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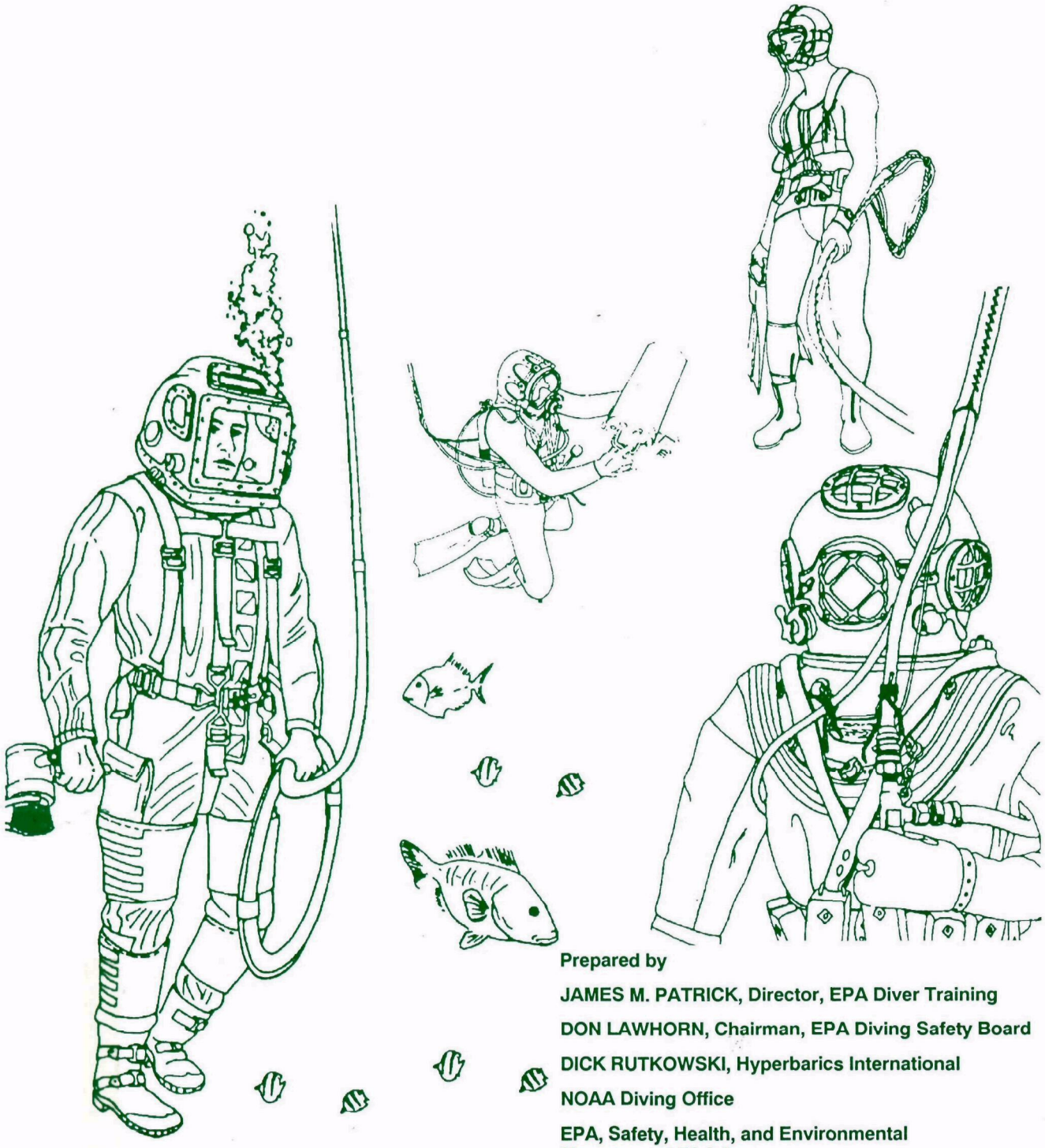
EPA

Diver Training Curriculum



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NOAA Diving Office

EPA, Safety, Health, and Environmental Management Division

DIVER TRAINING CURRICULUM

by

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DISCLAIMER

The information described in this manual has not been subjected to Agency review and is intended to be used as an instructor/student guide during the EPA Diver Training Course. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

James M. Patrick
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EPA DIVING TRAINING CURRICULUM

