DATE SIGNED (YYYYMMDD)		
<input type="checkbox"/> If this box is marked, supplier must sign Acceptance and return the following number of copies:											
17. ACCOUNTING AND APPROPRIATION DATA/LOCAL USE See Schedule											
18. ITEM NO.	19. SCHEDULE OF SUPPLIES/SERVICES				20. QUANTITY ORDERED/ ACCEPTED *	21. UNIT	22. UNIT PRICE		23. AMOUNT		
	See Schedule										
*If quantity accepted by the Government is same as quantity ordered, indicate by X. If different, enter actual quantity accepted below quantity ordered and encircle.					24. UNITED STATES OF AMERICA				25. TOTAL		\$632,938.00
					BY: /s/Lynn M Torres				26. DIFFERENCES		
					09/26/2014 CONTRACTING/ORDERING OFFICER						
27a. QUANTITY IN COLUMN 20 HAS BEEN											
INSPECTED		RECEIVED		ACCEPTED, AND CONFORMS TO THE CONTRACT EXCEPT AS NOTED:							
b. SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE						c. DATE		d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE			
e. MAIL NG ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE						28. SHIP NO.		29. D.O. VOUCHER NO.		30. INITIALS	
						PARTIAL		32. PAID BY		33. AMOUNT VERIF ED CORRECT FOR	
f. TELEPHONE		g. E-MAIL ADDRESS				FINAL					
36. I CERT FY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT.						31. PAYMENT COMPLETE		34. CHECK NUMBER			
a. DATE		b. SIGNATURE AND TITLE OF CERTIFY NG OFFICER				PARTIAL		35. BILL OF LADING NO.			
						FULL					
37. RECEIVED AT		38. RECEIVED BY (Print)		39. DATE RECEIVED		40. TOTAL CON-TA NERS		41. S/R ACCOUNT NUMBER		42. S/R VOUCHER NO.	

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GENERAL INFORMATION

This is a full and open competition with no set-aside. A subcontracting plan is required.

Proposals are due 21 SEPT.

Questions are due no later than 14 SEPT.

All offerors submitting a proposal in response to this solicitation shall notify Lynn Torres via e-mail at lynn.torres@navy.mil at the same time of proposal submission stating that they have submitted a proposal through the Seaport-E portal.

Prior similar work has been successfully performed by Epsilon Systems Solutions in San Diego, CA. This work scope is not identical, and as such, they are not considered an incumbent for procurement purposes.

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SECTION B SUPPLIES OR SERVICES AND PRICES

CLIN - SUPPLIES OR SERVICES

For FFP Items:

Item	PSC	Supplies/Services	Qty	Unit	Unit Price	Total Price
8000	R499	GAS FARM & LOCK OUT TRUNK RECONFIGURATION at NAVAL DIVING AND SALVAGE TRAINING CENTER PANAMA CITY, FL (O&MN,N)	1.0	LO	██████████	\$632,938.00

The proposed Task Order type will be Firm Fixed Price (FFP).

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SECTION C DESCRIPTIONS AND SPECIFICATIONS

See Attachment (Performance Work Statement) for drawings that are listed at the end of section C. Drawings are not included in the body of this solicitation, and the attachment must be viewed for a full understanding. There is not difference in the text of the attachment and the text represented here.

Contract Specification

GAS FARM & LOCK OUT TRUNK
RECONFIGURATION

NAVAL DIVING AND SALVAGE TRAINING CENTER
PANAMA CITY, FL

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PART C6: TABLES & FIGURES

NOTE: THE SYMBOL "N/A" BESIDE A PARAGRAPH NUMBER INDICATES THAT NO SPECIFICATION IS INTENDED IN THAT PARAGRAPH.

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1. GENERAL PARAGRAPHS

1.1 GENERAL:

1.1.1 INTENTION: It is the declared and acknowledged intention and meaning to describe the work required to fabricate and install the hyperbaric piping systems for the Gas Farm and Lock Out Trunk (LOT) Reconfiguration and preservation as described herein. The piping systems shall be fabricated, tested and installed at the Naval Diving and Salvage Training Center (NDSTC), at the Naval Support Activity (NSA), Panama City, FL. The contractor shall be responsible for all work specified herein. All Hyperbaric Facilities shall be complete and useable upon completion of the work.

1.1.2 DESCRIPTION OF WORK: The contractor shall provide all labor and materials for the design, procurement, fabrication, maintenance, repair, assembly, shop testing and shipping of the described Hyperbaric Facilities. Further, the contractor shall prepare and submit all documents, records and manuals specified herein. Some examples of the work the contractor shall design, fabricate and install are as follows:

a) Fabricate and install the Gas Farm Oxygen Supply Piping systems as described herein.

b) Fabricate and install the Gas Farm Helium Supply Piping systems as described herein.

c) Fabricate and install the LOT Stainless Steel Doors, blast and paint the LOT as described herein.

d) Submission of design, drawings, fabrication & test documents.

1.1.3 EXISTING FACILITIES: Part C6 contains drawings and schematics of the facilities. The hyperbaric contractor shall provide the work described herein.

1.1.4 GOVERNMENT FURNISHED EQUIPMENT (GFE): The CGA Bottle stop valves for the Oxygen bottles nine (9) in all will be provided Oxygen clean with the correct frangible disc for the working pressure installed. The contractor will replace the existing CGA valves with the ones provided. The contractor shall be working around connecting to existing NDSTC high pressure flasks and piping.

1.1.5 EXISTING CONDITIONS: The Gas Farm and LOT Facilities are currently operational. The contractor shall make every effort practical to reduce downtime to these facilities during the course of this project.

1.1.6 LOCATION: Installation and final system testing of the hyperbaric systems will be conducted at NDSTC, Building 350, Naval Support Activity, Panama City, FL.

1.1.7 TIME OF DELIVERY: The work shall begin (on the "Start Work date") 15 consecutive calendar days after the "Award Date". The contract completion date is 365 consecutive calendar days after the "Award Date". The "Award Date" is shown in Section A, block 28 of this contract. The contractor shall make no material procurement until after the Preliminary Design package has been submitted and reviewed, unless prior approval is received from the Contracting Officers Technical Representative (COTR).

1.1.8 "AS-NEW" DEFINITION: All components that shall be serviced, inspected, tested and refurbished to "as new" condition. The "as new" condition of the components is that condition which is acceptable to the original design and/or meeting the requirements of the quality control provisions of the Military Specification, or commercial code for the particular component. The "as new" condition includes, but is not limited to the following: complete internal/external visual inspection, replacement of all software, operational test and cleaning. In the event the component cannot be restored to "as new" condition an in-kind replacement for the component is required. The component must pass all the tests of the original design capabilities. Justification for replacement components must be approved by the Contracting Officer via the COTR.

1.1.9 "IN KIND" REPLACEMENT DEFINITION: The in kind replacement of a component is defined as the identical component if the identical component is still in manufacture. In the event the

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identical component is no longer in manufacture, the replacement component must meet all of the requirements of the original component. The requirements of the original components can usually be obtained from the original supplier/manufacturer. If "in kind" components are not available, then replacement components shall be provided upon review and acceptance by the COTR to the contractor.

- 1.1.10 **"HYPERBARIC" TERM:** Anywhere in this specification where the term "Hyperbaric" is used, it shall be assumed (where applicable) to mean "Hyperbaric Systems".

1.2 ADDITIONAL PARAGRAPHS:

- 1.2.1 **SPECIAL PERFORMANCE REQUIREMENTS DUE TO HAZARDS TO PERSONNEL:** Attention of prospective offerors is called to the fact that this contract calls for the fabrication of life sensitive support systems. Failure to adhere to the highest standards of metallurgy, welding, oxygen cleanliness and workmanship will create severe hazards to persons working on or near these systems when they are pressurized. Failure to meet these requirements may be cause for termination for default, and in any event will be cause for Government rejection of components.

- 1.2.2 **CONTRACTORS TECHNICAL RESPONSIBILITY:** This specification contains technical requirements to which the contractor must adhere; however, it is the contractor's responsibility to confirm by engineering analysis that component sizes cited herein are adequate to perform the "Operational/Performance Requirements" cited in Part C2. Typical of such items are pipe sizes etc. Data has been provided herein to demonstrate the conceptual feasibility of such a facility. Other technical issues that are not specified herein are at the discretion of the contractor. The contractor shall cite his intentions in these areas in the preliminary design submission.

- 1.2.3 **CONFORMANCE REQUIREMENTS:** Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, shall not relieve the contractor from performing such omitted or misdescribed details of the work but they shall be performed as if fully and correctly set forth and described in the drawings and specifications.

- 1.2.4 **CONTRACTOR'S SPECIFICATION CHECK:** The contractor shall check all drawings and specifications furnished him immediately upon their receipt and shall promptly notify the Government of any discrepancies. Numbers marked on drawings shall in general be followed in preference to scale measurements. Large scale drawings shall in general govern small scale drawings. The contractor shall compare all drawings and verify the data before laying out the work and will be responsible for any errors that might have been avoided thereby.

- 1.2.5 **CONTRACTOR'S SITE VERIFICATION CHECK:** The contract requires the interface of new material/equipment with existing equipment in the building. The contractor is responsible for on-site verification of existing conditions. The contractor is responsible for the integration of new equipment into existing spaces, and the interface of new equipment with existing systems, such as gas, electrical, water, etc. Prior to the submission of the Final Design, the contractor is responsible for visiting the site to facilitate layout of the work.

- 1.2.6 **STANDARD PRODUCTS:** Use will be made of materials and equipment that are standard catalog products of manufacturers regularly engaged in the production of such materials and equipment and shall be the manufacturer's latest standard design that complies with the specification requirements. Where two or more products of a similar type are used, they will be products of the same manufacturer. Where two or more products are of a similar type that the same manufacturer's model number can be used, all the products shall be identical. Where standard products are available which have been proven successful for hyperbaric application, they shall be used. Each major component used in this installation will be clearly marked so that the manufacturer, model, serial number, and the principal characteristics of the item can readily be determined after final installation.

- 1.2.7 **DOCUMENT SUBMITTAL SCHEDULE:** The following is a summary of the documents that are required to be submitted to the Government. Five copies of each document shall be submitted in three ring binders. Document descriptions are in Part 5, "Quality Assurance". Piecemeal submittal of documents is unacceptable; such submittals shall be returned. As-Built drawings may be submitted piecemeal to NDSTC for preliminary review before the submission of the As-Built

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package. Submittals shall be completed and delivered no later than the dates listed below:

a. 45 Days After "Start Work Date":

1. Preliminary Design Package (where applicable).
2. Quality Assurance Plan (submitted with only first appendix package).
3. Preliminary System Manual Outline (where applicable).
4. Weld Procedures, Welders Qualification and Welder Qualification Records (where applicable).
5. Safety Plan.
6. Functional Test Plan.
7. Cleaning Procedures.
8. 80% Component Database/Component Manufacturer's Design Data (CMDD).
9. Gas Sample Procedures.

c. 30 Days Before Contract Completion Date:

1. As-Built Drawings.
2. 100% Contractor's Records and Documents.
3. 100% Component Database/Component Manufacturer's Design Data (CMDD).
4. Final System Manual.
5. Gas Sample Reports.
6. Functional Test Records & Reports.
7. Purchase Orders.

d. Monthly Report: Each Monthly Submittal shall be delivered no later than 10 days after beginning of each month and shall include:

1. Project Schedule.
2. Component database (latest revision).
3. Current Progress Report.

e. Weekly Report: The contractor shall submit a paragraph reporting contract progress the previous week and the work expected to be accomplished for the upcoming week during a weekly meeting with NDSTC Engineering Department Representative (and a copy submitted to the COTR).

