APPENDIX 7
EMERGENCY ACTION PLAN FOR SCIENTIFIC DIVING

Sources for the following information include the University of Miami's Dive Safety Manual and the NOAA diving manual.

All divers are required to be familiar with HPU's emergency action plan for diving activities. It is your responsibility to review emergency procedures regularly so that we may all be confident that if an accident were to occur that we could both respond accordingly and render aid or be confident that we will be taken care of. Scuba diving is inherently risky, and it is each diver's responsibility to plan dives according to the participant's training and physical capabilities and to stop any unsafe practices as soon noticed. The community of scientific divers at HPU must self-regulate and look out for each other at all times. Please do your part and be prepared. If at any time a diver shows complete lack of awareness to these emergency procedures, his/her diving privilege will be revoked.

BASIC STEPS FOR MANAGING DIVING ACCIDENTS

1. **Stop** everything going on and try to think clearly.

2. **Assess** the scene of the incident for hazards. If the scene appears unsafe, do not proceed with rescue efforts. Call 9-1-1. If the scene can be made safe while ensuring the safety of all rescuers, proceed with rescuing the injured diver.

3. **Use** any pertinent resources available to you. If you need others to help, direct them with clear and concise instructions. People will follow a leader's instruction in stressful times. In Hawaii, there can be many experienced watermen near the shoreline at any given time. Ask for help if you need.

4. **Exposure** protection – Use nitrile gloves and a face mask if bodily fluids are present. These items are in the emergency dive first aid kit.

5. **Check** the victim for level of responsiveness using the acronym AVPU.
    a. A – Injured diver is aware and oriented to him/herself, the time, and the location.
    b. V – Injured diver gives a response when presented with a verbal stimulus.
    c. P – Injured diver gives a response only when presented with a painful stimulus.
    d. U – Injured diver is completely unresponsive and shows no mental function.

6. **Call** for help - 9-1-1. If the injured diver is not A on AVPU scale or if there is any question whether EMS may be needed, call 9-1-1.
    a. Reference the *Scientific Diving Emergency Contacts* page at the end of this plan and the copy of your dive plan for numbers and addresses of care facilities near the dive site.
    b. If appropriate, call the Diver's Alert Network for consultation and advice.
    c. Call the DSO or other DCB members for help and further guidance.

7. **Care** for the victim. Always prioritize ABC's – airway, breathing, and circulation. If the victim is unconscious, start your care with Look-Listen-Feel for both breathing and the presence of a pulse. If a pulse is present without breathing, rescue breaths are appropriate. If neither pulse nor breathing are present, initiate CPR.
    a. Position the injured diver on his/her back.
    b. Give 30 compressions about 2" deep on the center of the sternum at a rate of 100-120 compressions per minute.
    c. Open victim's airway with head-tilt, chin-lift method.
    d. Provide two breaths to the victim.
    e. Continue this pattern of 30 compressions to 2 breaths for 2 minutes (about 5 sets of 30:2).
    f. Look, listen, and feel for signs of life every 2 minutes.
    g. Continue this process as long as possible.

8. **Oxygen.** Generally, the best thing for the majority of diving accidents is administration of 100% Oxygen. The first choice of oxygen delivery equipment for any injured diver is the demand regulator included in the oxygen kit. Second choice is the non-resuscitator bag with the oxygen hook up.

9. Treat for **shock** by:
    a. Maintaining the diver's temperature.
    b. If possible, place the injured diver supine with legs elevated 10-12" (if head, neck, or back injury is not suspected). If this is not possible, place diver in a position of comfort.
    c. Provide oxygen.
    d. Do not administer fluids orally.

10. Notes. If there are enough people present, assign someone to take notes on the patient's state. Note times of readings and/or changes in symptoms. Write clearly. This information should be handed off to paramedics when they arrive on the scene and should stay with the patient.

11. **Accident reports.** Each diver at the scene should fill out an accident report while details are fresh in their minds. As time passes, many details often slip. Please be honest and accurate as to what you saw you. Each diver is to submit their own story and to not corroborate stories with others. Accident reports will be submitted to the HPU Dive control board within 24 hours of the incident.

12. **Dive gear.** Do not disassemble the dive gear of the injured diver in the case of a serious accident. Please keep in-tact and label with the diver's name. The dive gear will be passed on to the DSO and the DCB.

