



HAL
open science

Atlantis IV Annexes

Sa Comex

► **To cite this version:**

| Sa Comex. Atlantis IV Annexes. COMEX. 1982. hal-04510082

HAL Id: hal-04510082

<https://hal.univ-brest.fr/hal-04510082>

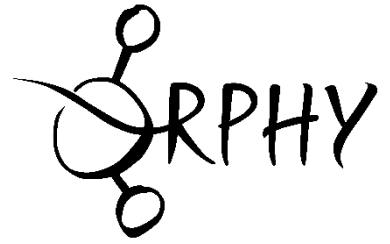
Submitted on 18 Mar 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0 International License



The present document is the property of COMEX SAS. It has been entrusted to the ORPHY laboratory, which scanned and uploaded it.

COMEX (Compagnie Maritime d'Expertises), established in 1962, has positioned itself in the offshore activities sector, where it held a leading international position, becoming the world's foremost company in engineering, technology, and human or robotic underwater interventions. Comex designed a Hyperbaric Testing Center in 1969 and developed its own research programs on various breathing mixtures used in deep-sea diving (helium and later hydrogen). These research efforts led to spectacular advancements in this field, including several world records, both in real conditions and simulations. Comex still holds the world record at -701 meters, achieved in its chambers during Operation HYDRA 10.

The ORPHY laboratory focuses on major physiological functions, their regulation, interactions, and their contribution to the development and prevention of certain pathologies. The primary mechanisms studied involve metabolic aspects (oxygen transport and utilization, energetics, etc.) and electrophysiological aspects (contractility and excitability), mainly related to respiratory, vascular, and/or muscular functions. These mechanisms are studied under various physiological and physiopathological conditions, ranging from the cellular and subcellular levels to the entire organism. In Europe, the ORPHY laboratory is one of the leaders in hyperbaric physiology and diving research.

Being a major player in innovation and expertise in the field of pressure, COMEX maintains a scientific archive from its experimental diving campaigns. The value of this archive is both scientific and historical, as it documents a remarkable chapter in the history of marine exploration and contains results obtained during dives that are very unlikely to be replicated in the future.

ATLANTIS IV

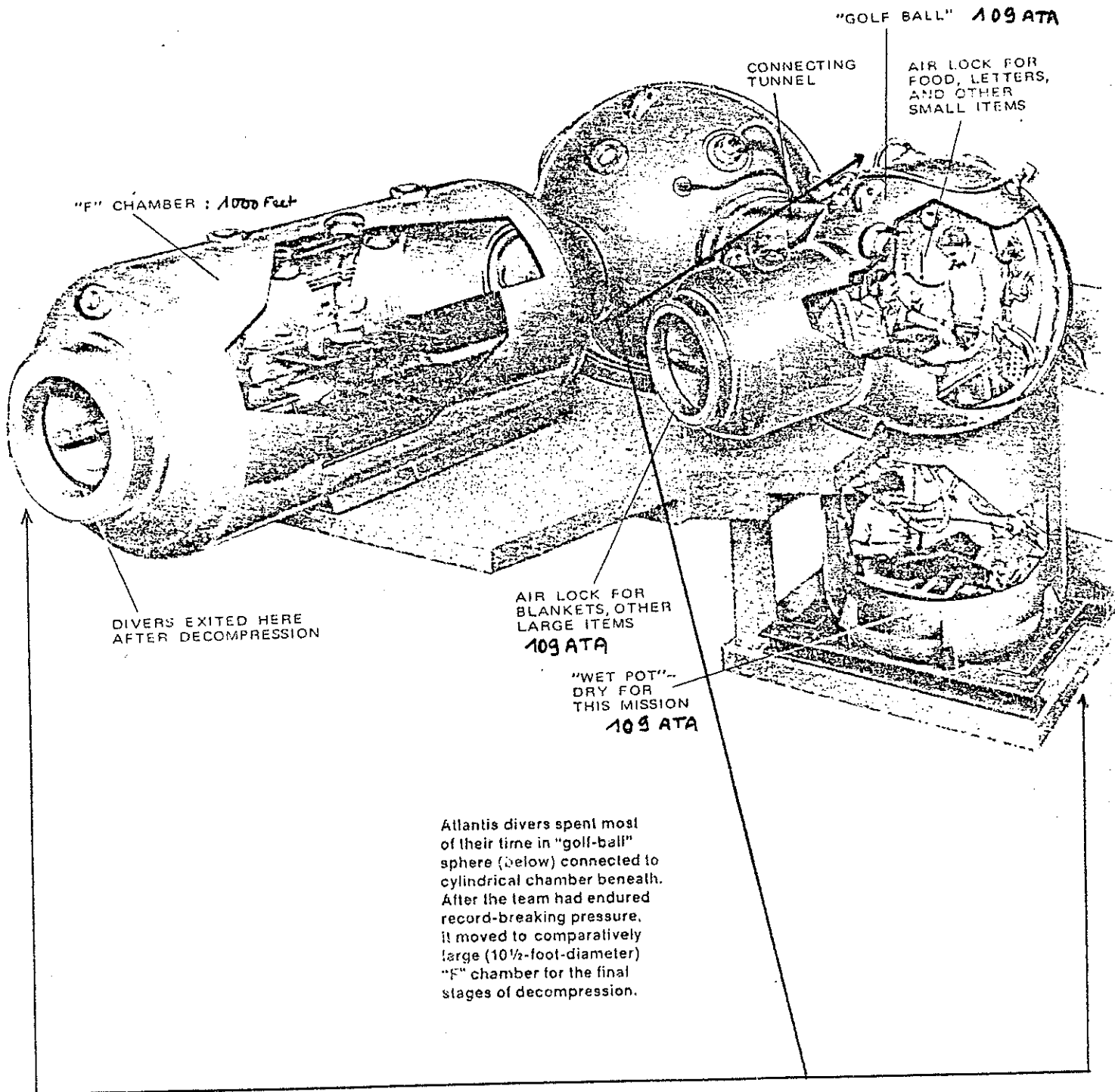
ANNEXES

Diffusion restreinte limitée aux seuls destinataires.

Document strictement confidentiel. Informations non publiables

ATLANTIS IV

ANNEXE I



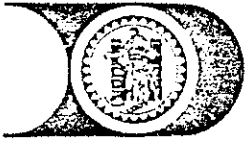
ENSEMBLE 1000 Feet utilisé en décompression à partir de cette profondeur

ENSEMBLE 109 ATA .
3 hommes pendant 37 jours

L'ENSEMBLE DE PLONGÉE DE DUKE UNIVERSITY.

ATLANTIS IV

ANNEXE I I



DUKE UNIVERSITY MEDICAL CENTER

Public Relations Department

FACT SHEET

ATLANTIS IV DIVE

Dive Began: Sept. 27, 1982

Expected to End: Nov. 10

Expected to Match World Diving Record Set at Duke Last Year: 2,250 feet (686 m)

Purpose: Fourth dive in a series that began in 1979 to determine the optimal rate of compression and nitrogen concentration in breathing mixture needed for divers to work efficiently and safely at depths greater than 2,000 feet. The Atlantis dives have examined the effects of TRIMIX gas and compression rate on high pressure nervous syndrome (HPNS), which is associated with dizziness, nausea, tremors, fatigue, etc. TRIMIX gas was developed at Duke and is made by adding nitrogen to an oxygen and helium mixture. Atlantis IV is specifically testing a 5 percent nitrogen concentration with a slow compression rate.

