

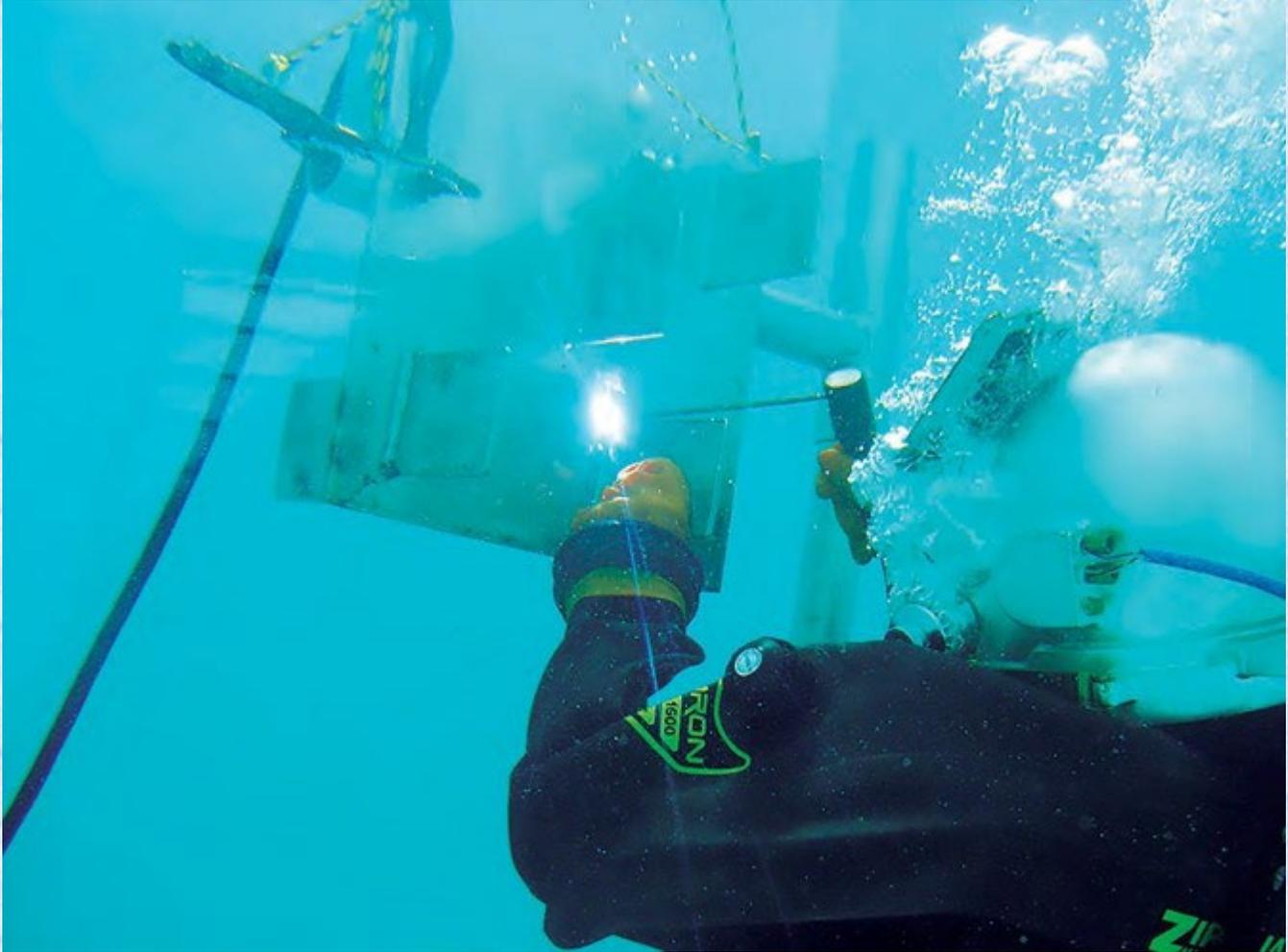


Underwater Engineering Services, Inc.

Enterprise Road Fort Pierce, FL 34982

Telephone: 772-337-3116 Website: [www.uesi.com](http://www.uesi.com)

Commercial Diving | Scour and Erosion Control | Marine Construction  
Inspection Services | Nuclear Diving | Nuclear Coatings | Underwater Welding



City of Key West

ITB No. 26-002

Re-Bid Navy Mole Pier Seawall Project

Bid Due: February 18, 2026 @ 3:00 pm

Submitted to:

City of Key West

Attn: City Clerk

1300 White Street

Key West, FL 33040



*City of Key West  
Re-Bid Navy Mole Pier Seawall Project  
ITB #: 26-002  
Bid Due: February 18, 2026 @ 3:00 pm*

## Table of Content

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Section 1	Bid Forms - Bid Bond
Section 2	Addendum's
Section 3	Company Licenses/Evidence of Insurance/Misc. Docs
Section 4	Safety Plan/Dive Operations Plan

# Section 1 Bid Forms



## **BIDDER'S CHECKLIST**

(Note: The purpose of this checklist is to serve as a reminder of major items to be addressed in submitting a bid and is not intended to be all inclusive. It does not alleviate the Bidder from the responsibility of becoming familiar with all aspects of the Contract Documents and proper completion and submission of his bid.)

1. All Contract Documents are thoroughly read and understood. [✓]
2. All blank spaces in bid filled in, using black ink or typewritten. [✓]
3. Total and unit prices added correctly and attached Schedule of Values [✓]
4. Addenda acknowledged. [✓]
5. Subcontractors are named as indicated in the bid. [✓]
6. Experience record included. [✓]
7. Bid signed by authorized officer and notarized. [✓]
8. Bid Bond completed and executed, including power-of-attorney dated the same date as Bid Bond. [✓]
9. Bidder familiar with federal, state, and local laws, ordinances, rules and regulations affecting performance of the work. [✓]
10. Bidder, if successful, able to obtain and/or demonstrate possession of required licenses and certificates within ten (10) calendar days after receiving a Notice of Award. [✓]
11. Bid submitted intact with 1 original, and 2 flash drives as stated in the Invitation to Bid. [✓]
12. Bid Documents submitted in sealed envelope and addressed and labelled in conformance with the instructions in the Invitation to Bid. [✓]
13. Bid Certifications and Affidavits signed and notarized, where applicable. [✓]

NOTE TO BIDDER: Use preferably black ink or typewritten for completing this Bid Form.

## **BID FORM**

To: The City of Key West  
Address: 1300 White Street, Key West, Florida 33040  
Project Title: **Re-Bid Navy Mole Pier Seawall Project**  
ITB #26-002

Bidder's contact person for additional information on this bid:

Company Name: Underwater Engineering Services, Inc.

Contact Name & Telephone #: Andrew Connelly - 772-337-3116

Email Address: aconnelly@uesi.com

### **BIDDER'S DECLARATION AND UNDERSTANDING**

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this bid are those named herein, that this bid is, in all respects, fair and without fraud, that it is made without collusion with any official of the City, and that the bid is made without any connection or collusion with any person submitting another bid on this contract.

The Bidder further declares that they have carefully examined the Contract Documents for the construction of the project, that they have personally inspected the site, and satisfied themselves as to the quantities involved, including materials and equipment, and conditions of work involved, including the fact that the description of the quantities of work and materials, as included herein, is brief and is intended only to indicate the general nature of the work and to identify the said quantities with the detailed requirements of the Contract Documents, and that this bid is made according to the provisions and under the terms of the Contract Documents, which documents are hereby made a part of this bid.

### **CONTRACT EXECUTION AND BONDS**

The Bidder agrees that if their bid is accepted, they will, within ten (10) days, not including Sundays and legal holidays, after the Notice of Award, sign the contract in the form annexed hereto, and will at that time, deliver to the City examples of the Performance Bond and Payment Bond required herein, and evidence of holding required licenses and certificates, and will, to the extent of their bid, furnish all machinery, tools, apparatus, and other means of construction and do the work and furnish all the materials necessary to complete all work as specified or indicated in the Contract Documents.

### **CERTIFICATES OF INSURANCE**

Bidder agrees to furnish the City, before commencing the work under this contract, the Certificates of Insurance (COI) as specified in these documents.

### **START OF CONSTRUCTION AND CONTRACT COMPLETION TIME**

The Bidder further agrees to begin work within ten (10) calendar days after receiving the Notice to Proceed and to complete the project, in all respects, within one hundred and eighty 180 calendar days after the date of the Notice to Proceed.



## PROPOSAL FORM

### RE-BID NAVY MOLE PIER SEAWALL REPAIR ITB26-002

	Description of Work/Materials (Please list addl. items as necessary)	Amount
	<b>Permits</b>	
	1. Navy Excavation Permit-Contractor will be require to obtain a GPR Survey of all utilities.	\$
	2. USACE (Permit Acquired No Cost)	
	3. FDEP (Exempt NO PERMIT REQUIRED-No cost)	1,450.00
	P&P bonds	\$ 22,000.00
	Mobilization/Demobilization	\$ 124,190.00
	General conditions	\$ 43,630.00
	Demolition/clear/fill	\$ 38,342.00
	Fabrication/Installation of steel patch panels	\$ 466,924.00
	Polyurethane grout	\$ 347,860.00
	#57 stone fill	\$ 69,396.00
	Subtotal:	\$ 1,113,792.00
	<b>TOTAL:</b>	<b>\$ 1,113,792.00</b>
	<b>ADD/ALT</b>	N/A
	<b>Electrical</b>	\$ N/A
	<b>Non-Shrink Polyurethane Grout Including Install-Unit Price: (Per SQFT)</b>	\$ N/A
	<b>Soil Infill Including Install-Unit Price: (Per/SQFT)</b>	\$ N/A
	<b>57 Stone Including Install-Unit Price (Per Ton)</b>	\$ 524.00
	<b>Soil Infill Including Install-Unit Price (Per/YD)</b>	\$ 510.00
	<b>Underwater Welding - Unit Price (Per/SQFT)</b>	\$ N/A
	<b>3/8" Steel Plate Including Install-Unit Price (Per/SQFT)</b>	\$ N/A

**RE-BID NAVY MOLE PIER SEAWALL REPAIR LUMP SUM BASE BID:**

(Includes all demolition, disposal, fixtures, equipment, materials, & labor)

\$ 1,113,792.00

---

In Words:

One Million One Hundred Thirteen Thousand Seven Hundred Ninety Two Dollars & Zero Cents

Payment for materials & equipment authorized by the Owner in a written Change Order but not listed in the Schedule of Values will be provided at suppliers' invoice plus 15 %.

**(This space intentionally left blank)**

List items to be performed by Bidder's own forces and the estimated total cost of these items. (Use additional sheets if necessary.)

Welding and Fabrication \_\_\_\_\_

Diving and Project Management \_\_\_\_\_

Excavation and Demolition \_\_\_\_\_

Backfilling and Restoration \_\_\_\_\_

\_\_\_\_\_

**(This space intentionally left blank)**

**SUBCONTRACTORS**

The Bidder further proposes that the following subcontracting firms or businesses will be awarded subcontracts for the following portions of the work if the Bidder is awarded the contract:

Uretek USA, Inc.  
Name

13900 Humble Road, Tomball, Texas, 77375  
Street City State Zip

Name Polyurethane Specialists, LLC

291 SW Equestrian Way, Lake City, Florida, 32024  
Street City State Zip

N/A  
Name

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
Street City State Zip

N/A  
Name

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
Street City State Zip

**SURETY**

Lexon Insurance Co. whose address is

12890 Lebanon Road, Mount Juliet, TN, 37122-2870  
Street City State Zip

**BIDDER**

The name of the Bidder submitting this bid is

Underwater Engineering Services, Inc. doing business at

3306 Enterprise Road, Fort Pierce, FL, 34982  
Street City State Zip

which is the address to which all communications concerned with this Bid and with the Contract shall be sent.

The names of the principal officers of the corporation submitting this bid, or of the partnership, or of all persons interested in this bid as principals are as follows:

Kenneth Griffin, President \_\_\_\_\_

Douglass Robb, Secretary \_\_\_\_\_

Andrew Connelly, V.P. Director of Project Development \_\_\_\_\_

Bernadette Ortiz, V.P. Office Manager \_\_\_\_\_

Alton Rogers, Vice President \_\_\_\_\_

**If Sole Proprietor or Partnership**

IN WITNESS hereto the undersigned has set their (its) hand this \_\_\_\_\_ day of \_\_\_\_\_ 2025.

of Bidder \_\_\_\_\_

Signature

\_\_\_\_\_ Title

**If Corporation**

IN WITNESS WHEREOF the undersigned corporation has caused this instrument to be executed, and its seal affixed by its duly authorized officers this 18th day of February 2025.26

(SEAL)

Underwater Engineering Services, Inc.  
Name of Corporation

By Andrew Connelly  
Andrew Connelly

Title V.P. Director of Project Development

Attest for Douglass Robb

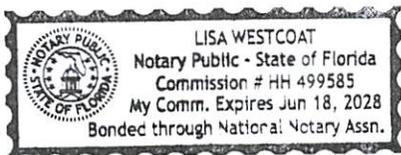


Sworn and subscribed before this 18th day of February, 2026

NOTARY PUBLIC, State of Florida, at Large

My Commission Expires: June 18, 2028

Lisa Westcoat Lisa Westcoat





CUSTOMER: Nettles Island, Inc.  
 PROJECT NAME: Nettles Island Seawall Repair & Anode Installation  
 STATE/COUNTRY: Jensen Beach, USA  
 CUSTOMER CONTACT: Daniel Frederick PHONE: (772) 229-2930 EMAIL: daniel@nettlesislandcondo.com  
 UESI PROJECT MANAGER: Michael Orth  
 UESI PROJECT NUMBER: COM-2400011.00/COM-2400011.01  
 PROJECT DATES: 6/27/2024 – 6/16/2025  
 PROJECT DESCRIPTION: Demo existing concrete seawall cap and constructing a new concrete seawall cap. Installation of anodes for the North Canal seawall and cap repair.  
 CONSTRUCTION VALUE: \$1,158,243.00

CUSTOMER: Harry Pepper & Associates, Inc.  
 PROJECT NAME: Dive Services S9 and S9A Broward  
 STATE/COUNTRY: Broward, USA  
 CUSTOMER CONTACT: Daryl Vorpahl PHONE: (904) 721-3000 EMAIL: ddvorpahl@hpepper.com  
 UESI PROJECT MANAGER: Jeremiah Duncan  
 UESI PROJECT NUMBER: COM-2200136.00  
 PROJECT DATES: 10/27/2022 – 8/6/2025  
 PROJECT DESCRIPTION: Underwater welding/diving to make Structure S-9 repairs.  
 CONSTRUCTION VALUE: \$363,980.00

CUSTOMER: Florida Power & Light  
 PROJECT NAME: FPL Substation Seawall St Augustine  
 CITY/STATE: St. Augustine, Florida  
 CUSTOMER CONTACT: David Antonovich PHONE: 561-691-7678 EMAIL: David.antonovich@fpl.com  
 UESI PROJECT DIRECTOR: Andrew Connelly  
 PROJECT MANAGER: Randal Bazemore – Matthew Peacock  
 UESI PROJECT NUMBER: COM-2200207  
 PROJECT DATES: 12/01/2022-02/15/2024  
 PROJECT DESCRIPTION: Installed sheet pile seawall with concrete batter piles, and constructing of a concrete cap.  
 CONSTRUCTION VALUE: \$2,401,861

CUSTOMER: GPI  
 PROJECT NAME: Nutrien Dock MHC Repair  
 CITY/STATE: Morehead, North Carolina  
 CUSTOMER CONTACT: Timothy Letton PHONE: 978-570-2999 EMAIL: tletton@gpinet.com  
 UESI PROJECT DIRECTOR: Charles Vallance  
 PROJECT MANAGER: Charles Vallance  
 UESI PROJECT NUMBER: COM-2021349  
 PROJECT DATES: 11/29/21-12/05/23  
 PROJECT DESCRIPTION: Performed underwater inspection and provided engineering reports of the bulkhead and made repairs to the bulkhead wall and barge dock. Underwater concrete and sheet pile repair, grout injection to fill voids and stabilize soil.  
 CONSTRUCTION VALUE: \$1,194,699.91

CUSTOMER: Florida Power & Light  
 PLANT NAME/LOCATION: Smith Plant, Panama City Florida  
 PROJECT NAME: Intake Canal Cellular Structure Restoration  
 STATE/COUNTRY: Panama City, Florida, USA  
 CUSTOMER CONTACT: Andrew Chan PHONE: (772)285-6074 EMAIL: andrew.chan@fpl.com  
 UESI PROJECT MANAGER: Lee Busbin  
 UESI PROJECT NUMBER: COM2200078.00  
 PROJECT DATES: 05/19/22 – 8/30/2022  
 PROJECT DESCRIPTION: Install approx..1 10LF of new SSP Seawall, C.I.P Concrete Cap, and concrete slab.  
 CONTRACT VALUE: \$809,295.00



CUSTOMER: Martin County Board of County Commissioners  
PROJECT NAME: Martin County BOCC Tuckahoe Mansion Seawall  
CITY/STATE: Jensen Beach, Florida  
CUSTOMER CONTACT: Jessica Garland PHONE: (772) 288-5795 EMAIL: jgarland@martin.fl.us  
UESI PROJECT DIRECTOR: Andrew Connelly  
UESI PROJECT NUMBER: COM-2021203.00  
PROJECT DATES: 02/01/2021 – 10/18/2021  
PROJECT DESCRIPTION: UESI provided services for the seawall replacement project consisted of the removal of an existing 300' long wood boardwalk, removal and relocation of several 70' tall palm trees, 30+LF helical tiebacks and the installation of a new 400LF seawall in front of a failing existing seawall. The new 400' long seawall was a combination wall consisting of steel sheet pile and cast in-place concrete. Approximately 1,000 tons of Rip Rap Stone was placed in front of the new wall and a new wood boardwalk was built to match the pre-existing wood boardwalk.  
CONSTRUCTION VALUE: \$988,627.40

CUSTOMER: Industrial TurnAround Corporation (ITAC)  
PROJECT NAME: ITAC MHCP Bulkhead Inspection Nutrien Morehead NC  
STATE/COUNTRY: North Carolina, USA  
CUSTOMER CONTACT: Chris Lupton PHONE: (252)341-3364 EMAIL: Chris.Lupton@itac.us.com  
UESI PROJECT MANAGER: Patrick Savadge  
UESI PROJECT NUMBER: COM2021292.00  
PROJECT DATES: 06/28/2021 – 10/08/2021  
PROJECT DESCRIPTION: Provide a condition inspection of the East Barge Berth Bulkhead at the Nutrien Phosphate Facility, Port of NC. Includes concrete pile cap and steel sheet piles.  
CONSTRUCTION VALUE: \$70,674.00

**ANTI – KICKBACK AFFIDAVIT**

STATE OF Florida                    )  
  : SS  
COUNTY OF St. Lucie                )

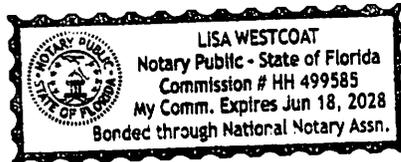
I, the undersigned hereby duly sworn, depose and say that no portion of the sum herein bid will be paid to any employees of the City of Key West as a commission, kickback, reward or gift, directly or indirectly by me or any member of my firm or by an officer of the corporation.

By: *Andrew Connelly*  
Underwater Engineering Services, Inc./Andrew Connelly

Sworn and subscribed before me this 18th day of February, 2026.

NOTARY PUBLIC, State of Florida at Large                    *Lisa Westcoat*

My Commission Expires: June 18, 2028





**SWORN STATEMENT UNDER SECTION 287.133(3)(A)**  
**FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES**

**THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICER AUTHORIZED TO ADMINISTER OATHS.**

1. This sworn statement is submitted with bid or proposal for \_\_\_\_\_  
City of Key West Navy Mole Pier Seawall Repair (Rebid)

2. This sworn statement is submitted by Underwater Engineering Services, Inc.  
(Name of entity submitting sworn statement)

whose business address is \_\_\_\_\_  
3306 Enterprise Road, Fort Pierce, FL 34982

and (if applicable) its Federal Employer Identification Number (FEIN) is \_\_\_\_\_  
59-2405375

(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement \_\_\_\_\_)

3. My name is Andrew Connelly  
(Please print name of individual signing)

and my relationship to the entity named above is V.P. Director of Project Development

4. I understand that a “public entity crime” as defined in Paragraph 287.133(1)(g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or with the United States, including but not limited to, any bid or contract for goods or services to be provided to any public or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, material misrepresentation.

5. I understand that “convicted” or “conviction” as defined in Paragraph 287.133(1)(b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication guilt, in any federal or state trial court of record relating to charges brought by indictment information after July 1, 1989, as a result of a jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

6. I understand that an “affiliate” as defined in Paragraph 287.133(1)(a), Florida Statutes, means:

- a. A predecessor or successor of a person convicted of a public entity crime; or
  - b. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term “affiliate” includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an affiliate. The ownership by one person of shares constituting controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm’s length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.
7. I understand that a “person” as defined in Paragraph 287.133(1)(8), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with public entity. The term “person” includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity.
8. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. (Please indicate which statement applies).

Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor any affiliate of the entity have been charged with and convicted of a public entity crime subsequent to July 1, 1989, AND (Please indicate which additional statement applies.)

There has been a proceeding concerning the conviction before a hearing of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer did not place the person or affiliate on the convicted vendor list. (Please attach a copy of the final order.)

The person or affiliate was placed on the convicted vendor list. There has been a subsequent proceeding before a hearing officer of the State of

Florida, Division of Administrative Hearings. The final order entered by the hearing officer determined that it was in the public interest to remove the person or affiliate from the convicted vendor list. (Please attach a copy of the final order.)

The person or affiliate has not been put on the convicted vendor list. (Please describe any action taken by or pending with the Department of General Services.)

*Andrew Connelly*

(Signature)

Andrew Connelly/V.P. Director of Project Development

(Date) 2/18/2026

STATE OF Florida

COUNTY OF St. Lucie

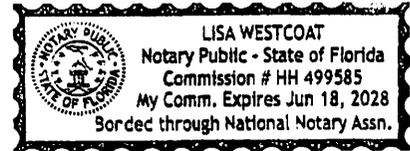
PERSONALLY, APPEARED BEFORE ME, the undersigned authority,

Andrew Connelly who, after first being sworn by me, affixed his her  
(Name of individual signing)

Signature in the space provided above on this 18th day of February, 2026.

My commission expires: June 18, 2028

*Lisa Westcoat*  
NOTARY PUBLIC  
Lisa Westcoat



**INDEMNIFICATION**

To the fullest extent permitted by law, the Bidder expressly agrees to indemnify and hold harmless the City of Key West, their officers, directors, agents, and employees (herein called the "indemnitees") from liabilities, damages, losses and costs, including, but not limited to, reasonable attorney's fees and court costs, such legal expenses to include costs incurred in establishing the indemnification and other rights agreed to in this paragraph, to persons or property, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of the Bidder, its Subcontractors or persons employed or utilized by them in the performance of the contract. Claims by indemnitees for indemnification shall be limited to the amount of Bidder's insurance or \$1 million per occurrence, whichever is greater. The parties acknowledge that the amount of the indemnity required hereunder bears a reasonable commercial relationship to the contract and it is part of the project specifications or the bid documents, if any.

The indemnification obligations under the contract shall not be restricted in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Bidder under workers' compensation acts, disability benefits acts, or other employee benefits acts, and shall extend to and include any actions brought by or in the name of any employee of the Bidder or of any third party to whom Bidder may subcontract a part or all of the Work. This indemnification shall continue beyond the date of completion of the work.

BIDDER : Underwater Engineering Services, Inc.

SEAL:



3306 Enterprise Road, Fort Pierce, FL 34982  
Address

  
Signature

Andrew Connelly  
Print Name

V.P. Director of Project Development  
Title

DATE: 2/18/2026



**EQUAL BENEFITS FOR DOMESTIC PARTNERS AFFIDAVIT**

STATE OF Florida )  
: SS  
COUNTY OF St. Lucie )

I, the undersigned hereby duly sworn, depose and say that the firm of Underwater Engineering Services, Inc. \_\_\_\_\_ provides benefits to domestic partners of its employees on the same basis as it provides benefits to employees' spouses per City of Key West Ordinance Sec. 2-799.

By: *Andrew Connelly*  
Andrew Connelly  
V.P. Director of Project Development

Sworn and subscribed before me this

18th Day of February, 2026.

*Lisa Westcoat*

NOTARY PUBLIC, State of Florida at Large

My Commission Expires: June 18, 2028





**VENDOR CERTIFICATION REGARDING**  
**SCRUTINIZED COMPANIES LISTS**

Respondent Vendor Name: Underwater Engineering Services, Inc.

Vendor FEIN: 59-2405375

Vendor's Authorized Representative Name and Title: Andrew Connelly/V.P. Director of Project Development

Address: 3306 Enterprise Road

City: Fort Pierce State: Florida

Zip: 34982

Phone Number: 772-337-3116

Email Address: aconnelly@uesi.com

Section 287.135(2)(a), Florida Statutes, prohibits a company from bidding on, submitting a proposal for, or entering into or renewing a contract for goods or services of any amount if, at the time of contracting or renewal, the company is on the Scrutinized Companies that Boycott Israel List, created pursuant to section 215.4725, Florida Statutes, or is engaged in a boycott of Israel. Section 287.135(2)(b), Florida Statutes, further prohibits a company from bidding on, submitting a proposal for, or entering into or renewing a contract for goods or services over one million dollars (\$1,000,000) if, at the time of contracting or renewal, the company is on either the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, both created pursuant to section 215.473, Florida Statutes, or the company is engaged in business operations in Cuba or Syria.

As the person authorized to sign on behalf of Respondent, I hereby certify that the company identified above in the section entitled "Respondent Vendor Name" is not listed on either the Scrutinized Companies that Boycott Israel List, Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List I understand that pursuant to section 287.135, Florida Statutes, the submission of a false certification may subject such company to civil penalties, attorney's fees, and/or costs and termination of the contract at the option of the awarding governmental entity.

Certified By: Andrew Connelly/V.P. Director of Project Development,  
Print Name Print Title

who is authorized to sign on behalf of the above-mentioned company.

Authorized Signature: 

**AFFIDAVIT ATTESTING TO NONCOERCIVE CONDUCT**  
**FOR LABOR OR SERVICES**

Entity/Vendor Name: Underwater Engineering Services, Inc.

Vendor FEIN: 59-2405375

Vendor's Authorized Representative: Andrew Connelly/V.P. Director of Project Development  
(Name and Title)

Address: 3306 Enterprise Road

City: Fort Pierce State: Florida Zip: 34982

Phone Number: 772-337-3116

Email Address: aconnelly@uesi.com

As a nongovernmental entity executing, renewing, or extending a contract with a government entity, Vendor is required to provide an affidavit under penalty of perjury attesting that Vendor does not use coercion for labor or services in accordance with Section 787.06, Florida Statutes.

As defined in Section 787.06(2)(a), coercion means:

1. Using or threatening to use physical force against any person;
2. Restraining, isolating, or confining or threatening to restrain, isolate, or confine any person without lawful authority and against her or his will;
3. Using lending or other credit methods to establish a debt by any person when labor or services are pledged as a security for the debt, if the value of the labor or services as reasonably assessed is not applied toward the liquidation of the debt, the length and nature of the labor or service are not respectively limited and defined;
4. Destroying, concealing, removing, confiscating, withholding, or possessing any actual or purported passport, visa, or other immigration document, or any other actual or purported government identification document, of any person;
5. Causing or threatening to cause financial harm to any person;
6. Enticing or luring any person by fraud or deceit; or
7. Providing a controlled substance as outlined in Schedule I or Schedule II of Section 893.03 to any person for the purpose of exploitation of that person.

As a person authorized to sign on behalf of Vendor, I certify under penalties of perjury that Vendor does not use coercion for labor or services in accordance with Section 787.06. Additionally, Vendor has reviewed Section 787.06, Florida Statutes, and agrees to abide by same.

Certified By: Andrew Connelly, who is authorized to sign on behalf of the above referenced company.

Authorized Signature: 

Print Name: Andrew Connelly

Title: V.P. Director of Project Development

**THE CITY OF KEY WEST E-VERIFY AFFIDAVIT**

Beginning January 1, 2021, Florida law requires all contractors doing business with The City of Key West to register with and use the E-Verify System in order to verify the work authorization status of all newly hired employees. The City of Key West requires all vendors who are awarded contracts with the City to verify employee eligibility using the E-Verify System. As before, vendors are also required to maintain all I-9 Forms of their employees for the duration of the contract term. To enroll in the E-Verify System, vendors should visit the E-Verify Website located at [www.e-verify.gov](http://www.e-verify.gov).

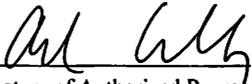
In accordance with Florida Statute § 448.095, **it is the responsibility of the Awarded Vendor to ensure compliance with all applicable E-Verify requirements.**

By executing this affidavit, the undersigned contractor verifies its compliance with Florida Statute § 448.095, stating affirmatively that the individual, firm, or corporation which is engaged in the performance of services on behalf of the City of Key West, has registered with, is authorized to use, and uses the U.S. Department of Homeland Security's E-Verify system.

Furthermore, the undersigned contractor agrees that it will continue to use E-Verify throughout the contract period, and should it employ or contract with any subcontractor(s) in connection with the performance of services pursuant to this Agreement with The City of Key West, contractor will secure from such subcontractor(s) similar verification of compliance with Florida Statute § 448.095, by requiring the subcontractor(s) to provide an affidavit attesting that the subcontractor does not employ, or subcontract with, an unauthorized alien. Contractor further agrees to maintain records of such compliance during the duration of the Agreement and provide a copy of each such verification to The City of Key West within five (5) business days of receipt.

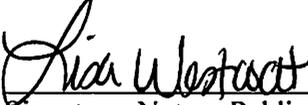
Failure to comply with this provision is a material breach of the Agreement and shall result in immediate termination of the Agreement without penalty to the City of Key West. Contractor shall be liable for all costs incurred by the City of Key West to secure replacement Agreement, including but not limited to, any increased costs for the same services, and costs due to delay, and rebidding costs, if applicable.

2/18/2026  
Date

  
(Signature of Authorized Representative)  
Andrew Connelly/V.P. Director of Project Development

State of Florida,  
County of St. Lucie,

Personally Appeared Before Me, the undersigned authority, Andrew Connelly who,  being personally known or  having produced his/her signature in the space provided above on this 18th day of February, 2026.

  
Signature, Notary Public  
Lisa Westcoat

June 18, 2028  
Commission Expires

Stamp/Seal:



LISA WESTCOAT  
Notary Public - State of Florida  
Commission # HH 499585  
My Comm. Expires Jun 18, 2028  
Bonded through National Notary Assn.





machinery, tools, apparatus, means of transportation for, and the performance of the work covered in the bid and the Contract Documents, entitled:

**ITB 26-002 / Re-Bid Navy Mole Pier Seawall Repair**

WHEREAS, it was a condition precedent to the submission of said bid that a cashier's check, certified check, or bid bond in the amount of five (5) percent of the base bid be submitted with said bid as a guarantee that the Bidder would, if awarded the contract, enter into a written contract with the City for the performance of said contract, within ten (10) working days after written notice having been given of the award of the contract.

NOW, THEREFORE, the conditions of this obligation are such that if the Principal within ten (10) consecutive calendar days after written notice of such acceptance, enters into a written contract with the Oblige and furnishes the Performance and Payment Bonds, each in an amount equal to one hundred (100) percent of the base bid, satisfactory to the City, then this obligation shall be void; otherwise the sum herein stated shall be due and payable to the Oblige and the Surety herein agrees to pay said sum immediately upon demand of the Oblige in good and lawful money of the United States of America, as liquidated damages for failure thereof of said Principal.

Signed and sealed this 18th day of February, 2026.

Principal

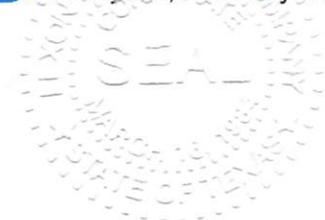
Underwater Engineering Services, Inc.

By *Andrew Combelly*  
*Andrew Combelly Vice President*

STATE OF Florida )  
: SS  
COUNTY OF St. Lucie )

Surety Lexon Insurance Company

By *Samoa A. Prejean*  
Samoa A. Prejean, Attorney In Fact #W178180



KNOW ALL BY THESE PRESENTS, that Endurance Assurance Corporation, a Delaware corporation ('EAC'), Endurance American Insurance Company, a Delaware corporation ('EAIC'), Lexon Insurance Company, a Texas corporation ('LIC'), and/or Bond Safeguard Insurance Company, a South Dakota corporation ('BSIC'), each, a "Company" and collectively, "Sompo International," do hereby constitute and appoint: Kelly A. Menard, Linda B. Carbo, Rene Thibodaux, Samoa A. Prejean

as true and lawful Attorney(s)-In-Fact to make, execute, seal, and deliver for, and on its behalf as surety or co-surety; bonds and undertakings given for any and all purposes, also to execute and deliver on its behalf as aforesaid renewals, extensions, agreements, waivers, consents or stipulations relating to such bonds or undertakings provided, however, that no single bond or undertaking so made, executed and delivered shall obligate the Company for any portion of the penal sum thereof in excess of the sum of **One Hundred Million (\$100,000,000.00)**

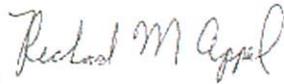
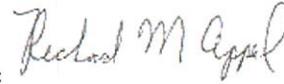
Such bonds and undertakings for said purposes, when duly executed by said attorney(s)-in-fact, shall be binding upon the Company as fully and to the same extent as if signed by the President of the Company under its corporate seal attested by its Corporate Secretary.

This appointment is made under and by authority of certain resolutions adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC, a copy of which appears below under the heading entitled "Certificate".

This Power of Attorney is signed and sealed by facsimile under and by authority of the following resolution adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC and said resolution has not since been revoked, amended or repealed:

RESOLVED, that the signature of an individual named above and the seal of the Company may be affixed to any such power of attorney or any certificate relating thereto by facsimile, and any such power of attorney or certificate bearing such facsimile signature or seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached.

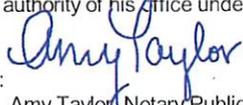
IN WITNESS WHEREOF, each Company has caused this instrument to be signed by the following officers, and its corporate seal to be affixed this 25th day of May, 2023.

<p><b>Endurance Assurance Corporation</b></p>  <p>By: Richard Appel; SVP &amp; Senior Counsel</p>	<p><b>Endurance American Insurance Company</b></p>  <p>By: Richard Appel; SVP &amp; Senior Counsel</p>	<p><b>Lexon Insurance Company</b></p>  <p>By: Richard Appel; SVP &amp; Senior Counsel</p>	<p><b>Bond Safeguard Insurance Company</b></p>  <p>By: Richard Appel; SVP &amp; Senior Counsel</p>
---	---	---	---



**ACKNOWLEDGEMENT**

On this 25th day of May, 2023, before me, personally came the above signatories known to me, who being duly sworn, did depose and say that he/she is an officer of each of the Companies; and that he executed said instrument on behalf of each Company by authority of his office under the by-laws of each Company.

By:   
Amy Taylor, Notary Public – My Commission Expires 3/9/27



**CERTIFICATE**

I, the undersigned Officer of each Company, DO HEREBY CERTIFY that:

1. That the original power of attorney of which the foregoing is a copy was duly executed on behalf of each Company and has not since been revoked, amended or modified; that the undersigned has compared the foregoing copy thereof with the original power of attorney, and that the same is a true and correct copy of the original power of attorney and of the whole thereof;
2. The following are resolutions which were adopted by the board of directors of each Company by unanimous written consent effective the 30th day of March, 2023 for BSIC and LIC and the 17th day of May, 2023 for EAC and EAIC and said resolutions have not since been revoked, amended or modified:  
"RESOLVED, that each of the individuals named below is authorized to make, execute, seal and deliver for and on behalf of the Company any and all bonds, undertakings or obligations in surety or co-surety with others: RICHARD M. APPEL, MATTHEW E. CURRAN, MARGARET HYLAND, SHARON L. SIMS, CHRISTOPHER L. SPARRO, and be it further  
RESOLVED, that each of the individuals named above is authorized to appoint attorneys-in-fact for the purpose of making, executing, sealing and delivering bonds, undertakings or obligations in surety or co-surety for and on behalf of the Company."
3. The undersigned further certifies that the above resolutions are true and correct copies of the resolutions as so recorded and of the whole thereof.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the corporate seal this 18th day of February, 2026

By:   
Daniel S. Lodge, Secretary

**NOTICE: U. S. TREASURY DEPARTMENT'S OFFICE OF FOREIGN ASSETS CONTROL (OFAC)**

No coverage is provided by this Notice nor can it be construed to replace any provisions of any surety bond or other surety coverage provided. This Notice provides information concerning possible impact on your surety coverage due to directives issued by OFAC. **Please read this Notice carefully.** The Office of Foreign Assets Control (OFAC) administers and enforces sanctions policy, based on Presidential declarations of "national emergency". OFAC has identified and listed numerous foreign agents, front organizations, terrorists, terrorist organizations, and narcotics traffickers as "Specially Designated Nationals and Blocked Persons". This list can be located on the United States Treasury's website – <https://www.treasury.gov/resource-center/sanctions/SDN-List>. In accordance with OFAC regulations, if it is determined that you or any other person or entity claiming the benefits of any coverage has violated U.S. sanctions law or is a Specially Designated National and Blocked Person, as identified by OFAC, any coverage will be considered a blocked or frozen contract and all provisions of any coverage provided are immediately subject to OFAC. When a surety bond or other form of surety coverage is considered to be such a blocked or frozen contract, no payments nor premium refunds may be made without authorization from OFAC. Other limitations on the premiums and payments may also apply.

Any reproductions are void.

# Section 2 Addendum's





## **ADDENDUM NO. 1**

### **Re-Bid Navy Mole Pier Seawall Repair**

#### **ITB 26-002**

This addendum is issued as supplemental information to the Invitation to Bid package for clarification of certain matters of both a general and a technical nature. The referenced Invitation to Bid package is hereby amended in accordance with the following items:

1. **Clarification: (ITB 26-002 Page 2. And 14. Update)**

#### **Page 2.**

#### **Access request for Pre-Bid Meeting**

- **Point of Clarification:** On the morning of the pre-bid meeting, attendees that submitted the proper request by January 26, 2026 at 4 P.M. shall go to the Visitor Control Center between 7:00AM-9:00AM to complete background check and obtain a base access pass to Truman Annex/Mole Pier (Please remember to bring your printed paper copy of the emailed invitation). Visitor Control Center Wait Times Vary. The Pre-Bid Meeting will begin at the Navy Mole Pier inside of the Truman Waterfront Park at 10:00AM. Visitor Control Center is located at A641 Saratoga Ave, Key West, FL 33040. No firearms are allowed.

**Pre-Bid Meeting: 10 A.M. LOCAL TIME at the Navy Mole Pier in the Truman Waterfront Park. BASE ACCESS PASS MUST BE OBTAINED FROM THE BOCA CHICA VISITOR CONTROL CENTER ON 28JAN, PRIOR TO THE SITE VISIT.**

#### **Page 14.**

#### **PART 1**

## BIDDING REQUIREMENTS

Please provide your name, email address, company information, including address and phone number, to Keith Bring [keith.bring@cityofkeywest-fl.gov](mailto:keith.bring@cityofkeywest-fl.gov) and LT Skye McNutt [skye.r.mcnutt.mil@us.navy.mil](mailto:skye.r.mcnutt.mil@us.navy.mil). An invitation to obtain your access pass will be emailed. Please print a copy of this email invitation and bring it with you to the Visitor Control Center outside of NAS Key West, Boca Chica Annex, to be received for security screening.

2. **Changes to Submission Requirements:** [No Changes]
3. **Updates to Project Timeline:** [No Changes]
4. **Responses to Questions:** [No Changes]
5. **Additional Resources:** [No Changes]

  
\_\_\_\_\_  
Signature Andrew Connelly

Underwater Engineering Services, Inc.  
Name of Business



**ADDENDUM NO. 2**  
**Re-Bid Navy Mole Pier Seawall Repair**  
**ITB 26-002**

This addendum is issued as supplemental information to the Invitation to Bid package for clarification of certain matters of both a general and a technical nature. The referenced Invitation to Bid package is hereby amended in accordance with the following items:

1. **Clarification:** [No Changes]
2. **Changes to Submission Requirements:** [No Changes]
3. **Updates to Project Timeline:** [No Changes]
4. **Responses to Questions:** [No Changes]
  - **Question:** The bid documents require the bidder to have a State of Florida Contractors license. Will this be required since this is on Federal Navy property.

**Answer:**

**Page #16 of ITB-26-002 states: Please refer to ITB 26-002 regarding requirements.**

Each response must be submitted on the prescribed form and accompanied by a bid security as prescribed in the instructions to Bidders, payable to the City of Key West, Florida, in an amount not less than five (5) percent of the bid amount.

The Bidder must be a licensed contractor by the state of Florida and submit proof of such with the bid.

The successful Bidder shall furnish documentation showing that they are in compliance with the licensing requirement of the State and the provisions of Chapter 66 Section 87 of the Code of Ordinances of the City of Key West, within ten (10) days following the Notice of Award and must demonstrate that they hold at a minimum, the following licenses & certificates.

- A. City of Key West Business Tax License Receipt
- B. A valid Certificate of Competency issued by the Chief Building Official of Key West, Florida.
- C. A valid occupational license issued by the City of Key West, Florida.

All bid bonds, insurance contracts, and Certificates of Insurance (COI) shall be either executed by or countersigned by a licensed resident agent of the Surety or Insurance Company having their place of business in the State of Florida, and in all ways complying with the insurance laws of the State of Florida. Further, the said Surety or Insurance Company shall be duly licensed and qualified to do business in the State of Florida.

Before a contract is awarded for the work contemplated herein, the City will conduct such an investigation as is necessary to determine the performance record and ability of the apparent low Bidder to perform the size and type of work specified under this contract. Upon request, the Bidder shall submit such information as deemed necessary by the City to evaluate the Bidder's qualifications.

Page #22 of ITB 26-002 states:

**CITY OF KEY WEST LICENSE REQUIRED**

Bidders are required to have a Certified or Registered General Contractors City of Key West license. License fees do not exceed \$410.00. License shall be obtained within ten (10) days of Notice of Award.

- **Question:** If the bidder does need a Florida license; does this also apply to subcontractors.

**Answer:** All sub-contractors required to pull a permit are required to be licensed in the state of Florida.

5. **Additional Resources:** [No Changes]

  
\_\_\_\_\_  
Signature Andrew Connelly

\_\_\_\_\_  
Underwater Engineering Services, Inc.  
Name of Business



**ADDENDUM NO. 3**  
**Re-Bid Navy Mole Pier Seawall Repair**  
**ITB 26-002**

This addendum is issued as supplemental information to the Invitation to Bid package for clarification of certain matters of both a general and a technical nature. The referenced Invitation to Bid package is hereby amended in accordance with the following items:

1. **Clarification:** [Changes]

**Update: The United States Navy has decided to remove/omit all electrical scope from this ITB 26-002.**

2. **Changes to Submission Requirements:** [Changes]

**Update: All electrical scope noted in the original bid documents pursuant ITB 26-002 Re-Bid Navy Mole Pier Seawall Repair has been removed/omitted from the bidding requirements. Please do not submitted any cost via ADD/Alternate line item "Electrical" on pg. #18.**

3. **Updates to Project Timeline:** [No Changes]

4. **Responses to Questions:** [No Changes]

1. The scope of work in the bid documents state we are to supply 4-50-amp dock pedestals. The electrical drawings show the pedestals as 30-amp 120vac. Can you confirm the correct pedestal configuration? Marina pedestals can be supplied with 50-amp 240vac and 30-amp 120vac receptacles. Do you want us to supply that configuration for versatility?

**Answer: N/A**

2. The electrical drawings show that we are to feed the new 200amp panel from the existing panel. The existing panel and service disconnect are only rated for 100amps. Adding a 200amp panel to the existing 100amp panel will overload

the existing panel. There is a spare conduit in the existing 100amp disconnect that appears to stub up in the existing transformer. Can we utilize this spare conduit to feed the new 200amp panel?

Answer: N/A

3. The existing 75kva transformer is 3-phase 120/208vac. The 50amp receptacles specified in the bid documents do not specify the voltage. Typically, 50amp marine receptacles are 220vac and 30amp marine receptacles are 120vac. If 50amp receptacles are to be supplied the voltage will be 120/208vac. If the 50amp receptacles are what are wanted, will the 208vac voltage be a problem for the boats that will be utilizing the pedestals?

Answer: N/A

5. The drawings call for a single phase 120/240vac single phase panel. The existing transformer is 120/208vac 3 phase. The AMI meter that is to be installed is not available in 120/208vac single phase. Are we to install a 3-phase 120/208vac panel and meter?

Answer: N/A

5. During the site visit we noticed that the dock was osculating quite a bit due to the rough seas. Using the specified flexible seal tight conduit may cause the wire to chafe inside the conduit due to the extreme motion of the dock. Can we use type G-cable to feed the pedestals instead of the specified seal tight conduit?

Answer: N/A

6. **Additional Resources:** [No Changes]

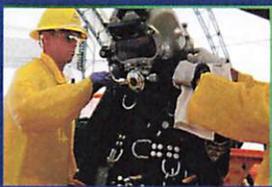


Andrew Connelly/V.P. Director of Project Development  
Signature

Underwater Engineering Services, Inc.

Name of Business

# Section 3 Company Licenses/ Misc. Docs.





Ron DeSantis, Governor

Melanie S. Griffin, Secretary



**STATE OF FLORIDA**  
**DEPARTMENT OF BUSINESS AND PROFESSIONAL REGULATION**

**CONSTRUCTION INDUSTRY LICENSING BOARD**

THE GENERAL CONTRACTOR HEREIN IS CERTIFIED UNDER THE  
PROVISIONS OF CHAPTER 489, FLORIDA STATUTES

**GREENMAN, STEVE BEECHER**

UNDERWATER ENGINEERING SERVICES INC  
3306 ENTERPRISE ROAD  
FORT PIERCE FL 34982

LICENSE NUMBER: CGC1507554

EXPIRATION DATE: AUGUST 31, 2026

Always verify licenses online at [MyFloridaLicense.com](http://MyFloridaLicense.com)

ISSUED: 08/08/2024

Do not alter this document in any form.

This is your license. It is unlawful for anyone other than the licensee to use this document.





**2025 - 2026**

**St. Lucie County Local Business Tax Receipt**

P.O. Box 308, Fort Pierce, FL 34954  
tcslc.com

Facilities or machines #	Rooms #	Seats #	Employees #10	Receipt #1009626
Type of business 7399 PROFESSIONAL MISC (CONSULTING ENGINEER)				Expires SEPTEMBER 30, 2026

DBA name	Business: Underwater Engineering Services Inc
Mailing address: Underwater Engineering Services Inc 3306 Enterprise Rd #100 Fort Pierce, FL 34982	Business location: 3306 Enterprise Rd #100 Fort Pierce, FL 34982 <i>*GOOD FOR THIS LOCATION ONLY*</i>

RENEWAL		City of Fort Pierce	
Original tax:	\$27.55		
Penalty:			
Collection cost:			
Total:	\$27.55	Paid 09/08/2025 27.55	0000-20250908-176952

Law requires this Local Business Tax Receipt to be displayed conspicuously at the place of business in such a manner that it can be open to the view of the public and subject to inspection by all duly authorized officers of the county. Upon failure to do so, the local business taxpayer shall be subject to the payment of another Local Business Tax for the same business, profession or occupation.

Pursuant to Florida law, all Local Business Tax Receipts shall be sold by the Tax Collector beginning July 1 of each year and shall expire on September 30 of the succeeding year. Those Local Business Tax Receipts renewed beginning October 1 shall be delinquent and subject to a delinquency penalty of 10 percent for the month of October. An additional 5 percent penalty for each month of delinquency is added until paid, provided that the total delinquency penalty shall not exceed 25 percent of the Local Business Tax for the delinquent establishment.

In addition to the penalty, the Tax Collector is entitled to a collection fee of \$1 to \$5. This fee is based on the amount of Local Business Tax, which will be collected from delinquent taxpayers after September 30 of the business year.

This receipt is a Local Business Tax only. It does not permit the local business taxpayer to violate any existing regulatory or zoning laws of the state, county or city. It also does not exempt the local business taxpayer from any other taxes, licenses or permits that may be required by law.

Pursuant to Florida law, Local Business Taxes are subject to change.

