

**THURSTON COUNTY PUBLIC WORKS
NOXIOUS WEED DIVISION
UNDERWATER DIVING SAFE PRACTICES MANUAL**

FINAL

Prepared by;

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Prepared for:

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Olympia WA 98512
360 786 5576

February 1, 2015

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TABLE OF CONTENTS

1.0 Introduction 1

1.1 Safety Policy 1

1.2 Purpose 1

1.3 Relevant Regulations and References 1

1.4 Application 1

1.5 Covered Activities and Conditions 2

1.6 Exceptions 3

2.0 Organization/Responsibility 3

2.1 TCNWD Coordinator 4

2.2 Diving Health and Safety Designated Person in Charge (Diving Safety Officer) 4

2.3 On-Site DPIC 5

2.4 TCNWD Field Personnel 5

2.5 Contractors 6

3.0 DIVE TEAM REQUIREMENTS 6

3.1 Qualification as a Diver 6

3.2 Depth Qualification 7

3.3 Additional Training 7

3.4 Equipment Qualifications 7

3.5 Environmental Qualifications 8

3.6 Maintenance of Qualifications 8

3.7 Restriction, Suspension, or Revocation of Diving Qualification 8

3.8 Reactivation 8

3.9 Dive Tender 8

3.10 Waiver of Requirements 9

4.0 MEDICAL REQUIREMENTS 9

4.1 Medical Requirements of Dive Team 9

4.1.1 General 9

4.1.2 Frequency of Physical Examinations 10

4.1.3 Testing Requirements for a Medical Examination: Initial and Re-Examination 10

4.2 Contra-Indications to Diving 11

4.2.1	Absolute Contra-Indications to Diving.....	11
4.2.2	Relative Contra-Indications to Diving.....	11
4.3	Physician's Written Report	12
5.0	RECORD KEEPING	12
6.0	BREATHING AIR	12
6.1	Air Purity Standards.....	12
6.2	High Pressure (scuba) Air	13
7.0	DIVING EQUIPMENT	13
7.1	General Policy.....	13
7.2	Ownership and Compensation.....	13
7.3	Surface Supply Diving Systems.....	13
7.3.1	Required and Recommended SS Equipment	13
7.3.2	Hoses and Umbilicals	15
7.3.3	Timekeeping	16
7.3.4	Buoyancy Control	16
7.3.5	Weights and Harnesses	16
7.3.6	Compressed Gas Cylinders	16
7.3.7	Air Compressors	16
7.3.8	Volume Tanks or Air Receivers.....	17
7.3.9	Air (Gas) Distribution Piping	17
7.3.10	Bailout Requirements	17
7.4	Scuba Diving Equipment.....	18
7.4.1	Required and Recommended Scuba Equipment.....	18
7.4.2	Scuba Equipment Record Keeping.....	18
7.4.3	Regulators.....	19
7.4.4	Scuba Regulator Hoses	19
7.4.5	Scuba Cylinders.....	19
7.4.6	Scuba Cylinder Valves	19
7.4.7	Scuba Dive Computers and Depth Gauges	19
7.4.8	Auxiliary Equipment.....	20
8.0	DIVING OPERATIONS - General	20
8.1	Participation	20
8.2	Dive Planning.....	20
8.3	Diving Safety Equipment	21
8.4	Warning Signals (flags and buoys)	21
8.5	Diver Emergency Medical Information.....	21

Thurston County Public Works
Noxious Weed Division Diving Safe Practices Manual. February 1, 2015

8.6	Pre-Dive Briefing.....	22
8.7	General Boat Diving	22
8.7.1	Vessel Attributes	22
8.7.2	General Boat Diving Procedures.....	23
8.7.3	Liveboating.....	23
8.8	Post-Dive Procedures.....	24
8.8.1	Post-Dive Debriefing.....	24
8.8.2	Post-Dive Records.....	24
9.0	DIVING OPERATIONS - Surface Supply Diving (Lightweight) Procedures	25
9.1	Limits for Surface Supply (SS) Diving.....	25
9.2	SS Dive Team Composition	25
9.3	Standby (Safety) Diver Requirements	25
9.4	Communications.....	25
9.5	Tending Safety.....	26
9.6	Water Entry and Exit.....	26
10.0	DIVING OPERATIONS - Scuba Diving Procedures	26
10.1	Limits for Scuba Diving.....	26
10.2	Scuba Dive Team Composition	27
10.3	General Scuba Diving Procedures.....	27
10.4	Boat Scuba Diving	28
10.5	Current Diving	29
11.0	SNORKELING PROCEDURES.....	29
12.0	EMERGENCY PROCEDURES (EPs)	30
12.1	General Emergency Procedures.....	30
12.2	Surface Supplied Diving EPs	31
12.3	Scuba EPs	32
12.4	Post – Emergency Procedures	32
13.0	DEFINITIONS	32
14.0	ATTACHMENTS.....	35
14.1	Attachment 1 State of Washington Labor and Industries, Safety Standards for Diving Operations 296-37 WAC Standards for Commercial Diving Operations; includes the State of Washington Department of Labor and Industries Safety and Health Consultation Report dated 26 April 2011.	35

Thurston County Public Works
Noxious Weed Division Diving Safe Practices Manual. February 1, 2015

14.2 Attachment 2 Diving and Safety Equipment Checklists35
14.2.1 Diving Gear Considered Essential and/or Appropriate for Scuba Divers35
14.2.2 Diving Gear Considered Essential and/or Appropriate for Surface Supplied Divers35
14.2.3 Diving Support or Safety Equipment.....35

1.0 Introduction

1.1 Safety Policy

Thurston County Noxious Weed Division (TCNWD) is committed to providing our employees with a safe and healthy work environment. It is not only our obligation to each other, but work related injuries and illnesses cause needless pain and suffering, cost money, and adversely affect our reputation with our constituency. It is our firm belief that all work related injuries and illnesses are preventable. Thus, it is our goal to have a workplace that is free from occupational injuries and illnesses. TCNWD will make every attempt to eliminate the possibility of injuries and illnesses. No aspect of the Department's activities, including expediency and cost, shall take precedence over the health and safety of our employees.

1.2 Purpose

This Diving Safe Practices Manual (hereinafter referred to as "Manual") is promulgated in accordance with federal and state directives for all commercial diving activities performed under the auspices of the TCNWD. This Manual constitutes the general portion of a "Safe Practices Manual" applicable to all diving operations as required under Washington Administrative Code (WAC) 296-37-530 and other regulations (see Section 1.3 below for specific relevant regulations). Site and/or project-specific Health and Safety Plans (HASP) will apply this Manual to specific project tasks and environments to provide a complete "Safe Practices Manual".

The purposes of this Manual and the diving safety program are:

1. To ensure that all diving is conducted in a manner that will maximize protection of dive mission members from accidental injury and/or illness
2. To minimize liability risk
3. To optimize completion of underwater tasks
4. To set forth standards for training and qualification.

This Manual cannot establish field procedures for every mission situation, which is the objective of project and site-specific HASPs and work plans, but serves as a minimum safety standard for all diving operations undertaken by TCNWD. The procedures set forth in this manual are applicable to all environments and situations in which underwater work will be done.

1.3 Relevant Regulations and References

This Manual is primarily based on the State of Washington Labor and Industries, Safety Standards for Diving Operations 296-37 WAC Standards for Commercial Diving Operations (Attachment 1 of this Manual). In addition, the Manual incorporates appropriate rules from other regulations on commercial diving from which appropriate guidance has been incorporated or used. These documents include:

- U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) 29 CFR Title 1910 Subpart T Standards for Commercial Diving.
- U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) 29 CFR Title 1910 Subpart T Standards for Commercial Diving as interpreted by the U.S. OSHA Directive CPL 02-00-151, OSHA Instruction on 29CFR Part 1910 Subpart T – Commercial Diving Operations, effective June 13, 2011.
- Association of Diving Contractors International Consensus Standards for Commercial Diving and Underwater Operations.
- U. S. Navy Diving Manual, Revision 6

1.4 Application

This Manual was written to meet or exceed the protection afforded by existing government regulations governing in-water work (i.e., snorkeling or underwater diving) by employees. If a conflict arises between the

current edition of this Manual and applicable federal, state, or other legal directives and statutes, the state rule shall take precedence.

This Manual applies to all TCNWD projects and activities where TCNWD personnel and TCNWD contractors conduct underwater diving operations. In order for the TCNWD diving program to achieve optimum safety for personnel and limit risk and liability exposure for TCNWD, the following minimum requirements are necessary to comply with federal and state regulations:

1. TCNWD shall “develop and maintain a safe practices manual” (WAC 296-37-530 “Safe practices manual”) that defines safety procedures for diving operations, qualifications and responsibilities of dive team members, equipment use and maintenance, and emergency procedures. The procedures in this Manual shall apply at all locations where diving and diving-related activities are conducted in any water body or structure under the auspices of TCNWD.

This Manual contains the following information:

- o Safety procedures for in- or underwater diving operations including snorkeling
 - o Assignments and responsibilities of the dive team members
 - o Equipment procedures
2. TCNWD shall appoint a “Designated Person in Charge” (DPIC) (also referred to as the “Diving Safety Officer” [DDSA], see Section 2.2) to administer, coordinate, and facilitate the Diving Safe Practices Manual and health and safety aspects of in- and underwater operations, and related activities.

1.5 Covered Activities and Conditions

The TCNWD diving activities are considered to be “light commercial” because of the following factors:

- Shallow water, less than or equal to 30 feet depth; all diving will be within the following no-decompression limits:¹

Depth(ffw)	No-Stop Limit (minutes)
10	Unlimited
15	Unlimited
20	Unlimited
25	595 (9 hrs 52 min)
30	371 (6 hrs 10 min)
31	334 (5 hrs 34 min) ²

- Surface supplied air equipment is restricted to full face masks
- The majority of in-water and underwater activities are snorkeling and scuba
- Only normal air (21% oxygen) is used as breathing gas
- Only plant removal with small hydraulic suction dredges is conducted; no “heavy” construction, ship breaking, welding, or other “heavy commercial activities are conducted.

¹ U.S. Navy Diving Manual Revision 6, 15 April 2008. Table 9.7 *No-Decompression Limits and Repetitive Group Designators for No-Decompression Air Dives.*

² Divers at 30 ffw must follow the 31-foot limits.