1.2.8 HYPERBARIC FACILITY CODES AND STANDARDS: The contractor's designs and all other work provided under this contract must assure in all instances that the finished hyperbaric facility conforms to the codes and standards listed below. Areas of conflict shall be brought to the attention of the Government as soon as they are noted. The issue of the respective code to be used for this contract is the effective code at the time of signing of the contract.

- a. NAVSEA SS521-AA-MAN-010, "U.S. Navy Diving And Manned Hyperbaric Systems Safety Certification Manual".
- b. NAVSEA 0994-LP-001-9010, REV 6, "U.S. Navy Diving Manual".
- c. Hyperbaric Facilities UFC 4-159-01N (formerly DM-39, "Hyperbaric Facilities Design Manual").
- d. NFPA 99, "Health Care Facilities".
- e. TMCHENG/05-010-SCA
- f. NDSTC Procedure Description; Standard Drawing Requirements PD-2-01\
- g. Piping Devices, Flexible Hose Assemblies, S6430-AE-TED-010, Volume 1, and Revision 1 dated August 2006

1.2.9 REFERENCE SOURCES: Reference publications are cited throughout this specification. The addresses of the sponsoring organizations are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

- a. Military Standards (MIL-STD-, MIL-V-, MIL-Q-, etc.) can be ordered from the following address:

Standardization Documents Order Desk

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Building 4 D
700 Robbins Ave
Philadelphia, PA 19111-5094

or

General Services Administration
Specifications and Consumer Information
Distribution Sections (WFSLs)
Washington Navy Yard
Building 197
Washington, DC 20407

- b. Navy/NAVSEA Publications:
Navy Publications and Forms Center
5801 Tabor Ave.
Philadelphia, PA 19120
- c. American National Standards Institute (ANSI)
1430 Broadway
New York, New York 10018
Ph: 212-354-3300
- d. American Society for Testing and Materials (ASTM)
1916 Race Street
Philadelphia, PA 19103
Ph: 215-299-5400
- e. American Society of Mechanical Engineers (ASME)
345 East 47th Street
New York, New York 10017
- f. Compressed Gas Association, INC. (CGA)
1235 Jefferson Davis Highway
Arlington, VA 22202
Ph: 703-979-0900
- g. American Welding Society (AWS)
2501 N.W. 7th Street
Miami, FL 33125
Ph: 305-443-9353
- h. Department of Defense (DOD) publications can be ordered from the following address:

US Army Adjutant General Publications Center
2800 Eastern Boulevard
Baltimore, Maryland 21220
Ph: 301-671-2533
- i. National Fire Protection Association (NFPA)
1 Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9101
Ph: (617) 770-3000
- j. Department of the Army
US Army Corps of Engineers
Washington, DC 20314-1000
- k. Society for Protective Coatings (SSPC)
40 24th Street, 6th Floor
Pittsburg PA 15222-4656
Ph: (412) 281-2331
Fax: (412) 281-9992
<http://www.sspc.org>

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Government property unless he/she furnishes satisfactory proof that he/she is a citizen of the United States or is specifically authorized admittance by the Government. NDSTC will be POC for contractor access. Current NSA-PC access requirements will be adhered to.

- 1.2.11 STATION REGULATIONS:** The contractor and his employees and subcontractors shall become familiar with and obey all station regulations including fire, traffic and security regulations. All personnel employed on the station shall keep within the limits of the work and avenues of ingress and egress. Personnel shall not enter any restricted areas unless required to do so and must be cleared for such entry. The contractor's equipment shall be conspicuously marked for identification. A Hot Work chit is required from base Fire Department prior to commencement of subject Hot Work performed at the Facility and a "designated Fire Watch" and appropriate required equipment will be provided by the Contractor.
- 1.2.12 ACCESS TO BUILDING:** Regular working hours shall be an 8 ½ hour period established by the Government between 7 a.m. and 5 p.m. Monday through Friday, excluding Government holidays. The contractor shall make an application for work outside of the regular working hours 15 calendar days prior to such work to the Government. After hours work shall also be coordinated through NDSTC.
- 1.2.13 EXISTING CONDITIONS AND EXTRA OBLIGATIONS OF THE CONTRACTOR:** the contractor will be working in a specified section of the building. All other sections of the building other than the hyperbaric sections will be off limits to contractor personnel. The contractor and his employees will not be allowed outside the work area or in adjacent existing buildings without prior approval of the COTR. The contractor shall not use the existing buildings for storage.
- 1.2.14 AVAILABILITY AND USE OF UTILITY SERVICES:** The Government will furnish standard utility services free of charge for the specified installation work and on-site testing. Unique utility requirements (Any utility service not available from the building.) are the responsibility of the contractor.
- 1.2.15 STORAGE AREAS AND PARKING:** Unsecured outside space, not to exceed 1500 ft², will be available at the site for use as a storage area. All storage facilities, at the contractor's own expense and in a manner satisfactory to the COTR, shall be installed, maintained, and removed prior to the final acceptance of the work. Exact location for storage and work areas shall be provided to the contractor upon award of the contract. Two Parking spaces adjacent to the Pierside Support Building will be provided by NDSTC.
- 1.2.16 COOPERATION WITH NAVAL DIVING & SALVAGE TRAINING CENTER PERSONNEL:** Attention is invited to the fact that normal school operations cannot be interrupted. The contractor shall cooperate and schedule his work to avoid conflict with and interruption of the work of others insofar as practicable. In the case of conflict with normal school operations that cannot be resolved satisfactorily, the matter shall be referred to the Contracting Officer, via the COTR, for decision, and such decision shall be final, subject to right of appeal in accordance with the terms of the contract.
- 1.2.17 RE-ENTRY CONTROL:** The following re-entry control procedures are required to be performed by the contractor when breachment of a certification boundary, other than that of the scope of work boundary, is required during this contract. The re-entry control process must be coordinated with NDSTC Engineering Department or Officer and must not conflict with the operation or training mission of NDSTC.
- 1.2.17.1 PRELIMINARY RE-ENTRY CONTROL:** The contractor shall submit to the NDSTC Engineering Department or Officer and the Contracting Officer, at least fifteen (15) days in advance of the desired start date, the following re-entry control information:
- a. Requested Work Boundaries.
 - b. Estimated System Down Time (in days).
 - c. Desired Start Date.
- 1.2.17.2 FINAL RE-ENTRY CONTROL DOCUMENTATION:** Upon completion of the work requiring re-entry control, the contractor shall submit the following information to the NDSTC Engineering Department, COTR, and the NAVFAC System Certification Authority (SCA) Officer:
- a. Purchase orders with manufacturers letters of compliance.

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- b. Weld procedure and welders qualifications.
- c. NDT procedure, results of NDT, and inspectors qualifications.
- d. Flush procedures and results.
- e. Cleaning procedure and results of cleaning.
- f. Hydrostatic test procedure and results.
- g. Joint identification drawings and welding log.
- h. Air sample results.
- i. All objective Quality Evidence (OQE) to close the REC.

1.2.18 REPAIR AND RESTORATION: If the contractor, during performance of the work described herein, causes damage to other features or existing elements of the described hyperbaric facilities or components or adjacent areas of Facility, the damage shall be reported to the COTR, repaired and restored to its original condition using similar methods and identical finish, at the Contractor's expense.

1.2.19 HAZARDOUS MATERIALS HANDLING: The contractor is responsible for submitting a list of all Hazardous Materials proposed for use within the scope of the contract. This is including the Safety Data Sheets (SDS) for each separate component, a minimum of 10 days prior to scheduled usage of the materials to the COTR and the Command Engineering Officer to obtain government approval.

All contracting personnel involved in the "on-site" contract performance and or administration must attend a Base Environmental Brief, prior to the start of any work. This can be given by NDSTC or arranged by the Command Engineering Department or Supply Department personnel through the Base.

All Hazardous materials used and waste generated in the course of the contract that are or must be removed by the contractor from the Facility and Navy Base. The material must be disposed of in the manner as specified by the State code for disposal of non-hazardous and hazardous materials. The contractor is responsible for obtaining the DOT approved shippable containers used to transport the HAZMAT/HAZWASTE receiving facility. Documents signed by the receiving facility once the material reaches it's final destination need to be returned to the Command Engineering Officer and copies forwarded to the Base Environmental Office, for reporting purposes.

END OF SECTION

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PART C2

2. OPERATIONAL REQUIREMENTS: The hyperbaric facility is designed to perform the following operations and standards. **See Part C6 for specific requirements.**

2.1 OXYGEN SYSTEM: The oxygen system shall be capable of providing oxygen various points at NDSTC as described herein.

2.1.1 OXYGEN STORAGE:

- a. Storage Pressure: 3000 psig
- b. Storage Configuration: Eight (8) bottles for breathing oxygen and one (1) bottle

2.2 HELIUM SYSTEM: The helium system shall be capable of providing helium various points at NDSTC as described herein.

2.2.1 HELIUM STORAGE:

- a. Storage Pressure: 3000 psig
- b. Storage Configuration: Nine (9) bottles for helium

2.3 LOCK OUT TRUNK (LOT): The LOT is built to the following criteria:

- a. ASME maximum internal allowable working pressure 20 psi
- b. ASME maximum external working pressure 20 psi
- c. Maximum Operating Temperature 125°F
- d. Minimum Operating Temperature 0°F

END OF SECTION

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PART C3

3.0 PIPING & INSTRUMENTATION TECHNICAL REQUIREMENTS

3.1 GENERAL REQUIREMENTS:

3.1.1 "POWER PIPING": Hyperbaric piping, valves and components shall conform to the requirements of ANSI B31.1, "Power Piping". This specification refers to paragraphs in B31.1; the referenced B31.1 paragraph numbers are followed by an asterisk for identification purposes (illustration, "Paragraph 100.1.1*"). The piping, valves and components shall conform to the following additional requirements.

3.1.2 PIPING: Paragraph 100.1.1* Scope-After "This code prescribes minimum requirements for the design, material, fabrication, erection, test and inspection of..." add, "Hyperbaric Facilities". "Piping" is defined in paragraph 100.1.1*; piping includes tubing. Whenever pipe is stated in this specification in general terms (i.e., only pipe joints), it shall be assumed to state a requirement for all pipe and tube used.

3.1.3 PROVEN COMPONENTS: Pressure containing components normally covered by ANSI B31.1 shall be in accordance with paragraph 104.7*, therein "components shall be used that have been proven satisfactory by successful performance under comparable US NAVY service conditions". Components for a hyperbaric facility must have proven experience in existing hyperbaric facilities for high pressure air, oxygen and water service. Pressure vessels (other than the PVHO's) shall meet the requirements of ASME, Section VIII, Division 1 or as specified.

3.1.4 MATERIAL & COMPONENTS, GENERAL: Material, components and equipment installed in the piping systems shall be as specified and suitable for the gasses and liquids contained and for the maximum operating temperature and pressure. All valves shall be placed so that they can be easily reached, operated and maintained by a person without extensive system disassembly or the aid of special equipment, such as ladders, or they shall be provided with other means of mechanical operation. Valves shall be placed so that accompanying gauges or other displays are easily read. Pipe and tubing shall be protected from abuse and accidents and be placed for ease of operation, maintenance and replacement.

3.1.5 CALIBRATION: All measuring instruments, gauges, relief valves, process control transmitters, indicators, etc. shall be calibrated. All these items requiring calibration shall have at least twelve months remaining on their respective calibration at the time of the acceptance of the facility. All calibration shall be conducted by a Met-Cal certified calibration shop.

3.1.6 MATERIAL PROTECTION: Equipment and materials shall be properly stored, adequately protected and carefully handled to prevent contamination or damage before and during installation. Equipment and materials shall be installed, handled, stored and protected in accordance with the manufacturer's recommendations.