Underwater Engineering Services Inc  
3306 Enterprise Rd #100  
Fort Pierce, FL 34982



# CERTIFICATE OF MARINE / ENERGY INSURANCE

DATE (MM/DD/YYYY)  
1/6/2026

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> Arthur J. Gallagher Risk Management Services, LLC PO Box 100 Plattenville LA 70393  License#: 0D69293	<b>CONTACT NAME:</b> Danielle Formeller <b>PHONE (A/C, No, Ext):</b> 225-278-5642 <b>FAX (A/C, No):</b> <b>E-MAIL ADDRESS:</b> Danielle_Formeller@ajg.com <b>PRODUCER CUSTOMER ID #:</b> UNDEENG-01
	<b>INSURER(S) AFFORDING COVERAGE</b>
<b>INSURED</b> Underwater Engineering Services, Inc. 3306 Enterprise Rd. Fort Pierce FL 34982-8433	<b>INSURER A:</b> Accredited Surety and Casualty Company, Inc <b>INSURER B:</b> Berkley Casualty Company <b>INSURER C:</b> Pacific Insurance Company, Limited <b>INSURER D:</b> Transguard Insurance Company of America <b>INSURER E:</b> Samsung Fire & Marine Insurance Co LTD <b>INSURER F:</b>
	<b>NAIC #</b> 26379 15911 10046 28886

### COVERAGES

CERTIFICATE NUMBER:900202431

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
E	<b>HULL AND MACHINERY</b>  <input type="checkbox"/> COLLISION LIABILITY <input type="checkbox"/> TOWERS LIABILITY			SMCZ19040AAA	12/31/2025	12/31/2026	<input checked="" type="checkbox"/> PER SCHEDULE ON FILE	
							INSURED VALUE	\$
							COLLISION (Ea occurrence)	\$
							TOWERS (Ea occurrence)	\$
								\$
E	<b>PROTECTION AND INDEMNITY</b>  <input type="checkbox"/> CREW LIABILITY <input type="checkbox"/> JONES ACT <input checked="" type="checkbox"/> COLLISION LIABILITY <input checked="" type="checkbox"/> TOWERS LIABILITY <input type="checkbox"/> REMOVAL OF WRECK <input type="checkbox"/> IN REM			SMCZ19040AAA	12/31/2025	12/31/2026	<input type="checkbox"/> PER CLUB RULES	
							<input checked="" type="checkbox"/> EA OCCURRENCE PER VESSEL, CSL	\$ 1,000,000
							COLLISION (Ea occ), CSL	\$
							TOWERS (Ea occ), CSL	\$
							REMOVAL OF WRECK (Ea occurrence)	\$
								\$
								\$
								\$
A C	<b>POLLUTION LIABILITY</b>  <input checked="" type="checkbox"/> OPA 90 <input checked="" type="checkbox"/> CERCLA <input type="checkbox"/> NON-OPA / NON-CERCLA			V-22064-25 21 OH 0609171-25	12/31/2025 12/31/2025	12/31/2026 12/31/2026	EA OCCURRENCE	\$ 5,000,000
							Professional Poll.	\$ 1,000,000
								\$
								\$
								\$
								\$
								\$
								\$
								\$
								\$
								\$
C D	Professional Leased & Rented Equip			21 OH 0609171-25 IMP4004297 00	12/31/2025 12/31/2025	12/31/2026 12/31/2026	Per Claim	\$ 1,000,000
							Any one item	\$ 25,000
							Max occurrence	\$ 500,000

### CERTIFICATE HOLDER

### CANCELLATION

Evidence of Insurance	SHOULD ANY OF THE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE 





# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

12/16/2025

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

<b>PRODUCER</b> PG Genatt Group LLC 3333 NEW HYDE PARK RD SUITE 409 NEW HYDE PARK NY 11042	<b>CONTACT NAME:</b> Alyson Graziosi	
	<b>PHONE (A/C. No. Ext):</b> 516-628-5705	<b>FAX (A/C. No):</b> 516-470-0338
<b>E-MAIL ADDRESS:</b> AGRAZIOSI@CRPGRP.COM		
<b>INSURER(S) AFFORDING COVERAGE</b>		<b>NAIC #</b>
<b>INSURER A:</b> North Pointe Insurance Company		27740
<b>INSURED</b> Underwater Engineering Services, Inc. 3306 Enterprise Road Suite 203 Fort Pierce FL 34982	<b>INSURER B:</b>	
	<b>INSURER C:</b>	
	<b>INSURER D:</b>	
	<b>INSURER E:</b>	
	<b>INSURER F:</b>	

**COVERAGES**

CERTIFICATE NUMBER: 1963340175

REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS
	<b>COMMERCIAL GENERAL LIABILITY</b> <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR  GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:						EACH OCCURRENCE \$ DAMAGE TO RENTED PREMISES (Ea occurrence) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$ \$
A	<b>AUTOMOBILE LIABILITY</b> <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY <input checked="" type="checkbox"/> \$1,000 COMP <input checked="" type="checkbox"/> \$1,000 COLL			165000040	12/31/2025	12/31/2026	COMBINED SINGLE LIMIT (Ea accident) \$2,000,000 BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$ \$
	<b>UMBRELLA LIAB</b> <input type="checkbox"/> OCCUR <b>EXCESS LIAB</b> <input type="checkbox"/> CLAIMS-MADE DED <input type="checkbox"/> RETENTION \$						EACH OCCURRENCE \$ AGGREGATE \$ \$
	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b> ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? <input type="checkbox"/> Y/N <input checked="" type="checkbox"/> N/A (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below						PER STATUTE <input type="checkbox"/> OTH-ER <input type="checkbox"/> E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

\*\*Evidence of Insurance\*\*

**CERTIFICATE HOLDER**

CANCELLATION 30 day notice applies

Evidence of Insurance

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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UNANIMOUS WRITTEN CONSENT  
OF THE  
BOARD OF DIRECTORS  
OF  
**UNDERWATER ENGINEERING SERVICES, INC.**  
IN LIEU OF A MEETING

The undersigned, being all of the members of the Board of Directors of Underwater Engineering Services, Inc. a Florida corporation (the "Corporation"), do hereby consent, pursuant to the appropriate Section of Business Corporation Law of the State of Florida, to the taking of the following action without holding a meeting, such actions being stated and in the form of and to be as fully effective as if taken by, unanimous resolutions of the Board of Directors of said Corporation at a meeting duly called and held on the date hereof at which they were present and acting throughout as the duly authorized actions of the directors of the Corporations:

**RESOLVED:** That the officers (see attached) are hereby elected to serve in the capacity set forth opposite their respective names at the pleasure of the Board of Directors in the offices of the Corporation indicated in accordance with the Bylaws of the Corporation and until their respective successors have been elected and shall have qualified.

**RESOLVED:** That the proper officers be, and each individually hereby is, authorized for and on behalf of the Corporation to sign any and all additional documents and to take any and all further action as may be necessary to carry out any of the actions approved by this consent and to execute and file in the proper public offices and all forms, reports, returns and certificates that now are, or may hereafter be required of the Corporation and that said officers are or shall be required to make on its behalf.

**RESOLVED:** That a copy of this unanimous written consent be filed with the minutes of proceedings of the Corporation.

This unanimous written consent may be signed in counterparts, any of which may be signed by facsimile. The originally executed document shall be forwarded thereafter to the Corporation.

**IN WITNESS WHEREOF**, the undersigned have executed this action by unanimous written consent as of the 3<sup>rd</sup> day of January 2025.

*Michael J. Buoncore*

\_\_\_\_\_  
Michael J. Buoncore, Director & Chairman

*Steve Greenman*  
\_\_\_\_\_  
Steve Greenman (Jan 3, 2025 10:27 EST)

\_\_\_\_\_  
Steven B. Greenman, Director

*Louis A. Norella III*

\_\_\_\_\_  
Louis A. Norella III, Director

<u>Org</u>	<u>Emp ID</u>	<u>Name</u>	<u>2025 Officer Designation</u>	<u>Action</u>	<u>Reason</u>
UE:25	13797	Griffin, Kenneth	1-President		
GP:90	1794	Hough, Robert	2-Executive Vice President	Addition	Replace Buoncore
UE:25	3829	Walcheski, Robert J.	3-Senior Vice President		
UE:25	11848	O'Connor, Jeffrey	4-Vice President		
UE:25	3821	Rogers, Alton	4-Vice President		
UE:25	3043	Ortiz, Bernadette	4-Vice President		
UE:25	11299	Connelly, Andrew	4-Vice President		
UE:25	3914	Herold, Matthew	5-Assistant Vice President	Addition	
UE:25	15337	Hess, Diana	5-Assistant Vice President	Addition	

## Underwater Engineering Services, Inc.

### Removal

Charlie Vallance – Retired

Randal Bazemore - Retired

### Nomination

Robert Hough - EVP – Bob is replacing Mike and needs to be able to sign bank and legal documents on behalf of UESI.

Matthew Herold, AVP – Promoted to the role of Operations Manager. Matt is the single conduit between management and the field staff. He is responsible for the health and well being of our crews, job assignments, field guidance and expertise , training requests, project scheduling and employee mentorship. Matt directly manages a significant amount of our personnel and controls a large budget.

Diana Hess, AVP - Diana was hired this year to replace the departed Jason Ogilvie as the Quality Assurance Manager. She leads a crucial department in our organization and directly interfaces with clients and internal staff. She brings with her a tremendous resume, with an impressive formal education and significant field experience. As time progresses, I would envision Diana to move into our VP Role of Technical Expert once Bob Walcheski decides to retire or reduce his role at UESI.

**Request for Taxpayer  
Identification Number and Certification**  
Go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9) for instructions and the latest information.

Give form to the  
requester. Do not  
send to the IRS.

**Before you begin.** For guidance related to the purpose of Form W-9, see *Purpose of Form*, below.

<b>Print or type. See Specific Instructions on page 3.</b>	<b>1</b> Name of entity/individual. An entry is required. (For a sole proprietor or disregarded entity, enter the owner's name on line 1, and enter the business/disregarded entity's name on line 2.) <b>Underwater Engineering Services, Inc.</b>	
	<b>2</b> Business name/disregarded entity name, if different from above.	
	<b>3a</b> Check the appropriate box for federal tax classification of the entity/individual whose name is entered on line 1. Check only one of the following seven boxes. <input type="checkbox"/> Individual/sole proprietor <input type="checkbox"/> C corporation <input checked="" type="checkbox"/> S corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate <input type="checkbox"/> LLC. Enter the tax classification (C = C corporation, S = S corporation, P = Partnership) _____ <b>Note:</b> Check the "LLC" box above and, in the entry space, enter the appropriate code (C, S, or P) for the tax classification of the LLC, unless it is a disregarded entity. A disregarded entity should instead check the appropriate box for the tax classification of its owner. <input type="checkbox"/> Other (see instructions) _____	<b>4</b> Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from Foreign Account Tax Compliance Act (FATCA) reporting code (if any) _____  <i>(Applies to accounts maintained outside the United States.)</i>
	<b>3b</b> If on line 3a you checked "Partnership" or "Trust/estate," or checked "LLC" and entered "P" as its tax classification, and you are providing this form to a partnership, trust, or estate in which you have an ownership interest, check this box if you have any foreign partners, owners, or beneficiaries. See instructions _____ <input type="checkbox"/>	
	<b>5</b> Address (number, street, and apt. or suite no.). See instructions. <b>3306 Enterprise Road</b>	Requester's name and address (optional)
	<b>6</b> City, state, and ZIP code <b>Fort Pierce, FL 34982</b>	
	<b>7</b> List account number(s) here (optional)	

**Part I Taxpayer Identification Number (TIN)**

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

**Note:** If the account is in more than one name, see the instructions for line 1. See also *What Name and Number To Give the Requester* for guidelines on whose number to enter.

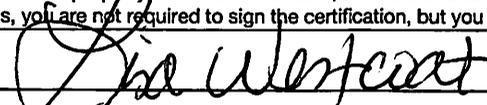
<b>Social security number</b>									
				-			-		
<b>or</b>									
<b>Employer identification number</b>									
5	9	-	2	4	0	5	3	7	5

**Part II Certification**

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person (defined below); and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

**Certification instructions.** You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and, generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

<b>Sign Here</b>	Signature of U.S. person 	Date 1/1/2026
------------------	---	------------------

**General Instructions**

Section references are to the Internal Revenue Code unless otherwise noted.

**Future developments.** For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9).

**What's New**

Line 3a has been modified to clarify how a disregarded entity completes this line. An LLC that is a disregarded entity should check the appropriate box for the tax classification of its owner. Otherwise, it should check the "LLC" box and enter its appropriate tax classification.

**Purpose of Form**

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS is giving you this form because they

New line 3b has been added to this form. A flow-through entity is required to complete this line to indicate that it has direct or indirect foreign partners, owners, or beneficiaries when it provides the Form W-9 to another flow-through entity in which it has an ownership interest. This change is intended to provide a flow-through entity with information regarding the status of its indirect foreign partners, owners, or beneficiaries, so that it can satisfy any applicable reporting requirements. For example, a partnership that has any indirect foreign partners may be required to complete Schedules K-2 and K-3. See the Partnership Instructions for Schedules K-2 and K-3 (Form 1065).

**From:** noreply@civicplus.com  
**Sent:** Monday, October 6, 2025 1:02 PM  
**To:** Lisa Westcoat  
**Subject:** Online Form Submittal: Licensed Contractor Registration Form

Licensed Contractor Registration Form

**DEPT. OF BUSINESS &  
PROFESSIONAL REGULATION (DBPR) LICENSED  
CONTRACTOR  
REGISTRATION**

---

**CITY OF KEY WEST  
BUILDING DEPARTMENT  
P.O. BOX 1409  
KEY WEST, FL 33040**

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(Section Break)

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Per Florida Statute 489.119(5)(c)

*If a vehicle bears the name of a contractor or business organization, or any text or artwork which would lead a reasonable person to believe that the vehicle is used for contracting, the registration or certification number of the contractor must be conspicuously and legibly displayed with the name, text, or artwork. Local governments may also require that locally licensed contractors must also display their certificate of competency or license numbers. Nothing in this paragraph shall be construed to create a mandatory vehicle signage requirement.*

---

Date: 10/6/2025

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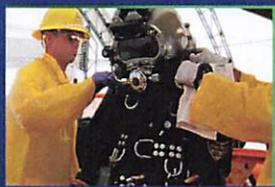
Business Name: Underwater Engineering Services Inc.

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<b>Qualifier Name:</b>	Steve Greenman
<b>Business Address:</b>	3306 Enterprise Road
<b>City</b>	Fort Pierce
<b>State</b>	FL
<b>Zip Code</b>	34982
<b>Business Phone Number:</b>	7723373116
<b>Mobile Number:</b>	7723701368
<b>E-mail:</b>	lwestcoat@uesi.com
<b>Select which applies:</b>	General Contractor
<b>Attached either Workers' Comp (WC) Insurance or WC Exemption:</b>	City of Key West_Underwater Engineering Services, In_24-25 UNDERWATER ENGINE_10-6-2025_1056449041.pdf
<b>Attach Copies of Business Tax Receipts from Local Jurisdiction:</b>	St Lucie County Tax Receipt 092025.pdf
<b>Attach Copies of Liability Insurance:</b>	City of Key West_Underwater Engineering Services, In_24-25 UNDERWATER ENGINE_10-6-2025_1056449041_1.pdf
<b>Attach Copies of DBPR State License</b>	UESI General Contractor- exp 083126.pdf
<b>Electronic Signature</b>	I agree

(Section Break)

# Section 4 Safety Plan/Dive Operations Plan



# Dive Operations Plan

Prepared by:  
Underwater Engineering Services, Inc.  
3306 Enterprise Road  
Fort Pierce, FL, 34982

Submitted to:  
City of Key West  
US Navy

Dated: 02/8/2026

Project Name: Navy Mole Pier Seawall Repair

In accordance with current revisions & regulations contained under:

- 29 CFR Parts 1910 & 1926 – OSHA
- 46 CFR part 197, subpart B – USCG
- USACE EM-385-1-1
- ADCI Consensus Standards
- UESI Safety Program

**SAJ-DDC Approval:** \_\_\_\_\_

**SAJ-DSI Approval:** \_\_\_\_\_

If for any reason the dive plan is altered in mission, depth, personnel, or equipment, the DDC must be contacted to review and accept the alteration prior to actual operation.

# Table of Contents

1.	Date Prepared (Month / Day / Year):.....	1
2.	Planner / Contact Info: .....	1
3.	Dive Platform:.....	1
4.	Date(s) of Dive:.....	1
5.	Planned Start / End Time(s).....	1
6.	Expected Project Duration: .....	1
7.	Project Location:.....	1
8.	Anticipated Surface Conditions:.....	1
9.	Visibility (ft) .....	1
10.	Current (kn) .....	1
11.	Water Temp (°f).....	1
12.	Anticipated Max Depth (fsw): .....	1
13.	Max Bottom Time (min) .....	1
13.	Name and Duties of Dive Team Members .....	1
14.	Dive mode & list of dive equipment to be used:.....	1
15.	Detailed description of work to be performed / how work will be accomplished. ....	2
16.	Work to be performed by divers .....	2
17.	Tools and material to be handled and installed.....	2
18.	Topside assistance to support dive team (cranes, equipment, lock operator, etc.).....	2
19.	Emergency Management Plan .....	3
20.	Emergency Contacts.....	5
21.	Project Contacts .....	5
22.	Site Equipment List (non-diving specific) .....	5
23.	Attachments .....	5
	Attachment A (Activity Hazard Analysis).....	6
	Attachment B (Employee Certifications and Dive Logs).....	7
	Attachment C (Equipment Certs) .....	<b>Error! Bookmark not defined.</b>
	Attachment D (UESI Dive Safety Manual and Forms) .....	9
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1. Date Prepared (Month / Day / Year): .....2/08/2026
2. Planner / Contact Info: ..... Alex Kraeger /akraeger@uesi.com (772) 485-5003
3. Dive Platform: ..... Dive Trailer
4. Date(s) of Dive:.....(exact dates TBD)
5. Planned Start / End Time(s)..... 0700-1800
6. Expected Project Duration: ..... 80 Days
7. Project Location: .....Navy Mole Pier, Key West, FL 33040
8. Anticipated Surface Conditions:..... Varies (0-1 foot chop)
9. Visibility (ft) 0-10 10. Current (kn) 0 11. Water Temp (°f) 75-85
12. Anticipated Max Depth (fsw): <30 13. Max Bottom Time (min) 461 / Unlimited

Altitude adjustments will be made for altitudes above 1000' (304.8m) above sea level (per US Navy Dive Tables).

**13. Name and Duties of Dive Team Members**

NAME	Supervisor	Diver	Tender
Jeremiah Duncan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Matt Herold (alternate DS 1)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steve Lano	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Brian Kilburn	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conner Hetland	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Chandler Price	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Misael Pastrana	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**14. Dive mode & list of dive equipment to be used:**

Mode & Method: Surface supplied air (SSA), standard air / no decompression (no D).

The air system consists of an air compressor plumbed to a volume tank with filters or high-pressure air bank. Air supply is sent to a manifold where it's delivered to the diver through an approved breathing air hose that's married into an umbilical. Topside HP (e-air) and diver carried backup air (EGS or "bailout") will be of sufficient supply to allow the diver(s) to safely exit the water.

**DIVE EQUIPMENT LIST:**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Quincy 325 air compressor</li> <li>2. Volume Tank &amp; Air Filters</li> <li>3. High Pressure E-Air Bottles</li> <li>4. Air manifold (rack)</li> <li>5. Pneumofathometer (depth gauge)</li> <li>6. 2 x Dive Umbilical (one w/ video)</li> </ol> | <ol style="list-style-type: none"> <li>7. Kirby Morgan Diving Helmet</li> <li>8. Low Pressure Alarm</li> <li>9. Carbon Monoxide Monitor</li> <li>10. Dive Radio / Hardwire Comms</li> <li>11. Diver Carried Emergency Air</li> </ol> |
|---|--|

**15. Detailed description of work to be performed / how work will be accomplished.**

Clean and inspect sensors on lock gates.

The dive team will launch the dive boat from closest accessible boat ramp, travel to the lock, and set up dive station. The dive supervisor, diver and standby diver will meet with the lock attendant and go over the safety requirements for the work being performed. The locks will be adjusted to allow for the dive team to safely perform work. The lock gates will be adjusted to allow safest practical access for dive work to be performed, system will be locked/tagged out prior to dive boat approaching the work location. The dive boat will be secured to the work location and a pressure washer set up. The dive team will perform pre-dive checks and pre-dive brief.

The primary diver will enter the water from the ladder and crossover directly to the structure to perform an as-found inspection of the manatee screens attached to the lock gates. The diver will pressure clean the screens and structure as needed. The diver will cut away any damaged or degraded screen and tie wraps. The diver will measure the repair area to size out the repair area. Topside support will cut the screen sections to fit over the area and allow sufficient overlap of the existing serviceable material. The screen sections will be pre-cut, field fit, then secured with industrial heavy gauge tie wraps in combination with appropriate hardware. The diver will trim, and tie wrap any excess material to ensure the edges do not present any hazards of entrapment or snags during operational use. The radio operator will document the findings and repairs. The dive team will sign off the clearance after all maintenance has been complete. This process will be repeated until all maintenance is complete on all required gates.

The team will demobilize the equipment.

All inspections and repairs will be documented, video recorded and submitted as required.

The dive logs for all dives will be furnished to the USACE District Dive Coordinator every day, at end of shift.

**16. Work to be performed by divers.**

1. Perform as found inspection of manatee screens attached to lock gates
2. Pressure clean manatee screens and components as needed to perform inspections and repairs.
3. Perform visual / video inspection of manatee screen systems attached to the lock gates.
4. Perform repairs on manatee screens attached to lock gates.
5. Perform video inspection of any repairs made to manatee screens attached to lock gates.

**17. Tools and material to be handled and installed.**

- |                               |                                     |
|-------------------------------|-------------------------------------|
| 1. 5K Pressure Cleaner        | 5. Welder/burning equipment         |
| 2. Measuring tape             | 6. Video camera (mounted on helmet) |
| 3. Misc. hand tools           | 7. Steel plate materials            |
| 4. Grout Pump/ Pump equipment | 8. 3K-5K telehandler                |
|                               | 9. Mini-Excavator                   |

**18. Topside assistance to support dive team (cranes, equipment, etc.)**

Equipment operator for handling materials to dive team.

Top side crew to assist with dive team, electrician, pump crew.

## 19. Emergency Management Plan

**Primary site communications to EMS:** Cell Phone

**Medical Evacuation Area:** Navy Mole Pier Boat Ramp

**Site Specific Instructions:**

1. Ensure scene is safe and activate Emergency Management Plan.
2. Remove diver from water and remove gear, assess diver's condition. If it is a medical emergency, contact EMS.  
**If ambulatory**, transport to Navy Mole Pier Boat Ramp. (see map below).
3. Provide care as trained until their condition stabilizes, emergency medical support relieves the rescue effort, or the area becomes unsafe and need to move the injured person. Continue care when conditions are safe.
4. If the injury is dive related and requires decompression, call local emergency services first then contact Divers Alert Network. Follow ambulatory instructions if the diver is ambulatory.

**Map: Reference Location ambulatory person**



**Reference Section 17.0 in the UESI Diving Safety Manual for additional guidance on dive related emergencies.**

**Emergency Equipment:** Stokes Litter / ANSI – ADCI Class 2 First Aid Kit w/ BVM / 30min+ Emergency Oxygen Supply

### Closest Hospital:

#### Lower Florida Keys Medical Center

5900 W College Road, Key West, FL 33040

### Directions to Lower Florida Keys Medical Center from Navy Mole Pier

← from Key West, Florida 33040  
to Lower Florida Keys Medical Center: Yergen C...

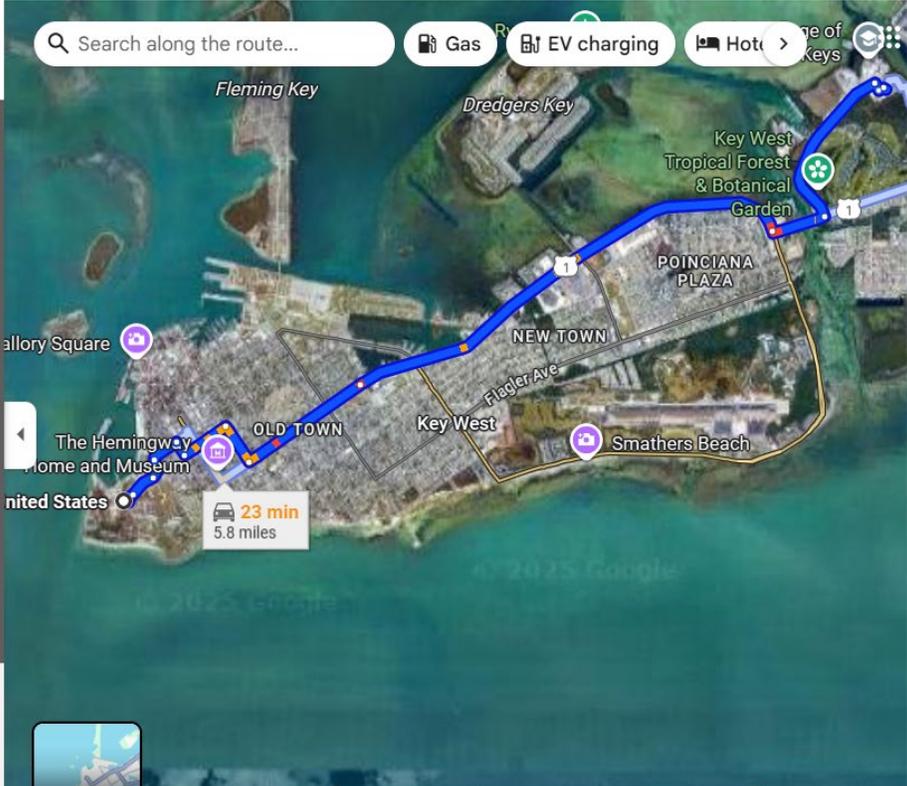
**22 min (5.8 miles)**   

via U.S. Rte 1  
Fastest route now due to traffic conditions

**Key West**  
Florida 33040

- > Take Angela St/Quay Rd, Southard St, Angela St and Simonton St to Truman Ave  
7 min (1.1 mi)
- > Take U.S. Rte 1 to College Rd in Stock Island  
11 min (3.7 mi)
- > Follow College Rd to your destination in Key West  
3 min (1.0 mi)

**Lower Florida Keys Medical Center: Yergen Cara M MD**  
5900 College Rd, Key West, FL 33040



### Closest Hyperbaric Chamber:

#### Lower Florida Keys Medical Center

5900 W College Road, Key West, FL 33040

20. Emergency Contacts

Primary Contact: Fire Department Phone Number: 911  
Nearest Hospital: Lower Florida Keys Medical Center Phone Number: (305) 294-5531  
Hospital Address: 5900 W College Road, Key West, FL 33040  
Nearest Chamber: Lower Florida Keys Medical Center Phone Number: (305) 294-5531  
Chamber Address: 5900 W College Road, Key West, FL 33040  
Divers Alert Network DAN Emergency (after 911) Phone Number: (919) 684-9111

21. Project Contacts

Cellular phones will be the primary means of contact between the dive site, project office / personnel, and the lockmaster/operator.

VHF radio will be a secondary means of contact between the dive crew and lockmaster/operator.

Site Contact: TBD Phone Number: \_\_\_\_\_ Marine VHF: Channel 13  
US NAVY COR (POC) TBD Phone Number: \_\_\_\_\_  
US NAVY DSI TBD Phone Number: \_\_\_\_\_  
US NAVY DDC TBD Phone Number: \_\_\_\_\_  
UESI (Dive Supervisor) Jeremiah Duncan Phone Number: 772-971-9138  
UESI (DS alternate 1) Matt Herold Phone Number: 772-834-7059  
City of Key West \_\_\_\_\_ Phone Number: \_\_\_\_\_

22. Site Equipment List (non-diving specific)

Padlocks for Lockout/Tagout

23. Attachments

Attachment A: Activity Hazard Analysis  
Attachment B: Employee Certifications  
Attachment C: UESI Dive Safety Manual and Forms  
Attachment D: 29 CFR Part 1910, Subpart T / Commercial Diving Ops  
Attachment E: \_\_\_\_\_

# Attachment A

## (Activity Hazard Analysis)



# Activity Hazard Analysis (AHA)

<b>Project Information</b>	Overall Risk Assessment Code (RAC) (Use highest code)					<b>M</b>
Contract Number# ITB No. 25-018	<b>Risk Assessment Code (RAC) Matrix</b>					
Customer: City of Key West	<b>Severity</b>	<b>Probability</b>				
Activity: Repairs to existing seawall		Frequent	Likely	Occasional	Seldom	Unlikely
Project Location: Navy Mole Pier, Key West, FL 33040	Catastrophic	E	E	H	H	M
Date Prepared: 02/08/2026	Critical	E	H	H	M	L
Prepared by: Alex Kraeger / UESI Safety Manager	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L
Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)						
"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.					<b>RAC Chart</b>	
"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible					<b>E = Extremely High Risk</b>	
Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					<b>H = High Risk</b>	
					<b>M = Moderate Risk</b>	
					<b>L = Low Risk</b>	



Job Steps	Hazards	Controls	RAC
1. Mobilize & Setup <i>Continues through all activities.</i>	Head, hand, eye, & foot injuries	All personnel shall wear hard hat, safety glasses and protective toe boots and reflective vests.	<b>M</b>
	Drowning	Coast Guard Approved Type I, II, III or Type V Personal Flotation Devices (PFDs) must be worn when there is a possibility of falling into water. Ring Life Buoys (Type IV - throw rings) with 60ft of 3/8in line attached must be readily available for each group working around the water. A ladder or a means of self-rescue must be established and installed prior to any other activities where exposure to drowning could occur.	<b>M</b>
	Abrasion, Cuts & Soft Tissue Injury	CPR and first aid training must be current for all dive personnel. A properly stocked first aid kit will be onsite. :30 min (minimum) O2 supply will be available for emergency use.	<b>L</b>
	Heat Stress & Dehydration	Cool potable water must be available. Utilize shade as much as possible. Wear light color clothing and apply sunscreen on exposed skin. Take breaks when needed. Report symptoms of heat stress immediately.	<b>M</b>
	Cross-contamination (work and food particulates)	Restrooms and sanitation facilities will be available for onsite personnel.	<b>L</b>
	Vehicle / Vessel struck by or caught between	Construction limits must be appropriately marked and barricaded as necessary. Employees must wear a class 2 or higher reflective vest when working near vehicles and equipment. Use spotters when moving equipment / vehicles with restricted or blocked view. Identify walk paths and construction limits to keep workers out of hazardous areas.	<b>M</b>



Job Steps	Hazards	Controls	RAC
1. Mobilize & Setup <i>Continues through all activities.</i>	Shock Hazards / Electrocution Hazards	Prior to use, all equipment must be inspected including cords and tools. All hand tools that require electricity must be double insulated or properly grounded. GFCIs must be used at the power source. Existing power lines must be identified as a potential overhead hazard during any activities within their vicinity.	<b>M</b>
	Environmental Hazards	All material must be properly disposed of. All non-hazardous materials must be stored in an organized and safe manner. Adequate spill kits shall on site and readily available. Spills shall be reported and cleaned up immediately.	<b>L</b>
	Back Strain / Manual Lifting	Practice good manual lifting techniques. Ensure pathways are clear and use spotters. Verbally communicate intentions. Verify path and landing areas prior to lifting and moving material and equipment. Ensure good handholds are available. Always use mechanical means of moving heavy items when available and practical.	<b>L</b>
	Elevated noise levels / hearing loss	Hearing protection is required when working around equipment or performing tasks that produce noise levels above 90db.	<b>L</b>
	Biological hazards from insect stings, snake bites, etc.	Check area for insects and wildlife. Do not place dive hat, wetsuits, etc. directly on the ground. Check inside boots, hats and suits prior to diver dressing out. If stung or bit, report at once, declare known allergies, treat with first aid and seek professional rescue if difficulty breathing is associated.	<b>M</b>
	Aggressive Wildlife	Have an authorized wildlife trapper on site when appropriate. Report any nuisance potentially dangerous wildlife and do not approach.	<b>M</b>



Job Steps	Hazards	Controls	RAC
1. Mobilize / Setup <i>Continues through all activities</i>	Burns & Fire Hazard	Allow equipment to cool down before refueling and refuel between dives. Do not place equipment around exhaust and properly store flammable chemicals. Perform housekeeping regularly to prevent trip hazards. Have fire extinguisher ready when operating internal combustion engines. Clean up any spills right away.	<b>M</b>
	Unplanned release of energy and differential pressure	Inspect the area for potential energy sources. Any equipment must be locked out and tagged prior to dive operations. Any differential pressure must be equalized prior to dive ops.	<b>M</b>
	Inclement Weather and Lightning	If inclement weather conditions are expected, visually monitor the weather for signs of lightning and building storms. Utilize electronic monitoring and/or weather apps when available. All diving activities shall stop if lightning is within 10 miles, wind conditions or sea states are unsafe, or if conditions restrict the ability to communicate or visually monitor the overall safety of the worksite. Personnel shall place the task in a safe condition, secure necessary equipment and seek suitable shelter during inclement weather.	<b>M</b>
2. Dive Operations / General	Slips, trips, & falls	Inspect area for safest practical access. Inspect clean and secure ladders before use.	<b>M</b>
	Sharp Objects	Use caution when approaching any unknown structures. Be aware of loose boards, degrading conditions, fishing line and hooks, broken glass, etc. Use appropriate PPE.	<b>M</b>
	Motorized Vessel(s)	Keep diver and tools within construction limits. Display proper signage and flags to signal diver down. Have signal device, such as horns and radios, to warn approaching boaters.	<b>M</b>
	Carbon Monoxide	Use calibrated detector to monitor CO. Move dive compressor intakes upwind of exhaust. Direct exhaust away from intakes and employees.	<b>M</b>



Job Steps	Hazards	Controls	RAC
2. Dive Operations / General (cont.)	Diver breathing hose fouling, entanglement, or damage.	Dive umbilical management. The tender must assist by continuously tending the diver and not letting too much slack in the water. Keep additional lines scoped away from dive hoses.	<b>M</b>
	Loss of air pressure or contamination of main air supply	Surface supplied ("e-air) and diver carried ("bailout bottle") high pressure emergency backup air must be enough to allow diver(s) to escape safely to the entry/exit point. When using a dive compressor, and a potential for carbon monoxide contamination is present, CO monitors shall be in use and calibrated. If air contamination becomes an issue, controls to prevent reoccurrence must be in place prior to resuming dive operations. Consider other activities in the area and protect the intake from fumes, gases, or potential contamination.	<b>M</b>
	Loss of Communications	Switch to line pull signals and terminate dive. Reestablish communications prior to resuming dive operations.	<b>M</b>
	Dive Related Disorders (AEG / DCS)	Divers must be fit to dive (existing injuries or illness, medications, hydration, or anything that will affect their health during or after the dive). Follow dive plan and dive tables. Do not exceeded ascent rate of more than 30 feet per minute. If needed, use a down line for the diver to control ascent and rest on. No planned decompression diving is allowed for this project.	<b>M</b>
	Unexpected conditions or significant change of scope	If unexpected conditions exist or arise, creating additional hazards, terminate dive and re-brief on task and conditions. Notify project owner / site representative and proceed only if hazards are controlled and conditions are acceptable.	<b>M</b>



Job Steps	Hazards	Controls	RAC
3. Clean & Inspect Seawall	Caught Between	Follow Lockout / Tagout procedures	<b>M</b>
	High Pressure Water / Injection Wounds / Debris generating at surface	Heavy duty chemical gloves provide sufficient hand protection to protect against injection injury. The pressure cleaner shall only be activated (made hot) when the diver calls for it to be energized. The diver must maintain good hand and foot placement during cleaning activities. All personnel must stay out of the pressure cleaning area and wear proper PPE in the work area. The diver must always be aware of the nozzle direction.	<b>M</b>
4. Perform repairs as needed to seawall	Sharp objects	Propper PPE (gloves), hand placement and stability while using tools. Use the right tools for the task.	<b>L</b>
5. Demobilize	This step has the same hazards as described in Step 1 / Mobilize	This step utilizes the same controls as described in Step 1 / Mobilize	<b>M</b>



Equipment to be Used	Training Requirements	Inspection Requirements
Surface supplied commercial dive equipment	Certified through accredited commercial dive school or US military diver training	All gear must be inspected pre and post dive ops. Dive compressors used for breathing are tested to Grade E breathing air standards. Annual and biannual maintenance is performed on all life support equipment.
5K Pressure Washer	On job training and authorization	Pre-use inspection required
Welding/Burning Equipment	On job training and authorization	Pre-use inspection required Prevent electrical shock



# Attachment B (Employee Certifications)



RESUME

**MATTHEW HEROLD**

PROJECT MANAGER / DIVE SUPERVISOR

EDUCATION: Dive Lab/Kirby Morgan Certified Helmet Technician 2004  
Diver's Academy of the Eastern Seaboard 1995  
University of Connecticut 1994

CERTIFICATIONS:

ADC Surface-Supplied Air Diving Supervisor  
ACDE/ANSI Commercial Diver  
First Aid, CPR, Emergency Oxygen and Bloodborne Pathogens  
OQSG Underwater Pipeline Repair Activities  
Procure Safety Qualified: Confined Spaces  
FSO/Cylinder Hazmat Handler  
NDT/UT Level 1  
OSHA 30 Hour  
Rigging  
TWIC

SKILLS:

Intake Inspection & Maintenance, Traveling Water Screen Inspection and underwater repair, Cutting and Welding, Core Sampling, Timber Work, Equipment Operator, Chamber Operator, Boat Handler, Pile Jacketing, Concrete Forming, Rigging, Contaminated Water Diving, Equipment Maintenance, Video Inspections.

EXPERIENCE:

**UNDERWATER ENGINEERING SERVICES, INC.** 2008-Present

*Project Manager / Dive Supervisor*

Be fully cognizant of all relevant governmental regulatory agency regulations that apply to the diving operation and the diving mode employed, and the employer's basic safe practices/operations manual; see that all rules and regulations are followed; have adequate knowledge, training and familiarization with all life-support and ancillary equipment designated to the diving operations; while on duty, be in immediate control and available to implement emergency procedures; ensure prior to commencing a diving operation, in addition to parties directly involved in the diving operation, that masters of craft, pilots of submersibles, harbor masters, managers of offshore installations, pipelines, civil engineering sites, inland waterways, and all persons responsible for anything that affects the diving operation are advised that diving or underwater operations are to be undertaken; ensure diving operations are carried out from a suitable and safe location on the surface; develop or modify and produce pre- and post-dive checklists for the operation; develop and implement emergency/contingency procedures; be aware of the procedures to follow to obtain medical support in the event of an accident, either diving or non-diving related; ensure a two-way communication system is available at the dive location to obtain emergency assistance; facilitate a Job Hazard Analysis for each task undertaken; establish a dive plan ensuring that sufficient breathing mixtures, supplies and proper equipment are available for safe and timely completion of the job task; assign the duties of all members of the dive team and personally direct them throughout the diving operation; personally inquire if all personnel on the dive team are qualified and physically able to perform tasks assigned; maintain a depth bottom time and breathing mix profile at the dive location for each diver during the

dive; ensure that each diver is continuously tended while in the water; ensure the dive is terminated when diver requests termination, fails to respond to communication or communication is lost between the diver and dive team members at the dive location, communication is lost between the vessel operator and the diving supervisor during live boating operations, diver begins to use his or her diver-carried reserve breathing gas supply, and weather or site conditions are degrading to the extent that diver safety may be compromised; ensure after every dive that the physical condition and wellbeing of the diver is checked by visual observation and verbal questioning, maintain and submit reports required by employer and relevant governmental regulations concerning diving operations and equipment maintenance, testing or repair, and view and ensure accuracy of diver's personal logbook and affix signature to properly record activities; maintain a supervisor's logbook that details all dives and medical treatment supervised. \*

**UNDERWATER CONSTRUCTION CORP.** 2001-2007

*Dive Supervisor*

Responsible for numerous hydro-electric, fossil and nuclear power plant Intake / Discharge System maintenance, inspection and repair projects with the Tennessee Valley Authority.

**DIVERSIFIED THERAPY** 2004-2005

*Hyperbaric Technician*

Responsible for patient orientation, chamber maintenance and daily chamber operations in a clinical wound care setting.

**ASSOCIATED MARINE SALVAGE** 2004-2005

*Diver / Salvor*

Numerous salvage projects including the salvage and refloat of the 100' Ivanna, and 100' Discovery as well as numerous smaller vessels sunk during the 2004 hurricane season.

**RESOLVE MARINE GROUP** 2000-2008

*Lead Diver / Diver Supervisor / Salvor*

Responsible for salvage, heavy rigging, pipeline installation, large scale underwater burning and fuel removal from sunken vessels. Specific projects include: fuel lightering and wreck removal of the 150' freighter Mary Star of the Seas, Historic wreck removal during harbor clearing in San Juan Puerto Rico, Trailer Bridge triple decker barge refloat, Oil/ Fuel removal and Salvage of the BORCO oil transfer platform in Freeport Bahamas, Raising of the 150' sail vessel Zues with delivery to dry dock. Salvage of Dry Dock – Port of Tampa.

**SPEARIN, PRESTON AND BURROWS** 1998-2000

*Diver / Tender / Dock Builder*

Responsible for underwater and topside concrete forming, pile jacketing, plumb posting, dock- building and pile diving.

**DRAKE ASSOCIATES** 1998-2000

*Lead Diver*

Responsible for 24-hour emergency haz-mat response, submarine cable location and repair. Responsibilities also included pre-construction inspections and QA/QC inspections.

**BOSWELL ENGINEERING** 1998-1999

*Diver Inspector*

Responsible for level II and III underwater inspections in and around New York City area.

**MVN** 1999

*Diver*

Responsible for steam system blown down repair, oil spill containment and environmental clean up with duties including: cutting, welding, rigging, pipe installations, concrete forming, coring and epoxy injection crack repair.

**ADVANCED ENGINEERING** 1997-1998

*Dive Supervisor*

Responsible for level II inspections and boat operations in the New York City Area

**AQUATECH** 1996-1997

*Diver*

Responsible for pile jacketing and salvage.

\*Specific project experience can be obtained upon request.

DIVERS ACADEMY OF EASTERN SEABOARD INC.

2300 SOUTH BROADWAY • CANON, NEW JERSEY

100% Attendance

The DIVERS ACADEMY OF EASTERN SEABOARD INC. Presents this Diploma to

Matthew W. Herold

This 28th day of Mar. 1996

Who has demonstrated the skill and proficiency with Deep Sea  
and Helium Diving Equipment to NAAG standards  
NAAG / ACDE 01-1993 to be eligible for graduation  
as a Commercial Deep Sea Diver

DIRECTOR

MASTER DIVER

*J. M. Gray*

*J. Hunt*



**Association of Diving Contractors  
International**



**Cert. # 48806**

**Expires 05/09/2029**



**SURFACE-SUPPLIED AIR DIVING SUPERVISOR**

**MATTHEW HEROLD I.D. H643559760970**

**Commercial Diver Certification Card**



**American Red Cross**  
Training Services

## **Certificate of Completion**

Matthew Herold

has successfully completed requirements for

**Adult First Aid/CPR/AED**

Date Completed: 8/12/2024

Validity Period: 2 Years

Conducted by: Underwater Engineering Services, Inc.



To verify certificate, scan code or visit [redcross.org/digitalcertificate](https://redcross.org/digitalcertificate) and enter ID.

Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



01LB0EC

Oxygen First Aid for  
Scuba Diving Injuries (EO2) **Provider**



Name: Matthew Herold  
Completed: August 12, 2024  
Instructor: Alex Kraeger  
Instructor ID# 91345

Meets ILCOR/AHA 2021 Guidelines  
This person has met or exceeded the performance requirements  
for course completion set by Divers Alert Network.  
Expires two years from completed date.





**American Red Cross**  
Training Services

## **Certificate of Completion**

Matthew Herold

has successfully completed requirements for

**Bloodborne Pathogens Training**

Date Completed: 1/31/2025

Valid Until: 1/31/2026

Conducted by: Underwater Engineering Services, Inc.



To verify certificate, scan code or visit [redcross.org/digitalcertificate](https://redcross.org/digitalcertificate) and enter ID.

Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



01QG1B2



RESUME

**JEREMIAH DUNCAN**

DIVE SUPERVISOR

EDUCATION:

Commercial Diving Academy

2008

CERTIFICATIONS:

ADC Surface-Supplied Air Diving Supervisor  
First Aid, CPR/AED, Emergency Oxygen and Bloodborne Pathogens  
ANSI N45.2.6 Level II Coatings Inspector  
NDE Visual Exam (VT) Level II (VT-1/VT-2/VT-3) Certification to ASNT SNT-TC-1A, CP-189  
FSO/Cylinder Hazmat Handler  
OSHA 30-Hour Construction  
OSHA 10-Hour Construction  
NDT – Level I and II  
Hazwoper  
Rigging  
TWIC

EXPERIENCE:

**UNDERWATER ENGINEERING SERVICES, INC.**

2008-Present

*Dive Supervisor / Diver*

Be fully cognizant of all relevant governmental regulatory agency regulations that apply to the diving operation and the diving mode employed, and the employer's basic safe practices/operations manual; see that all rules and regulations are followed; have adequate knowledge, training and familiarization with all life-support and ancillary equipment designated to the diving operations; while on duty, be in immediate control and available to implement emergency procedures; ensure prior to commencing a diving operation, in addition to parties directly involved in the diving operation, that masters of craft, pilots of submersibles, harbor masters, managers of offshore installations, pipelines, civil engineering sites, inland waterways, and all persons responsible for anything that affects the diving operation are advised that diving or underwater operations are to be undertaken; ensure diving operations are carried out from a suitable and safe location on the surface; develop or modify and produce pre- and post-dive checklists for the operation; develop and implement emergency/contingency procedures; be aware of the procedures to follow to obtain medical support in the event of an accident, either diving or non-diving related; ensure a two-way communication system is available at the dive location to obtain emergency assistance; facilitate a Job Hazard Analysis for each task undertaken; establish a dive plan ensuring that sufficient breathing mixtures, supplies and proper equipment are available for safe and timely completion of the job task; assign the duties of all members of the dive team and personally direct them throughout the diving operation; personally inquire if all personnel on the dive team are qualified and physically able to perform tasks assigned; maintain a depth bottom time and breathing mix profile at the dive location for each diver during the dive; ensure that each diver is continuously tended while in the water; ensure the dive is terminated when diver requests termination, fails to respond to communication or communication is lost between the diver and dive team

members at the dive location, communication is lost between the vessel operator and the diving supervisor during live boating operations, diver begins to use his or her diver-carried reserve breathing gas supply, and weather or site conditions are degrading to the extent that diver safety may be compromised; ensure after every dive that the physical condition and wellbeing of the diver is checked by visual observation and verbal questioning, maintain and submit reports required by employer and relevant governmental regulations concerning diving operations and equipment maintenance, testing or repair, and view and ensure accuracy of diver's personal logbook and affix signature to properly record activities; maintain a supervisor's logbook that details all dives and medical treatment supervised. \*

**U.S. NAVY SEABEES**

2004-2008

\*Specific project experience can be obtained upon request.

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**SPECIFIC NUCLEAR PROJECTS:**

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PLANT	LOCATION	OWNER
● St. Lucie Nuclear	Jensen Beach, FL	Florida Power & Light
● Turkey Point Nuclear Plant	Homestead, FL	Florida Power & Light
● Columbia Station	Richland, WA	Energy Northwest
● Oconee Nuclear Station	Seneca, SC	Duke Energy
● Susquehanna Nuclear Station	Susquehanna, PA	Talen Energy
● Farley	Columbia, AL	Alabama Power
● Plant Hatch	Baxley, GA	Georgia Power Company
● Byron Station	Byron, IL	Constellation/Exelon
● Seabrook Station	Seabrook, NH	NextEra Energy
● Duane Arnold Energy Center	Palo, IA	NextEra Energy

# Commercial Diving Academy

This is to certify that

**Jeremiah Duncan**

Having satisfactorily completed the course of study  
and having complied with all other requirements of the Academy in  
Jacksonville, Florida on this 26th Day of September 2008

# Diploma

With all the honors, rights, privileges and obligations pertaining to

**Air/Mixed Gas Commercial Diver**



  
FOUNDER/CEO

  
DIRECTOR OF EDUCATION



# Association of Diving Contractors International



**Cert. # 60292**

**Expires 12/20/2029**



**SURFACE-SUPPLIED AIR DIVING SUPERVISOR**

**JEREMIAH WADE DUNCAN I.D. A22425754**

**Commercial Diver Certification Card**



**American Red Cross**  
Training Services

## **Certificate of Completion**

Jeremiah Duncan

has successfully completed requirements for

**Adult First Aid/CPR/AED**

Date Completed: 8/23/2024

Validity Period: 2 Years

Conducted by: Underwater Engineering Services, Inc.



To verify certificate, scan code or visit [redcross.org/digitalcertificate](https://redcross.org/digitalcertificate) and enter ID.

Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



01LTH20



**American Red Cross**  
Training Services

## **Certificate of Completion**

Jeremiah Duncan

has successfully completed requirements for

**Bloodborne Pathogens Training**

Date Completed: 8/8/2025

Valid Until: 8/8/2026

Conducted by: Underwater Engineering Services, Inc.



To verify certificate, scan code or visit [redcross.org/digitalcertificate](https://redcross.org/digitalcertificate) and enter ID.

Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



021E9CJ

Oxygen First Aid for  
Scuba Diving Injuries (EO2) Provider



Name: Jeremiah Duncan  
Completed: August 26, 2024  
Instructor: Alex Kraeger  
Instructor ID# 91345

Meets ILCOR/AHA 2021 Guidelines  
This person has met or exceeded the performance requirements  
for course completion set by Divers Alert Network.  
Expires two years from completed date.