TCNWD will conduct in-water or underwater operations only in conjunction with the control of aquatic noxious weeds. All in-water activities will be conducted in water depths of less than 30 feet and in water currents less than 1 knot. These operations may include the following activities, diving modes, and environmental conditions (e.g., maximum depths and water current conditions):

- A. Survey only in lakes; diving mode: scuba with normal breathing air or snorkeling; maximum depth: 30 feet freshwater (ffw)³; water current: none.
- B. Survey only in rivers to assess and/or monitor aquatic plant conditions; diving mode: snorkeling; maximum depth (breath hold dives): 6 ffw; water current: less than 1 knot.
- C. Removal of plant material by hydraulic dredging; diving mode: tethered scuba with communications or surface supplied air; maximum depth: 30 ffw;
- D. Invasive aquatic plant removal from lakes and rivers all dives; diving mode: snorkeling or scuba; maximum depth: 20 ffw; water currents: none.
- E. Ecological community surveys for assessment, monitoring, and/or sampling; diving mode: snorkeling or scuba; maximum depth: 30 ffw; water currents: none or less than 1 knot.

TCNWD aquatic vegetation survey and control activities will not be conducted in environments where chemical hazards (polluted water or sediments) are present.

1.6 Exceptions

This Manual does not apply to diving operations that are:

- 1. Performed solely for recreational purposes not under TCNWD auspices.
- 2. Performed solely for emergency search and rescue or related public safety purposes by or under the control of another government agency.

2.0 Organization/Responsibility

Commitment to safety and health requires that all work proceed only if it is safe and environmentally sound to do so. The safety and health of on-site personnel will take precedence over cost and schedule considerations for all work. The responsibility for ensuring that this takes place rests with every worker. Effectively meeting these responsibilities depends upon open communication between individuals and their supervisors prior to starting work and after safety, health, and/or environmental issues are identified. Completing Job Hazard Analyses⁴ to aid in planning safe work performance will be an integral part of meeting health and safety (H&S) expectations.

All TCNWD personnel have the authority to STOP WORK if they see a potential or actual hazard that may threaten the safety of on-site workers or the environment. Upon stopping work, the TCNWD DDSA and/or the TCNWD Coordinator must be immediately notified and provided with information regarding the nature of the safety, health, or environmental concern. The TCNWD Coordinator will consult with the Designated Diving Safety Advisor (DDSA)/or DDSA should meet with the worker with the intent of resolving the worker's concerns. Once the concerns are resolved to the satisfaction of the worker, work can proceed, but can only be restarted by the one of the above TCNWD officers.

³ Indicated depths are as measured by a diver's depth gauge, dive computer, or a sounding line.

⁴ JHAs are variously known as Job or Activity Hazard or Safety Analyses.

If the concerns are not resolved to the satisfaction of the worker and/or the DPIC, work does not proceed. The Coordinator, and/or DDSA will be contacted to obtain assistance in resolving the concerns. Using his/her expertise and safety, health, and environmental rules, regulations, and procedures, the TCNWD Coordinator and/or DDSA will attempt to resolve the matter with all parties involved. Work will not resume until resolution is achieved.

The implementation of health and safety at a specific work location will be the shared responsibility of the TCNWD Coordinator, on-site DPIC (i.e., diving safety supervisor), and TCNWD's contractors implementing the scope of work.

2.1 TCNWD Coordinator

The Coordinator has the direct authority and responsibility for the diving program and its related activities. The Coordinator (Rick Johnson) is the individual responsible for the review, approval, and implementation of this Manual. However, modifications to this Manual and HASPs that might result in less stringent precautions cannot be undertaken by the Coordinator without the approval of the DDSA. Specific duties related to H&S of the Coordinator include:

- Advising the DDSA on general and specific matters relating to activities of the TCNWD, personnel, and needs for accomplishing the Department's objectives
- Facilitating Incident investigations
- Conducting random project audits
- Ensuring that the on-site DPIC and dive teams have the appropriate and necessary equipment and supplies for safe operations.

2.2 Diving Health and Safety Designated Person in Charge (Diving Safety Officer)

The Designated Diving Safety Advisor for the TCNWD diving program's health and safety aspects (hereafter referred to as the DDSA) shall be responsible for promulgating diving safety procedures and practices, providing the Coordinator with H&S guidance on diving and related field activities, and educating TCNWD personnel in H&S protocols. Policy recommendations relating to the diving program shall be made to the Coordinator or his/her designee. The DDSA will also receive recommendations on safe work practices from the Coordinator, divers, Thurston County or State of Washington authorities, and other sources.

The DDSA appointed by the TCNWD Coordinator:

- Shall be an employee or contractor of Thurston County
- Shall have extensive experience as a working diver with at least 10 years continuous experience substantiated by a verifiable dive log.
- Shall have completed a working diver training course and be certified as a Master Diver or Instructor by a nationally recognized diving training organization or U.S. Navy.
- Shall assist the TCNWD Coordinator in the safe conduct of the diving program.
- Shall provide oversight of TCNWD in-water activities through review of diving logs, equipment service records, and other relevant documents with occasional on-site visits.
- Shall assist the TCNWD Coordinator with JHAs and HASPs by providing compilation direction, reviews, and approvals.
- Shall be responsible with the Coordinator for assuring that each dive team member meets or exceeds the basic qualification requirements prior to engaging in dive program activities.
- Shall recommend to the Coordinator suspension of any diving operations or techniques that he/she considers unsafe.

- Shall maintain regular contact with the TCNWD Coordinator to evaluate job site conditions and new information which might require modifications to the project or job-specific HASP or this Manual

2.3 On-Site DPIC

Each diving project or operation shall have an on-site DPIC (i.e., diving safety supervisor) who will have complete and direct responsibility for the diving operation and the authority to terminate any diving operation he/she deems unsafe. The DPIC will be on-site during all activities covered by the applicable HASP. If he/she cannot be on site or is underwater, another designated qualified person, will be the acting on-site DPIC. The on-site DPIC is responsible for enforcing the requirements of the project or job-specific HASP once work begins.

The on-site DPIC will be knowledgeable and competent with the diving equipment, diving operations in progress, emergency diving procedures, diving physics and physiology, and medical aspects of diving.

The on-site DPIC will have the following qualifications and familiarity with the following:

- TCNWD's diving health and safety programs and regulations of the governing or insuring agency with jurisdiction pertaining to diving
- Site hazards and accident investigation
- Dive accident prevention and management planning

Some of the on-site DPIC's specific responsibilities include:

- Maintaining a high level of health and safety consciousness among workers at the work site
- Maintain a safe working environment at TCNWD work sites.
- Conducting H&S briefing and assuring that all on-site personnel are familiar with the project or job-specific HASP, and have attended the daily pre-work briefing
- Procuring and distributing to TCNWD personnel the personal protective equipment (PPE) needed for the project
- Verifying that all PPE and H&S equipment is in good working order
- Monitoring and directing the safety performance of all personnel to ensure that required safety and health procedures are being followed and correcting any deficiencies
- Notifying the TCNWD Coordinator and/or DDSA of all noncompliance situations and stopping work in the event that an immediately dangerous situation is perceived
- Initiating emergency response in accordance with the applicable HASP
- Assisting and facilitating accident/incident investigations and preparing accident/incident investigation reports
- Maintaining an accurate dive log for each diver including the bottom time, maximum depth, and specific tasks.

2.4 TCNWD Field Personnel

All TCNWD field personnel covered by the applicable HASP are responsible for following the H&S procedures specified in the HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Read the applicable HASP in its entirety prior to the start of on-site work
- Bring forth any questions or concerns regarding the content of the HASP to the on-site DPIC, TCNWD Coordinator, or DDSA prior to the start of work

- Attend the required daily pre-work briefing and any subsequent safety meetings that are conducted during the implementation of the project; sign the Daily Health and Safety Briefing Attendance Form
- Assess each task prior to beginning work on that task for hazards and necessary precautions
- Assess the work area for changing conditions and new hazards and address the hazards
- Stop work and initiate corrective actions if work site hazards create unacceptable risk
- Report all incidents, injuries and illnesses, to the on-site DPIC, DDSA, and/or TCNWD Coordinator.
- Comply with the requirements of the appropriate HASP and the requests of the on-site DPIC.

2.5 Contractors

Additionally, TCNWD on-site contractor's responsibilities include the following:

- Read the project or job-specific HASP in its entirety prior to the start of on-site work
- Attend the required daily pre-work briefing and any subsequent safety meetings that are conducted during the implementation of the project; sign the Daily Health and Safety Briefing Attendance Form.
- Ensure that their equipment is in good working order with daily inspections
- Operate their equipment in a safe manner
- Provide all required PPE to their employees

3.0 DIVE TEAM REQUIREMENTS

3.1 Qualification as a Diver

To participate in the TCNWD dive program, each dive team member shall:

1. Be an employee of Thurston County.
2. Submit evidence of appropriate dive training consisting of at a minimum a certification card from a recognized diving instruction agency, NOAA, an accredited commercial diving training institution, or a branch of the military showing completion of an open water scuba training course (minimum 5 dives, approximately 40 hours) or commercial surface supplied (SS) diving course.
3. Submit a dive log with a least 12 open water dives within the last 3 years. If a record of previous diving experience is not available, the TCNWD Coordinator and DDSA will provide appropriate qualification procedures.
4. Hold and maintain current certification training in cardiopulmonary resuscitation (CPR) and standard first aid.
5. Submit acceptable evidence of physical fitness for diving as indicated by a medical examination for hyperbaric exposure as identified in Section 4.1 of this Manual.
6. Complete a checkout dive with or under the supervision of the DDSA or an on-site DPIC. The purpose of the check out dive will be to demonstrate that the candidate is a competent diver and ready to work under typical conditions. The checkout dive(s) will be conducted following established procedures described in Sections 8.0 General Procedures and 9.0 Surface Supply Diving Procedures or 10.0 Scuba Diving Operations of this manual. The candidate diver will complete the following:
 - Demonstrate familiarity with a standard diving HASP and emergency procedures

- Two or more dives from the shore (scuba only if from shore), boat, or other suitable platform and demonstrate skills at qualification depth.
 - Demonstrate assembly, disassembly, and care of all appropriate equipment at the dive site
7. The diver shall demonstrate proficiency in the use of U.S. Navy or NOAA no-decompression tables and a depth gauge and/or dive computer of the diver's choice.
 8. Demonstrate proficiency in all aspects of diving operations, including dive planning, repetitive dive profiles, ascent/descent rates, and emergency procedures.
 9. Successfully complete any additional training as deemed necessary by the TCNWD Coordinator or DPIC.

3.2 Depth Qualification

TCNWD dive team members will be qualified to a depth of 30 ffw:

A 30-foot depth qualification will allow the diver to participate in all TCNWD diving operations where the working depth for the diver will not exceed 30 ffw. During the checkout dives:

- Descend to a depth of 30 ffw
- Successfully complete an underwater navigation exercise (scuba) or a work-related task of appropriate complexity (e.g., pipe puzzle) at depths greater than 25 fsw
- Demonstrate the ability to accomplish or cope with multiple simultaneous tasks at depth
- Demonstrate the ability to communicate underwater by hand signals, line-pull signals, voice, and/or in writing
- Demonstrate the ability to control buoyancy
- The diver shall demonstrate proficiency in the use of appropriate no-decompression tables and a dive computer or depth gauge of the diver's choice.