VARIABLE-VOLUME DRY SUIT

DIVING ACCIDENT MANAGEMENT

DIVER RESCUE

OPERATIONAL/WORKING DIVER

CONTAMINATED WATER DIVING

DIVEMASTER

NOAA NITROX I AND II

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CURRICULUM OUTLINE FOR EPA DIVING PROGRAM

Program Purpose:

The purpose of this curriculum is to instruct the Environmental Protection Agency (EPA) and other visiting divers in the use of variable-volume dry suit, diving accident management, contaminated water awareness, operational/working diver, divemaster, and NOAA NITROX I and II. These instructional techniques apply to Underwater Breathing Apparatus (UBA) to be used with Self-Contained Underwater Breathing Apparatus (SCUBA) and surface supplied air equipment in accordance with EPA Directives.

Program Objective:

The objective is to ensure that each diver can safely use the UBA in accordance with the EPA Diving Directives, return to his/her unit and perform working dives. Divers must have a good working knowledge of the equipment used in the course and limitations in accomplishing working dives. The program will aid in establishing guidelines used in contaminated water diving and diving accident management.

Any candidate who does not meet requirements of this outline will be dropped from the EPA Diving Program or be reverted to a trainee diver. In trainee diver status, divers are not allowed to perform working dives.

Program Equipment:

All participants should bring all diving equipment from their unit, as listed in this Program Outline. Participants who cannot bring the proper diver's dress should notify the Course Director and other arrangements will be made.

Equipment which should be brought by the participant from their unit includes: regulator, underwater pressure gauge, knife, watch, mask, wet suit, fins, snorkel, compass, depth gauge, gear bag, 30 lbs. of weight, weight belt, and back pack. SCUBA tanks are normally furnished by the Diving Program.

Medical Examinations/ Qualifications:

All participants must show proof of meeting the qualifications as outlined in the EPA Diving Directives. All participants, through their Unit Diving Officer must submit their medical records and diving qualification to the EPA Diving Officer before the course begins. Any participant whose records are not in order will not be allowed in the water without the approval of the EPA Diving Officer and/or the EPA Diving Medical Review Board.

VARIABLE-VOLUME

DRY SUIT

VARIABLE-VOLUME DRY SUIT DIVER TRAINING PROGRAM (Course Outline Only)

Note: This is a course outline for instructors and team leaders, divemasters and divers.

Purpose: The purpose of this program is to teach all participants the principles, applications and use of the variable-volume dry suit.

Objective: The objective of this program is to ensure that the participants are qualified in the use of variable-volume dry suits in accordance with the NOAA/EPA Diving Directives.

Qualifications: Participants must be qualified for scuba diving in accordance with the EPA Diving Directives and be recommended by their unit diving officer, through the EPA Diving Safety Board.

OPERATIONAL CONTAMINATED WATER DIVER TRAINING COURSE OUTLINE

FIRST DAY:

0800-0830
Classroom

INTRODUCTION

1. Program
2. Facilities
3. Instructors/team leaders
4. Registration
5. Review of diving qualifications, medicals, etc.
6. Team selection
7. Transportation, hotels, etc.
8. Inventory of student diving equipment

0830-1000
Classroom

HYPOTHERMIA/HYPERTHERMIA

1. Body core temperature changes and their physiological effects
2. Heat transfer
   a. Conduction
   b. Convection
   c. Radiation
3. Prevention of heat loss in cold water
4. Prevention of over-heating
5. Restoring body heat in hypothermia
6. Lowering body temperature in hyperthermia
7. Decompression tables and cold-water diving
8. Missed decompression procedures
9. Blowup decompression procedures
10. Polluted water diving

THE VARIABLE-VOLUME DRY SUIT

1. Purpose of the dry suit
2. Pros/cons of Viking vs. other variable-volume dry suits
3. Preparing the dry suit for diving:
    a. Inspection procedures for holes, etc.
    b. Inspection and care of the zipper
    c. Check on inlet/outlet valves
    d. Care of the neck seal and cuffs
    e. Operation, care and inspection of inflation hose
    f. Repairing the suit
    g. Proper fit and its importance
    h. Lubrication of neck seal and cuffs before entry
    i. Mobility in the dry suits
    j. Cleaning of the suit after normal use
    k. Disinfecting washdown of polluted water dive