3.1.7 PERSONNEL PROTECTION: Belts, pulleys, chains, gears, couplings, projecting setscrews, keys and other rotating parts located so that any person can come in close proximity thereto shall be fully enclosed or properly guarded. High temperature equipment and piping so located as to endanger personnel or create a fire hazard shall be properly guarded or covered with insulation. Areas of high noise shall be properly posted and adequate safety equipment shall be supplied. Electrical connections so located as to endanger personnel shall be fully enclosed or properly guarded. Areas of high noise exceeding 84dB shall be properly posted.

3.1.8 MANUFACTURER INSTRUCTIONS: Where installation procedures or any part thereof are required to be in accordance with the recommendations of the manufacturer of the material being installed, printed copies of these recommendations shall be furnished to the COTR with the Preliminary Design Submittal. Installation of the

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product shall not be allowed to proceed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.

- 3.1.9 O-RING SEALS: All piping components such as valves, check valves, relief valves, reducers, and similar equipment, shall be installed with O-ring seal unions.
- 3.1.10 CHASES: All piping and electrical conduit shall run in chases. The chases shall be located so that they do not interfere with operations or maintenance. In Hyperbaric operating spaces the piping, conduit and chases shall be run so as to be of minimal presence to the operators and chamber occupants. The contractor's design shall conform to component manufacturers' requirements.
- 3.1.11 PIPING, GENERAL: There shall be adequate joints for disassembly, cleaning and inspection. Single lengths of piping shall not exceed 30 feet between unions. All piping installed internal to the chamber shall be configured so as to not interfere with normal operations.
- 3.1.12 PIPING SIZE: Piping shall be sized to a maximum gas velocity of .8 mach or less.
- 3.1.13 WELDED PIPING AND FITTINGS: Piping, unless otherwise specified, shall be seamless annealed stainless steel conforming to ASTM A312, Type 304L or 316L. Pipe shall be 1/2" or larger. All tube, unless otherwise specified, shall be seamless annealed stainless steel conforming to ASTM A269, Type 304L or 316L. All fittings shall conform to ASTM A403, Type 304L or 316L and shall be seamless. Tube shall be 1/2" I.D. or larger, except gauge and sampling lines which will be 1/4" or larger. All Piping (pipe, tube, and fittings) located in areas external to the building shall be 316 or 316L. Traceability details (heat numbers etc.) shall be etched or permanently marked on all piping (pipe, tube, fittings, tailpieces, threadpieces, etc).
- 3.1.14 PIPE MATERIAL CERTIFICATIONS: The contractor shall submit material certifications for all weld filler metal (wire, rods, etc.), pipe and fittings used in this contract. The material certifications shall ensure that the pipe, fittings and filler meet all specification requirements. The material certifications shall include, but are not limited to: complete analysis (chemical element percentage composition), mechanical physical properties including tensile, yield, elongation, and manufacturer and manufacturing details. Vendor supplied purchase orders, Vendor Certificates of Conformance (C of C) and Mill Certs for welded pieces shall accompany all piping (pipe, tube, valves and fittings) IAW US Navy System Certification Manual, SS521-AA-MAN-10.
- 3.1.15 JOINT STANDARDS: Only pipe joints that are fabricated, erected, tested and inspected to nationally accepted standards may be used (typically; butt welds, socket welds, bolted flange connections, O-ring faced fittings). Others are not acceptable (typically; brazed, byte type, flared, compression fittings and threaded).
- 3.1.16 FLEX HOSES: Flexible hoses shall be installed at reciprocating machinery. When a flexible hose is to be subjected to considerable vibration or flexing, sufficient slack shall be provided to avoid mechanical loading. Flexible hose burst pressure shall be four times operating pressure. Flexible hoses shall be installed so that operators of the equipment are not endangered. All flexible hoses installed shall be labeled with a metal information tag according to the requirements in the US Navy System Certification Manual, SS521-AA-MAN-010. All flex hoses shall have an independent identification number etched on the metal identification tag and on one of the end fittings. This identification number shall correspond to all documentation related to the respective flex hose (hydrotest, cleaning, etc.) All flexible hoses shall be subjected to a hydraulic proof test equal to twice the rated working pressure of the hose (See NAVSEA S6430-AE-TED-010). All flexible hoses shall be covered with

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non-corrosive stainless steel wire braid. All fittings shall be constructed of non-corrosive stainless steel.

- 3.1.17 FLEX HOSE RESTRAINER: All flex hoses shall have restrainers (Safety Lines), fabricated in accordance with the U.S. Navy Diving Manual. Safety lines shall be provided for the full length of each flex hose assembly, securely fastened at both ends. In the case of charging whips, the manifold end shall be securely fastened. The working end shall have a device for securing the line to the cylinder.
- 3.1.18 FITTINGS ID: The inside diameter of elbows, tees and other fittings shall be equal to or greater than the pipe to which they are attached.
- 3.1.19 PIPING ID: Identify piping in accordance with Table B-3, Color Code and Component Designation for Diving Systems", NAVSEA SS521-AA-MAN-010. Identification shall apply to piping on each segment of pipe between fittings. All valve handles, operator controls and gauge outer rings shall have color coding applied. Provide two copies of the piping identification code framed under glass or acrylic and installed where instructed by the COTR.
- 3.1.20 COMPONENT TAGS: All components shall be tagged with identification plates of plastic laminate measuring approximately one half inch high, by one and one half inches long minimum, by one eighth inch thick, firmly attached by contact adhesive or by other means acceptable to the Government. These plates shall be marked by engraving with one quarter inch high block type identification letters/numbers, and shall be color coded as appropriate. The Component Tag index shall be submitted with the Preliminary Design. Other means of tagging may be used, but must be approved by the COTR.
- 3.1.21 COMPONENT ID PLATES: All component identification shall be performed in accordance with PD-2.
- 3.1.22 PANEL ID TAGS: All panels and major subsystems shall be identified with an ID plate. These plates shall be made of plastic laminate, two inches high and at least six inches long by one-eighth inch thick. The plates shall be marked by engraving with three-quarter inch high block type identification letters/numbers, and shall be color coded as appropriate. All piping entering/leaving a panel shall be identified. These plates shall be made of plastic laminate, 1 1/2 inches high and at least four inches long by one-eighth inch thick. The plates shall be marked by engraving with 1/2-inch high block type identification letters/numbers, and shall be color coded as appropriate. These labels shall be firmly attached by contact adhesive or by other means acceptable to the Government. ID tag wording shall be provided with the Preliminary Design. Other means of tagging may be used, but must be approved by the COTR.
- 3.1.23 TUBING GUIDELINES: There shall be a length of straight tubing adjacent to the nut equal to 2 tube diameters or more. The total length of a tube assembly shall be 20 tube diameters or more. Each tube assembly shall have at least one bend equal to or greater than 90°.
- 3.1.24 THROTTLE VALVES: All valves that regulate flow (other than on-off function), oxygen service valves, and high pressure valves (except for those remotely actuated) are considered throttle valves. They shall be globe or needle valves. These valves shall conform to MIL-V-24109. For throttle valves which are larger than those that meet the requirements of MIL-V-24109 (3" or greater), these valves shall conform to MIL-V-24109 with respect to control of flow and pressure. Valve Handles shall be color coordinated with Table B-3, Color Code and Component Designation for Diving Systems", NAVSEA SS521-AA-MAN-010.
- 3.1.25 SHUTOFF VALVES: All hand operated valves, other than throttling valves, shall be ball valves. They shall be two-way (bi-directional) flow, three piece, with a swing out construction, valves conforming to ASME/ANSI B-16.34 and

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utilizing a soft sealing surface. Socket weld end connections shall conform to ANSI B-16.11. Butt weld end connections shall conform to ANSI B-16.25. The construction materials shall be compatible with air and oxygen service. All valves shall be rated at a working pressure equal to or greater than the maximum possible system pressure. On panels, in which the direction the valve handles point indicates the open or closed position, the direction shall be the same for all valves on the panel. Valve handles shall be color coordinated with Table B-3, Color Code and Component Designation for Diving Systems", NAVSEA SS521-AA-MAN-010.

3.1.26 **COMPONENT SEATS:** Breathing gas components shall have seats and seals that are suitable for oxygen service.

3.1.27 **LUBRICANTS:** All lubricants shall be suitable for oxygen service.

3.1.28 **CHECK VALVES:** All check valves shall utilize a soft sealing surface poppet or disc and spring.

3.1.29 **PRESSURE GAUGES:** Pressure gauges, except as otherwise specified, shall have a 4 1/2 inch dial and shall meet the following criteria:

- a. Unless otherwise specified, shall be made with phosphor bronze or stainless steel, with heli coil or bourdon tube sensing elements.
- b. The case shall be made of acrylonitrile butadiene styrene plastic and shall have a blow relief device.
- c. Oxygen gauges shall be cleaned and marked for oxygen service IAW Mil-STD-1330D.
- d. Oxygen gauges shall have a green outside case.
- e. Each gauge shall be capable of isolation from the system by a three-way gauge calibrat valve, which meets the requirements of MIL-V-24578B(SH) dated 31 August 1982, and snub assembly.
- f. They shall have an accuracy of 1% full scale unless otherwise specified.

3.1.30 **GAUGE RANGE:** The full range of pressure gauges shall be 130% to 150% of the maximum operational range.

3.1.31 **VENT LINES:** Vent lines shall be independent of each other and of other lines. All vents lines shall exhaust outside the building, and shall be so configured and capped to prevent ingress of weather or debris. They shall be designed to provide lightning protection.

3.1.32 **RELIEF VALVES:** Relief valves installed on PVHO's and on ASME air storage flasks shall conform to and be marked and stamped in accordance with ASME Section VIII, Division 1, "Pressure Vessels". Non ASME coded relief valves shall be installed on systems other than PVHO's and ASME storage flasks. Relief valves shall be located so that the exhaust port is not nearer than 5 feet from operators, the vented gas shall be directed away from operators. Relief valves for piping greater than 1" NPT and for oxygen shall be piped outdoors. All non-ASME coded relief valves shall be adjustable-type relief valves.

3.1.33 **PIPING CLEANING:** Piping shall be installed to facilitate cleaning. All high points shall be ventable, low points shall be drainable.

3.1.34 **REDUCTION STATIONS:** Pressure regulating station components shall be selected so that output pressure will not drop below 90% of nominal set pressure for all conditions of flow and upstream pressure; and, maximum flow requirements shall be met under all conditions of upstream pressure and flow. Minimum upstream pressure shall be three times downstream pressure. Provide each pressure reducing station with a regulator, a filter upstream of the regulator, gauges to show the supply pressure, reduced pressure and a safety relief valve on the low pressure side with sufficient capacity to relieve the high pressure. Pressure regulators shall be capable of operating within a temperature range of 32 to 165 degrees Fahrenheit. All dome-loaded regulators shall be provided with appropriate hand loaded regulators for the adjustment of the reduced pressure downstream of the dome-loaded regulator. The exception for filters shall be that no filters shall be provided for maintenance panel or drive air panel regulators. All regulators shall be provided with straight thread o-ring fitting end connections.