Payoff: Research like this will allow mankind to better utilize the ocean's resources and could allow oil production and mining in deeper waters than those in which divers can now function effectively.

Project Director: Dr. Peter B. Bennett, director of the F. G. Hall Environmental Laboratory and professor of anesthesiology at Duke University Medical Center. Dr. Bennett, who was born and educated in England, is the developer of the deep diving breathing mixture, TRIMIX, which has been shown to help prevent HPNS.

Divers (Began training Aug. 1):

STEPHEN V. PORTER, 27, assistant supervisor of engineering support for F.G. Hall Laboratory and Oceaneering International commercial diver. Veteran of two previous dives at Duke. Hometown: Cortez, Colorado.

CMDR. PAUL BARRY, 36, medical officer in the U.S. Navy and currently carrying out diving medical research training at Duke. Hometown: Buffalo, N.Y.

DR. GARY LATSON, 25, second year resident in anesthesiology at Duke. Will celebrate 26th birthday Oct. 17. Hometown: Houston, Texas.

Diving Chamber: Golf ball-shaped chamber is eight feet in diameter and sits on a "tee" that is six feet in diameter and 10 feet tall.

Sponsors of Dive: Duke and F. G. Hall Laboratory; National Institutes of Health; U. S. Navy Bureau of Medicine and Surgery; COMEX (French diving company); and Shell International Oil Company.

RESEARCH TEAM

Performance Ability	Dr. P. Bennett Ms. M. McLeod
Lung Function	Dr. J. Salzano Dr. E. Camporesi Dr. R. Moon Mr. B. Stolp
Hematologic Effects	Dr. J. Andersen
Reflex Effects	Dr. J. Parmentier
Sleep EEG	Dr. G. Marsh
Psychiatric Problems	Dr. P. Logue
Decompression	Dr. R. Vann
Medical Director	Dr. J. Miller
Pressure Chamber Managers	Mr. R. Schumacher Mr. O. Doar
Chamber Supervisors	Mr. A. Boso Mr. T. Edwards

ATLANTIS IV

ANNEXE III

MEMORANDUM

TO: Dr. P. Bennett
 FROM: Bud Shelton
 SUBJECT: Physical Examination for deep dive subjects.

The below is a list of laboratory, radiographic and professional consultations used to evaluate above personnel.

Complete blood count with differential
 Serum electrolytes
 Sedimentation rate
 Standard test for syphilis
 Urinalysis
 Electroencephalogram —
 Electrocardiogram —
 Electronystagmogram
 Audiogram
 Evoked potentials:
 a) Auditory
 b) Somatosensory } OK/D
 c) Visual
 Chest x-ray
 Long bone x-rays
 Bone scan — *1/2 Strength.*
 — Brain C.T. scan
 Dental screen
 Neurologic evaluation —
 Ophthalmologic evaluation
 * Psychiatric evaluation
 Neuropsychiatric laboratory, to include:
 a) MMPI — *personality check.*
 * b) Paced auditory serial addition task
 c) Wechsler adult intelligence scale — *IQ*
 d) Aphasia screening battery
 e) Trails
 f) Tapping
 g) Tactual performance test
 * h) Dynamometer
 i) Wechsler memory scale - revised
 j) Category test
 * k) Seashore rhythm & speech
 * l) Figural recognition test
 * m) Metamemory questionnaire
 n) Greek cross
 o) Wechsler associated learning
 p) Digit symbol
 q) Digit span
 * r) New York memory
 * s) Levin selective reminding task

continued

Clinical Psychology evaluation which includes Bowman Gray School of Medicine's battery of memory test to diagnose mild cognitive decrements (persistent), which includes:

- a) Complex figures, Rey -Taylor test, immediate and delayed recall
- b) Prose narrative
- c) Rey auditory-verbal learning test.
- d) Bowman Gray figural learning test
- e) Porteus Mazes
- f) Token task
- g) Hooper visual organization test
- * h) Thorough psychiatric-neuropsychologic history

Complete General Medical Examination.

* These studies added at the beginning of the Atlantis IV (fall 1982) workups.

ATLANTIS IV

ANNEXE IV

DIVE SCHEDULE - ATLANTIS IV . Annex 4

DATE 27 Sept.DAY 1 (Monday)CODE 1C1

TIME	DEPTH	EVENT	
0530	0	Arrive @ lab, change clothes, stow gear in chamber, ear therapy	
0600		Blood samples taken in lab	JA
0645		PT #1 in chamber	MM
0745		Prepare for compression	
0800	LS	Compress 5 m/min to 180 m	CO
0836	180	Arrive 180 m x 2 hr	
0845		Breakfast	NM
1036	L180	Compress 3 m/min to 240 m	CO
1056	240	Arrive 240 m x 6 hr	
1100		PT #2 + EEG	MM
1230		Lunch	NM
1400		Rest period x 2 hr (lights down, sleep)	
1656	L240	Compress 1.5 m/min to 305 m	CO
1740	305	Arrive 305 m x 2 hr	
1740		PT #3 + EEG	MM
1915		Dinner	NM
1940	L305	Compress 0.5 m/min to 350 m	CO
2000		Shower, cleanup, set up bunks	
		Debrief	DS
		Logs	
2110	350	Arrive 350 m. Hold overnight	
2200		Lights out	

DATE 29 Sept.DAY 3 (Wednesday)CODE 3C3

TIME	DEPTH	EVENT	
0700	460	Wake up, stow bunks, ear therapy	
0730		Breakfast	NM
0830		PT #7	MM
0930	L460	Compress 0.1 m/min to 490 m	CO
0930		EEG	MM
1000		Pulmonary function x 2 hr <i>Non Fait.</i>	JS, EC, BS, RM
1200		Lunch	NM
1300		Rest, debrief, logs	DS
1430	490	Arrive 490 x 1 hr	
1430		PT #8	MM
1530	L490	Compress 0.1 m/min to 520	CO
1530		EEG	MM
1600		Reflex	JP
1930		Dinner	NM
2030	520	Arrive 520 m. Hold overnight	CO
2030		PT #9 + EEG	MM
2200		Showers, cleanup, set up bunks	
2300		Lights out	

DATE 1 Oct.DAY 5 (Friday)CODE 5C5

TIME	DEPTH	EVENT	
0700	570	Wake up, stow bunks, ear therapy	
0730		Breakfast	NM
0830		PT #12	MM
0930	L570	Compress .05 m/min to 600 m	CO
0930		EEG	MM
1000		Pulmonary function	JS, EC, BS, RM
1300		Lunch	NM
1400		Rest, debrief, logs	DS
1800		Dinner	NM
1930	600	Arrive 600 m. Hold overnight	
1930		PT #13 + EEG	MM
2100		Shower, cleanup, set up bunks	
2200		Lights out	