DANGERS OF USING DRY SUITS

1. Blowups — how they can occur and contribute to embolism:
    a. Air in the legs when inverted
    b. Dropping of the weight belt
    c. Using the dry suit as a lift bag
    d. Stuck inlet, inflator hose/valve
    e. BC fully inflated preventing access to purge valve
    f. Nonfunctioning purge valve
2. Holes in upper portion of dry suit and loss of buoyancy
3. Diver in inverted position due to air in legs
4. Out of air and difficulty in maintaining buoyancy
5. Suit too large and loss of fins due to air in feet
6. Suit too tight

BLOW UP PREVENTION AND RECOVERY METHODS

1. Don't use the variable-volume suit as a lift bag
2. Ensure adequate training in use of the dry suit
3. Know emergency venting procedures:
    a. Neck seal
    b. Wrist
    c. Purge valve
    d. Flare-outs to slow ascent
4. Don't use BC over purge and inlet valves
5. Use shoulder harness or other means of holding weight belt in place, especially with weak buckles

WEIGHT BELTS

1. Use of a heavily weighted scuba weight belt and problems (buckles not holding)
2. The pros and cons of using harnesses on weight belts or using commercial-type belts with harnesses
3. The use of weights: types, sizes, and how to place them for best position in the water
4. Dangers of dropping weight belts (blowups)
5. Weighing for the dive and check buoyancy

ANKLE WEIGHTS

1. Keep feet down helping to prevent inverted blowup
2. Allow for more air in legs, keeping lower half of the diver warmer
3. Some weight retained if weight belt is lost
4. Help to keep feet in boots of dry suit if diver gets inverted
5. Make swimming harder, especially long distances

FIN STRAPS

Help to keep fins on when jumping into water or when diver gets into inverted position and air gets into legs.

NECK SEAL

1. Proper fit for good seal around the neck
2. How to wear the seal
3. Lubrication and ease of donning
4. Venting suit through neck seal
5. Leaks caused by long hair
6. Advantages of neck seals in surface-supplied diving

HOODS

1. Possible external squeeze
2. Problems associated with air in hood on ascent
3. Elimination of air in hood with a hole
4. Care of hood and seal
5. Long hair and problems associated with leaks
6. Problems of leaks due to overlapping of hood and mask
7. Venting from hood and neck seal

AIR INLET VALVE

1. Proper use for buoyancy control (ascent/descent)
2. Cleaning and inspecting before dive
3. Dangers involved with stuck inlet valve
4. Quick-connect to air hose and its function
5. Problems if quick-connect becomes loose under water

AIR OUTLET VALVE (PURGE)

1. Proper use (ascent/descent)
2. Cleaning, inspecting and lubricating
3. Stuck purge valve
4. Leaky valve

AIR HOSE

1. Proper type and fit
2. Purpose
3. Quick-connect
4. Adapting hose to the first stage:
    a. U.S. models must use an adaptor with Teflon set to change from metric thread
    b. A "T" swivel might be needed if only one low-pressure port on first stage
    c. A new modification-type hose is used to prevent fitting from coming off at depth
    d. Quick-connect is cleaned and lubricated for proper operation

AIR IN SUIT

1. Insulation for warmth
2. Buoyancy control
3. Changes in buoyancy due to depth
4. Blowups (inverted/upright)

UNDERWEAR

1. Types, purposes and insulation qualities
2. Additional weight with additional underwear

CUFFS

1. Importance of proper fit
2. Venting from cuffs
3. Lubrication
4. Repair
5. Type of material

ZIPPER

1. Care and lubrication of zipper

FINS

1. Types of dry suits
2. Proper fit
3. Shoe and suit interface problems
4. Fin straps and their importance
5. Dangers of losing fins:
   a. When jumping into water
   b. When diver is in inverted position

1000-1030
Classroom

FILM, 20 MIN., TV, VIDEO, B&W

(This film demonstrates the normal and emergency functions of the Unisuit)

1. Ascending/descending, using air inlet valve and purge valve with controlled conditions
2. Descending without letting air into the dry suit (this demonstrates suit squeeze in all portions of the body)
3. Inverted diver with air in legs attempting to right himself
4. Venting from the wrists
5. Swimming without weight belt
6. Venting from the neck seal
7. Barrel roll showing movement of air in suit
8. Adding air, becoming positive, and venting from wrist, neck, and/or purge
9. Inverted diver drops weight belt, corrects position, and controls buoyancy to the surface
10. Dropping weight belt and controlled breathing ascent to surface
11. Descending without weight belt
12. Shoulder-harness-type weight demonstration (with buckles and velcro) — the pros and cons of shoulder harness use