RESUME

**STEVE LANO**

DIVE SUPERVISOR

EDUCATION:

Inland Commercial Diver Training Center

2001

CERTIFICATIONS:

ADC Surface-Supplied Air Diving Supervisor

First Aid, CPR/AED, Emergency Oxygen and Bloodborne Pathogens

OSHA 30-Hour Construction

TWIC

Living Shoreline for Marine Contractors UF/IFAS

EXPERIENCE:

**UNDERWATER ENGINEERING SERVICES, INC.**

2008-Present

*Dive Supervisor / Diver*

Be fully cognizant of all relevant governmental regulatory agency regulations that apply to the diving operation and the diving mode employed, and the employer's basic safe practices/operations manual; see that all rules and regulations are followed; have adequate knowledge, training and familiarization with all life-support and ancillary equipment designated to the diving operations; while on duty, be in immediate control and available to implement emergency procedures; ensure prior to commencing a diving operation, in addition to parties directly involved in the diving operation, that masters of craft, pilots of submersibles, harbor masters, managers of offshore installations, pipelines, civil engineering sites, inland waterways, and all persons responsible for anything that affects the diving operation are advised that diving or underwater operations are to be undertaken; ensure diving operations are carried out from a suitable and safe location on the surface; develop or modify and produce pre- and post-dive checklists for the operation; develop and implement emergency/contingency procedures; be aware of the procedures to follow to obtain medical support in the event of an accident, either diving or non-diving related; ensure a two-way communication system is available at the dive location to obtain emergency assistance; facilitate a Job Hazard Analysis for each task undertaken; establish a dive plan ensuring that sufficient breathing mixtures, supplies and proper equipment are available for safe and timely completion of the job task; assign the duties of all members of the dive team and personally direct them throughout the diving operation; personally inquire if all personnel on the dive team are qualified and physically able to perform tasks assigned; maintain a depth bottom time and breathing mix profile at the dive location for each diver during the dive; ensure that each diver is continuously tended while in the water; ensure the dive is terminated when diver requests termination, fails to respond to communication or communication is lost between the diver and dive team members at the dive location, communication is lost between the vessel operator and the diving supervisor during live boating operations, diver begins to use his or her diver-carried reserve breathing gas supply, and weather or site conditions are degrading to the extent that diver safety may be compromised; ensure after every dive that the physical condition and wellbeing of the diver is checked by visual observation and verbal questioning, maintain and submit reports required by employer and relevant governmental regulations concerning diving operations and equipment maintenance, testing or repair, and view and ensure accuracy of diver's personal logbook and affix signature to properly record activities; maintain a supervisor's logbook that details all dives and medical treatment supervised. \*

<b>NORTHERN AMERICAN INDUSTRIAL SERVICES</b> <i>Freelance Dive Supervisor/ Diver</i> Inland inspection, dredging, salvage and construction.	2014-2021
<b>TITAN SALVAGE</b> <i>Freelance Commercial Diver</i> Nana Tide salvage project (Italy and West Africa)	2013-2021
<b>CALLAWAY MARINE TECHNOLOGIES</b> <i>Freelance Commercial Dive</i> SFWMD Inspection Program, ROV and marine construction.	2011-2021
<b>SHORELINE FOUNDATION, INC.</b> <i>Freelance Commercial Diver</i> Port of Palm Beach Pier Removal and Restoration project, diving, marine construction and pile driving.	2013-2021
<b>TRITON DIVING SERVICES</b> <i>Diver / Tender</i> Offshore inspection and construction.	2008-2010
<b>SUPERIOR OFFSHORE INTERNATIONAL</b> <i>Commercial Diver</i> Offshore inspection and construction.	2007-2008
<b>TOP COR</b> <i>Commercial Diver</i> Pier restoration, offshore cable installation with Harbor Branch.	2005-2006
<b>PRO DEEP</b> <i>Commercial Diver</i> CP jacket job Skyway Pier South, topside and underwater concrete work, burning and welding, underwater excavation, rigging, small boat handling.	2004-2005
<b>AMERICAN INSHORE DIVERS CORPORATION</b> <i>Commercial Diver</i> Cable location, salvage, underwater excavations and video inspection.	2004
<b>HARBOR OFFSHORE</b> <i>Commercial Diver/Tender</i> Topside, portable safety nets, tending, core drilling and rigging.	2004

- EASTERN MARINE** 2003--2004  
*Diver*  
Light construction and salvage, mooring installation and maintenance, light dredging, small boat handling and boat maintenance.
- S.F.V. IRONWOOD** 2003  
*Mate*
- F.V. APPARITION** 2002-2003  
*Mate*
- NORFOLK TUG** 1999-2000, 2001-2002  
*Tugboat Chief Engineer and Deckhand*  
Responsible for the boats main engines, generators and crew. Diving when required.
- CROFTON DIVING** 2000-2001  
*Commercial Diver*  
Handled marine construction, rigging, pile driving, bulkhead and pier maintenance, small boat handling, burning and welding, ship husbandry, jetting power cables, salvage, bridge inspection and wheel jobs.
- U.S. MARINE CORPS** 1992-1996  
*Corporal E-4*  
Responsible for 25-person squad, combat training and maintenance of facilities and equipment. Honorably discharged.

\*Specific project experience can be obtained upon request.

THE FACULTY AND STAFF OF  
**INLAND COMMERCIAL DIVER  
TRAINING CENTER, INC.**

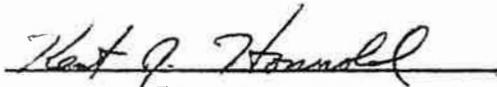
HEREBY ACKNOWLEDGE THAT

**STEVEN G. LANO**

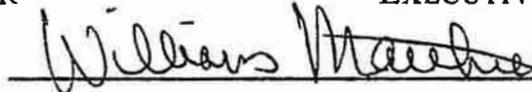
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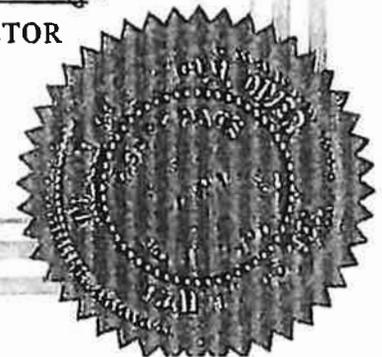
HAS SATISFACTORILY COMPLETED THE REQUIREMENTS FOR THE  
**INLAND COMMERCIAL DIVER/TENDER COURSE**  
WITH THE USE OF SURFACE-SUPPLIED AIR FOR NO-DECOMPRESSION DIVES TO 80  
FEET AND IS HEREBY ADMITTED THE RIGHTS AND PRIVILEGES  
BELONGING TO THAT TRAINING AND ACHIEVEMENT.

MAY 18, 2001

  
INSTRUCTOR

  
EXECUTIVE DIRECTOR/INSTRUCTOR

  
PRESIDENT



**Association of Diving Contractors  
International**



Cert. # 62668

Expires 04/01/2026



**SURFACE-SUPPLIED AIR DIVING SUPERVISOR**  
**STEVEN G. LANO I.D. L500-787-73-386-0**  
Commercial Diver Certification Card



NO. 95601128554

## National Safety Council

# Certificate of Training Completion

This is to certify that

**Steven Lano (ISN-08387026)**

of Underwater Engineering Services, Inc. (400-230102)

has successfully completed all of the  
requirements for the training program

## **Bloodborne Pathogens (BBP) - National Safety Council**

for LMS



Collect. Verify. Connect.

**100**

SCORE

**August 05, 2024**

TRAINING DATE

**August 05, 2025**

TRAINING EXPIRATION

EMPLOYEE SIGNATURE



**American Red Cross**  
Training Services

## **Certificate of Completion**

Steven Lano

has successfully completed requirements for

**Administering Emergency Oxygen**

Date Completed: 2/16/2024

Validity Period: 2 Years

Conducted by: Underwater Engineering Services, Inc.



To verify certificate, scan code or visit [redcross.org/digitalcertificate](https://redcross.org/digitalcertificate) and enter ID.

Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



01FC4G4



**American Red Cross**  
Training Services

## **Certificate of Completion**

Steven Lano

has successfully completed requirements for

**Adult First Aid/CPR/AED**

Date Completed: 1/20/2023

Validity Period: 2 Years

Conducted by: Underwater Engineering Services, Inc.



To verify certificate, scan code or visit [redcross.org/digitalcertificate](https://redcross.org/digitalcertificate) and enter ID.

Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



013P114



RESUME

**BRIAN KILBURN**

DIVE SUPERVISOR / INSPECTOR

EDUCATION:

Divers Institute of Technology	2019
Montana State University	2003

CERTIFICATIONS:

ANSI N45.2.6 Level II Coatings Inspector  
ANST SNT-TC-1A/CP-189 Certified Level II UT (Straight Beam)  
Kirby Morgan Helmet and Band Mask Technician  
ADC Air/Mixed Gas Commercial Diver  
First Aid, CPR, Emergency Oxygen and Bloodborne Pathogens  
Job Safety Analysis Identifying & Controlling Hazards  
NDT – Level I and II  
Underwater Welding  
Hazardous Waste  
Rigging

EXPERIENCE:

**UNDERWATER ENGINEERING SERVICES, INC.** 2008-Present

*Dive Supervisor / Inspector*

Be fully cognizant of all relevant governmental regulatory agency regulations that apply to the diving operation and the diving mode employed, and the employer's basic safe practices/operations manual; see that all rules and regulations are followed; have adequate knowledge, training and familiarization with all life-support and ancillary equipment designated to the diving operations; while on duty, be in immediate control and available to implement emergency procedures; ensure prior to commencing a diving operation, in addition to parties directly involved in the diving operation, that masters of craft, pilots of submersibles, harbor masters, managers of offshore installations, pipelines, civil engineering sites, inland waterways, and all persons responsible for anything that affects the diving operation are advised that diving or underwater operations are to be undertaken; ensure diving operations are carried out from a suitable and safe location on the surface; develop or modify and produce pre- and post-dive checklists for the operation; develop and implement emergency/contingency procedures; be aware of the procedures to follow to obtain medical support in the event of an accident, either diving or non-diving related; ensure a two-way communication system is available at the dive location to obtain emergency assistance; facilitate a Job Hazard Analysis for each task undertaken; establish a dive plan ensuring that sufficient breathing mixtures, supplies and proper equipment are available for safe and timely completion of the job task; assign the duties of all members of the dive team and personally direct them throughout the diving operation; personally inquire if all personnel on the dive team are qualified and physically able to perform tasks assigned; maintain a depth bottom time and breathing mix profile at the dive location for each diver during the dive; ensure that each diver is continuously tended while in the water; ensure the dive is terminated when diver requests termination, fails to respond to communication or communication is lost between the diver and dive team

members at the dive location, communication is lost between the vessel operator and the diving supervisor during live boating operations, diver begins to use his or her diver-carried reserve breathing gas supply, and weather or site conditions are degrading to the extent that diver safety may be compromised; ensure after every dive that the physical condition and wellbeing of the diver is checked by visual observation and verbal questioning, maintain and submit reports required by employer and relevant governmental regulations concerning diving operations and equipment maintenance, testing or repair, and view and ensure accuracy of diver's personal logbook and affix signature to properly record activities; maintain a supervisor's logbook that details all dives and medical treatment supervised. \*

**MIDCO DIVING AND MARINE SERVICES**

2019

*Diver/Inspector*

Duties included conducting cleaning, repair, and inspection dive operations of potable water reservoirs per ANSI and AWWA C652 standards for decontamination. Trained and experienced in high altitude diving operations. Certified confined space entrant and fall protection PPE user.

**MONTANA OPTICOM**

2015-2018

*Lead Fiber Optic Construction Foreman*

Responsibilities include leading and supervising fiber construction crews, review daily production reports, material usage, place conduit/cables in trenches, splice conduit sections, provide on the job training and maintain a safe work environment.

**PAULEY CONSTRUCTION**

2012-2015

*Construction Foreman*

Responsibilities include leading and supervising fiber construction crews, review daily production reports, material usage, place conduit/cables in trenches, splice conduit sections, provide on the job training and maintain a safe work environment.

**Commercial experience includes** Performing coating inspections of evaluations of marine structures controlled by the Army Corp of Engineers, DOT, and SFWMD including State and Federally controlled water ways. Structures include bridges, bridge pilings, seawalls, cathodic protection installations, water management systems (gates, canals, pump assemblies, etc.), artificial reefs, holding tanks in both saltwater and freshwater environments.

**Nuclear experience includes** ANSI N45.2.6/ASTM D 4537 inspections and assessment of underwater epoxy and inorganic zinc coatings inside nuclear Service Level I boundaries (including UT-T method), application of Service Level I epoxy coatings underwater for the purpose of repairing steel surfaces; documenting inspection results, assisting with Final report archiving, photography and video of all structures and components. Satisfactorily performed inspections as a certified Level I inspector from 2019 – 2022.

\*Specific project experience can be obtained upon request.

---

SPECIFIC NUCLEAR PROJECTS:

PLANT	LOCATION	OWNER
● St. Lucie Nuclear	Jensen Beach, FL	Florida Power & Light
● Fermi Nuclear	Newport, MI	Detroit Edison
● Monticello Nuclear	Monticello, MN	Xcel Energy
● Seabrook Station	Seabrook, NH	NextEra Energy
● Cooper Nuclear Station	Brownville, NE	Nebraska Public Power District
● Limerick Generating Station	Pottstown, PA	Constellation Energy Generation

# DIVERS INSTITUTE OF TECHNOLOGY



The DIVERS INSTITUTE OF TECHNOLOGY

*Presents this Diploma to*

**Brian A. Kilburn**

This 26<sup>th</sup> day of February, 2019

*Who has demonstrated the skill and proficiency with Surface Supplied Air and Helium Diving Equipment to be eligible for graduation as a Professional Commercial Diver.*

  
EXECUTIVE DIRECTOR

  
DIRECTOR OF TRAINING



Seattle, Washington

**Association of Diving Contractors  
International**



**Cert. # 66456**

**Expires 08/16/2028**



**SURFACE-SUPPLIED AIR DIVING SUPERVISOR**

**BRIAN ADAM KILBURN I.D. 2279**

**Commercial Diver Certification Card**



**American Red Cross**  
Training Services

## **Certificate of Completion**

Brian Kilburn

has successfully completed requirements for

**Adult First Aid/CPR/AED**

Date Completed: 8/2/2024

Validity Period: 2 Years

Conducted by: Underwater Engineering Services, Inc.



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01L23AS

Oxygen First Aid for  
Scuba Diving Injuries (EO2) **Provider**



Name: Brian Kilburn  
Completed: August 5, 2024  
Instructor: Alex Kraeger  
Instructor ID# 91345

Meets ILCOR/AHA 2021 Guidelines  
This person has met or exceeded the performance requirements  
for course completion set by Divers Alert Network.  
Expires two years from completed date.





**American Red Cross**  
Training Services

## **Certificate of Completion**

Brian Kilburn

has successfully completed requirements for

**Bloodborne Pathogens Training**

Date Completed: 8/8/2025

Valid Until: 8/8/2026

Conducted by: Underwater Engineering Services, Inc.



To verify certificate, scan code or visit [redcross.org/digitalcertificate](https://redcross.org/digitalcertificate) and enter ID.

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021E9CF



RESUME

**CONNER HETLAND**

DIVE SUPERVISOR / INSPECTOR / NDE EXAMINER

EDUCATION:

Divers Institute of Technology

2018

CERTIFICATIONS:

ANSI N45.2.6 / ASTM D4537 Level II Coating Inspector  
Level II UT-T (ASME Section V & XI)  
Level II VT-1 / VT-3 (ANSI/ASNT CP-189)  
ADC Surface-Supplied Air Diver  
First Aid, CPR, and Emergency Oxygen  
Bloodborne Pathogens  
OSHA 29 CFR 1910.120  
Kirby Morgan Helmet & Bank Mask  
Operator  
EANX-Scuba Program Open Water Certified  
NDT – Level I and II  
Offshore Survival  
Underwater Welding  
Hazardous Waste  
Rigging  
TWIC

EXPERIENCE:

**UNDERWATER ENGINEERING SERVICES, INC.**

2018-Present

*Dive Supervisor / Inspector / NDE Examiner*

Be fully cognizant of all relevant governmental regulatory agency regulations that apply to the diving operation and the diving mode employed, and the employer's basic safe practices/operations manual; see that all rules and regulations are followed; have adequate knowledge, training and familiarization with all life-support and ancillary equipment designated to the diving operations; while on duty, be in immediate control and available to implement emergency procedures; ensure prior to commencing a diving operation, in addition to parties directly involved in the diving operation, that masters of craft, pilots of submersibles, harbor masters, managers of offshore installations, pipelines, civil engineering sites, inland waterways, and all persons responsible for anything that affects the diving operation are advised that diving or underwater operations are to be undertaken; ensure diving operations are carried out from a suitable and safe location on the surface; develop or modify and produce pre- and post-dive checklists for the operation; develop and implement emergency/contingency procedures; be aware of the procedures to follow to obtain medical support in the event of an accident, either diving or non-diving related; ensure a two-way communication system is available at the dive location to obtain emergency assistance; facilitate a Job Hazard Analysis for each task undertaken; establish a dive plan ensuring that sufficient breathing mixtures, supplies and proper equipment are available for safe and timely completion of the job task; assign the duties of all members of the dive team and personally direct them throughout the diving operation; personally inquire if all personnel on the dive Team are qualified and physically able to perform tasks assigned; maintain a depth bottom

time and breathing mix profile at the dive location for each diver during the dive; ensure that each diver is continuously tended while in the water; ensure the dive is terminated when diver requests termination, fails to respond to communication or communication is lost between the diver and dive team members at the dive location, communication is lost between the vessel operator and the diving supervisor during live boating operations, diver begins to use his or her diver-carried reserve breathing gas supply, and weather or site conditions are degrading to the extent that diver safety may be compromised; ensure after every dive that the physical condition and wellbeing of the diver is checked by visual observation and verbal questioning, maintain and submit reports required by employer and relevant governmental regulations concerning diving operations and equipment maintenance, testing or repair, and view and ensure accuracy of diver's personal logbook and affix signature to properly record activities; maintain a supervisor's logbook that details all dives and medical treatment supervised.

**PORTER DIVING** 2019  
 Freelance Diver for Nuclear Outage (Diablo Nuclear Power Plant)

**VETERANS MARINE SERVICES** 2019  
 Inspector on navy tug boats, inspecting concrete structures

**Commercial experience includes** Performing coating inspections of evaluations of marine structures controlled by the Army Corp of Engineers, DOT, and SFWMD including State and Federally controlled water ways. Structures include bridges, bridge pilings, seawalls, cathodic protection installations, water management systems (gates, canals, pump assemblies, etc.), artificial reefs, holding tanks in both saltwater and freshwater environments.

**Nuclear experience includes** ANSI N45.2.6/ASTM D 4537 inspections and assessment of underwater epoxy and inorganic zinc coatings inside nuclear Service Level I boundaries (including UT-T method), application of Service Level I epoxy coatings underwater for the purpose of repairing steel surfaces; documenting inspection results, assisting with Final report archiving, photography and video of all structures and components. Satisfactorily performed inspections as a certified Level I inspector from 2019 – 2022.

---

SPECIFIC NUCLEAR PROJECTS:

PLANT	LOCATION	OWNER
• Fermi Nuclear Generating Station	Newport, MI	DTE Energy
• Cooper Nuclear Station	Brownville, NE	Nebraska Public Power District
• Monticello Nuclear Generating Plant	Monticello, MN	Xcel Energy
• Columbia Nuclear Power Station	Richland, WA	Energy Northwest
• Saint Lucie Nuclear Power Plant	Jensen Beach, FL	NextEra Energy
• Seabrook Nuclear Power Station	Seabrook, NH	NextEra Energy
• Diablo Canyon Power Plant	Avila Beach, CA	PG&E Corporation
• Susquehanna	Berwick, PA	Talen Energy
• Turkey Point	Homestead, FL	NextEra Energy

# DIVERS INSTITUTE OF TECHNOLOGY



The DIVERS INSTITUTE OF TECHNOLOGY

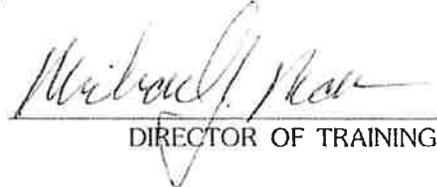
*Presents this Diploma to*

*Conner Reid Hetland*

*This 23<sup>rd</sup> day of January, 2018*

*Who has demonstrated the skill and proficiency with Surface Supplied Air and Helium Diving Equipment to be eligible for graduation as a Professional Commercial Diver.*

  
EXECUTIVE DIRECTOR

  
DIRECTOR OF TRAINING



Seattle, Washington

**Association of Diving Contractors  
International**



Cert. # 60742

Expires 01/23/2025



**SURFACE-SUPPLIED AIR DIVER**  
**CONNER HETLAND I.D. 5640**  
Commercial Diver Certification Card



**American Red Cross**  
Training Services

## **Certificate of Completion**

Conner Hetland

has successfully completed requirements for

**Adult and Pediatric First Aid/CPR/AED and Administering Emergency Oxygen**

Date Completed: 2/9/2024

Validity Period: 2 Years

Conducted by: Underwater Engineering Services, Inc.



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Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



01EQ7OQ



**American Red Cross**  
Training Services

## **Certificate of Completion**

Conner Hetland

has successfully completed requirements for

**Bloodborne Pathogens Training**

Date Completed: 8/8/2025

Valid Until: 8/8/2026

Conducted by: Underwater Engineering Services, Inc.



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021E9CN



## RESUME

### CHANDLER PRICE

#### DIVER

#### EDUCATION:

CDA Technical Institute  
CCTC

2021  
2018-2020

#### CERTIFICATIONS:

ADC Entry Level Tender/Diver  
First Aid, CPR and Emergency Oxygen  
Underwater NDT Specialist – Level I and II  
Entry-Level Underwater Welder  
OSHA 10-Hour Construction  
24-Hour Dive Operations  
Offshore Survival  
Topside Welding  
Hazwoper

#### EXPERIENCE:

##### **UNDERWATER ENGINEERING SERVICES, INC.**

2021-Present

##### *Diver*

Support nuclear project work as directed by the Vice President of Nuclear Operations. Tasks might include tending during diving operations in a nuclear environment, diving in a radioactively contaminated environment, underwater repairs to submerged equipment and infrastructure in a nuclear environment, underwater coating evaluation and rehabilitation, and underwater inspection in a nuclear environment. Support commercial diving project work as directed by the Vice President of Commercial Diving Operations. Tasks might include equipment maintenance, equipment load-out, equipment set-up and breakdown, working as a dive tender, jetting/dredging, decompression chamber operations, inspection with video documentation, burning/welding, diving in a contaminated environment, diving/tending in areas populated by hazardous animals, hand and power tool operation, pneumatic/hydraulic tool operation, saws and other cutting tools, crane rigging and signaling, salvage or environmental operations, topside construction activities, hand digging, heavy lifting and basic carpentry. conduct marine construction tasks under the direction of a crew leader. Tasks include loading and unloading of equipment and materials, basic carpentry, assist in installing seawall, in water piles or sheet piles.

# CDA Technical Institute

This is to certify that

Chandler Lee Price

Having satisfactorily completed the course of study  
and having complied with all other requirements of CDA Technical Institute in  
Jacksonville, Florida on this 18th Day of June, 2021

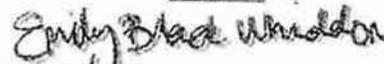
## Diploma

With all the honors, rights, privileges and obligations pertaining to

Air/Mixed Gas Commercial Diver



FOUNDER/CEO



VICE PRESIDENT



**Association of Diving Contractors  
International**



**Cert. # 69709**

**Expires 08/13/2030**



**SURFACE SUPPLIED AIR DIVING SUPERVISOR**

**CHANDLER PRICE I.D. P620-11200-001-0**

**Commercial Diver Certification Card**



**American Red Cross**  
Training Services

## **Certificate of Completion**

Chandler Price

has successfully completed requirements for

**Adult First Aid/CPR/AED and Administering Emergency Oxygen**

Date Completed: 8/12/2025

Valid Until: 8/12/2027

Conducted by: Underwater Engineering Services, Inc.



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Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



02118A6



**American Red Cross**  
Training Services

## **Certificate of Completion**

Chandler Price

has successfully completed requirements for

**Bloodborne Pathogens Training**

Date Completed: 8/8/2025

Valid Until: 8/8/2026

Conducted by: Underwater Engineering Services, Inc.



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Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



021E9CV



RESUME

**MISAEEL PASTRANA**

DIVER

**ANSI N45.2.6 / ASTM D4537 Level I Coating Inspector**

EDUCATION:

CDA Technical Institute  
Marion Technical Institu

2021  
2019-2020

CERTIFICATIONS:

ANSI N45.2.6 Level I Coatings Inspector  
ADC Entry-Level Tender/Diver  
First Aid, CPR/AED, Emergency Oxygen and Bloodborne Pathogens  
OSHA 10-Hour Construction  
AWS Welding Operator  
NDT – Level I and II  
Offshore Survival  
Topside Welding  
Hazwoper  
TWIC

EXPERIENCE:

**UNDERWATER ENGINEERING SERVICES, INC.**

2021-Present

*Diver*

Support nuclear project work as directed by the Vice President of Nuclear Operations. Tasks might include tending during diving operations in a nuclear environment, diving in a radioactively contaminated environment, underwater repairs to submerged equipment and infrastructure in a nuclear environment, underwater coating evaluation and rehabilitation, and underwater inspection in a nuclear environment. Support commercial diving project work as directed by the Vice President of Commercial Diving Operations. Tasks might include equipment maintenance, equipment load-out, equipment set-up and breakdown, working as a dive tender, jetting/dredging, decompression chamber operations, inspection with video documentation, burning/welding, diving in a contaminated environment, diving/tending in areas populated by hazardous animals, hand and power tool operation, pneumatic/hydraulic tool operation, saws and other cutting tools, crane rigging and signaling, salvage or environmental operations, topside construction activities, hand digging, heavy lifting and basic carpentry. conduct marine construction tasks under the direction of a crew leader. Tasks include loading and unloading of equipment and materials, basic carpentry, assist in installing seawall, in water piles or sheet piles.

SPECIFIC NUCLEAR PROJECTS:

PLANT	LOCATION	OWNER
● St. Lucie Nuclear	Jensen Beach, FL	Florida Power & Light
● Turkey Point Nuclear	Florida City, FL	Florida Power & Light
● Fermi	Newport, MI	Detroit Edison
● Cooper Station	Brownville, NE	Nebraska Public Power District
● Seabrook Station	Seabrook, NH	NextEra Energy

# CDA Technical Institute

This is to certify that

Misael Andres Pastrana-Montes

Having satisfactorily completed the course of study  
and having complied with all other requirements of CDA Technical Institute in  
Jacksonville, Florida on this 29th Day of January, 2021

## Diploma

With all the honors, rights, privileges and obligations pertaining to

Air/Mixed Gas Commercial Diver



*Raymond A. ...*  
FOUNDER/CEO

  
*Emily Black Whiddon*  
VICE PRESIDENT



**Association of Diving Contractors  
International**



**Cert. # 66829**

**Expires 11/07/2028**



**SURFACE-SUPPLIED AIR DIVER**

**MISAEEL PASTRANA I.D. 20075295**

**Commercial Diver Certification Card**



**American Red Cross**  
Training Services

## **Certificate of Completion**

Misael Pastrana

has successfully completed requirements for

**Adult First Aid/CPR/AED**

Date Completed: 8/28/2024

Validity Period: 2 Years

Conducted by: Underwater Engineering Services, Inc.



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Learn and be inspired at [LifesavingAwards.org](https://LifesavingAwards.org)



01LIJNL

Oxygen First Aid for  
Scuba Diving Injuries (EO2) **Provider**



Name: Misael Pastrana  
Completed: September 25, 2024  
Instructor: Alex Kraeger  
Instructor ID# 91345

Meets ILCOR/AHA 2021 Guidelines  
This person has met or exceeded the performance requirements  
for course completion set by Divers Alert Network.  
Expires two years from completed date.





**American Red Cross**  
Training Services

## **Certificate of Completion**

Misael Pastrana

has successfully completed requirements for

**Bloodborne Pathogens Training**

Date Completed: 3/14/2025

Valid Until: 3/14/2026

Conducted by: Underwater Engineering Services, Inc.



To verify certificate, scan code or visit [redcross.org/digitalcertificate](https://redcross.org/digitalcertificate) and enter ID.

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01RNJN9

# Attachment C

## (UESI Dive Safety Manual and Forms)



**Underwater Engineering Services, Inc.**

# **DIVING SAFETY MANUAL**

**Confidential & Proprietary**

**UESI-MNL-DSM-001**

**R0**

3306 Enterprise Road

Fort Pierce, FL 34982

In Accordance With:

- Association of Commercial Divers International
- 29 CFR Part 1910, Subpart T - Commercial Diving Operations
- 46 CFR Part 197 Subpart B – Commercial Diving Operations
- US Army Corps of Engineers - EM 385-1-1

This document replaces:

- *CPM-1 - UESI "Commercial Diving Operations" (2015)*
- *General Safe Practices* – Located in the UESI Health and Safety Manual, Rev. 5 (2019)

UESI-MNL-DSM-001 R0	<b>DIVING SAFETY MANUAL</b>	MANAGEMENT COMMITMENT
JANUARY 3, 2025	UNDERWATER ENGINEERING SERVICES, INC.	PAGE 1 OF 1

## **MANAGEMENT COMMITMENT**

### **To All Employees:**

Underwater Engineering Services, Inc. is firmly committed that the safety of our employees, and the public, and environmental responsibility is of the highest priority. UESI is committed to establishing a safety conscious culture to provide its workers optimal safe work practices, procedures, policies, equipment and facilities. Ensuring the safety of all workers as the first priority of business creates a workplace, where employees can take pride and ownership of not only their work, but also for being a vital link in the overall safety network. Safety depends upon a common mindset of desire to work in a careful and planned manner, using a comprehensive set of safe practice procedures, error prevention methods and industry best practices. Safety and environmental responsibility demand cooperation on everyone's part. Thus, it's important that communication be kept open at all times between management and employees.

### **To meet our commitment to safety, management will:**

- Promote a positive attitude towards accident prevention
- Establish and insist upon safe work practices and conditions
- Provide appropriate supervision, training, and monitor conformance to UESI safety standards
- Ensure employees and other persons understand and accept their responsibility to promote a safe and healthy workplace through compliance to our Code of Safe Practices and Standards of Conduct
- Ensure employees and other persons understand and accept their responsibility to promote safe and environmental responsible work practice through compliance to our Code of Safe Practices, Standards of Conduct and state and federal regulations.
- Ensure that contractors working on our premises have, and follow, appropriate safety procedures

Everyone is obligated to understand and follow all company safety standards. Ultimately, effective achievement will result in a workplace where employees work with confidence in their fellow employees and in their own knowledge and skills and take pride and are recognized for their efforts and achievements. UESI has established policies, procedures and safe work practices within this Environmental, Health and Safety Manual.

This Health & Safety Manual sets forth our Code of Safe Practices and Standards of Conduct guidelines and rules for all employees while conducting commercial diving operations. This program has been developed to assure compliance with federal, state, and local regulations to meet occupational safety and health rules and regulations that apply where we operate.

This Dive Safety Manual Procedure is intended for your use and guidance during your employment with the company. We ask that you understand and commit to its contents and keep it readily available. It should answer many questions you may have; however, it is not intended to cover every aspect of your employment. Please feel free to ask questions. Your Supervisor, Manager or UESI ESH Management (including designated project safety advocates), will be more than willing to assist you.

In the final analysis, it is up to each employee. There is no substitute for knowledge, experience, good judgment and a duty of care to each other. We are counting on each of you to work safely and productively, protect the environment, take pride in your work and care for your fellow employees.

  
 \_\_\_\_\_  
 Ken Griffin  
 President – Branch Manager

  
 \_\_\_\_\_  
 Robert Walcheski  
 Sr. Vice President – Technical Operations

UESI-MNL-DSM-001 R0	<b>DIVING SAFETY MANUAL</b>	Mission and Forward
January 3, 2025	<b>UNDERWATER ENGINEERING SERVICES, INC.</b>	Page 1 of 1

# DIVING SAFETY MANUAL

## **SAFETY MISSION STATEMENT**

Underwater Engineering Services, Inc. is dedicated to preventing injuries, accidents, and environmental impact and ensuring compliance with in-house safety programs, industry best practices, and regulatory requirements. We achieve this by promoting a safety conscious work environment (SCWE) and providing high-quality training, comprehensive workplace evaluation, appropriate emergency response, hazardous materials management from acquisition to disposal, and by managing regulatory information.

## **PREFACE**

This manual is designed to provide a resource for safety information that UESI employees shall use to help prevent injuries and illnesses resulting from unsafe acts and/or conditions.

The intent of this manual is to promote jobsite safety through adherence to OSHA safety regulations and by defining recommended safe work practices affecting the commercial diving, marine construction industries and other trades working with us.

This manual is intended to augment a company safety program. It is not intended to be used as the total company safety program (policy). All UESI employees should familiarize themselves with the contents of this manual. The safety procedures apply to all persons employed by UESI and all subcontractors under our operational and contractual control.

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## 1.0 SCOPE

The Commercial Diving Operations Procedure will apply to all UESI projects where and when commercial diving operations are performed.

## 2.0 GOVERNANCE

All commercial diving operations shall adhere to the most current revision of the ADCI Consensus Standards and all federal regulations.

- During operations conducted under the jurisdiction of the US Coast Guard, work will be in strict adherence to 46 CFR Subpart B Section 197 *Commercial Diving Operations*.
- During operations conducted within the jurisdiction of the US Occupational Safety and Health Administration, work will be in strict adherence to 29 CFR 1910 Subpart T.
- During operations conducted for the federal government and as required, work will be conducted in strict adherence of the US Army Corps of Engineers Safety and Health requirements for commercial diving as set forth in Manual No. 385 1-1 (EM 385-1-1) Section 30.

## 3.0 PURPOSE

The Commercial Diving Operations Procedure will provide UESI employees with clear and exact guidelines for performing safe diving operations.

The purpose of this procedure is to provide the safest working conditions possible for divers on all UESI projects. It is impossible to anticipate or foresee every diving hazard and to attempt to do so is beyond the scope of this procedure. It is our intention to see that the minimum requirements set forth are adhered to and to forewarn all divers entering into any work agreement with UESI that compliance with the specific requirements as well as the spirit of this procedure is expected. If any part of this manual is found to conflict with the latest revision of the OSHA Commercial Diving Operations Standards, the diver must be in compliance with those regulations. In planning any job, there should be cooperation from all divers to ensure that the work is performed safely efficiently.

## 4.0 RESPONSIBILITY

The Branch Manager administers the requirements of this procedure and performs periodic inspections of work locations to determine the effectiveness of implementation.

Field Supervisor are completely responsible for conducting safe diving operations and applying the requirements of this procedure to our field operations.

## 5.0 DEFINITIONS

- ACFM – Actual cubic feet per minute.
- ASME Code or Equivalent – ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, or an equivalent code which the employer can demonstrate to be equally effective.
- ATA - Atmosphere absolute.
- Bell – An enclosed compartment pressurized (closed bell) or unpressurized (open bell), which allows the diver to be transported to and from the underwater work area and which may be used as a temporary refuge during diving operations.
- Bottom Time – The total elapsed time measured in minutes from the time the diver leaves the surface in descent to the time that the diver begins ascent.
- Bursting Pressure – The pressure at which a pressure containment device would fail structurally.
- Cylinder – A pressure vessel for the storage of gases.
- Decompression Chamber – A Pressure vessel for human occupancy such as a surface decompression chamber, closed bell, or deep diving system used to decompress divers and to treat decompression sickness.
- Decompression Sickness – A condition with a variety of symptoms which may result from gas or bubbles in the tissues of divers after pressure reduction.

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- 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.
- Dive Location – A surface or vessel from which a diving operation is conducted.
- Dive Location Reserve Breathing Gas – A supply system of air or mixed-gas (as appropriate) at the dive location that is independent of the primary supply system and sufficient to support divers during the planned decompression.
- Dive Team – Divers and support employees involved in a diving operation, including the designated person-in-charge.
- Diver – An employee working in water using underwater apparatus that supplied compressed breathing gas at the ambient pressure.
- Diver-carried Reserve Breathing Gas – A diver-carried supply of air or mixed gas (as appropriate) sufficient under standard operating conditions to allow the diver to reach the surface, or another source of breathing gas, or to be reached by a standby diver.
- Diving Mode – A type of diving requiring specific equipment, procedures and techniques (SCUBA, surfaced-supplied air or mixed gas).
- FSW – Feet of seawater (or equivalent static pressure head).
- Hyperbaric Conditions – Pressure conditions in excess of surface pressure.
- In-water Stage – A suspended underwater platform that supports a diver in the water.
- Liveboating – The practice of supporting a surface-supplied air or mixed gas diver from a vessel which is underway.
- Mixed-gas Diving – A diving mode in which the diver in the water is supplied with a breathing gas other than air.
- No-decompression Limits – The depth-time limits of the “no-decompression limits and repetitive dive group designation table for no-decompression air dives,” the latest version of the U.S. Navy Diving Manual or equivalent limits which the employer can demonstrate to be equally effective.
- PSIG – Pounds per square inch gauge.
- Scientific Diving – Diving performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks. Scientific diving does not include performing any tasks usually associated with commercial diving such as: placing or removing heavy objects underwater; inspection of pipelines and similar objects; construction; demolition, cutting or welding; or the use of explosives.
- Standby Diver – A diver at the dive location available to assist a diver in the water.
- Surface-supplied Air Diving – A diving mode in which the diver in the water is supplied from the dive location with compressed air for breathing.
- Treatment Table - A depth-time and breathing gas profile designed to treat decompression sickness.
- Umbilical – The composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which supplies the diver or bell with breathing gas, communications, power, or heat as appropriate to the diving mode or conditions and includes the safety line between the diver and the dive location.
- Volume Tank – A pressure vessel connected to the outlet of a compressor and used as an air reservoir.
- Working Pressure – The maximum pressure to which a pressure containment device may be exposed under standard operating conditions.

## 6.0 COMMERCIAL DIVING TRAINING REQUIREMENTS

### 6.1 ENTRY-LEVEL QUALIFICATIONS

- All personnel entering the profession of commercial diving shall be a high school graduate or equivalent. The entry-level minimum skill designation on the diving crew is a tender/diver. The entry-level tender/diver satisfied the minimum entry-level qualifications of diving proficiency, technical proficiency and experience by successfully completing a formal course of study.
- A formal course of study for a tender/diver shall be completed at any accredited school, military school or equivalent whose curriculum, at a minimum, conforms to the current ANSI/ACDE requirements upon completion of the course.
- The ADCI recognizes some formal training certificates issued from within other nations. Certificates of that nature will be evaluated together with presented documentation such as dive logs/supervisor logs, etc., to determine whether the individual is eligible in all aspects for issuance of an ADCI commercial diver card.

### 6.2 MINIMUM REQUIRED EXPERIENCE AND PROFICIENCY

- Advancement beyond the designation of tender/diver requires completion of actual participation in commercial diving operations and demonstrated proficiency during working dives.
- Field experience is defined as those days spent (offshore, inland lakes, harbors, rivers, etc.) participating as a crew member in diving operations as the level of competency determined by prior training and demonstrated proficiency.
- Diving proficiency establishes the required minimum number of open water working dives required to obtain various designations. All dives must be performed during a 24-month period immediately prior to issuance of the designation. Work must be performed during each dive with proper supervision. All dives must have a minimum of 20 minutes bottom time. A number of shorter-duration dives may be combined to equal one dive of the required 20-minute bottom time.
- **Advancement** to higher designations requires completion of training and experience for all lower designations.

### 6.3 MINIMUM QUALIFICATIONS

- **Entry-Level Tender/Diver**  
Commercial diver training having minimum documented hours of formal instruction in subjects set forth in the current ANSI Standard at time of course completion.
- **Advanced Certifications**  
Must meet requirements as set forth in current standards.
- **Others**  
Technical proficiency as appropriate to the specific diving mode as detailed under the ADCI certification card program requirements or appropriate section for these standards.

## 7.0 DIVER'S PERSONAL LOGBOOK

- It is recommended that all divers maintain a personal logbook (ADCI Commercial Diver Logbook or equivalent) to detail hyperbaric exposures. The logbook should be identified to the diver using it by photograph, signature and home address. As a minimum, the following should be entered into the logbook:
- Diving contractor's name and address.
- Date of the dive.
- The name or other designation and location of the diving site or vessel from which the diving operation was carried out.
- Maximum depth reached on the dive.
- The time left surface, bottom time and the time reached surface for each hyperbaric exposure.
- Surface interval, if dive includes time for decompression.

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- Type of breathing apparatus and breathing mixture used.
- Task performed.
- Designation of the decompression table and schedule used.
- Any DCS or injury incurred during the dive.
- Comments section.
- Supervisor's signature.
- Place for a countersignature or stamp of the diving company.
- As applicable, additional pages must be provided to show:
  - Dates of diving physicals, signed by the examining physician.
  - A record of all relevant training sessions.
  - A record of all equipment testing and maintenance.
  - A record of the diver's helmet type

## 8.0 CREW REST POLICY

- No employee shall work more than 16 continuous hours, unless in the event of an emergency.  
 An "emergency" in this case would be an event in which there is a direct threat to the health and well-being of an individual or individuals. Also included would be a risk of a significant loss of property or a major risk to the environment.
- All employees will be afforded the opportunity to have 8 hours of uninterrupted rest/sleep between duty periods (refer to UESI Fatigue Management policy for more details regarding this subject).

## 9.0 INJURY/ACCIDENT REPORTING

### 9.1 Federal Regulatory Requirements 46 CFR – Department of Transportation – Coast Guard

Subchapter V - Marine Occupational Safety and Health Standards. Part § 197.484, requires the person in charge to notify the officer in charge, marine inspection, as soon as possible after a diving casualty occurs, if the casualty involves any of the following:

- Loss of life.
- Diving-related injury to any person causing incapacitation for more than 72 hours.
- Diving-relating injury to any person requiring hospitalization for more than 24 hours.
- Part § 197.486 defines the form of the written report of casualty and requires:
  - That the report be furnished on Form CG-2692 when the diving installation is on a vessel; or that a written report, in narrative form, be used when the diving installation is on a facility.
  - In either instance, the report must furnish the following information:
    - Name and official number (if applicable) of the vessel or facility.
    - Name of the owner or agent of the vessel or facility.
    - Name of the person in charge.
    - Name of the diving supervisor.
    - Description of the casualty, including presumed cause.
    - Nature and extent of the injury to persons.

### 9.2 Federal Regulatory Requirements 29 CFR – Department of Labor – Occupational Safety and Health Administration

Subpart T – Commercial Diving Operations, § 1910.440, requires that an employer record the occurrence of any diving-related injury or illness that requires any dive team member to be hospitalized for 24 hours or more, specifying the circumstances of the incident and the extent of any injuries or illnesses.

Employer Reporting Requirement:

- All work-related fatalities within 8 hours must be reported to OSHA.
- All work-related inpatient hospitalizations, all work-related amputations and all work-related losses of an eye within 24 hours must be Reported to OSHA.

#### Reporting to OSHA:

1. By telephone to the nearest OSHA Area Office during normal business hours.
2. By telephone to the 24-hour OSHA hotline at 1-800-321-OSHA (6742).
3. Electronically, which is available at [www.osha.gov](http://www.osha.gov).

ADCI member companies are urged to furnish ADCI with a copy of any report required by either 29 CFR or 46 CFR. In those instances, where the report is initially submitted in an oral format (29 CFR), furnish to ADCI information derived from log entries required by that regulation. Reports should be furnished to ADCI at the same time as submitted to regulatory authorities to ensure that ADCI is able to properly respond to enquiries regarding the actual circumstances rather than having to rely upon media releases that often are inaccurate or embellished.

## 10.0 EQUIPMENT

- Prior to operation, all dive, emergency and support equipment shall be inspected and ready for safe diving operations.
- All modes of communication are inspected and tested prior to the start of any work tasks.
- All first aid and rescue equipment are accounted for, inspected and readily accessible in the event of an emergency.
- All dive operation warning flags, signs, placards or shapes are correctly displayed and clearly visible to anyone in close proximity to the dive station.
- All life support equipment will be maintained in accordance with the most current ADCI Standards.

## 11.0 DIVING MODES

### INTRODUCTION

UESI conducts underwater inspection, construction, maintenance and repair using Surface-Supplied Diving modes. Remotely operated vehicles (ROVs) and other technically advanced support equipment and instrumentation may be deployed when such operations enhance safety or provide additional information.

Equipment and manning levels referenced in this section should be considered the recommended minimum for approaching ALL diving applications, which is based on one dive and any applicable decompression required. Increased manning levels and additional equipment may be required for any diving in excess of one dive and any decompression required. Proper pre-job planning shall be conducted to ensure that the necessary personnel and equipment resources are available for diving operations.

The specific operations procedures vary with the type of diving mode employed. Prior to mobilization, a project risk assessment/hazard identification process or dive plan shall be performed to determine the type of diving mode to be employed, equipment needed and job manning requirements.

Prior to the commencement of any diving operation, a Job Hazard Analysis shall be completed and all members of the dive team, including master of the vessel (as well as other involved personnel) shall be present at a pre-dive safety meeting.

### Diving Mode Depth Limits

- Maximum Depth for Surface-Supplied Air Diving-190 FSW (57.91 MSW)
- Maximum Depth for Surface-Supplied Mixed Gas Diving (HeO<sub>2</sub>) – 300 FSW (91.44 MSW)

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Remotely operated vehicles (ROVs) and other technically advanced support equipment and instrumentation may be deployed when such operations will enhance safety or provide additional information.

### 11.1 SELF-CONTAINED (SCUBA)

Scuba procedures should not be used for conducting commercial diving operations except where it can be clearly shown to be safer and more efficient than other modes of diving. The following are requirements for self-contained diving operations.

- **Minimum Personnel Requirements**
  - Commercial scuba diving 0-40 fsw with no decompression (UESI restricts the maximum depth of commercial SCUBA to 40 fsw)
  - One Diving Supervisor
  - One Diver
  - One Tender/Diver, who shall be properly equipped and capable of performing the duties of Standby Diver. (When two divers are in the water at the same time and can see each other, they can act as Standby Divers for each other.)
  - At a minimum, at least one member of the team must have a recognized Oxygen Provider certification or be a DMT. If that member is part of the dive rotation, then at least two members of the team must have a recognized Oxygen Provider certification or be a DMT.
- **Operational Guidelines**
  - Two-way audio communication between diver and topside are required.
  - The dive plan shall not exceed the diver's air supply, exclusive of the reserve supply, nor shall it exceed the no-decompression limits. Cylinder pressure shall be determined immediately before each dive. Dive depths shall not exceed 40 fsw.
  - Scuba dives shall not be conducted in current in excess of one (1) knot current.
  - Scuba dives shall not be conducted in any confined space.
  - During all dives, the Standby Diver shall be available while the Diver is in the water.
  - Scuba divers shall be line tendered from the surface or accompanied by another diver in the water in continuous visual contact.
  - Scuba operations will take place only in daylight or easily controlled environments (e.g. shallow pools or aquariums).
  - All divers will wear a buoyancy compensator and have a whistle or other audio signaling device.
  - During periods of low visibility, divers shall also carry a lighted beacon.
  - Each diver will be equipped with an EGS.
  - Divers shall be equipped with a submersible tank pressure gauge.
  - **Minimum Equipment Requirements**
  - Divers shall be equipped with a knife, diving wristwatch and depth gauge.
  - Full Faced Masks with through water communication to the surface and diver-to-diver communication are desired.
  - A weight belt with a quick release, which is appropriate for the diver's dress and depth shall be worn.
  - A buoyancy compensating device (BCD) should be used to secure the tank to the diver and provide underwater buoyancy compensation or surface buoyancy as needed. If the diver is dressed in a dry suit, a cylinder harness with a quick release may be worn to secure the cylinder to the diver.
  - An Oxygen administration kit.

### 11.2 SURFACE SUPPLIED AIR DIVING (SSA) W & W/O PLANNED DECOMPRESSION

**SURFACE-SUPPLIED AIR DIVING 0-100 FSW (0-30 MSW) WITH NO DECOMPRESSION**

The following are minimum requirements for surface-supplied air diving operations:

**Minimum Personnel**

- "At a minimum, at least one member of the dive team must have a recognized O<sub>2</sub> provider certification or be a DMT. If that member is a part of the dive rotation, then at least two members of the dive team must have a recognized O<sub>2</sub> provider certification or be DMTs."
- The minimum number of personnel comprising a dive team is never less than three. Merely because a dive team comprised of three persons may be adequate during one operation does not mean the same number of persons will be sufficient to accommodate the requirements of another operation.
- Diving contractor management and diving supervisors must carefully consider manning levels of the dive team. Although regulations may permit diving with a minimum crew of three persons, that level of manning is strictly under optimal conditions. For example, any time commercial diving operations are intended to take place in a remote location, or where an air gap from the diving station to the water exceeds 15 feet (4.6m), at least a fourth member of the dive team should be considered.

**Shallow Operations with Large Crews**

When a diving operation takes place in less than 100 fsw (30 msw) and the on-shift crew size is eight or more, then a diving supervisor who is not part of the diving rotation must be part of the crew.

**Minimum Personnel Requirements:**

- One air-diving supervisor.
- One diver.
- One tender/diver who shall be properly equipped and capable of performing the duties of a standby diver. At a minimum, at least one member of the dive team must have a recognized O<sub>2</sub> provider certification or be a DMT. If that member is a part of the dive rotation, then at least two members of the dive team must have a recognized O<sub>2</sub> provider certification or be DMTs.

**Diving Supervisor**

A qualified person shall be designated as the diving supervisor for each diving operation. The diving supervisor is in charge of the planning and execution of the diving operation, including the responsibility for the safety and health of the dive team. The diving supervisor shall possess the proper ADCI supervisor certification card and be knowledgeable and familiar with all techniques, procedures, emergency procedures and operational parameters for the diving mode under his or her direct supervision.

**Diver**

Must have training and/or experience in the following areas:

- Air-diving procedures and techniques
- Emergency procedures
- Diving accident treatment procedures
- Proper operation and use of all equipment related to air diving including decompression chambers
- Use of air-diving equipment
- Familiarity with the type of work engaged in

**Tender/Diver**

Tender/Diver will be a trained and qualified commercial diver.

NOTE: An additional dive crew member is normally required when any diving operation is conducted that has an increased complexity or hazards.

The diving supervisor must consider whether the use of any surface-tended equipment by the diver will require an additional individual to tend associated cables or hoses. This includes hand jetting, water blasting, cutting and

welding, the use of any pneumatic or hydraulically operated tool or the use of underwater video or sonar equipment requiring a power or data cable not affixed to the diver's umbilical.

Diving in remote locations where assistance is not immediately available, the diving supervisor may require additional members to be added to the dive team.

### Operational Guidelines

- The approximate depth of each dive shall be determined prior to the start of operations.
- The breathing mixture supplied to the diver must be composed of a mixture of gasses that is appropriate for the depth of the dive. When using mixed gas or enriched air, all gasses must be analyzed before they go online for O<sub>2</sub> content and for proper mixture necessary to support the maximum depth of the planned dive.
- Each diver shall be continuously tended while in the water by a separate dive team member.
- Each diving operation shall have a primary breathing gas supply sufficient to support all divers for the duration of the planned dive, including decompression.
- A diver-worn or carried emergency gas supply (ECS) shall be utilized.
- If no decompression is on site, the nearest manned operational chamber should be known, and an evacuation plan should be in place.

### Minimum Equipment Requirements

- One air source and volume tank to support two divers.
- Topside secondary air source.
- Adequate supply of gasses for the planned dive profile.
- Two hose groups consisting of:
  - Air hose.
  - Strength member/strain relief. (The strength member may be the entire hose assembly, if so designed.)
  - Communications cable.
  - Pneumofathometer hose.
- One control station consisting of:
  - Communication systems.
  - Depth gauges and gas distribution system with the capability to supply and control two divers at the maximum work depth.
  - One set of air decompression and treatment tables.
  - Two time-keeping devices.
  - One basic first aid kit with means of manual resuscitation (pocket mask or others). Local regulatory authorities may require additional equipment and training.
  - Emergency O<sub>2</sub> administration kit.
- Two sets of diver's personal diving equipment consisting of:
  - Helmet or mask.
  - Diver-worn EGS.
  - Weight belt if needed.
  - Protective clothing.
  - Tools as required.
  - Safety harness with leg straps.
  - Knife.
- Spare parts as required.
- Logbooks, dive sheets, safe practices manual, first aid handbook and written JHA applicable to job.