3.3 Additional Training

Prior to participating in diving operations under the auspices of TCNWD other than the qualification dives described in Section 3.2, candidates must complete training in emergency procedures including:

- Emergency oxygen therapy
- Rescue diving and/or diving accident response training (DART)

3.4 Equipment Qualifications

If the diver desires to use underwater equipment in addition to or more technical than basic scuba or SSA apparatus as described in Section 7.0 on diving equipment, divers shall show the DPIC the following.

1. Statement of need to use special equipment from the TCNWD Coordinator and/or DPIC.
2. TCNWD personnel are adequately trained to use the special equipment in the proposed environment
3. Experience or plans for practice with the proposed equipment
4. Dive plans for using the proposed equipment to achieve the project objectives
5. Diving equipment or procedures that may fall under this provision include but are not limited to the following:
 - Tools powered by electricity, air (i.e., pneumatics), or oil-powered hydraulics

- Line tended scuba diving for more than one dive and for more than one easily accomplished task

3.5 Environmental Qualifications

If TCNWD personnel are required to conduct operations in hazardous environments, the dive team must have the equipment, training, practice, and planning for the environment. Hazardous environments may include, but not be limited to the following:

- Currents stronger than 0.5 knots
- Extreme turbulence (e.g., rivers)
- High altitude lakes or streams
- Steep slopes or vertical walls where the bottom of the wall or slope is greater than 30 ffw
- Work in conditions that present extreme hazard of fouling for a scuba or SS diver

TCNWD aquatic vegetation survey and control activities will not be conducted in environments where chemical hazards (polluted water or sediments) are present.

3.6 Maintenance of Qualifications

TCNWD diver qualification will be reviewed annually based on the date of the last medical exam, or more frequently as circumstances indicate. To maintain qualification in the TCNWD diving program, all divers shall comply with the following requirements. Failure to meet these requirements may be cause for restriction from diving operations.

- During any 12-month period, each TCNWD-qualified diver shall log a minimum of 12 dives. These 12 dives may include any dives associated with training, work, or recreation. Each certified diver shall complete at least two dives in each quarter.
- All TCNWD-qualified divers shall pass an annual medical exam as described in Section 4.0 of this Manual. After each major illness or injury, dive team members shall submit to medical interview by a qualified physician and/or medical examination before resuming diving activities.
- All qualified divers shall annually renew CPR training. All qualified divers shall also renew biannually standard first-aid certifications.
- Diving accident response training with emergency oxygen administration certification shall be renewed at two-year intervals.

3.7 Restriction, Suspension, or Revocation of Diving Qualification

An individual's qualification or candidacy for qualification as a dive team member may be restricted, suspended, or revoked by the TCNWD Coordinator for cause that may include violation of any of the regulations in this Manual.

3.8 Reactivation

A diver with a restricted, suspended, or revoked qualification may be reinstated after complying with such conditions as the TCNWD Coordinator may impose.

3.9 Dive Tender

A "Dive Tender" is a member of the dive team that may do any of the following activities:

- Tends a tethered diver (tethered scuba or SS diver)

- Operates a vessel for scuba divers (see Sections 8.7.2 General Boat Diving Procedures and 10.4 Scuba Boat Diving) or snorkelers
- Operates air and communications controls for a SS diver
- Otherwise assists divers from the surface in ways that directly affect the health and safety of the diver.

Although training as a diver is strongly recommended but not required, tenders should be familiar with diving procedures and the potential hazards of diving. The DDSA and/or on-site DPIC will ensure the tender is trained to perform assigned duties. Specific responsibilities are:

- Conducting diving support activities in accordance with the TCNWD Diving Manual, and reporting to the on-site DPIC, Coordinator, or DDSA any problems associated with safety in diving operations
- Following the instructions of the on-site DPIC for each diving operation
- Reporting accidents, equipment failures, or incidents requiring line-pull communication to the on-site DPIC, Coordinator, or DDSA
- Monitor surface conditions, such as weather, current, vessel traffic that could adversely affect the safety of the divers.

As a minimum, dive tenders shall:

- Successfully complete and maintain current CPR, standard first aid, and diving accident response training with emergency oxygen administration certifications.
- Be trained in record-keeping and time-keeping functions
- Be trained in planning and monitoring the dive profile
- Be familiar with the set up and operation of scuba and/or SS; communications; support, and special equipment used by the dive team

Because a tender may also be responsible for operating a diver-support vessel, the tender should be trained and experienced with the operation of diving support vessels, associated communications, and U.S. Coast Guard "Rules of the Road". At a minimum, all diving support vessel operators, tenders or divers, will have taken an approved Boating Safety Course and be in possession of a Certificates of Completion and/or qualification card.

3.10 Waiver of Requirements

The TCNWD Coordinator, in consultation with the DDSA and DPIC may grant a temporary waiver in writing for specific requirements of training, examinations, certifications, or minimum activity to maintain the eligibility of a dive team member to participate in a dive operation as long as the worker meets minimum qualifications.

4.0 MEDICAL REQUIREMENTS

4.1 Medical Requirements of Dive Team

4.1.1 General

Each applicant for qualification and each dive team member who will conduct snorkeling, underwater diving, or other in-water work under TCNWD auspices shall pass a physical examination and be declared physically fit to engage in strenuous activities. A physician's report of the examination shall be submitted to the TCNWD Coordinator and/or DPIC for review.

4.1.2 Frequency of Physical Examinations

Physical examinations shall be completed:

- Prior to initial diving exposure within the preceding 12 months.
- Divers shall complete a medical examination at intervals and composed of tests determined by the governing agency with jurisdiction (e.g., 1 year intervals as determined by Washington State Labor and Industries and /or state or local agency)⁵
- After an injury or illness requiring medical attention and/or hospitalization, whether or not diving related.
- After any episode of unconsciousness.

4.1.3 Testing Requirements for a Medical Examination: Initial and Re-Examination

The following tests will be required at the indicated intervals. The required tests and testing intervals may be modified by the regulatory authority with jurisdiction:

Blood work

- Complete Blood Count (CBC)
 - Initial
 - Annual with each diving medical
- Other (e.g., sickledex) as clinically indicated on initial examination only

Urinalysis (blood, glucose, protein) (dipstick sufficient)

- Initial
- Annual with each diving medical

X-rays

- Chest – full size PA (inspiratory and expiratory) and lateral
 - Initial
 - Periodic if clinically indicated or requested by physician or government authority

Electrocardiogram (ECG or EKG)

- Initial (resting and stress or “treadmill”) once at 35 years and over.

Pulmonary Function (spirometry)

- Initial
- Annually

Pure Tone Audiogram (hearing test)

- Annually

Color Vision

⁵ OSHA Regulation (Standards – 29 CFR) 1910.420, Subpart T; 1910.411 (revoked in 1984)

- Periodic if clinically indicated or requested by physician or government authority

4.2 Contra-Indications to Diving

4.2.1 Absolute Contra-Indications to Diving

- Persons subject to spontaneous pneumothorax.
- Persons subject to epileptic seizures (or syncopal attacks).
- Lung cysts or definite air-trapping lesions on chest X-ray.
- Perforated eardrum.
- Active asthma.
- Drug addiction.
- Brittle diabetes where individual is subject to insulin shock or diabetic coma.
- Middle ear surgery with placement of plastic strut in air-conduction chain.
- Pregnancy.
- Angina or myocardial infarction.
- Sickle-cell trait or disease.
- Chronic alcoholism.
- Prior chest surgery: thoracotomy.
- History of diving pulmonary over-pressure accident.
- Conditions requiring stimulants, depressants, tranquilizers, hallucinogens, anticonvulsants, sedatives, hypnotics, steroids, antiasthmatics, bronchodilators for control.

4.2.2 Relative Contra-Indications to Diving

- Decreased pulmonary reserve from any cause.
- Malignancies (active) unless treated and without reoccurrence for five years.
- Gross obesity
- Cardiac rhythm disorders other than premature beats.
- Cardiac abnormalities (e.g., pathological heart block, severe valvular disease, intraventricular conduction defects other than isolated right bundle branch block, angina pectoris, arrhythmia, coronary artery disease).
- Chronic inability to equalize sinus and/or middle ear pressure.
- Impaired organ function caused by alcohol or drug use.
- Conditions requiring medication for control (e.g., antihistamines, decongestants, motion sickness (antihistamines), diuretics, or insulin).
- Meniere's disease.
- Certain hemoglobingopathies.
- Inguinal hernia.
- Juxta-articular osteonecrosis.

- Significant personality or psychiatric abnormalities.
- Recent fractures or sprains.
- Poor physical fitness including obesity or anorexia nervosa

4.3 Physician's Written Report

After any medical examination required by this standard, TCNWD shall obtain a written report prepared by the examining physician that shall contain the examining physician's opinion of the individual's fitness to dive, including any recommended restrictions or limitations. This will be reviewed by the DPIC, who will determine in consultation with the DDSA whether the individual should be qualified unconditionally, be designated as a "Restricted Activity Diver," be required to undergo further testing, or be rejected.

TCNWD shall provide the individual with a copy of the physician's written report.

5.0 RECORD KEEPING

- Upon the request of the appropriate insuring agency with jurisdiction (e.g., Washington Department of Labor and Industries WAC 296-37-575, U.S. OSHA), TCNWD shall make available for inspection and copying any relevant record or document required by these agencies, including medical records.
- Dive team member medical records (physician's reports) (WAC 296-37-525) - five years
- Safe practices manual (WAC 296-37-530) - current document only
- Recording dive (WAC 296-37-545) one year, except five years where there has been an incident of decompression sickness
- Equipment inspections and testing records (WAC 296-37-570) - current entry or tag, or until equipment is withdrawn from service
- Records of hospitalizations (WAC 296-37-575) - five years.
- Medical records shall be available to the attending physician of the TCNWD diver or former diver when released in writing by the requesting diver or authorized designee.
- If a diver ceases to dive under TCNWD auspices, the diver's records will be retained for five years.

After the expiration of the retention period of any record required to be kept for five years, the employer shall forward such records to the National Institute for Occupational Safety and Health, Department of Health and Human Services.