1030-1130
Classroom

SUIT SELECTION (CHECK FOR FIT) INVENTORY

1. Each student is fitted with a suit for the duration of the program
2. Suits are checked by students for leaks
3. Suits repaired as needed
4. Each student is issued an air inlet hose
5. Students attach air inlet hose to first stage to ensure proper threads from U.S. to metric
6. Each student is issued fin straps

ACCESSORIES

1. Weighted shoes for stability
2. Rubbers or galoshes for protection
3. Gloves: types, insulation values, and duration of use in cold water for each type
4. Under-gloves for added insulation
5. Full-face mask for added warmth/communications
6. Hats, pots and/or helmets and how they can be mated to the dry suit
   a. Neck seal, hat, pot, and/or helmet not attached
   b. Neck ring, hat, pot, and/or helmet attached
7. Mixed gas diving and different heating values
8. Coveralls: types, reasons for wearing, etc.
9. Cleaning, storing and/or hanging the dry suit

1130-1300 LUNCH

1300-1355
Pool (Shallow End)

DRY SUIT CHECKOUTS

1. Program instructor demonstrates getting into and out of dry suit
2. All students prepare their suits for diving
   a. Set up dive stations with team leader/buddy
   b. Set up scuba tank and regulator
   c. Lubricate dry suit, cuffs, neck seal, and zipper as needed
3. Students dress in dry suit
4. Students checked by instructor for:
   a. Proper fit
   b. Proper equipment
   c. Proper connections of air hose to regulator and suit
   d. Proper type, fit and weight on weight belt
   e. Proper fins and fit with fin straps
5. Students enter shallow end of pool for self-checkout of:
   a. Suit buoyancy with and without weights
   b. Use of air inlet valve and purge valve
   c. Ascent and descent with use of air inlet and purge valves, and proper position for use
   d. Getting into inverted position, air in legs
   e. Swimming with and without ankle weights
   f. Mobility in suit
   g. Venting from wrists and neck seal
   h. Swimming with and without weight belt
   i. Barrel rolls
   j Removal of face mask and work with hood seal

Pool
(Deep End)

DRY SUIT CHECKOUTS

1. Students enter deep end of pool for self-checkout of dry suit:
   a. Perform exercises in item 5 above
   b Check suit squeeze
   c. Controlled ascents and non-controlled ascents

1630-1700

SECURE FROM POOL ACTIVITIES

1. Undress and secure diving dress and equipment
2. Report to team leader for debriefing
3. Report defective equipment and repairs needed

SECOND DAY

0800-0845

1. Homework review (physics/physiology)
2. Question and answer period
3. Debriefing of previous day's water work by team leaders
4. Briefing and schedules for day's program

0845-1000

1. Diving Accident Management
   a. Pressure
      i) ATA, FSW and PSI
   b. Physics
      i) Dalton's Law ($P = P_1 + P_2 + P_3$ ... etc.)
      ii) Partial pressure of gases
   c. Boyle's Law
      i) Pressure vs. Volume
      ii) Pressure vs. Diameter
   d. Boyle's Law as related to the skin diver (breath holding)
   e. Boyle's Law as related to scuba diving and breathing under pressure

1000-1015 BREAK

1015-1100

1. Extra Alveolar Air
    a. Physics
    b. Physiology
    c. Pathophysiology of:
        i. Arterial Gas Embolism
        ii. Pneumothorax
        iii. Pneumopericardium
        iv. Pneumomediastinum

1100-1145 TEAM BRIEFING FOR AFTERNOON WATER WORK

1145-1300 LUNCH

1300-1600
Open Water

TEAM LEADERS ORGANIZE TEAMS AND DIVE STATIONS/SITES

1. Teams report to the dive site
2. Leaders brief teams on their respective dive projects
3. Teams set up dive stations, check all gear, and work with buddy to ensure he has all gear and understands the dive plan
4. Dive teams dress in dry suits
5. Buddies check each other, review dive plan and tables
6. Team leaders check each dive team
7. Divemaster and/or safety diver check each diver
8. Divemaster/team leader ensure diving accident management emergency plan is in effect
9. Teams check out with divemaster and enter water

Purpose (Dive Plan)

The purpose of this dive is to let students become familiar with their diving dress (dry suits) for the first time in open-water conditions. Diver will work with team leader and/or divemaster and demonstrate performance of all normal and emergency procedures as practiced in the pool the previous day. The rate of advancement through these exercises will be determined by the instructor. Students who do not show proficiency will remain one-on-one with the team leader until proficiency is demonstrated. This will allow students to move to the next part of the training program (working with another student). The rate of advancement through these exercises is determined by the instructor/team leader.

