RESEARCH AND TECHNOLOGY WORK UNIT SUMMARY	1. AGENCY ACCESSION*	2. DATE OF SUMMARY*	REPORT CONTROL SYMBOL
		811001	DD-DDR&E(AR) 636(3977)

3. DATE PREV SUM'RY	4. KIND OF SUMMARY	5. SUMMARY SCTY*	6. WORK SECURITY*	7. REGRADING*	8a. DISB'N INSTR'N	8b. SPECIFIC DATA-CONTRACTOR ACCESS	9. LEVEL OF SUM
80110	D.CHANGE	U	U	X	NL	[X] YES [ ] NO	A. WORK UNIT

CODES:*	PROGRAM ELEMENT	PROJECT NUMBER	TASK AREA NUMBER	WORK UNIT NUMBER
Y	63713N	M0099PN	M0099PN001	1155
TRIBUTING	0	0	0	
CONTRIBUTING	0	0	0	

11. TITLE (Precede with Security Classification Code)*

(U) Tracer gas kinetic studies for decompression table design

12. SCIENTIFIC AND TECHNOLOGICAL AREAS*

012900 Physiology 005900 Environmental Biology 002400 Bioengineering

13. START DATE	14. ESTIMATED COMPLETION DATE	15. FUNDING AGENCY	16. PERFORMANCE METHOD
7910	8310	DN	C. IN-HOUSE

17. CONTRACT/GRANT

a. DATES/EFFECTIVE: EXPIRATION:

b. NUMBER:*

c. TYPE: d. AMOUNT:

e. KIND OF AWARD:

18. RESOURCES ESTIMATE		a. PROFESSIONAL MAN YEARS	b. FUNDS (In thousands)
FISCAL YEAR	PRECEDING FY81	0.4	191
	CURRENT FY82	1.25	244

19. RESPONSIBLE DOD ORGANIZATION 391584

NAME:* Naval Medical Research and Development Command

ADDRESS:* National Naval Medical Center
Bethesda, Maryland 20014

RESPONSIBLE INDIVIDUAL
NAME: J.F. KELLY CAPT DC USN
TELEPHONE: (202)295-1453

ERAL USE

C

20. PERFORMING ORGANIZATION 259650

NAME:* National Naval Medical Center
Hyperbaric Medicine Program Center
Medicine Branch

ADDRES. Bethesda, Maryland 20014

PRINCIPAL INVESTIGATOR (Furnish SSAN if U.S. Academic Institution)

NAME:* Weathersby, P.K. LCDR MSC USN

TELEPHONE: (202) 295-1810

SOCIAL SECURITY ACCOUNT NUMBER:

ASSOCIATE INVESTIGATORS

NAME: Flynn, E.T. CAPT MC USN

NAME: Homer, L.D., M.D., Ph.D.

WORDS (Precede EACH with Security Classification Code) (U) CIVAPP Decompression Sickness (U) Animal Subjects
) CIVAPP: Kinetics (U) CIVAPP: Gas Exchange (U) Human Subjects

23. TECHNICAL OBJECTIVE,* 24. APPROACH, 25. PROGRESS (Furnish individual paragraphs identified by number. Precede text of each with Security Classification Code.)

23. (U) TECHNICIAN OBJECTIVE. This study will quantitate the rate processes of nonmetabolic inert gas in the body which are crucial to the rational formulation of decompression schedules in diving. Measurements will be made on the amounts and rates of exchange of gases in whole animals, men, and individual organs. Mathematical analyses will be developed that reliably summarize the data and adequately predict gas behavior during compression and decompression.

24. (U) APPROACH. Radioactive gases including ^{133}Xe and $^{13}N2$ will be used to study gas uptake and elimination in individual dog (Canis familiaris) and human tissues as a function of gas physical property, route of administration, pressure and exercise. The human experiments involve volunteer military personnel breathing the tagged gas, or having samples of expired gas measured under pressure. A mathematical description of gas processes will be developed that will describe the experiments without appeal to half-time analysis. A device will be constructed to measure inert gas solubility in tissue under hyperbaric conditions.

25. (U) PROGRESS (800501-810501). Joint experiments were performed with the Lawrence Livermore Laboratories to measure the kinetics of radiolabelled nitrogen gas in human subjects. Several available mathematical models of tissue gas exchange were also compared in their description of dog-xenon exchange data. A first generation solubility device was constructed and found to perform poorly. (Publications: 03).

NAV1.954607.012

*Available to contractors upon originator's approval.

INCIPAL I. ..IGATOR P.K. Weathersby, LCDR, MSC, USN

1498 ..UMBER OR SHORT TITLE Tracer gas kinetic s s for decompression tat esign

11 55

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
E OF MAL ECIES STRAIN	NUMBER OF ANIMALS	INDIVIDUAL ANIMAL PURCHASE COST	TOTAL PURCHASE COSTS (b x c)	TOTAL NUMBER OF ANIMAL-DAYS (b x anticipated length of time in-house)	PER DIEM COSTS	TOTAL PER DIEM COSTS (e x f)	TOTAL ANIMAL COSTS (d + g)
dog (mongrel	66	105	6930	2640	5.33	14071	21001

RESEARCH PROPOSAL SUMMARY (ADDENDUM)

TITLE: Tracer gas kinetic studies for decompression table design

NUMBER: M0099PN001.1155
For NEW proposals, leave blank. For on-going work units, cite Project, Task Area and Work Unit numbers previously assigned by the NMRDC.

PRINCIPAL INVESTIGATOR

Weathersby, P.K., LCDR, MSC, USN

Name, Rank, or Grade

Naval Medical Research Institute
Hyperbaric Medicine Program Center

Activity/Program Center

Expected Date of Transfer from activity, if military

ASSOCIATE INVESTIGATOR

Flynn, E.T., CAPT, MC, USN
Homer, L.D., GS-15

Name, Rank or Grade

Naval Medical Research Institut
Hyperbaric Medicine Program Cen

Activity/Program Center

Expected date of transfer from activity, if military

RESOURCES:

Direct Man Years	Preceding FY 81	Current FY 82	Current FY + 1
Military Professional	0.25	1.0	1.0
Military Supporting	0.2	1.55	1.0
Civilian Professional	0.15	.25	0.5
Civilian Supporting	0.25		
Total	2.45	2.8	2.5
FUNDS			
Personnel	62.3	6.2	6.2
Equipment (Other than ADP)	266	32.0	20.0
Supplies (Other than ADP)	25.0	20.0	20.0
Travel		18.0*	5.0
Animal Per Diem		14.0	18.5
Contracts			
ADP Equipment and Supplies		2.0	2.0
Other (Specify)			
Overhead*	103.6	151.9	151.9
NMRDC TOTAL			
Reimbursables (Give Source and Appropriation Number)			
GRAND TOTAL	191.2	244.1	223.6

* Total of Department and General Overhead

*Travel of investigators and subjects to Livermore, CA.

EQUIPMENT: (In order to priority list equipment requirements by item and cost; include only those items for which the unit cost exceeds $1000. Total cost should agree with figures entered on Equipment lines of the Resources table. Include cost of installation. Equipment costing less than $1000 should be included in operating supplies requirement.

1. Radioactive effluent monitor $5K
2. Microtome $12K
3. Digital graphics $15K