6.0 BREATHING AIR

6.1 Air Purity Standards

Normal compressed breathing air used by divers shall be 'D' grade or better and shall have following characteristics⁶:

- Oxygen content of 19.5-23.5% by volume

⁶ U.S. OSHA Regulations. Standards - 29 CFR. Respiratory Protection. 1910.134(i)(1)(ii)

- Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less
- Carbon monoxide (CO) content of 10 ppm or less
- Carbon dioxide content of 1,000 ppm or less
- Lack of noticeable odor

6.2 High Pressure (scuba) Air

- The TCNWD DPIC or DPIC shall designate a primary and secondary source of breathing gas replenishment (i.e., tank fills) for any TCNWD project
- The TCNWD DPIC or DPIC shall check the compressor testing records of any source of air to be used in a TCNWD diving project. Such records should indicate air quality testing at 6-month intervals (WAC 296-37-570(2)(e)).
- Breathing air for high pressure (scuba) cylinders shall meet the above standards (Section 6.1), or shall be tested before use.
- Compressed air storage cylinders shall be designed, constructed, and maintained in accordance with U.S. Department of Transportation standards.

7.0 DIVING EQUIPMENT

7.1 General Policy

All equipment shall meet standards as determined by the TCNWD Coordinator, the DDSA, and appropriate regulatory agencies. All equipment used during TCNWD diving operations, regardless of ownership, shall conform to the standards established in this Manual. Equipment that is subjected to extreme usage under adverse conditions should undergo more frequent testing and maintenance.

TCNWD's policy on diving equipment is to use more than sufficient quality and state of the art equipment to ensure the safety and well being of the divers. Equipment used in diving operations, particularly those items which are classified as life support equipment, must be properly maintained and kept in good working order.

7.2 Ownership and Compensation

It is acceptable that divers use personal scuba equipment, the maintenance of which they are responsible as prescribed in this Manual. TCNWD will maintain control of the quality of a diver's gear and reduce the physical and legal risks associated with diving gear by providing maintenance services from a qualified vendor selected by the TCNWD Coordinator. TCNWD divers will provide their personal diving equipment (regulators, gauges, tanks, and buoyancy compensators) to the selected service company no less frequently than annually. The service company will invoice TCNWD for the maintenance and provide a detailed report (e.g., completed work order) to the diver and TCNWD describing the work performed and condition of each piece of equipment.

7.3 Surface Supply Diving Systems

All air piping systems, air compressors, volume tanks, and distribution consoles shall be constructed, cleaned and maintained as life support equipment.

7.3.1 Required and Recommended SS Equipment

All SS divers will be equipped with diving equipment as listed in Attachment 2 Diving and Safety Equipment Checklists (Section 14.2), except where conditions or tasks call for special equipment or accommodations. In some cases, a TCNWD diver may supplement personal dive equipment by renting equipment as approved by

Thurston County Public Works

Noxious Weed Division Diving Safe Practices Manual. February 1, 2015

the TCNWD Coordinator in consultation with the DDSA, and on-site DPIC. and/or the TCNWD Coordinator. Minimum equipment for SS operations will include:

- Supply of primary breathing air - This can be supplied by a LPAC or from fixed high pressure (i.e., scuba) cylinders.
- Emergency /Reserve breathing air
- Diver Communications System
- Umbilical – capable of providing air, communications, pneumofathometer, and safety strength member. The umbilical will not incorporate quick-disconnect fittings.
- Air distribution box/ rack. [i.e. central air (gas) distribution center]
- Recommended: Depth gauge and/or diving computer to be used as a depth gauge/time keeping instrument
- Minimum Diver Worn Equipment
- Full Face Mask - equipped with a non-return and an exhaust valves.
 - Must have a minimum ventilation rate of 4.5 ACFM at any depth and/or capable of maintaining CO₂ levels below 0.02 ATA when the diver is producing CO₂ at the rate of 1.6 l/min. [WAC 296-37-570(8)(b)].
 - Fitted with a two-way audio communications system and maintained in accordance with manufacture's specifications.
 - Fitted with a restrictor valve to protect the diver when using a bailout air supply.
 - Perform maintenance in accordance with manufacturer's specifications and documented performance testing.
 - Non return valves shall be tested daily during set up and serviced annually
 - Communications must be inspected semi-annually and connectors cleaned
 - Second stage regulators should be serviced at least annually
 - Oral nasals cups and other soft goods should be inspected annually and replaced as needed.
- Safety Harness. Designed for attachment around the diver's body and of sufficient strength to permit the lifting of the diver and his equipment from the water. There will be a mechanical quick release between the harness and the umbilical. The harness shall not be used as a weight belt; however, it may be integrated with the bailout cylinder.
- Bailout Supply. Diver worn emergency supply cylinder with sufficient air (gas) to allow the diver to return to the surface. The bailout system must be configured such that the diver can activate bailout without assistance.
- Thermal Protection Suit. The thermal protection suit shall be suitable for the water temperature and duration of exposure. The suit will be properly sized to the diver to prevent injury.
- Weight Belt. Sufficient weight to maintain the diver at working depth. The weight belt shall not be used to attach the umbilical to the diver. It will be equipped with an appropriate release buckle and attached to the diver in a manner to prevent accidental disengagement.
- Knife. Carried in a sheath or folding, must be sharp and capable of cutting wet line, fishing tackle, and thick vegetation
- Boots and/or Fins. as appropriate for the type of dive. Foot protection must be used even in warm water to avoid injury from broken glass, fishing gear, metal debris, or other sharp objects.

7.3.2 Hoses and Umbilicals

Flexible hoses used to interconnect various components of diving equipment must have a minimum burst pressure equal to 4 times (WAC 296-37-570(3)(a)(ii)) the maximum allowable pressure and sized to permit required flow rates for diver consumption. They shall be of rugged construction, kink resistant, and corrosion resistant. Hoses must be of suitable design that they will not collapse when subjected to external pressures in excess of internal pressure (i.e., have a working pressure greater than the pressure equivalent to the maximum depth of the dive (relative to the supply source) plus 150 psi).

Air (gas) supply hose connectors shall be made of corrosion resistant materials, and resistant to accidental disengagement. Connectors must have a working pressure at least equal to the working pressure of the hose to which they are attached. An annual inspection will be conducted of hose connectors at the same time as the attached hose is tested.

Umbilicals will consist of an air (gas) hose, communications cable, and a strength member. Hoses must be made of kink and corrosion resistant materials with a nominal breaking strength of at least 1,000 pounds. A strength member shall be included as an integral part of each umbilical. In some umbilicals, the strength member may be part of the communications cable. Umbilicals shall have a minimum break strength of the hose assembly, including terminating hardware, of 1,000 pounds.

Umbilicals shall not include quick disconnect connectors except in special situations such as shallow water training (e.g., pool or dockside).

The umbilical shall be marked in 10-foot increments to 100 feet, beginning on the diver's end. There shall be 50-foot increments marked after the first 100 feet.

The umbilical line shall be purged of foreign material with breathable air prior to connection to the helmet or mask. Hose ends must not be left open when not in use: they shall be taped, capped, or plugged.

Every effort will be made to ensure the air hose is one continuous length. If a repair is made, then no more than one splice barb connection will be permitted in an umbilical air supply hose. In some specialized setups (e.g., pool diving) where the bottom is controlled, then only an air and communications cable is needed.

TCNWD will use the following testing and maintenance regime as administered and overseen by the TCNWD Coordinator and DPIC:

- Inspection and testing of all hoses within each regulator assembly will be conducted on an annual basis with the regulator overhaul.
- Testing will be 1.5 times over pressure and held for 10 minutes on all hoses connected directly to the breathing regulator that could cause a loss of breathing gas in the event of failure.
- Testing on all hoses not directly connected to the breathing regulator will be 1.1 times over pressure and held for 10 minutes.
- Umbilical breathing air hoses will be pressure tested annually (WAC 296 37 570 (3)(a)(iii)) or more often if needed to 1.5 times designed working pressure with a 200 lb axial load applied to the fittings while the test pressure is applied for 10 minutes. There should be no loss of pressure when corrected for temperature or creeping of end fittings.
- Replace any hose recommended for replacement by the service facility.
- Replace any hose that is damaged during use between annual testing events
- Visually inspected annually and after each repair or alteration for cuts, bubbles, kinks, or other damage.
- Annually verify hose markings - 10 foot increments to 100 feet beginning at the diver's end, and in 50 foot increments thereafter

- Annual Inspection of the positive attachment to the umbilical to the divers safety harness with a mechanical quick release (i.e. spinnaker shackle). Attachment must be in a manner to prevent a strain being placed on the divers helmet or mask.
- Breathing hoses must be cleaned after any contamination or repairs.

7.3.3 Timekeeping

A timekeeping device shall be kept at each dive location. It should be suitable and easily readable.

7.3.4 Buoyancy Control

Helmets or masks connected directly to the dry suit or other buoyancy-changing equipment shall be equipped with an exhaust valve: and a dry suit or other buoyancy changing equipment not directly connected to the helmet or mask shall be equipped with an exhaust valve.

7.3.5 Weights and Harnesses

Divers shall be equipped with a weight belt or assembly capable of appropriate release. Each diver shall wear a safety harness with a positive buckling device, an attachment point for the umbilical to prevent strain on the mask or helmet, and a lifting point to distribute the pull force of the line over the diver's body. The harness, weights belts, and/or attachment points will be visually inspected before each mobilization and each dive.

7.3.6 Compressed Gas Cylinders

High-pressure cylinders must be manufactured to a recognized code or standard and approved by DOT. Valves will be standard as specified by Compressed Gas Association. Valves must be equipped with an over pressure relief device. They should be stored in a well-ventilated area, protected from overheating and secured.

7.3.7 Air Compressors

Compressors used for diver air are designed specifically for that purpose and must be the proper type, have sufficient pressure and flow rate, and be suitable for the service. Instrumentation should be installed to monitor safe operation. Personnel protection will be installed as per Washington L&I requirements for rotating machinery (WAC 296-806). Air intakes shall be arranged to be clear of engine exhausts or other air born contaminants. Diesel or gasoline exhaust must be kept clear of air intakes. National Electrical Code requirements for control, wiring, and drive units must be met.

Low pressure air compressors (LPAC) used to supply diving air must be equipped with a volume tank. It is recommended to have a filter on the outlet side of the compressor and a particle filter on the inlet side. LPAC's used to supply air to the diver shall be equipped with a volume tank, a check valve on the inlet side, a pressure gauge, a relief valve, and a drain valve.

Compressor systems providing surface air to divers must have a low pressure warning device installed at the air purification system inlet to alert dive tenders of low air pressure.

The minimum alarm setting shall be 45 Psi plus an additional 15 Psi for each working atmosphere.

- 1 ATM = 33 fsw or 15 Psi
- 2 ATM = 66 fsw or 30 Psi
- 3 ATM = 99 fsw or 45 Psi

Pressure relief valves' cracking pressure will be tested annually.