The team leader/instructor will ensure that dive area is cleared for diving in accordance with the EPA Diving Directives. The diving accident management emergency plan must be in effect and understood by all involved, in accordance with the EPA Diving Directives and the EPA Diving Accident Management manual.

The students will use all dry suit techniques as employed in the previous days' pool session. The afternoon session will use ascending/descending lines to control rates, but will make excursions using buddy lines and diver-to-surface lines. While making these excursion in limited visibility, divers will use a compass. The tending diver on the surface will signal divers below with the line-pull signals when he/she wants them to come up for any reason

A diving safety boat must be in the water in case of diving emergency, and equipped to handle emergencies in accordance with EPA Diving Directives. All appropriate clearances must be maintained for diving, and appropriate flags must be flown in accordance with the EPA Diving Directives.

SECURE FROM DIVING OPERATIONS

1. Secure diving projects
2. Secure diving accident management network
3. Inform all appropriate authorities that diving operations are secured, remove diving flags
4. Secure diving equipment, undress, and clean all gear
5. Debriefing by team leader

1600-1630 BREAK

1630-1800

CONTINUE DIVING ACCIDENT MANAGEMENT/RESCUE FOR E.A.A.

1. Prevention of diving accidents (E.A.A.)
   a. Medical Causes
   b. Operational
   c. Environmental
2. Early recognition of signs/symptoms of E.A.A.
3. First aid of diving accident
   a. Use of oxygen and its importance, medical implications and pathophysiology
   b. Protection of airway and vital signs
   c. Oxygen safety
   d. Oxygen delivery systems

THIRD DAY

0800-0845

HOMEWORK REVIEW (Physics/Physiology III)

0845-0900

TEAM LEADER REVIEW SESSION

0845-1000

MAN AND HIS NEW ENVIRONMENT

Acclimation to mean sea level

Ascending to lesser pressure (hypobaric conditions)

Descending to higher pressures (hyperbaric conditions)

Ascending/descending in unpressurized conditions

Controlling physiological parameters within the body, under varying pressures

Barotrauma (direct effects of pressure) and the semi-rigid spaces in the body and how they are affected

Indirect effects of pressure
(decompression sickness and density of gases)

a) Inward/outward gradient of inert gases from the body and importance of keeping it in balance

Note: Divers attending this program should fully understand the physics, physiology and medical aspects of decompression sickness. The lecture above is a quick review, especially for non-divers, of the basic physics/physiology of diving.

MEDICAL ASPECTS (Signs/Symptoms)

1. Decompression sickness
   a. How it occurs
   b. Onset times
   c. Post dive early recognition of mild/severe signs and symptoms
   d. Immediate first aid
2. Examination by physician at chamber
3. Transfer into chamber and related problems
4. Flashback to accident site, showing victim coming to surface confused, being helped into boat and first aid being administered. Full narration of procedures as performed for a conscious and unconscious victim
5. Coast Guard alarm office and their procedures for alerting flight crews
6. Complete visual display of "bubble trouble", signs/symptoms
7. Complete animated outline of the pathology of decompression sickness and extra alveolar air

REVIEW OF:

a. Importance of oxygen and its pharmacology
b. The Trendelenburg Position/Left Lateral Down
c. Liquids and aspirin and the pharmacology

100-1015 BREAK

1015-1100

DIVING ACCIDENT MANAGEMENT
(Manual is used for this lecture as a guideline and for future reference)

History of first aid procedures

Case history of victim with management in the field and outcome at the chamber

Case history of victim with proper first aid and evacuation

Review of the diving accident flow chart first aid procedure

a. Mild symptoms

b. Severe symptoms

Step by step explanation of the flow chart, why and when to give oxygen, and other first aid measures

The importance of first aid for early mild symptoms

a. Fatigue

b. Weakness

c. Indifference/personality changes

d. Skin rash

1100-1200

INTRODUCTION TO ADVANCED DIVE EQUIPMENT

1. AGA (Use and Service)
2. Wireless Communication
3. Pinger Locator
4. Hand pull signals

1200-1300

LUNCH

1300-1630

WATER WORK

1. Purpose of day's dive plan: The purpose of this day is for team leaders to designate divemasters and allow them to supervise a diving operation/project of less qualified divers on any of the projects designated by the Diving Supervisor. This might be any project outlined in days one and two of this program. Students with lesser qualifications should use these projects to improve their diving ability and skills.