DATE 3 Oct.DAY 7 (Sunday)CODE 7C7

TIME	DEPTH	EVENT	
0700	625	Wake up, stow bunks, ear therapy	
0730		Breakfast	NM
0830		PT #16	MM
0930	L625	Compress .05 m/min to 650 m	CO
0930		EEG	MM
1000		Pulmonary function	JS,EC,BS,RM
1200		Rest period x 1 hr	
1300		Lunch	NM
1400		Resp. equip. check & rest - 3 hrs	JS,DS,BS,et al
		Debrief, logs	DS
1700		EEG	MM
1750	650	Arrive 650 m. End of compression	
1750		Subject interviews	PB
1810		PT #17	MM
1915		Dinner	NM
2015		Shower, cleanup, set up bunk	
2200		Lights out	

DATE 5 Oct.DAY 9 (Tuesday)CODE 9B2

TIME	DEPTH	EVENT	
0630	650	Wake up, stow bunks, ear therapy	
0700		Breakfast	NM
0800		PT #20 + EEG	NM
0930		Respiratory physiology - 9 hr	JS, EC, BS, RM
0930		Insert A-line	
1100		Wet pot calibrations	
1200		Break and snack x 15 mins	NM
1500		Break x 15 min	
1600		IL analysis	
1730		Remove A-line	
1830		Clear away resp. equip.	
1900		Dinner	NM
2000		Shower, cleanup, set up bunks	
		Debrief	DS
		Logs	
2200		Lights out	

DATE 7 Oct.DAY 11 (Thursday)CODE 11B4

TIME	DEPTH	EVENT	
0630	650	Wake up, stow bunks, ear therapy	
0700		Breakfast	NM
0800		PT #22 + EEG	MM
0930		Respiratory physiology - 9 hr	JS,EC,BS,RM
0930		Insert A-line	
1100		Wet pot calibrations	
1200		Break and snacks x 15 mins	NM
1500		Break x 15 mins	
1600		IL analysis	
1730		Remove A-line	
1830		Clear away resp. equip.	
1900		Dinner	NM
2000		Shower, cleanup, set up bunks	
		Debrief	DS
		Logs	
2200		Lights out	

DATE 8 Oct.DAY 12 (Friday)CODE 12E1

TIME	DEPTH	EVENT	
0600	650	Wake up, coffee (black), ear therapy	
0610		Blood sampling, centrifuging, cleanup	JA
		Breakfast	NM
0830		PT #23	MM
0930	L650 m	Compress .05 m/min to 686 m	CO
0930		EEG	MM
1000		Doppler trial	AD
1030		Rest period x 2 hrs	
1230		Lunch	NM
1400		Rest period x 3 hrs (lights low, sleep)	
		Debrief, logs	DS
1800		Dinner	NM
2000		EEG	MM
2030		PT #24	MM
2130	686	Arrive 686 m. Hold overnight	
2130		Interview subjects	PB
		Set up bunks	
		Shower	
		EEG electrodes	GM
2300		Lights out	

DATE 9 Oct.

DAY 13 (Saturday)

CODE 13E2

TIME	DEPTH	EVENT	
0630	686	Wake up, coffee (black), ear therapy	
0640		Blood sampling, centrifuging, clean up	JA
		Breakfast	NM
0900		PT #25	NM
1000		EEG	NM
1100		Reflex x 2 hrs	JP
1300		Lunch	NM
1400		Neuropsychology	PL
1630		Psychiatric interview	AS
1730		Rest	
1800		Dinner	NM
1900		PT #26 + EEG	NM
2030		Shower, cleanup, set up bunks	
		Debrief	DS
		Logs	
2130	L686	Begin decompression (2 Eph to 457 m)	00
2200		Lights out	

DATE 10 Oct.

DAY 14 (Sunday)

CODE 14D1

TIME	DEPTH	EVENT	
Decompression rate = 2 fph N ₂ = 5%			
0700	680.0	Wake up, set up Doppler, ear therapy	AD
0715		Doppler, then coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #27	NM
1030		EEG x 1 hr	NM
1200		Lunch	NM
1300		Rest, logs, debrief	DS
1800		Dinner	NM
1900		Shower, clean up, set up bunks	
		Doppler	AD
2200		Lights out	

DATE 12 Oct.

DAY 16 (Tuesday)

CODE 16D3

TIME	DEPTH	EVENT	
		Decompression rate = 2 fph	
0700	650.8	Wake up, set up Doppler, ear therapy Doppler, coffee	AD
0800		Clean up, stow bunks	
0830		Breakfast	NM
1030		EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS,EC,BS,RM
1800		Dinner	NM
1900		PT #29	MM
2000		Shower, clean up, set up bunks Doppler	AD
2200		Lights out	

DATE 14 Oct.

DAY 18 (Thursday)

CODE 18D5

TIME	DEPTH	EVENT	
		Decompression rate = 2 fph	
0700	621.5	Wake up, set up Doppler, ear therapy Doppler, coffee	AD
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #30	NM
1030		EEG	NM
1200		Lunch	NM
1300		Logs, debrief	DS
1800		Dinner	NM
1930		Shower, clean up, set up bunks Doppler	AD
2200		Lights out	

DATE 16 Oct.

DAY 20 (Saturday)

CCDE 20D7

TIME	DEPTH	EVENT	
		Decompression rate = 2 fph	
0700	592.2	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #31 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BS, RM
1800		Dinner	NM
1930		Shower, clean up, set up bunks	
		Doppler	AD
2200		Lights out	

DATE 18 Oct.

DAY 22 (Monday)

CODE 22D9

TIME	DEPTH	EVENT	
Decompression rate = 2 fph			
0700	563.0	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #32 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BS, RM
1800		Dinner	NM
1930		Shower, clean up, set up bunks	
		Doppler	AD
2200		Lights out	

DATE 20 Oct.DAY 24 (Wednesday)CODE 24D11

TIME	DEPTH	EVENT	
		Decompression rate = 2 fph	
0700	533.7	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #33 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BS, RM
1800		Dinner	NM
1930		Shower, clean up, set up bunks	
		Doppler	AD
2200		Lights out	

DATE 22 Oct.

DAY 26 (Friday)

CODE 26D13

TIME	DEPTH	EVENT	
		Decompression rate = 2 fph	
0700	504.4	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #35 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	
1800		Dinner	NM
1930		Shower, clean up, set up bunks Doppler	AD
2200		Lights out	

DATE 24 Oct.DAY 28 (Sunday)CODE 28D15

TIME	DEPTH	EVENT	
		Decompression rate = 2 fph	
0700	474.6	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #36 + EEG	NM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS,EC,BS,RM
1800		Dinner	NM
1930		Shower, clean up, set up bunks	
		Doppler	AD
		EEG electrodes	GM
2200		Lights out	

DATE 26 Oct.

DAY 30 (Tuesday)

CODE 30D17

TIME	DEPTH	EVENT	
		Decompression rate = 3 fph	
0700	439.4	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #37 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BS, RM
1800		Dinner	NM
1930		Shower, clean up, set up bunks Doppler	AD
2200		Lights out	

DATE 28 Oct.

