NAVAL AIR ENGINEERING CENTER
AEROSPACE CREW EQUIPMENT LABORATORY
PHILADELPHIA, PA. 19112

IN REPLY REFER TO:
C-4:EH:alc
6502
(6379)
20 AUG 1965

6500 (Human Volunteers)

From: Commanding Officer, Naval Air Engineering Center, Phila., Pa. 19112
To: Secretary of the Navy
Via: (1) Chief, Bureau of Naval Weapons (RA-15)
(2) Chief, Bureau of Medicine and Surgery (Code 71)
(3) Chief, Bureau of Naval Personnel

Subj: Experimental studies of a medical nature involving persons in the Naval Establishment

Ref: (a) MMD Art. 1011

Encl: (1) Copy of Statement of Work on NASA DPR T-41830 (G) of 9 Apr 1965

1. Approval is requested for the conduct of the experimental study described below, in which volunteer personnel of the Naval Establishment will be used as subjects. The studies to be conducted will receive primary financial support from the National Aeronautics and Space Administration (NASA), but substantial assistance to the program will be made in Navy personnel, facilities, and funds because of the direct importance of the program to the Navy's present and future operations.

2. The purpose of this study is to extend work already carried out by the Aerospace Crew Equipment Laboratory (ACEL) in determining the physiological effects of breathing mixtures of oxygen and an inert gas on the incidence of bends following decompression from an altitude of 18,000 ft. to one of 35,000 ft. Past studies utilized nitrogen as the inert gas in the mixture; in the present study, helium will be used in place of nitrogen. Details of this study are included in enclosure (1).

3. As indicated above, the study to be conducted is an extension of similar studies conducted by the ACEL. Provisions to assure constant surveillance of the subjects during the test period by qualified medical personnel and all measures to assure their well-being and safety have been developed and will be applied, as directed by reference (a).

Henry G. Wagner

HENRY G. WAGNER
BY DIRECTION

NASA - DEFENSE PURCHASE REQUEST

1. PAGE 1 OF
4. AMENDMENT NUMBER N/A

2. DATE APR 9 1965

3. REQUEST NUMBER T-41830 (G)

5. TO: Aerospace Crew Equipment Laboratory
Naval Air Engineering Center
Philadelphia, Pennsylvania

6. FROM: (Agency, Name, Telephone number of originator)
NASA Manned Spacecraft Center
Procurement & Contracts Division
General Research Procurement Branch
2101 Webster-Seabrook Road
Attention: John Kochner

7. ITEM DESCRIPTION

ITEM NO. a	DESCRIPTION OF SUPPLIES OR SERVICES (Federal Stock Number, Nomenclature, Specification and/or Drawing No., etc) b	QUANTITY c	UNIT d	ESTIMATED UNIT PRICE e	ESTIMATED TOTAL PRICE f
1	Defense Purchase Request for Research to Investigate the Potential Decompression Hazard Associated with a 7 psi 50% O_2 - 50% He, spacecraft atmosphere, in accordance with the attached Exhibit "A", "Statement of Work" pursuant to NASA Terms and Conditions. Technical Monitor: Edward L. Michel, EC6 HU 3-5554 (Area Code 713)				$60,000.00

8. SEE ATTACHED PAGES FOR DELIVERY SCHEDULES, PRESERVATION AND PACKAGING, SHIPPING, DISPOSITION OF PROPERTY, AND SPECIAL INSTRUCTIONS.

9. GRAND TOTAL $60,000.00

10. THIS REQUEST [X] IS [ ] IS NOT SUBJECT TO SECTION 305 OF THE NATIONAL AERONAUTICS AND SPACE ACT OF 1958.
(See special instructions on reverse side.)

11. MAIL SF 1080 BILLINGS TO NASA Manned Spacecraft Center
General Research Procurement Branch Attention: John Kochner
2101 Webster-Seabrook Road BG721
Houston, Texas 77058

12. NASA APPROPRIATION SYMBOL
PR No. 507-1069
908-40-06-01-EA-2510-EC621
Approp. Code 80X0108

13. AUTHORIZING OFFICER (Type Name and Title)
A. C. Wilder, Jr., Contracting Officer

14. SIGNATURE A. C. Wilder

NASA FORM 523 APR 61

INSTRUCTIONS

The NASA-Defense Purchase Request is to be used by NASA to request the procurement of supplies or services by any activity of the Department of Defense. These instructions pertain to preparation and use of the form by NASA activities.