### 11.3 SURFACE-SUPPLIED AIR DIVING 0-100 fsw (0-30 msw) WITH PLANNED DECOMPRESSION

**Minimum Personnel**

- One air-diving supervisor
- One diver
- One standby diver
- Two Tender/Divers

At a minimum, at least one member of the dive team must have a recognized O<sub>2</sub> provider certification or be a DMT. If that member is a part of the dive rotation, then at least two members of the dive team must have a recognized O<sub>2</sub> provider certification or be a DMT.

**Diving Supervisor**

- A qualified person shall be designated as the diving supervisor for each diving operation. The diving supervisor oversees the planning and execution of the diving operation, including the responsibility for the safety and health of the dive team.
- The diving supervisor shall be knowledgeable and familiar with all techniques, procedures, emergency procedures and operational parameters for the diving mode under his or her direct supervision.

**Diver**

Must be trained and/or experienced in the following areas:

- Air diving procedures and techniques.
- Emergency procedures.
- Diving accident treatment procedures.
- Proper operation and use all equipment related to air diving, including decompression chambers.
- Use of air diving equipment.
- Familiarity with the type of work engaged in.
- Tender/Diver will be a trained and qualified commercial diver.

**Operational Guidelines**

- The approximate depth of each dive shall be determined prior to the start of operations.
- All breathing media other than standard breathing air shall be verified for proper composition prior to being placed on-line.
- A decompression chamber shall be ready for use at the dive location and accessible by the diver within the allowed time frame as prescribed by the decompression schedule.
- Each diver shall be continuously tended while in the water by a separate dive team member.
- Each diving operation shall have a primary breathing gas supply sufficient to support all divers for the duration of the planned dive, including decompression, as well as a secondary independent breathing gas supply. A diver-worn or carried emergency gas supply (EGS) shall be utilized.

**Minimum Equipment**

- Two independent air sources and volume tank to support two divers.
- Dive station emergency air source.
- One double-lock decompression chamber and adequate air source to recompress the chamber to 165 fsw.
- Adequate supply of gasses for the planned dive profile and a potential treatment.
- Two hose groups consisting of:
  - Air hose.
  - Strength member/stain relief. (The strength member may be the entire hose assembly, if so designed.)
  - Communications cable.

- Pneumofathometer hose.
- One set of air decompression and treatment tables.

**For planned in-water decompression:**

- Third source of diver's emergency air supply, in addition to diver's umbilical and EGS.
- One control station consisting of:
  - Communication systems.
  - Depth gauges and gas distribution system with the capability to supply and control two divers at the maximum work depth.
  - Two time-keeping devices.
  - One basic first air kit with bag-type manual resuscitator with transparent mask and tubing.
- Two sets of diver's personal diving equipment consisting of:
  - Helmet or mask.
  - Diver-worn EGS.
  - Weight belt if needed.
  - Protective clothing.
  - Tools as required.
  - Safety harness.
  - Knife.
- Spare parts as required.
- Logbooks,
- Dive sheets, safe practices manual, first aid handbook and written JHA applicable to job.

**11.4 SURFACE-SUPPLIED AIR DIVING 101-190 fsw (30-57 msw)**

**Minimum Personnel Requirements**

- One air-diving supervisor.
- One diver.
- One standby diver.
- Two tender/divers.

At a minimum, at least one member of the dive team must have a recognized O<sub>2</sub> provider certification or be a DMT. If that member is a part of the dive rotation, then at least two members of the dive team must have a recognized O<sub>2</sub> provider certification or be DMTs.

### **Diving Supervisor**

A qualified person shall be designated as the diving supervisor for each diving operation. The diving supervisor oversees the planning and execution of the diving operation, including the responsibility for the safety and health of the dive team.

The diving supervisor shall possess the proper ADCI supervisor certification card and be knowledgeable and familiar with all the techniques, procedures, emergency procedures and operational parameters for the diving mode under his or her direct supervision.

### **Diver**

Must have training and/or experience in the following areas:

- Air diving procedures and techniques.
- Emergency procedures.
- Diving accident treatment procedures.
- Proper operation and use of all equipment related to air diving, including decompression chambers.
- Have experience in the use of air diving equipment.
- Familiarity with the type of work engaged in.
- Tender/Divers will be a trained and qualified commercial diver.

### **Operational Guidelines**

- The approximate depth of each dive shall be determined prior to the start of operations.
- The breathing mixture supplied to the diver must be composed of a mixture of gases that is appropriate for the depth of the dive. When using mixed gas or enriched air, all gasses must be analyzed for proper mixture necessary to support the maximum depth of the planned dive or decompression.
- A decompression chamber shall be ready for use at the dive location and accessible by the diver within the allowed time frame as prescribed by the decompression schedule.
- Each diver shall be continuously tended while in the water by a separate dive team member.
- Each diving operation shall have a primary breathing gas supply sufficient to support all divers for the duration of the planned dive, including decompression.
- Except when heavy gear (e.g., MK V type equipment) is worn, a diver-worn or carried emergency gas supply (EGS) shall be utilized.

### **Minimum Equipment Requirements**

- Two independent air sources and volume tanks to support two divers.
- Dive station emergency air source.
- One double-lock decompression chamber and adequate air source to recompress the chamber to 165 fsw.
- Adequate supply of gasses for the planned dive profile and a potential treatment.
- Diver worn EGS
- Two hose groups consisting of:
  - Air hose.
  - Strength member/strain relief. (The strength member may be the entire hose assembly, if so designed.)
  - Communications cable.
  - Pneumofathometer hose.
- One set of decompression and treatment tables.
- For planned in water decompression:
- One diving stage or other support platform.
- Third source of diver's emergency air supply, in addition to diver's umbilical and EGS.

- One control station consisting of:
  - Communication systems.
  - Depth gauges and gas distribution system with the capability to supply and control two divers at the maximum work depth.
  - Two time-keeping devices.
  - One basic first aid kit with bag-type manual resuscitator with transparent mask and tubing.
- Two sets of diver's personal diving equipment consisting of:
  - Helmet or mask.
  - Weight belt if needed.
  - Protective clothing.
  - Tools as required.
  - Safety harness.
  - Knife.
- Spare parts as required.
- Logbooks, dive sheets, safe practices manual, first aid handbook and written JHA applicable to job.

### 11.5 SURFACE SUPPLIED MIXED-GAS DIVING

The use of a breathing gas for working dives where the O<sub>2</sub> percentage may vary, and inert gasses other than N<sub>2</sub> may be used in the mixture. Mixed gas is typically used for dives outside the depth range where air is a suitable breathing gas.

- The use of mixed gas requires special procedures, training, and equipment.
- Mixed-gas diving is not routinely performed by UESI and should be considered a high risk infrequently performed evolution.
- Mixed-gas diving shall be performed in accordance with UESI Procedure DSP-005.
- The use of mixed gas must be approved by the UESI Branch Manager.

### 11.6 SATURATION DIVING

The use of saturation diving requires special procedures, training, and equipment and is not a diving mode that is engage in by UESI.

## 12.0 GENERAL CRITERIA FOR PERSONNEL

Each person engaged in diving and underwater operations shall possess the necessary qualifications for the job assignment. Designation of skill levels in these standards incorporates three primary elements:

- Technical training.
- Field experience.
- Demonstrated proficiency.

Persons assigned to specific diving and underwater activities shall possess the following:

- Diving procedures and techniques.
- Emergency procedures.
- Physiology and physics as they relate to diving.
- Diving equipment.
- First aid and CPR.
- Familiarity with procedures and proficiency in the use of tools, equipment, devices and systems associated with the assigned tasks.
- For persons engaged as divers or otherwise exposed to hyperbaric conditions, physical qualifications for such activities must be met as outlined in **ADCI Standards for Commercial Diving Section 2.3 Diver Medical Requirements**. Such physical qualifications must be documented on an **ADCI medical history and physical examination form**, or an equivalent form.

### 13.0 COMMERCIAL DIVER MEDICAL REQUIREMENTS

It is recommended that candidates attending formal commercial diver training programs and schools follow the ADCI medical and examination guidelines outlined in this section.

#### 13.1 GENERAL

- For persons engaged as divers, or otherwise subjected to hyperbaric conditions, the following ADCI medical examinations (or equivalent) are required.
  - An initial medical examination by a physician qualified to perform commercial diver medical examination following the ADCI recommended guidelines.
  - Periodic examinations are recommended on an annual basis.
  - A re-examination after a diving-related injury or illness as needed to determine fitness to return to diving duty.
- For the purposes of these medical requirements all examinations are to be performed only by licensed physicians qualified to perform commercial diver medical examinations.

#### 13.2 PHYSICAL EXAMINATION

For persons engaged as divers or otherwise subjected to hyperbaric conditions, the initial exam and periodic medical re-examination will be recorded using the ADC diving medical examination form and will include the following:

- Work history.
- The tests required in ADCI Standards for Commercial Diving Medical Section; Table 1 as appropriate.
- Any tests deemed necessary to establish the presence of any of the disqualifying conditions listed in this section.
- Any additional tests the physician deems necessary.
- All persons engaged as divers or otherwise subjected to hyperbaric conditions are required to get an annual exam. More frequent or extensive examination(s), including a complete medical re-examination, should be required if there have been any incidents (illness, accidents, etc.) during that year that may have caused a change in the individual's medical condition. The diver is required to notify the diving medical examiner of any changes in his/her medical condition including any change in medications.

#### 13.3 RE-EXAMINATION AFTER INJURY OR ILLNESS

- Any person engaged as a diver, or otherwise exposed to hyperbaric conditions, will have a medical examination following a known diving-related injury or illness that requires hospitalization or known decompression sickness with audio-vestibular, central nervous system dysfunction or arterial gas embolism. Divers experiencing type 1 decompression sickness that is treated and symptoms resolve with a single treatment table do not need to be seen by a diving medical examiner prior to return to diving.
- Any person engaged as a diver, or otherwise exposed to hyperbaric conditions, will have a medical evaluation following any non-diving injury or illness that requires any prescription medication, any surgical procedure or any hospitalization.
- The person should not be permitted to return to work as a diver, or otherwise be subjected to hyperbaric conditions, until he or she is released by a physician recognized by the ADCI to do so.
- The examining physician should determine the scope of the examination in light of the nature of the injury or illness.

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### MEDICAL TESTS FOR DIVING (Medical Section Table 1)

Test	Initial	Annual	Comments
History & Physical	X	X	Include predisposition to unconsciousness, vomiting, cardiac arrest, impairment of oxygen transport, serious blood loss or anything that, in the opinion of the examining physician, will interfere with effective underwater work.
Chest X-ray	X	X	PA and lateral (Projection: 14" x 17" minimum) every three years unless medical conditions dictate otherwise.
<b>Bone and Joint X-ray Survey</b>	X		Optional and as medically indicated.
<b>EKG: Standard (12 Leads)</b>	X		Optional initially to establish baseline; annually after age 35; and as medically indicated.
<b>EKG: Stress Test</b>			Required as medically indicated if the Framingham Risk Score indicates risk of >10%.
<b>Spirometry</b>	X	X	Required including FVC, FEV1 and FEF25-75. Tests should be compared with NHANESIII reference values for determining percent of predicted.
<b>Audiogram</b>	X	X	Threshold audiogram by pure tone audiometry; bone conduction audiogram as medically indicated.
<b>EEG</b>			Required only as medically indicated.
<b>Visual Acuity</b>	X	X	Required initially and annually.
<b>Color Blindness</b>	X		Required.
<b>Complete Blood Count</b>	X	X	
<b>Routine Urinalysis</b>	X	X	
<b>Pregnancy Test</b>	X	X	Recommended prior to saturation diving.
<b>Sickle Cell Screen</b>	X		Optional.
<b>TB Screening</b>	X	X	Optional.
<b>Comprehensive Metabolic Profile</b>	X	X	Optional, including cholesterol and triglycerides required for divers over 40.
<b>Framingham Risk Score</b>	X	X	Required annually after the age of 35.

#### 13.4 PHYSICIAN'S WRITTEN REPORT

- A written report outlining a person's medical condition and fitness to engage in commercial diving or other hyperbaric activities should be provided by the examining physician at any time a physical examination is required herein. The written **physical examination form** should be accompanied with a completed copy of the standard **ADCI medical history form**.
- The examining physician should be qualified by experience or training to conduct the commercial diver physical examination.
- Fit to Dive physicals and statements must be in accordance with the ADCI format or an equivalent alternative.

#### 13.5 DISQUALIFYING CONDITIONS

A person having any of the following conditions, as determined by a physician's examination, shall be disqualified from engaging in diving or other hyperbaric activities.

- History of seizure disorder other than early childhood febrile conditions.
- Cystic bullous or cavitory disease of the lungs, significant obstructive or restrictive lung disease and/or spontaneous pneumothorax.
- Chronic inability to equalize sinus and middle ear pressure.
- Significant central or peripheral nervous system disease or impairment.
- Chronic alcoholism, drug abuse or dependence or history of psychosis.
- Hemoglobinopathies associated with comorbidities.
- Any person engaged as a diver, or otherwise exposed to hyperbaric conditions, will have a medical evaluation following any non-diving injury or illness that requires any prescription medication, any surgical procedure, or any hospitalization.

- Untreated or persistent/metastatic or other significant malignancies including those that require chemotherapy and/or radiation therapy unless five years after treatment with no evidence of recurrence.
- Hearing impairment in the better ear should be at least 40 dB average in the 500, 1000, and 2000 Hz frequencies.
- Justa-articular osteonecrosis is disqualifying.
- Chronic conditions requiring continuous control by medication that increases risks in diving.
- Pregnancy.

### 13.6 WITHDRAWAL FROM HYPERBARIC CONDITIONS FOR DIVERS

It shall be determined based on the physician's examination whether a person's health will be materially impaired by continued exposure to hyperbaric conditions. The physician should indicate, in the written report, any limitations or restrictions that would apply to the person's work activities.

## 14.0 ASSIGNMENTS AND CREW DESIGNATIONS

### 14.1 ENTRY LEVEL TENDER/DIVER

#### Responsibilities

- Continuously tender a diver.
- Prepare and support the dive until its completion.
- Support any in-water decompression.
- Assist the diver in dressing and undressing.
- Confirm the diver's equipment is functioning and notify the Dive Supervisor when the diver is ready.
- Tend the diver's umbilical.
- Be aware of the diver's depth at all times.
- Set up and operate equipment as directed by the Dive Supervisor.
- Perform routine maintenance on diving equipment.
- Repair equipment as qualified.
- Work topside as directed.
- Be alert to unsafe conditions or hazards.
- Operate the decompression chamber as directed.
- Monitor chamber occupant and communicate routinely.
- Complete all required paperwork.
- Conduct no other operations when running a chamber.
- Perform tasks as a diver or standby when directed to do so by supervisor.
- Join and monitor a diver in the chamber when undergoing decompression or treatment.
- Be alert for ailments that might affect the diver during chamber operations.
- Report all symptoms of DCS or any other ailment to dive Supervisor immediately.
- Maintain personal diver's logbook.
- Study and understand employer's operational policies and governmental regulations related to required duties while conducting diving operations.
- Maintain a safe, clean and organized dive station.
- Continuously inspect all equipment during its use.
- Communicate clearly with all other crew members, both verbally and in writing when required.

#### Qualifications and Certifications

- ADCI Entry-Level Tender/Diver certification card.
- Successful completion of a "Fit to Dive" Physical.
- Valid CPR and First Aid Certificate.
- High School Diploma or equivalent.
- Be 18 years old or older.

## 14.2 DIVER 1,2 or 3

### Responsibilities

- Complete all tasks assigned by the Dive Supervisor.
- Understand all life support and ancillary equipment designated to the diving operation.
- Study and understand employer's operational policies and governmental regulations related to required duties while conducting diving operations.
- Have reviewed and understand the Job Hazard Analysis (JHA).
- Maintain a high level of physical fitness.
- Comply with all commands from the Diving Supervisor.
- Ensure the diver's deepest depth is reported to Dive Supervisor prior to leaving bottom.
- Transition from the water into the chamber without delay.
- Act as the Standby Diver when directed to do so.
- Act as the chamber operator when directed to do so.
- Comply with all regulations or instructions regarding the use, maintenance, repair and testing of all diving equipment.
- Maintain personal diver's logbook.
- Report any ailments or injuries to Dive Supervisor.
- Report any symptoms of DCS to Dive Supervisor.
- Report any defective equipment or tooling to Dive Supervisor.
- Be alert for unsafe conditions or hazards.
- Conduct all tasks in a safe manner.
- Remain at the dive station for at least 1 hour after dive or chamber decompression.
- Understand the rules involved in flying or traveling to higher altitudes after diving.
- Ensure that the dive equipment has been inspected, correctly maintained, properly prepared and tested prior to diving operations.
- Maintain a safe, clean and organized dive station.
- Continuously inspect all equipment during its use.
- Communicate clearly with all other crew members, both verbally and in writing when required.
- Ensure the tasks to be performed are clearly understood and no questions exist prior to getting in the water.
- Act as the Standby Diver when directed.

### Qualifications and Certifications

- Designated level through experience, knowledge and skills. Diver 3-1, 1 being most experienced.
- Meet all entry level requirements.
- Undergo a "Fit to Dive" physical before conducting any dives.
- Possess a valid CPR and First Aid Certification.

## 14.3 SURFACE SUPPLIED AIR DIVING SUPERVISOR

### Responsibilities

- Understand the role of crew leader.
- Prior to beginning operations, notify all stakeholders that diving operations are taking place.
- Ensure diving operations are undertaken from a suitable and safe location.
- Develop the Pre-Dive and Post Dive Check lists.
- Effectively manage all members of the dive team. Assign tasks and supervise the crew's activities.
- Conduct a shift safety briefing prior to the commencement of any work activities. Review:
  - Day work plan
  - Expected work tasks
  - Associated hazards
  - The steps required to eliminate or mitigate those risks
  - Dive plan

- Maintain a safe and clean jobsite.
- Control all visitors that approach the worksite.
- Ensure all members of the crew and all visitors review the JHA and sign to acknowledge the safety briefing.
- Test all communication equipment prior to any dive.
- Assess the physical and mental condition of all crew members to ensure they appear able to undertake their respective assignments.
- Ensure that all equipment is inspected, suitable for the job and meets industry standards and regulations.
- Ensure all manuals, tables and documents are on site and readily accessible.
- Maintain record of all dives- depth, bottom times and breathing media.
- Maintain records of all work activities.
- Ensure the diver is continuously tended while in the water.
- Terminate a dive when appropriate.
- Assess and record the diver's condition at the conclusion of the dive.
- Ensure the diver remains awake and at the dive station for at least an hour after any decompression or dives outside the no decompression limit.
- Report all accident, injuries, incidents or near-misses as required by employer.
- Draft and submit required reports and dive related paperwork as required by governing bodies and the employer.
- Review and sign accurate entries made into a diver's personal logbook.
- Maintain a supervisor's logbook, which details all dives and any medical treatments.

#### **Qualifications and Certifications**

- Designation through experience, knowledge and skills.
- Successfully complete the ADCI Supervisor's Exam.
- Undergo a "Fit to Dive" physical before conducting any dives.
- Possess a valid CPR and First Aid Certification.

#### **14.4 MIXED GAS DIVER**

##### **Responsibilities**

- Complete all tasks assigned by the Dive Supervisor.
- Understand all life support and ancillary equipment designated to the diving operation.
- Study and understand employer's operational policies and governmental regulations related to required duties while conducting diving operations.
- Have reviewed and understand the Job Hazard Analysis (JHA).
- Maintain a high level of physical fitness.
- Comply with all commands from the Diving Supervisor.
- Ensure the diver's deepest depth is reported to Dive Supervisor prior to leaving bottom.
- Transition from the water into the chamber without delay.
- Act as the Standby Diver when directed to do so.
- Act as the chamber operator when directed to do so.
- Comply with all regulations or instructions regarding the use, maintenance, repair and testing of all diving equipment.
- Maintain personal diver's logbook.
- Report any ailments or injuries to Dive Supervisor.
- Report any symptoms of DCS to Dive Supervisor.
- Report any defective equipment or tooling to Dive Supervisor.
- Be alert for unsafe conditions or hazards.
- Conduct all tasks in a safe manner.
- Remain at the dive station for at least 1 hour after dive or chamber decompression.
- Understand the rules involved in flying or traveling to higher altitudes after diving.
- Ensure that the dive equipment has been inspected, correctly maintained, properly prepared and tested prior to diving operations.
- Maintain a safe, clean and organized dive station.

- Continuously inspect all equipment during its use.
- Communicate clearly with all other crew members, both verbally and in writing when required.
- Ensure the tasks to be performed are clearly understood and no questions exist prior to getting in the water.
- Act as the Standby Diver when directed.

#### **Qualifications and Certifications**

- Undergo a "Fit to Dive" physical before conducting any dives.
- Possess a valid CPR and First Aid Certification.

### **14.5 MIXED GAS DIVING SUPERVISOR**

#### **Responsibilities**

- Understand the role of a crew leader.
- Prior to beginning operations, notify all stakeholders that diving operations are taking place.
- Ensure diving operations are undertaken from a suitable and safe location.
- Develop the Pre-Dive and Post Dive Check lists.
- Effectively manage all members of the dive team. Assign tasks and supervise the crew's activities.
- Conduct a shift safety briefing prior to the commencement of any work activities. Review:
  - Day work plan
  - Expected work tasks
  - Associated hazards
  - The steps to eliminate or mitigate those risks
  - Dive plan
- Maintain a safe and clean jobsite.
- Control all visitors that approach the worksite.
- Establish a dive plan which ensures that sufficient breathing gases are available in sufficient quantities to complete all dives.
- Ensure all members of the crew and all visitors review the JHA and sign to acknowledge the safety briefing.
- Test all communication equipment prior to any dive.
- Assess the physical and mental condition of all crew members to ensure they appear able to undertake their respective assignments.
- Ensure that all equipment is inspected, suitable for the job and meets industry standards and regulations.
- Ensure all manuals, tables and documents are on site and readily accessible.
- Maintain record all dives- depths, bottom times and breathing media.
- Maintain records of all work activities.
- Ensure the diver is continuously tended while in the water.
- Terminate a dive when appropriate.
- Assess and record the diver's condition at the conclusion of the dive.
- Ensure the diver remains awake and at the dive station for at least an hour after any decompression or dives outside the no decompression limit.
- Report all accidents, injuries or near-misses as required by employer.
- Draft and submit required reports and dive related paperwork as required by governing bodies and the employer.
- Review and sign accurate entries made into the diver's personal log book.
- Maintain a supervisor's logbook, which details all dives and any medical treatments.

#### **Qualifications and Certifications**

- Designation through experience, knowledge and skills
- Successfully complete the ADCI Supervisor's Exam.
- Undergo a "Fit to Dive" physical before conducting any dives.
- Possess a valid CPR and First Aid Certification.

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#### 14.6 GENERAL PROVISIONS

- Each dive team member shall be assigned tasks in accordance with the employee's experience or training, except that limited additional tasks may be assigned to an employee undergoing training provided that these tasks are performed under the direct supervision of an experienced dive team member.
- UESI will not require a dive team member to be exposed to hyperbaric conditions against the employee's will, except when necessary to complete decompression or treatment procedures.
- UESI shall not permit a dive team member to dive or be otherwise exposed to hyperbaric conditions for the duration of any temporary physical impairment or condition which is known to the employer and is likely to affect adversely the safety or health of a dive team member, or which may prevent them from performing specific tasks. These conditions include, but are not limited to: colds, alcohol intoxication or it's aftereffects, the influence of drugs, pregnancy, respiratory or middle ear diseases, skin or external ear infections, excessive fatigue, or emotional distress.

#### 14.7 DESIGNATED PERSON IN CHARGE

- An employee designated by UESI shall be at the dive location in charge of all aspects of the diving operation affecting the safety and health of dive team members.
- The designated person in charge shall have experience and training in the conduct of the assigned diving operation.

#### 15.0 PRE-DIVE PROCEDURES

##### 15.1 GENERAL

The diving supervisor shall provide or assure that the following requirements prior to each diving operation, unless otherwise specified, are met.

##### 15.2 EMERGENCY AID

- UESI personnel must have access to telephone communications in the immediate area that the diving operations are being performed. If this is not possible, a cellular telephone or call numbers of the following:
- Decompression Chamber. Any diving operation which requires a decompression chamber will have an operable and manned chamber on site. For emergency purposes, the location of a treatment chamber will be included in the dive planning process. Identification of a chamber will have to be on a project-by-project basis because of the vast number of differing dive location, which UESI conducts operations.
- Identification of nearest hospitals shall be contained in the Dive Safety Plan.
- Identification of nearest physician shall be contained in the Dive Safety Plan in almost all instances, dialing 911 will summon emergency assistance and transportation for injured personnel. If operations are conducted in a remote location, which might be outside of cellular phone or radio range, the mode of transport must be addressed in the Dive Safety Plan.
- The nearest U.S. Coast Guard Rescue Coordination Center shall be identified in the Dive Safety Plan.

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### 15.3 FIRST AID SUPPLIES

- An emergency medical treatment kit (first aid) for diving operations must be approved by a physician and shall be contained in a clearly marked container and available at the dive location at all times. In addition, the following equipment must also be available at any UESI dive location.
- Manual resuscitator (bag type or pocket mask).
- Prophylactic kit – bloodborne pathogens (gloves, bleach/H<sub>2</sub>O solution, etc.)
- American Red Cross – standard First Aid Handbook – or equivalent.
- U.S. Navy Diving Manual (field edition).
- Inspection of first aid kit required annually.
- When used in a decompression chamber or bell, the first aid kit shall be suitable for use under hyperbaric conditions.

#### Recommended First Aid Kit Inventory

First Aid Supplies		
Contents Card	Each	1
Physician Approval Letter	Each	1
Seahorse Case 630	Each	1
Wound Care		
Band Aid Assorted Fabric	Each	100
Burn Dressing 4" x 4"	Each	1
Conforming Gauze 2"	Each	2
Conforming Gauze 4"	Each	2
Cotton Pads	Each	10
Cotton Tipped Applicators 3"	100	1
Elastic Bandage 4"	Each	2
Eye Pad Large	Each	6
Gauze Pads 2" x 3"	Each	8
Gauze Pads 3" x 4"	Each	5
Sam Splint	Each	1
Trauma Dressing 8" x 10"	Each	4
Tape Waterproof 3 in 1	Each	1
Triangular Bandage	Each	3
EMERGENCY	EA	10
Airway Kit Guedel sizes 00-4	Each	1
CPR Pocket Mask	Each	1
Resuscitator Bag Valve Mask with Mask & Tubing	Each	1
Skin Preparations		
BZK Antiseptic Towelettes	Each	10
Burn Free Gel U/D	Each	6
Eye Cup Plastic	Each	1
Eye Wash	120ml	1
Hydrocortisone 1% Cream U/D	Each	10
Hydrogen Peroxide Solutions	120ml	1
Povidone Iodine Swabsticks	Each	10
Triple Antibiotic Ointment U/D	Each	10
Instruments & Medical Appliances		
Biohazard Bag 23" x 23"	Each	4
Instant Cold Compress 5" x 7"	Each	2
First Aid Booklet	Each	1
Forceps Splinter 3.5"	Each	1
Gloves Nitrile Large	1 Pair	6

Safety Pins Large	12	1
Trauma Shears	Each	1
For-purpose manufactured tourniquet	Each	1
<b>Medications</b>		
Acetaminophen 325mg U/D Tablets	Each	10
Alka Seltzer Tablets	12	1
Ammonia Inhalants	10	1
Antacid Calcium Supplement	150	1
Aspirin 325mg U/D Tablets	Each	10
Bismuth Chewable Tablets (Pepto Bismol)	30	1
Charcoal Activated Liquid	120ml	1
Diphenhydramine 25mg Caplets	24	1
Ear Relief (Alcohol Free)	10ml	1
Guaitussin DM Cough Syrup	120ml	1
Ibuprofen 200mg U/D Tablets	Each	10
Loperamide 2mg Caplets	12	1
Pdoehedrine 30mg Tablets	24	1
Sting Relief Medicaine Swabs	10	1
<b>Not for Use in Hyperbaric Chambers</b>		
Alcohol Preps	10	10
Insect Repellent Pump Spray	2oz	1
Oxymetozaline Nasal Spray	15ml	1
Sunscreen Lotion (SPF 30)	120ml	1

#### 15.4 PLANNING AND ASSESSMENT

- The planning of a diving or underwater operation shall include a dive operations plan.
- During the planning and assessment phases of a diving or underwater operation, before diving operations commence, a plan must be developed to ensure the safe and efficient performance of the work. In either case, the dive operations plan is a critical element of any diving or underwater project.
- In general, the operations plan will address such issues as the details relative to the goals and methods for the project, operational sequence, operational safety, crew and equipment requirements, emergency procedures, communications, and regulatory requirements. This list is not finite, and the items to be addressed in the dive operations plan will be uniquely dictated by the specifics of each particular project.
- The Job Hazard Analysis (JHA) is a document specifically designed to identify all project related tasks and the hazards associated with those specific tasks. Once the task and hazard relationship is established, a plan for mitigating or eliminating those hazards is developed. All hazards have to be remedied to a condition where team members are operating in an environment which is as safe as possible.
- A dive operations plan differs from the Job Hazard Analysis (JHA) in that JHA is focused specifically on project safety only, whereas the dive operations plan is designed to ensure the work is well-understood and properly planned, manned and equipped.

#### 15.5 PROJECT SAFETY

- Dive operations will be planned in accordance with UESI safe practices.
- A UESI qualified diving supervisor shall be in charge of the operations.
- All diving personnel shall be qualified for the tasks they are assigned.
- An emergency response plan shall be available, posted and reviewed by all personnel.
- A pre-dive safety meeting shall be conducted.
- The job and all tasks shall be defined, reviewed, and understood by dive team and vessel personnel.

**15.6 Diving and Support Personnel**

- Ensure all divers are trained and experienced for the task they are assigned.
- Verify that all divers are physically and mentally fit to dive.
- Ensure that all personnel on the job have direct communication with all parties directly involved in the dive operation.

**15.7 EQUIPMENT**

- Ensure that dive gear and support equipment has been inspected/checked and ready for dive operations.
- Ensure all emergency and support equipment has been inspected and is fully functional.
- Ensure all needed methods of communication are available and functioning.
- Ensure all first aid/CPR equipment and kits, as well as backboard, are well supplied and available.
- Ensure that all dive flags/shapes/signals are prominently displayed during dive operations.

**15.8 HAZARDOUS ACTIVITIES / CONCURRENT OPERATIONS**

To minimize hazards to the dive team, diving operations shall be coordinated with other activities in the vicinity, which are likely to interfere with the diving operation.

Supporting crafts and subcontractors should be included on all safety briefings, especially the pre-job daily meeting.

**15.9 EMPLOYEE BRIEFING**

- Dive team members shall be briefed on the following:
  - The tasks to be undertaken.
  - Safety procedures for the diving mode.
  - Any unusual hazards or environmental conditions likely to affect the safety of the diving operation.
  - Steps to lessen or mitigate any identified hazards.
  - Any modifications to operating procedures necessitated by the specific diving operation.
- Prior to making individual dive team member assignments, the Dive Supervisor shall enquire into the dive team member's current state of physical fitness and indicate to the dive team member the procedure for reporting physical problems or adverse physiological effects during and after the dive.

**15.10 EQUIPMENT INSPECTION**

The breathing gas supply system including reserving breathing gas supplies, masks, helmets, thermal protection, and bell handling mechanism (when appropriate) shall be inspected prior to each dive.

Dive helmets, personal or company, must be inspected, properly maintained and ensured they are fully functional prior to diving.

**15.11 WARNING SIGNAL**

When diving from surfaces other than vessels in the areas capable of supporting marine traffic, an appropriate warning display shall be exhibited near the worksite so that it has "all-around" visibility. This signal should be given only during active diving evolutions. The signal may include shapes, lights, flags or placards.

**16.0 EMERGENCY PROCEDURES**

The below listed procedures are steps that should be taken in the event of an unexpected event that occurs, which endangers the diver. Any emergency will necessitate that the dive be terminated and events leading to and actions during the emergency thoroughly examined and documents.

**16.1 LOSS OF BREATHING MEDIA**

- Diver to source breathing gas from "bailout:
- Supervisor to activate secondary air/gas supply.

- Supervisor sends air/gas to diver's pneumofathometer – Diver to place pneumofathometer hose end into hat under neck dam after bubbles emerge from the hose end.
- Alert Standby Diver.
- Diver travels to bell/stage/surface.
- If required send standby diver to assist recovery of primary diver.
- Terminate dive.

#### 16.2 LOSS OF DIVER COMMUNICATION

- Attempt to re-establish communications.
- If unable to re-establish communication, attempt to signal diver via line pull signals.
- Send breathing air/gas to diver via pneumofathometer.
- Alert Standby Diver.
- Diver travels to bell/stage/surface.
- Bring diver to first stop via line pull signals.
- If required send standby diver to assist recovery of primary diver.
- Terminate dive.

#### 16.3 LOST DIVER

- Diver hose always tended by top side dive crew.
- Diver has constant communication with top side crew.
- If communication is lost attempt to re-establish communications.
- If unable to re-establish communication, attempt to signal diver via line pull signals.
- Alert standby diver.
- If required send standby diver to assist recovery of primary diver.
- Terminate dive.

#### 16.4 FOULED OR ENTRAPPED DIVER

- Ensure diver does not ditch equipment.
- Diver informs topside of situation.
- Alert Standby Diver.
- Diver determines extent of entrapment and attempts to free himself or herself.
- If required send standby diver to assist recovery of primary diver.
- Terminate dive.

#### 16.5 INJURED DIVER IN THE WATER

- Diver informs topside and dive is aborted.
- Alert Standby Diver.
- Diver informs topside of nature and extent of injury.
- If required send standby diver to assist recovery of primary diver.
- Supervisor to monitor diver's breathing. If diver stops breathing, attempt to over pressurize diver's regulator.
- If required send standby diver to assist recovery of primary diver.
- Recover injured diver from the water.
- If needed, request medical assistance and evacuation of injured crew.

#### 16.6 DIVER BLOW UP / RAPID ASCENT TO SURFACE

- UESI Dive Supervisor will coordinate medical attention to Crew Member
- Dive operations will stop  
Diver will be extracted from water by tender and standby diver
- UESI personnel are trained and qualified in administering CPR and basic first aid. Dive supervisor will coordinate administration of first aid, pending the severity of the illness or injury, and contact local medical responders.

- Emergency services will transport injured crew member to the appropriate medical aid under the supervision of the Emergency Medical Team or the Designated UESI personnel.

#### 16.7 DIVER LOSS OF CONSCIOUSNESS

- The UESI Dive Supervisor will coordinate the rescue effort.
- Instruct standby diver(s) assist in extraction if needed. Standby diver(s) will be recovered as soon as conditions permit. Standby divers will be continuously monitored during diver extraction.
- Diver will be removed from the water. If removing a diver from the water by hand is not practical due to access conditions, UESI will need to ensure a lifting device is available for immediate extraction.
- UESI personnel are trained and qualified in administering CPR and basic first aid, will remove the diver's helmet and check for breathing and pulse. If breathing is absent but pulse is present, start mouth-to-mouth ventilation while removing the dive suit. If breathing and pulse are absent, remove suit and begin CPR.
- When the medical team arrives, they shall take charge, providing the diver's condition is not a dive-related accident such as an air embolism. In the case of a dive-related medical problem, the UESI dive team supervisor or his designee shall remain in charge of supervising medical treatment. UESI personnel will assist as necessary.
- Emergency services will transport injured crew member to the appropriate medical aid under the supervision of the Emergency Medical Team or the Designated UESI personnel.

#### 16.8 INJURY / ILLNESS OF MEMBER OF THE SURFACE CREW WITH DIVER IN THE WATER

- UESI Dive Supervisor will coordinate medical attention to Surface Crew Member
- Dive operations will stop
- Diver will be extracted from water by tender and standby diver
- UESI personnel are trained and qualified in administering CPR and basic first aid. Dive supervisor will coordinate administration of first aid, pending the severity of the illness or injury, and contact local medical responders.
- Emergency services will transport injured crew member to the appropriate medical aid under the supervision of the Emergency Medical Team or the Designated UESI personnel.

#### 16.9 PARTIAL SEVERANCE OF DIVER'S UMBILICAL – GAS HOSE ONLY

- Send breathing air/gas to diver via pneumofathometer.
- Diver activates bailout.
- Alert Standby Diver.
- Diver to place pneumofathometer hose end into hat under neck dam.
- Diver returns to the stage/surface.
- Terminate dive and decompress diver as required.
- If required send standby diver to assist recovery of primary diver or carry new bailout or hose to primary diver.

#### 16.10 COMPLETE SEVERANCE OF DIVER'S UMBILICAL

- Diver activates bailout and returns to stage/surface.
- Alert Standby Diver.
- Deploy Standby Diver if Primary Diver has yet to surface.
- Deploy marker buoy at diver's last known location.
- Standby Diver to carry new bail out bottle or hose to Primary Diver. Travel using the down line of stage wire.
- Terminate dive and decompress divers as required.

#### 16.11 DIVE STATION FIRE

- Topside Fire
- Employ standard firefighting measures.
- Suspend diving operations if required.

- Evacuate dive station if required.

#### 16.12 FIRE INSIDE PVHO

- Each chamber must have a means of extinguishing a fire from inside.
- Notify dive control of fire.
- Evacuate nearby chambers and workstations if possible.
- Diver inside chamber to put on BIBS with emergency gas.
- Secure electrical power to non-essential systems.
- Extinguish fire.
- Vent Chamber.
- Determine condition of chamber occupant.

#### 16.13 EQUIPMENT FAILURE – DIVER IN THE WATER

- Evaluate effect on diver.
- Inform diver of even and plan of action.
- Alert Standby Diver.
- Alert Back Deck.
- Diver informs topside of his/her status.
- Dive terminated – Diver recovered to the surface.

#### 16.14 ADVERSE WEATHER/ENVIRONMENTAL CONDITIONS

- The Safe Dive Plan or JHA should consider the following conditions and mitigate associated risks.
- Inclement weather.
- High sea state.
- High currents.
- Wind, rain and lightning.
- Toxic gases.
- Dangerous marine life.

#### 16.15 DIVER SYMPTOMS OF OXYGEN TOXICITY WHILE IN THE WATER

- Supervisor notes signs or diver reports symptoms.
- Reduce Oxygen partial pressure or switch to AIR.
- Deploy Standby Diver.
- Decompress on appropriate table unless a 50/50 mix is available for in-water decompression.

#### 16.16 OXYGEN TOXICITY DURING TREATMENT

- Diver reports to topside.
- Diver to remove O<sub>2</sub> Mask for 15 minutes. Once all symptoms are resolved, return to decompression using Oxygen.
- Lock Tender in chamber to monitor diver's treatment.
- If symptoms return, repeat Step 2.
- If symptoms return, discontinue Oxygen use and seek qualified medical advice.

#### 16.17 EMERGENCY EVACUATION

- Notify all personnel and terminate dive.
- Decompress Diver or follow omitted decompression procedures.
- Evacuate all un-necessary personnel to safe location.
- Inform company management of events.
- Consider emergency procedures for:
  - Loss of power.
  - Loss of Bell.
  - Loss of ROV.
  - Inclement weather.

## 17.0 PROCEDURES DURING DIVE

### 17.1 GENERAL

UESI will comply with the following requirements that are applicable to each diving operation unless otherwise specified.

### 17.2 WATER ENTRY AND EXIT

- There shall be a safe means of entering the water or returning to the dive platform.
- The means may be in the form of a ladder, dive stage or other appropriate device.
- If a ladder is employed, it shall extend no less than 3 feet below the water surface.
- The means of entry and exit shall be adequate to facilitate the rescue/recovery of personnel.
- Safe dive operations with an air gap in excess of 15' need to be considered and the use of a diver's stage might prove appropriate.

### 17.3 COMMUNICATIONS

- An operational two-way voice communication system shall be used between each surface supplied air or mixed gas diver and a dive team member at the dive location.
  - Failure to maintain stable communication between the diver and the dive supervisor shall result in the dive being immediately terminated.
- All on site supporting crafts personnel and subcontractors should be a part of the communication plan.
- An operational, two-way communication system shall be available at the dive location to obtain emergency assistance (cellular phone, VHF radio).
  - The dive plan should include a secondary and tertiary method of emergency communication.

### 17.4 DECOMPRESSION TABLES

The latest revision(s) of applicable decompression, repetitive and no-decompression tables shall be at the dive location.

US Navy Dive Manual Rev 7

**Table 9-7. No-Decompression Limits and Repetitive Group Designators for No-Decompression Air Dives.**

Depth (fsw)	No-Stop Limit	Repetitive Group Designation															
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Z
10	Unlimited	57	101	158	245	426	*										
15	Unlimited	36	60	88	121	163	217	297	449	*							
20	Unlimited	26	43	61	82	106	133	165	205	256	330	461	*				
25	1102	20	33	47	62	78	97	117	140	166	198	236	285	354	469	992	1102
30	371	17	27	38	50	62	76	91	107	125	145	167	193	223	260	307	371
35	232	14	23	32	42	52	63	74	87	100	115	131	148	168	190	215	232
40	163	12	20	27	36	44	53	63	73	84	95	108	121	135	151	163	
45	125	11	17	24	31	39	46	55	63	72	82	92	102	114	125		
50	92	9	15	21	28	34	41	48	56	63	71	80	89	92			
55	74	8	14	19	25	31	37	43	50	56	63	71	74				
60	63	7	12	17	22	28	33	39	45	51	57	63					
70	48	6	10	14	19	23	28	32	37	42	47	48					
80	39	5	9	12	16	20	24	28	32	36	39						
90	33	4	7	11	14	17	21	24	28	31	33						
100	25	4	6	9	12	15	18	21	25								
110	20	3	6	8	11	14	16	19	20								
120	15	3	5	7	10	12	15										
130	12	2	4	6	9	11	12										
140	10	2	4	6	8	10											
150	8		3	5	7	8											
160	7		3	5	6	7											
170	6			4	6												
180	6			4	5	6											
190	5			3	5												

\* Highest repetitive group that can be achieved at this depth regardless of bottom time.

Table 9-8. Residual Nitrogen Time Table for Repetitive Air Dives.

Locate the diver's repetitive group designation from his previous dive along the diagonal line above the table. Read horizontally to the interval in which the diver's surface interval lies. Next, read vertically downward to the new repetitive group designation. Continue downward in this same column to the row that represents the depth of the repetitive dive. The time given at the intersection is residual nitrogen time, in minutes, to be applied to the repetitive dive.

\* Dives following surface intervals longer than this are not repetitive dives. Use actual bottom times in the Air Decompression Tables to compute decompression for such dives.

Residual Nitrogen Time (Minutes)

Depth	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Z
10	2:20	1:17	1:10	1:04	1:00	1:00	1:00	1:00	1:00	1:00	1:00	1:00	1:00	1:00	1:00	1:00
15	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06
20	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06
25	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06
30	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06
35	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06	1:06	1:06	1:06	1:06
40	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06	1:06	1:06	1:06
45	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06	1:06	1:06
50	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06	1:06
55	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06	1:06
60	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06	1:06
65	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06	1:06
70	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10	1:06
75	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16	1:10
80	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20	1:16
85	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36	2:20
90	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49	3:36
95	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41	4:49
100	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33	5:41
105	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25	6:33
110	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17	7:25
115	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09	8:17
120	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02	9:09
125	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29	10:02
130	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56	11:29
135	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23	12:56
140	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50	14:23
145	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17	15:50
150	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44	17:17
155	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11	18:44
160	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38	20:11
165	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05	21:38
170	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32	23:05
175	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00	24:32
180	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27	26:00
185	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54	27:27
190	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21	28:54
195	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48	30:21
200	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15	31:48
205	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42	33:15
210	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09	34:42
215	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36	36:09
220	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03	37:36
225	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30	39:03
230	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57	40:30
235	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24	41:57
240	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51	43:24
245	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18	44:51
250	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45	46:18
255	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12	47:45
260	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39	49:12
265	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06	50:39
270	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33	52:06
275	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00	53:33
280	76:45	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27	55:00
285	78:12	76:45	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54	56:27
290	79:39	78:12	76:45	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21	57:54
295	81:06	79:39	78:12	76:45	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48	59:21
300	82:33	81:06	79:39	78:12	76:45	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15	60:48
305	84:00	82:33	81:06	79:39	78:12	76:45	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42	62:15
310	85:27	84:00	82:33	81:06	79:39	78:12	76:45	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09	63:42
315	86:54	85:27	84:00	82:33	81:06	79:39	78:12	76:45	75:18	73:51	72:24	70:57	69:30	68:03	66:36	65:09
320	88:21	86:54	85:27	84:00	82:33	81:06	79:39	78:12	76:45	75:18	73:51	72:24	70:57	69:30		

### 17.5 DIVE PROFILES

A depth-time profile including, when appropriate, any breathing gas changes shall be maintained for each diver during the dive including decompression.

### 17.6 HAND-HELD POWER TOOLS AND EQUIPMENT

- Hand-held electrical tools and equipment being utilized near water shall be energized only if a ground interrupt circuit is used.
- Hand-held power tools shall not be supplied with power from the dive location until requested by the diver.

### 17.7 WELDING AND BURNING

- A current supply switch to interrupt the current flow to the welding or burning electrode shall be:
- Tended by a dive team member in voice communication with the diver performing the welding or burning; and kept in the open position except when the diver is welding or burning.
- The welding machine frame shall be grounded.
- Welding and burning cables, electrode holders, and connections shall be capable of carrying the maximum current required by the work and shall be properly insulated.
- Divers performing welding and burning operations shall wear insulating gloves.
- Prior to welding or burning on closed compartments, structures or pipes, which contain a flammable vapor or in which a flammable vapor may be generated by the work, they shall be vented, flooded or purged with a mixture of gases which will not support combustion.

### 17.8 TERMINATION OF DIVE

The working interval of a dive shall be terminated when:

- A diver requests termination.
- A diver fails to respond correctly to communications or signals from a dive team member.
- Communications are lost and cannot be quickly reestablished between the diver and a dive team member at the dive location, and between the designated person-in charge and the person controlling the vessel in live-boating operations.
- A diver begins to use diver carried reserve breathing gas or the dive location reserve breathing gas.

### 18.0 POST DIVE PROCEDURES

After the completion of each dive, the diver shall:

- Be questioned as to his or her physical condition.
- Be instructed to report any physical problems or adverse physiological effects, including symptoms of decompression sickness or gas embolism.
- Be advised of the location of an operational decompression chamber.
- Be alerted to the potential hazards of flying after diving.
- Be alerted to the potential hazards of traveling to higher elevations from the dive site.

After the completion of any dive outside the no-decompression time/depth limits, the following recommended:

- Take reasonable steps to have the diver remain awake and in the vicinity of the decompression chamber for at least one hour.
- Instruct such divers to remain within two hours travel time of the decompression chamber for an additional five hours.
- Instruct such divers of the hazards of flying after diving.
- On any dive that results in decompression sickness, proper medical authority should be consulted prior to the diver flying after treatment.

## 19.0 RECOMPRESSION CAPABILITY

A decompression chamber capable of recompression the diver at the surface to a minimum of 165 fsw (6 ATA) shall be available at the dive location for:

- Mixed gas diving shallower than 300 fsw; or diving outside the no decompression limits shallower than 300 fsw.
- The decompression chamber shall be:
  - Dual lock;
  - Multi-place; and located within five minutes of the dive location.
- The decompression chamber shall be equipped with:
  - A pressure gauge for each pressurized compartment designed for human occupancy;
  - A built-in breathing system with a minimum of one mask per occupant;
  - A two-way voice communication system between occupants and a dive team member at the dive location.
  - A view port.
  - Illumination capability to light the interior.
  - Treatment tables, treatment gas appropriate to the diving mode, and sufficient gas to conduct treatment shall be available at the dive location.
- A dive team member shall be available at the dive location during and for at least one hour after the dive to operate the decompression chamber (when required or provided).

## 20.0 DECOMPRESSION PROCEDURE ASSESSMENT

UESI shall:

- Investigate and evaluate each incident of decompression sickness based on the recorded information, consideration of the past performance of decompression table used and individual susceptibility.
- Take appropriate corrective action to reduce the probability of recurrence of decompression sickness.
- Prepare a written evaluation of the decompression procedure assessment, including any corrective action taken.

## 21.0 CONTAMINATED DIVING

### 21.1 GENERAL

Personnel engaged in, but not limited to, project assignments and diving operations involving potential exposure to hazardous materials (HAZMAT), radiological, biological, chemical and other contaminated environments shall comply with the safety guidelines and requirements established in the UESI Health & Safety Program.

UESI's effort to protect their employees from unnecessary exposure to contaminated sources will be accomplished utilizing the following controls:

- Education and training
- Compliance with regulatory standards and guidelines
- Specialized equipment and technology
- Special safety considerations
- Personnel physical examinations and immunizations
- Job scope – communication and planning

In the event an employee feels that he/she has been exposed to a contaminated source, it is the responsibility of that employee to report the incident immediately to his/her supervisor for disposition. Situations where an employee has been acutely exposed to contaminated source will be considered a medical emergency and treated in accordance with the latest emergency medical services (EMS) protocol. UESI's Operations & Safety Department must be notified of the incident immediately.

### 21.2 TRAINING

Personnel that participate in contaminated water diving operations need training consistent with regulatory requirements for the area where operations are to be conducted, such as:

- Hazardous Waste Operations and Emergency Response (HAZWOPER) training is required when clean-up activities are conducted at sites where there is an uncontrolled release of hazardous waste into the environment (or the potential for an uncontrolled release).
  - Working at a facility where hazardous waste is controlled under normal operating conditions will typically fall under HAZCOM (hazard communication), not HAZWOPER.
- Hazard Communication (HAZCOM) training is required before exposure to any hazardous chemicals.
- Bloodborne Pathogens training is required to perform activities at a sewage treatment facility.
- Process safety management (PSM) awareness training will be required when a facility stores certain amounts of specific listed hazardous chemicals.

Specific training must be furnished in:

- Dry suits.
- Personal protective equipment for topside and diving personnel.
- Decontamination procedures, including preparation of the disinfectant or other solution intended for use.
- Decontamination of personnel and equipment used during operations.

### 21.3 SITE EVALUATION

When operations will take place where the water is suspected or known to be contaminated, a site assessment must be conducted. This assessment should include:

- Any suspected contaminants and potential hazards.
- Testing of the dive environment: It is not always possible to tell whether an environment is contaminated either by sight or smell. Any diving environment should be approached with caution, and when contamination is suspected, the water should be tested prior to commencing operations.
- Wind: In situations where there may be toxic fumes, the dive station, compressor and topside personnel must be situated up-wind from any source of contamination to the air.
- Current: Both on the surface and underwater, the diver should approach any known point-source of contaminant from the up-current side whenever possible. This will allow the current to carry contaminants away from the diver.