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- 3.1.35 FILTERS:** Filters shall be provided preceding all pressure regulators, except as noted in the specification or drawings. A filter shall be provided downstream of all externally supplied supply banks ("K bottle banks for oxygen, nitrogen, etc., Liquid oxygen, Liquid nitrogen, etc.) and preceding all dome loaded regulators regardless if not on drawings. All filters, unless otherwise specified, shall be fabricated in accordance with ASME Section VIII Div I, and shall be capable of changing the filter element without removing the filter body from the line. It shall be capable of removing particulate larger than 10 microns unless otherwise specified. Filters shall be sized so that the pressure drop across a clean filter is not more than 2.5 percent for LP systems (500 psi and less) or not more than 15 psi for HP systems (500 psi and more) of the specified minimum inlet pressure to the regulator at maximum flow rate specified for the regulator. All filters shall be provided with straight thread o-ring fitting end connections. In an oxygen system, all components of a filter shall be manufactured using brass. In air systems, all components of the filter shall be manufactured using stainless steel.
- 3.1.36 UNIONS:** Unions shall be installed in the piping and each end of the flexible hoses to facilitate removal and maintenance of components.
- 3.1.37 N/A**
- 3.1.38 PANELS:** Control Consoles and Control Panels for recompression chambers shall be constructed in a panel mount configuration, with the component bodies behind the panel, and only displays or operating mechanisms exposed. All other panels shall be constructed in an "exposed component, surface mounted" configuration. Panels and mounting brackets shall be fabricated of aluminum. The panels shall be manufactured of a minimum of 1/4" plate. The exposed panel surface and all brackets shall be powder coated to the required color of the panel service after fabrication. The support brackets used to support the pipe and components shall also be powder coated after fabrication. All components on the panel shall be independently supported (pipe shall not be used to support components). Panels that cannot be supported due to their weight shall be supported with leg supports that adequately support the weight of the panels.
- 3.1.39 WELD JOINT INTERIOR:** Paragraph 111* Welded Joints-The finished interior surface of pipe joints shall be smooth in order to reduce noise in the piping. Backing rings, if used, shall be removed. There shall be no excess reinforcement on the inside of pipe joints caused by the welding process. Machine welding or consumable inserts shall be used in the welding process to avoid any excess reinforcing of the weld. The contractor shall provide a detail description of the weld process in the preliminary design.
- 3.1.40 WELDING QUALIFICATIONS:** Paragraph 127.5* Qualification. All welders, welding procedures, and procedures shall be qualified by the contractor prior to welding on this project. Qualification by a previous employer is unacceptable. The following documents shall be submitted by the contractor:
- a. QW-482 Welding Procedure Specification
 - b. QW-483 Procedure Qualification Record
 - c. QW-484 Welder or Welding Operator Qualification Test
 - d. Vision and eye test examination records
- 3.1.41 WELD IDENTIFICATION:** All welds shall have weld identification numbers clearly and legibly etched on the pipe base metal adjacent to the respective weld. All etched weld numbers shall correspond to the welder log and Joint Identification Drawing (JID). JID's will be assigned by NDSTC Engineering during review of the Preliminary Design package. The welders log and JID shall be submitted by the contractor. The welders log and JID shall contain sufficient information to cross reference between all welding qualifications, welding records, Non-destructive testing (NDT) qualifications, and NDT records.
- 3.1.42 COMPONENT SUPPORTS:** Pipe and/or tubing shall be adequately supported at intervals no greater than 100 pipe diameters, and in both directions at elbows. Components (valves, regulators, etc.) shall be supported so that the

force required to operate the component or other normal operational load does not cause visual deflection, rotation or vibration. All piping that is currently installed that will not be removed shall be properly supported.

3.1.43 **CONTAMINATION:** Precautions shall be taken during fabrication to prevent construction dirt from entering pipe in storage or partially completed piping systems.

3.1.44 N/A

3.1.45 N/A

3.1.46 N/A

3.1.47 **OXYGEN SYSTEMS:** Oxygen piping shall conform to the requirements of CGA Pamphlet G-4.4, "Industrial Practices for Gaseous-Oxygen Transmission and Distribution Piping Systems". The following are noted:

- a. Pipe and fittings shall be stainless steel ASTM 316L.
- b. All valves, regulators and other components shall be copper based alloy. All oxygen system valves shall meet the requirements for throttle valves as specified in C3.1.24.
- c. Pipe joints shall be butt welded.
- d. Vent lines shall be independent of other lines and shall vent outdoors. The vent line venting oxygen shall be cleaned as required by this specification.
- e. The oxygen vent shall be properly isolated from weather, combustibles, personnel, other systems and air compressor intakes.
- f. Components for oxygen systems shall not react with oxygen nor fluorinated compounds in any way that might cause generation of heat or loss of oxygen to the surrounding atmosphere. All oxygen system components shall utilize polytetra fluoroethylene (teflon), or fluoroethylene (Viton) seals and gaskets. All other wetted parts shall be stainless steel or as otherwise specified.
- g. Gauge and sampling piping provided in oxygen systems which are 1/4" tube may have pipe joints which are socket welded. Gauge and sampling piping lengths and the amount of socket welded fittings shall be kept to a minimum.
- h. All oxygen piping shall be grounded.
- i. All filter elements and housings shall be manufactured of bronze or monel.

3.1.48 **NON-DESTRUCTIVE EXAMINATION:** Mandatory minimum non-destructive examination of welds shall conform to the requirements of Table 136.4* and the following.

WELD TYPE	EXAMINATION
Butt weld.....	RT
Welded branch connections.....	RT for 2" and over. MT or PT for less than 2".
Fillet, socket welds.....	MT or PT all sizes.

NOTES:

- a. Welds shall be given a visual examination in addition to the examination specified above. Acceptance standards for visual examination shall be those of American Welding Society, D1.1 paragraph 8.15.1, "Quality of Welds".
- b. RT=Radiographic Examination (paragraph 136.4.5*)

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- c. PT=Liquid Penetrant Exam (paragraph 136.4.4*).
- d. MT=Magnetic Particle Exam (paragraph 136.4.3*).

3.1.49

SYSTEM CLEANING: Pipe that contains gases that will be breathed by humans shall be cleaned.

- a. The contractor shall be responsible for cleaning all new piping and components, and existing piping and components on which work is performed, to the nearest disassembly joint. Equipment, materials, instruments, personnel and laboratory services required for cleaning certification shall be provided by the contractor.
- b. The contractor shall submit his cleaning procedures to the Government. Procedures for cleaning the air system must be consistent with NAVSEA SS521-AA-MAN-010, appendix G. The use of organic solvents as a cleaning agent is prohibited.
- c. Components which are certified clean upon delivery by the manufacturer will not require cleaning if the integrity is not violated. Components which have been shop tested and certified for cleanliness shall be bagged and removed from the system during cleaning operations. Systems may be cleaned as a whole or in sections provided all clean piping is kept isolated and free of contamination after cleaning.
- d. An air gas sample shall be taken from the discharge of each air supply which will be breathed by humans. The total amount of gas samples taken shall ensure that there is analysis of the entire system. An additional sample shall be taken at one of the compressor air inlets. Samples shall be taken after hydrotesting, cleaning and assembly. Air purity shall meet or exceed standards stated in the U.S. Navy Diving Manual (NAVSEA SS521-AG-PRO-010), Table 4-1, 4-2, 4-3, 4-4, or 4-5. Dew point analysis shall be conducted that confirms that less than -40°F air is being supplied by the compressors.
- e. Gas samples shall be taken at the discharge of all other pipe gas supplies which may be breathed by humans (oxygen, nitrox, heliox,) or used for mixing of breathing supplies (nitrogen, helium, etc.). The total amount of gas samples taken shall ensure that there is analysis of the entire system. Samples shall be taken after hydrotesting, cleaning and assembly. Purity shall meet or exceed the standards stated in the U.S. Navy Diving Manual (NAVSEA SS521-AG-PRO-010), Table 4-1, 4-2, 4-3, 4-4, or 4-5.
- f. Oxygen system cleaning procedures and Gas sample requirements must comply with the requirements of MIL-STD-1330D.
- g. All gas samples shall be tested for the presence of unacceptable levels of all agents used in cleaning. An unacceptable level is any level less than 1/10th the maximum OSHA eight (8) hour exposure level for any constituent in the cleaning material.
- h. If liquid cleaning solutions are used requiring final H₂O rinse, the final rinse solution shall be sampled to insure cleaning agents do not remain in the system.

3.1.50

HYDROSTATIC TEST: Paragraph 137* - Leak Test. Piping shall be hydrostatically strength tested to 1-1/2 design pressure.

3.1.51

GAS LEAK TEST: A gaseous leak test shall be conducted after the hydrostatic strength test. The test shall be conducted with air unless otherwise specified or required by breathing media service. The maximum test pressure shall be the Maximum Operating Pressure. The gas pressure shall be permitted to stabilize as a result of temperature change. All possible sources of pressurization and volume storage (tanks, etc.) shall be isolated from the system. High pressure piping and low pressure piping in systems shall be tested independently. The maximum test pressure shall be safely brought to maximum operating pressure and held. After allowing for equalization, a complete system bubble test will be performed, with no bubbles allowed. The pressure will then be brought to low pressure (50 psi) and left for an extended period of at least 3 hours. The pressure shall not drop.

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3.2 SPECIFIC REQUIREMENTS:

- 3.2.1 GAS FARM OXYGEN PIPING:** The contractor shall provide for the piping systems as shown in section C6. The piping shall connect to the existing supplies to the Building 356 Pier Side Building and Hotel stations (at GV-X-26), to the Applied Instruction Building (at GV-UO-01), and to the Gas Transfer Room (at GV-OX-04) located out in the Gas Farm as shown in section C6. The piping shall also connect to the piping connection from the Gas Transfer Room (at GV-OX-02) as shown in section C6. The piping shall connect to each flask through a flex hose and a new GFE CGA 540 valve to be installed by the contractor. Each GFE CGA valve its own burst disc. For purposes of flask cleanliness the new CGA valves are to be installed as soon as the existing CGA valves are removed. The piping shall meet the requirements of section C3. Two panels shall be provided for piping Oxygen to and from different locations. The two panels shall be located on each side of the Oxygen Flask Bank, aligned down the aisle on each side of the bank.
- 3.2.2 DEMO OF ALL EXISTING GAS FARM FLASK MANIFOLD PIPING:** The contractor shall demolish Gas Farm Oxygen flask manifold piping. The contractor shall demolish all piping on the front of the oxygen bank from the CGA angle valves on the front of each flask up to valves GV-X-26, GV-UO-01, GV-OX-04, and GV-OX-02. These four valves shall be demolished once final installation is ready (these valves are used as part of the temporary service (detailed below). The contractor shall also demo the old piping to and including the unused Gas Farm Oxygen Charging Panel. The existing schematic is shown in section C6.
- 3.2.3 TEMPORARY TUBE TRUCK AND MANIFOLD:** The contractor shall provide for a tube truck to provide oxygen throughout the installation period. The contractor shall provide a temporary manifold that shall connect the tube truck to the existing supplies to the Building 356 Pier Side Building and Hotel stations (at GV-X-26), to the Applied Instruction Building (at GV-UO-01), and to the Gas Transfer Room (at GV-OX-04) as shown in section C6.
- 3.2.4 GAS FARM HELIUM PIPING:** The contractor shall provide for the piping systems as shown in section C6. The piping shall connect to the existing supply **FROM** the Building 350 Gas Transfer Room (at GV-H-05), to the supply **TO** the Building 350 Gas Transfer Room (at GV-H-02) as shown in section C6. The piping shall connect to each flask via a flex hose into the Mil-STD 24109 on each flask. The contractor shall install a new Burst disk on the back of each flask that is "In Kind" to the existing burst disk. The existing burst disk is a ¼" OESCO Reorder # U-3517-01 with a burst pressure of 3851 psi. The piping shall meet the requirements of section C3. Two panels shall be provided for piping Helium to and from different locations. The two panels shall be located as followed: One in front of the flask bank and the other down the on each side of the Helium Flask Bank, aligned down the aisle on each side of the bank. Every effort should be made by the contractor to conserve the helium in the banks. It is recommended that the contractor wait until the piping on the front of the flask is completed until replacing the burst disks. NDSTC will be able to use the new piping to move helium from one flask to another so that helium is conserved.
- 3.2.5 DEMO OF ALL EXISTING GAS FARM FLASK MANIFOLD PIPING:** The contractor shall demolish the Helium Gas Farm flask manifold piping. The contractor shall demolish all piping on the front of the Helium bank from the CGA angle valves on the front of each flask up to valves GV-H-02, and GV-H-05. These two valves shall be demolished once final installation is ready. The existing schematic is shown in section C6.