All compressors shall have air tested every six months, after each repair, and /or alteration to the system. A current air sample test shall be kept with the compressor (WAC 296-37-570(2)(e)).

Each compressor shall be maintained following recommended manufacturer's preventative maintenance schedule. Compressors shall have a unique identity incorporating manufacturer, model, and serial number. Records must be kept on all maintenance service actions on both the compressor and the prime mover (diesel, electric, or gas engines) and should include the following:

- Compressor oil and lubricant changes annually
- Belt changes every 3 to 5 years
- Gauge testing annually
- Relief valve testing annually
- Filter service and replacement annually
- Flexible hose inspections & testing annually
- Engines serviced annually including an Oil change

Filters installed to prevent contamination should be serviced annually or as recommended by the manufacturer. Installed filters and housings must meet or exceed the flow rate and pressure ratings of the compressor or piping system on which they are installed.

7.3.8 Volume Tanks or Air Receivers

Volume Tanks shall be designed, fabricated, inspected, and tested in accordance with ASME Boiler & Pressure Vessel Code "Unfired Pressure Vessels" or equivalent. They will be equipped with pressure gauges, check valve on the inlet side, a drain valve at the lowest point, and a relief valve set at 110% of maximum working pressure. Volume tanks and receivers should have the following:

- Internal visual inspection annually
- Hydrostatic testing every 5 years or 10 years as determined by the DOT regulations
- Be designed, constructed, and maintained in accordance with the applicable provisions of DOT regulations [29 CFR 1910.101 and 1910.169 through 1910.171].
- Be stored in a ventilated area and protected from excessive heat and secured from falling.
- Shut-off valves will be protected by a cap, except when in use or manifolded.
- Overhaul or replace valves when Hydrostatically tested
- Annually visual inspection for damage and proper valve operation

7.3.9 Air (Gas) Distribution Piping

Piping, tubing, valves, regulators, filters, and other components must be manufactured to a recognized American National Standards Institute (ANSI) code or standard to assure the piping and tubing is rated to the maximum working pressure and permitted flow rates. Valves will be slow opening when design pressure exceeds 500 psi. Piping systems must be equipped with an over pressure relief device. Each system must be labeled by its contents.

7.3.10 Bailout Requirements

A bailout (diver carried reserve) will be worn by all lightweight surface supply divers. The minimum bailout supply volume will be calculated by determining the amount of air to be consumed by the diver during a safe ascent to the surface from the underwater work site (WAC 37-555(3)(d)(iii)).

Bailout systems must be equipped with a scuba high pressure regulator. Bailout regulators should have a relief valve installed, (set to 165 psi. or using the manufactures requirements). The valve to activate the bailout shall be positioned for easy access by the diver. Bailout hoses should be connected to the mask with connections

that permit ease of donning or doffing the mask. All bailout systems will have a restrictor valve to protect the diver in the case of a broken connection.

7.4 Scuba Diving Equipment

7.4.1 Required and Recommended Scuba Equipment

All scuba divers will be equipped with diving equipment as listed in Attachment 2 Diving and Safety Equipment Checklists except where conditions or tasks call for special equipment or accommodations. In some cases, a TCNWD diver may supplement personal dive equipment by renting equipment as approved by the DPIC and/or the TCNWD Coordinator.

7.4.2 Scuba Equipment Record Keeping

Each equipment modification, repair, test, calibration, or maintenance service shall be logged, which log shall include the date and nature of work performed, serial number of the item, and the name of the person or vendor performing the work for the following equipment:

- Regulators
- Breathing and non-breathing pressurized gas hoses
- Submersible pressure gauges
- Depth gauges
- Dive Computers
- Scuba cylinders
- Cylinder valves
- Dry suits
- Submersible breathing masks
- Compressors
- Analytical instruments

Copies of all such services shall be submitted to the TCNWD Coordinator for record keeping (see Section 6.0).

7.4.2.1 Independent Reserve Air Requirement

Each TCNWD scuba diver is required to have a diver-carried independent reserve breathing-gas supply (i.e., emergency gas supply [EGS]) in the form of an independent reserve cylinder that has a separate scuba regulator or that is connected to the underwater breathing apparatus. The valve of the EGS must be in the closed position prior to the dive to ensure that the air reserve will not be depleted inadvertently during the dive. The reserve cylinder must be mounted and carried in such a way that the diver can easily reach the valve to open it. Reserve cylinders and regulators are subject to the same maintenance and record-keeping requirements as other diving and safety equipment.

A "Spare Air®" bottle, or equivalent device, that is attached positively to the diver to ensure against loss while remaining easily accessible, will be sufficient as an independent reserve cylinder. Spare Air® is the trade name for a small, high-pressure air bottle with an attached breathing regulator that is designed for use as an emergency-air source.

The reserve air supply must meet the emergency air volume requirements for the dive profile.

7.4.3 Regulators

Scuba regulators must conform to appropriate standards as defined by the State of California regulations on diving operations⁷. Regulators must be inspected and tested annually and performance must conform to California standards.

7.4.4 Scuba Regulator Hoses

- Inspection and testing of all hoses within each regulator assembly will be conducted on an annual basis with a regulator overhaul.
- Replace any hose recommended for replacement by the service facility.
- Replace any hose that is damaged during use between annual testing events
- Visually inspected annually and after each repair or alteration for cuts, bubbles, kinks, or other damage.
- Breathing hoses must be cleaned after any contamination or repairs.

7.4.5 Scuba Cylinders

- Scuba cylinders shall be designed, constructed, and maintained in accordance with the applicable provisions of the Unfired Pressure Vessel Safety Orders.
- Aluminum cylinders manufactured prior to 1989 may not be used under TCNWD auspices because of documented structural problems.
- Scuba cylinders shall be hydrostatically tested at intervals not to exceed 5 years in accordance with U.S. Department of Transportation standards or upon used equipment purchase or extraordinary occurrence including but not limited to significant exterior damage or excessive heat exposure.
- Scuba cylinders shall have an internal inspection at intervals not to exceed 12 months.

7.4.6 Scuba Cylinder Valves

- Valve service: Complete overhaul concurrent with cylinder hydrostatic test- each 5-year period, used equipment purchase, or extraordinary occurrence as warranted by valve performance (leaking, excessively stiff operation, damage).
- Valve burst disk: Replacement as part of complete valve overhaul each 5 year period, used equipment purchase, extraordinary occurrence as warranted by disk performance (failure, severe exterior screw damage), and either second or third year of use based on current cylinder hydro date (even year hydro = even year disk replacement).

7.4.7 Scuba Dive Computers and Depth Gauges

Because of the shallow depths of TCNWD operations, it is expected that divers may not wear or need a depth gauge or dive computer. In any case, the on-site DPIC will have the means to determine whether depths greater than 25 ffw can or may be exceeded. If so, procedures must be followed to prevent divers from exceeding 30 ffw.

⁷ U.S. OSHA and the State of Washington do not have scuba regulator standards. State of California Title 8 Subchapter 7 Group 26 Article 152 Section 6057) (b) SCUBA (1) Regulators. Regulators shall be submitted to functional test every six months at which time, at a breathing rate of 15 breaths per minute the regulator must have an exhalation pressure not to exceed 3 inches of water nor a negative inhalation pressure not to exceed minus 3 inches of water.

If used, dive computers shall not be the sole source for dive planning in place of primary dive tables (U.S. Navy or NOAA). Dive computers and/or depth gauges shall be inspected and tested prior to first use and at intervals not to exceed 1 year.

7.4.8 Auxiliary Equipment

- Backpacks and weight systems shall be regularly examined by the person using them.
- Submersible pressure gauges and depth gauges shall be inspected and tested before first use and at intervals not to exceed 1 year. Inaccurate gauges shall not be used. A record of inspections, tests, and repairs shall be maintained.
- All weight systems and scuba backpacks worn by the diver shall be equipped with quick release devices designed to permit jettisoning the entire gear. Weights should be capable of release by one hand.
- Personal flotation systems, buoyancy compensators, dry suits, or other variable volume devices, shall be equipped with an exhaust valve. These devices shall be functionally inspected and tested at intervals not to exceed 12 months.

8.0 DIVING OPERATIONS - General

8.1 Participation

- No person shall engage in diving operations under the auspices of TCNWD without approval of the TCNWD Coordinator and DPIC.
- It is the diver's right to refuse, without fear of penalty, the diving plan or the dive if, in the diver's judgment, conditions are unsafe or unfavorable or if the diver would be violating the dictates of training or diving regulations.
- Any on-site worker may stop operations at any time if he/she is convinced that unsafe or hazardous conditions threaten the health and safety of on-site personnel.
- No diver shall be permitted to dive while subject to any temporary condition or impairment that is known or is likely to affect adversely the safety or health of the diver or other dive operation members.

8.2 Dive Planning

A written site-specific work plan and HASP shall be submitted to the DPIC and TCNWD Coordinator prior to conducting underwater operations. Before implementation, the HASP must be reviewed and approved by the DPIC or his/her designee. Each worker must read and be familiar with the HASP and attend pre-work safety meetings. A template for the HASP can be obtained from the DPIC. The HASP will be prepared by a member of the dive team, DPIC, DPIC, or his/her designee and will contain the following information:

- Diving Mode (scuba, SS, snorkeling)
- Work Description
- Job Safety Analyses (JSAs) for the activities associated with the job.
- An Emergency Response Plan (ERP) for the dive location that includes:
 - Nearest U.S. Coast Guard Rescue Coordination Center and/or source of emergency medical services
 - Location and methods for contacting emergency response vehicles/ vessels, including phone numbers, call numbers, locations of phones, radios, etc.

- Work plan for the dives including anticipated number, depths, and estimated durations of dive if the HASP is site-specific.
- Required specialized equipment
- Location of 1st aid and oxygen kit and associated emergency equipment
- Location of nearest recompression facility that will accept civilian divers
- Altitude correction tables as needed
- NOAA neurological examination procedures

8.3 Diving Safety Equipment

The following items must be present, easily available, and in good condition at each dive site:

- A copy of the most recent version of the TCNWD Diving Safe Practices Manual
- Emergency procedures and information in the form of a project and/or site-specific HASP
- An approved first aid kit
- An emergency oxygen kit
- A stokes litter or backboard with flotation capability
- Communications equipment in the form of a VHF marine radio and/or telephone (landline telephone, cellular, or satellite) to summon emergency assistance.