DAY 32 (Thursday)

CODE 32D19

TIME	DEPTH	EVENT	
		Decompression rate = 3 fph	
0700	395.5	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #38 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BS, RM
1800		Dinner	NM
1930		Shower, clean up, set up bunks	
		Doppler	AD
2100		Lights out	

DATE 30 Oct.DAY 34 (Saturday)CODE 34D21

TIME	DEPTH	EVENT	
		Decompression rate = 3 fph	
0700	351.6	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		PT #39 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS,EC,BS,RM
1800		Dinner	NM
1930		Shower, clean up, set up bunks	
		Doppler	AD
		EEG electrodes	GM
2200		Lights out	

DATE 1 Nov.DAY 36 (Monday)CODE 36D23

TIME	DEPTH	EVENT	
		Decompression rate = 3 fph	
0700	307.7	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up, stow bunks	
0830		Breakfast	NM
0930		Pack for transfer to F chamber	
1050	304.2	Mate G-D-F chambers	CO
		Transfer to F chamber	
1200	304.2	Change decompression rate to 4 fph	CO
1300		Lunch	
1400		Debrief, logs	DS
1600		Pulm. function x 2 hr	JS,EC,BS,RM
1800		Dinner	NM
1930		Shower, clean up	
		Doppler	AD
2200		Lights out	

DATE 3 Nov.

DAY 38 (Wednesday)

CODE 38D25

TIME	DEPTH	EVENT	
		Decompression rate = 4 fph	
0700	251.8	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up	
0830		Breakfast	NM
0930		PT #40 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BR, RM
1800		Dinner	NM
1930		Shower, clean up	
		Doppler	AD
2200		Lights out	

DATE 5 Nov.

DAY 40 (Friday)

CODE 40D27

TIME	DEPTH	EVENT	
		Decompression rate = 4 fph	
0700	193.2	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up	
0830		Breakfast	NM
0930		PT #41 + EEG	NM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BS, RM
1800		Dinner	NM
1930		Shower, clean up	
		Doppler	AD
2200		Lights out	

DATE 7 Nov.

DAY 42 (Sunday)

CODE 42D29

TIME	DEPTH	EVENT	
		Decompression rate = 4 fph	
0700	134.7	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up	
0830		Breakfast	NM
0930		PT #42 + EEG	MM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BF, RM
1800		Dinner	NM
1930		Shower, clean up	
		Doppler	AD
2200		Lights out	

DATE 9 Nov.DAY 44 (Tuesday)CODE 44D31

TIME	DEPTH	EVENT	
		Decompression rate = 4 fph	
0700	76.2	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up	
0830		Breakfast	NM
0930		PT #43 + EEG	NM
1200		Lunch	NM
1300		Debrief, logs	DS
1400		Pulmonary function x 2 hrs	JS, EC, BS, RM
1800		Dinner	NM
1930		Shower, clean up	
		Doppler	AD
2200		Lights out	

DATE 11 Nov.

DAY 46 (Thursday)

CODE 46D33

TIME	DEPTH	EVENT	
		Decompression rate = 4 fph	
0700	17.7	Wake up, set up Doppler, ear therapy	AD
0710		Doppler, coffee	
0800		Clean up	
0830		Breakfast	NM
0930		PT #44 + EEG	MM
1015	13.7 m (45 ft)	Begin 3.5 hr hold	CO
1200		Lunch	NM
1300		Debrief, logs	DS
1345	45 ft	Begin decompression at 19 min/ft	CO
1400		Pulmonary function x 2 hrs	JS, EC, BR, RM
1800		Dinner	NM
1830	30 ft	Change decompression rate to 23 min/ft	CO
1930		Shower, clean up	
		Doppler	AD
2200	20 ft	Change decompression rate to 28 min/ft	

ATLANTIS IV

ANNEXE V

ATLANTIS IV OPERATIONAL CHRONOLOGY (COMPRESSION PROFILE)

(DAY 1)

CLOCK	ELAPSED	ELAPSED	METERS	FEET	PSIG	ATA
Hr:Mi::Sec	Hr:Mi::Sec	Min::Sec				
06:00::00	-02:00::00	-120::00	0 m	0 fsw	0 psig	1 ATA

ASSIGNED WATCH PERSONNEL ARRIVE AT COMPLEX

COMMENCE VALVE LINE UP CHECK

He to G chbr. (reducing station set at 300 psig, outside He bank No.1 on line. Tube No.1 on forward He/N2 truck lined up to and stopped off at He reducing station.)

O2 Make Up (charged to G chamber with 2 full cylinders of 50/50 He/O2 on line capable of being refilled from bulk storage.)

G Orange BIBS (charged with 20% O2, 5% N2, Bal He, 5 G cylinders on spider.)

G Green BIBS (charged with 7% O2, 5% N2, Bal He, 5 G cylinders on spider.)

Excursion Line (connected to He supply - not charged.)

F Orange BIBS (charged with bottom or first respiratory gas. .762% O2 5% N2 Bal He)

F Green BIBS (secured.)

COMMENCE ANALYZER CALIBRATION

COMMENCE PRE DIVE CHAMBER CHECK LIST

ATLANTIS IV OPERATIONAL CHRONOLOGY

(DAY 1 Contd.)

 08:15::00 00:15::00 +15::00 75 m 246.1fsw 109.4psig 8.44ATA

O2 MAKE UP COMPLETED - (.5 ATA O2 = 5.913%)

 08:29::24 00:29::24 +29::24 147m 482.3fsw 214.6psig 15.6ATA

SHIFT COMPRESSION GAS - FROM HE TO HE/N2
 (continue compression uninterrupted to 180 meters)

 08:30::00 00:30::00 +30::00 150 m 492.1fsw 218.7psig 15.88ATA

SHIFT BIBS GAS - (From 7% O2 5% N2 Bal He To 4% O2 5% N2 Bal He)

(7% O2 = 1.11 ATA O2)

(4% O2 = .63 ATA O2)

(5% N2 = .79 ATA N2)

ALL DIVERS FREE FLOW MASKS FOR 30 SECONDS

Break down 80/20 + Replace with 4% O2 5% N2 Bal He

 08:31::00 00:30::00 +31::00 155m 508.5fsw 226psig 16.39ATA

BIBS SHIFT COMPLETED

 08:36::00 00:36::00 +36::00 R180 m 590.6fsw 252.5psig 19.86ATA

REACH 180 METERS - STOP - 2 HOURS

Chamber atmosphere O2 = 2.646% (.5 ATA)

CO2 = 264.6 PPM)

N2 = 5% (.75 ATA)

He = 92.35% (17.4 ATA)

ALL DIVERS OFF BIBS

ATLANTIS IV OPERATIONAL CHRONOLOGY

(DAY 1 Contd.)

17:40::00 09:40::00 +580::00 R305m 1000.7fsw 445.8psig 31.3ATA

REACH 305 METERS - STOP - 2 HOURS

Chamber Atmosphere O2 = 1.596% (.5 ATA)
CO2 = 159.6 PPM
N2 = 5% (1.56 ATA)
He = 93.4% (29.2 ATA)

19:40::00 11:40::00 +700::00 L305 m 1000.7fsw 445.8psig 31.3ATA

LEAVE 305 METERS
COMMENCE COMPRESSION - (On He/N2 at 0.5 meters/minute)
(1 Hour 30 Minutes to 350 meters)

21:10::00 13:10::00 +790::00 R350 m 1148.3fsw 510.4psig 35.7ATA

REACH 350 METERS - STOP - 8 HOURS 50 MINUTES
(overnight)

Chamber Atmosphere O2 = 1.397% (.5 ATA)
CO2 = 139.7 PPM
N2 = 5% (1.78 ATA)
He = 93.6% (33.43 ATA)

ATLANTIS IV OPERATIONAL CHRONOLOGY

(DAY 2 Contd.)