Block 5: The original and 5 copies of the purchase request, each complete with all attachments, will be forwarded to the DOD activity shown in this block.

Block 7b: Describe the required services or supplies accurately and in sufficient detail to enable the purchasing activity to understand the requirement. When applicable, the particular NASA program and/or project to which the request or amendment pertains will be indicated. Attachments may be used as required. For items of hardware stocked by the DOD, the item identification of the Army, Navy or Air Force and the federal stock number will be entered if known. When applicable, the specification number, manufacturer's part number and other descriptive data, such as the desired grade, style, type, color, size, rating, etc.

Block 8: Attachments should be prepared in sufficient quantity so that each copy of a request is complete with a copy of every attachment listed therein.

SHIPPING INSTRUCTIONS: When names and addresses of consignees of all supplies to be delivered are not contained herein, or otherwise furnished, request for the issuance of shipping instructions shall be made to the appropriate NASA originating office not less than 30 days prior to date on which any of the articles is to be ready for shipment. Three copies of shipping documents shall be forwarded to the NASA originating office and each consignee.

DISPOSITION OF PROPERTY: Include instructions for the disposition of any non-expendable or other residual property purchased with NASA funds.

PRIORITY RATING: Include applicable priority rating and claimant program identification (Example: Priority Rating DO-A2). In procurement for DX programs, identification will also include the unclassified program name.

Block 10: If this request or any part of the supplies or services covered thereby are subject to Section 305 of the National Aeronautics Space Act of 1958 (42 U.S.C. 2457), copies of required clauses relating to Property Rights in Inventions together with appropriate instructions for the inclusion of such clauses in contracts shall be furnished the purchasing activity.

Block 12: Cite appropriation symbol, cost coding or any other accounting data to be included in the ensuing documentation.

Security Classification: If the purchase request or any part thereof is classified, DD Form 254 "Security Requirements Check List" (ASPR 16-811) or other written notice of security requirements will be prepared.

Changes: All changes that affect the contents of the purchase request must be processed as a purchase request amendment. This includes such changes as a decrease in quantity, increase or decrease in funds, change in the specifications or in the part, stock or drawing numbers, etc. Such changes may be made initially by expeditious means such as telegraph or telephone communication, but each change will be confirmed by a purchase request amendment. The original and 5 copies of purchase request amendments will be forwarded to the DOD recipient of the original purchase request. In preparing an amendment, Blocks 1 through 6 must always be completed. Only those remaining blocks of the form that are applicable to the change or revision of the data in the purchase request or prior amendments thereto need be filled in. The unused blocks, however, should have "N/C" inserted to reflect no change.

EXHIBIT "A"

STATEMENT OF WORK

PURPOSE

The purpose of this document is to describe a program to investigate the potential decompression hazard associated with the utilization of a mixed gas spacecraft atmopshere.

PROGRAM

1. OBJECTIVE:

The program objective shall be the preparation of a report, including, all test data, on experiments designed to investigate the suitability of an 18000 foot, 50% O_2 - 50% He atmosphere with respect to bends protection following rapid decompression.

2. DESCRIPTION:

The program is aimed at extending and amplifying the work already carried out under a previous NASA funded program. Emphasis will be placed on establishing the required time for equilibrations (partial denitrogenation) at the test atmosphere which will afford protection against bends following a subsequent rapid decompression to 35,000 feet.

3. TEST FACILITIES:

3.1 A low pressure chamber which is capable of being decompressed from sea level to 35,000 feet in 40 seconds period of time.

3.2 The chamber atmosphere composition during equilibration to the test atmosphere shall be maintained at 50% O_2 - 50% He at a simulated altitude of 18,000 feet.

3.3 Full chamber support facilities shall be available, including medical monitoring and safety procedures, provision for food and water, disposal of waste, facilities for recreation, and an adequate communications system.

3.4 A minimum of twelve (12) healthy male subjects shall be supplied by the Contractor who shall have responsibility for their selection,

medical examination, safety, and well-being. If possible, it would be desirable to select subjects in the 27-42 age range.

3.5 Clinical and physiological laboratory apparatus shall be provided to measure the parameters described under Test Procedures, before, during, and after the experiment.

3.6 Facilities for the measurement of human body fat through the displacement of water method as well as through skin fold measurements.