HAWAII PACIFIC UNIVERSITY
SCIENTIFIC DIVING EMERGENCY CONTACTS

RECOMPRESSION CHAMBER: (808) 587-3425

Kuakini Hyperbaric Treatment Center
HPM Tower; Ground Floor
347 N Kuakini St, Honolulu, HI 96817

AMBULANCE, FIRE, AND POLICE: Dial 9-1-1

UNITED STATES COAST GUARD (HONOLULU): (808) 541-2450
VHF Channel 16

DIVER'S ALERT NETWORK (DAN): Emergency (919) 684-9111
Non-emergency medical advice (919) 684-2948

AREA HOSPITALS WITH EMERGENCY FACILITIES:

***** Kuakini has the recompression chamber on site

HONOLULU AREA

Kuakini Medical Center - 347 N Kuakini St, Honolulu, HI 96817	(808) 536-2236
Queen's Medical Center - 1301 Punchbowl St, Honolulu, HI 96813	(808) 691-1000
Straub Medical Center (Town) - 888 S King St, Honolulu, HI 96813	(808) 522-4000
Kaiser Moanalua - 3288 Moanalua Rd, Honolulu, HI 96819	(808) 432-0000
Pali Momi Medical Center - 98-1079 Moanalua Rd, Aiea, HI 96701	(808) 486-6000

WINDWARD

Adventist Health Castle - 640 Ulukahiki St, Kailua, HI 96734	(808) 263-5500

LEEWARD

Waianae Health Center - 86-260 Farrington Hwy, Waianae, HI 96792	(808) 697-3300
Queen's West Oahu - 91-2141 Fort Weaver Rd, Ewa Beach, HI 96706	(808) 691-3000

NORTHSHORE

Kahuku Medical Center - 56-117 Pualalea St, Kahuku, HI 96731	(808) 293-9921
Wahiawa General Hospital - 128 Lehua St, Wahiawa, HI 96786	(808) 621-8411

HPU CONTACTS:

Diving Safety Officer	(808) 772-7181

DIVE ACCIDENT NOTES

Patient's Name: _____ Date/Time: _____

Describe pain/numbness: _____

_____

HISTORY

Number of dives in past 24 hours: _____ Depth of last dive(ft): _____ Duration: _____

Symptoms notice before, during, or after the dive? _____

If during the dive, was it while descending, at depth, or ascending? _____

Symptoms increased or decreased since first noticed? _____

Other symptoms since onset? Describe. _____

_____

Experienced similar symptoms before: _____

Ever previously had DCS or air embolism? _____ If yes, when: _____

VITALS

Time	Pulse (beats/min)	Breathing (breaths/min)	AVPU (Alert,Verbal,Pain,Unresponsive)

Medications: _____ Allergies: _____

Time started on Oxygen: _____ CPR started: _____ CPR ended: _____

Calls placed (Check the appropriate boxes): 9-1-1 ☐ DAN ☐ Kuakini ☐ DSO ☐

Diver's Alert Network suggestions for treatment: _____

_____

_____

_____

_____

Data recorded by: _____ Contact Phone: _____

LUNG OVER-EXPANSION INJURIES

ARTERIAL GAS EMBOLISM (AGE)

As a diver surfaces without exhaling, air trapped in the lungs expands and may rupture lung tissue releasing gas bubbles into the circulatory system where they may be distributed to the body tissues. The ascending diver is normally in a vertical position and the bubbles tend to travel upward toward the brain, eventually reaching a small artery blocking circulation. The effects of halting circulation to the brain are critical and require immediate treatment. Symptoms of embolism may be present when the victim reaches the surface or within a few minutes afterwards.

CAUSES
- Holding breath during ascent while breathing compressed air
- Lung disease causing air trapping
- Diving with cold or chest congestion
- Airway obstruction from foreign object in the mouth (gum, etc)

SYMPTOMS
- Unconsciousness within five minutes of surfacing
- Dizziness or staggering
- Visual distrubances
- Paralysis
- Bloody froth from the mouth or nose
- Respiratory arrest
NOTE: Symptoms usually appear within 15 minutes of surfacing from a dive

TREATMENT
- EVACUATE TO RECOMPRESSION CHAMBER/HOSPITAL ASAP!
- ABC's - airway, breathing, and circulation
- Administer 100% oxygen with diver in suppine position
- Administer fluids (water) to conscious patients

LUNG OVER-EXPANSION INJURIES

PNEUMOTHORAX

As a diver ascends, the lungs typically vent expanding air without problem. If the air is blocked from exiting normally, the lungs can overinflate and damage the alveoli and bronchial passages. If expanding air ruptures the lung, air escapes into the small, normally airless area between the lungs and chest. This is a pneumothorax. The two types of pneumothorax include:1) *simple pneumothorax* - involves a one time event of air escaping from the lungs into the pleural cavity AND 2) *tension pneumothorax* involves a repeated leaking of air into the pleural cavity with each breath. Both are very serious and require immediate medical attention.