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- **Perimeter:** Whenever possible, a perimeter should be established around the dive station and dive site to keep unprotected persons away from any possible contamination.
- **Established zones:** Zone management should be employed when applicable to keep unprotected personnel and equipment outside of the hot zone.

#### 21.4 TOPSIDE PERSONNEL PROTECTIVE EQUIPMENT: EPA SELECTION GUIDELINES

To aid in the selection of complete protective ensembles, including chemical protective clothing and respirators, the United States Environmental Protective Agency's (EPA) Office of Emergency and Remedial Response has designated four levels of chemical hazards, ranging from extremely dangerous or unknown (Level A) to situations where only basic workwear (Level D) is the required protection. The OSHA standard recommends the use of these guidelines, which can assist employers in complying with the protective equipment requirements of the standard.

The following is a brief review of the EPA guidelines. These are explained in greater detail in Appendix B of the OSHA standard and Table 1 (in this section).

- **Level A** calls for a vapor-right suit (total-encapsulating) that is non-permeable to the chemicals to which a worker will be exposed. Also necessary is an approved, positive-pressure, self-contained breathing apparatus (SCBA) or a NIOSH-approved, positive-pressure air-line respirator with escape SCBA having no less than a five-minute air cylinder. Outer and inner chemical-resistant boots with a steel toe and shank should also be used.
- **Level B** necessitates the same level of respiratory protection and complete skin coverage as Level A. However, protective clothing does not have to be vapor tight.
- **Level C** calls for a full-face piece, or half-mask air-purifying respirator; splash garments used with outer and inner chemical resistant gloves; and chemical resistant boots with a steel toe and shank.
- **Level D** calls for basic workwear such as long sleeve coveralls, hard-soled shoes and face shields or goggles.

Before any diving operation is conducted in contaminated water, a risk assessment is vital. Personal protective equipment (PPE) must be selected based on its known ability to protect workers from the specific hazards present or suspected. This applies to the diver and the topside personnel. There are four different categories of topside PPE, from the least protective (Level D) to total encapsulation (Level A). Requirements for these levels are set forth in Table 1 in this section.

The key variable that must be considered when selecting PPE are:

- Identification of the hazard(s).
- Route of potential hazard to employees, e.g., inhalation, skin absorption, ingestion and eye or skin contact.
- The performance of PPE materials, seams, visors and all other vital components.
- Matching PPE durability of materials such as seam, tear, burst and abrasion strength to dive site-specific conditions.
- Matching site environmental conditions to PPE effect on employees (e.g., heat stress, hypothermia, dehydration, duration of task, etc.).
- Equipment selection (PPE). Site-specific variables must be considered, and protection geared to the worst-case situation if those variables are not positively identified. The more that is known about the site, the easier it will be to customize suitable PPE to ensure protection of the dive team topside members.

<b>TABLE 1</b>				
<b>GUIDELINES FOR SELECTION OF PERSONAL PROTECTIVE EQUIPMENT</b>				
<b>EPA Level</b>	<b>Respiratory Protection</b>	<b>Protective Clothing</b>	<b>Hand and Foot Protection</b>	<b>Additional Protection</b>
<b>B</b>	An approved positive-pressure, full face-piece, self-contained breathing apparatus (SCBA) or An approved, positive-pressure, supplied-air respirator with escape SCBA (minimum 5-minute duration)	Totally encapsulating chemical protective suit specifically designated to resist permeating by chemicals that are encountered	Gloves: Outer and inner chemical-resistant gloves  Boots: Chemical-resistant, with steel toe and shank	<ul style="list-style-type: none"> <li>• Coveralls</li> <li>• Long underwear</li> <li>• Hard hat</li> <li>• Two-way radio communication system</li> </ul>
	An approved full face-piece or half-mask air-purifying respirators	Hooded chemical-resistant clothing made to the chemicals encountered (coveralls and long-sleeved jacket; one- or two-piece chemical splash suit; disposable chemical-resistant overalls).		<p style="text-align: center;"><b>Above, plus:</b> Face shield Boot covers (disposable, chemical-resistant)</p> <p style="text-align: center;"><b>Above, plus:</b> all items that precede it Escape tank</p>
<b>C</b>				
<b>D</b>		Coveralls	Boots: Chemical-resistant, with steel toe and shank	<p style="text-align: center;"><b>Above, plus:</b> all items that precede it Safety glasses or splash goggles Gloves</p>

### 21.5 DIVER -WORN OR CARRIED EQUIPMENT AND ACCESSORIES

Selection of the diver-worn equipment must be based on the level of contamination protection required. The following equipment configurations are only recommendations. Responsibility for selection of equipment and diving techniques must be made by the persons engaged in the diving activity as identified in the dive plan and/or job safety / hazard analysis.

Equipment that supports the diver must also be compatible with the contaminants that may be encountered.

There are three levels of protection for diver-worn equipment and accessories, from the most protective (Level One) to the least protective (Level Three). Requirements for these levels are set forth in Table 2 in this section.

All diver-worn equipment should be tested for integrity and function prior to the diving operation.

**TABLE 2  
DIVER-WORN OR CARRIED EQUIPMENT AND ACCESSORIES**

<b>Level One (Most Protective)</b>	<b>Level Two</b>	<b>Level Three (Least Protective)</b>
<ul style="list-style-type: none"> <li>For diving in waters containing biological contamination, petroleum fuel, lubricating oils and industrial chemicals known to cause long-term health risks or death.</li> <li>Helmeted surface-supplied diver with mated non-porous dry suit with attached boots, gloves and a return line exhaust or double exhaust valve system.</li> </ul> <p><b>Note:</b> The use of Level One protection should take into consideration the chemical compatibility of the equipment being used and the resultant permeation of waterborne contamination into the equipment. (Consult manufacturer's data). Diving in waters containing strong chemicals or nuclear contamination where even minor exposure could cause a serious threat will require special consideration and planning, equipment precaution, and training.</p>	<ul style="list-style-type: none"> <li>Biological or chemical contamination that will cause short-term health effects but will not cause lasting injury, disability or death.</li> <li>Surface-supplied umbilical with dry suit with attached and sealed hood, gloves and boots.</li> <li>Full-face mask that overlays the dry suit hood face seal.</li> </ul>	<ul style="list-style-type: none"> <li>Recommended for diving in waters that are considered to pose a minimal health risk.</li> <li>Scuba/surface-supplied umbilical with half-mask or full mask, chafing overalls, and hand and foot protection.</li> </ul>

**Any actual or suspected breach of Level One diving system is case for the immediate termination of diving operations.**

### 21.6 DECONTAMINATION PROCEDURES

In certain highly contaminated diving situations, the following procedures may be applied but are not necessarily applicable for every job:

- The area surrounding the diving control station may be divided into three zones for proper isolation of contamination. The zone immediately surrounding the point of water entry/exit is deemed "high contamination." The zone where divers and gear progress after initial decontamination is termed "low contamination." The final zone into which the divers progress after they have been decontaminated and all diving gear removed is "clean."
- An effective color-coding system may be employed to communicate clearly the demarcation point of the decontamination area. One system might be to use red to identify all "high" areas, yellow for "low" areas and green for "clean" areas. If at all feasible, the "clean" zone should be positioned up-wind of the contaminated zones.
- Initial freshwater rinse: Spray off bulk of contaminants using high-pressure, clear freshwater rinse. If effluent does not require capture, begin hosing diver as he or she initially exits water to limit quantity of contaminants transferred to the dive station.
- Take precautions to direct water flow away from potential points of leakage of diver's rig, such as exhaust valves, seal junctions, etc. A high-pressure jet of water directed at such potential breach points may inject contaminants inside of the protective gear and into contact with the diver. Care should be taken to ensure the removal of the bulk of contaminants at this stage in order to afford the greatest efficacy of subsequent decontamination steps.

- **Oversuit:** If a reasonable expectation exists for encountering bulky, adherent contaminants in the course of a dive, the use of a disposable oversuit is strongly encouraged. Disposable, hazardous material protective suits may be secured to a diver after he or she has been outfitted with the entire diving rig.
- No effort to make the oversuit water-tight should be attempted. Such action could complicate the dive by creating air pockets that could affect buoyancy of the diver. As the diver arrives on the dive station, the oversuit should be cut away to allow for decontamination of the diver and equipment. At this time, removal of the dive gear such as harnesses, weight belts, emergency gas supply (bailout) tanks, etc., should be performed with these items themselves being properly decontaminated.
- **Scrub down:** After the diver has been initially rinsed and his or her equipment removed, he or she may be scrubbed with a stiff-bristle synthetic brush and a cleaning solution as applicable. Long handled brushes may facilitate the cleaning process. Hand-held brushes may be employed for detailed cleaning of the dive helmet and the neck-dam interface.
- Once the diver has been thoroughly scrubbed with cleaning solution applied from head to toe, he or she should be rinsed with fresh water. Care should be taken to ensure the diver has been cleaned of all visible contamination, most notably in the area adjacent to the neck-dam, helmet and dry suit.
- The composition of the cleaning solution should be appropriate for the contaminant to be removed.
- **Undress diver:** Once the diver has been adequately decontaminated and moved into the "low contamination" zone, the dive gear should be removed. First, disconnect the locking mechanism from the helmet to dry suit and remove the helmet. Then, remove the dry suit and gloves and finally, the undergarments.
- IF there are no indications that the diving rig has been breached during the dive, the diver may proceed to the "clean" zone and if applicable, take a post-dive shower.
- If there are positive indications of dermal exposure to contaminants, additional decontamination measures may be required.
- **Clean equipment:** After removal from the diver, all equipment should undergo secondary decontamination.
- **Capture effluent:** In some circumstances it will be necessary to capture all fluids used to rinse, wash and re-rinse the diver and equipment and dispose of them in a manner appropriate for hazardous materials. If necessary, the above procedures will need to be altered to ensure that all decontamination procedures take place within a water-impermeable capturing area.

## 21.7 HAZARD EVALUATION AND IDENTIFICATION

- When the threat of a chemical hazard is suspected, consider conducting a historical review of the site. Items such as spill history, known chemicals present, volume of chemicals, active discharges, air quality, present and past nature of operations, and presence of extremely hazardous substances should be examined. Facility safety officers, plant supervisors or technicians may provide useful information.
- When planning contaminated water diver operations, water temperature needs to be taken into account when determining the proper equipment to be used.
- Check with local, state or federal water quality agencies for current advisories on biotoxins, waterborne pathogens, microbial contamination, fish or shellfish advisories, beach closures or storm events, any of which may indicate pollutants to be present.
- When hazardous contaminants are suspected, consider water or sediment sampling and analysis. The selected laboratory can provide proper containers and procedures for sample collection, handling and shipping.
- If the pollutants have been identified, rapid on-site test kits for selected chemicals in sediment or water are, in some cases, available.
- Hand-held detectors for monitoring a class of airborne chemicals, such as volatile organics can be utilized for:
- Initial entry into the staging area during mobilization if the air quality is unknown.
- Continuous monitoring with alarms during diving operations to rapidly notify the participants if air quality changes.
- Scanning the diver upon water exit and after decontamination to determine if contaminants are present.

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- Lists of very dangerous chemicals that may readily penetrate diving equipment or cause substantial harm after a brief exposure can be obtained from the suit manufacturer. If a diver or topside crew member suspects exposure, blood, urine or other biological samples may be gathered for medical review.

## 22.0 LIVEBOATING

Liveboating is a diving technique where a single surface-supplied diver performs work underwater while his hose is being tended from the bow of a vessel which is manually operated by the vessel master and underway using its main propulsion system.

### ADDITIONAL CONSIDERATIONS

Due to the inherent risks of liveboating operations, all other means of diving operations should be considered if possible. If liveboating has been determined to be the method of diving to be executed, these additional considerations should be considered to ensure safe operations:

- Performance of a thorough risk assessment.
- Performance of drills for diver recovery, loss of breathing media to diver, and to test the vessel's emergency shutdown device.
- Depending on the vessel, shaft rotation indicators, propeller guards, and other barriers to prevent the diver and standby diver's umbilical from contacting the vessel propellers should be considered for utilization.
- An assessment of work to be performed, water depth, and the communications available on the vessel should factor into the manning levels of the crew.
- Ensure that the dive supervisor has a clear line of sight of the diver's umbilical entering the water and diver's bubbles.
- Ensure that there are direct communications between the captain, diving supervisor, standby diver and tender.
- For situations where another guideline or policy exists, the more stringent guidance / requirement needs to be followed unless it would make the operation unsafe.

### MINIMUM REQUIREMENTS

- If a diving operation requires a hand-held tool that is separately tended from the diver, it is highly recommended that it be performed by methods other than liveboating. However, if the job can be performed only through liveboating, only one surface-powered tool can be used at a time. Small umbilical's, (e.g., CP probes and pipe trackers) should be married to the diver's umbilical.
- No liveboating operations may include planned in-water decompression.
- Scuba cannot be used during liveboating operations.
- No liveboating shall be performed within the anchor spread of another boat or barge.
- Maximum depth in which liveboating can be performed is 130 fsw (36.6 msw)

### MINIMUM PERSONNEL REQUIREMENTS

- In all cases, personnel and equipment shall be selected to ensure maximum safety during operations. On small boats/vessels of less than 33 feet (10.05 meters), it may be permissible for the crew to consist of no fewer than three persons (diving supervisor, diver and tender/diver) due to space limitations.
- Liveboating diving operations (0-130 fsw [39.6 msw]) (Vessels larger than 33 feet/10.05 meters). The dive crew shall consist of a minimum of seven (7) diving qualified personnel.
- One (1) Dive Supervisor
- One (1) Diver
- One (1) Standby Diver
- Two (2) Tender/Divers
- Two (2) personnel that are qualified divers to assist with rescue boat operations.

**DIVING SUPERVISOR**

Must be experienced and knowledgeable in liveboating operations.

**PROCEDURES**

- Continuous and easily understandable communications will be maintained between the dive station and wheelhouse at all times.
- The vessel master is notified before the diver enters or exits the water and the propulsion system must be disengaged.
- The boat will be maneuvered in such a manner so as to permit the tender/diver or diving supervisor to continuously monitor the direction of the diver's umbilical with respect to the dive control station.
- The vessel's propulsion system should be stopped before the diver enters or exits the water.
- A standby diver will be continuously prepared to enter the water when directed by the diving supervisor.
- All liveboating operations must be tended from the bow and the boat shall be operated from the wheelhouse or flying bridge
- Liveboating shall not be done:
  - In seas that impede the station-keeping ability of the vessel.
  - In other than daylight hours.
  - During periods of restricted visibility. (Restricted visibility means any condition in which vessel navigational visibility is restricted by fog, mist, falling snow, heavy rainstorms, sandstorms or any other similar causes.)
  - Any time existing conditions make liveboating unsafe in the opinion of the vessel captain and/or supervisor.
- The vessel operator must be experienced in liveboating operations and familiar with the scope of underwater tasks including the depth and duration of the dive.

**23.0 EQUIPMENT****23.1 GENERAL**

- Equipment such as helmets, masks, bailout systems, regulators, etc., that provide direct life support shall be of a type familiar to the diver, and subject to a planned maintenance system.
- Due to the life-support nature of diving, personnel involved in the operation, maintenance and repair of diving systems and equipment shall have appropriate training and experience in the maintenance and use of type of equipment used.
- The diving supervisor shall ensure that all diving systems and equipment have been examined and tested prior to diving to determine their condition and suitability for service. No diving operation shall be permitted to commence until all systems and equipment have been thoroughly tested for proper functionality.
- All relief valves related to life support systems shall be inspected and tested annually as to cracking pressure (must not exceed + 10% of MAWP.)

**23.2 MAINTENANCE RECORDS**

- Suitable equipment logs shall be established and maintained in a correct and current condition.
- Life-support equipment shall have a unique identity assigned by the manufacturer or contractor, be easily visible, permanently affixed and traceable to the equipment/maintenance log.
- Entries made in the equipment log shall describe the nature of the work performed, including the dates of modification, repair or test, the name of the individual performing the work or test, and the particular piece of equipment involved.
- A preventative maintenance program is required for all life-support equipment.

**23.3 DIVERS DRESS**

Diver's dress shall be suitable for the job intended and consider such factors as biological, radiological, chemical and thermal conditions.

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## **DRY SUITS**

**Diving personnel should be familiar with dry suit use requirements or should receive training prior to dry suit operations.**

Dry suits shall:

- Have a means of preventing over-inflation, which could result in an uncontrolled ascent.
- Be constructed of material suitable to the environment in which it is to be used.
- Protect the diver from the environment, e.g., temperature or hazardous material.

## **HOT WATER SUITS**

Hot water suits shall:

- Flow sufficient water to maintain the diver(s) in thermal balance at the desired temperature.
- Be capable of withstanding an operating temperature of 110° F (44°C).
- Have a means to allow the diver to bypass incoming water prior to it entering the suit.

## **HARNESSES**

A working diver shall be equipped with a full body diving harness that is designed to:

- Provide a method to securely attach the umbilical to the diver.
- Lift an unconscious or injured diver and his or her equipment from the water in an emergency.
- Be utilized for underwater use.
- Has an overall breaking strength of no less than 2,000 pounds.
- Is equipped with a positive buckling device (i.e., designed to prevent strap pull-through and accidental release by the diver). It shall not be possible to release the harness by a single action.
- Is equipped with at least one attachment point for the umbilical that is rated to at least the same breaking strength as the lifeline or strength member in the umbilical bundle. If the harness has multiple attachment points of different strengths, those suitable for umbilical attachments are to be clearly identified.
- Is equipped with adjustable, permanently attached leg straps.
- Is fitted with at least one lifting (recovery) ring, accessible when the diver is fully dressed, suitable for recovery of the diver from the water in an emergency using a hoisting device or other suitable means.
- Is designed to maintain the diver in a heads-up position during recovery (using the lifting ring) from the water in an emergency.
- Allows for easy disconnect of the main umbilical and weights, without removal of the main bail-out harness. This may be achieved by use of a separate/independent outer harness or jacket for the bailout system and diver's weights, or similar systems.
- Is to be visually inspected prior to use for any signs of deterioration or damage. Any harness whose material condition is in doubt shall not be used until a determination is made by the diving supervisor.
- Is to be regularly maintained in accordance with the manufacturer's recommendations.
- Is certified by the manufacturer as detailed below.

### **Certification and Testing of Diving Harnesses**

- A new diving harness shall be certified by the manufacturer or supplier to confirm that.
- Each securing point intended for attaching an umbilical or lifting a diver out of the water in an emergency shall withstand a tensile of at least 2,000 pounds for five minutes without sustaining damage that would render it inoperable or unsafe to use.
- Each complete full-body harness, including adjustment systems, buckles, etc., shall withstand a tensile load of at least 2,000 pounds for five minutes, applied in the direction of lift, without sustaining damage that would render it inoperable or unsafe to use.

Each harness is clearly marked in a durable manner with the following minimum information:

- Manufacturer's name.
- Unique identifier.
- Breaking strength.

**WEIGHT BELTS**

Weight belts shall:

- Be sufficient weight to maintain the diver at working depth.
- Not be used as an attachment for the diving umbilical.
- Be equipped with an appropriate release device.
- Be attached to the diver in a manner to avoid accidental disengagement.

**DIVER-WORN OR CARRIED EMERGENCY GAS SUPPLY**

EGS systems shall:

- Have a cylinder(s) meeting the requirements in ADCI Standards for Commercial Diving Section 6.11.2
- Have a depth-compensating regulator on the cylinder capable of delivering the proper pressure and flow to the diver's helmet or mask in accordance with the helmet or mask manufacturer's recommendations.
- Have a means of attachment to the hat or mask, which prevents accidental disengagement.
- The diver carried EGS or mask/helmet shall have a positive means of isolating it from the primary gas supply.
- When diving a gas mixture other than air, sample/test to verify contents.
- Bottles must be clearly marked with content, date, pressure and the name of the individual performing this verification.

**EMERGENCY GAS SUPPLY DURATION FORMULA**

$$DA = VA/CD$$

**DA** = Duration in Minutes

**VA** = Available Volume

**CD** = Consumption Rate at Depth

**Consumption rate at depth = Volume minute X depth in bars or atmospheres**

**Gauge pressure minus (depth in pressure + regulator delivery pressure) = usable gas pressure**

Diver worn or carried emergency gas supply (bailout) shall have a minimum calculated four-minute supply at the anticipated depth. (See bailout calculations in ADCI Standards for Commercial Diving Section 11: Reference Materials).

**HELMETS AND MASKS**

Helmets and masks and their associated diver-carried regulators are components of a critical life-support system that, if not functioning properly, can expose the diver to significant hazards. As such, all helmets and masks and their associated diver-carried regulators shall be maintained and inspected in strict compliance with the manufacturer's recommendations. Suitable logs shall be maintained to reflect compliance.

Helmets and masks used for surface supplied diving operations shall:

- Be appropriate for the task intended.
- Be fitted with a two-way audio communications system.
- Be equipped with a non-return valve in the main gas supply that closes readily and positively.
- Have non-return valves with springs not exceeding 3 psi cracking pressure.
- Be made of corrosion-resistant materials.
- Be maintained in accordance with manufacturer's specifications and have all modifications that affect safety or performance documented in the equipment log.

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### LIGHTWEIGHT DIVING HELMETS

Lightweight diving helmets shall:

- Meet the requirements of ADCI Standards for Commercial Diving Section 6.4.1.
- Be fitted to accept diver worn EGS.
- Be fitted to allow for positive and ready removal from the diver in all uses.

### BIBS (BUILT-IN BREATHING SYSTEMS)

Individual breathing equipment utilized in PVHO built-in breathing systems (BIBS) shall:

- Be held in place by adjustable straps, hoods or other suitable means that frees the diver's hands.
- Be capable of providing 2.0 ACFM (56.6 alpm) at maximum depth (Some regional and regulatory requirements may differ.)
- Be equipped to allow user to adjust for ease of breathing or constant free flow.
- Be equipped with an exhaust valve.
- Be equipped to prevent over-pressurization or rapid negative pressure from endangering the user.
- Be maintained in accordance with manufacturer's specifications.

## 23.4 HOSES

### GENERAL

Flexible breathing gas hoses used with diving systems or equipment shall:

- Have a minimum burst pressure equal to four times the maximum allowable working pressure (MAWP). Be suitable/rated by manufacturer for work intended.
- Have a MAWP and flow rating not less than the system in which it is installed or used and be suitable for the service intended.
- Have connectors with pressure capability equal to or greater than the designed working pressure of the system on which they are installed.
- Have fittings of corrosion-resistant material that cannot be accidentally disengaged.
- Be kink-resistant or arranged to prevent kinking.
- Have a suitable temperature rating when used for hot water service.
- Be visually examined and pressure tested after each pressure boundary repair.
- Be of suitable design to prevent collapse when used for operation with higher external pressure than internal pressure.
- Have a maximum allowable working pressure equal to or greater than supply pressure plus 150 psi. (10.546 kg/sq).
- Have all hose end fittings plugged, capped, or bagged (i.e. umbilical to helmet connection/bailout to helmet quick coupling connection). The use of tape by itself for this purpose is not permitted.

### BREATHING GAS HOSES

Breathing gas hose assemblies shall:

- Meet requirements of ADCI Standards for Commercial Diving Section 6.5.1.
- Be suitable for breathing gas service.
- Each hose assembly will be subjected to an annual pressure test to one- and one-half times the design working pressure of the system. The test pressure should be maintained (when corrected for temperature) for 10 minutes.
- When initially constructed and after any alteration/repair, a 200-pound axial load test on the hoses' fittings will be performed unless it is contrary to the manufacturer's recommendations.
- **Note: The axial load weight may be removed after the initial test pressure has been applied, providing no leakage is evident.**

### 23.5 UMBILICALS

Diver umbilical and dive hose assemblies shall:

- Meet with requirements of ADCI Standards for Commercial Diving Sections 6.5.1. and 6.5.2.
- Be marked from the diver/bell end in 10-foot intervals up to 100 feet and marked in 50-foot intervals thereafter.
- Be subjected to an annual pressure test one- and one-half times the design working pressure of the system with a 200 pound axial load applied on fittings while initial test pressure is applied. The test pressure should be maintained without loss of pressure (when corrected for temperature) for 10 minutes.

Note: To ensure uniformity throughout the commercial diving industry, ADCI Standard 006 recommends the following color coding be used by all participants.

10 feet (3.05 meters)	1 white band
20 feet (6.10 meters)	2 bands
30 feet (9.15 meters)	3 white bands
40 feet (12.2 meters)	4 white bands
50 feet (15.25 meters)	1 yellow band
60 feet (18.29 meters)	1 yellow band/1 white band
70 feet (21.34 meters)	1 yellow band/2 white bands
80 feet (24.39 meters)	1 yellow band/3 white bands
90 feet (27.44 meters)	1 yellow band/4 white bands
100 feet (30.49 meters)	1 red band
150 feet (45.73 meters)	1 red band/1 yellow band
200 feet (60.98 meters)	2 red bands
250 feet (76.22 meters)	2 red bands/1 yellow band
300 feet (91.46 meters)	3 red bands

- Beyond 300 feet (91.46 meters), continue to place yellow bands after 50 feet (15.25 meters) and red bands after 100 feet (30.49 meters)
- Be marked with a unique identify and be subjected to a planned maintenance program.
- Consist of a breathing gas hose, communications cable, a means of determining the diver's depth, and a strength member (the strength member may be the entire hose assembly, if so designed).
- Have a minimum break strength of the hose assembly, including terminating hardware (e.g., "D" ring or attaching points), of 1,000 pounds.
- Pneumo hose shall be annually pressure-tested for leakage.

**The umbilical assembly used for the standby diver must be of sufficient length to reach the primary diver at his or her furthest possible excursion from the dive station.**

### 23.6 OXYGEN HOSES UTILIZED FOR BREATHING GAS

- Oxygen hoses shall meet the requirements of ADCI Standards for Commercial Diving Section 6.5.2 and be suitable for use intended.
- LP hose assemblies (less than 500 psi) used in systems containing greater than 50 percent oxygen are to be cleaned for oxygen service.
- Hoses used for oxygen (over 50 percent) service shall be identified by a consistent color code or tagged "FOR OXYGEN USE ONLY".
- Lubricants used to assemble fittings on hoses for oxygen service shall be compatible with oxygen.

### 23.7 BREATHING GAS HOSES (HP) (HP hoses associated with the breathing gas system)

Breathing gas hose assemblies shall:

- Have a minimum burst pressure equal to four times the maximum allowable working pressure (MAWP) and be suitable/rated by the manufacturer for work intended.
- Have connectors with pressure capability equal to or greater than the designed working pressure of the system on which they are installed.

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- Have fittings of corrosion-resistant material that cannot be accidentally disengaged.
- Be kink-resistant or arranged to prevent kinking.
- Be visually examined and pressure tested after each boundary repair.
- Be suitable for breathing gas service.
- Each hose assembly will be subjected to an annual pressures test to the maximum allowable working pressure (MAWP) of the system. The test pressure should be maintained (when corrected for temperature) for 10 minutes. The test pressure should be maintained (when corrected for temperature) for 10 minutes.

## 23.8 COMPRESSOR SYSTEMS

### COMPRESSOR AND GAS PUMPS

Compressors, boosters, gas transfer pumps and filters used to provide breathing air/gas for diving shall be designed and manufactured to:

- Have suitable personnel protection around rotating machinery that meets applicable jurisdictional requirements.
- Have the necessary instrumentation to facilitate operations.
- Be of the proper type, pressure and flow rate, and be suitable for service intended.
- Have its air intake arranged to be clear of exhaust fumes and other contaminants.
- Have flexible pressure hoses in accordance with ADCI Standards for Commercial Diving Section 6.5.1.
- Have electrical controls, wiring and drive units meeting the jurisdictional requirements, when so equipped.

### FILTRATION

Filters, when installed to prevent contamination, must meet or exceed the flow rate and pressure rating of the compressor or piping system in which they are installed and be able to deliver breathing gas in compliance with Compressed Gas Association (or equivalent) purity standards for extended operation.

### TESTING

- Compressors used for breathing gas shall be functionally tested per the following schedule and shall conform to design specifications.
- Prior to being put into service.
- Periodically in accordance with manufacturer's recommendations and planned maintenance schedule.
- During annual inspection.
- After any repairs that may affect the compressor's performance.

### AIR PURITY REQUIREMENTS

- All compressors, transfer pumps or booster pumps used for breathing air service will be subjected to an air quality test every six months. Compressors with a discharge pressure of 500 psi or less shall meet the standards of the current ANSI CGA required for Grade D air, or equivalent. Compressors with a discharge pressure that exceeds 500 psi shall meet the requirements of the current ANSI CGA for Grade E air, or equivalent.
- Air purity tests shall be taken at the discharge point that would normally supply the breathing gas system, the diver's hose or cylinder fill point.
- Documentation of the latest test(s) shall be kept on file and available upon request.
- Compressors used for breathing gas transfer other than atmospheric air shall be checked every six months to ensure they do not induce contaminants into the gas being processed.

### 23.10 LAUNCH AND RECOVERY SYSTEMS (LARS)

#### GENERAL

Launch and recovery systems intended for the launch and recovery of a diver or divers between the surface dive location and the work location by either bell or stage shall:

- Be designed, manufactured installed, and tested in accordance with applicable design codes, standards and regulations.
- Air purity tests shall be taken at the discharge point that would normally supply the breathing gas system.
- Be fitted with two independent braking systems capable of holding 1.25 times the safe working load of the winch.
- Be designed so that the load can be stopped, and held in position, if the power supply fails, is disengaged, is switched off, or if operating control is released.
- Have controls located or equipped such as to afford the operator both a view and control of the lifting operation, or appropriate signalman.
- After any installation, alteration, repair or failure, be thoroughly examined and be functionally and load tested to 1.25 times the safe working load of the handling system.
- Have wire ropes and fittings that are:
  - Installed, terminated and maintained in accordance with design criteria and/or manufacturer's recommendations.
  - Visually inspected every six months for damage, deterioration or deformation.
  - Periodically examined and tested to recognized applicable codes and standards.
  - Have wire ropes and fittings that are rated eight times the load.
- Have a spooling arrangement fitted if fleeting angle exceeds 2 degrees.

### 23.11 DIVER ENTRY AND EGRESS SYSTEMS

#### DIVING LADDER AND STAGE

Diving ladders and stages shall:

- Be capable of supporting the weight of two divers plus their gear.
- Be capable of corrosion-resistant material or be maintained free of corrosion.
- Be suitable for the purpose intended.
- Ladders must extend a minimum of 3 feet below surface where installed.
- Stages must be equipped with a safety chain and internal handholds for dive safety during launch and recovery.

### 23.12 OPEN-BOTTOM BELLS

Open-bottom bells shall:

- Have an upper section that provides an envelope capable of maintaining a bubble of breathing mixture for a diver when the diver is standing on the lower section with his or her body through the open bottom and his or her head in the bubble.
- Have lifting eyes rated for lifting 500 pounds for each occupant, plus the weight of the bell.
- Be protected against and maintained free from injurious corrosion.
- Able to accommodate two divers with gear in an un-cramped position.
- Be fitted with internal handholds for divers.
- Have provisions for mounting of breathing gas cylinder(s) and regulator for emergency breathing at all depths of intended operation.

### 23.13 GAUGES

Gauges utilized with diving equipment or systems shall:

- Be suitable for purpose intended.
- Be cleaned for oxygen when installed in oxygen systems using mixtures greater than 50%.

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When used to indicate a diver's depth:

- Be of appropriate range and graduation.
- Be graduated in units consistent with the decompression tables to be utilized.
- Be calibrated to a known standard every six months.
- Be recalibrated when a discrepancy exists exceeding +/- 2 percent of full scale.
- Be marked with a label, tag or sticker indicating date of last calibration and date due, which will not interfere with full-scale visibility.
- Have calibrations documented in the equipment log.
- A pressure-limiting device may be fitted to avoid gauges being over-pressured.
- If master reference gauge is calibrated, gauge accuracy needs to be at least .25%

Devices utilized to monitor a diver's exposure time under pressure shall be suitable for purpose and easily readable.

### 23.14 COMPRESSED GAS EQUIPMENT

#### VOLUME TANKS/AIR RECEIVERS

Volume tanks used in diving systems shall:

- Be designed, fabricated, inspected, tested and certified in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section VIII, Div. I, "Unfired Pressure Vessels," and/or other statutory or classification society requirements.
- Be equipped with a pressure gauge.
- Be equipped with a check valve on the inlet side.
- Be pressure-rated to the maximum system pressure on which it is installed.
- Be equipped with a relief valve as required by code of manufacturer and tested at least annually.
- Be equipped with condensate drain valve, located at its lowest point.
- Be equipped with slow-opening valves when used with design pressures exceeding 500 psi.
- Be cleaned for oxygen service and have slow-opening valves when used in systems containing greater than 50 percent oxygen.
- Be inspected internally and externally at least annually for damage or corrosion.
- Be pneumatically tested to MAWP annually, utilizing the breathing mixture normally used.
- Be hydro tested to 1.3 MAWP (ASME 2007 UG 99) every fifth year or after any repair, modification or alteration to the pressure boundary and marked with the test date.
- Have a unique identity with results of all tests being recorded in the equipment log.

#### GAS STORAGE CYLINDERS AND TUBES

High-pressure gas cylinders or tubes shall:

- Be manufactured to recognized code or standard.
- Be equipped with an overpressure relief device.
- Be visually examined externally at least annually for damage and corrosion.
- If rack-mounted into banks of cylinders or tubes, have valves and regulators protected from damage caused impact or from falling objects.
- Be hydrostatically tested every fifth year to the requirements of the code of the manufacturer by an authorized test facility and stamped with the date of test.
- Be inspected internally at least annually for damage or corrosion if used underwater by a qualified technician.
- Be labeled as to contents. Fire-hazard warning signs should be erected in the vicinity of stored oxygen.
- Be stored in a well-ventilated area, protected from overheating and secured from falling.
- A record shall be kept in a designated place of the contents and pressure of each cylinder, quad or bank. These records should be updated daily when the system is in use.

## SCUBA AND EGS (BAILOUT) BOTTLES

High pressure bottles used for scuba and EGS (bailout) shall:

- Be manufactured to recognized codes or standards.
- Be equipped with an overpressure relief device.
- Be inspected internally and externally at least annually for damage or corrosion by a qualified technician.
- Be hydrostatically tested every fifth year to the requirements of the code of the manufacturer by an authorized test facility and stamped with the date of test.
- Have a unique identity with results of all test being recorded in the equipment log.

## 23.15 PRESSURE VESSELS FOR HUMAN OCCUPANCY (PVHO)

### GENERAL

Pressure vessels for human occupancy (PVHOs), associated with diving operations cover a wide range of applications, including, but not limited to, deck decompression chambers, diving bells, saturation living chambers, transfer locks and hyperbaric emergency evacuation systems.

PVHOs and associated systems are specialized equipment that are operated with in the harsh environment of the diving industry and present potential risks to personnel supporting diving operations. PVHOs typically have unique attributes such as acrylic viewports and quick-opening pressure closures that have requirements for maintenance and safe operation.

The ADCI, in its technical and advisory capacity to the diving industry, has adopted a set of recommended standards for PVHOs specifically to minimize the risks involved with their safe operation. These standards were conceived as recommendations to be incorporated into industry practice. The standards cover PVHO is governed by industry standards, classification societies and national and applicable regulatory authorities (see "References" at the end of ADCI Standards for Commercial Diving Section 6).

### PVHO DESIGN AND CONSTRUCTION REQUIREMENTS

All PVHOs shall meet the following minimum requirements:

- PVHOs and their associated systems shall be built in accordance with the most current version of ASME PVHO-1 and/or in conformance with the requirements of a classing society competent in PVHO diving systems.
- Have a pressure relief device as per the most current version of ASME PVHO-1 or the code/standard of construction. Normally this is no more than 10 percent above MAWP (maximum allowable working pressure) of the PVHO.
- Any doors, hatches or quick-acting closures associated with a TUP (transfer under pressure) system shall be equipped with an interlock system to prevent accidental opening under pressure. This would include medical locks; equipment locks and bell TUP quick closures.
- Have a control panel with a dedicated pressure gauge indicating depth for each pressurized compartment. The gauges shall:
  - Be maintained with a calibration of each depth gauge within six months.
  - Be arranged to allow comparison with another gauge while in operation.

### SURFACE DIVING DECOMPRESSION CHAMBERS

Surface diving decompression chambers shall:

- Be dual-lock and multi-place (except emergency rescue chambers or chambers designed to mate with another P.V.H.O., if regulatory codes allow).
- Have sufficient internal dimensions to accommodate a person living in a horizontal position with another person attending (except designated diving bells, transfer locks and emergency rescue chambers).
- Permit ingress and egress of personnel and equipment while the occupants remain pressurized.

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- Have a means of operating all installed man way locking devices, except disabled shipping dogs, from both sides of a closed hatch.
- Have illumination of the interior sufficient to allow operation of any controls and allow for visual observation, diagnosis and/or medical treatment.
- Have viewports that allow the interior to be observed from the exterior.
- Have a minimum pressure capability of 6 ATA (165 fsw [50 msw]); **and a minimum pressure capability of the maximum depth of the dive plus 1 ATA.**
- Be capable of a minimum pressurization rate of 60 fsw (18.3 msw) within 1 minute. The inner lock may be blown down in advance to achieve this pressurization rate. There must be adequate air capacity on site to achieve deeper treatment depths.
- Be capable of a decompression rate of 30 fsw (9.2 msw) per minute to 33 fsw [10.06 msw].
- Have a means to maintain an atmosphere below a level of 25 percent oxygen by volume.

## MAINTENANCE OF PRESSURE VESSELS FOR HUMAN OCCUPANCY ADDENDUM

### INTRODUCTION

The ADCI, in its technical and advisory capacity to the diving industry, has adopted a set of guidelines for the repair and maintenance of PVHO equipment that it recommends be incorporated into industry practice.

The diving business is, by its nature, an industry that operates with a harsh environment. Consequently, the design, construction and maintenance of diving equipment and the associated operational procedures are governed by industry and national standards, as well as national and international regulations (Appendix A). PVHO tankage and its associated hardware and associated systems are specialized equipment, rules for which were conceived specifically to minimize the risk involved.

### GENERAL PRECAUTIONS FOR ACRYLIC VIEWPORTS

These are general precautions for the cleaning, operational inspection, installation, and maintenance of acrylic viewports used in pressure vessels for human occupancy. For additional information, it is recommended that ASME PVHO-2 be referenced. This document **covers design, inspection and maintenance for acrylic viewports.**

### CLEANING

When cleaning is required, viewports should be carefully cleaned, and surfaces must not be scratched. An acceptable cleaning agent is mild soap and water.

**Do not use solvents of any type** (alcohol, acetone, etc.) for any purposed on the window, gaskets or O-rings.

**CAUTION:** Only hand-cleaning is allowed. The use of power-driven tools is not permitted.

After cleaning, inspect with window for blemishes such as cracks, chips, dings, scratches, crazing, blisters or discoloration. (Crazing is the development of a network of fine spiderweb-type cracks on the surface; it can be caused by either stress or exposure to solvents.)

### IN-SERVICE INSPECTION

- Operational inspections should be conducted prior to each chamber pressurization. Visually inspect the accessible exterior, interior and bearing surfaces for the presence of blemishes in the form of crazing, cracks, scratches, blisters and discoloration. A common flashlight will assist in locating blemishes such as chips, cracks, or crazing and in determining the condition of bearing surfaces.
- Blemishes on the low-pressure face can serve as initiators of cracks and subsequent failure in flat disk and conical frustum viewports. For diving bells and submersible diver lock-out compartment viewports, both faces should be considered low-pressure faces.

- The depth of the blemish can be measured with a depth micrometer with a pointed rod (Brown and Sharpe, or equivalent or an optical comparator). Consideration should be given to the concentration of scratches, cracks or crazing occurring in the venter of the viewing area, as this may be an indication of stress.

#### INSTALLATION

- Viewports should be properly cleaned and carefully installed to ensure proper fit and safe operation. All viewport surfaces should be free of defects.
- All metal contact surfaces must be smooth and clean. Surface should be free of all defects and foreign matter. An oxygen compatible lubricant, which is compatible with acrylic, should be used. Retaining bolts should also be cleaned, inspected and lubricated.
- O-ring and gasket sealing surfaces must be completely free of any foreign material, such as cleaning agents and solvents, rust, sand, grit, paint chips, etc.
- All paint that will come in contact with the viewport should be fully cured.

#### MARKINGS

Viewport identification markings must be preserved on each viewport during cleaning and handling. Corresponding viewport documentation should be maintained with the PVHO documentation package.

NOTE: Further information can be found in ANSI ASME/PVHO-1, Section 2.

#### DAMAGE BY ACCIDENT

Major structural damage may be caused by an accident or mishandling. This may include things like:

##### PRESSURE HULL DAMAGE

- Dents
- Gouges
- Damaged penetrator (stripped threads)
- Mating flange
- Lift lug or tie-down eye (bent, broken or hold elongation)
- Support base (frame deformation)

##### DOORS

- Damaged sealing surface
- Bent/broken hinge
- Damaged dogging mechanism

##### VIEWPORT DAMAGE

- Crazing
- Cracked/chipped
- Weld spatter
- Paint thinner damage
- Overheated/blistered (permanent deformation)

#### DAMAGE BY CORROSION

##### GENERAL

More important than damage done by an accident, and often unseen until more extensive, is the damage done by corrosion. Most damage by corrosion can be avoided with a diligent preventative maintenance program, however, even with the best preventative maintenance programs, damage can still occur.

### TYPICAL CORROSION DAMAGE MAY INCLUDE

- Pit corrosion (shell and heads).
- Crevice corrosion.
- Penetrators.
- Viewport sealing surfaces.
- Door faces.
- Sealing surfaces.
- O-ring grooves.

### CORROSION ALLOWANCE

Pressure vessels are typically built with a corrosion allowance in the calculated required metal thickness. This information is usually found on the pressure vessel certificate. Examination of corrosion-affected areas should be done in a manner necessary to determine if the corrosion has gone beyond the calculated allowable amount and may require remedial action.

### REPAIR OF A PVHO

- The owner should be aware of the requirements of the regulatory authority and of interested third parties, as their requirements will have a direct bearing on the repair specification.
- PVHO repair must be approached properly, regardless of how well the work is done or the quality of the material used. Without a conscious effort to comply with existing rules and regulations, it is possible to have an expensive repair that does not meet the requirements and is unacceptable.
- It is important that a defined method is used when approaching the repair of a PVHO.

### RECOMMENDED STEPS FOR APPROACHING ANY REPAIR ARE AS FOLLOWS

#### APPRAISAL

- The initial step is to appraise the damage. This means more than a casual look at the vessel and agreeing that it has been damaged. All damage should be investigated to determine the cause and what measures can be taken to prevent a reoccurrence.
- Measure or otherwise quantify the damage so you can answer questions about the extent of the visible damage. Be aware that there may be areas of hidden damage. Make a sketch or map of the damaged area; photos may be helpful. Make a written report, describing the nature and extent of the damage. Be accurate and include as much detail as possible. Be honest in your appraisal; remember that the goal is to save the PVHO vessel and to put it safely back into service.
- Damage to the pressure boundary of the vessel will require that any repairs be done in accordance with the code of manufacture. Likewise, damage to the attached piping shall be repaired to the code to which it was built. Only components meeting the applicable code requirements should be used for repairs or replacements.
- Gather all the existing documentation on the vessel. This information will be needed by engineering, code repair shop, authorized code inspector, insurance adjuster, classing society surveyor, etc.
- Depending on the type and extent of damage, it may be necessary to perform in a nondestructive examination (NDE) to determine the extent of damage. It may be necessary to grit-blast the vessel to bare metal to determine the exact scope of work.
- Prepare a written report and budget for the repairs.

#### PLAN

- Make a technical plan for the repair. The plan should clearly establish the scope of work for the fabricator, as well as the scope of responsibility. This plan, if correctly drawn up, can function as the specification for the work and as part of a purchase order.
- The plan should clearly state the codes, standards, rules, regulations and quality of workmanship that will govern the work. Don't forget the paperwork requirements. Be very specific about the paperwork and paper deliverables for which the fabricator or repair shop is responsible.

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- Prepare the drawings and/or calculations as necessary to affect the planned repair. An engineer, either in-house or outside, may need to be engaged to verify all details have been addressed.

You should then obtain agreement from the regulator (jurisdiction) or classing society that:

- The proposed repairs and techniques are within the code.
- The proposed materials meet the code requirements.
- The repair plan will be approved.
- Most repairs will require an initial survey to look at the vessel and assess your repair plan.

## EXECUTION

Having obtained the concurrence of the required parties, and armed with your repair plan, budget, drawings and specifications, you are now ready to talk with a qualified fabricator or repair shop.

The least problematic choice is the original vessel fabricator. This is not always possible, but the likelihood is that the original fabricator will have the records that will make the repair and documentation go more smoothly.

Unfortunately, many of the fabricators that have built PVHOs in the last 15 years are either out of business or may not have retained the records on your vessel. The ASME requires records to be retained for only five years. It is a good idea to require, as part of your purchase agreement with any fabricator or repair facility, that you receive a copy of all paperwork. If the vessel was registered with the National Board of Pressure Vessel Inspectors, you can get copies of the certificate by contacting the National Board.

The next best choice would be a fabricator that is currently building and certifying PVHO vessels. The fabricator should be authorized to apply the ASME "U" stamp and/or the "R" stamp from the National Board. The scope and criteria to differentiate between minor and major repairs is provided in the National Board Code ANSI-NB23. Alternatively, for PVHOs constructed to other codes, the repair should be certified to do repairs to the code to which the PVHO vessel was built.

## TESTING

- Prior to, during and after repairs, various types of testing may be employed. Test results should be retained as part of the equipment record.
- All non-destructive examinations should be done in accordance with ASME Section-V: Non-Destructive Examination, by personnel competent in the type of test employed.
- Pressure tests should be done in accordance with a written procedure and appropriate safety precautions.

## DOCUMENTATION

- All repairs and alterations are to be recorded in the equipment log. This should be accompanied by references to certificates and identification markings. Pressure testing should likewise be documented and recorded in the log. Any alterations or modification should be reflected in all drawing revisions.
- All certificates, drawings, calculations and reports should be retained for the service life of the equipment.

**A professional approach to the repair of PVHOs will yield professional results, thereby preserving an asset and ensuring the safety of the occupants and operators.**

**It is impossible to guarantee that accidents will not happen. However, the probability can be significantly reduced by a good PREVENTATIVE MAINTENANCE PROGRAM and consistent safe practices.**

**24.0 REFERENCES**

ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 and 2

ASME Section V: Non-Destructive Examination

ANSI – ASME/PVHO-1 and 2

ANSI B31.1: Code for Pressure Piping, Power Piping

Association of Diving Contractors International (ADCI) Consensus Standards for Commercial Diving Operations

29 CFR Part 1910: OSHA Rules for Commercial Diving

46 CFR Part 197: USCG Rules for Commercial Diving Operations

IMO (International Maritime Organization) Code of Safety for Diving Systems, a.536 (13)

IACS (International Association of Classing Societies)

ABS (American Bureau of Shipping)

DNV (Det Norske Veritas)

Lloyds Registry

National Board of Boiler & Pressure Vessel Inspectors ANSI-NB23

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**25.0 RECORD OF REVISION**

Revision No.	Pages Affected	Paragraph No.	Date
Revision 0	Rewrite and formatting changed from previous editions.	N/A	01/03/2025

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## **APPENDIX B – COMMERCIAL DIVING PROGRAMS & PROCEDURES**

- 1.0 DSP-001, BIOLOGICALLY/CHEMICALLY CONTAMINATED DIVING OPERATIONS
- 2.0 DSP-002, RADIOLOGICALLY CONTAMINATED DIVING OPERATIONS

**NOTE:** Always reference dive programs and procedures within the UESI Quality Assurance Department due to existing UESI submittals utilized within existing programs, currently in use at nuclear power plants. These documents must be verified and obtained through UESI Quality Assurance.

- 3.0 DSP-003, WARM WATER DIVING OPERATIONS
- 4.0 DSP-004, ENRICHED-AIR DIVING (NITROX)
- 5.0 DSP-005, SURFACE-SUPPLIED MIXED-GAS DIVING (HEO2)

## **FORMS**

- 1.0 SURFACE SUPPLIED AIR LOG
- 2.0 DIVING AIR CHART
- 3.0 REPETITIVE DIVE WORKSHEET

## **Regulations & Standards:**

- 1.0 ADCI Consensus Standards (Association of Diving Contractors International)
- 2.0 29 CFR Part 1910, Subpart T – Commercial Diving Operations
- 3.0 US Navy Dive Manual
- 4.0 USACE EM 385-1-1 (US Army Corp of Engineers)
- 5.0 U.S. Coast Guard 46 CFR 197 Subpart B.