4. TEST PROCEDURE:

4.1 The subjects shall be divided into groups of at least four persons. Each of the groups shall be subjected two times to each of the set of conditions and procedures described below except paragraph 4.1.5 where one exposure will suffice.

4.1.1 Three hours of preoxygenation at sea level, followed by a rapid decompression (40 sec.) to 35,000 feet, remaining at 35,000 feet for three hours.

4.1.2 Twelve hours of pratial denitrogenation at 18,000 feet breathing a 50% O_2 - 50% He atmosphere followed by a decompression in one minute to 35,000 feet and remaining there for three hours with exercise. (Paragraph 4.2.1).

4.1.3 Repeat test contained in paragraph 4.1.2, but with either 15 hours of 9 hours of partial denitrogenation, depending on the results obtained.

4.1.4 Repeat test conditions contained in paragraph 4.1.2, but with either 6 or 18 hours of partial denitrogenation, depending on the results obtained.

4.1.5 Repeat paragraph 4.1.1 as well as that test in which the partial denitrogenation time at 18,000 feet was found adequate to afford bends protection in the event of a subsequent decompression to 34,000 feet, but with a more strenuous exercise. (Paragraph 4.2.2)

4.2 Exercise

4.2.1 During periods of equilibration at 18,000 feet, except for eat, sleep, and rest periods; all subjects shall engage in light exercise by playing cards between intervals of "marking time"

30 counts in 15 seconds every 15 minutes. This same exercise shall be continued during the period following decompression to 35,000 feet.

4.2.2 The more strenuous exercise to be used in paragraph 4.1.5 shall consist of 10 deep knee bends every 15 minutes together with elevation of a 14 lb weight to shoulder level during each knee bend.

4.3 The basis for detecting bends shall be through reports of subjects regarding their own condition. Removal of an individual from the chamber shall be the responsibility of the medical observer after evaluation of such factors as an increase in intensity of the pain, manifestations and progression of pain in more than one joint, choke symptoms, etc.

4.3.1 In cases where reported symptoms dictate the removal of the subject, the subject shall be recompressed to 27,000 feet and the disappearance, subsidence, etc. of the symptoms shall be investigated.

4.4 At least two days shall intervene between successive exposures of any one subject.

5. VARIATIONS:

5.1 Any variations from the work statement outline which the Contractor deems necessary for the successful execution of the experiment shall be incorporated in a detailed experimental protocol he will prepare in agreement with the Contracting Officer.

5.2 The contractor shall have responsibility for the well-being of the subjects and shall have the authority to terminate the experiment should the tests described above and the clinical evaluation indicate the presence of any hazard to the subjects.

5.3 The Contractor shall inform NASA, after consideration and integration with other on-going programs, of the time schedule for the completion of the work requested.

6. REPORTING REQUIREMENTS:

6.1 It is the intent of this contract that useful research information obtained under this contract be published by NASA and/or in technical and scientific journals and/or in the transactions

or proceedings of technical meetings. The Contractor should prepare reports for publication or presentation any time a useful body of information has been obtained. Unless specifically required by this contract, reports for publication will not contain reference to or recommendations concerning program or policy matters of the NASA.

6.2 Publications

In the event the Contractor elects publication in a technical or scientific journal, or in transactions or proceeding of technical meetings, he will submit information copies to NASA in advance of publication or oral presentation, and will furnish the name of the journal or technical group to which the material is to be submitted. Reprints of published reports will be submitted to NASA after publication. Specific written approval is required for publication or presentation of research material prior to submission of final report.

6.3 Final Report

On completion of work under this contract, the Contractor shall prepare a complete and detailed description and summary of the work carried on under the contract, in suitable form to be used as a NASA Technical Report or Technical Note, one copy of this final report shall be suitable for photo-offset reproduction without further editing or retyping. Reference to published material resulting from this contract may serve as part of this report. This report, in draft form, shall be reviewed by the Technical Monitor prior to clearance or editing for final preparation. Thirty copies of the Final Report shall be delivered to Manned Spacecraft Center Procurement and Contracts Division within two months after the completion of the experimental protocol.

6.4 General

All reports and publications prepared under this contract shall contain acknowledgement of NASA support and will identify the contract under which the work was performed.

6.5 It is anticipated that the work called for in the above Statement of Work can be completed in a six month period of performance.

EC6:ELMichel:ssb 11-17-64