17:20::00 33:20::00 +2000::00 L430m 1410.8fsw 627.0psig 43.66ATA

LEAVE 430 METERS
COMMENCE COMPRESSION - (On He/N2 at 0.125 meters/minute)
(4 Hours To 460 meters)

21:20::00 37:20::00 +2240::00 R460m 1509.2fsw 670.79psig 46.63ATA

REACH 460 METERS - STOP - 12 HOURS 10 MINUTES
(overnight)

Chamber Atmosphere O2 = 1.07% (.5 ATA)
CO2 = 107 PPM
N2 = 5% (2.33 ATA)
He = 93.9% (43.8 ATA)

ATLANTIS IV OPERATIONAL CHRONOLOGY

(DAY 4)

09:30::00 73:30::00 4410::00 L520m 1706.0fsw 758.3psig 52.58ATA

LEAVE 520 METERS
COMMENCE COMPRESSION - (On He/N2 at .075 meters/minute)
(6 Hours 40 Minutes To BIBS shift)
(11 Hours 07 Minutes To 570 meters)

16:10::00 80:10::00 4810::00 RL550m 1804.5fsw 802.0psig 55.56ATA

SHIFT BIBS GAS - (From 1.97% O2 5% N2 Bal He To .762% O2 5%
N2 Bal He)

(1.97% O2 = 1.09 ATA O2)
(.762 O2 = .42 ATA O2)
(5% N2 = 2.77 ATA N2)

20:37::00 84:37::00 +5077::00 R570m 1870.1fsw 831.2psig 57.54ATA

REACH 570 METERS STOP - 12 HOURS 53 MINUTES
(overnight)

Chamber Atmosphere O2 = .867% (.5 ATA)
CO2 = 86.7 PPM
N2 = 5% (2.88 ATA)
He = 94.13% (54.16 ATA)

ATLANTIS IV

ANNEXE VI

DIVE QUESTIONNAIRE

NAME: _____

DATE: _____

DEPTH: _____

TIME: _____

MORNING QUESTIONNAIRE

1 Please estimate the time that you started to try to fall asleep _____ , and when you fell asleep _____

2 What time did you wake up in the morning _____

3 How many times did you wake up during the night _____

4 If your sleep was particularly good or poor , please give the reasons below , _____

5 How well rested do you feel compared to a nights sleep at the surface ? Poor Equal Better

6 Please indicate , using the scale below , if and how much the following sytoms are troubling you .

- | | |
|------------------|--------------|
| Dizziness _____ | 1 Not at all |
| Tremor _____ | 2 A little |
| Apetite _____ | 3 Alot |
| Breathing _____ | 4 Severely |
| Vision _____ | |
| Depression _____ | |
| Tiredness _____ | |
| Pain _____ | |
| Hot/Cold _____ | |

7 Is there anything else that we should know about before the day starts ? _____

31) DECREASED SEXUAL INTEREST	++	+	-	--
32) NERVOUS STOMACH	++	+	-	--
33) TREMORS	++	+	-	--
34) UNUSUAL CLUMSINESS	++	+	-	--
35) HEADACHE	++	+	-	--
36) LOOSE STOOLS	++	+	-	--

2) INDICATE IF YOU HAVE HAD PAIN IN THE FOLLOWING PLACES.
PLEASE MARK THE SEVERITY , USING THE SCALE BELOW , ON
THE LEFT AND THE NUMBER OF OCCURENCES TODAY ON THE RIGHT.

1 NOT AT ALL

2 NIGGLE , UNDER A MINUTE LONG

3 MILD TO MODERATE PAIN , 1 to 5 MINUTES

5 MODERATE TO SEVERE PAIN , > 5 MINUTES

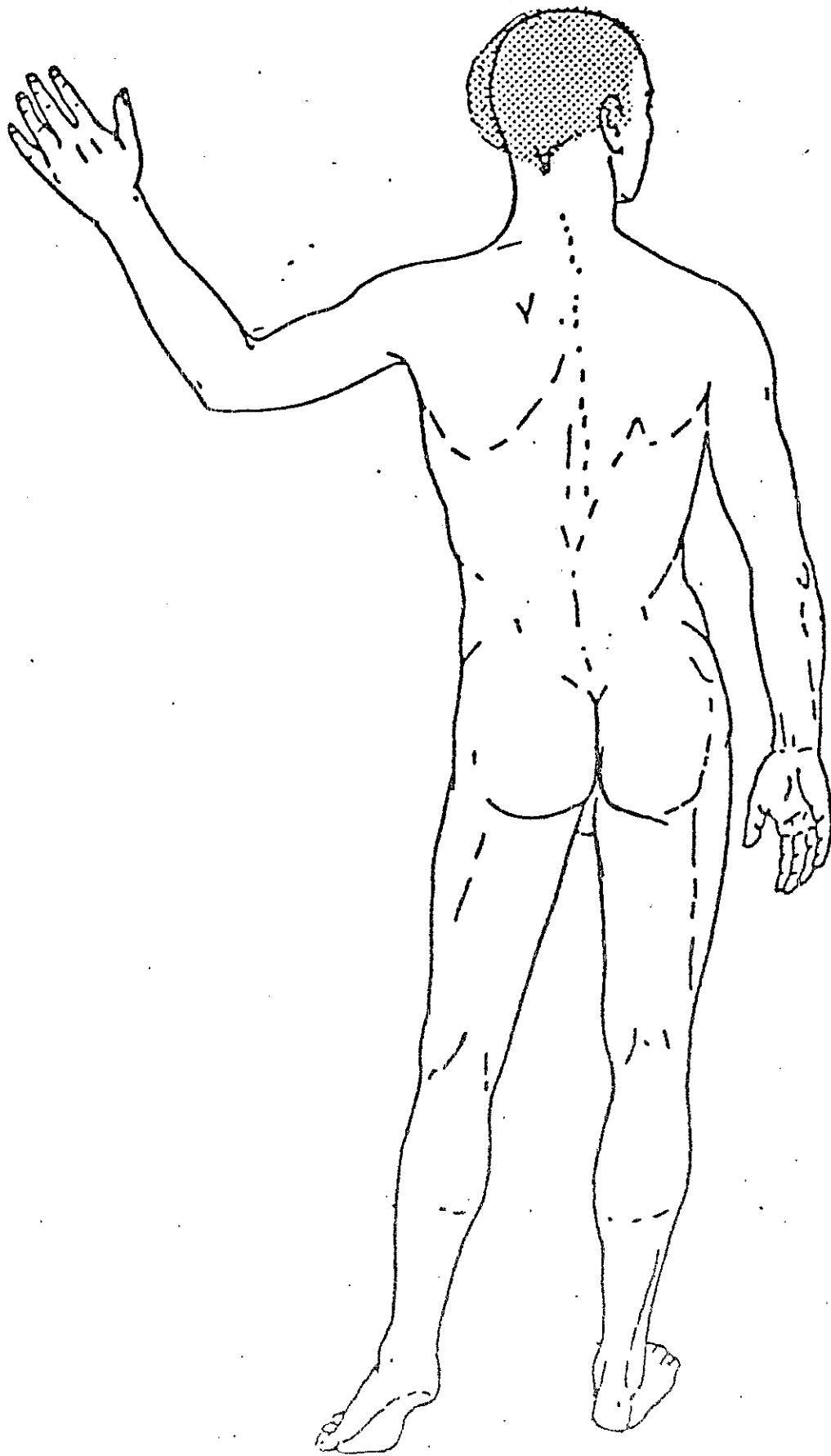
<u>LEFT</u>	<u>RIGHT</u>	
___ SHOULDER ___	___ SHOULDER ___	___ HEAD ___
___ ELBOW ___	___ ELBOW ___	___ CHEST ___
___ WRIST ___	___ WRIST ___	___ BACK ___
___ HAND ___	___ HAND ___	___ BUTTOCK ___
___ FINGERS ___	___ FINGERS ___	___ ABDOMEN ___
___ HIP ___	___ HIP ___	___ GROIN ___
___ KNEE ___	___ KNEE ___	
___ ANKLE ___	___ ANKLE ___	
ANY OTHER _____		