**End of Document**

# UNDERWATER ENGINEERING SERVICES, INC.

## Repetitive Dive Worksheet

REV. 0  
FORM

### 1. Previous Dive:

\_\_\_\_\_ Minutes

Standard Air

Unlimited / No-Decompression

Sur D O<sub>2</sub>

Sur D Air

+ \_\_\_\_\_ = \_\_\_\_\_ feet

\_\_\_\_\_ Repetitive Group Designation (RGD)

### 2. Surface Interval

\_\_\_\_\_ hours \_\_\_\_\_ minutes on surface

\_\_\_\_\_ repetitive group from item 1 above

\_\_\_\_\_ new repetitive group letter designation from residual nitrogen time (RNT)

### 3. Residual Nitrogen Time

\_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_ feet, depth of repetitive dive

\_\_\_\_\_ new repetitive group designation from item 2 above

\_\_\_\_\_ minutes, residual nitrogen time or bottom time of previous Sur D dive

### 4. Equivalent Single Dive Time

\_\_\_\_\_ minutes, RNT from item 3 above or bottom time of previous Sur D dive

+ \_\_\_\_\_ minutes, actual bottom time of repetitive dive

- \_\_\_\_\_ minutes, equivalent single dive time

### 5. Decompression for Repetitive Dive

\_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_ feet, depth of repetitive dive

\_\_\_\_\_ minutes, equivalent single dive time from item 4 above

Decompression:

standard air

unlimited / No-decompression

Sur D O<sub>2</sub>

Sur D Air

Decompression Stops:	Depth	Water	Chamber
	_____ (fsw)	_____ minutes	_____ minutes
	_____ (fsw)	_____ minutes	_____ minutes
	_____ (fsw)	_____ minutes	_____ minutes
	_____ (fsw)	_____ minutes	_____ minutes
	_____ (fsw)	_____ minutes	_____ minutes
	_____ (fsw)	_____ minutes	_____ minutes
	_____ (fsw)	_____ minutes	_____ minutes

\_\_\_\_\_ schedule used (depth / time)

\_\_\_\_\_ repetitive group letter designation



# UNDERWATER ENGINEERING SERVICES, INC.

3306 Enterprise Rd.

Fort Pierce, FL 34982

## SURFACE -SUPPLIED AIR DIVE LOG

**Job No.:** \_\_\_\_\_ **Date:** \_\_\_\_\_ **Time:** \_\_\_\_\_  
**Client:** \_\_\_\_\_ **Location:** \_\_\_\_\_  
**Client Representative:** \_\_\_\_\_ **Dive Supervisor:** \_\_\_\_\_  
**Dive Platform:** \_\_\_\_\_ **Task to be Performed:** \_\_\_\_\_

D I V E #	DIVER	RGD	SI	RGD	RNT	L/S	L/B	R/S	BT	D E P T H	TBT	DECO TABLE/ SCHED/ RGD
1												
2												
3												
4												
5												
6												
7												
8												

**Air Temp:** \_\_\_\_\_ °F      **Water Temp:** \_\_\_\_\_ °F      **Current:** \_\_\_\_\_ kt      **Visibility** \_\_\_\_\_ Ft.  
**Wind Velocity:** \_\_\_\_\_ kt      **Sea State** \_\_\_\_\_      **General Diving Conditions:** \_\_\_\_\_ Good / Fair

D I V E #	TENDER	STAND-BY DIVER	BAIL OUT PRESS	DIVERS HELMET/ DRESS	POST DIVE FITNESS- OK DIVERS SIGNATURE	COMMENTS
1						
2						
3						
4						
5						
6						
7						
8						

**DIVE SUPERVISOR SIGNATURE** \_\_\_\_\_

**UNDERWATER ENGINEERING SERVICES, INC.**  
**Dive Chart Form**

REV. 0  
FORM

DIVING CHART- AIR					Date	
NAME OF DIVER 1		DIVING APPARATUS		TYPE DRESS		EGS (PSIG)
NAME OF DIVER 2		DIVING APPARATUS		TYPE DRESS		EGS (PSIG)
TENDERS (DIVER 1)			TENDERS (DIVER 2)			
&			&			
LEFT SURFACE (LS)	DEPTH(FSW)		REACHED BOTTOM (RB)		DESCENT TIME	
LEFT BOTTOM (LB)	TOTAL BOTTOM TIME (TBT)		TABLE & SCHEDULE USED		TIME TO FIRST STOP	
REACHED SURFACE (RS)	TOTAL DECOMPRESSION TIME (TDT)		TOTAL TIME OF DIVE (TTD)		REPETITIVE GROUP	
DESCENT	ASCENT	DEPTH OF STOPS	DECOMPRESSION TIME		TIME	
			WATER	CHAMBER	WATER	CHAMBER
		10			L	
		20			R	
		30			L	
		40			R	
		50			L	
		60			R	
		70			L	
		80			R	
		90			L	
		100			R	
		110			L	
		120			R	
		130			L	
PURPOSE OF DIVE:			REMARKS:			
DIVER'S CONDITION:			DIVE SUPERVISOR:			

Site Safety Audit Survey

**UESI SAFETY AUDIT SURVEY**

<b>TO:</b>	<b>COPY:</b>
<b>FROM:</b>	
<b>SURVEY DATE:</b>	<b>PAGE 1 OF</b>
<b>PROJECT NAME &amp; LOCATION:</b>	

The following site safety observations represent only those work practices and conditions viewed during the actual inspection. All safety observations noted represent potential liability with respect to; *personal safety, OSHA inspection & enforcement, and legal concerns.*

Each **VIOLATION (V-)** is given an item number and is briefly describe on the survey form. Following each violation are one or more **RECOMMENDATIONS (R-)** which represent suggested methods for correcting the deficiencies. These are suggestions only. Any correction is acceptable providing it meets all established safety guidelines and/or requirements. *A Hazard Rating System has been provided to establish correction priorities (see bottom of page.)*

Please address the non-compliance safety observations contained in the attached sheets with the appropriate supervisor for the area(s) inspected.

The supervisor should initiate corrective action immediately for any HRI rated hazard. Any HR2 rated hazard should be corrected at the earliest possible date unless otherwise stated on the survey form. An HR3 rated hazard should be corrected by the required response date, or adequate justification given, as to why the item(s) have not been corrected.

Supervisors should respond in writing, indicating corrective actions taken, and dates of completion. This can be accomplished by filling in the required information in the "**ACTION TAKEN/DATE COMPLETED**" COLUMN ON THE SURVEY FORM. If an item has not been completed by the required response date, indicate date which the item is expected to be corrected, and explain briefly why the correction was delayed.

If clarification of a non-compliance item is required, please contact Robert Walcheski at 772-370-1764 or at the UESI office at 772-337-3116.

Completed forms should be returned to the UESI, Fort Pierce office, Attn: Robert Walcheski, on or before the required response date.

**REQUIRED RESPONSE DATE:** \_\_\_\_\_

**DATE RETURNED:** \_\_\_\_\_  
(To be filled by UESI Safety)

**HAZARD RATING SYSTEM:** HR1 = DANGEROUS, DO NOT USE OR CONTINUE UNTIL CORRECTED.  
HR2 = HAZARD, LIMIT USE, CORRECT AS SOON AS POSSIBLE.  
HR3 = CAUTION, CORRECTION REQUIRED BY RESPONSE DATE.



**Site Safety Audit Survey**



**Jobsite Safety Inspection Checklist**

**Project:** \_\_\_\_\_ **Job No.:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Project Manager:** \_\_\_\_\_ **Supervisor:** \_\_\_\_\_

Inspection Criteria	Yes	No	Comments
<b>A. General</b>			
1. Emergency phone numbers and procedures posted?			
2. First aid supplies readily available?			
3. First aid supplies adequate for job manpower?			
4. Required posters and signs posted and readable?			
<b>B. Personal Protective Equipment</b>			
1. Hard hats worn by all personnel in work areas?			
2. Eye and face protection worn as required?			
3. Hearing protection worn as required?			
4. Respiratory protection worn as required?			
5. Safety harnesses and lanyards worn for fall protection?			
6. Workers dressed properly for the job?			
7. Personal protective equipment in good condition?			
8. Safety supplies adequate for job manpower?			
<b>C. Housekeeping</b>			
1. Walkways and stairs kept clear of material and debris?			
2. Cords and hoses strung to prevent trip and fall hazard?			
3. Are liquid spills cleaned up immediately?			
4. Restrooms and eating areas clean?			
5. Fabrication and work areas clean and orderly?			
6. Site trailers and vaults clean and orderly?			
7. Gang boxes clean and orderly?			
8. Trash, scrap, and debris picked up and disposed of?			
<b>D. Fire Protection</b>			
1. Fire fighting equipment well marked and accessible?			
2. Employees trained to use fire-fighting equipment?			
3. Fire extinguishers inspected monthly?			
4. Smoking prohibited where flammables are located?			
5. Flammables stored and handled in approved containers?			
6. Oily rags disposed of in an approved container?			
7. Temp. heaters kept 20' away from combustible materials?			

**Site Safety Audit Survey**



**Jobsite Safety Inspection Checklist**

Inspection Criteria	Yes	No	Comments
<b>E. Material Handling and Storage</b>			
1. Materials stored neatly in stacks or piles?			
2. Cylindrical materials racked or cribbed and blocked?			
3. Loose materials containerized or palletized?			
4. Aisle space maintained around stored materials?			
5. Storage areas kept clear of scrap, debris, and trash?			
6. Slings and chokers in good condition?			
7. Chain falls and come-a-longs in good condition?			
8. Cranes operated in a safe manner by operators?			
9. Workers move from under suspended loads?			
10. Workers know and use proper crane signals?			
11. Crane hand signals posted on jobsite?			
12. Workers attach tag lines to loads?			
13. Hoisting hooks have safety latches?			
14. Running cables inspected and in good condition?			
15. Load limits marked on all hoisting rigs?			
<b>F. Tools</b>			
1. Power tools have guards in place?			
2. Power tools either grounded or double insulated?			
3. Power tool cords and plugs in good condition?			
4. Impact tools with mushroomed heads dressed as needed?			
5. Broken tools repaired or replaced as needed?			
<b>G. Welding and Cutting</b>			
1. Gas cylinders stored upright and secured?			
2. Oxygen cylinders segregated from fuel gas cylinders?			
3. Full cylinders segregated from empty cylinders?			
4. Caps secured on all cylinders not in use?			
5. Welding leads in good condition?			
6. Welding screens erected in high flash areas?			
7. Welding blankets used to protect materials/equipment?			
8. Fire watches posted as needed?			
9. Proper permits issued (as required)?			
10. Fire extinguishers kept close to hot work areas?			

**Site Safety Audit Survey**



**Jobsite Safety Inspection Checklist**

Inspection Criteria	Yes	No	Comments
<b>H. Electrical</b>			
1. 120 volt tools and equipment tested and color-coded?			
2. Extension cords heavy duty, 3-wire type?			
3. Temporary lights equipped with bulb guards?			
4. Sufficient lighting to work and move safely?			
5. Lockouts used to de-energize operational systems?			
6. Welders and stationary equipment properly grounded?			
<b>I. Ladders</b>			
1. Straight ladders secured at top landing?			
2. Straight ladders extend 36" above top landing?			
3. Straight ladders have feet or blocked at bottom?			
4. Straight ladders set up with a 4 to 1 slope?			
5. Top step of stepladders not used as a step?			
6. Climbing the back of stepladders prohibited?			
7. Workers use the proper height ladder for the job?			
8. Portable ladders used only by company employees?			
<b>J. Scaffolds and Manlifts</b>			
1. All scaffold parts and hardware used as required?			
2. All scaffold hardware and parts in good condition?			
3. Scaffolds fully planked?			
4. All scaffold planks cleaned?			
5. Scaffolds have guardrails, midrails, and toe boards?			
6. Wheels on rolling scaffolds locked during scaffold use?			
7. Workers prohibited from riding rolling scaffolds?			
8. Manlifts in good operating condition?			
9. Only trained employees allowed to operate manlifts?			
10. Outriggers extended when manlifts are in use?			
11. Workers prohibited from exiting raised manlifts?			
12. Workers only allowed to work from floor of basket?			
13. Workers required to tie-off while basket is raised?			
14. Only company employees allowed to operate manlifts?			

**Site Safety Audit Survey**



**Jobsite Safety Inspection Checklist**

Inspection Criteria	Yes	No	Comments
<b>K. Handrails and Hole Covers</b>			
1. Perimeters and drop-offs protected by rails or cables?			
2. Railings sturdy, continuous, and have midrails?			
3. Railings replaced after temporary removal?			
4. Floor holes protected by railings or hole covers?			
5. Hole covers secured to prevent movement?			
6. Hole covers marked to prevent accidental removal?			
7. Hole covers replaced after temporary removal?			
<b>L. Excavation and Trenching</b>			
1. Excavations 5' or deeper shored, sloped, or boxed?			
2. Workers stay within shored area?			
3. Excavated spoil stored at safe distance from work?			
4. Barricades placed on all open sides at end of shift?			
5. Ladders placed every 50' for entry and egress?			
6. Excavations de-watered as needed?			
7. Backfill placed as soon as possible?			
<b>M. Employee Communications</b>			
1. Do foremen communicate with their crews on job methods?			
2. Do foremen react to employee safety recommendations?			
3. Do foremen address unsafe actions and conditions?			
4. Are safety meetings held weekly with all employees?			

**ATTACH ADDITIONAL COMMENTS TO BACK OF FORM**

Inspection Completed By: \_\_\_\_\_ Date: \_\_\_\_\_  
 Signature / Printed Name / Title

Project Manager/Site Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_  
 Signature / Printed Name / Title

Inspection Reviewed By: \_\_\_\_\_ Date: \_\_\_\_\_  
 Signature / Printed Name / Title

# Attachment D

(29 CFR Part 1910,  
Subpart T /  
Commercial Diving  
Ops)



# OSHA INSTRUCTION

U.S. DEPARTMENT OF LABOR

Occupational Safety and Health Administration

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DIRECTIVE NUMBER: CPL 02-00-151

EFFECTIVE DATE: June 13, 2011

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SUBJECT: 29 CFR Part 1910, Subpart T – Commercial Diving Operations

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## ABSTRACT

- Purpose:** This instruction provides guidelines for the occupational safety and health standards for commercial diving operations, 29 CFR Part 1910, Subpart T.
- Scope:** OSHA-wide.
- References:** See [section III](#).
- Cancellation:** CPL 02-00-143, 29 CFR Part 1910, Subpart T – Commercial Diving Operations, August 11, 2006.
- State Impact:** Notice of Intent and Equivalency Required (see [section VI](#)).
- Action Offices:** National, Regional, Area and State Plan offices.
- Originating Office:** Directorate of Enforcement Programs.
- Contact:** Director, Office of Maritime Enforcement  
200 Constitution Ave., N.W., Room N-3610  
Washington, DC 20210  
(202) 693-2399

By and Under the Authority of

David Michaels, PhD, MPH  
Assistant Secretary

## Executive Summary

This instruction provides guidance to Occupational Safety and Health Administration (OSHA) National, Regional, and Area Offices; industry employer and employee groups; State programs; and federal agencies concerning OSHA's policy and procedures for implementing intervention and inspection programs to reduce injuries, illnesses and fatalities, and to eliminate workplace hazards found in commercial diving operations. This instruction provides tools to support intervention and inspection programs in the commercial diving industry. This instruction:

- Supports the reduction of occupational exposure to hazards through direct intervention, and promotes a safety and health culture through compliance assistance, cooperative programs, and strong leadership.
- Maximizes OSHA's effectiveness and efficiency by strengthening its capabilities and infrastructure.

## Significant Changes

This instruction has been revised and updated to include significant changes as follows:

- Provides OSHA compliance officers, consultants, and other interested government and industry parties with information to support interventions involving commercial diving operations and to minimize employee exposure to hazards.
- Provides additional answers to commonly asked questions related to commercial diving operations in [Appendix A](#). This appendix consolidates all previously issued interpretations of OSHA's commercial diving operations standards.
- Provides additional clarification of the requirements and duties of diver tenders ([Appendix E](#)).
- Updates the instruction to ensure that current editions of other OSHA instructions, as well as industry standards and manuals, are referenced (e.g., [CPL 02-00-150](#), Field Operations Manual (FOM), April 22, 2011, and [Association of Diving Contractors International](#), Consensus Standard for Commercial Diving and Underwater Operations (6<sup>th</sup> Edition)).
- Updates [Appendix D](#) of this instruction related to no-decompression air dives based on Revision 6 to the [U.S. Navy Diving Manual](#).
- Adds electronic links to enhance web-based usability.

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- I. Purpose. This instruction provides OSHA’s National, Regional, and Area Offices; industry employer and employee groups; State programs; and federal agencies with guidance concerning OSHA’s policy and procedures on the enforcement of safety and health standards for commercial diving. The purpose of this instruction is to provide comprehensive guidance that will allow OSHA offices to establish or support intervention and inspection programs in the commercial diving industry. Further, this instruction provides guidance and information to ensure compliance with commercial diving operations standards and the consistent enforcement of these standards.
- II. Scope. This instruction applies OSHA-wide to all programmed and unprogrammed compliance inspections, consultation interventions, and other activities such as compliance assistance, cooperative programs, training, and education related to commercial diving operations.
- III. References.
  - A. 29 CFR Part 1910, General Industry Standards.
  - B. 29 CFR Part 1915, Shipyard Employment Standards.
  - C. 29 CFR Part 1917, Marine Terminals Standards.
  - D. 29 CFR Part 1918, Longshoring Standards.
  - E. 29 CFR Part 1926, Construction Industry Standards.
  - F. OSHA Directives.
    1. CSP 01-00-002, State-Plan Policies and Procedures Manual, March 21, 2001.
    2. CPL 02-00-142, Shipyard “Tool Bag” Directive, August 3, 2006.
    3. CPL 02-00-135, Recordkeeping Policies and Procedures Manual (RKM), December 30, 2004.
    4. CPL 02-00-051, Enforcement Exemptions and Limitations under the Appropriations Act, May 28, 1998.
    5. CPL 02-00-150, Field Operations Manual (FOM), April 22, 2011.
    6. CPL 02-01-047, OSHA Authority Over Vessels and Facilities on or Adjacent to U.S. Navigable Waters and the Outer Continental Shelf (OCS), February 22, 2010.
  - G. Other References.
    1. OSHA Maritime Web Page.

2. OSHA Publications.
3. U.S. Navy Diving Manual (Revision 6).
4. Association of Diving Contractors International, Consensus Standard for Commercial Diving and Underwater Operations (6<sup>th</sup> Edition).
5. 46 CFR, Chapter I, Part 197, Subpart B – U.S. Coast Guard Commercial Diving Operations.
6. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH/OSHA/USCG/EPA), October, 1985.
7. NOAA Diving Manual – Diving for Science and Technology (Fourth Edition).

IV. Cancellation. This instruction supersedes the following:

CPL 02-00-143, 29 CFR Part 1910, Subpart T – Commercial Diving Operations, August 11, 2006.

V. Action Offices. The policies and procedures set forth in this instruction are effective immediately and will remain in effect until canceled by proper authority.

A. Responsible Office. Directorate of Enforcement Programs (DEP), Office of Maritime Enforcement (OME).

B. Action Office. OSHA Regional Administrators, Area Directors, State-Plan Designees, and National Office Directors must ensure that the policies and procedures set forth in this instruction are followed.

Regional Administrators also must ensure that Consultation Program Managers in their regions are informed of the requirements of this instruction and encourage the involvement of Consultation Programs in commercial diving operations.

VI. Federal Program Change.

Notice of Intent and Equivalency Required. This instruction describes a federal program change which provides comprehensive guidance on the policies and procedures for the enforcement of safety and health standards of Commercial Diving Operations. States with OSHA-approved State Plans must have policies and procedures that are at least as effective as those in this instruction for the enforcement of the commercial diving standard within their jurisdiction. See section XII., paragraph A.9., and Appendix B of this instruction for a discussion of federal and State jurisdiction.

States are required to notify OSHA within 60 days whether they intend to adopt policies and procedures identical to those in this instruction or adopt or maintain different policies and procedures. If a State adopts or maintains policies and procedures that differ from

Federal OSHA's, the State must identify the differences and may either post its new or existing different policies on its State Plan website and provide the link to OSHA or submit an electronic copy to OSHA with information on how the public may obtain a copy from the State. If the State adopts identical policies and procedures, it must provide the date of adoption to OSHA. State adoption must be accomplished within 6 months, with posting or submission of documentation within 60 days of adoption. OSHA will provide summary information on the State responses to this instruction on its website.

VII. Significant Changes. This instruction has been revised and updated to include significant changes as follows:

- Provides OSHA compliance officers, consultants, and other interested government and industry parties with information to support interventions involving commercial diving operations and to minimize employee exposure to hazards.
- Provides additional answers to commonly asked questions related to commercial diving operations in Appendix A. This appendix consolidates all previously issued interpretations of OSHA's commercial diving operations standards.
- Provides additional clarification of the requirements and duties of diver tenders (Appendix E).
- Updates the instruction to ensure that current editions of other OSHA instructions, as well as industry standards and manuals, are referenced (e.g., CPL 02-00-150, Field Operations Manual (FOM), April 22, 2011, and Association of Diving Contractors International, Consensus Standard for Commercial Diving and Underwater Operations (6<sup>th</sup> Edition)).
- Updates Appendix D of this instruction related to no-decompression air dives based on Revision 6 to the U.S. Navy Diving Manual.
- Adds electronic links to enhance web-based usability.

VIII. Federal Agencies. This instruction describes a change that may affect federal agencies. It is the responsibility of the head of each federal agency to establish and maintain an effective and comprehensive safety and health program. Executive Order 12196, Section 1-201, and 29 CFR 1960.16, require federal agencies to adopt policies and procedures necessary to provide a level of protection equivalent to that provided by Federal OSHA standards and regulations.

IX. Application. This instruction applies OSHA-wide to all interventions, inspections, and violation-abatement assistance related to commercial diving. This instruction also applies to OSHA outreach efforts that include compliance assistance, cooperative programs, training, and education.

Further, this instruction applies to all State consultation programs with authority over commercial diving activities. State consultation programs are expected to provide safety

and health program assistance, training, education, hazard identification, and abatement assistance to employers.

- X. Background. The initial standard for commercial diving operations was issued in the Federal Register, July 22, 1977 (see [42 FR 37650](#)). The preamble, from pages 37650 to 37668, contains information and background on the purposes and intent of the standard.

In 1979, 29 CFR 1910.411 *Medical requirements* of the original diving standards promulgated on July 22, 1977, was challenged in a court case, *Taylor Diving & Salvage Company v. Department of Labor*, 599 F.2d 622 (5<sup>th</sup> Circuit 1979); OSHA subsequently removed this section from 29 CFR Part 1910, Subpart T.

On November 26, 1982, OSHA published a provision (see 29 CFR 1910.401(a)(2)(iv)) exempting scientific diving from coverage under 29 CFR Part 1910, Subpart T (see Federal Register notice [47 FR 53357](#)). This exemption applied only when: (1) the diving operation meets the Agency's definition of scientific diving; (2) the diving operation is part of a diving program that uses a safety manual; and (3) the diving program is directed and controlled by a diving-control board that conforms to specified criteria. However, the United Brotherhood of Carpenters and Joiners (UBCJ) subsequently challenged this exemption in a federal appellate court (see *United Brotherhood of Carpenters and Joiners v. Department of Labor*, No. 82-2509 (D.C. Cir. 1982)). On April 4, 1984, this court issued an unpublished memorandum and order in which it stated that OSHA must provide the UBCJ with an opportunity to submit evidence to the public record regarding the exemption, and make a clear distinction between commercial and scientific diving. The Agency then reopened the public record to allow the UBCJ and other members of the public to submit additional evidence regarding the exemption, and to propose interpretive guidelines that would be used to distinguish between commercial and scientific diving (see Federal Register notice [49 FR 29105](#)). After carefully considering the new evidence submitted to the record, OSHA published on January 9, 1985, a notice in the Federal Register reinstating the conditions for the scientific exemption specified earlier in 29 CFR 1910.401(a)(2)(iv), and establishing the interpretive guidelines by which it will be determined whether the diving operation is scientific or commercial (see Federal Register notice [47 FR 53357](#)).

On February 17, 2004 (see Federal Register notice [69 FR 7351](#)), OSHA amended 29 CFR Part 1910, Subpart T – Commercial Diving Operations, to allow recreational diving instructors and diving guides to comply with an alternative set of requirements instead of the decompression chamber requirements in the existing 29 CFR Part 1910, Subpart T standards. The final rule applies only when these employees engage in recreational diving instruction and diving-guide duties; use an open-circuit, a semi-closed-circuit, or a closed-circuit self-contained underwater-breathing apparatus supplied with a breathing gas that has a high percentage of oxygen mixed with nitrogen (relative to standard air); dive to a maximum depth of 130 feet of sea water; and remain within the no-decompression limits specified for the partial pressure of nitrogen in the breathing-gas mixture. This final rule became effective on March 18, 2004.

- XI. Inspection Guidelines.

- A. Compliance Safety and Health Officers (CSHOs) shall not perform any type of diving during the course of an investigation or inspection without the prior approval of the Director, Directorate of Enforcement Programs.
- B. It is preferable that CSHOs be familiar with diving operations and equipment before conducting an inspection at a worksite that includes diving operations. More importantly, however, the CSHO should be familiar with other OSHA standards that may pertain to the worksite, such as: construction (e.g., pile driving, cranes and derricks); shipyard employment (e.g., dry-docking a vessel); and general industry (e.g., powerplant inspection and maintenance).
- C. Area Offices that have offshore activities may obtain Oil and Gas Development Maps for each State having such operations. These maps are available from the respective State for State territorial seas (example: in Alaska these maps are available from the Alaska Department of Natural Resources – Department of Oil and Gas), and from the U.S. Department of the Interior – Bureau of Ocean Energy Management Regulation and Enforcement (BOEMRE) (formally Minerals Management Service (MMS)) for coastal waters beyond State territorial seas.
- D. Normal variance procedures are in effect with respect to the diving standard. When employers indicate that they have a variance request pending that OSHA has not yet acted upon, a citation shall still be issued for any violation. The employer should be informed that the variance request will be taken into account in considering the proper abatement period or proposed penalty. Questions regarding variances shall be referred to OSHA’s National Office, Directorate of Technical Support and Emergency Management (DTSEM), Office of Technical Programs and Coordination Activities (OTPCA).

XII. General Inspection Procedures.

A. 29 CFR 1910.401 Scope and application.

1. Scope.

This standard applies (except as noted in section XII., paragraph A.5.b., of this instruction) to all commercial diving and related support operations subject to OSHA authority. As with all OSHA standards, the legal responsibility for compliance rests solely on the employer. Employers are expected to comply with all standards or parts of standards that apply to the tasks in which their employees are engaged.

2. Authority.

In general, OSHA authority over commercial diving operations is the same as OSHA authority over any other industry as expressed under Section 4(a) of the Occupational Safety and Health Act of 1970. Since OSHA covers all employment and places of employment within a State that is under Federal OSHA jurisdiction, the Act’s requirements apply to both inland commercial

diving operations and any other type of employment within the State territorial seas for coastal States and from other land masses listed in Section 4(a) of the Act (extends seaward for 3-nautical miles from the general coastline; except for Texas, the Gulf Coast of Florida, and Puerto Rico where it extends seaward for 9-nautical miles from the general coastline); in the case of the Great Lakes and St. Lawrence Seaway, the limit extends from the coastline to the established international boundary lines with Canada. Section 4(a) also covers workplaces beyond the State territorial seas that are engaged in employment operations in connection with the Outer Continental Shelf (OCS) lands (NOTE: “lands” not “vessels”), and work related to these operations. See [Appendix B](#) of this instruction for further guidance related to authority that is specific to commercial diving operations.

3. Applicable Standards.

Commercial diving operations must be in compliance with 29 CFR Part 1910, Subpart T.

NOTE: 29 CFR 1928.21(b) reads, “Except to the extent specified in paragraph (a) of this section, the standards contained in Subparts B through T and Subpart Z of Part 1910 of this title does not apply to agricultural operations.” Agricultural operations include the following Standard Industry Classification (SIC) and North American Industry Classification System (NAICS) codes:

1987 SIC MATCHED TO 2007 NAICS

1987 SIC Code	1987 SIC Description	2007 NAICS Code	2007 NAICS Description
01	Agricultural Production – Crops	111	Crop Production
02	Agricultural Production – Livestock and Animal Specialties	112	Animal Production
071	Soil Preparation – Services	115112	Soil Preparation, Planting, and Cultivating
0721	Crop Planting, Cultivating and Protecting	115112	Soil Preparation, Planting, and Cultivating
0722	Crop Harvesting, Primarily by Machine	115113	Crop Harvesting, Primarily by Machine
0724	Cotton Ginning	115111	Cotton Ginning

0761	Farm Labor Contractors and Crew Leaders	115115	Farm Labor Contractors and Crew Leaders
0762	Farm Management Services	115116	Farm Management Services

NOTE: The classification of aquaculture industry operations depends upon specific conditions. Operations that are part of the controlled growing and harvesting of fish, shellfish, and plants in fresh, brackish, and marine waters are covered by the OSHA standards for agriculture, [29 CFR Part 1928](#). Any aquaculture operations that are not uniquely agricultural and not part of the controlled growing and harvesting of fish, shellfish, and plants would be covered by 29 CFR Part 1910, Subpart T – Commercial Diving Operations. Other types of diving activities (such as inspecting and maintaining underwater piping equipment) also are covered by 29 CFR Part 1910, Subpart T. Diving operations conducted by agricultural employees engaged in employments under the above-listed SIC or NAICS codes may not be covered by 29 CFR Part 1910, Subpart T. Contractors of agricultural employers who do not fall within these SIC or NAICS codes are covered by 29 CFR Part 1910, General Industry Standards.

4. Precedence of Standards.

When a provision of 29 CFR Part 1910, Subpart T, differs or conflicts with any other OSHA standard, the requirements of 29 CFR Part 1910, Subpart T, shall take precedence when applied to diving operations. The CSHO should review [29 CFR 1910.5](#) for guidance before issuing a citation for a violation of a general industry standard to an employer engaged in diving operations. Questions regarding this procedure shall be referred to OSHA’s National Office, [Directorate of Enforcement Programs](#).

5. Citing Standards.

a. The proper standards to cite for violations shall be determined by the type of work that the diving operation requires. For example:

- i. Repairs on a vessel requiring a diver to examine damage to the hull. These violations would be cited, as appropriate, under 29 CFR Part 1910, Subpart T (see 1910.401 – 1910.441).

NOTE: 29 CFR Part 1910, Subpart T – Commercial Diving Operations, is incorporated into [29 CFR Part 1915](#) by 29 CFR 1915.6 (see [CPL 02-00-142](#), Shipyard “Tool Bag” Directive).

- ii. Maintenance work requiring a diver to enter a sewer line to free debris from a strainer. These violations would be cited, as appropriate, under 29 CFR Part 1910, Subpart T (see 1910.401 – 1910.441).
- iii. Work on a dock that requires a diver to perform construction work (construction work includes the actual erection, alteration, and repair of the dock). These violations would be cited under [29 CFR Part 1926](#).

Subpart Y, with specific reference to the appropriate section of 29 CFR Part 1910, Subpart T (see 1910.401 – 1910.441).

- iv. If the CSHO is not sure which standard applies to the operation, then the CSHO shall cite both standards (one in the alternative).
- b. The commercial diving operations standard does not apply to diving operations under the following conditions:
  - i. 29 CFR 1910.401(a)(2)(i). Diving for instructional purposes by persons using only open-circuit, compressed air, self-contained underwater-breathing apparatus (SCUBA) within the no-decompression limits.  
  
NOTE: OSHA standards do not apply to individuals engaged in recreation or sport diving (generally SCUBA) that is not related to employment.
  - ii. 29 CFR 1910.401(a)(2)(ii). Diving solely for search, rescue, or related public-safety purposes by or under the control of a government agency.  
  
NOTE: Diving contractors who perform such emergency service not under the control of a government agency, but as an independent contractor for private purposes, do not fall under this exclusion. However, they may be covered by the provisions concerning application of the standard in an emergency (see 29 CFR 1910.401(b)).
  - iii. 29 CFR 1910.401(a)(2)(iii). Diving operations when performed for research, development, and related activities in which human subjects are involved. These operations are covered by the standards contained in 45 CFR Part 46, Protection of Human Subjects, administered by the U.S. Department of Health and Human Services (previously known as the U.S. Department of Health, Education and Welfare), or equivalent federal standards. Questions of equivalence or applicability shall be referred to OSHA's National Office, Office of Maritime Enforcement.
  - iv. 29 CFR 1910.401(a)(2)(iv) and 29 CFR Part 1910, Subpart T, Appendix B. Diving operations that are defined as scientific diving and that are under the direction and control of a diving program containing all elements specified in the commercial diving operations standard.
  - v. Section 4(b)(1) of the OSH Act. Those specific working conditions of diving operations over which other federal agencies exercise statutory authority to prescribe or enforce standards or regulations affecting occupational safety and health. Questions regarding OSHA's authority shall be referred to OSHA's National Office, Office of Maritime Enforcement (see Appendix B of this instruction for additional guidance).

NOTE: Appendix C of this instruction provides additional discussion and information regarding exclusions and exemptions from OSHA's commercial diving standard.

6. Federal Agency Coverage and Application.

a. U.S. Coast Guard.

The U.S. Coast Guard has prescribed diving regulations under 46 CFR, Chapter I, Part 197, Subpart B – Commercial Diving Operations. U.S. Coast Guard regulations state that they apply to commercial diving operations taking place: at any deepwater port or the safety zone thereof as specified by 33 CFR Part 150 (see NOTE below); from any artificial island, installation, or other device on the Outer Continental Shelf (OCS) and the waters adjacent thereto as defined in 33 CFR Part 147, or otherwise related to activities on the OCS; from all vessels with a valid certificate of inspection (COI) issued by the U.S. Coast Guard (i.e., “inspected” vessels), including mobile offshore drilling units (MODUs) regardless of their geographic location; from any vessel connected with a deepwater port or within the deepwater port safety zone; and from any vessel engaged in activities related to the OCS.

NOTE: “Deepwater port” means any fixed or floating man-made structure other than a vessel, or any group of structures, located beyond State territorial seas, and that are used or intended for use as a port or terminal for the transportation, storage, or further handling of oil or natural gas for transportation to any State, and for other uses including the transportation of oil or natural gas from the United States' Outer Continental Shelf. The term includes all components and equipment, including pipelines, pumping stations, service platforms, buoys, mooring lines, and similar facilities to the extent they are located seaward of the general coastline. In the case of natural gas, the term includes all components and equipment, including pipelines, pumping or compressor stations, service platforms, buoys, mooring lines, and similar facilities, to the extent that they are located seaward of the general coastline and do not include interconnecting facilities. The local U.S. Coast Guard Office can provide detailed guidance regarding deepwater ports, the associated safety zones, and the identification of related components and equipment (see <http://homeport.uscg.mil> or USCG Phonebook).

b. Other Federal Agencies.

The Department of the Navy (DON) requires compliance with the U.S. Navy Diving Manual (Revision 6). For civilian employees, this manual includes additional provisions which provide protection equivalent to the OSHA diving standard. DON civilian divers are identified as all permanent DON employees who have been formally trained at an approved U.S. Navy diving school. Commercial divers contracted by DON who are not

permanent government employees are not subject to these provisions. The additional provisions for DON civilian divers include: limiting the maximum diving depths and in-water decompression times; having a recompression chamber onsite for all SCUBA and surface-supplied air diving deeper than 100 fsw, and for all mixed-gas diving; and having an emergency gas supply (“come-home bottle” or “bail-out bottle”) for any dive greater than 60 fsw, planned decompression dives, or any dive for which direct access to the surface is not available. The complete list of DON restrictions for DON civilian diver employees is included in the U.S. Navy Diving Manual (see Volume 2, section 6-8.9; Revision 6). Furthermore, DON civilian diver employees are exempt from regulation by OSHA when conducting uniquely military operations.

NOTE: Other federal agencies, such as the U.S. Army Corps of Engineers and the Federal Highway Administration, have developed diving requirements for their own employees and contractor employees. However, when the diving operations are subject to OSHA authority the OSHA diving standard continues to cover these employees, and commercial diving operations conducted by federal employees or their contractors must meet, but may exceed, the requirements of 29 CFR Part 1910, Subpart T.

7. Inspection Priorities.

Diving operations that do not fall within one of the exemption categories listed in this section, and that involve an employer-employee relationship, are covered by 29 CFR Part 1910, Subpart T. Inspection priorities shall be followed as stated in CPL 02-00-150, Field Operations Manual (FOM), with respect to different types of diving operations.

8. 29 CFR 1910.401(b) Application in Emergencies.

- a. This exclusion was included in the standard to allow the designated person-in-charge discretion to deviate from the requirements of the standard in situations where death or serious harm to individuals, or major environmental damage (such as an oil or other hazardous material leak, or repairs to a municipal dam gate to avoid or mitigate flooding), is likely to occur or continue to occur, but only to the extent that such action is immediately necessary to prevent or minimize the harm or damage. This exclusion applies only for the duration of the emergency. The employer is required to notify the nearest OSHA Area Office within 48 hours of the onset of the situation requiring such deviation. The Area Director may request that the employer submit a written record (such as a facsimile, e-mail or letter) of the notification within 48 hours of the request for a written record, or as otherwise agreed to, explaining what deviations from the standard were made and what additional precautions were instituted to provide for the safety and health of the employees during the emergency. Failure of the employer to notify the OSHA Area Office of the emergency situation within the specified time shall be considered a violation of this

provision of the standard. These incidents shall be closely monitored to ensure that this provision is not abused. A pattern of repeated deviations shall be cause for an inspection.

- b. This emergency provision does not apply to situations involving only economic or property damage.
9. Federal and State Authority.
- a. All State-Plan States have promulgated a commercial diving standard either identical to 29 CFR Part 1910, Subpart T, or at least as effective as the OSHA standard (California, Michigan, Oregon, and Washington have State diving standards that differ from OSHA's). (A description of any differences will be made available by these State-Plan States to affected employers and employees through the State-Plan States' website or other means.)
  - b. Federal OSHA enforces its diving standard whenever commercial diving operations are being conducted by private-sector employees in States under Federal OSHA enforcement authority, and in maritime operations not covered by a State-Plan State (see the appropriate subpart of 29 CFR Part 1952). The dive location (see section XII., paragraph B.11., of this instruction) determines which entity has authority. Federal OSHA does not have authority over State and local government employees.
  - c. States with approved plans enforce the diving standard: when commercial diving operations are being conducted by private-sector employees not engaged in shipyard employment or marine terminal activities (e.g., equipment repair, sewer maintenance, or construction); in maritime operations (i.e., shipyard employment and marine terminals) as provided by their plans in California, Minnesota, Vermont, and Washington; and with regard to State and local government employees (see, however, the exemption for search, rescue, and related public-safety diving by or under the control of a government agency in Appendix C of this instruction).

NOTE: See Appendix B of this instruction for additional information related to OSHA's jurisdiction.

B. 29 CFR 1910.402 Definitions.

1. Acfm: Actual cubic feet per minute.
2. ASME Code or equivalent: ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, or an equivalent code which the employer can demonstrate to be equally effective.

NOTE: "Equivalent" means equipment that is designed, built, and maintained to standards that will provide employees with at least the same level of

protection as equipment that meets the ASME Boiler and Pressure Vessel Code, Unfired Pressure Vessels, Section VIII. The employer shall be responsible for demonstrating equivalency. Questions regarding equivalency should be referred to OSHA's National Office, [Office of Maritime Enforcement](#).

3. ATA: Atmosphere absolute.
4. Bell: An enclosed compartment, pressurized (closed bell) or unpressurized (open bell), which allows the diver to be transported to and from the underwater work area and which may be used as a temporary refuge during diving operations.
5. 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 ascent (i.e., the diver "leaves the bottom").
6. Bursting pressure: The pressure at which a pressure containment device would fail structurally.
7. Cylinder: A pressure vessel for the storage of gases.

NOTE: [29 CFR 1910.101\(a\)](#) adopts 49 CFR Parts 171-179 for cylinder inspection requirements (see [49 CFR Part 173, Subpart G](#) – Gases; Preparation and Packaging, for details). The Department of Transportation (DOT) classifies compressed air as a Division 2.2 Hazardous Material (i.e., non-flammable gas) in the [Hazardous Materials Table](#) (49 CFR 172.101) for pressures of 25.9 psig (43.8 psia) or greater at 68°F ([49 CFR 173.115\(b\)\(1\)](#)). Cylinders typically will be stamped with DOT markings, but also may be stamped with ICC markings. For more comprehensive information regarding SCUBA cylinder markings, refer to paragraph 5.7, of the NOAA Diving Manual.

8. Decompression chamber: A pressure vessel for human occupancy such as a surface decompression chamber, closed bell, or deep diving system used to decompress divers and to treat decompression sickness.

NOTE: As used in this standard, the term "decompression chamber" refers to any pressure vessel for human occupancy used to decompress divers and to treat decompression sickness. A closed bell, if used as a decompression chamber, shall meet the design criteria stated in 29 CFR 1910.430(f).

9. Decompression sickness: A condition with a variety of symptoms which may result from gas or bubbles in the tissues of divers after pressure reduction.
10. Decompression table: A profile or set of profiles of depth-time relationships for the ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures.
11. Dive location: A surface or vessel from which a diving operation is conducted.

NOTE: The term “dive location” refers to the surface location from which diving operations are conducted such as a vessel, barge, wharf, pier, riverbank, or offshore rig, and does not mean the diver’s underwater work location.

12. Dive-location reserve breathing gas: A supply system of air or mixed-gas (as appropriate) at the dive location which is independent of the primary supply system and sufficient to support divers during the planned decompression.
13. Dive team: Diver and support employees involved in a diving operation, including the designated person-in-charge (DPIC).
14. Diver: An employee working in water (i.e., regardless of depth) using an underwater apparatus which supplies compressed breathing gas at the ambient pressure.
15. Diver-carried reserve breathing gas: A diver-carried supply of air or mixed-gas (as appropriate) sufficient under standard operating conditions to allow the diver to reach the surface, another source of breathing gas, or to be reached by a standby diver.
16. Diving mode: A type of diving requiring specific equipment, procedures and techniques (SCUBA, surface-supplied air, or mixed-gas).
17. Fsw: Feet of seawater (or equivalent static pressure head).

NOTE: An example of equivalent static pressure head would be the pressure of air inside a pressurized decompression chamber.

18. Heavy gear: Diver-worn deep-sea dress, including helmet, breastplate, dry suit, and weighted shoes.

NOTE: Advances in diving equipment and technology have led to heavy gear that does not include a breastplate. Surface-supplied diving gear, including helmet, dry suit, and weighted shoes (i.e., with the helmet directly connected to the dry suit, forming a self-contained pressure envelope for the diver) constitutes heavy gear as well.

19. Hyperbaric conditions: Pressure conditions in excess of surface pressure.
20. Inwater stage: A suspended underwater platform that supports a diver in the water.
21. Liveboating: The practice of supporting a surfaced-supplied air or mixed-gas diver from a vessel which is underway.
22. Mixed-gas diving: A diving mode in which the diver is supplied in the water with a breathing gas other than air.

NOTE: For diving operations, air is a mixture of oxygen and nitrogen with an oxygen content of 19.5% – 23.5%. Breathing gas mixtures with an oxygen content less than 19.5% or greater than 23.5%, or that use gases other than oxygen and nitrogen (excluding trace gases such as those found in compressed atmospheric air), constitute a mixed gas for the purposes of commercial diving. The early terms for nitrogen-oxygen mixtures as used by the U.S. Navy were “nitrogen-oxygen mixtures” or “nitrox.” Other terms often used to describe oxygen-rich mixtures include “oxygen-enriched air” (OEA) and “enriched-air nitrox” (EAN or EANx). The “x” in EANx evolved to state the oxygen percentage, as in EAN32 for 32% oxygen content. Additional terms used by NOAA include “NOAA Nitrox I” or “NN32” and “NOAA Nitrox II” or “NN36,” referring, respectively, to the 32% and 36% mixtures commonly used in diving.

23. No-decompression limits: The depth-time limits of the “no-decompression limits and repetitive dive group designation table for no-decompression air dives,” U.S. Navy Diving Manual or equivalent limits which the employer can demonstrate to be equally effective.

NOTE: The term “no-decompression limits” applies to those depth-time combinations for which decompression of the diver is not required. The no-decompression tables from the U.S. Navy Diving Manual are included in Appendix D of this instruction.

24. Psi(g): Pounds per square inch (gauge).
25. Scientific diving: Means diving performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks. Scientific diving does not include performing any tasks usually associated with commercial diving such as but not limited to: placing or removing heavy objects underwater; inspection of pipelines and similar objects; construction; demolition; cutting or welding; or the use of explosives.

NOTE: Additional guidance is provided in Appendix C of this instruction.

26. SCUBA diving: A diving mode independent of surface supply in which the diver uses open-circuit self-contained underwater breathing apparatus.
27. Standby diver: A diver at the dive location available to assist a diver in the water.

NOTE: The requirement that the standby diver be at the dive location, which is a location on the surface (such as the shore, a pier, or a dock) or on the deck of a vessel, eliminates the possibility that another diver in the water or at another dive location would be considered a standby diver. Standby divers do not necessarily have to be fully dressed, but must be available to render the

necessary assistance in a timely manner. The term “available” means to be clothed and equipped, and ready to enter the water at a moment’s notice. Gear such as face masks, air cylinders, and harnesses can be donned quickly, and need not be worn until the standby diver is required to enter the water.

28. Surface-supplied air diving: A diving mode in which the diver in the water is supplied from the dive location with compressed air for breathing.
29. Treatment table: A depth-time and breathing-gas profile designed to treat decompression sickness.
30. Umbilical: The composite hose bundle between a dive location and a diver or diving bell, or between a diver and a diving bell, which supplies the diver or diving bell with breathing gas, communications, power, or heat as appropriate to the diving mode or conditions, and includes a safety line between the diver and the dive location.
31. Volume tank: A pressure vessel connected to the outlet of a compressor and used as an air reservoir.
32. Working pressure: The maximum pressure to which a pressure containment device may be exposed under standard operating conditions.

C. 29 CFR 1910.410 Qualifications of dive team.

1. The level of experience or training required by the standard depends upon the job the employees are required to do. All dive-team members must have either experience or training in the use of tools, equipment, systems, techniques, operations, operational procedures, and emergency procedures that are pertinent to, and necessary for, the assigned tasks for the diving mode (i.e., SCUBA, surface-supplied air, or mixed-gas diving). It is essential that those dive-team members who are exposed to hyperbaric conditions, or those members who control the exposure of others, have knowledge of the physiological effects of diving and the related effects of pressure. Accordingly, this standard also requires that employees be trained in diving-related physics and physiology. Employee qualifications achieved through field experience or classroom training, or both, may be used to meet the requirements of the standard. For example:
  - a. Most divers begin as tenders and advance to diving status after a period of field experience and/or classroom training. A diving-tender trainee receiving on-the-job training will be assigned as a tender only under the supervision of a qualified diver.
  - b. Tenders are members of the dive team who provide surface-support to divers at the diving location. A tender employed in shallow-water air diving is required to have a basic understanding of the breathing-air system, the operating and emergency procedures, and knowledge of the care and use of

equipment. See [Appendix E](#) of this instruction for additional guidance regarding the responsibilities and duties of tenders.

- c. A mixed-gas diver conducts underwater work using mixed-gas as the breathing medium. Mixed-gas divers are required to have an advanced understanding of diving, including a working knowledge of mixed-gas equipment such as a decompression chamber, diving bell, and mixed-gas breathing supply system, and operational and emergency procedures associated with mixed-gas diving. In addition, the mixed-gas diver must have an understanding of the physics and physiology of mixed-gas diving. See [paragraph XII.K.](#), 29 CFR 1910.426 *Mixed-gas diving* of this instruction for additional information.
  - d. Chamber operators are required to have experience or training in conducting decompression procedures, knowledge of the physics and physiology of decompression, and the operation of the decompression equipment to which they are assigned.
  - e. Each dive-team member must be trained in cardiopulmonary resuscitation (CPR) and standard first aid. The American Red Cross standard course or equivalent training is specified by the standard. Employees completing this training are issued a card certifying that they have successfully completed the course. Any first-aid training meeting the requirements of 29 CFR 1910.151(b), 1926.50(c), or 29 CFR Part 1915, Subpart F, will meet the requirements of the standard (such as first-aid courses offered by the American Heart Association, American Petroleum Institute, National Safety Council, and American Academy of Orthopedic Surgeons).
2. The following methods may be used to check diving qualifications:
- a. Field experience.
    - i. Employment records.
    - ii. Written statements from previous employers.
    - iii. Written statements from diving officers or commanding officers (military).
    - iv. Field operations records.
    - v. The employee's diving logs.
  - b. Diving proficiency.
    - i. Company field operations records.
    - ii. Federal service operations records (such as from the Army Corps of

Engineers, NOAA, or military).

iii. The employee's diving logs.

c. Technical training.

i. Federal service qualification certificates (such as from the Army Corps of Engineers, NOAA, or military).

ii. Diving school certificates of completion.

iii. Company training program completion statements or equivalent proof of competency.

iv. Valid commercial diver certification card for the appropriate training level issued by the Association of Diving Contractors International.

3. Under 29 CFR 1910.410(b)(1), employers must generally assign tasks to dive-team members according to their experience and training. Additionally, the phrase "known to the employer" in 29 CFR 1910.410(b)(3) means that the designated person-in-charge must inquire into each dive-team member's health prior to a task assignment. The employer also is required in 29 CFR 1910.421(f)(2) to advise dive-team members of the procedures for reporting physical problems or adverse physiological effects during and after diving. Consistent with these provisions, an employer cannot require dive-team members to dive or otherwise work under hyperbaric conditions when they: (1) have any ailment that is likely to adversely affect the safety or health of any member of the dive team; (2) lack the necessary training or education; or (3) refuse to work under such conditions (i.e., under hyperbaric conditions). However, should a diver request termination during a dive, it may be necessary to prolong the diver's exposure to hyperbaric conditions to complete decompression or medical recompression treatment to avoid serious physical harm or death to the diver.
4. Under 29 CFR 1910.410(c), the designated person-in-charge (DPIC) (commonly referred to as the "diving supervisor" or the "diving foreman") is immediately responsible for the safety and health of the dive team. The DPIC can be the employer or an employer representative chosen by the employer. The DPIC shall have experience in, and knowledge of, all phases of the diving operation for which he/she is responsible. The DPIC shall be stationed at the dive location, and shall not be stationed at another dive location (i.e., he/she must be stationed at one dive location and be responsible only for the diving operation at that location). The DPIC can be a diver, when qualified as a diver, and when another dive-team member is available at the dive location who is trained and capable of performing the necessary functions of the DPIC's duties, when the DPIC is a diver in the water. The qualifications of the DPIC can be checked using the same methods listed in section XII., paragraph C.2., of this instruction.

D. 29 CFR 1910.420 *Safe practices manual.*

1. This standard requires that the employer develop and maintain a safe practices manual that includes information and procedures relating to the safety and health of the dive-team members. The manual must contain a copy of the commercial diving operations standard and a statement of the employer's policy for ensuring compliance with the standard. The manual must be at the dive location and available to all dive-team members.
2. The safe practices manual must provide a written operational procedure for each diving mode used by the employer. The CSHO shall review the manual to determine if it contains safety procedures and checklists for diving operations, assignments and responsibilities of the dive-team members, equipment procedures and checklists, and emergency procedures (at a minimum: fire, equipment malfunction or failure, adverse environmental conditions, and medical illness and injury). The safe practices manual guidance and procedures must be supplemented with additional information specific to each diving operation. This supplemental information is obtained during pre-dive planning and assessment (see 29 CFR 1910.421(d)), and promulgated to the dive-team members during the employee briefing (see 29 CFR 1910.421(f)).