8.4 Warning Signals (flags and buoys)

- At all diving locations an international flag “A” (“alpha”) and the recreational divers flag (red square with a white diagonal stripe from upper attached corner to lower flying corner) shall be displayed at the dive location in a manner that allows all around visibility.
- In any waters where vessel traffic may be present, the recreational divers flag (red with a diagonal white stripe) shall be displayed at the dive location in a manner that allows all around visibility.
- Flags will be displayed in a manner that will permit all-around visibility as a rigid replica or with stiffeners to ensure easy and clear identification by oncoming traffic.
- The flag will be within 100 ft of the actual location of the submerged dive team.
- Warning flags will be displayed whenever divers are in the water.
- Flags will be secured when divers are not in the water.
- The work vessel shall be illuminated as specified in US Coast Guard Rules of the Road or inland situations as per state or local regulations.

8.5 Diver Emergency Medical Information

The following qualification and emergency information will be assembled for each diver. This information will be maintained at the project site by the DPIC or on-site DPIC. It will be available to the appropriate representative of the insuring or governing agency with jurisdiction. Otherwise, the information will be for emergency use only. It will not be available except at the discretion of the DPIC or DPIC and the individual diver in question.

- Name and diver training information, including levels and dates of certifications and locations and dates of diving experience
- Emergency information for each diver including: name, phone number, and relationship of person to be contacted in the event of an emergency

- Applicable medical information (e.g., allergies, medications, or injuries which could affect diving)

8.6 Pre-Dive Briefing

Prior to each diving operation, the TCNWD Coordinator or on-site DPIC shall:

- Conduct and document in writing using a standard briefing form the pre-diving safety meeting (i.e., Tailgate Safety Briefing)
- Inquire about the physical fitness of each dive team member.
- Review the planned diving operation, noting any environmental conditions or unusual hazards likely to affect the safety of the diving operation and effect any necessary modifications to diving procedures.
- Review any modifications to operating procedures necessitated by the specific diving operation
- Review the tasks assigned to each dive team member.
- Review and establish contingency plans.
- Review emergency signals and procedures.
- Review method and procedure for reporting physical problems resulting from dive.
- Gain input from each dive team member.
- Supervise the inspection and functional test of each diver's equipment and support systems.
- Have each dive team member acknowledge the pre-dive briefing by initialing the briefing form.

8.7 General Boat Diving

8.7.1 Vessel Attributes

TCNWD diving operations will be conducted from relatively small vessels. Any vessel used for diving support shall have the following attributes:

- The vessel shall be large enough to adequately accommodate all members of the dive team, the divers' life-support equipment, and any special equipment being used in the operation. A smaller vessel (dinghy or tender) may be used to transport divers from a larger vessel to a dive location or retrieve scuba divers after surfacing.
- The size and design of the vessel shall be of such a configuration that the vessel will be seaworthy and not loaded beyond the capacity recommended by the manufacturer for the expected water conditions.
- A vessel may be owned by TCNWD or a subcontractor and operated by TCNWD employees or a subcontractor for a specific project. In any case, diving support vessels shall be covered by appropriate damage and liability insurance and equipped with the following in good operating condition:
 - All appropriate U.S. Coast Guard safety equipment to include running lights, fire extinguisher, horn, emergency signaling device, and personal flotation devices for all personnel
 - A marine VHF radio or other suitable communication means (cellular or satellite phone) capable of contacting emergency services
 - An accurate means of determining depth (sonar depth finder or sounding line)
 - Anchoring equipment of sufficient weight and strength for the vessel and expected conditions
 - A means of securing scuba and other gas cylinders tanks to prevent rolling or uncontrolled hazardous movement

- A means for divers to enter and leave the water easily and safely (e.g., ladder)
- Gear lines as appropriate for securing diver equipment in the water before or after a dive

8.7.2 General Boat Diving Procedures

When diving operations are conducted from a vessel, the following procedures should be used:

- All divers will familiarize themselves with operation of the dive support vessel, its safety equipment, and available communications facilities.
- Display the red and white recreational diving and international flag “A” (“alpha”) dive flags as described in Section 8.4.
- The DPIC and/or tender shall check the depth and conditions under the vessel before divers exit the vessel to prevent the divers hitting the bottom or debris in shallow water or descending into greater depths than expected.
- On-water work will be terminated in the event that the U.S. Coast Guard or National Weather Service posts warnings for winds stronger than 21 knots (Small Craft Warnings = winds 21 to 33 knots) in the dive area or between the dive site and staging location.
- On-water work will be terminated in the event that water currents become too strong for the divers to maintain position and/or return to an anchored boat without undue effort. Underwater operations may be terminated at the diver’s request.
- On-water work will be terminated in the event that thunderstorms approach the diving site within one mile or less.

8.7.3 Liveboating

“Liveboating” is defined as “The practice of supporting a surface-supplied air or mixed gas diver from a vessel which is underway” (WAC 296-37-5-5(22)) (underlining added). The TCNWD Coordinator and DDSA must be informed and full safety procedures written and implemented prior to any liveboating. Liveboating in conjunction with surface supplied diving will only be conducted in an emergency. In addition, the use of a mobile boat (“live boat”) in conjunction with non-tethered scuba diving will follow procedures 1-4; it must be noted that Procedure 5 cannot be followed because of the lack of a “diver’s hose” (umbilical or tether).

At a minimum, the following safety procedures will be followed:

1. Liveboating shall not be conducted. in rough seas that significantly impede diver mobility or work function or the maneuverability of the support vessel
2. Liveboating shall not be conducted in other than daylight hours.
3. The propeller of the vessel shall be stopped while the diver enters or exits the water.
4. A SS diver engaged in liveboating emergency operations shall carry a diver-carried reserve breathing gas supply.
5. A device shall be used which minimizes the possibility of entanglement of the diver's hose. Two-way voice communication between the tender(s) and the person controlling the vessel shall be available while the diver is in the water.
6. In an emergency, a standby diver other than the operator of the vessel shall be suited and ready while a diver is in the water.

8.8 Post-Dive Procedures

8.8.1 Post-Dive Debriefing

After the completion of the diving operation, the on-site DPIC shall:

- Check the physical condition of each diver and inquire about any adverse physical or physiological problems.
- Ensure that each diver knows the location of medical care and recompression chamber facilities ready for use and how to contact the DDSA and TCNWD Coordinator.

8.8.2 Post-Dive Records

The on-site DPIC must maintain on a daily basis a separate log (“supervisor dive log”) of the diving operation containing the following information:

- Names of dive team members including designated person-in-charge;
 - Type of diving apparatus used and the gas medium breathed
 - Times the diver left the surface and returned to the surface
 - Total bottom time
 - Maximum depth attained
 - Date the dive was undertaken, and remarks (such as project number, unusual incidents, hazardous conditions)
 - Owner of scuba tanks used by the diver whether carried by scuba divers, used as bail out bottles, or on board the support vessel for surface supplied diving operations
1. The supervisor dive log(s) must be filed with the TCNWD Coordinator upon completion of the operation.
 2. Each diver shall maintain a “Professional Diver Log Book”⁸ that conforms to the requirements of the U.S. Coast Guard, U.S. OSHA, and other regulatory agencies with jurisdiction. The records in a diver's personal log shall be in chronological order, and the on-site DPIC shall verify and sign each day's entries. The diver's log book must contain the following information:
 - Type of diving apparatus used and the gas medium breathed
 - Times the diver left the surface and returned to the surface
 - Total bottom time
 - Maximum depth attained
 - Surface interval, if a repetitive dive
 - Decompression tables that were used
 - Date the dive was undertaken, and remarks (such as name of employer, unusual incidents)
 - Additional remarks on-site conditions, activities, or other remarks are encouraged
 3. Current and up-to-date diver logs for each diver on-site and supervisor dive logs for the current operation must be available at the dive site for inspection by TCNWD staff or an appropriate regulatory agency.

⁸ The preferred log book is the “Commercial Diver Log Book” of the Association of Diving Contractors International published by Best Publishing Company.

9.0 DIVING OPERATIONS - Surface Supply Diving (Lightweight) Procedures

Surface Supplied diving involves all forms of diving in which the breathing gas is supplied from the surface to the diver through a flexible hose called an umbilical from the surface. SS diving policies outlined here represent safe dive practices that comply with the minimum standards of WAC 296-37. This mode of diving includes a surface-supplied diver and support personnel.

Air for surface supplied diving operations is supplied either from an air compressor(s) or from high pressure (H.P.) air cylinders (e.g., scuba air tanks). All air supplies must meet the purity requirements as set forth in Section 6.0 of this manual.

9.1 Limits for Surface Supply (SS) Diving

- It is understood that SS diving by TCNWD personnel will be restricted to depths less than 30 ffw for the purposes of control and removal of noxious plants and associated material.
- Surface Supplied diving should be done from a stable vessel / platform which is anchored or secured to a structure. For liveboating see Section 8.7.3 of this Manual.
- SS diving by TCNWD personnel will be limited to “light commercial” activities, and no construction, welding, ship breaking, excavation or tunneling, blasting, or other tasks included as “heavy commercial” diving will be conducted.

9.2 SS Dive Team Composition

A minimum TCNWD SS dive team involved in removal of plant material using dredging or other means will consist of three (3) persons with duties as follows:

- On-site DPIC who may be an active diver or tender, but must be on-site and on the surface at all times, but may designate a temporary alternate if he/she has underwater duties.
- Diver (may be DPIC)
- Standby (Safety) Diver (may be the DPIC)
- Tender(s) (must be qualified as DPIC)
- Additional divers may be necessary as determined by the TCNWD Coordinator and/or DPIC to provide for proper shift relief, particularly in remote locations where assistance from non-diving crew personnel is not immediately available. The use of qualified non-diver helpers may be needed in these operations to run compressors, charge cylinders, operate non-diving equipment, etc. More divers may be required to support a proper rotation and ensure divers obtain rest between dives.

9.3 Standby (Safety) Diver Requirements

A standby diver is a fully qualified TCNWD-diver ready to enter the water and render assistance anytime during a dive. Standby divers must be briefed along with primary divers on the job and tasks, so the standby diver is fully aware of the dive situation and conditions. The standby diver should be aware at all times of the dive progress. Standby divers shall not be assigned as the tender for the primary diver; the standby diver's sole responsibility is as emergency standby diver.

9.4 Communications

- Continuous, two-way voice communications between the SS diver(s) and the surface will be maintained throughout the diving operation. If voice communications are lost, line-pull signals will be

used, and the dive will be immediately terminated. Line pull signals shall be standardized and reviewed before each day of SS diving operations.

- The dive team will have a cellular or satellite telephone or confirmed access to a land line at a nearby shoreline residence or other source. Reliable service for the telephone will be confirmed prior to beginning operations. In addition, an operating marine VHF radio will be on board any support vessel for direct communication with other vessels, the Coast Guard, or other emergency assistance agencies.
- When a diver fails to respond correctly to communications or signals from another dive team member, the dive shall be terminated. If communications are lost and cannot be quickly re-established between the diver and the tender and/or on-site DPIC, or another diver at the dive location, then the dive shall be terminated.