2. Objectives:

   a. The objective of the above dive plan is to ensure that each divemaster can supervise diving operations with less qualified divers, in accordance with the EPA Diving Directives and this Course Outline. He should be confident in all emergency situations, make decisions to avoid accidents, and in the event of an accident, be able to stabilize the victim and evacuate him to the hyperbaric trauma system, if needed.

   b. Student divers should be able to perform all working skills of an EPA working diver, in accordance with the EPA Diving Directives and this Course Outline.

   c. Previously qualified EPA divers who are in this course to requalify must demonstrate their skills.

3. Team leaders, diving supervisors, instructors, and divemasters must observe all subordinates and report their abilities, particularly if there are any students with abilities less than the standards outlined in this Course Outline and the EPA Diving Directives.

4. Any diver whose performance/ability/skill/knowledge upon completion of this course does not equal that of an EPA working diver or higher will, upon recommendation of the Course Director through the EPA Safety Board Chairman, be dropped from the EPA Diving Program or reverted to an EPA Trainee Diver.

1300-1630

WATER WORK

TEAM BRIEFING BY DIVEMASTER TRAINEE, SUPERVISED BY INSTRUCTOR

1. Team leader/instructor/divemaster selection
2. Team selection and other surface support personnel
3. Hyperbaric accident trauma network requirements:

   a. Emergency phone numbers

   b. Money for emergency phone calls

   c. Call or visit to chamber complex

   d. Verification that local paramedics know dive site, where chamber is located, and diving accident/first aid procedures

e. Communication channels/frequencies

f. Mechanical resuscitative equipment at site

g. Oxygen supply at dive site (enough to transport patient to chamber complex)

4. Small boats as needed

5. Plan to remove injured diver out of water

6. Surface support personnel (standby/safety diver)

7. Secure dive site for diving operations:

   a. Notification of proper authorities: harbor, Coast Guard, etc., to ensure safe diving operations

8. Diving flags on shore/floats, as needed

9. Safe ship dive check-off sheet, if working under boats or docks in immediate area, to ensure that they have no electronic equipment operating that could be harmful to divers (pingers, sonar, etc.), even though diving operations might not be under ships

10. Dive projects as directed by Diving Instructor,

    Dry Suits
    Surface Supply Diving
    U/W Communications (Wireless, Hard Wire, Hand Signals, Diver Recall Systems)
    Search and Recovery Procedures
    Underwater Tools (Flange)
    Underwater Metal Detectors
    Active/Passive Pinger Locators
    Underwater Cutting (Mapp Gas)
    Nitrox I and II

Teams will be assigned projects as directed by EPA Diving Instructors.

1630-1700 Debriefing by Diving Instructors

Fill in dive log

1700-1800

The importance of first aid, stabilization and evacuation for severe signs/symptoms

a. Joint pains

b. Dizziness/visual disturbances

c. Paralysis of face, limbs or extremities

d. Feeling of blow on chest/chest pain

e. Shortness of breath

f. Severe hacking cough/bloody, frothy mouth

g. Staggering/difficulty telling direction

h. Convulsions

i. Collapse or unconsciousness

j Cessation of breathing and/or pulse

Importance of knowing location of nearest hyperbaric trauma center and how to evacuate victim

a. Availability of hyperbaric physician

b. Availability and location of multi-place, multi-lock recompression chamber

c. Methods of evacuation (air/land)

d. Communication (phone/radio)

Importance of qualification in first aid procedures and CPR

Importance of emergency medical equipment at site

a. Oxygen, type, supply and delivery system

b. Neurological base line equipment

c. Complete first aid kit for diver/marine use

d. Fluids (oral/I.V.), I.V by qualified persons only

e. Aspirin, Afrin, etc.

Emergency evacuation procedures for paramedics, physicians and flight crews. The importance of their knowing these procedures before beginning evacuation.

a. Maintain breathing and heart functions, ensure airway is open and remains open

b. Supply oxygen to patient in transport, pros/cons of the Trendelenburg Position/Left Lateral Down

c. Ensure paramedics/physicians understand why diving accident victims must be taken directly to recompression chamber facility instead of to a hospital

d.