3) MARK THESE PAIN LOCATIONS WITH AN ARROW ON THE NEXT
TWO PAGES.

4) PLEASE ALSO INDICATE CUTS AND SKIN PROBLEMS ON THE NEXT
PAGES IN THE FOLLOWING SIMILAR WAY.

CUTS (C) →

SKIN PROBLEMS (S) →



ATLANTIS IV PERFORMANCE

NAME _____

TIME _____

DEPTH

WHAT: COME-ALONGS

NUMBERS: 4

WHERE: BAY

SIZE (M): 2

DEPTH (M): 31

VISIBILITY (M): 31

TEMPERATURE (C°): 2

BOTTOM CONDITIONS: STONES

RISK FACTORS: LANDSLIDE

SUPPLEMENT: STREAM

	TRUE	FALSE
1 A is preceded by B - BA		
2 B does not precede A - AB		
3 A is not followed by B - BA		
4 B is preceded by A - BA		
5 A is followed by B - AB		
6 A does not follow B - AB		
7 B is not preceded by A - AB		
8 B follows A - AB		
9 A precedes B - BA		
10 B does not follow A - BA		
11 B precedes A - AB		
12 B is followed by A - AB		
13 B is not followed by A - BA		
14 B is preceded by A - AB		
15 B is followed by A - BA		
16 B precedes A - BA		
17 A is not followed by B - AB		
18 A is followed by B - BA		
19 B is not preceded by A - BA		
20 B is followed by A - AB		
21 A does not follow B - BA		
22 A is preceded by B - AB		
23 B does not follow A - AB		
24 A is not preceded by B - BA		
25 A follows B - BA		
26 A is not preceded by B - AB		
27 A follows B - AB		
28 A does not precede B - AB		
29 A precedes B - AB		
30 B follows A - BA		
31 B does not precede A - BA		
32 A does not precede B - BA		

	TRUE	FALSE
33 A does not follow B - AB		
34 A is not followed by B - BA		
35 B is not preceded by A - BA		
36 B is preceded by A - AB		
37 A follows B - BA		
38 B precedes A - BA		
39 B is followed by A - BA		
40 A precedes B - AB		
41 A follows B - AB		
42 B does not precede A - BA		
43 A does not precede B - BA		
44 A is preceded by B - BA		
45 B is not followed by A - AB		
46 B does not follow A - BA		
47 B does not precede A - AB		
48 A is followed by B - AB		
49 B is not preceded by A - AB		
50 B follows A - BA		
51 A does not precede B - AB		
52 A is not followed by B - AB		
53 B is preceded by A - BA		
54 A is not preceded by B - AB		
55 A does not follow B - BA		
56 A is followed by B - BA		
57 A is not preceded by B - BA		
58 B is followed by A - AB		
59 B is not followed by A - BA		
60 A precedes B - BA		
61 B does not follow A - AB		
62 A is preceded by B - AB		
63 B precedes A - AB		
64 B follows A - AB		

69	25	82	20	42	21	47	89	57	49	43
18	95	14	54	88	43	73	33	26	58	16
82	46	45	47	46	71	10	46	46	87	11
31	23	47	96	85	36	63	85	38	13	21
<u>50</u>	<u>19</u>	<u>74</u>	<u>52</u>	<u>98</u>	<u>79</u>	<u>92</u>	<u>95</u>	<u>15</u>	<u>93</u>	<u>30</u>

91	56	23	89	44	32	33	20	63	95	26
75	47	91	24	83	29	44	66	51	42	13
25	74	36	45	81	88	69	22	44	96	12
78	23	80	52	42	66	17	43	14	97	54
<u>43</u>	<u>72</u>	<u>68</u>	<u>87</u>	<u>18</u>	<u>50</u>	<u>79</u>	<u>58</u>	<u>70</u>	<u>16</u>	<u>17</u>

15	50	89	99	21	78	19	55	69	85	17
33	92	48	62	11	52	97	37	70	68	60
68	93	90	88	81	32	18	22	99	41	68
36	22	10	73	89	29	31	22	60	31	51
<u>45</u>	<u>98</u>	<u>32</u>	<u>46</u>	<u>18</u>	<u>79</u>	<u>22</u>	<u>94</u>	<u>72</u>	<u>16</u>	<u>89</u>

80	37	34	36	10	94	88	19	83	35	38
75	68	44	30	25	54	12	55	48	22	36
33	82	56	56	56	76	80	92	40	17	71
22	74	43	65	16	65	76	54	97	92	69
<u>39</u>	<u>84</u>	<u>54</u>	<u>82</u>	<u>90</u>	<u>13</u>	<u>34</u>	<u>94</u>	<u>43</u>	<u>77</u>	<u>81</u>