9.5 Tending Safety

- When tending an umbilical, hose, scuba diver safety line or tether, or equipment tether, tend about 1-3 feet from the side rail, if possible, and hand over hand the umbilical over the side. Never let it slip freely through your hands.
- If an umbilical, hose, or line starts to run free, do not try to stop it by jumping on it, stepping on it, or grabbing it by hand. Pick it up at the coil or figure-8 stack and use a line to tie it down to a cleat or foundation.
- The **NEVER** list of Tending Safety:
 - ***Never step into the bight***
 - ***Never let an umbilical slip freely through your hands***
 - ***Never tend over the rail***
 - ***Never tend loosely -always feel the diver***
 - ***Never step or jump on to a running umbilical, hoses or lines***

9.6 Water Entry and Exit

Diver shall be able to safely enter and exit from the water. The on-site DPIC must evaluate the situation and ensure an adequate means is available for egress/ingress. When required for safe entry and exit, ladders capable of supporting the diver shall be provided. The ladder shall extend below the water surface at least 3 feet (WAC 296-37-540(2)).

10.0 DIVING OPERATIONS - Scuba Diving Procedures

10.1 Limits for Scuba Diving

- It is understood that scuba diving by TCNWD personnel for the purposes of assessment, surveys, monitoring, and removal of noxious plants in associated environments will have the following limitations:
- Depths less than 30 ffw
 - Breathing gas will be normal air with 21 percent oxygen
 - Day light hours only
 - In currents less than one knot unless the diver is line tended (see Section 10.5 Current Diving)

- Solo scuba diving, where one diver works alone underwater, will not be allowed without a standby diver and line tending, communications, or direct visual contact.

10.2 Scuba Dive Team Composition

- A scuba dive team will consist of a crew of three (3) or more members.
- Team composition may be increased as needed to meet the demands of work sites and/or government agencies with jurisdiction (e.g., U.S. Army Corps of Engineers).
- One member of the dive crew will be designated as an on-site DPIC responsible for the safe conduct of diving and dive-supporting operations. The DPIC shall be at the dive location and in charge of all aspects of the operation affecting the health and safety of the dive team members. The on-site DPIC may designate an alternate (e.g., a qualified tender) to serve as on-site DPIC when the DPIC is diving or off site. The on-site DPIC may serve as tender for the dive team.
- A dive tender maintains on-site records and acts in support of both divers throughout the operation. The primary function of the dive tender is to ensure the safety of the divers. The dive tender may also operate the dive support or research vessel from which the divers are operating (see Section 10.4 Boat Scuba Diving).
- Under emergency conditions, the DPIC may deviate from the standards of this Manual to the extent necessary to prevent or minimize a situation that is likely to cause death, serious injury, or major environmental damage. Such deviations shall not knowingly or unnecessarily jeopardize life, health, or safety. The TCNWD Coordinator shall be notified within 24 hours of the onset of the emergency and briefed on the nature of the emergency and the extent of the deviation from diving standards.

10.3 General Scuba Diving Procedures

1. An underwater loud speaker capable of transmitting either voice or a recall tone will be used for direct voice communications with the dive team to provide instructions for safety and operations. This unit can and will be used from a vessel or from shore using a buoy to support the hydrophone off bottom.
2. At all diving locations, whether operations are conducted using a vessel or from shore, the recreational diver's flag (red with a diagonal white stripe) and the Code Alpha flag must be displayed prominently displayed from the diving support vessel and/or using a flag buoy(s) (see Section 8.4.).
3. Solo scuba diving without surface communications and a tended safety line is prohibited. All scuba diving shall be by dive team pairs, unless the assigned task requires the use of additional team members. Members of the dive team shall maintain a proper buddy system of visual or physical contact and communication to be capable of rendering immediate assistance throughout the diving operation.
4. Each diver will have the capability of achieving and maintaining neutral buoyancy underwater and positive buoyancy on the surface; a diver's dry or wet suit should not be used as the primary means of buoyancy control.
5. Each diver shall have available an alternate breathing gas supply in the form of an independent reserve cylinder (i.e., "pony bottle") with a separate regulator.
6. Ascent rates should not exceed 40 ft (12 m) to 50 ft (15 m)/minute.
7. The on-site DPIC and/or tender shall monitor dive duration and topside activities near the dive site.
8. The diving operation shall be terminated when:
 - The TCNWD Coordinator, on-site DPIC, tender, or any worker associated with the job requests termination
 - A diver requests termination

- On receipt of a recall signal
 - Dive team members lose contact or fail to respond to communications or signals from another dive team member for more than 2 minutes
 - Any dive team member is aware of any unplanned, unusual, and/or unsafe situation that threatens the safety or health of any dive team member
9. Dives will be terminated while there is still sufficient tank pressure to permit the diver to safely reach the surface and inflate his/her buoyancy control device. Alternate air sources (e.g., pony or bailout bottles) shall not be used to extend underwater working time except in an emergency.
10. Divers conducting a single dive should have a minimum surface interval of 12 hours before ascending to an altitude of 4,000 feet or higher than the diving location including flying.

10.4 Boat Scuba Diving

For free-swimming (divers are not connected to the support vessel by a line or umbilical) scuba diving operations, the vessel may be anchored or freely operated by the supervisor/tender.

- Voice communications with the divers while in the water will be maintained using an underwater hydrophone/speaker. This equipment will be used to transmit voice instructions or an emergency recall signal.
- Diver will mark their position with a buoy. The buoy will be small and towed with floating line to minimize entanglement with vegetation. Divers will use the buoy to acknowledge voice instructions.
- Anchored vessels shall be securely anchored as close to the site of operations as is practical, downstream of the site, and a flag buoy (a buoy with a mast) will be streamed from the boat. The tender shall maintain a constant watch on the divers' bubbles or other position marker and be prepared to assist the dive team.
- The divers will not exit the vessel until receiving approval from the boat operator.
- If the divers are tended without the vessel being anchored, the operator should use the following procedures to avoid incidental and harmful contact:
 - Drop the divers off upstream of the work site
 - Remain downstream of the divers while the divers are underwater.
 - Maintain a safe distance from the divers that will allow maneuvering without overrunning the divers' position.
 - Keep a constant watch on the divers' bubbles or other position marker indicating the position of the divers.
 - At no time should the vessel be brought directly over the divers.
 - Approach divers on the surface only after making direct eye contact and establishing communication (hand signs or voice) with the divers except where a diver is in obvious distress.
 - Wait to approach divers for retrieval until the entire dive team is on the surface, except in planned or emergency situations.
 - For pickup, approach the divers on the surface from downwind or down current; the tender should assist the divers aboard.
 - During drop off or pickup when the divers are in close proximity of the boat, the engine(s) should be in neutral or turned off.

10.5 Current Diving

The maximum allowable current that a scuba diver can swim against is approximately 1 knot or 1.7 feet/second flow. Dives against currents above 1 knot shall be performed by a tethered scuba diver or a SS diver. Drift diving in a river in excess of 1 knot is permitted provided a chase boat accompanies the divers.

11.0 SNORKELING PROCEDURES

Snorkeling is distinct from other diving modes in that it does not include the use of an artificial gas supply and regulator or surface supplied system to provide breathing air. Absence of an air supply system makes snorkeling a water surface-oriented activity. With snorkeling gear, a person can complete only short duration, shallow depth dives below the surface while holding his/her breath. Snorkeling, however, does involve above-normal risks that can be minimized by adherence to safety procedures outlined in this Section.

All planning and other procedures that are required for scuba diving under TCNWD auspices are required for snorkeling including a HASP and emergency equipment (Attachment 2: Diving Support or Safety Equipment). Emergency oxygen equipment is recommended for snorkeling operations in the case of shallow water blackout, near-drowning, or other medical emergency such as cardiac problems. However, oxygen equipment may be eliminated after consultation with the DPIC.

Personnel conducting snorkeling should be TCNWD -qualified dive team members as described in Section 3.0 or specifically for Snorkeling as prescribed below. Personnel who are not certified dive team members and who wish to conduct snorkeling may submit a proposal to the DPIC and the TCNWD Coordinator for the activity demonstrating the need, the qualifications of the personnel that will be involved, methods for any work to be conducted, work site conditions, and safety procedures to be followed. Personnel including shore support personnel wishing to conduct snorkeling operations shall have current CPR and first aid certifications. Training will include the administration of oxygen under emergency conditions if such equipment is present. Following approval of the proposed work and safety plans, personnel planning to snorkel who are not certified dive team members shall demonstrate to the DPIC the following skills:

- Surface snorkel 1,000 feet in open water using a mask (keeping face in the water) and a snorkel for breathing.
- Complete submergence of the head and effective clearing of the snorkel without removing equipment from the mouth or face, to be completed at least twice in the 1,000 feet.
- Remove and replace mask at surface.
- Free-dive to a depth of 10 feet or greater and retrieve an object from the bottom, bring the object to the surface, clear snorkel without removal, and repeat.
- Ability to communicate in water to support and team personnel

During snorkeling operations, the following procedures and limitations shall be followed:

- Snorkeling operations shall follow pre-dive procedures as specified for compressed gas diving including submitting to the DPIC and TCNWD Coordinator for approval a HASP and conducting a pre-work briefing in which the dive and emergency response plans shall be reviewed and emergency equipment checked by each member of the team (see Section 8.2).
- Appropriate diving warning signals are required to be displayed at the snorkel site if any vessel traffic is possible.
- A support person with current CPR and first aid training shall participate as a buddy or partner. The support person will be in a boat or on shore within 100 feet and in visual contact of the snorkeler at all

times. If the support person is also working in the water, that person shall also be certified for snorkeling and properly equipped with dive or snorkeling gear.

- Snorkeling will not be conducted in in areas of high vessel traffic.
- Snorkeling will not be normally conducted in strong stream currents where the snorkeler cannot easily maintain position or return to shore. If a snorkeler wishes to drift with a current, hazards such as white water, falls, overhangs, snags, or other direct hazards must be avoided. A drifting snorkeler shall always be within 100 feet of a shore or boat where support personnel are present
- Snorkeling will be conducted only during daylight hours.
- If snorkeling operations will include surface dives where the diver will be completely submerged and out of sight of the support person on the shore, the snorkeling team shall use the “buddy” system with at least two team members swimming together. One team member will remain on the surface and maintain visual contact while the other is underwater. Using the buddy system will reduce the risk of drowning due to entanglement.