Ensure they understand why patient must be kept on oxygen (unless convulsions occur). Without oxygen, bubbles will reload with nitrogen and worsen condition.

e. Keep patient out of hot sun and monitor for shock

f. Do not give pain killing drugs. I.V.'s can be started to prevent vascular collapse or dehydration (plain lactated ringers is I.V. of choice: otherwise, D5LR or DI/2NS). Two aspirins may be given.

g. Instruct flight crews to fly or pressurize aircraft below 1000 feet (if no hazard to aircraft). Pressure as near to mean sea level is desired

h. Prepare a complete history of events leading up to, and including accident should be forwarded. All first aid measures taken and any previous medical history of patient should be forwarded with patient

i. In the event of a fatality, all diving equipment should be forwarded to the proper authority

In-water recompression (pros/cons)

1. In-water recompression should not be attempted:

   a. It loads the bubbles more

   b. Exposure time is too great

   c. Environmental factors subject to change

   d. Pros/cons of in-water treatment with oxygen

   e. If serious symptoms exist, it is not possible to put into water. If mild symptoms, time exists to evacuate

   f. Missed decompression procedures (asymptomatic)

Recompression chamber requirements (35 mm slide presentation of types/sizes/purposes)

1. Multi-place, multi-lock, 6 ata
2. Multi-place, single-lock, 6 ata
3. Mono-place (single-place), 2 ata
4. Single-place, 6 ata
5. Portable, inflatable (PIRC)

NOTE: The pros and cons of each type of recompression chamber is discussed to ensure that diving accident victims requiring hands-on care and six atmospheres of pressure are sent to the proper facility, in accordance with the OSHA Regulations.

Pressure must be sufficient to reduce bubble size (gas embolism requires 6 atmospheres and even this only reduces the diameter of the bubble by 52%).

Physicians have no way of getting hands on patient

a. To maintain vital signs and monitor patient

b. Keep airway clear

c. Perform neurological examinations necessary to determine proper treatment/reoccurrence of symptoms

d. Perform operations such as intubation as needed

Pulmonary overdistention cases may have air leakage causing a tension pneumothorax which requires hands-on care and continuous monitoring. Physicians must have the option of changing from oxygen to air and/or going deeper than 2 atmospheres when necessary. Mono-type chambers do not have this capability.

Oxygen convulsions may cause respiratory arrest, close off patient's glottis, causing embolism while dropping pressure to relieve convulsions

It is often better to transport victims without putting them into a one-lock chamber for the above reasons. Transportation using oxygen and Trendelenburg while monitoring vitals is often the best way.

COMMUNICATIONS

Ensure participants understand the importance of communications to:

a. Talk with physician on the beach

b. Alert the Coast Guard, if at sea

c. Know all important frequencies and numbers necessary to make a medical evacuation in U.S. and foreign territories

   i. Know all frequencies and telephone numbers for contacting shore-based paramedics

   ii. Know all numbers for recompression chamber facilities and/or physicians attached to them

   iii. Have copies of international/domestic chamber facilities, USN, Worldwide Hyperbaric Chamber, Shore Based, NAV SHIPS 0994-4011

HELICOPTER EVACUATION PROCEDURES

1. Try to establish communications with the helicopter. If your boat is unable to, work through another boat if possible
2. Maintain speed of 10 to 15 knots
3. Maintain course into the wind, about 20 degrees on port bow
4. Put all antennas down if possible, while continuing to maintain communications
5. Secure all loose objects on/around decks
6. Always let the lifting device (stretcher) touch the boat before handling, to prevent electric shock
7. Place life jacket on patient
8. Tie patient in basket (stretcher) face up
9. If patient cannot communicate, place as much information about him as possible on note paper and pin to clothes (age, name, address, medications given, etc.)
10. If patient is a diving accident victim, ensure that flight crew has a copy of or is instructed in procedures for diving accidents and will take patient to hyperbaric trauma complex (chamber)
11. If patient dies, inform flight crew
12. Instruct flight crews to fly as low as possible to prevent pressure changes and explain why

FOURTH DAY

0800-0845

Review Homework (Physics/Physiology III)

Review previous day's diving project

0845-1000

OPERATIONAL DIVING

1. Dive planning
   a. Gas physiology (narcosis, DCS and CNS balance)
2. Gas supply requirements
3. Cylinder duration
4. Gas analyzation
5. Compressor safety (lubricants, filters and the lungs)
6. Decompression procedures

7. Dive safety
8. Contaminated water (diving and equipment)
    a. Type of dress
    b. Decontamination
    c. On-site coordinator
    d. On-site awareness of contaminants
    e. Use of ROV's and other related equipment