NOTE: The "Consensus Standards for Commercial Diving and Underwater Operations" published by the Association of Diving Contractors International is recognized as meeting the general requirements of a safe practices manual.

E. 29 CFR 1910.421 *Pre-dive procedures.*

1. The provisions of this section must be followed by the employer for all diving modes, with the designated person-in-charge responsible for overall compliance with these provisions and briefing dive-team members.
2. 29 CFR 1910.421(b) *Emergency aid.* The CSHO shall determine whether the emergency aid list is complete and is available to all dive-team members. This list must contain the telephone or call numbers of: the nearest operational decompression chamber (if a chamber is not required at the dive location); accessible hospital(s); the available physician(s); the means of transportation available for use in the event of an emergency; and the nearest U.S. Coast Guard Rescue Coordination Center.
3. 29 CFR 1910.421(c) *First aid supplies.* The CSHO shall determine whether a first-aid kit is available at the dive location. The first-aid kit provided at the dive location must be appropriate for the diving operations, and approved by a physician. If it is to be used in a pressure chamber, such as a decompression chamber or a diving bell, the first-aid kit must be suitable for use under hyperbaric conditions because some items in a standard kit (such as bottles of liquid, mercury thermometers, or ammonia ampoules) may burst under pressure. In addition to any other first-aid or medical supplies, the kit must include an American Red Cross standard first-aid handbook, or an equivalent handbook,

and a bag-type resuscitator with a transparent hose and mask (so that the operator can see that the diver's air passages are clear).

4. 29 CFR 1910.421(d) *Planning and assessment*. This provision requires the employer to include in the planning of a diving operation an assessment of the safety and health features of the diving mode, surface and underwater conditions and hazards, primary and reserve breathing-gas supply, thermal protection, diving equipment and systems, dive-team assignments and the physical fitness of dive-team members (including any impairments known to the employer), repetitive dive designation or residual inert-gas status of divers, decompression chamber procedures (including any altitude corrections), and emergency procedures. The employer typically assigns this planning task to the designated person-in-charge. Most of the information required by this provision should be in the safe practices manual (see 29 CFR 1910.420). While conducting the planning and assessment, the employer must consider all hazards involved and ensure compliance with other OSHA standards (such as [29 CFR 1910.147 – The control of hazardous energy \(lockout/tagout\)](#); [29 CFR Part 1910, Subpart H – Hazardous Materials](#); [29 CFR Part 1910, Subpart N – Materials Handling and Storage](#); and [29 CFR Part 1910, Subpart Q – Welding, Cutting and Brazing](#)). Some information may not be found in the safe practice manual because it cannot be determined until the dive team reaches the dive location. The CSHO can question the dive-team members to determine that the employer has complied with the requirements of this provision.

NOTE: 29 CFR 1910.421(d) can be cited for any identified hazard that was not addressed properly by an employer when they planned and conducted an assessment of the diving operation or the work to be performed. For example, the hazards of installing piling underwater remain similar to installing piling above water with respect to maintaining vertical stability, and being positively secured to prevent accidental detachment of the pile from the hoisting equipment (see ANSI/ASSE A10.19-2008 – Safety Requirements for Pile Installation and Extraction Operations and ANSI A10.42-2000 – Safety Requirements for Rigging Qualifications – American National Standard for Construction and Demolition Operations).

NOTE: The NOAA Diving Manual addresses diving at altitudes above sea level in Section 4.5 (Dealing with Changes in Altitude). Altitude corrections are not typically required for most dives conducted below 1,000 feet (altitude) as discussed in the manual.

5. 29 CFR 1910.421(e) *Hazardous activities*. Hazards encountered during diving operations such as weather, water temperature, current, and bottom conditions must be recognized and taken into account during the planning and execution of the operation. When other operations being conducted in the vicinity (such as dredging, marine traffic, or movement of materials directly above the dive location and/or area of the dive) are likely to interfere with the diving operation, the designated person-in-charge shall plan the operation only after appropriate coordination with persons responsible for the other activities so that any hazard

exposures to the diver(s) or other dive-team members will be eliminated. Failure to plan for such conditions, or to coordinate activities, shall be a basis for a citation.

6. 29 CFR 1910.421(f) *Employee briefing*. The employee briefing is usually conducted by the designated person-in-charge just prior to the diver(s) entering the water. The dive-team members shall be briefed on the tasks to be undertaken, safety procedures for the diving mode, any unusual hazards or environmental conditions likely to affect the safety of the diving operation, and any modifications to operating procedures necessitated by the specific diving operation. The designated person-in-charge also must advise the dive-team members of the procedures for reporting physical problems or adverse physiological effects during and after the dive. It is particularly important that the designated person-in-charge inquire into each dive-team member's current state of physical fitness before making assignments. To determine compliance, the CSHO can question dive-team members and observe the diving operation, if one is ongoing.

7. 29 CFR 1910.421(g) *Equipment inspection*.

a. The equipment-inspection requirement prior to each dive relates directly to the equipment-checklist requirement in the safe practices manual. The breathing-supply system, including reserve breathing-gas supplies, masks, helmets, thermal protection, and diving bell-handling mechanisms (when appropriate) must be inspected prior to each diving operation. Pre-dive equipment inspection items are those that are critical for the safety of the dive operation. For surface-supplied diving, the breathing-supply system equipment inspection includes diving umbilicals as defined in 29 CFR 1910.402, *Definitions*. An umbilical inspection includes a visual inspection of the breathing-gas hose, communications cable, and the safety line between the diver and the dive location, and power cables and hot-water hoses as appropriate. This inspection ensures that: the umbilical has the required components, the components are properly rigged and married together, and all components are in good working condition (no leaks, tears, or damage). Umbilicals being used for diving operations with missing components or components in a condition that pose a hazard to the diver or dive team (such as a cut breathing-gas hose, power cable with bare wires exposed, or excessively frayed safety line) will be cited under 29 CFR 1910.421(g).

NOTE: The tender often sets up and checks the diver's equipment prior to conducting the dive. Refer to Appendix E – Requirements and Typical Duties of Diver Tenders, which outlines a list of typical duties and equipment checks (including checking the non-return valve on the diver's mask or helmet) that should be completed prior to dive operations.

b. Compliance with the pre-dive inspection requirements usually is determined only by observation (such as systems, equipment, processes and

procedures), and questioning the employees. This standard makes no distinction between employer-provided equipment and employee-provided equipment with regard to the pre-dive inspection requirement. While an employee may make such inspections, it is the employer who is responsible for ensuring compliance with all equipment requirements of the standard.

8. 29 CFR 1910.421(h) *Warning signal*.

- a. The following paragraphs describe the two distinctions made in the requirements for displaying the warning signal for commercial diving operations:
  - i. 29 CFR 1910.421(h) requires the warning signal to be displayed when diving from surfaces other than vessels such as wharves, piers, pilings, jetties, fixed caissons, levees, dikes, dams, breakwaters, and artificial islands (secured to the sea floor). Violations of this requirement shall be cited under this section.
  - ii. The requirement for displaying the warning signal when the dive location is located on a vessel is covered by the U.S. Coast Guard Inland Navigation Rules. These requirements are not enforceable by OSHA. If the CSHO observes violations of the warning signal when the dive location is on a vessel, no citation shall be issued. However, the CSHO shall inform the employer of the violation(s) and recommend abatement(s). The CSHO also shall note the incident on the OSHA-1 Form and notify the nearest U.S. Coast Guard Office of the violation(s) (see <http://homeport.uscg.mil> or [USCG Phonebook](#)).
- b. The warning signal is a rigid replica of the international code Flag “A,” and must be at least one meter (3’-3½”) in height (see [Appendix F](#) of this instruction).

NOTE: The red flag with a white diagonal stripe commonly used by recreational SCUBA divers does not satisfy the 29 CFR 1910.421(h) requirements. However, it can be used in addition to the “Alfa” flag to alert others who are familiar with the recreational SCUBA diving flag (e.g., recreational divers and boaters).

F. 29 CFR 1910.422 Procedures during dive.

1. 29 CFR 1910.422(b) *Water entry and exit*. A means capable of supporting the diver (such as an inwater stage or ladder) while entering or exiting the water is required. If it is a fixed structure, such as a ladder, it must extend below the water sufficiently to allow adequate diver access and support (a minimum of one meter is recommended). Portable ladders should be secured to maintain stability and to prevent pinch points. The employer also must provide a means for assisting an injured diver from the water to the surface or into a diving bell (such as an inwater stage, stokes basket, or harness).

2. 29 CFR 1910.422(c) *Communications*. An operational two-way voice communication system is required for communications between each surface-supplied air diver or mixed-gas diver and a member of the dive team at the dive location or in the diving bell (if a diving bell is provided or required). Line-pull signals do not meet this requirement, except for the SCUBA-diving mode. A two-way voice communication system is required for communications between the diving bell and the dive location. Also, an operational, two-way communication system (such as a cell phone, marine radio, or e-mail) must be available for obtaining emergency aid.
3. 29 CFR 1910.422(d) *Decompression tables*. This paragraph requires that decompression, repetitive, and no-decompression tables (as appropriate) be available at the dive location. These tables serve as guides for determining decompression and no-decompression profiles for the diving operation. The CSHO shall check that the decompression tables are available at the dive location (for standard air decompression tables refer to section III., paragraph G.3., of this instruction, and U.S. Navy Diving Manual, Volume 2, Chapter 9, “Air Decompression”).
4. 29 CFR 1910.422(e) *Dive profiles*. A written record called a depth-time profile (including any breathing-gas changes, when appropriate) must be maintained for each diver during the dive, including decompression. This record aids the designated person-in-charge (or the dive-team member managing the decompression interval) in implementing the planned dive schedule and decompression interval, and making necessary adjustments in the decompression schedule if changes occur in planned bottom times or depths. The dive profile information may be recorded by whatever means and in whatever form the employer prefers, provided that the information is maintained accurately and completely.
5. 29 CFR 1910.422(f) *Hand-held power tools and equipment*.
  - a. The standard does not require hand-held electric power tools used underwater to have a pressure-sensitive manual control switch. However, when electrically powered hand-held tools are used underwater, and the source of power is supplied from the dive location or a diving bell, the hand-held power tool shall not be supplied with power until requested by the diver. When the diver has finished work with the hand-held electric-power tool, the power to the tool will be de-energized from the dive location or the diving bell.
  - b. In addition to the requirements of 29 CFR 1910.422(f)(1) and (f)(2), all hand-held electric power tools and equipment must comply with 29 CFR 1910.303(b) and 29 CFR 1910.399.

Clarification of the term “approval” is given in 29 CFR 1910.303(a) as follows: “The conductors and equipment required or permitted by this

subpart shall be acceptable only if approved.”

The term “acceptable” is defined under 29 CFR 1910.399 as follows: “An installation or equipment is acceptable to the Assistant Secretary of Labor, and approved within the meaning of [29 CFR Part 1910, Subpart S – Electrical].” An installation would be acceptable if it meets one of the following three conditions:

- If it is accepted, or certified, or listed, or labeled, or otherwise determined to be safe by a nationally recognized testing laboratory [as defined by 29 CFR 1910.7].
- With respect to an installation or equipment of a kind which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, if it is inspected or tested by another federal agency, or by a State, municipal, or other local authority responsible for enforcing occupational safety provisions.
- With respect to custom-made equipment or related installations which are designed, fabricated for, and intended for use by a particular customer, if determined to be safe for its intended use by the manufacturer on the basis of test data which the employer keeps and makes available for inspection to the Assistant Secretary and [his/her] authorized representatives.

6. 29 CFR 1910.422(g) *Welding and burning*.

- a. A current supply switch must be available to interrupt the current flow to the welding or burning electrode. The switch shall be tended by a dive-team member in voice communication with the diver performing the welding or burning (see 29 CFR 1910.422(g)(1)(i)). The disconnect switch must be in the open position unless the diver is actually welding or burning (see 29 CFR 1910.422(g)(1)(ii)). The CSHO shall determine that the welding machine’s frame is properly grounded by means of solid, metal-to-metal contact on all ship’s structure and/or shore ground connections (see 29 CFR 1910.422(g)(2) and 1910.254(d)). The ground connection also may be checked with a meter. The CSHO also shall determine that the cables, electrode holders and connections are insulated to prevent overheating or breakdown (see 29 CFR 1910.422(g)(3)). The employer must provide insulated gloves for the diver’s protection (see 29 CFR 1910.422(g)(4)). See 29 CFR 1910.137 *Electrical protective equipment*, for selection and use of the proper type of gloves and inspection intervals for the gloves.

NOTE: Personnel designated to operate electric cutting and welding equipment used in diving operations shall have experience or training in the safe use of this equipment (see 29 CFR 1910.410(a)(2)(i); welding and burning training violations will be cited under 29 CFR 1910.410).

- b. This standard does not place any restriction on the use of AC current or rectified AC current arc welding.
- c. 29 CFR 1910.422(g)(5). This paragraph states that prior to welding or burning on closed compartments, structures, or pipes that contain a flammable vapor or in which a flammable vapor may be generated by the work, they shall be vented, flooded, or purged with a mixture of gases that will not support combustion. "Closed compartments" as used in this paragraph, means any space that is enclosed by bulkheads and overheads (i.e., walls and ceilings), including large diameter pipes and other structures that, because of poor ventilation, could hold or contain a flammable gas or vapor. Prior to hot work, the employer must remove from closed compartments all flammable gases and vapors by ventilating, flooding, or purging with an inert-gas that will not support combustion. Venting alone is not sufficient unless it removes the flammable gases from the compartments. Closed compartments, structures, and pipes already under flow, as in hot tapping operations, meet the requirement for being flooded.

WARNING: A flooded compartment is not necessarily safe for cutting and welding. During the cutting and welding process, oxygen (from the diver's welding/cutting O<sub>2</sub> supply hose), hydrogen (electrolysis generated by the work process), and other gases may collect in the overhead of a compartment, if it is not properly vented (made gas free). Should the diver cut or weld into the area where the gas collects, then a serious explosion can occur. By properly venting the space, gas will not collect and the space will remain flooded. When making vertical cuts/welds, it is best to start high (shallow water depth) and finish low (deeper water depth).

- 7. 29 CFR 1910.422(h) *Explosives*. Explosive charges are used to perform some types of underwater work, including demolition, sheet-pile cutting, cable cutting, and excavating. Explosives suitable for underwater work include Primacord<sup>®</sup>, various gelatins (gels), plastic blocks, and some liquids. Employers must comply with this provision, as well as the applicable requirements of 29 CFR [1910.109](#) and 29 CFR [1926.912](#), when handling, storing, and using explosives. This provision requires divers to be out of the water when detonating an explosive or testing the electrical continuity of the explosive circuits.

NOTE: Only personnel who are properly trained or experienced shall handle explosives (see 29 CFR 1910.410(a)(1) and (a)(2)(i); explosive training violations will be cited under 29 CFR 1910.410).

- 8. 29 CFR 1910.422(i) *Termination of dive*. This paragraph applies to all diving modes. The designated person-in-charge is responsible for determining when a dive shall be terminated. "Termination" means ending the working interval of a dive. However, it may still be necessary to complete the decompression procedures (when required). The working interval of a dive must be terminated when: the diver so requests; the diver fails to respond correctly to instructions

from the dive team (indicating a possible disability of the diver or an equipment failure); communications with the diver are lost and cannot quickly be reestablished (either between the diver and the dive location or diving bell, or between the diver and the designated person-in-charge and the skipper of the support vessel for liveboating operations); or the diver begins to use the reserve breathing gas. Any of these situations requires termination of the dive. The decompression interval should not be omitted after termination of the dive if doing so would add to the diver's overall physical risk, unless the circumstances make inwater decompression impossible or present a greater physical risk to the diver.

G. 29 CFR 1910.423 Post-dive procedures.

1. 29 CFR 1910.423(b) *Precautions*. At the completion of a dive, the employer must: thoroughly check the physical condition of the diver; instruct the diver to report any physical problems or adverse physiological reactions (including decompression sickness symptoms); advise the diver of the location of the nearest decompression chamber; and alert the diver to the hazards of flying too soon after the dive. As a general rule, a diver should wait 12 hours before flying for air diving not involving decompression, and wait 24 hours for air dives involving decompression and all mixed-gas diving. For additional information, see the U.S. Navy Diving Manual or the NOAA Diving Manual. Decompression sickness effects can occur for some time after the completion of the dive, and sleep can conceal the onset of decompression sickness. Consequently, after a dive deeper than 100 fsw, a dive that requires decompression, or after any dive using a mixed-gas breathing mixture, the employer is required to instruct the diver to remain awake and in the vicinity of the decompression chamber at the dive location for at least one hour after the dive, including one hour after any decompression or diving medical treatment (such as medical treatment for decompression sickness or arterial gas embolism).
2. 29 CFR 1910.423(c) *Recompression capability*. Decompression chambers provide the only effective therapy (i.e., recompression) for decompression sickness and arterial gas embolism. A decompression chamber also can reduce a diver's underwater exposure since chambers may be used to decompress the diver on the surface (i.e., procedures known as "surface decompression on air" and "surface decompression on oxygen").
  - a. 29 CFR 1910.423(c)(1). This provision requires the use of a decompression chamber capable of recompressing the diver at the surface to a minimum of 165 fsw (6 ATA) at the dive location for: SCUBA dives deeper than 100 fsw; surface-supplied air dives deeper than 100 fsw but shallower than 220 fsw; mixed-gas dives shallower than 300 fsw; or diving outside the no-decompression limits shallower than 300 fsw.
  - b. 29 CFR 1910.423(c)(2). A decompression chamber capable of recompressing the diver at the surface to the maximum depth of the dive must be available at the dive location for dives deeper than 300 fsw.

- c. 29 CFR 1910.423(c)(3). The decompression chamber must be dual-lock (i.e., having two compartments) so that supplies and personnel may be transferred into and out of the main compartment. The chamber also must be multi-place (i.e., the main compartment must be large enough for two persons), and must be located and ready for use within 5 minutes of the diver's exit from the water.
- d. 29 CFR 1910.423(c)(4). The decompression chamber must be equipped with: a pressure gauge for each inner lock and outer lock; a built-in breathing system (BIBS) with at least one mask for each chamber occupant; two-way voice communication between the chamber occupant(s) and a dive-team member at the dive location who is monitoring the decompression; a view port; and sufficient illumination to observe the chamber occupant(s).
- e. 29 CFR 1910.423(c)(5) and (c)(6). Treatment tables, oxygen or other appropriate treatment gas, and sufficient gas to pressurize the decompression chamber during the treatment period must be available at the dive location. In addition, a competent dive-team member must be available during the dive, and for one hour afterward, to tend and operate the chamber.

NOTE: To be used as a recompression facility (i.e., in lieu of a chamber), a diving bell must meet all the criteria listed in 29 CFR 1910.423(c). Chambers used for dives that are 300 fsw and deeper must have a pressure capability equal to or greater than the maximum depth of the dive (the CSHO shall check the dive plan and tables for the maximum depth of the dive). 29 CFR 1910.430(f) sets forth additional requirements that apply only to decompression chambers.

- 3. 29 CFR 1910.423(d) *Record of dive.*
  - a. 29 CFR 1910.423(d)(1) and (d)(2). The record maintained for each diving operation must include: the names of the dive-team members, including the designated person-in-charge; the date, time, and location of the dive; the diving mode(s) used; a general description of the work performed; the approximate underwater and surface conditions; and the maximum depth and bottom time for each diver. The following additional information is required for dives outside the no-decompression limits, deeper than 100 fsw, or using mixed-gas: depth-time and breathing-gas profiles; decompression tables (including any modifications); and, for repetitive diving, the elapsed time since the last pressure exposure (if less than 24 hours) or the repetitive dive designation for each diver.

NOTE: These provisions do not require a standard form or that the dive records for each individual diver be kept on a separate sheet. When two or more divers are working simultaneously, the information required may be

kept for the divers on one record. However, if the divers have different dive exposures or use different decompression tables, then separate entries must be made for each diver.

- b. 29 CFR 1910.423(d)(3). For each dive in which decompression sickness is suspected or symptoms are evident, the following additional information must be recorded and maintained: a description of decompression sickness symptoms (including depth and time of onset); and a description of treatment results. The information required also shall be recorded on the OSHA 300 Log (“Log of Work-Related Injuries and Illnesses”). Employers shall maintain a log of recordable work-related injuries and illnesses. The key word is “recordable.” The purpose of this requirement is to document recordable illnesses, including incidents of decompression sickness, even when the initial symptoms include such manifestations as skin itch, slight joint cramps, and slight numbness of the extremities. Although seemingly innocuous, these symptoms are recognized and suspected as mild forms of decompression sickness. Symptoms and treatments must be recorded similarly to any other injury or illness. Refer to [Appendix G](#), of this instruction, for additional reporting and recordkeeping guidance, including the exemption for commercial diving operations.

4. 29 CFR 1910.423(e) *Decompression procedure assessment*. This paragraph requires the employer, within 45 days of occurrence, to investigate and evaluate each incident of decompression sickness, to take appropriate corrective action, and to prepare a written evaluation assessing the incident. The corrective action may include an adjustment of the dive procedures, reassessment of the decompression tables, or a reexamination of the particular dive involved. A check of the dive records should show whether an incident occurred that required an investigation, corrective action, and a written evaluation.

H. 29 CFR 1910.424 – 1910.427 Specific Operations Procedures.

The requirements of 29 CFR 1910.424 through 1910.427 are in addition to any other applicable requirements in 29 CFR Part 1910, Subpart T.

- I. 29 CFR 1910.424 SCUBA diving. Because a SCUBA diver has a limited breathing supply, does not usually have voice communication, and often is not monitored or controlled by surface-support personnel, the limits on this mode of diving are more stringent than for other diving modes.

1. 29 CFR 1910.424(b) *Limits*.

- a. 29 CFR 1910.424(b)(1) and (b)(2). The limits for SCUBA diving are more restrictive than for surface-supplied air diving or mixed-gas diving (see [Appendix H](#)). The maximum depth for SCUBA diving is 130 fsw (see 29 CFR 1910.424(b)(1)). A decompression chamber is required (i.e., available within 5 minutes from the dive location) when diving deeper than 100 fsw, or when diving outside of the no-decompression limits (see 29 CFR

1910.424(b)(2)).

- b. 29 CFR 1910.424(b)(3). Each SCUBA diver must be line-tended when the current exceeds one knot (1.689 feet per second, or about 17 feet per 10 seconds). Three basic types of currents affect diving operations: river or major ocean currents; currents produced by the ebb and flow of the tides (which may add or subtract from any existing current); and underwater or rip currents caused by the rush of water returning from waves breaking along a shoreline. The CSHO shall determine that the employer has ascertained the strength of the local currents at the dive location from Tide and Current Tables, Coast and Geodetic Survey Charts, Coast Pilot Publications, or other sources. A SCUBA diver is seriously encumbered when swimming against a current exceeding one knot, and the standard prohibits such activity unless the diver is line-tended. A SCUBA diver may, however, swim downstream with a current when means are provided to pick the diver up (such as retrieval with a boat).

NOTE: When two SCUBA divers are in the water, one tending line to the surface is sufficient when the two divers are connected by a “buddy line.”

- c. 29 CFR 1910.424(b)(4). Each SCUBA diver must be line-tended from the surface when diving in an enclosed or physically confining space (i.e., any underwater location where the diver cannot ascend directly to the surface; commonly referred to as “free access to the surface”).

NOTE: For vessels without longitudinal (horizontal) stabilizers, “free access to the surface” means that the diver is diving above the turn of the bilge; for vessels with longitudinal stabilizers (usually found on military combat vessels), “free access to the surface” means that the diver is diving above the stabilizers.

2. 29 CFR 1910.424(c) *Procedures*.

- a. 29 CFR 1910.424(c)(1). This paragraph requires that a standby diver be available for all SCUBA diving operations. An “available” standby diver means that the diving gear for the standby diver is at the dive location and ready for use (i.e., set up and fully checked out), with a qualified diver at the dive location available to be the standby diver. A second diver (“buddy diver”) in the water does not satisfy the requirement for a standby diver. One employee can be both the standby diver and tender, provided that this employee is a qualified diver; for a three-person dive team, the designated person-in-charge (DPIC) would assume tending duties when the standby diver (tender) is in the water. A DPIC also can be the standby diver, provided that: (1) he/she is a qualified diver, and (2) another dive-team member at the dive location is trained and capable of performing necessary DPIC functions while the DPIC is in the water as the standby diver.
- b. 29 CFR 1910.424(c)(2). This paragraph requires that a SCUBA diver be

line-tended from the surface when in the water or that the SCUBA diver be accompanied by, and in continuous visual contact with, another diver during the diving operation.

NOTE: While line-tending the SCUBA diver from the dive location is considered preferable to “buddy diving,” it is recognized that “buddy diving” is an accepted practice. The safety advantage of having two divers in the water tending each other (“buddy diving”) is lost if they cannot maintain continuous visual contact; without visibility, divers cannot tend each other adequately.

- c. 29 CFR 1910.424(c)(3). When diving is conducted in an enclosed or physically confining space, a diver shall be stationed at the underwater point of entry to assist in tending the diver in the space.

NOTE: The diver stationed at the underwater point of entry is required in addition to any standby diver at the dive location.

- d. 29 CFR 1910.424(c)(4) and (c)(5). Each SCUBA diver is required to have: (1) a diver-carried reserve breathing-gas supply that consists of a manual reserve (J-valve), or (2) an independent reserve cylinder that has a separate regulator or that is connected to the underwater breathing apparatus (see 29 CFR 1910.424(c)(4)). The valve of the reserve breathing-gas supply must be in the closed position prior to the dive (see 29 CFR 1910.424(c)(5)) to ensure that the air reserve will not be depleted inadvertently during the dive.

NOTE: A Spare Air<sup>®</sup> bottle, or equivalent device, that is attached positively to the diver by a suitable line (so that the bottle is not lost if dropped) is sufficient as an independent reserve cylinder, provided that it meets the emergency air volume requirements for the dive profile. Spare Air<sup>®</sup> 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.

- 3. Commercial SCUBA air diving with one diver in the water requires a minimum of three dive-team members: a designated person-in-charge (DPIC) (see 29 CFR 1910.410(c)), a standby diver (see 29 CFR 1910.424(c)(1)), and a line-tended diver (see 29 CFR 1910.424(c)(2)). Commercial SCUBA diving with two divers in the water requires a minimum of four dive-team members: a DPIC (see 29 CFR 1910.410(c)), a standby diver (see 29 CFR 1910.424(c)(1)), and two divers (see 29 CFR 1910.424(c)(2)).

NOTE: Additional guidance regarding minimum dive-team requirements is provided in [Appendix A](#), Questions #2 and #3, of this instruction.

NOTE: In establishing the number of dive-team members required for a dive, proper consideration must be given to 29 CFR 1910.421(d) *Planning and assessment*, 29 CFR 1910.421(e) *Hazardous activities*, and 29 CFR 1910.422(b)(3). This latter provision requires employers to provide a means to

assist an injured diver from the water (such as an inwater stage, small boat, or stokes basket) or into a diving bell, that may necessitate additional dive-team members.

J. 29 CFR 1910.425 Surface-supplied air diving.

1. 29 CFR 1910.425(b) *Limits.*

- a. 29 CFR 1910.425(b)(1). The maximum depth for surface-supplied air diving is 190 fsw, except that surface-supplied air dives with bottom times of less than 30 minutes may be conducted to a maximum depth of 220 fsw.
- b. 29 CFR 1910.425(b)(2). A decompression chamber is required (available within 5 minutes from the dive location) for dives deeper than 100 fsw, or any dive that requires planned decompression.

NOTE: Decompression chambers and closed diving bells, when used as a recompression facility, shall meet the criteria specified by 29 CFR 1910.423(c) and 29 CFR 1910.430(f).

- c. 29 CFR 1910.425(b)(3). A diving bell is required for dives with an inwater decompression time greater than 120 minutes, except when heavy gear is worn or diving is conducted in physically confining spaces.

2. 29 CFR 1910.425(c) *Procedures.*

- a. 29 CFR 1910.425(c)(1). Each diver is required to be continuously tended while in the water.

NOTE: 29 CFR 1910.425(c)(1)(i) requires that a separate dive-team member tend each diver in the water when the dive exceeds 100 fsw or is outside the no-decompression limits. The increased hazards and complexity associated with deeper or longer dives may compromise diver safety if a tender is responsible for tending more than one diver.

- b. 29 CFR 1910.425(c)(2). When diving is conducted in enclosed or physically confining spaces, another diver shall be stationed at the underwater point of entry.

NOTE: The diver stationed at the underwater point of entry is required in addition to any standby diver at the dive location.

- c. 29 CFR 1910.425(c)(3). This paragraph requires that each diving operation have a primary breathing-gas supply that is sufficient to support divers for the duration of the planned dive, including decompression.
- d. 29 CFR 1910.425(c)(4)(i), (c)(4)(ii), and (c)(4)(iii). For dives deeper than 100 fsw or outside the no-decompression limits, each diver must: be tended

by a separate dive-team member; have a standby diver available at the dive location while the diver is in the water; and have a diver-carried reserve breathing-gas supply, except when heavy gear is worn.

- e. 29 CFR 1910.425(c)(4)(iv). A reserve breathing-gas supply is required at the dive location for dives deeper than 100 fsw or outside the no-decompression limits.

NOTE: The reserve breathing-gas supply required at the dive location must be on-line and ready for use, and its source must be independent of the primary breathing-gas supply. The reserve breathing-gas supply must be of sufficient quantity and pressure to allow each diver to complete any planned decompression schedule.

- f. 29 CFR 1910.425(c)(5)(i) and (c)(5)(ii). For surface-supplied air diving with heavy gear, deeper than 100 fsw, or outside the no-decompression limits, an extra breathing-gas hose must be available to the standby diver, and the hose must be capable of supplying breathing gas to the diver in an emergency. Also, an inwater stage must be provided for the diver(s) in the water.
- g. 29 CFR 1910.425(c)(6). A diver-carried reserve breathing-gas supply must be provided to a diver in the water when the diver is prevented by the configuration of the dive area from ascending directly to the surface (i.e., when the diver does not have “free access to the surface”), except when the diver wears heavy gear or when the physical space does not permit the use of such a breathing-gas supply. The diver-carried reserve must be sufficient under operating conditions to allow the diver to reach the surface, or another source of breathing gas, or to be reached by a standby diver. Heavy-gear diving is exempted from these provisions because the gear carries its own reserve.

NOTE: For vessels without longitudinal (horizontal) stabilizers, “free access to the surface” means that the diver is diving above the turn of the bilge; for vessels with longitudinal stabilizers (usually found on military combat vessels), “free access to the surface” means that the diver is diving above the stabilizers.

- 3. Commercial surface-supplied air diving with one diver in the water requires a minimum of three dive-team members: a DPIC (see 29 CFR 1910.410(c)), and a diver “who shall be continuously tended [by a tender other than the DPIC] while in the water” (see 29 CFR 1910.425(c)(1)). For surface-supplied air diving that is 100 feet or less and does not involve planned decompression, a standby diver is not a specified requirement for every dive. However, based on the requirements of 29 CFR 1910.421(d) *Planning and assessment*, the hazard analysis and assessment of the dive will dictate the use of a standby diver when underwater conditions and hazards or potential hazards involve: proximity to underwater differential pressure flow (e.g., pump intake suction, gravity drain,

or an open sluice gate on a dam), no free access to the surface, the possibility of diver entanglement or entrapment, or unknown bottom conditions. If a standby diver is required (such as when these conditions are present or for depths that exceed 100 fsw), these duties may be performed by the DPIC or the tender. A tender who is a qualified diver can be the standby diver; for a three person dive-team, the DPIC would assume tending duties when the standby diver (tender) is in the water. A DPIC who is a qualified diver also can be the standby diver, provided that another dive-team member is at the dive location who is trained and capable of performing the necessary functions of the DPIC when the DPIC is in the water as the standby diver.

NOTE: In establishing the number of dive-team members required for a dive, proper consideration must be given to 29 CFR 1910.421(d) *Planning and assessment*, 29 CFR 1910.421(e) *Hazardous activities*, and 29 CFR 1910.422(b)(3). This latter provision requires employers to provide a means to assist an injured diver from the water (such as an inwater stage, small boat, or stokes basket) or into a diving bell, that may necessitate additional dive-team members.

K. 29 CFR 1910.426 *Mixed-gas diving*.

1. 29 CFR 1910.426(b) *Limits*.

- a. 29 CFR 1910.426(b)(1)(i). Mixed-gas diving requires a decompression chamber to be ready for use at the dive location for all dives (available within 5 minutes from the dive location). Decompression chambers and closed diving bells, when used as a recompression facility, must meet the criteria stated in 29 CFR 1910.423(c). 29 CFR 1910.430(f) sets forth additional requirements that apply only to decompression chambers. A diving bell (open diving bell or closed diving bell) is required for dives in the range of 220 – 300 fsw or involving inwater decompression lasting longer than 120 minutes, except when heavy gear is worn or when diving in physically confining spaces.

NOTE: See Appendix C of 29 CFR Part 1910, Subpart T, for exceptions to the decompression chamber requirement pertaining to recreational diving instructors and diving guides when other alternative requirements are met.

- b. 29 CFR 1910.426(b)(ii). A closed diving bell is required for dives deeper than 300 fsw, except when diving is conducted in physically confining spaces.

2. 29 CFR 1910.426(c) *Procedures*.

- a. 29 CFR 1910.426(c)(1) and (c)(2). A separate dive-team member is required to tend each mixed-gas diver in the water. A standby diver must be available while a diver(s) is in the water.

NOTE: A separate tender must be assigned to each mixed-gas diver at all times, and a standby diver must be available to assist the mixed-gas diver(s) in the water. Therefore, for mixed-gas diving, a tender cannot be a standby diver unless a qualified dive-team member is available to assume the tender's duties.

- b. 29 CFR 1910.426(c)(3). When diving is conducted in enclosed or physically confining spaces, another diver must be stationed at the underwater point of entry to assist in tending the diver in the space.

NOTE: The diver stationed at the underwater point of entry is required in addition to any standby diver at the dive location.

- c. 29 CFR 1910.426(c)(4). This paragraph requires a primary breathing-gas supply sufficient to support divers for the duration of any planned dive, including decompression.
- d. 29 CFR 1910.426(c)(5). A reserve breathing-gas supply is required at the dive location for all mixed-gas dives.

NOTE: The reserve breathing-gas supply required at the dive location must be on-line and ready for use, and its source must be independent of the primary breathing-gas supply. The reserve breathing-gas supply must be of sufficient quantity and pressure to allow each diver to complete any planned decompression schedule.

- e. 29 CFR 1910.426(c)(6)(i) and (c)(6)(ii). When a mixed-gas diver wearing heavy gear is in the water, an extra breathing-gas hose must be available to the standby diver, and the hose must be capable of supplying breathing-gas to the diver in the water during an emergency. Also, an inwater stage must be provided for a diver wearing heavy gear.
- f. 29 CFR 1910.426(c)(7). An inwater stage is required for divers who do not have access to a diving bell for dives deeper than 100 fsw or dives outside the no-decompression limits.
- g. 29 CFR 1910.426(c)(8). When a closed diving bell is used, a dive-team member must be available in the diving bell to tend the diver in the water.
- h. 29 CFR 1910.426(c)(9). A diver-carried reserve breathing-gas supply is required when diving deeper than 100 fsw or outside the no-decompression limits, or when the diver is prevented by the configuration of the dive area from directly ascending to the surface (i.e., when the diver does not have "free access to the surface"), except when heavy gear is worn or when the physical space does not permit the use of such a breathing-gas supply.

NOTE: For vessels without longitudinal (horizontal) stabilizers, "free access to the surface" means that the diver is diving above the turn of the

bilge; for vessels with longitudinal stabilizers (primarily found on military combat vessels), “free access to the surface” means that the diver is diving above the stabilizers.

NOTE: In establishing the number of dive-team members required for a dive, proper consideration must be given to 29 CFR 1910.421(d) *Planning and assessment*, 29 CFR 1910.421(e) *Hazardous activities*, and 29 CFR 1910.422(b)(3). This latter provision requires employers to provide a means to assist an injured diver from the water (such as an inwater stage, small boat, or stokes basket) or into a diving bell, that may necessitate additional dive-team members.

- L. 29 CFR 1910.427 *Liveboating*. Supporting a surface-supplied air or mixed-gas diver from a vessel that is underway is known as liveboating. This operation is one of the most hazardous diving operations, and it is restricted to surface-supplied diving only (liveboating operations cannot be performed with SCUBA equipment).
1. 29 CFR 1910.427(b) *Limits*. Liveboating is not permitted for diving operations that: have an inwater decompression time of more than two hours; use surface-supplied air at depths greater than 190 fsw (except that surface-supplied air dives with a bottom time of less than 30 minutes may be conducted to depths of 220 fsw or less); use mixed-gas at depths deeper than 220 fsw; occur in rough seas that would impede the diver’s mobility or ability to perform the assigned work; or take place during non-daylight hours.
  2. 29 CFR 1910.427(c) *Procedures*.
    - a. 29 CFR 1910.427(c)(1). The propeller of the vessel must be stopped before the diver enters or exits the water.
    - b. 29 CFR 1910.427(c)(2). With a vessel underway, a diver’s hose can become entangled in the vessel’s propeller. Therefore, when inspecting a liveboating operation, the CSHO shall verify the availability and use of a device designed to minimize the possibility of the diver’s hose becoming entangled in the vessel’s propeller. Such a device may be a propeller shroud, a weighted fairlead system, or an air tugger with a heavy weight. The use of a tender to prevent hose entanglement without some mechanical support is not sufficient to satisfy this requirement. When a floating hose is used, the hose shall be checked carefully to ensure that the requirements for breathing-gas supply hoses are met (see 29 CFR 1910.430(c)).
    - c. 29 CFR 1910.427(c)(3). This paragraph requires the use of two-way voice communications between the designated person-in-charge and the person controlling the vessel while the diver is in the water.
    - d. 29 CFR 1910.427(c)(4). A standby diver is required for all liveboating operations.

- e. 29 CFR 1910.427(c)(5). A diver-carried reserve breathing-gas supply shall be carried by each diver engaged in liveboating operations.

M. 29 CFR 1910.430 Equipment.

- 1. 29 CFR 1910.430(a) *General*. Every equipment modification, repair, test, calibration, or maintenance service must be recorded in a log or by means of a tagging system. The tag or log entry must include the date, the type of work performed on the equipment, and the name or initials of the person who performed the work. The CSHO shall check to ensure that the employer has recorded the information required by this provision. This information is used to determine whether the equipment meets the requirements of 29 CFR 1910.430 or is in need of maintenance, testing, or replacement. These records (logs or tags) must be kept by the employer until replaced by a subsequent up-to-date record, or until the equipment is withdrawn from service.
- 2. 29 CFR 1910.430(b) *Air compressor system*.
  - a. 29 CFR 1910.430(b)(1) and (b)(2). Air compressor systems used to supply air to the diver must be equipped with a volume tank (VT), a check valve on the inlet side of the VT (to prevent loss of air if the compressor fails), a VT pressure gauge, a VT relief valve (to prevent excessive pressure buildup), and a VT drain valve (to drain or “bleed” accumulated moisture from the VT). In addition, the air compressor intakes must be located away (upwind) from any internal combustion engine exhaust or other contamination source to protect the diver’s breathing air.

NOTE: Generally, an upwind horizontal separation of at least twelve feet should be maintained between the air compressor intake and the engine exhaust. In addition, the air intake should be located at least six feet above the ground, deck, or other low-lying area that could collect contaminants that are heavier than air. Even if a system is designed to keep the exhaust downwind of the intake (e.g., floating, weathervaning system), these horizontal and vertical distances should be maintained.

- b. 29 CFR 1910.430(b)(3) and (b)(4). The employer is responsible for checking the output of the air compressor system every 6 months to ensure that the diver’s breathing air does not contain more than 20 ppm (parts per million) by volume of carbon monoxide (CO), more than 1,000 ppm by volume of carbon dioxide (CO<sub>2</sub>), 5 milligrams per cubic meter of oil mist (except that non-oil-lubricated compressors need not be tested for oil mist), or a pronounced or noxious odor. The CSHO shall interview appropriate employees and examine the records indicating the results of such tests. The CSHO also shall check to ensure that the air sample was taken at the connection to the distribution system (manifold). The CSHO or industrial hygienist should obtain a sample of the breathing air for later evaluation or, when possible, test for contaminants onsite.

NOTE: Unlike compressors used with air-respiratory systems that are not normally monitored, diving compressors are continually monitored by the dive team and are not required to have CO and high-temperature alarms.

NOTE: See section XII., paragraph M.5., *Compressed gas cylinders* regarding the use of third-party air compressors to fill SCUBA cylinders.

3. 29 CFR 1910.430(c) *Breathing-gas supply hoses.*

- a. 29 CFR 1910.430(c)(1)(i), (c)(1)(ii), (c)(1)(iii), and (c)(1)(iv). Under paragraph (c)(1)(i), each breathing-gas hose must have a working pressure at least equal to the working pressure of the total breathing-gas system. Therefore, a hose connected to the low-pressure or downstream side of a regulating valve must meet the working pressure of that part of the system. For instance, the hose working pressure does not have to be equal to the pressure of the gas storage-bank cylinders, but must be equal to the working pressure downstream from the regulator. The working pressure rating of the hose usually will be found on a decal or stencil with the manufacturer's name at regular intervals along the hose length.

Paragraph (c)(1)(ii) requires that each breathing-gas supply hose have a rated bursting pressure at least four times the maximum working pressure (see the definition of "bursting pressure," section XII., paragraph B.6., of this instruction). Paragraphs (c)(1)(iii) and (c)(1)(iv) specify, respectively, that each breathing-gas supply hose must be tested annually to at least 1.5 times of its working pressure, and that the open ends of a hose must be taped, capped, or plugged when the hose is in storage or not in use to prevent foreign matter from contaminating the hose.

- b. 29 CFR 1910.430(c)(2)(i), (c)(2)(ii), and (c)(2)(iii). Connectors for diver's breathing-gas systems must be made of corrosion-resistant material and have a rated working pressure equal to the maximum working pressure of the hose to which they are connected. Connectors must be resistant to accidental disengagement.

NOTE: Installation of cadmium-plated or other corrosion-resistant plated fittings is acceptable and meets the requirements of "corrosion-resistant" to the extent that the plating remains intact. However, when the plating becomes worn and the parent metal becomes pitted, the connector must be replaced.

- c. 29 CFR 1910.430(c)(3)(i), (c)(3)(ii), and (c)(3)(iii). Umbilicals must be marked in 10-foot increments from the diver to 100 feet, and in 50-foot increments thereafter. Hoses in umbilicals (i.e., breathing-gas hoses, hot water hoses, or other hoses that carry air or liquids) must be kink resistant. The breathing-gas hose in the umbilical also must meet other applicable hose requirements of 29 CFR 1910.430(c)(1) and (c)(2). The maximum allowable working pressure of the umbilical breathing-gas hose can be

calculated by: subtracting the maximum depth (in psi) of the supply source (surface or diving bell) from the maximum depth (in psi) of the dive for which it will be used; and then adding 100 psi to this figure.

NOTE: Additional guidance is available in the ADCI *Consensus Standards for Commercial Diving and Underwater Operations (Section 6 of the 6<sup>th</sup> Edition)*.

4. 29 CFR 1910.430(d) *Buoyancy control*. The following equipment must have exhaust valves: helmets or masks connected directly to a dry suit or other buoyancy-changing equipment, and dry suits or other buoyancy-changing equipment not directly connected to the helmet or mask. A buoyancy compensator used for SCUBA diving must have an inflation source separate from the breathing-gas supply. SCUBA diving requires the use of a personal flotation device capable of maintaining the diver at the surface in a face-up position; this device also must be capable of oral inflation, have an exhaust valve, and have a manually activated inflation source independent of the breathing-gas supply.
5. 29 CFR 1910.430(e) *Compressed gas cylinders*. Employers must follow the OSHA standards for general industry that regulate the design, construction, and maintenance of compressed gas cylinders (see [29 CFR 1910.101](#) and [29 CFR 1910.169](#)). In addition, the cylinders must be stored in a ventilated area away from excessive heat, and must be secured from falling. When the cylinders are in use, they must be equipped with a shut-off valve and a protective cap. The protective cap is not required when the cylinders: are designed with recessed shut-off valves, are connected to a manifold, or are used for SCUBA diving.

NOTE: [29 CFR 1910.101\(a\)](#) adopts 49 CFR Parts 171-179 for cylinder inspection requirements (see [49 CFR Part 173, Subpart G](#) – Gases; Preparation and Packaging, for details). The Department of Transportation (DOT) classifies compressed air as a Division 2.2 Hazardous Material (i.e., non-flammable gas) in the [Hazardous Materials Table](#) (49 CFR 172.101) for pressures of 25.9 psig (43.8 psia) or greater at 68°F ([49 CFR 173.115\(b\)\(1\)](#)). Cylinders typically will be stamped with DOT markings, but also may be stamped with ICC markings. For more comprehensive information regarding SCUBA cylinder markings, refer to paragraph 5.7, of the NOAA Diving Manual.

NOTE: When SCUBA cylinders are filled using an air compressor not owned by the employer (such as at a local dive shop), the employer of the dive team must obtain a copy of the air sample results that comply with 1910.430(b)(3) and (4).

6. 29 CFR 1910.430(f) *Decompression chambers*. Each decompression chamber manufactured after October 20, 1977, must be built and maintained in accordance with the ASME Code, or an equivalent standard (the meaning of the term “ASME or equivalent code” is covered under section XII., [paragraph B.2.](#), of this instruction). Decompression chambers manufactured on or prior to

October 20, 1977, must be built and maintained in conformity with the code requirements to which they were built, or to an equivalent standard or code. Decompression chambers must have: a means of maintaining the atmosphere below 25 percent oxygen by volume; noise mufflers on the intake and exhaust lines (to facilitate communication and to protect against hearing loss) that are regularly inspected and maintained; suction guards on the exhaust line openings; and a means for extinguishing fire. Ignition sources and combustible material must be kept to a minimum inside the chamber.

NOTE: Appropriate means to maintain the oxygen level below 25 percent may include a ventilation system or an overboard dump system. An overboard dump system exhausts the occupant's expired breathing gases from the built-in breathing system (BIBS) (used for breathing purposes inside a decompression chamber) to prevent a buildup of oxygen inside the chamber above 25 percent by volume.

7. 29 CFR 1910.430(g) *Gauges and timekeeping devices*. To monitor a diver's depth-time profile, a gauge indicating diver depth that can be read at the dive location is required for all dives except SCUBA (SCUBA divers carry their own depth gauges). To maintain accuracy, each mechanical depth gauge must be dead-weight tested or calibrated against a master gauge every 6 months, and when a discrepancy larger than 2 percent of full scale occurs between any two equivalent gauges. A cylinder pressure gauge that the diver can monitor must be carried by each SCUBA diver. Also, a timekeeping device must be kept at the dive location for recording time intervals during each dive to maintain an accurate depth-time profile for each diver.

NOTE: For depth and pressure gauges that are digital, employers must comply with the manufacturer's recommendations for verifying accuracy.

8. 29 CFR 1910.430(h) *Masks and helmets*. Surface-supplied air and mixed-gas masks and helmets must have a non-return valve, that closes readily and positively, at the attachment point between the helmet or mask and hose, as well as an exhaust valve. Surface-supplied air and mixed-gas masks and helmets must have a minimum ventilation rate capability of 4.5 acfm for any depth at which they are used, or the capability of maintaining the diver's inspired carbon dioxide partial pressure below 0.02 ATA when the diver is producing carbon dioxide at a rate of 1.6 standard liters per minute (LPM).

NOTE: The purpose of this helmet and mask provision is to ensure that breathing gas is supplied to the diver at a rate sufficient to meet the breathing requirements of the diver, and to dilute or flush exhaled breathing gas from the diver's mask or helmet. This provision serves as a guide for the design and selection of masks and helmets, not as a basis for routine operational tests or field verification. Although this provision does not require employers to perform any test on helmets and masks, it does require employers to ensure that the appropriate ventilation rate is maintained during operational use. Citations shall be issued under this provision only after consulting with OSHA's National

Office, Office of Maritime Enforcement.

9. 29 CFR 1910.430(i) *Oxygen safety*. Equipment used with oxygen or breathing-gas mixtures containing over 40 percent oxygen (by volume) must be designed for oxygen service. Components (except umbilicals) exposed to oxygen or breathing-gas mixtures containing over 40 percent oxygen (by volume) must be cleaned of flammable materials before use. Oxygen systems over 125 psig and compressed air systems over 500 psi must have slow-opening shut-off valves (such as a needle valve).

NOTE: The purpose of this provision is to ensure that equipment exposed to oxygen is cleaned of flammable materials and hydrocarbon contaminants before placing that equipment into oxygen service. Similarly, before new or replacement components are placed into service in an oxygen-cleaned system, they also must be cleaned before being connected to the system.

10. 29 CFR 1910.430(j) *Weights and harnesses*. The requirements for weights and harnesses do not apply when a diver wears heavy gear (except as delineated in the NOTE below). In all other cases, each diver must be equipped with a weight belt or assembly that has a quick-release feature. Except for SCUBA diving and when the diver wears heavy gear, the diver must 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 umbilical and harness over the diver's body).

NOTE: When OSHA issued the commercial diving standard in 1977, harnesses were exempted from heavy gear since this gear was used with a harness-type weight belt that incorporated an attachment point for the umbilical. Advances in diving equipment and technology have led to heavy gear that uses an outer garment to carry necessary weights in pockets that are designed for that purpose (see NOTE to the definition of "heavy gear," section XII., paragraph B.18., of this instruction); such gear requires a harness with an attachment point for the umbilical, and a lifting point(s).

- N. 29 CFR 1910.440 *Recordkeeping requirements*. The provisions of this standard specify the recordkeeping requirements for commercial diving operations.
  1. 29 CFR 1910.440(a)(2). The employer must record any diving-related injury or illness that results in a dive-team member being hospitalized for a period of 24 hours or longer. The record must describe the circumstances of the incident and the extent of the injuries or illnesses.

NOTE: These incidents do not have to be reported to OSHA (unless three or more hospitalizations are involved), but the record must be made available to a CSHO upon request. Frequency of injuries and illnesses may be an indication of improper planning or improper dive procedures.