In addition to basic snorkeling equipment (e.g., mask, snorkel, and fins), the following equipment and information shall be present and available for use:

- Adequate thermal protection for all personnel
- First aid kit and emergency oxygen equipment as deemed appropriate by the DPIC.
- Buoyancy control equipment appropriate to the conditions and tasks
- Emergency signaling devices (e.g., whistle) to be carried by both snorkeling and support personnel
- A telephone (cellular or satellite) or 2-way radio adequate for communication to emergency services should be available to the support person
- A throwable floating rescue device, such as a life ring or floating seat cushion, attached to a line at least 90 feet long
- List of emergency contact numbers (telephone or call signs), including the nearest hospital
- Map showing the route to the nearest hospital

12.0 EMERGENCY PROCEDURES (EPs)

It is the intention of this Manual to provide safe procedures for conducting dive operations and to provide contingencies to minimize the possibility of dive mishaps threatening the health and safety of dive team members. A deviation from these procedures such as completely depleting a scuba tank while at depth can threaten the health and safety of the diver. In addition, potentially hazardous unforeseen events are occasionally encountered, such as the malfunction of a scuba regulator or a dive computer or hazardous weather. These situations and others can lead to mishaps, which include dive incidents, unplanned decompressions, or injuries.

As stated previously, this Manual assumes that all underwater diving conducted under the auspices of TCNWD will be conducted according to the protocols presented in this Manual and in depths less than 33 ffw. Thus, except for embolism, conditions requiring decompression should not be encountered by TCNWD personnel and the following EPs do not include them.

12.1 General Emergency Procedures

Each diver and on-site DPIC shall know his/her responsibilities and necessary action in each emergency. Divers and DPIC personnel will train for and thoroughly understand each emergency.

Thurston County Public Works

Noxious Weed Division Diving Safe Practices Manual. February 1, 2015

- In case of a diving medical emergency, contact local emergency medical services (EMS) and the Diver Alert Network (DAN) if possible, prior to traveling to an emergency medical facility.
- In the event an injury has occurred during a dive operation, EPs shall be instituted according to the project and site specific HASP.
- If pressure-related symptoms (e.g., embolism) are evident or suspected, the DPIC or other team member shall arrange transport to the nearest recompression chamber available for the diver as directed by EMS and/or DAN. The DPIC or alternate shall also prepare a detailed description of the decompression sickness symptoms, including depth and time of onset, which will accompany the diver to the recompression facility.

If a dive team member is involved in a dive incident that results in injury, the following procedures shall be implemented.

1. If the incident occurred to a diver while in or underwater, recover the injured diver from the water.
2. Initiate life support measures (CPR, rescue breathing, emergency oxygen administration) immediately as appropriate or required.
3. Stop bleeding if appropriate.
4. Perform first-aid treatment as needed.
5. Activate EMS (911) if required.
6. Explain the circumstances of the dive incident to the evacuation teams, medics, and physicians.
7. Do not assume that they understand why 100 percent oxygen is required for the diving accident victim or that recompression treatment may be necessary.
8. If the injury is too serious for first-aid treatment at the site, coordinate transport of the victim by EMS (if available) or other means to the nearest appropriate medical facility, If the diver was injured under hyperbaric conditions, include the injured diver's current dive log and dive computer if available,. Provide whatever appropriate first-aid remedies are available at the site while waiting and during transport.
9. If possible, the DPIC, DPIC, or designated dive team member will accompany the victim and evacuation team to the hospital.
10. The DPIC or DPIC will secure the diver's equipment in use at the time of the accident for subsequent investigation and evaluation.
11. Report the accident to the DPIC and as soon as possible but within 8 hours. The TCNWD Coordinator must report any hospitalization or fatality to Washington L&I within 8 hours.

12.2 Surface Supplied Diving EPs

Each dive team conducting surface supply air diving must have an understanding of at least the EPs listed below; in addition to any other job specific EP's needed. Specific EPs will be included in each HASP.

- SS EP-1 Fouled or Entrapped Diver
- SS EP-2 Loss of Air
- SS EP-3 Severance of Divers Umbilical
- SS EP-4 Loss of Communications
- SS EP-5 In-Water Trauma Or Injury
- SS EP-6 Unconscious Diver
- SS EP-7 Fire in Surface Equipment, On or Near Dive Station

12.3 Scuba EPs

Each dive team conducting scuba diving must have an understanding of at least the EPs listed below; in addition to any other job specific EPs needed. Specific EPs will be included in each HASP.

- Scuba EP-1 Lost Diver
- Scuba EP-2 Fouling or Entrapment
- Scuba EP-3 Loss of Air / Out of air
- Scuba EP-4 In water trauma or injury
- Scuba EP-5 Unconscious Diver
- Scuba EP-6 In water equipment failure

12.4 Post – Emergency Procedures

All dive incidents shall be reported in writing to the TCNWD Coordinator and DPIC. The DPIC shall maintain a database of incidents and their resolution. This database will be reviewed periodically to ensure corrective actions have been taken.

The report on the dive incident or injury will include the following:

- The place, date and time of the event
- The names and job titles of persons injured in the event
- The names of other team members and witnesses if available and appropriate
- A brief description of the event
- A statement of the sequence of events which preceded the mishap
- Identification of any unsafe conditions, acts, or procedures which contributed in any manner to the event
- An evaluation of any equipment involved in the incident that may have contributed
- An evaluation of the victim's and rescue team actions
- Recommended corrective actions to prevent similar mishaps

If deemed necessary by the DPIC or TCNWD Coordinator and/or the insuring agency with jurisdiction, improve or update this manual and emergency action plans.

13.0 DEFINITIONS

Bottom Time

The total elapsed time measured in minutes from the time when the diver leaves the surface in descent to the time that the diver begins a direct ascent to the surface.

Buddy Breathing

The sharing of a single air source between divers.

Certified Diver

A diver who holds a recognized valid certificate from a recognized certifying agency. A member of the TCNWD dive program will be a "qualified diver" and/or a "qualified tender".

Cylinder

A pressure vessel for the storage of gases.

Decompression Sickness

A condition with a variety of symptoms which may result from gas and bubbles in the tissues of divers after pressure reduction.

Decompression Table

A profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures.

Designated Person-in-Charge

The Designated Person-In-Charge (DPIC) is the person responsible for the health and safety aspects of the Thurston County Noxious Weed Control Department diving activities on a project and site basis. The DPIC is a qualified person responsible for the long-term and day-to-day implementation of the TCNWD diving program who approves divers, approves and monitors (as necessary) diving projects, and maintains safety and quality standards. The DPIC cooperates with and is responsible to the TCNWD Coordinator for the conduct of the TCNWD's diving program. He/she has routine operational authority for this program, including the conduct of training and certification, approval of dive plans, maintenance of diving records and equipment, and ensuring compliance with this standard and all relevant regulations.

Dive

A descent into the water, an underwater diving activity using compressed gas, an ascent, and return to the surface. Any dive without regard to the location, associated activities, or circumstances with these components shall be considered a dive and recorded as such.

Dive Location

The surface location including a vessel from which a diving operation is conducted.

Dive Site

The physical location of a diver during a dive.

Dive Team

Divers and support individuals who are exposed to or control the exposure of others to hyperbaric conditions.

Dive Tender

An individual that remains on the surface during a dive and is responsible for the safety of the dive team. The tender may also be a boat operator.

Diver

An individual in the water who uses apparatus, including snorkels, which supplies breathing gas at ambient pressure.

Diving Mode

The type of diving requiring specific equipment, procedures, and techniques. This manual covers only scuba (air or nitrox), light-weight surface supplied (air or nitrox), and snorkel.

Diving Safety Officer (DDSA)

The Diving Safety Officer is also known as the Designated Person in Charge of the health and safety aspects of the Thurston County Noxious Weed Control Department diving activities. The DDSA is a qualified person responsible for long-term and day-to-day implementation of the TCNWD diving program who approves divers,

approves and monitors (as necessary) diving projects, and maintains safety and quality standards. The DDSA cooperates with and is responsible to the TCNWD Coordinator for the conduct of TCNWD's diving program. He/she has routine operational authority for this program, including the conduct of training and certification, approval of dive plans, maintenance of diving records and equipment, and ensuring compliance with this standard and all relevant regulations.

Emergency Ascent

An ascent made under emergency conditions where the diver exceeds the normal ascent rate.

FFW

Feet of fresh water, or equivalent static head; is used as term to denote the depth in any fresh water body, brackish, or marine in which diving under TCNWD auspices is conducted as determined by the diver using a depth gauge, dive computer, or sounding line. This depth can be in either English or Metric (conversions are 1 foot = 0.3048 meters or 1 meter = 3.28 feet).

Hyperbaric Conditions

Pressure conditions in excess of normal atmospheric pressure at the dive location.

Liveboating

The practice of supporting a surface-supplied air or mixed-gas diver from a vessel, which is underway.

No Decompression Limits

The depth-time limits of the "no-decompression" limits and repetitive dive group designations table for no-decompression" air dives of the U.S. Navy Diving Manual or equivalent limits.

On-Site Designated Person in Charge (on-site DPIC)

The qualified person having complete and direct on-site responsibility for a diving operation and who is knowledgeable and competent with the diving equipment, diving operations in progress, emergency diving procedures, diving physics, and physiology and medical aspects of diving.

Pressure Related Injury

Any injury resulting from pressure disequilibrium within the body as the result of hyperbaric exposure. Examples include decompression sickness, pneumothorax, mediastinal emphysema, air embolism, subcutaneous emphysema, or ruptured eardrum.

Pressure Vessel - See Cylinder

Scuba Diving

A diving mode independent of surface supply in which the diver uses open circuit self-contained underwater breathing apparatus.

Standby diver

A diver at the dive location available to assist a diver in the water.

Surface Supplied Diving

A diving mode in which the diver in the water is supplied from the dive location with compressed air for breathing.

14.0 ATTACHMENTS

U.S. Department of Labor, Occupational Safety & Health Administration (OSHA) 29 CFR Title 1910 Subpart T Standards for Commercial Diving as interpreted by the *U.S. OSHA Directive CPL 02-00-151, OSHA Instruction on 29CFR Part 1910 Subpart T – Commercial Diving Operations, effective June 13, 2011.*

- 14.1 Attachment 1 State of Washington Labor and Industries, Safety Standards for Diving Operations 296-37 WAC Standards for Commercial Diving Operations; includes the State of Washington Department of Labor and Industries Safety and Health Consultation Report dated 26 April 2011.**
- 14.2 Attachment 2 Diving and Safety Equipment Checklists**
 - 14.2.1 Diving Gear Considered Essential and/or Appropriate for Scuba Divers**
 - 14.2.2 Diving Gear Considered Essential and/or Appropriate for Surface Supplied Divers**
 - 14.2.3 Diving Support or Safety Equipment**