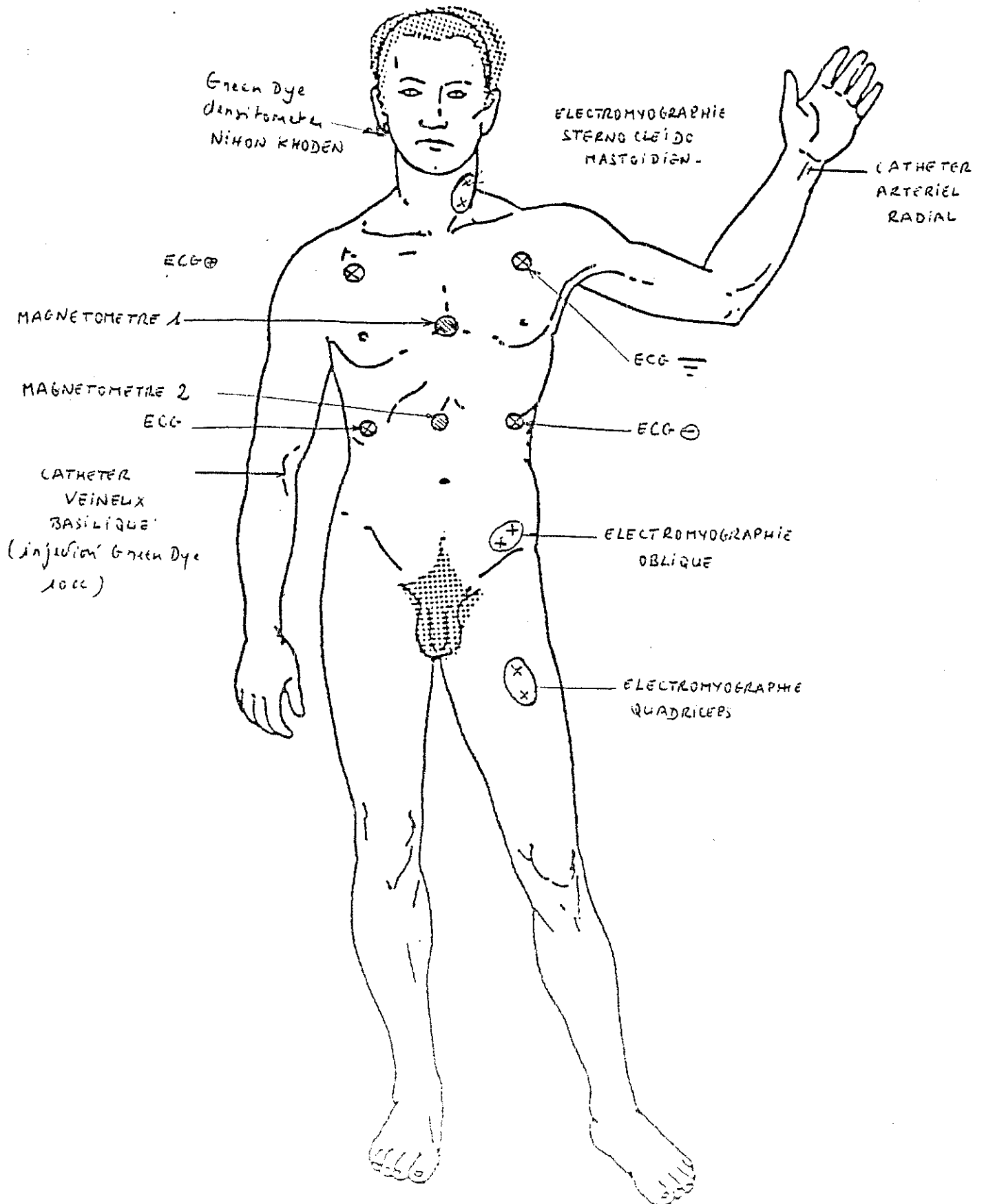
79	39	20	36	29	95	84	23	97	88	50
49	65	33	42	58	38	39	94	99	68	21
81	42	19	29	87	72	74	53	14	14	80
48	67	16	95	99	93	93	74	98	71	87
<u>55</u>	<u>21</u>	<u>30</u>	<u>98</u>	<u>15</u>	<u>85</u>	<u>90</u>	<u>62</u>	<u>62</u>	<u>97</u>	<u>41</u>

13	27	95	14	79	37	56	46	11	87	93
15	44	58	21	38	96	38	90	47	73	39
69	17	94	47	13	46	22	31	20	57	97
80	98	40	24	36	12	38	73	95	84	31
<u>58</u>	<u>12</u>	<u>96</u>	<u>15</u>	<u>87</u>	<u>61</u>	<u>31</u>	<u>62</u>	<u>90</u>	<u>91</u>	<u>13</u>

ATLANTIS IV

ANNEXE VII

ATLANTIS IV - Annex 7



EQUIPEMENT DES SUJETS POUR EPREUVES FONCTIONNELLES RESPIRATOIRES

ATLANTIS IV - Annexe 8

Moyenne des résultats des test psychométriques sur trois sujets, comparés à ceux d'Atlantis III
Sont exprimés en pourcentage de dégradation par rapport aux résultats obtenus en surface.

Atlantis III : TRIMIX 10% N₂ et 0,5 bar O₂ - 3 sujets.

atlantis IV : TRIMIX 5% N₂ et 0,5 bar O₂ - 3 sujets.

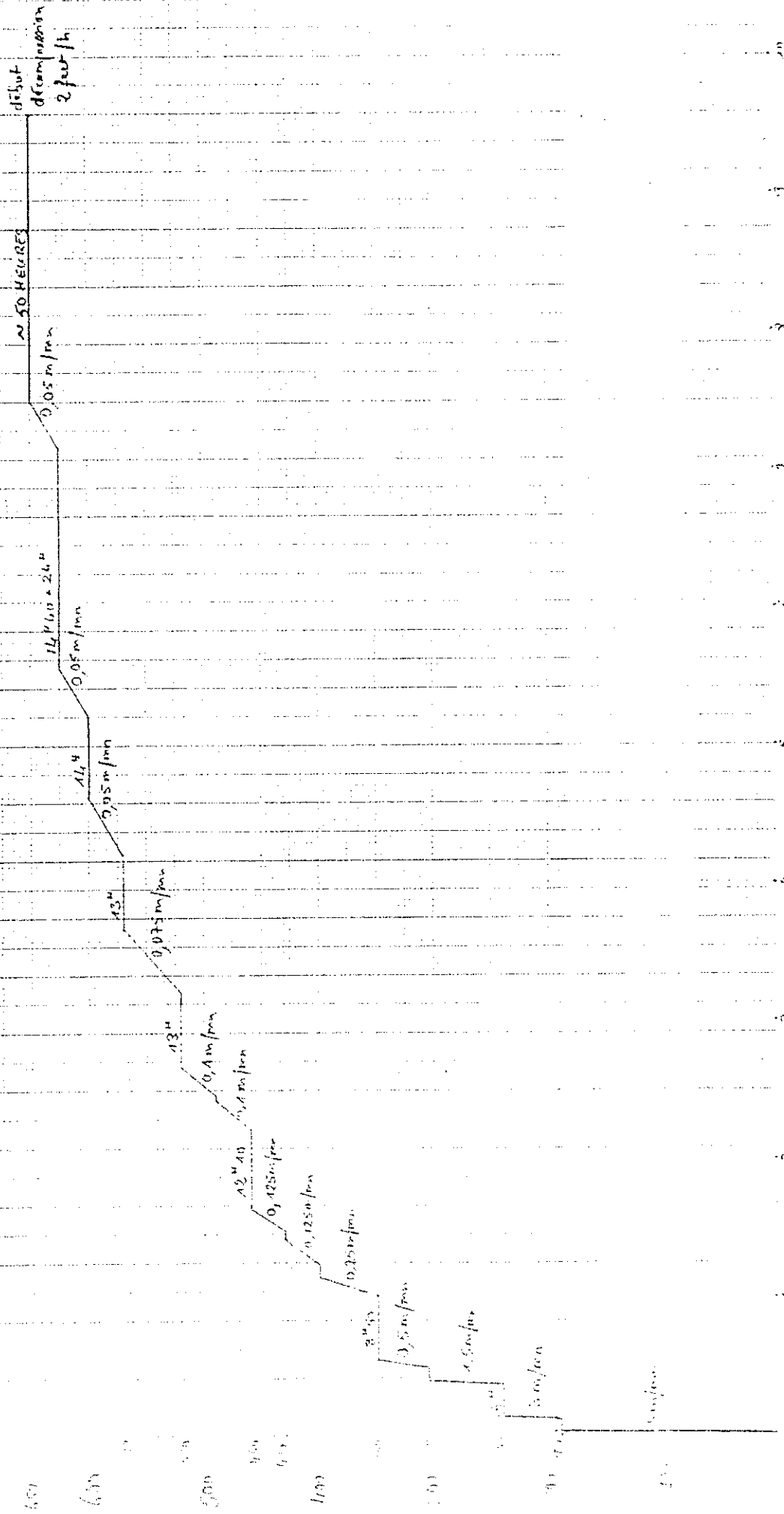
A noter un début de compression plus lente dans Atlantis IV.