END OF SECTION

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PART C4

4.1 GENERAL REQUIREMENTS: N/A

4.0 PIPING & INSTRUMENTATION TECHNICAL REQUIREMENTS

4.1 GENERAL REQUIREMENTS:

4.1.1 ASME: Pressure Vessels for Human Occupancy (PVHO) shall conform to the requirements of ASME/ANSI PVHO-1, "Safety Standard for Pressure Vessels for Human Occupancy" and ASME Section VIII, div 1, "Pressure Vessels". The PVHO shall be stamped. There are references to paragraphs in ASME Section VIII, div 2 in this specification. Those references are indicated by an exclamation mark following the paragraph number (Illustration, "Paragraph AG 301.1!").

4.1.2 NATIONAL BOARD REGISTRATION: See section C2.1

4.1.3 LOT MATERIAL: SA-516 GR 70 and SA-304L

4.1.4 LUBRICANTS: Provision shall be made for lubrication of all running parts (doors etc). Lubrication zerk fittings shall be made of non corrosive 316 stainless steel. Lubricants shall be as specified on the drawings, and shall conform to the requirements of NAVSEA S9086-H7-STM-010 Naval Ships' Technical Manual Chapter 262, Lubricating Oils, Greases, Hydraulic Fluids, and Lubrication Systems, Section 7, Lubricants in Diving Systems.

4.1.5 PAINTING: SEE SECTION 4.2 FOR SPECIFIC PAINTING REQUIREMENTS.

4.1.6 PVHO COLOR: The internal and external surfaces of each PVHO shall be painted a semi-gloss white.

4.1.7 LOT CLEANING: The LOT shall be clean upon delivery. It shall be cleaned with a non-ionic type detergent, and be free of extraneous debris.

4.2 SPECIFIC REQUIREMENTS:

4.2.1 CHAMBER REQUIREMENTS:

4.2.1.1 CHAMBER HULL RUNNING PARTS: All running parts of the chamber hull shall be lubricated. Lubricants for carbon steel and stainless steel hinge components, rolling element bearing and support system pins and pillow blocks shall be greased in accordance with MIL-G-27 (type 3). Rolling element bearings shall be thoroughly cleaned prior to being packed with this lubricant. All chamber hatch bearings shall be replaced. This type of lubricant shall not be used on aluminum materials.

4.2.1.2 CHAMBER HATCH LUBRICATION: The contractor shall inspect all the hatch fittings and replace any that are not in "as new" condition. All hatch bearings shall be removed and replaced with new hatch bearings. The contractor shall provide and lubricate the hatch bearings and hinge pin cams with halocarbon lubricant.

4.2.1.3 ACRYLIC VIEWPORTS: All viewports shall be replaced; they shall conform to the current ASME PVHO 1 code at time of award of this contract. The material shall be item A, conforming to MIL-L-391. The acrylic ports shall be annealed after machining. Each acrylic port shall be subjected to a hydrostatic test equal to one-and-a-half (1 ½) the vessel's maximum allowable working pressure for one hour prior to its installation in the chamber, on both sides of the viewport. The test pressure shall be reduced to MAWP psig and held for one hour on both sides of the viewport. During that period measurements shall be taken of the movement of the viewport in the frame with a dial indicator. Readings shall be made and recorded at 15 minute intervals. The viewport retaining ring bolts shall be replaced on all viewports. Retaining ring bolts shall be manufactured of 304 or 316 stainless steel.

4.2.1.4 DOOR SEALS: Seals shall be fluorocarbon elastomer rubber material conforming to MIL-S-10102.

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83248. All manway and medlock door seals shall be replaced.

- 4.2.1.5 RUBBER:** Rubber shall conform to ASTM D2000, durometer 50 through 70, class K, type A, air systems and NSTM 078-2.2.6.1 Seal Selection for Rapid Decompression Applications Oxygen Systems unless otherwise specified.
- 4.2.1.6 ACRYLIC VIEWPORT SEAT LUBRICANT:** Lubricant for acrylic viewport seats o-rings shall be silicone grease that conforms to MIL-S-8660.
- 4.2.1.7 VISUAL INSPECTION:** The following visual inspection shall be performed by the contractor:
- a. A visual inspection shall be performed on all hull welds of the pressure vessel. inspection shall be in accordance with ASME Section VIII, Division 1.
 - b. A visual inspection shall be performed on all piping welds in the CHAMBER system. inspection shall be in accordance with ANSI/ASME B31.1.
- 4.2.2.5 RADIOGRAPHIC TESTS:** No radiographic examination of the chamber shall be required by contractor except if rejectable flaws are found. Any radiographic tests on chamber shall be at an additional cost to the Government.
- 4.2.2.6 LOT CLOSURES:** The contractor shall demonstrate that each personnel closure operates properly and freely. Operation of the closure hinges shall be smooth without binding or chattering. The contractor shall replace each manway seal. All running parts of the CHAMBER shall be lubricated. Lubricants for carbon steel and stainless steel hinge components, rolling element bearings, and support system pins and pillow blocks shall be a grease in accordance with MIL-G-27617 (type 3). Rolling element bearings shall be thoroughly cleaned prior to being packed with this lubricant. All CHAMBER hatch bearings shall be replaced. This type of lubricant shall not be used on aluminum materials. The contractor shall inspect all stainless steel zerk fittings and replace any that are not in "as new" condition. All hatch bearings shall be removed and replaced with new hatch bearings. The contractor shall properly pack and lubricate the hatch bearings and hinge pin cams with halocarbon lubricant.
- 4.2.2.7 COMPONENT FAILURE:** Components which fail to meet specifications or are inoperative or erratic in operating shall be removed, repaired, and provided new, as directed by Contracting Officer, at the contractor's expense.
- 4.2.2.8 DAMAGE AND TOUCH-UP:** After completion of the overhaul and testing at the site, contractor shall touch-up marred paint and repair all damage suffered during the testing inspection. Painting shall be accomplished as specified in section 4.2.3, entitled "Painting".
- 4.2.2.9 METAL LOT SUPPORTS:** A visual inspection of the chamber supports at the site shall be accomplished by the contractor. The chamber foundation shall be inspected to determine if it is cracked and differential settlement occurred. The contractor shall report the findings in writing to the Government. Where parts are found fitted improperly as a result of deformation due to facility use, such conditions shall be reported immediately to the Contracting Officer and his approval of the method of correction obtained; the correction shall be made in the presence.
- 4.2.2.10 SOFTWARE REPLACEMENT:** The contractor shall replace all software for all LOT pipe joints broken in preparation of blasting and painting of the LOT. The replacement software shall be "in kind" to the existing software.
- 4.2.3.1 REPAINTING OF CHAMBER INTERIOR AND EXTERIOR:** The contractor shall completely repaint the interior and exterior of the chamber. As the painting will occur on site all base, local and state safety regulations must be followed.
- 4.2.3.2 PAINTING PLANS:** All painting plans must be submitted by the contractor and approved by the Contracting Officer.
- 4.2.3.3 PAINTING MATERIALS:** Paints shall be delivered in original factory containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer, all of which shall be legible at the time of use. Paint materials shall conform to the contract specifications. All paint

materials for the interiors of the pressure vessel assembly chambers, except as specified otherwise for the viewport bearing surfaces, shall be the products of Carboline. The contractor shall certify that the Chamber contains no asbestos, paints containing chromate lead paint, Polychlorinated Biphenyl's (PCB's), or elemental mercury.

4.2.3.4 PAINTING PREPARATION: Threaded hardware, stainless steel surfaces such as hatch hand hatch sealing surfaces, entire stainless steel and monel penetration surfaces, and viewport penetrations shall be masked or otherwise protected prior to surface preparation and coating operations. Following completion of painting, masking or protective materials shall be removed and metal surfaces cleaned as required.

4.2.3.5 VIEWPORT PENETRATIONS: The viewport penetrations shall be thoroughly cleaned and repaired with zinc oxide, or another acceptable corrosion protecting coating acceptable to the Contracting Officer.

4.2.3.6 SURFACE PREPARATION:

4.2.3.6.1 CHAMBER INTERIOR AND EXTERIOR SURFACES: The entire chamber interior surface shall be sandblasted or mechanical centrifugally blasted to "white metal" in accordance with SSPC SP-5. Bare surfaces shall be cleaned by wire brushing or other manual or mechanical means for removal of loose scale, rust, dirt, and other deleterious substances. Personnel performing sandblasting shall conform to the paragraph entitled "SAFETY" below. The exterior shall be roughed to prepare for the top coat described below.

4.2.3.6.2 SHOT DISPOSAL: The Contractor is responsible for proper disposal of all sandblast materials IAW all base, state and federal HAZMAT requirements.

4.2.3.7 PAINT APPLICATION: After being sandblasted, all interior and surfaces of the Outer Lock Inner Lock, including personnel and service lock closures shall be painted with the following system:

<u>Number of Coats</u>	<u>Material</u>	<u>Apply by</u>	<u>Thickness Dry Mils</u>	<u>Total Time</u>
1	Carboline 890H primer	spray	8	16 hrs
1	Carboline 890H finish white	spray	8	48-72 hrs
Total Dry film thickness:			16	

4.2.3.8 CHAMBER EXTERIOR WASHCOAT: The contractor shall provide for a complete washcoat of the exterior of the chamber. All painted surfaces are to be in "as new" condition. The contractor shall remove all piping and components from the exterior of the chamber to prevent a full washcoat. The paint to be applied shall be Bright White Carboguard 890. Paints shall be delivered in original factory containers that plainly show the designation, name, specification number, batch number, color, date of manufacture, manufacturer's directions, all of which shall be legible at the time of use. The exterior surface shall be "surface prepared" for washcoat painting in accordance with SSPC SP-7. Surfaces shall be "roughed" and cleaned in a manner to assure proper adherence of washcoat to existing paint. The final Dry Film Thickness to be applied shall be a minimum of 4 mils. The finished surfaces of the chamber exterior shall be free from runs, sags, and variations in color, texture, and finish. All surfaces including edges, corners, crevices, welds, and fasteners shall receive a film thickness equivalent to adjacent painted surfaces.

4.2.3.9 PAINT CURE: The contractor shall cure each coat by means of forced ventilation and heat in accordance with manufacturer's specifications. Curing time and conditions shall be recorded for each coat. Upon completion of the final cure and pressurization for leak testing, a sample shall be taken to verify that offgassing is complete.

4.2.3.10 PAINT INSPECTION: All painted surfaces of chamber shall be in "as new" condition. If failures are found, proper repair or complete new surface painting plans must be sent to the Contracting Officer.