1000-1015 BREAK

1015-1100

Nitrox diving (NNI and NNII)

Physics of nitrox diving

Oxygen life support ranges

CNS oxygen toxicity

Equivalent air depth concept

Nitrox decompression tables

Oxygen safety

1115-1200

Advanced equipment briefing

Wireless communication systems

MAPP Gas cutting

Nitrox diving

1200-1300 LUNCH

1300-1630 WATER WORK

1. Purpose of day's dive plan: The purpose of this day is for instructors to designate divemasters and allow them to supervise a diving operation/project of less qualified divers on any of the projects designated by Diving Instructors. This might be any project outlined in days one and two of this program. Students with lesser qualifications should use these projects to improve their diving ability and skills.
2. Objectives:

a. The objective of the above dive plan is to ensure that each divemaster can supervise diving operations with less qualified divers, in accordance with the EPA Diving Directives and this Course Outline. He should be confident in all emergency situations, make decisions to avoid accidents, and in the event of an accident, be able to stabilize the victim and evacuate him to the hyperbaric trauma system, if needed.

b. Student divers should be able to perform all working skills of an EPA working diver, in accordance with the EPA Diving Directives and this Course Outline.

c. Previously qualified EPA divers who are in this course to requalify must demonstrate their skills.

3. Team leaders, diving supervisors, instructors, and divemasters must observe all subordinates and report their abilities, particularly if there are any students with abilities less than the standards outlined in this Course Outline and the EPA Diving Directives.

4. Any diver whose performance/ability/skill/knowledge upon completion of this course does not equal that of an EPA working diver or higher will, upon recommendation of the Course Director through the EPA Safety Board Chairman, be dropped from the EPA Diving Program or reverted to an EPA Trainee Diver.

1300-1630

WATER WORK

TEAM BRIEFING BY DIVEMASTER TRAINEE, SUPERVISED BY INSTRUCTOR

1. Team leader/instructor/divemaster selection
2. Team selection and other surface support personnel
3. Establish hyperbaric accident trauma network requirements:
   a. Emergency phone numbers
   b. Money for emergency phone calls
   c. Call or visit to chamber complex
   d. Verification that local paramedics know dive site, and know where chamber is located, and diving accident/first aid procedures
   e. Communication channels/frequencies

f. Mechanical resuscitative equipment at site

g. Oxygen supply at dive site (enough to transport patient to chamber complex)

4. Small boats as needed

5. Plan to remove injured diver out of water

6. Surface support personnel (standby/safety diver)

7. Secure dive site for diving operations:

   a. Notification of proper authorities: harbor, Coast Guard, etc., to ensure safe diving operations

8. Diving flags on shore/floats, as needed

9. Safe ship dive check-off sheet if working under boats or docks in immediate area, to ensure that they have no electronic equipment operating that could be harmful to divers (pingers, sonar, etc.), even though diving operations might not be under the ships

10. Dive projects directed by diving instructors:

    Dry Suits
    Surface Supply Diving
    U/W Communications (Wireless, Hard Wire, Hand Signals, Diver Recall Systems)
    Search and Recovery Procedures
    Underwater Tools (Flange)
    Underwater Metal Detectors
    Active/Passive Pinger Locators
    Underwater Cutting (Mapp Gas)
    Practical Use of NOAA Nitrox I and II

Teams will be assigned projects as directed by the EPA Diving Instructors.

(FILMS/SLIDES)

a. Hypothermia

b. Hyperthermia

c. Drysuit Emergency Training Techniques

d. Overview of Diving Accidents

e. Microbial Hazards of Diving

f. Demonstration of NOAA/EPA Contaminated Diving Protection

g. Contaminated Water EPA Diving Operations

h. Use of ROV's in Contaminated Water by EPA Emergency Response Team

MATERIALS/HANDOUTS

a. Diving Accident Management Manual

b. Instructor/Student Guide to NITROX Use

c. Equipment Innovations Cut Risk for Divers

d. Interim Protocol for Diving Operations in Contaminated Waters

e. Microbial Hazards of Diving in Polluted Water

f. Compressor, Lubricants, Filters and the Lungs

g. Program Curriculum

h. Dry Suit Diving/Equipment Guidelines

i. Factors That Contribute to the Bends

j. Homework Assignments

k. Nitrox Training Manual

l. USN Divers Handbook