CAUSES
- Holding breath during ascent while breathing compressed air - Lung disease causing air trapping - Diving with cold or chest congestion - Airway obstruction from foreign object in the mouth (gum, etc)

SYMPTOMS
- Difficulty or rapid breathing - Shortness of breath - Hypotension - Cyanosis and shock - Chest pains (deep breath hurts) and intense pressure in the chest - Leaning towads affected side (and absent lung sounds on affected side) - Loss of consciousness or death

TREATMENT
- EVACUATE TO HOSPITAL ASAP! - ABC's - airway, breathing, and circulation - Administer 100% oxygen - Position patient on injured side - Treat for shock - In the case of a tension pneumothorax, air must be vented from the chest cavity by a medical professional

LUNG OVER-EXPANSION INJURIES

SUBCUTANEOUS EMPHYSEMA

Upon ascent, air escapes from a lung overpressurization into the tissues beneath the skin of the neck. It can be associated with mediastinal emphysema or can occur alone.

CAUSES

- Holding breath during ascent while breathing compressed air
- Lung disease causing air trapping
- Diving with cold or chest congestion
- Airway obstruction from foreign object in the mouth (gum, etc)

SYMPTOMS

- Feeling of fullness in the neck area
- Swelling or inflation around the neck and upper chest
- Crackling sensation when skin is pressed
- Change in sound of voice
- Cough

TREATMENT

- Transport to nearest medical facility
- ABC's - airway, breathing, and circulation
- Administer 100% oxygen if breathing is impaired
- Monitor for shock
- Unless showing signs of a gas embolism as well, recompression is not normally required

LUNG OVER-EXPANSION INJURIES

MEDIASTINAL EMPHYSEMA

Upon ascent, air escapes from a lung overpressurization into the tissues surrounding the heart, major blood vessels, and trachea (windpipe). This gas expands on ascent, causing pain under teh sternum (breast-bone), shortness of breath, or in extreme cases, fainting from impaired blood return to the heart.

CAUSES

- Holding breath during ascent while breathing compressed air
- Lung disease causing air trapping
- Diving with cold or chest congestion
- Airway obstruction from foreign object in the mouth (gum, etc)

SYMPTOMS

- Difficulty breathing
- Shortness of breath
- Faintness
- Pain under breastbone that may radiate to the neck, collarbone, or shoulder
- Cyanosis (blueness) of the skin, lips, or nailbeds
- Shock
- Swelling around the neck
- A brassy quality to the voice
- A sensation of pressure on the windpipe
- Cough
- Deviation of adams apple to affected side

TREATMENT

- Transport to nearest medical facility

- Mediastinal emphysema causing respiratory or circulatory impairment may require recompression

- ABC's - airway, breathing, and circulation

- Administer 100% oxygen

- Monitor for shock

DECOMPRESSION SICKNESS (DCS)

The result of inadequate decompression follwing exposure to increased pressure. Typically occurs as a result of ascending too quickly and not alloting the proper amount of time required for decompression to occur. An important note is that DCS can occur even when divers follow dive tables and computers and remain within recommended decompression limits. Please listen to your body for the 24 hours following a dive and consult a physician familiar with dive medicine should you experience any of these symptoms.

PREVENTION

- Make safety stops
- Ascend slowly (maximum of 30 feet per minute)
- Allow for longer surface intervals
- Plan dives conservatively
- Hydrate well when diving
- Maintain good physical fitness and nutrition
- Do not dive when dehydrated, intoxicated, hungover, or overly fatigued

SYMPTOMS

** Symptoms often occur within 6 hours of dive completion, but can be delayed up to 24 hours*

- Joint pain (most commonly in the elbow, shoulder, hip, or knee)
- Extreme fatigue and weakness
- Dizziness, tunnel vision, or staggering, occasiaonlly leading to unconsciousness
- Paralysis or numbness
- Itchy skin and/or blotchy rash on the abdomen
- Ringing in the ears or partial deafness, confusion or disortienation

TREATMENT

- Transport to recompression chamber ASAP and consult with physician familiar with diving injuries
  * DO NOT attempt to treat in the water
- Monitor ABC's (airway, breathing, and circulation)
- Administer 100% oxygen
- Administer fluids (water preferred)
- Rest in suppine position