4.2.3.10.1 CHAMBER INTERIOR AND EXTERIOR SURFACE INSPECTION: After the prime coat has dried for specified time, interior surfaces of the chamber shall be thoroughly checked for porosity. Porosities shall be marked and patched with primer. Phenoline 300 orange, with Special M filler, shall be used to patch porosities on metal surfaces. Putty knives or small trowels shall be used to push the material into voids and a brush dipped in Carboline Cleaner No. 1 shall be passed over the patches to smooth their surface. The finished surfaces of chamber interiors and exteriors shall be free from runs, sags, and variations in color, texture, and finish. All surfaces including edges, corners, crevices, welds, and fasteners shall receive a film thickness equivalent to adjacent painted surfaces. Each coat shall be inspected during and immediately after application for wet film thickness, pinholes, runs, and sags. The film thickness shall conform to the specifications. Pinholes, runs, sags, and the painted surfaces shall be repaired immediately while the paint is still wet, by removing the paint in the affected area and reapplying the coat. Pinholes which appear after the 1st coat has been applied must be filled properly. Each coat shall be dry and hard before application of the next coat and all paint work shall be subject to inspection at any time to ensure strict compliance with the specifications.

4.2.3.10.2 DAMAGE REPAIR: Surfaces damaged by the contractor during overhaul shall be refurbished to "as new" condition at the contractor's cost.

4.2.3.11 SAFETY: In all buildings and areas where painting, as called out in this specification is accomplished, the contractor shall take special precautions to see that proper ventilation is provided. Continuous forced-air circulation must be provided during coating application. In confined areas, workmen must wear air line respirators with a source of low-pressure fresh air and precautions shall be taken to provide eye protection for the workmen when spraying overhead. No painting shall be done adjacent to any fire hazard such as welding or cutting flame.

4.2.3.12 MS/DS SHEETS: OSHA Safety Data Sheets shall be provided for the paint system to be utilized as well as all solvents or thinners used in the preparation of the surfaces or mixing of the paints.

4.2.3.13 WORKMANSHIP: All work shall be done by skilled painters in a manner to produce a smooth, even surface free of runs, sags, orange peel or other defects, so that any final painted surface is free of sharp protrusions, pockets and pinholes. Where painting materials are applied incorrectly the faulty paint shall be removed and the surface recoated at the contractor's expense.

4.2.3.14 EXTRA PAINT: Provide one gallon of each type of paint used in any repainting. Paint shall be in new, unopened containers, clearly marked with date of manufacturer. Deliver along with purchase document for "Bar-coding" by and to NDS/TC Engineering.

4.2.3.15 AMBIENT GAS ANALYSIS: The chamber Hull shall have one ambient atmosphere gas analysis sample taken after the completion of the overhaul which must pass the gas analysis requirements of the table provide below. The ambient samples shall be taken from the inner and outer lock. The ambient samples shall have a 12-hour soak time at the max depth possible at the time of testing.

Atmospheric Target Compounds

Constituent	CAS No.	Limit (See Note 1)	Comments
Inorganic Compounds			
Oxygen	7782-44-7	See Note 2	
Carbon Dioxide	124-38-9	See Note 2	
Carbon Monoxide	630-08-0	10 ppm, max	Source - organic decomposition
Ammonia	7664-41-7	10 ppm, max	See Note 3, Source - metabolic & insulation
Hydrogen	1333-74-0	10,000 ppm, max	See Note 4, Source - metabolic & battery
Sulfur Dioxide	7446-09-5	10 ppm, max	See Note 3, Source - metabolic & waste
Hydrogen Sulfide	7783-06-4	10 ppm, max	See Note 3, Source -

			metabolic & waste
Chlorine	7782-50-5	0.1 ppm, max	See Note 3, Source - potable water
Mercury	7439-97-6	0.01 Mg/M3, max	See Note 3, Source - electronic displays
Organic Screening Analyses			
Total Hydrocarbons (expressed as, and including, methane)	NA	25 ppm, max	See Note 5.
Total Halogens (chlorinated, brominated & fluorinated compounds)	NA	10 ppm, max	See Note 6.
Odor & Aerosols	NA	None Detectable	Visual & Olfactory

Atmospheric Target Compounds (Cont'd)

Constituent	CAS No.	Limit	Comments (See Note 1)
<i>Halogenated Solvents</i>			
1,1,1 Trichloroethane (methyl chloroform)	71-55-6	2.5 ppm, max	See Note 7.
Trichloroethylene	79-01-6	0.1 ppm, max	See Note 7.
1,2-Dichloroethylene	540-59-0	0.1 ppm, max	See Note 7.
<i>Hydrocarbon Solvents</i>			
Benzene	71-43-2	0.1 ppm, max	See Note 3, Source - solvents & smoking
Butyl-Cellulose	111-76-2	2 ppm, max	See Note 3, Source - aqueous detergents
Xylene(s)	1330-20-7	10 ppm, max	See Note 3, Source - solvents & adhesives
<i>Intentionally Blank</i>			
<i>Other Organic Compounds</i>			
Acrolein	107-02-8	0.01 ppm, max	See Note 3, Source - smoking, varnish, & paper products
Formaldehyde	50-00-0	0.04 ppm, max	See Note 3, Source - insulation & varnish
Vinylidene Chloride	75-35-4	0.15 ppm, max	See Note 3 & 7, Source - insulation

Notes:

- Correct the limit (except oxygen and carbon dioxide) for Surface Equivalent Value (SEV) when sampling spaces whose floodable volume is variable, and material that will be installed in pressurized portions of a breathing gas system. Correct for SEV by dividing the limit by the maximum operating pressure of the manned space corrected to atmospheres absolute (ata). When the limit is below instrument sensitivity, the analyzing activity shall report results as less than the applicable instrument detectability. The minimum instrument detectability, using the most sensitive analytical device, shall be equal to the SEV corrected allowable exposure limit, or if greater, a value acceptable to cognizant medical department personnel.
- The concentration shall be in accordance with the gas used during the off-gas test.
- The limit specified is lower than that specified by OSHA or ACGIH to account for the health risk posed by extended exposure and exposure to multiple contaminants.
- The limit specified is one-quarter the lower explosive limit.

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5. Measurements exceeding the Total Hydrocarbon screening limit shall require additional analysis to determine the causative constituents.
6. Total halogen measurements shall express results in accordance with an accepted equivalency constituent such as chloromethane. Measurements exceeding the Total Halogen screening limit shall require additional analysis to determine the causative constituents.
7. The limit specified is based on the potential for decomposition to dichloro- or monochloroacetylene in carbon dioxide removal equipment.

- 4.2.4.1 **NEW STAINLESS STEEL MANWAYS:** The contractor shall provide for two (2) new stainless steel manways for the LOT. The manways shall be manufactured out of ASME 316L stainless steel. The doors shall be otherwise identical to the original design. The design drawings for the doors are provided in section C6.
- 4.2.4.2 **PRODUCTION IMPACT TESTS:** Production impact test(s) of shell material base plate shall be conducted for all vessels for all thicknesses of vessel plate. The production impact tests shall test the base material, welds and heat affected zones in accordance with paragraph AT-203!. Should only one thickness of vessel plate be used (cylinder, hemispheres, etc.), a test coupon shall be attached to the termination point of the cylinder longitudinal weld.
- 4.2.4.3 **TENSILE STRESSES:** Details shall be such that tensile stress shall not be applied to the shell in the transverse direction of rolled plates.
- 4.2.4.4 **ATTACHMENTS:** Attachments shall be of the same material and thickness as the pressure boundary. A request for exception to this requirement shall be submitted by the contractor and approved by the Government.
- 4.2.4.5 **LUBRICANTS:** Provision shall be made for lubrication of all running parts (doors etc.). Lubrication zerco's shall be made of non-corrosive 316 stainless steel. Lubricants shall be specified on the drawings, and shall conform to the requirements of NAVSEA S9086-H7-STM Naval Ships' Technical Manual Chapter 262, Lubricating Oils, Greases, Hydraulic Fluids, Lubrication Systems, Section 7, Lubricants in Diving Systems.
- 4.2.4.6 **MACHINED SURFACES:** All machined surfaces shall be MT or PT examined (paragraph AF 110!).
- 4.2.4.7 **SURFACES & EDGES:** Rough mill scale shall be removed from plate. Welds shall be dressed as appropriate to prevent any sharp or unsightly joints. Corners and edges shall be deburred, radiused or chamfered as specified in the contract drawings. Non-functional sharp edges or projecting points are not permitted.
- 4.2.4.8 **WELD CONFIGURATION:** All butt welds in the pressure vessel shall be full penetration double V-groove welds in accordance with paragraph AF 221!. All corner welds in the pressure vessel shall be full penetration double bevel groove welds in accordance with paragraph AF 223!. All welds to and in the pressure vessel shall be full penetration welds.
- 4.2.4.9 **WELD FINISH:** All welds shall be ground smooth prior to non-destructive examination.
- 4.2.4.10 **WELD RECORDS:** The chamber weld records required shall consist of a chamber weldment joint identification drawing (JID) for each chamber, with all chamber joint welds shown and a joint identification number assigned to each weld and a chamber weldment recorded form for each welded joint including non-pressure retaining joints. The weldment record shall include lug-attachment welds. The weldment record form shall contain the following information:
 - a. JID number.
 - b. Joint design type.
 - c. Base metal type with head and lot number.
 - d. Filler metal type with head and lot number.
 - e. Fit up inspection results.
 - f. Welding Procedure number.
 - g. Heat treatment if required.
 - h. Welder number.
 - i. Type of inspection and results.
 - j. Disposition of joint (pass/fail)
 - k. Any repairs of joint conducted.
 - l. Inspection procedure number.
 - m. NDT inspection number.
 - n. Signature and date.

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Welders symbols shall not be stamped on the pressure vessel, a weld map in accordance with AF 2351 shall be kept.

- 4.2.4.11 DOOR SEALS:** Door seals shall be o-ring type with dovetail grooves machined into the door. All double bevel sealing surfaces shall be flat to within .003"; surface finish shall be 32 rms or less than 32 rms or as otherwise specified. Refer to section C5 for details.
- 4.2.4.12 HYDROSTATIC TESTING:** The LOT doors shall be subjected to hydrostatic strength meeting requirements of ASME Section VIII. The tests shall be conducted with the manways in all possible pressure resistant configurations. The contractor shall submit a plan for a hydrostatic test. It is recommended that this testing be done in a contractor's shop using a temporary test rig manufactured for this purpose. The plans shall include safety precautions to be followed during testing.
- 4.2.4.13 LEAK TESTING:** A gaseous leak test shall be conducted after the hydrostatic strength test. The test shall be conducted with air unless otherwise specified. The maximum test pressure shall be design pressure. The gas pressure shall be permitted to stabilize as a result of temperature change. Then, a bubble test meeting the requirements of ASME section VIII shall be performed.
- 4.1.37 EFFECTIVE CODE:** The drawings provided with this contract shall be produced in accordance with the most current edition of the ASME Boiler and Pressure Vessel Code and the most current edition of ASME PVHO-1a.
- 4.1.38 FABRICATION REQUIREMENTS:** Each PVHO shall conform to ASME Section VIII, Division 1, "Pressure Vessels", and PVHO-1 "Pressure Vessels for Human Occupancy". Figures are included in Part C6. They shall also conform to Part C4.1, "Pressure Vessels for Human Occupancy, General Requirements" except for those paragraphs that refer to div 2. Each PVHO shall be stamped in accordance with paragraph UG-115.