Profondeur en msw.	BALL BEARING		PEG BOARD		HAND TOOL		ARITHMETIC REponses CORRECTES		SENTENCES A B REponses CORRECTES	
	III	IV	III	IV	III	IV	III	IV	III	IV
240		-17		-10		-5		-3		-5
305	-19	-11	-14	-11	-19	-11	-21	-4	-10	-6
400	-17	-9	-15	-16	-25	-23	-30	-18	-24	-18
430	-21	-17	-11	-13	-24	-18	-30	-22	-23	-3
460	-23	-15	-14	-12	-17	-20	-21	-17	-17	-6
460	-20	-13	-18	-14	-16	-16	-23	-13	-19	-9
490	-21	-24	-20	-14	-13	-13	-19	-24	-24	-14
520	-29	-21	-18	-10	-12	-11	-28	-10	-21	-17
520	-24	-27	-11	-11	-13	-15	-33	-27	-24	-16
570	-20	-13	-13	-9	-26	-11	-20	-13	-18	-9
570	-22	-14	-20	-13	-25	-17	-29	-24	-21	-12
600	-31	-12	-21	-7	-16	-15	-44	-12	-24	-10
600	-25	-31	-17	-14	-27	-14	-28	-15	-13	-16
625	-28	-27	-22	-20	-16	-15	-32	-16	-9	-4
625	-29	-35	-23	-15	-20	-16	-33	-16	-29	-2
625		-36		-21		-26		-14		-7
625		-40		-17		-25		-20		-5
650	-22	-51	-13	-14	-21	-19	-35	-30	-11	-11
650	-27	-52	-17	-23	-25	-23	-53	-27	-20	-10
650		-19		-20		-21		-19		-14
650		-36		-22		-31		-27		-6
625		-54		-21		-30		-31		-25
625		-29		-21		-45		-36		-19

ATLANTIS IV

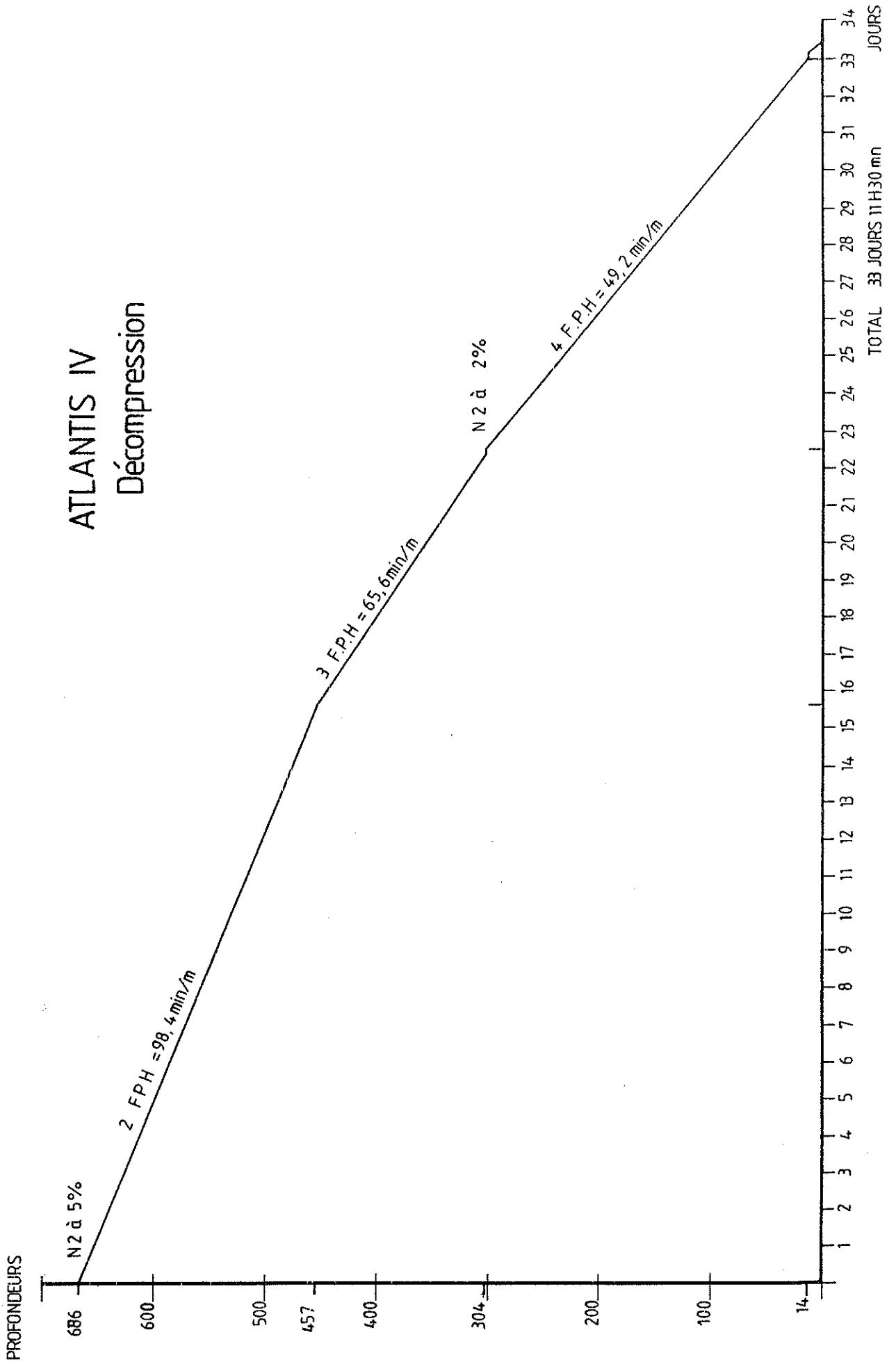
ANNEXE IX

ATLANTIS IV - COMPRESSION - ANNEXE 9



ATLANTIS IV

ANNEXE X



CE DOCUMENT EST LA PROPRIÉTÉ DE COMEX S.A. Toute réimpression ou utilisation non autorisée sans la permission écrite de la Comex S.A. est formellement interdite. Toute violation de cette obligation de secret et s'engage à ne pas le reproduire ni le communiquer à des tiers sans notre autorisation écrite. Lois du 17/3/1902 et 14/8/1909.