END OF SECTION

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PART C5

5 QUALITY ASSURANCE

5.1 GENERAL REQUIREMENTS:

- 5.1.1 All work performed shall be in accordance with and to the standards and specifications cited in each section. Any changes in design or deviation from accepted standards must be documented and submitted to the Government prior to change or implementation.
- 5.1.2 **DESIGN REVIEW MEETINGS:** Design and fabrication review meetings shall be held by the contractor at the contractor's facility or the installation site, at time intervals no greater than eight weeks. Two weeks advance written notice shall be furnished to the Government prior to each meeting.
- 5.1.3 **CONTRACT ADHERENCE:** The contractor shall rigidly adhere to the requirements for qualification, certification, test, examination and inspection required by the various contract documents.
- 5.1.4 **SUBCONTRACTORS:** Subcontractors shall be monitored by the contractor to assure timely and adequate performance and adherence to approved specifications. Copies of all certifications/qualifications required for the subcontractor to perform his work shall be submitted by the contractor to the Government.
- 5.1.5 **SUBMISSION NUMBER:** All submissions and submittals required by this contract shall include one (1) original and three (3) copies of the submission.
- 5.1.6 **DISK COPIES:** Systems manuals shall be prepared using a commercially available word processing program. All drawings shall be prepared on a commercially available computer aided design program. The component database shall be prepared on a commercially available spreadsheet design program. All submissions (Preliminary Design, Final Design, and As-Built) of systems manuals, drawings, and component database shall include CD copies of the system manuals, drawings, and component database. Final disk submission of systems manuals, drawings, and component database shall be marked "As built". Final disk submissions of drawings shall include all the names of all signers present, and the date of signature. Complete files must be in current NMCI computer program product format such as MS Word, MS Excel, AUTOCAD (2010), MS Access. The contractor shall provide a minimum of two (2) copies of all CD's. **IN ADDITION, THE CONTRACTOR SHALL SCAN THE ENTIRE ACCEPTED AS BUILT SUBMITTAL IN PDF FORM AND SUBMIT TWO (2) CDS TO NAVFAC ESC AND TWO (2) CD'S TO THE END USER.**
- 5.1.7 **NOTIFICATION OF TESTING:** The contractor shall provide the Government with written notification of all testing and a functional test plan (as described herein). This notification shall be received by the Government a minimum of fifteen working days prior to the date of the test.
- 5.1.8 **CONTRACTOR'S RECORDS AND DOCUMENTS:** The contractor shall submit copies of all records and documents required by this contract and the codes and specifications cited herein. One original and three copies shall be submitted.
- 5.1.9 **PIECEMEAL SUBMITTAL:** Piecemeal submittal of any submittals required by this specification is unacceptable, and such submittals will be returned without review. As-Built drawings may be submitted piecemeal to NDSTC for preliminary review before the submission of the As-Built package.
- 5.1.10 **QUALITY ASSURANCE PLAN:** The contractor's Quality Assurance Plan shall be in accordance with **ISO 9001/2000** or **MIL-Q-9858**, and with any further quality requirements specified in the contract. As a minimum content, the program plan shall disclose the contractor's planned approach to fulfilling the requirements of every paragraph of sections 3 through 7 of MIL-Q-9858. A description of the organization that will fulfill the quality program requirements with a definition of the responsibility and authority of each functional element, shall be included. All of the contractor's documented policies or procedures which implement the quality program shall be identified in appropriate places with the plan. A short summary of the objective or purpose of each procedure shall be given. The plan must delineate, by flow chart or similar technique, where inspection, audit and other controls are to be applied to assure conformance with the contract quality requirements and must identify each

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assembly, process and inspection instructions applicable to the contract hardware and show where it is to be applied. The plan shall describe the method by which the plan will be applied to sub-contractors.

5.1.11 SAFETY PLAN: The contractor's Safety Plan shall be in accordance with EM-385-1-1, and with any further safety requirements specified in the contract. This includes the submission of an Accident Hazard Analysis and Accident Prevention Plan. The contractor shall meet all of the safety requirements of the NSA Panama City. The Safety Plan shall be provided with the Preliminary Design Submittal.

5.1.12 PRELIMINARY DESIGN PACKAGE: Documents in this package shall be of sufficient detail to demonstrate that the contractor's plan for the work described in this contract is in conformance with this contract as well as demonstrating the technical and functional feasibility of the contractor's plan. All elements of the design shall be in strict conformance with the hyperbaric facility code requirements as stated in paragraph 1.2.8. It shall clearly indicate where equipment, components and piping runs are intended to be located. Pragmatic issues of installation and maintenance shall be addressed. During development of the preliminary design, the contractor is responsible for visiting the site to facilitate layout of work. The Government will respond to the Preliminary Design submittal within 30 days of receipt. The preliminary package shall consist of the following applicable items, as a minimum.

- a. General Arrangement Drawings.
- b. System piping and electrical schematics.
- c. Calculations.
- d. Proposed Material and Manufacturing Specifications and qualifications.
- e. Preliminary Component Manufacturer's Design Data.
- f. Subcontractors Identification, Qualifications, and Certifications.
- g. Hyperbaric Systems Manual Outline.
- h. Component and Panel ID tags.
- i. Test Plans
- j. Welding Qualifications and Procedures
- k. Cleaning Qualifications and Procedures
- l. Painting Plan
- m. Non-destructive Testing Plan and Qualifications

5.1.13 FINAL DESIGN PACKAGE: The Final Design shall be the final versions of the elements of the Preliminary Design Package. Should the contractor find an alternative Final Design item, which is in scope with the contract specifications, but that differs from the Preliminary Design submission for the respective item, the details of this alternative design item shall be fully documented in the Final Design package. The alternative Final design items shall be a distinct and separate part of the Final Design Package. The contractor shall provide details on why he recommends the change and any benefits to the Government in making this change. The Government shall have the right to accept this alternative Final Design item, or to require the contractor to proceed in accordance with his Preliminary Design for the respective item. Should the Government choose to accept the alternate Final Design item, it shall be at no additional cost or time to the Government. The contractor shall provide electronic copies of the Final Design Drawings with the Final Design Package. The Government will respond to the Final Design submittal within 30 days of receipt.

5.1.14 DRAWING PACKAGE: The drawing package shall be configured, and contain the elements, as described in the current version of NDSTC PD-2. The currently approved copy of PD-2 will be provided to the contractor upon request. This version of PD-2 shall apply where directed herein.

5.1.15 RECORD DRAWINGS AND DOCUMENTATION: The contents shall show the work as it was actually performed. The drawings shall be "D" size, or as designated herein or a drawing size acceptable to the COTR. It shall consist of:

- a. Engineering Drawings of an "As Built" condition.
- b. A serialized group of all component catalogues that are delivered with the components. They usually contain operation, maintenance, exploded view, replacement part numbers, etc.
- c. Weld Maps and Joint Identifications.

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The record drawings shall meet the requirements of the current approved version of PD-2.

5.1.16 COMPONENT MANUFACTURER'S DESIGN DATA: The contractor shall provide the Component Manufacturer's Design Data (CMDD) for all components provided as part of this contract. The CMDD shall be provided in one completely marked and coordinated package sufficient to assure full compliance with the specification requirements. Submittals for each manufactured product shall include, but not be limited to the following: Manufacturer's descriptive literature and catalog cuts, manufacturer's operation and maintenance manual (**2 Copies**), equipment drawings, diagrams, performance and characteristic curves, catalog model or number, nameplate data, size, layout dimensions, capacity, specification reference, component tag number, and find number from valve and component list/drawings.

5.1.17 SYSTEMS MANUAL: The contractor shall provide Systems Manuals. The contractor is responsible for providing all sections for systems provided under this contract. The manual shall consist of the following:

- a. General Facility Description:
- b. System Certification:
- c. There shall be a section addressing each of the Hyperbaric Systems. The following data shall be provided by the Contractor for each system:
 1. System Operational Capabilities, Limitations and Set Points.
 2. System Narrative Description.
 3. System Piping and Electrical Schematics.
 4. System Operating Instructions.
 5. System Maintenance Instructions.
 6. System Design Computations.
 7. System Spare Parts Data.
 8. Component List.
 9. System Functional Test.

5.1.18 CONTRACTOR'S RECORDS AND DOCUMENTS: Contractors records and documents shall include all records and documents required by Part C1 and C3. These shall include, but are not limited to:

- a. Test reports
- b. Inspection reports
- c. Test plans
- d. Travelers/route sheets
- e. Mill certs/material reports
- f. Procedures
- g. Qualifications
- h. Records
- i. Working drawings
- j. Radiographs
- k. Shop Drawings

5.1.19 COMPONENT DATABASE: The Component Database provides design, procurement and manufacturer's data about the components. The database requirement shall be met by the use of MS Excel or MS Access. The database fields (columns) shall be:

- a. Component Identification Tag number.
- b. Design data:
 1. Type Component.
 2. Size.
 3. Drawing Number used on.
 4. Required PSI.
 5. Material Body and Seat
 6. End Connection Type and Material
- c. Manufacturer's Data:
 1. Manufacturer's name
 2. Manufacturer's address, telephone number.
 3. Model Number.
- d. Maintenance Data:
 1. Part number and price of consumables.

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2. Frequency of maintenance.
3. Manufacturer's Recommended Spare Parts.

5.1.20 FUNCTIONAL TEST PLAN: The contractor shall submit a functional test plan for the complete test of all hardware provided as part of this specification. The functional test plan shall include valve line up, functional testing procedures, pass/fail criteria and shut down of the system being tested. There shall be initial blocks for all steps of the functional test plan. There shall be final signature blocks for both the contractor's completion and the Government's witnessing of successful functional test. The plan will provide information as to all equipment needed for testing and the calibration information for that equipment. The test plan shall contain, as a minimum, the following data:

- a. Test purpose/objectives.
- b. Identify each assembly to be tested.
- c. Describe test set up at each level of test, including diagrams and sketches to illustrate test set-up.
- d. Describe or identify all test equipment required. Calibration of test equipment.
- e. Describe all test procedures, including test sequence, test parameters, participant **pass/fail criteria.**
- f. Provide sample test data sheets to illustrate test data to be documented and delivered level of test.
- g. Establish criteria for acceptance at each level of test and describe the procedure followed in the event of malfunction or failure.
- h. Identify critical or unusual tests or test conditions.
- i. Overall test schedule.

5.1.21 SYSTEM FUNCTIONAL TEST: The contractor shall be required to demonstrate by testing that all piping, instrumentation and systems are capable of meeting all the criteria contained in this specification. The functional test shall not be conducted until all other required testing has been completed, gas analysis reports have been received, and final, as built drawings have been submitted to the Government. The contractor shall prepare a test plan and a test report.

5.1.22 PROJECT SCHEDULE: The contractor shall prepare a contract progress schedule that clearly defines the tasks necessary to accomplish the work. The schedule shall be a GANTT chart, CPM chart or "ROADMAP". The schedule shall be composed of defined and documented Milestones and Tasks (M&T). Milestones are defined as having no time duration; whereas, Tasks have time duration. The schedule shall show the order and interdependence of M&T and the sequence of M&T execution necessary to complete the contract. The schedule shall show the M&T that comprise the critical path. It shall show the float for those M&T not on the critical path. Procurement and subcontracting tasks may cite total individual procurement or subcontract cost. Copies of M&T documents whose work was completed during a monthly period shall be submitted with the monthly progress report for that period. The M&T documents shall be signed by the contractor to indicate certified completion of the Task. The monthly update of the contract schedule shall contain the date of effect of that update and a list of the revision dates of the schedule. The following shall be included in the schedule as either milestones or tasks, as a minimum, in addition to others necessary to describe the work:

- a. Work Tasks.
- b. Contractual execution date requirements milestones.
- c. Government furnished information and/or equipment milestones.
- d. Contractual submittal date requirements milestones.
- e. Procurement activities including major equipment tasks.
- f. Subcontract activities tasks.
- g. Quality Control checks.

5.1.23 MONTHLY REPORT: The contractor shall provide a monthly report, which shall include an update of the Project Schedule and Component Database. The revised documents shall reflect any changes occurring since the last updating. It shall also include a current Progress Report containing a summary of all work performed and any problems and their solutions encountered during the reporting period, and a statement of the overall status of the project, and a statement of the overall status of the project. This report shall be sent electronically in its entirety to the COTR.

5.1.24 PURCHASE ORDERS: The contractor shall submit all purchase orders for all material purchased. The Contractor shall prepare a database or table which cross-references data such as purchase order number, find number (if applicable), and any other pertinent information such as heat

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numbers. The purchase orders shall be kept in a separate three-ring binder (or binders). Each purchase order (and its applicable data) shall be separated by its own individual tab.

END OF SECTION

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PART C6

6 DRAWING SCHEMATICS:

FIGURE 1: OXYGEN SCHEMATIC AND TEMPORARY CONNECTIONS

FIGURE 2: EXISTING OXYGEN BANK SCHEMATIC

FIGURE 3: HELIUM BANK SCHEMATIC

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FIGURE 4: EXISTING HELIUM BANK SCHEMATIC

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FIGURE 5: LOT DOOR DESIGN

FIGURE 6: LOT DOOR DETAIL 1

FIGURE 7: LOT DOOR DETAIL 2

FIGURE 8: LOT DOOR DETAIL 3

FIGURE 9: LOT DOOR DETAIL 4

END OF SPECIFICATION

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SECTION D PACKAGING AND MARKING

Packaging and Marking shall be in accordance with Section D of the Seaport-E Multiple Award Basic contract.

The reports and other data to be furnished by the Contractor shall be preserved, packaged, and packed in accordance with the requirements of the United States Postal Service for First Class, or otherwise specified by the Contracting Officer. Electronic submission of reports is acceptable in most instances. Note that Navy servers do not allow active file transmission, such as .ZIP. Note that contractor-hosted data is not acceptable for final deliverables.

All Deliverables shall be packaged and marked IAW Best Commercial Practice.

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SECTION E INSPECTION AND ACCEPTANCE

Upon completion of all work and final submission of all data items, the contractor's Senior Technical Representative shall prepare and sign a Certificate of Final Acceptance memorandum, and submit it to the TOM for signature. The contractor shall include the fully signed memorandum with its final invoice.

Inspection and Acceptance shall be in accordance with Section E of the Seaport-E Multiple Award IDIQ Basic contract for Firm Fixed Price Task Orders. Packaging and Marking shall be in accordance with Section D of the Seaport-E Multiple Award IDIQ Basic Contract.

See section G for WAWF instructions. NAVFAC will retain POC/ACO authority for inspection/acceptance/payments.

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SECTION F DELIVERABLES OR PERFORMANCE

The periods of performance for the following Items are as follows:

8000

9/29/2014 - 9/28/2015

CLIN - DELIVERIES OR PERFORMANCE

All provisions and clauses in Section F of the basic contract apply to this task order

F.1 - CLIN – Performance Periods

The period of performance is from the date of task order award through 365 days thereafter. Offerors shall provide a proposal completion schedule if different than the period of performance above as part of their technical proposal. Specified delivery expectations are contained in section C PWS (or use Attachment 1 PWS for same info). Section 1.1.7

Services to be performed hereunder will be provided at the Naval Diving and Salvage Center, Panama City Florida.

See PWS Section 1.2.7 for the Government delivery schedule. Any exception to this schedule must be so noted in the proposal.

All deliverables shall be in accordance with the Quality Assurance Table in Attachment 2.

Attachment 3 discusses CDRLs.

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SECTION G CONTRACT ADMINISTRATION DATA

G14S CONTRACTOR'S SENIOR TECHNICAL REPRESENTATIVE

Contractors: Fill-in the information required below and submit it as an attachment to your proposal. the contractor's senior technical representative, point of contact for performance under this task order is:

Name:
Title:
Mailing Address:
E-mail Address:
Telephone:
FAX:

The contractor's contracting office POC is:

Name:
Title:
Mailing Address:
E-mail Address:
Telephone:
FAX:

G17S TOM APPOINTMENT

(a) The Task Order Ordering Officer hereby appoints the following individual as the Task Order Manager (TOM) for this task order:

Name: Alin Schmutz

(b) The TOM is responsible for those specific functions assigned in the Task Order Administration Plan, attached.

(c) Only the Contracting Officer has the authority to modify the terms of the task order. Therefore, in no event will any understanding, agreement, modification, change order, or other matter deviating from the terms of the basic contract or this task order between the contractor, an effort outside the existing scope of this task order is requested, the contractor shall promptly notify the Task Ordering Office in writing. No action shall be taken by the contractor unless the Task Order Ordering Officer, or basic contract PCO has issued a formal modification.

CONTRACTING OFFICER:

Lynn Torres
NAVFAC Expeditionary Warfare Center, EXWC
Code ACQ71
Naval Base Ventura County
1100 23RD Avenue, Bldg.1100
Port Hueneme, CA 93043-4347
lynn.torres@navy.mil

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252.232-7003 Electronic submission of payment requests and receiving reports

252.232-7006 Wide Area WorkFlow Payment Instructions.

As prescribed in 232.7004(b), use the following clause:

Wide Area Workflow Payment Instructions (JUN 2012)

(a) *Definitions.* As used in this clause—

Department of Defense Activity Address Code (DoDAAC) is a six position code that uniquely identifies a unit, activity, or organization.

Document type means the type of payment request or receiving report available for creation in Wide Area WorkFlow (WAWF).

Local processing office (LPO) is the office responsible for payment certification when payment certification is done external to the entitlement system.

(b) *Electronic invoicing.* The WAWF system is the method to electronically process vendor payment requests and receiving reports, as authorized by DFARS 252.232–7003, Electronic Submission of Payment Requests and Receiving Reports.

(c) *WAWF access.* To access WAWF, the Contractor shall—

(1) Have a designated electronic business point of contact in the Central Contractor Registration at <https://www.acquisition.gov>; and

(2) Be registered to use WAWF at <https://wawf.eb.mil/> following the step-by-step procedures for self-registration available at this Web site.

(d) *WAWF training.* The Contractor should follow the training instructions of the WAWF Web-Based Training Course and use the Practice Training Site before submitting payment requests through WAWF. Both can be accessed by selecting the “Web Based Training” link on the WAWF home page at <https://wawf.eb.mil/>.

(e) *WAWF methods of document submission.* Document submissions may be via Web entry, Electronic Data Interchange, or File Transfer Protocol.

(f) *WAWF payment instructions.* The Contractor must use the following information when submitting payment requests and receiving reports in WAWF for this contract/order:

(1) *Document type.* The Contractor shall use the following document type(s).

2-in-1

(2) *Inspection/acceptance location.* The Contractor shall select the following inspection/acceptance location(s) in WAWF, as specified by the contracting officer.

N/A

(3) *Document routing.* The Contractor shall use the information in the Routing Data Table below only to fill in applicable fields in WAWF when creating payment requests and receiving reports in the system.

Routing Data Table*

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<i>Field Name in WAWF</i>	<i>Data to be entered in WAWF</i>
Pay Official DoDAAC	N68732
Issue By DoDAAC	N39430
Admin DoDAAC	N39430
Inspect By DoDAAC	N39430
Ship To Code	
Ship From Code	
Mark For Code	
Service Approver (DoDAAC)	
Service Acceptor (DoDAAC)	N39430
Accept at Other DoDAAC	
LPO DoDAAC	N39430
DCAA Auditor DoDAAC	
Other DoDAAC(s)	

(4) *Payment request and supporting documentation.* The Contractor shall ensure a payment request includes appropriate contract line item and subline item descriptions of the work performed or supplies delivered, unit price/cost per unit, fee (if applicable), and all relevant back-up documentation, as defined in DFARS Appendix F, (e.g. timesheets) in support of each payment request.

(5) *WAWF email notifications.* The Contractor shall enter the email address identified below in the "Send Additional Email Notifications" field of WAWF once a document is submitted in the system.

lynn.torres@navy.mil

michele.pierpoint@navy.mil

alin.schmutz@navy.mil

(g) *WAWF point of contact.* (1) The Contractor may obtain clarification regarding invoicing in WAWF from the following contracting activity's WAWF point of contact.

(*Contracting Officer: Insert applicable information or "Not applicable."*)

(2) For technical WAWF help, contact the WAWF helpdesk at 866-618-5988.

[77 FR 38734, June 29, 2012]

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SLINID	PR Number	Amount
8000		632938.00

LLA :
AA 17 14141804 22M8 0252 3595A 0 068566 2D CP0008 0610A4ENJ01Q
Standard Number: N0610A14RCP0008

BASE Funding 632938.00
Cumulative Funding 632938.00

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SECTION H SPECIAL CONTRACT REQUIREMENTS

ESRS SUBCONTRACT REPORTING

IRS and SSR reports shall be submitted via the eSRS in accordance with FAR 52.219-9 and 52.219-25. To create an account, go to: <http://www.esrs.gov>.

ACCESS TO GOVERNMENT SITES

(a) Contractor personnel shall comply with all current badging and security procedures required to gain access to any government site. The contractor shall ensure that contractor personnel employed on any government site become familiar with and obey activity regulations. Contractor personnel shall not enter restricted areas unless required to do so and until cleared for such entry.

(b) All contractor equipment shall be conspicuously marked for identification. The contractor shall strictly adhere to Federal Occupational Safety and Health Agency (OSHA) Regulations, Environmental Protection Agency (EPA) Regulations, and all applicable state and local requirements.

CONTRACTUAL AUTHORITY AND COMMUNICATIONS

(a) Except as specified in subparagraph (b) below, no order, statement, or conduct of any Government personnel who visit the contractor's facilities or in any other manner communicates with contractor personnel during the performance of this task order shall constitute a change under the Changes clause of this contract.

(b) The contractor shall not comply with any order, direction or request of government personnel unless it is issued in writing and signed by the Contracting Officer, or in pursuant to specific authority otherwise included as a part of this task order.

(c) The Contracting Officer is the only person authorized to approve changes in any of the requirements of this task order and, notwithstanding provisions contained elsewhere in this task order, the said authority remains solely the Contracting Officer's. In the event the contractor effects any change at the direction of any person other than the Contracting Officer, the change will be considered to have been made without authority and no adjustment will be made in the task order price to cover any increase in charges incurred as a result thereof.

WORK WEEK

(a) All or a portion of the effort under this contract will be performed on a Government installation. The normal work week shall be Monday through Friday for all straight time worked. No deviation in the normal work week will be permitted without express advance approval in writing by the designated Ordering Officer(s) with coordination of the using departments. In the event that the contractor fails to observe the normal work week, any resulting costs incurred by the Government shall be chargeable to the contractor. Work on Center shall be performed during the normal work hours at that location unless differing hours are specified at time of task order award. For purposes of scheduling personnel, the contractor is hereby advised that the Government installation will observe all Federal Government holidays. The contractor is further advised that access to the Government installation may be restricted on these holidays.

(b) In any event the contractor is prevented from performance as the result of an Executive Order or an administrative leave determination applying to the using activity, such time may be charged to leave or indirect charges in accordance with company policy.

KEY PERSONNEL

NAVFAC 5252.237-9301 Substitution of Key Personnel (June 1994)

The contractor shall provide complete resumes for proposed substitutes, and any additional information requested by the Contracting Officer. Proposed substitutes should have comparable qualifications to those of their persons being

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replaced. The Contracting Officer will notify the Contractor within 15 days after receipt of all required information of the consent on substitutes. No change in fixed unit price may occur as a result of key personnel substitution.

(End of clause)

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SECTION I CONTRACT CLAUSES

**IN ACCORDANCE WITH THE SEAPORT-E MULTIPLE AWARD BASIC CONTRACT FOR FIRM
FIXED PRICE TASK ORDERS**

52.222-41 SERVICE CONTRACT ACT (1965)

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SECTION J LIST OF ATTACHMENTS

Attachment 1 - PWS with drawings

Attachment 3 CDRLs

Attachment 2 QASP

Attachment 4 subcontracting plan template