NOTE: Employers must report any fatality, and multiple hospitalizations (three

or more), by telephone or in person to the nearest OSHA Area Office, or by using OSHA's toll-free hotline at 1-800-321-OSHA. The caller making the accident report must talk directly to a person at OSHA (i.e., they cannot leave a message on the phone, send a fax, or send an e-mail). The maximum time allowed by 29 CFR 1904.39(a) for reporting a fatality or multiple hospitalizations is eight (8) hours; employers should report such cases as soon as possible after the occurrence (see Appendix G of this instruction for additional reporting guidance).

2. 29 CFR 1910.440(b)(1). This provision provides a CSHO with the authority to inspect and copy any record(s) required by this standard.
  3. 29 CFR 1910.440(b)(2). This provision requires employers to retain, and to provide to their employees, their employees' designated representatives, and OSHA (usually during an inspection), records and documents in accordance with paragraphs (a) – (e), and (g) – (i), of 29 CFR 1910.1020 *Access to employee exposure and medical records* (this standard was re-designated in 1996 from 29 CFR 1910.20 to 29 CFR 1910.1020). These records include: safe practices manual (see 29 CFR 1910.420); depth-time profiles (see 29 CFR 1910.422); decompression procedure-assessment evaluations (see 29 CFR 1910.423); and hospitalization records (see 29 CFR 1910.440). Additionally, this provision specifies that employers must retain and make available to their employees and their employees' designated representatives any equipment-inspection and equipment-testing records required under 29 CFR 1910.430 that pertain to these employees.
  4. 29 CFR 1910.440(b)(3). This paragraph requires employers to maintain the following records and documents: a safe practices manual (current document); depth-time profile of each dive (until completion of the dive, or completion of the decompression-procedure assessment in the event of a decompression-sickness incident); the dive record (for 1 year, except 5 years for dives involving a decompression-sickness incident); decompression-procedure assessment evaluations (for 5 years); equipment-inspection and equipment-testing records (current entry or tag, or until the equipment is withdrawn from service); and hospitalization records (for 5 years).
  5. Additional guidance regarding injury and illness reporting and recordkeeping for commercial diving operations is provided in Appendix G of this instruction.
- O. 29 CFR Part 1910, Subpart T, Appendix A – Examples of Conditions Which May Restrict or Limit Exposure to Hyperbaric Conditions.

This appendix lists disorders that may restrict or limit occupational exposure to hyperbaric conditions. The extent of the restriction depends on severity, presence of residual effects, response to therapy, number of occurrences, diving mode, and/or degree and duration of isolation.

P. 29 CFR Part 1910, Subpart T, Appendix B – Guidelines for Scientific Diving.

This appendix contains guidelines that are used in conjunction with 29 CFR 1910.401(a)(2)(iv), to determine those scientific diving programs that are exempt from the requirements of 29 CFR Part 1910, Subpart T.

Q. 29 CFR Part 1910, Subpart T, Appendix C – Alternative Conditions Under 29 CFR 1910.401(a)(3) for Recreational Diving Instructors and Diving Guides (Mandatory).

This appendix lists the conditions addressed by 29 CFR 1910.401(a)(3). This paragraph specifies that employers of recreational diving instructors and diving guides who comply with all of the conditions listed in this appendix, need not provide a decompression chamber for these divers as required under 29 CFR 1910.423(b)(2) or (c)(3), or 29 CFR 1910.426(b)(1).

R. Other Commercial Diving Resources.

While OSHA considers the industry standards set forth below to be a valuable resource for safe and healthful workplace practices in the commercial diving industry, such standards are for information purposes only and employers accessing such information still must comply with the requirements of the Occupational Safety and Health (OSH) Act and standards promulgated pursuant to the OSH Act. Therefore, applying these recommendations or practices does not necessarily constitute compliance with the OSH Act and OSHA standards, including 29 CFR Part 1910, Subpart T. In addition, OSHA does not control the publication of information on the websites listed in this section, and cannot guarantee the accuracy, reliability, or timeliness of the information contained in these websites.

1. Association of Diving Contractors International (ADCI). The ADCI is an international association, with headquarters in Houston, Texas, that represents employers in the commercial diving industry. The ADCI *Consensus Standards for Commercial Diving and Underwater Operations* include technical standards, and operational information, guidance and procedures in support of safe diving practices.

The following previously issued ADCI standards were incorporated into the ADCI *Consensus Standards for Commercial Diving and Underwater Operations (5<sup>th</sup> Edition)* in 2004, which was revised and updated in 2011 to the *6<sup>th</sup> Edition*.

- ADCI Standard 01-1994, In-Service Maintenance and Repairs of PVHOs
- ADCI Standard 02-1994, PVHO Window Cleaning, Inspection, Installation and Maintenance Instructions
- ADCI Standard 03-1995, Recommended Divers Supply Pressure
- ADCI Standard 04-1995, Duration of Bail-Out Cylinder
- ADCI Standard 05-1995, Recommended First Aid Kit Contents
- ADCI Standard 06-1995, Color Coding Guidance
- ADCI Standard 07-1996, Minimum Rest Hour Policy

- ADCI Standard 08-2000, High Pressure Water Blasting
- ADCI Standard 09-2000, Handling Systems Guidance on the Design, Installation and Testing for the Launch and Recovery of Divers
- ADCI Standard 10-1999, Commercial Diver Certification Card
- ADCI Standard 11-1998, Commercial Diving in Potable Water Facilities

ADCI also distributes the following safety videos:

- ADCI Video, Why a 3-Man Crew?
- ADCI Video, The Hazards of Diving in Delta-P (Differential-Pressure) Work Environments
- ADCI Video, The Hazards of Underwater Burning

Most ADCI products are available in Spanish (en Español). Additional information is available at the association's website, <http://www.adc-int.org/>.

2. Dive Lab. Located in Panama City, Florida, Dive Lab tests surface-supplied diving helmets, full facemasks, and associated life-support equipment for Kirby Morgan Diving Systems International (KMDSI) of Santa Maria, California. Dive Lab also provides repair, maintenance, and configuration training courses for the commercial, military, and scientific diving communities worldwide. They have produced several technical papers, including surface-supplied breathing requirements.

Additional information is available at the company's website, <http://www.divelab.com>.

S. Relationship to Other Federal Agencies and Transportation to Off-Shore Diving Sites.

1. In general, OSHA Area Directors should coordinate inspection activities with local U.S. Coast Guard counterparts in a manner that minimizes the duplication of agency resources and maximizes the protection of affected employees.
2. Consistent with operational efficiency and the safety of agency personnel, transportation necessary to conduct off-shore inspections should be obtained in accordance with the following priorities:
  - a. Appropriate federal agency, on an "as available" basis.
  - b. Private contractor.
  - c. Employer at the off-shore site.
3. Accident-investigation reports, statistical data, and other pertinent enforcement-related information may be freely exchanged with other agencies at the local level, consistent with existing rules and regulations.

## APPENDIX A: Commercial Diving Operations Questions and Answers

This appendix consolidates OSHA interpretations related to commercial diving operations that have been issued and remain valid as of the date of this instruction. Previously issued interpretations were reviewed to determine their current validity and accuracy. Interpretations for which standard references have changed were updated to reflect the current standard reference.

OSHA requirements are set by statute, standards, and regulations. The Agency's interpretations explain these requirements and how they apply to particular circumstances, but they cannot create additional employer obligations. These responses constitute OSHA's interpretations of the requirements discussed. Note that our enforcement guidance may be affected by changes to OSHA rules. Also, from time to time we update our guidance in response to new information. To keep apprised of such developments, you can consult OSHA's website at: <http://www.osha.gov>.

**Question #1: Are diving operations involving the underwater inspection of bridges and other submerged structures considered to be “scientific diving” under 29 CFR 1910.401(a)(2)(iv), and if this diving is “scientific diving,” what standards apply to these divers?**

Answer: The underwater inspection of bridges and other structures by divers is governed by OSHA regulations for commercial diving, 29 CFR Part 1910, Subpart T – Commercial Diving Operations. The exemption from OSHA's commercial diving standard for scientific diving would not be applicable to underwater inspections of bridges or other submerged structures.

**Question #2: What are the minimum number of dive-team members required to support air dives using SCUBA equipment and surface-supplied diving equipment, with one diver in the water?**

Answer: In establishing the number of dive-team members required for a dive, proper consideration must be given to 29 CFR 1910.421(d) *Planning and assessment*, 29 CFR 1910.421(e) *Hazardous activities*, and 29 CFR 1910.422(b)(3). This latter provision requires employers to provide a means to assist an injured diver from the water (such as an inwater stage, small boat, or stokes basket) or into a diving bell, that may necessitate additional dive-team members.

Commercial SCUBA air diving with one diver in the water requires a minimum of three dive-team members: a designated person-in-charge (DPIC) (see 29 CFR 1910.410(c)), a standby diver (see 29 CFR 1910.424(c)(1)), and a line-tended diver (see 29 CFR 1910.424(c)(2)). A tender who is a qualified diver can be the standby diver; for a three-person dive-team, the DPIC would assume tending duties when the standby diver (tender) is in the water. A DPIC also can be the standby diver, provided that: (1) he/she is a qualified diver, and (2) another dive-team member at the dive location is trained and capable of performing necessary DPIC-functions while the DPIC is in the water as the standby diver.

Commercial surface-supplied air diving with one diver in the water requires a minimum of three dive-team members: a DPIC (see 29 CFR 1910.410(c)), and a diver “who shall be continuously

tended [by a tender other than the DPIC] while in the water” (see 29 CFR 1910.425(c)(1)). For surface-supplied air diving that is 100 feet or less and does not involve planned decompression, a standby diver is not a specified requirement for every dive. However, based on the requirements of 29 CFR 1910.421(d) *Planning and assessment*, the hazard analysis and assessment of the dive will dictate the use of a standby diver when underwater conditions and hazards or potential hazards involve: proximity to an underwater suction, no free access to the surface, the possibility of diver entanglement or entrapment, or unknown bottom conditions. If a standby diver is required (such as when these conditions are present or for depths that exceed 100 fsw), these duties may be performed by the DPIC or the tender. A tender who is a qualified diver can be the standby diver; for a three-person dive team, the DPIC would assume tending duties when the standby diver (tender) is in the water. A DPIC also can be the standby diver, provided that: (1) he/she is a qualified diver, and (2) another dive-team member at the dive location is trained and capable of performing necessary DPIC-functions while the DPIC is in the water as the standby diver.

**Question #3: What is the minimum number of dive-team members required to support SCUBA diving when two divers are in the water, and when are SCUBA divers required to be line-tended?**

Answer: Commercial SCUBA air diving with two divers in the water requires a minimum of four dive-team members: a designated person-in-charge (DPIC)(see 29 CFR 1910.410(c)), a standby diver (see 29 CFR 1910.424(c)(1)), and two divers (see 29 CFR 1910.424(c)(2)). The two divers must be in continuous visual contact with each other or line-tended from the surface. The two divers require a tending line to the surface if they are required to work against a current exceeding one knot (1.689 feet per second, or about 17 feet per 10 seconds). When required or deemed necessary, one tending line to the surface is sufficient when the two divers are connected by a “buddy line.” When the standby diver is deployed, he/she is required to be line-tended from the surface. A tender who is a qualified diver can be the standby diver; for a four-person dive team with two divers, the DPIC would assume tending duties when the tender is in the water serving as the standby diver. A DPIC also can be the standby diver, provided that: (1) he/she is a qualified diver, and (2) another dive-team member at the dive location is trained and capable of performing necessary DPIC-functions while the DPIC is in the water as the standby diver.

**Question #4: What commercial diving schools, national diver-training consensus standards, and commercial diving licenses or certifications does OSHA accept as meeting the requirements of 29 CFR 1910.410 *Qualifications of dive team*?**

Answer: OSHA considers an employer to be in compliance with the requirements of 29 CFR 1910.410 when documentation shows that the diver completed training to the appropriate level (such as a surface-supplied air diver certificate, or a surface-supplied mixed-gas diver certificate) at a commercial (private), military, or other federal (such as the Army Corps of Engineers) diving school, or a school accredited by the Association of Commercial Diving Educators (ACDE). An employer also is in compliance when documented evidence shows that a diver’s training meets the requirements specified by the national consensus standard published by the American National Standards Institute (ANSI) and the Association of Commercial Diving Educators (ACDE)(i.e., ANSI/ACDE-01-2009, *American National Standard for Divers – Commercial Diver Training – Minimum Standard*). No commercial diver-licensing programs exist in the United States; however, the Association of Diving Contractors International (ADCI)

issues commercial diver certification cards in accordance with the ADCI *Consensus Standards for Commercial Diving and Underwater Operations (Section 3.0, 6<sup>th</sup> Edition (2011))*. OSHA considers an employer to be in compliance with the 29 CFR 1910.410 diver-training requirements when the employed divers have a valid ADCI commercial diver certification card indicating the appropriate training level.

**Question #5: Do the *Consensus Standards for Commercial Diving and Underwater Operations* published by the Association of Diving Contractors International (ADCI) comply with OSHA and U.S. Coast Guard requirements for commercial diving operations? For diving operations that are not covered by OSHA or U.S. Coast Guard regulations, such as maintenance and repair of pressure vessels for human occupancy (PVHO) or handling systems for diving bells, what does OSHA recognize as the best industry practice?**

Answer: OSHA recognizes the ADCI *Consensus Standards for Commercial Diving and Underwater Operations* as meeting the general requirements of 29 CFR 1910.420 for a safe practices manual. The contents of this document meet or exceed the requirements of 29 CFR Part 1910, Subpart T. For diving-related operational, maintenance, and testing matters that are not addressed by OSHA standards, OSHA recognizes ADCI standards as the best established industry practice.

OSHA's recognition of the ADCI standards is consistent with the position taken by the U.S. Coast Guard. In a letter from the U.S. Coast Guard, Chief, Office of Compliance, to the ADCI dated February 9, 2005, the U.S. Coast Guard stated, "Of significance, ADCI's *Consensus Standards for Commercial Diving and Underwater Operations* fully meet and exceed the Coast Guard's regulatory requirements for commercial diving operations found in 46 CFR 197. Now in its Fifth Edition, the ADCI *Consensus Standards* are considered commercial diving industry best practices and are recognized and used by the United States Coast Guard as our comprehensive guidance document."

NOTE: The ADCI *Consensus Standards for Commercial Diving and Underwater Operations* is now in its *6th Edition* (2011).

**Question #6: How is a determination made of a safe or minimum operating pressure for commercial diving surface-supplied equipment?**

Answer: The minimum safe operating pressure for any surface-supplied diving system is dependent upon three principal factors: (1) the depth of the dive; (2) pressure loss through the diving air-supply hose; and (3) the pressure requirements for the diving helmet or mask. Equally important is the flow (volume) of air supplied to the diver. Employers must comply with the manufacturers' recommended operating pressures and flow requirements for diving helmets and masks, and all diving systems must be analyzed by a competent person to ensure that the systems will support the diving operations adequately.

As required by 29 CFR 1910.430(h)(2), a surface-supplied air helmet or mask must have a minimum ventilation rate capability of 4.5 acfm at the depth of the dive, or the capability of maintaining the diver's inspired carbon-dioxide partial pressure below 0.02 ATA when the diver is producing carbon dioxide at a rate of 1.6 standard liters per minute. Diving system flow requirements must be analyzed as follows: (1) the flow volume of breathing gas needed by the

diver (discussed above); and (2) the flow requirements of the piping, hoses, and associated fittings and components, that must collectively be capable of supporting instantaneous peak flow rates of 7.0 acfm when demand-breathing diving helmets and masks are used.

Diving helmets and masks that incorporate an oral-nasal cavity with a demand-breathing arrangement are mechanically simple, easy to operate, and require significantly less air volume per unit of time, than required by steady-flow ventilated helmets and masks. However, to instantaneously match flow rates to diver breathing patterns, these helmets and masks require diving pressures and piping flow capacities that are significantly higher than needed in steady-flow equipment used in comparable service. Also, since oral-nasal and demand-breathing masks have limited volume and no storage capability, OSHA recommends that divers use an emergency air bottle (“come-home bottle” or “bail-out bottle”) when diving with such masks.

Too much air pressure to a helmet or mask can be just as dangerous as not having enough air pressure. For most demand-breathing regulators, the range between the minimum and maximum (free-flow) pressure is only about 75 psi, and the range between the optimum pressure and the maximum pressure is only about 50 psi. To avoid pressure-related hazards, the employer should consult the manufacturer of the diving helmet or mask to verify the minimum, optimum, and maximum pressure limits of the demand-breathing regulator.

When selecting a diving air compressor, it is important to determine the required output pressure (psig) and the output volume (scfm). These calculations are based on the pressure and flow available at the manifold (i.e., where the diver’s umbilical connects topside to the air-supply system). Allowances must be made for pressure reduction caused by the piping system components between the volume tank and diver’s manifold. For example, each filter can induce a 5 to 15 psi drop in system pressure.

Additional guidance is available in section XII., paragraph R., Other Commercial Diving Resources.

**Question #7: Are “hookah rigs” (i.e., an air compressor supplying air through a hose directly to the second-stage of a SCUBA regulator) allowed by OSHA standards? Is it acceptable to use the second-stage regulator from a SCUBA regulator assembly approved by the U.S. Navy for a “hookah rig”?**

Answer: Hookah rigs, as described in this question, are not in compliance with the OSHA commercial diving standard because such rigs prohibit diver-to-topside communications, which is a requirement for all surface-supplied diving operations (see 29 CFR 1910.422(c)(1)(i)). Further, assembling a hookah rig by using a second-stage regulator from a SCUBA regulator assembly can pose a severe hazard to divers. Second-stage SCUBA regulators are designed to function properly when supplied with pressure in a specified range (such as from 125 to 150 psi over the ambient water pressure). In a SCUBA regulator assembly, the first-stage SCUBA regulator has a mechanism that compensates for the ambient water pressure and maintains a constant pressure, in a specified range, to the second-stage regulator. Without the first-stage SCUBA regulator, as in the case with a hookah rig as described, the inlet air pressure to the second-stage regulator is not automatically compensated to maintain a constant over-bottom pressure (psi-ob); therefore, as the diver goes deeper, the air flow from the second-stage regulator decreases. Eventually, as the diver goes deeper, the diver will receive little or no air

from the second-stage regulator, which can result in asphyxiation of the diver.

Regulators authorized by the U.S. Navy are for use only in the specified configuration. Consequently, the use of a second-stage SCUBA regulator independent of the first-stage SCUBA regulator is not approved by the Navy. Also, Navy approval is for Navy equipment used in Navy diving operations; this approval does not extend to the use of such equipment by commercial divers or other organizations.

**Question #8: Are employers in compliance with OSHA standards when they rely on employees who own their own diving equipment to maintain this equipment?**

Answer: OSHA supports and encourages employees to maintain, inspect, and ensure the safe operation of the equipment that they own and use in their employers' diving operations. However, these actions do not relieve employers of their responsibilities under OSHA standards to ensure the proper use, maintenance, testing, and other required actions regarding diving equipment used in the course of employment. Accordingly, OSHA makes no distinction between "employer-owned" equipment and "employee-owned" equipment. If the equipment is not in compliance with OSHA standards, and it is being used in the course of employment, then the employer is in violation of the standards.

**Question #9: When a decompression chamber is not available at the dive location, can employers administer 100 percent oxygen to a diver who experiences decompression sickness or arterial gas embolism while the diver is being transported to a decompression chamber? Can an oxygen mask with a mouthpiece-held demand inhalator valve be used for unconscious patients?**

Answer: OSHA standards require a multi-place recompression chamber at the dive location for any planned decompression dive, any dive deeper than 100 fsw, or any dive on a breathing medium other than standard air. However, divers who are not covered by these recompression chamber requirements (such as conducting no-decompression dives less than 100 fsw) can incur decompression sickness (i.e., "bends") or an arterial gas embolism. In these situations, when no recompression chamber is immediately available, the following guidelines apply. When transporting a breathing diving patient from the dive location to an available chamber for treatment, or when transporting any other breathing diving patient from one treatment facility to another, a portable oxygen supply consisting of an E cylinder (approximately 669 liters of oxygen) and a transparent mask is recommended. When transporting a non-breathing diving patient from the dive location to an available chamber for treatment, a mechanical-bag resuscitator with a pure oxygen supply is recommended; the oxygen supply should be administered only by trained personnel. Under these circumstances, OSHA does not recommend the use of an emergency-oxygen kit having a replacement oxygen mask with a mouthpiece-held demand inhalator valve, because it is not suitable for an unconscious patient, and oxygen is incompatible with the rubber parts of the mouthpiece assembly.

Although the use of pure-oxygen treatment for a diving patient may be beneficial, it is not a substitute for recompression treatment. When a diver incurs any diving illness that requires recompression treatment (such as decompression sickness, or arterial gas embolism), the diver must be treated at a recompression facility. Oxygen treatment may be necessary or desired

during transport to a recompression facility, but it must never be used as a replacement for recompression treatment when such treatment is required.

**Question #10: Are detector-tube test kits suitable for compliance with 29 CFR 1910.430(b)(3) and (b)(4), which require that the output air from a diving compressor be tested every 6 months for carbon monoxide, carbon dioxide, and oil mist contaminants?**

Answer: The use of detector tubes to perform the sampling required by 29 CFR 1910.430(b)(3) and (b)(4) is acceptable when the manufacturer’s instructions and limitations are followed, and employers comply with the recordkeeping requirements of 29 CFR 1910.440(b)(2) and (b)(3)(vi). The OSHA Technical Manual, [TED 01-00-015](#), January 20, 1999, Section II (“Sampling, Measurement Methods and Instruments”), provides additional guidance concerning the use and known limitations of detector tubes. When such limitations exist, detector tubes may not be used, and the specified alternative methods (such as laboratory-tested air samples) shall be used instead. OSHA encourages employers to send compressor air samples to laboratories periodically for analysis to validate the results of detector-tube testing, and to conduct diver’s air sampling more frequently than semiannually.

**Question #11: How long must an employer retain records or documents required by 29 CFR 1910.440?**

Answer: See chart below.

**Retention Periods for Commercial Diving Records  
Required by 29 CFR 1910.440**

Record or Document	Retention Period
Safe practices manual	Current document only
Depth-time profile	Until completion of the dive record; or if decompression sickness occurs during the dive, until completion of decompression-procedure assessment
Dive record	1 year; 5 years for records involving decompression sickness
Decompression procedure assessment evaluations	5 years
Equipment inspection and testing records	Current entry or tag, unless the equipment is withdrawn from service (i.e., then no retention requirement)
Hospitalization records	5 years

**Question #12: 29 CFR 1910.430(b)(2) requires that air compressor intakes be located away from areas containing exhaust or other contaminants. In some smaller compressor systems, the air intake is near the exhaust. How far apart should the air intake and exhaust be from each other?**

Answer: Generally, an upwind horizontal separation of at least twelve feet should be maintained

between the air compressor intake and the engine exhaust. In addition, the air intake should be located at least six feet above the ground, deck, or other low-lying area that could collect contaminants that are heavier than air. Even if a system is designed to keep the exhaust downwind of the intake (e.g., floating, weathervaning system), these horizontal and vertical distances should be maintained.

**Question #13: Is “free diving” or “breath-hold diving” covered under 29 CFR Part 1910, Subpart T?**

Answer: No. 29 CFR 1910.402 defines a diver as, “An employee...using underwater apparatus which supplies compressed breathing gas at the ambient pressure.” Since a “free diver” or “breath-hold diver” is not using an underwater apparatus that supplies compressed breathing gas, he/she is not considered a diver; therefore, the 29 CFR Part 1910, Subpart T standards do not apply to this type of diving.

**Question #14: Is an employee under the age of 18 years old permitted to fill SCUBA bottles?**

Answer: Various State labor laws preclude employees under the age of 18 years old from handling compressed air which is classified as a hazardous material, with some specified exceptions such as inflating tires and party balloons. Compressed air is classified as a Division 2.2 Hazardous Material (i.e., non-flammable gas) in the [Hazardous Materials Table](#) (49 CFR 172.101) for pressures of 25.9 psig (43.8 psia) or greater at 68°F (49 CFR 173.115(b)(1)). Contact the specific State Labor Office for details on a specific State. Department of Labor’s Wage and Hour Division lists the Commissions, Directors, and Secretaries for each [State Labor Office](#).

**Question #15: Is air that is enriched with extra oxygen (O<sub>2</sub>) considered to be a mixed-gas regulated by the 29 CFR 1910.426 – Mixed-gas diving standards?**

Answer: Yes. Mixed-gas diving is defined in 29 CFR 1910.402 as, “A diving mode in which the diver is supplied in the water with a breathing gas other than air.” Therefore, if additional oxygen (O<sub>2</sub>) content is added to breathable air that raises the O<sub>2</sub> content above 23.5%, it is considered to be a mixed-gas, and the 29 CFR 1910.426 standards would apply.

NOTE: The early terms for nitrogen-oxygen mixtures as used by the U.S. Navy were “nitrogen-oxygen mixtures” or “nitrox.” Other terms often used to describe oxygen-rich mixtures include “oxygen-enriched air” (OEA) and “enriched-air nitrox” (EAN or EANx). The “x” in EANx evolved to state the oxygen percentage, as in EAN32 for 32% oxygen content. Additional terms used by NOAA include “NOAA Nitrox I” or “NN32” and “NOAA Nitrox II” or “NN36,” referring, respectively, to the 32% and 36% mixtures commonly used in diving.

**Question #16: Where can I find information on faulty dive equipment that has been recalled?**

Answer: The [Boating Safety Resource Center](#), sponsored by the U.S. Coast Guard, has this information for recreational boats and equipment (i.e., recalls, product assurance branch, etc.). ADCI routinely issues [Safety Notices](#) that are posted on their website that may contain product

information. In addition, the U.S. Consumer Product Safety Commission maintains a website, organized by hazard type, that lists recalled products (see [www.cpsc.gov/cgi-bin/haz.aspx](http://www.cpsc.gov/cgi-bin/haz.aspx)).

**Question #17: Is an elevated potable water tank in which diving occurs considered a permit-required confined space in accordance with 29 CFR 1910.146?**

Answer: Yes. In addition to 29 CFR 1910.146, employers must ensure that divers are protected to the appropriate levels required in 29 CFR 1910.134. For example, diving in an immediately dangerous to life and health (IDLH) atmosphere requires either a surface-supplied diving system, or SCUBA with a full facemask (i.e., SCUBA with a standard mask and second stage regulator would not meet 1910.134(d)(2)). General information regarding potable water diving is available in American Water Works Association (AWWA) *Standard C652-92, Section 5: Disinfection Procedures When Conducting Underwater Inspection of Potable-Water-Storage Facilities*. In addition, ADCI has a chapter titled, “Potable Water Diving Operations” in its 6<sup>th</sup> Edition of the *Consensus Standard for Commercial Diving and Underwater Operations*.

## **APPENDIX B: Summary of OSHA Authority**

### **RESTRICTIONS AND LIMITATIONS ON OSHA's AUTHORITY**

#### **GEOGRAPHICAL RESTRICTIONS**

Federal OSHA's authority is restricted to the following geographical limits:

- **State Territorial Seas** – Extends three (3) nautical miles (nm)(1 nm = 6,080 ft.) from the general coastline for all coastal areas, except Puerto Rico, Texas, and the Gulf Coast of Florida, which extend nine (9) nm from the general coastline.

NOTE: The State territorial seas for the East Coast of Florida extend three (3) nm and for the Gulf Coast of Florida extend nine (9) nm.

- **International Boundary with Canada** – All waters in the Great Lakes and St. Lawrence Seaway within the United States boundary line with Canada are included (i.e., no three (3) nm or nine (9) nm restriction since the Great Lakes and St. Lawrence Seaway are part of U.S. Inland Waters).
- **Outer Continental Shelf (OCS) Lands** – Begins at the outer limit of the State territorial seas and extends to the edge of the U.S. continental shelf (NOTE: the continental shelf varies in distance). OSHA authority on the OCS only applies to the sea floor or any structure attached thereto (it does not include the water above the sea floor, nor does it include vessels operating on the OCS).

#### **APPROPRIATIONS ACT LIMITATIONS**

Current appropriations legislation exempts small employers in relatively low-hazard industries from programmed (“general schedule”) OSHA inspections. For purposes of this appropriations exemption, a small employer is one that employs ten (10) or fewer employees. To qualify, the employer must be part of an industrial classification having a Days Away, Restricted, or Transferred (DART) rate, as determined from the OSHA 300 Log and an occupational illness and injury rate less than the national average rate for that industry as most recently published by BLS. The exemption does NOT affect OSHA's authority to take action relating to occupational health hazards; employee complaints of unsafe or unhealthful working conditions; fatalities, catastrophes, or imminent dangers; or investigations of discrimination under Section 11(c) of the OSH Act. OSHA Directive CPL 02-00-051 provides information on the current status of this Congressional exemption, while Appendix A to that instruction provides a list of industries with illness and injury rates currently below the national average.

## OSHA AND U.S. COAST GUARD AUTHORITY

### INSPECTED VESSELS

Under a 1983 Memorandum of Understanding between OSHA and the U.S. Coast Guard, the occupational safety and health of seamen on inspected vessels is the exclusive responsibility of the U.S. Coast Guard. The U.S. Coast Guard has safety and health authority over seamen working on an inspected vessel that is: (1) on the navigable waters of the U.S. (all U.S. Inland Waters and State territorial seas), and (2) owned in the U.S. and operated on the high seas (world-wide coverage).

OSHA has safety and health authority over working conditions of employees working on an inspected vessel, EXCEPT the working conditions of seamen and the working conditions of divers when the dive location is on an inspected vessel. Accordingly, the U.S. Coast Guard *Commercial Diving* regulations apply to diving operations when the dive location is on an inspected vessel (i.e., when diving operations are conducted from an inspected vessel). For inspected vessels, the OSHA standards most frequently involved are:

- Shipyard employment under 29 CFR Part 1915 – Covers all employees (other than seamen, and divers when the dive location is on an inspected vessel) who are engaged in shipbuilding, ship repair, or shipbreaking, or exposed to the hazards of such operations.
- Longshoring operations under 29 CFR Part 1918 – Covers all employees (other than seamen) who are engaged in longshoring operations or exposed to the hazards of such operations.

### UNINSPECTED VESSELS

The U.S. Coast Guard has exercised limited authority and issued limited regulations over the safety and health of employees working on an uninspected vessel, i.e., vessels that are not inspected vessels or recreational vessels. All of the following areas for uninspected vessels fall under the authority of the U.S. Coast Guard: fire extinguishers; life preservers and other lifesaving devices; flame arresters (backfire traps) on internal gas-driven engines; and venting of engine bilges and fuel tank compartment. Also, for commercial uninspected fishing industry vessels, the U.S. Coast Guard has issued various other requirements (46 CFR Part 28) dependent upon the type of vessel and the vessel's geographical area of operation (such as the vessel operates beyond the "boundary line" (see 46 CFR Part 7)).

OSHA has safety and health authority over an uninspected vessel for all occupational risks not covered by the U.S. Coast Guard. The OSHA standards most frequently involved for uninspected vessels include:

- Shipyard employment under 29 CFR Part 1915 – Covers all employees who are engaged in shipbuilding, ship repair, or ship breaking, or exposed to the hazards of such operations.
- Longshoring operations under 29 CFR Part 1918 – Covers all employees who are engaged in longshoring operations or exposed to the hazards of such operations.
- Commercial diving operations under 29 CFR Part 1910 – Covers all diving when the dive location is on an uninspected vessel. This includes diving from an uninspected vessel, and

doing work on an inspected vessel, such as hull scrubbing, propeller change, hull repair, etc.

NOTE: When the dive location is on an inspected vessel, the U.S. Coast Guard *Commercial Diving* regulations apply.

### UNINSPECTED COMMERCIAL FISHING INDUSTRY VESSELS

The U.S. Coast Guard exercises limited authority and has issued limited regulations (see [46 CFR Part 28](#)) over the safety and health of employees working on an uninspected commercial fishing industry vessel (see [CPL 02-01-047](#), *OSHA Authority Over Vessels and Facilities on or Adjacent to U.S. Navigable Waters and the Outer Continental Shelf (OCS)*, February 22, 2010). As per 46 CFR Part 28, the following limits are defined by the U.S. Coast Guard for uninspected commercial fishing industry vessels:

- Fish processors of 5,000 tons or less (only one vessel, the SS Ocean Phoenix, is currently known to exceed these limits; this vessel is an inspected vessel);
- Fish tenders of 500 tons or less; and
- Fishing vessels (all).

OSHA has safety and health authority over all employees, and for all working conditions, on an uninspected commercial fishing industry vessel that are not covered by the U.S. Coast Guard (see [CPL 02-01-047](#), *OSHA Authority Over Vessels and Facilities on or Adjacent to U.S. Navigable Waters and the Outer Continental Shelf (OCS)*, February 22, 2010). For uninspected commercial fishing industry vessels, the areas of OSHA coverage most frequently involved are:

- Uninspected commercial fishing industry vessels (see [CPL 02-01-047](#), *OSHA Authority Over Vessels and Facilities on or Adjacent to U.S. Navigable Waters and the Outer Continental Shelf (OCS)*, February 22, 2010) – Covers all employees who are engaged in work on uninspected commercial fishing industry vessels (fish processor vessels, fish tender vessels, and fishing vessels).
- Shipyard employment under [29 CFR Part 1915](#) – Covers all employees who are engaged in shipbuilding, ship repair, or shipbreaking, or are exposed to the hazards of such operations.
- Longshoring operations under [29 CFR Part 1918](#) – Covers all employees who are engaged in longshoring operations or exposed to the hazards of such operations.
- Commercial diving operations under [29 CFR Part 1910](#) – Covers all diving when the dive location is on an uninspected fishing industry vessel. This includes diving from an uninspected commercial fishing industry vessel when the divers are doing work on an inspected vessel (such as hull scrubbing, propeller change, hull repair).

NOTE: When the dive location is on an inspected vessel, then the U.S. Coast Guard *Commercial Diving* regulations apply.

NOTE: For commercial fish processor vessels over 5,000 tons (inspected vessels), the U.S. Coast Guard has authority over seaman engaged in any work activity.

## COMMERCIAL DIVING

The U.S. Coast Guard regulations for commercial diving operations are specified in 46 CFR, Chapter I, Part 197, Subpart B. U.S. Coast Guard regulations state the following coverage:

- At Deepwater Ports or the safety zone (to 5 nautical miles) thereof as per 33 CFR Part 150.
- From any artificial island, installation, or other device on the Outer Continental Shelf.
- From all vessels that have a valid certificate of inspection (inspected vessels).
- From any vessel engaged in activities related to Outer Continental Shelf lands.

OSHA covers commercial diving operations within OSHA's geographical authority when such operations are not covered by the U.S. Coast Guard. As delineated in 29 CFR 1910.401(a)(2), OSHA exempts from coverage of the commercial diving operations standard: SCUBA instructors conducting SCUBA air dives within the no-decompression limits; diving performed for search, rescue, and public safety purposes; human research diving subjects; and scientific diving. To qualify for the scientific diving exemption, all of the requirements in 29 CFR 1910.401(a)(2)(iv) and Appendix B to 29 CFR Part 1910, Subpart T, must be met. More comprehensive guidance regarding exclusions and exemptions from the commercial diving operations standard is provided in Appendix C of this instruction.

## FEDERAL AND STATE AUTHORITY

Federal OSHA's commercial diving standard covers private-sector employers in federal enforcement States, and employers who dive in association with maritime standards (i.e., shipyard employment, longshoring, and marine terminals) when these operations are not covered by a State with an OSHA-approved State-Plan; State and local government employees are covered by the commercial diving standard only in States with State-Plans.

Twenty-one States and one Territory have OSHA-approved State-Plans covering both private- and public-sector employment: Alaska, Arizona, California, Hawaii, Indiana, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nevada, New Mexico, North Carolina, Oregon, Puerto Rico, South Carolina, Tennessee, Utah, Vermont, Virginia, Washington, and Wyoming.

Four States and one Territory (Connecticut, Illinois, New Jersey, New York, and the U.S. Virgin Islands) have approved plans covering State and local government employment only.

California, Michigan, Oregon, and Washington have published and promulgated State diving standards which differ from the federal standards. The other State-Plans have promulgated diving standards identical to the federal standards at 29 CFR Part 1910, Subpart T.

NOTE: See the consolidated State Plan Matrix at the end of this appendix.

California, Minnesota, Vermont, and Washington cover certain private-sector maritime operations (i.e., shore-based shipyard employment and marine terminals) under their State-Plans. State coverage is set out in the text of this directive and in the appropriate subparts of 29 CFR

Part 1952, and is generally limited to shore-based activities not on the U.S. navigable waters (graving docks, shiplifts, and marine railways are part of U.S. navigable waters). For specific guidance, see section XII., paragraph A.9.c., of this directive. Also, Oregon covers commercial diving from all shore-side locations (for the definition of “dive location” see section XII., paragraph B.11.), even in maritime operations such as shipyard employment and marine terminals.

## Federal and State Coverage for Commercial Diving

State/Territory	Diving Standard	OSHA Plan Coverage
Alabama	Federal OSHA	FEDERAL: Private Sector Only
Alaska	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Arizona	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Arkansas	Federal OSHA	FEDERAL: Private Sector Only
California [Notes 1, 2]	State Diving Standard	STATE: Private Sector + State/Local Gov't Employees
Colorado	Federal OSHA	FEDERAL: Private Sector Only
Connecticut	Federal OSHA / Identical to Federal OSHA	FEDERAL: Private Sector//STATE: State/Local Gov't Employees
Delaware	Federal OSHA	FEDERAL: Private Sector Only
Florida	Federal OSHA	FEDERAL: Private Sector Only
Georgia	Federal OSHA	FEDERAL: Private Sector Only
Hawaii	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Idaho	Federal OSHA	FEDERAL: Private Sector Only
Illinois	Federal OSHA / Identical to Federal OSHA	FEDERAL: Private Sector//STATE: State/Local Gov't Employees
Indiana	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Iowa	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Kansas	Federal OSHA	FEDERAL: Private Sector Only
Kentucky	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Louisiana	Federal OSHA	FEDERAL: Private Sector Only
Maine	Federal OSHA	FEDERAL: Private Sector Only
Maryland	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Massachusetts	Federal OSHA	FEDERAL: Private Sector Only
Michigan [Note 1]	State Diving Standard	STATE: Private Sector + State/Local Gov't Employees
Minnesota [Note 2]	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Mississippi	Federal OSHA	FEDERAL: Private Sector Only
Missouri	Federal OSHA	FEDERAL: Private Sector Only
Montana	Federal OSHA	FEDERAL: Private Sector Only
Nebraska	Federal OSHA	FEDERAL: Private Sector Only
Nevada	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
New Hampshire	Federal OSHA	FEDERAL: Private Sector Only
New Jersey	Federal OSHA / Identical to Federal OSHA	FEDERAL: Private Sector//STATE: State/Local Gov't Employees
New Mexico	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
New York	Federal OSHA / Identical to Federal OSHA	FEDERAL: Private Sector//STATE: State/Local Gov't Employees
North Carolina	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
North Dakota	Federal OSHA	FEDERAL: Private Sector Only
Ohio	Federal OSHA	FEDERAL: Private Sector Only
Oklahoma	Federal OSHA	FEDERAL: Private Sector Only
Oregon [Note 1]	State Diving Standard	STATE: Private Sector + State/Local Gov't Employees
Pennsylvania	Federal OSHA	FEDERAL: Private Sector Only
Puerto Rico	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Rhode Island	Federal OSHA	FEDERAL: Private Sector Only
South Carolina	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
South Dakota	Federal OSHA	FEDERAL: Private Sector Only
Tennessee	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Texas	Federal OSHA	FEDERAL: Private Sector Only
Utah	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Vermont [Note 2]	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Virginia	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees
Virgin Islands	Federal OSHA / Identical to Federal OSHA	FEDERAL: Private Sector//STATE: State/Local Gov't Employees
Washington [Notes 1, 2]	State Diving Standard	STATE: Private Sector + State/Local Gov't Employees
West Virginia	Federal OSHA	FEDERAL: Private Sector Only
Wisconsin	Federal OSHA	FEDERAL: Private Sector Only
Wyoming	Identical to Federal OSHA	STATE: Private Sector + State/Local Gov't Employees

Note 1: Four States (CA, MI, OR, WA) have published unique State diving standards.

Note 2: Four States (CA, MN, VT, WA) have shore-side coverage of maritime industries.

## APPENDIX C: Exclusions and Exemptions from OSHA's Commercial Diving Standard

This appendix provides a summary review of the history, scope, and application of exclusions and exemptions to 29 CFR Part 1910, Subpart T – Commercial Diving Operations. Federal Register notices relevant to the development of the original OSHA diving standard and the subsequent amendment for the scientific diving exemption are cited in this summary; reference to these notices will provide a more comprehensive understanding of the issues involved.

### THE ORIGINAL COMMERCIAL DIVING STANDARD AND SCOPE OF OSHA'S STATUTORY AUTHORITY

On July 22, 1977, the U.S. Department of Labor's Occupational Safety and Health Administration (OSHA) issued final public notice of the adoption of a permanent diving standard that became effective on October 20, 1977 (see Federal Register notice [42 FR 37650](#)). This original diving standard, [29 CFR Part 1910](#), Subpart T – Commercial Diving Operations, established mandatory occupational safety and health requirements for commercial diving operations. The standard applies wherever OSHA has statutory authority. Consequently, the standard covers commercial diving in any natural or artificial inland body of water, as well as diving along the coasts (i.e., State territorial seas) of the United States and its possessions listed in Section 4(a) of the Occupational Safety and Health (OSH) Act (29 U.S.C. 655 *et al.*). For coastal States and Territories, the State territorial seas extend three (3) nautical miles seaward from the coastline, except for the Gulf Coast of Florida, Texas, and Puerto Rico, where the State territorial seas extend for nine (9) nautical miles from the general coastline. For States bordering the Great Lakes and St. Lawrence Seaway, all waters in the Great Lakes and associated rivers, up to the international boundary line with Canada, are U.S. navigable waters (U.S. Inland Waters).

### ORIGINAL EXCLUSIONS FROM OSHA'S COMMERCIAL DIVING STANDARD

The original OSHA diving standard provided three specific exclusions which remain in effect as follows:

1. Instructional diving utilizing only open-circuit compressed air SCUBA within the no-decompression limits. OSHA concluded that a valid distinction existed between SCUBA diving instructors and commercial divers which warranted an exclusion. The SCUBA diving instructor, who is an employee, is student oriented – not task oriented. The dive location is not determined by the location of a particular job as it is in commercial applications, where operations must of necessity be conducted under environmental conditions that are often adverse. The SCUBA diving instructor, by contrast, selects a location which is usually clear, shallow, and warm. Indeed, a swimming pool is the dive location for most SCUBA diving instruction. Such dives are discontinued if the slightest difficulty occurs. SCUBA diving instructors do not utilize construction tools, handle explosives, or use welding or burning tools. As a result of these factors, SCUBA diving instructors are rarely exposed to adverse sea states, temperature extremes, great depths, poor visibility, or heavy workloads, some or all of which are common to the majority of commercial diving operations. However, OSHA took into consideration that

some diving techniques and conditions pose greater potential hazards than others, regardless of the purpose of the dive. Thus, this exclusion for SCUBA diving instruction was limited to a restricted diving range, a particular diving mode, and specific equipment. The exclusion from the standard applies only to instructional diving which uses open-circuit compressed air SCUBA and is conducted within the no-decompression limits. The standard defines no-decompression limits as the depth-time limits of the “no-decompression limits and repetitive dive group designation table for no-decompression air dives” of the U.S. Navy Diving Manual, or equivalent limits that the employer can demonstrate to be equally effective. No distinction *per se* is made between instructors of prospective recreational divers and instructors of prospective commercial divers. However, the training for commercial divers involves diving that is surface-supplied, uses mixed-gas as a breathing gas, requires decompression, often involves adverse environmental conditions, or involves the use of underwater tools and equipment; each of these factors potentially increases the hazards of the operation. It is emphasized that when recreational diving instruction exceeds the specified limits, the OSHA diving standard applies. It is noted that individuals engaged in recreational diving not otherwise related to their respective employments, are not within the authority of the OSH Act, and, are outside the scope of OSHA’s diving standard. On the other hand, SCUBA diving for a commercial rather than instructional purpose is covered by the OSHA diving standard, regardless of equipment or depth-time range.

2. Search, rescue, and related public-safety diving by or under the control of a governmental agency. OSHA received a number of comments from persons engaged in diving incidental to police and public-safety functions, and the Agency concluded that an exclusion was appropriate for such applications. The purpose of the “by or under the control of a governmental agency” language is to make the exclusion applicable to all divers whose purpose is to provide search, rescue, or public-safety diving services under the direction and control of a governmental agency (such as local, State, or federal government) regardless of whether or not such divers are, strictly speaking, government employees. In excluding these search and rescue operations, OSHA determined that safety and health regulation of the police and related functions are best carried out by the individual States or their political subdivisions. It is pointed out that this exclusion does not apply when work other than search, rescue, and related public-safety diving is performed (such as divers repairing a pier). Diving contractors who occasionally perform emergency services, and who are not under the control of a governmental agency engaging their services, do not come under this exclusion. Such divers may, however, be covered by the provision concerning application of the standard in an emergency (see 29 CFR 1910.401(b) and section XII., paragraph A.8., in this instruction).

3. Diving governed by the Protection of Human Subjects regulations of the Department of Health and Human Services (HHS)(previously known as the Department of Health, Education and Welfare (HEW)) or equally effective rules or regulations of another federal agency. Diving operations which are governed by 45 CFR Part 46 are not within the scope of OSHA’s commercial diving standard. Such operations involve research and development or related scientific activities requiring human subjects, and receive HHS grants or contracts. Compliance with HHS regulations is mandatory for such employers or contractors, and the regulations are designed to promote safety and health. Similarly, any other federal agency that adopts rules or regulations that are equally effective (i.e., similar in design, purpose, and effect to those of HHS) are covered by this exclusion. The exclusion is supported in the record on the grounds that it would permit continued scientific research designed to extend the safe limits of diving physiology and technology. The long-term safety and health interests of divers are best served

by this research, and such diving cannot reasonably be expected to comply in every respect with a standard that is designed to reflect current commercial diving operational practice.

## EMERGENCY PROVISION OF OSHA’S COMMERCIAL DIVING STANDARD

The original OSHA diving standard also included a provision for emergency situations (see 29 CFR 1910.401(b)), which remains in effect, when the overriding consideration is the preservation of life and the protection of the environment.

The “emergency provision” permits deviations from the requirements of OSHA’s diving standard in situations where death, serious physical harm, or major environmental damage is likely, but only to the extent that such action is immediately necessary to prevent or minimize the harm. No exemption is provided by the emergency provision for situations where purely economic or property damage is likely. Although temporarily exempt from substantive portions of the standard that are inappropriate in such emergency situations, employers are required to notify the nearest OSHA Area Office within 48 hours of the emergency event. Further, upon the request of the Area Director, employers must submit a record of the notification, with an indication and explanation of what deviations from the standard were taken as a result of the emergency. This reporting requirement enables OSHA to monitor the use of this exemption.

NOTE: The emergency provision is not a substitute for the variances specified under Section 6(d) of the OSH Act. These variances permit alternative means of compliance that are not exemptions from a standard, and that afford employees at least the same degree of protection that the standard provides; these variances typically address well-defined, non-emergency circumstances. The emergency provision applies to unique, unplanned emergency circumstances for which diving services are sometimes needed on a temporary basis, thus making an OSHA variance unnecessary and inappropriate.

## SCIENTIFIC DIVING EXEMPTION – BACKGROUND AND DEVELOPMENT

The original OSHA standard for commercial diving operations did not exempt diving performed solely for scientific research and development purposes. Subsequent to the publication of OSHA’s original standard, the Agency received numerous requests from various individuals and organizations to reconsider the applicability of the standard to educational/scientific diving. Proponents for exempting educational/scientific diving noted that it was customary for the educational/scientific diving community to follow well-established, consensual standards of safe practice. They pointed out that the first set of consensual diving standards was developed by the Scripps Institution of Oceanography of the University of California in the early 1950s. Further, in 1973, diving safety boards and committees from ten major educational institutions involved in education/scientific diving met and accepted the University of California “*Guide for Diving Safety*” as a minimum standard for their individual programs. Therefore, it was contended that most diving programs at educational institutions were complying with this consensual standard, with limited modifications for regional and operational variations in diving, before the publication of the original OSHA diving standard. The educational/scientific diving community pointed to their excellent safety record prior to OSHA’s publication of a diving standard, and attributed their safety record to the effectiveness of self regulation by their community. Further, they noted that significant differences exist between educational/scientific diving and commercial diving. The educational/scientific diver is an observer and data gatherer who

chooses the work area and diving conditions that will minimize environmental stresses, and maximize the safety and efficiency of gathering data. In contrast, it was noted that the commercial diver is an underwater construction worker, builder, and trouble shooter whose work area and diving conditions are determined by the location and needs of the project.

Based on the concerns expressed by the educational/scientific diving community, on August 17, 1979, OSHA published an advance notice of proposed rulemaking (ANPR) (see Federal Register notice [44 FR 48274](#)) to obtain additional information concerning which provisions of the OSHA diving standard were causing the most difficulty, and what modifications to the standard should be considered. The responses to the ANPR, together with other information and data contained in OSHA's commercial diving record, convinced the Agency that there was a significant difference between educational/scientific diving and commercial diving; that the safety record of the educational/scientific diving community represented evidence of its successful self-regulation; and, as a result, an exemption for educational/scientific diving might be justified. Accordingly, on March 26, 1982, OSHA published a notice of proposed rulemaking (see Federal Register notice [47 FR 13005](#)) to exempt diving "performed solely for marine scientific research and development purposes by educational institutions" from the OSHA diving standard. Although it was proposed to exempt only educational institutions which perform scientific diving, in the notice of proposed rulemaking OSHA requested responses to three specific questions to solicit data and information for determining if the exemption should include other segments of the scientific diving community. The original closing date for the comment period for this notice of proposed rulemaking was May 10, 1982; however, on May 26, 1982, OSHA published a notice (see Federal Register notice [47 FR 22972](#)) extending the comment period as requested by the American Academy of Underwater Sciences to June 18, 1982, and scheduled informal public hearings for June 29-30, 1982, in Washington, DC, and July 7-9, 1982, in Los Angeles, California. Following completion of the public hearings, the submission of post-hearing comments, and receipt of arguments and briefs relating to the hearing issues, the Administrative Law Judge certified the record on September 3, 1982.

Based on the overwhelming support from comments and hearing testimony, as well as other information contained in the record, OSHA concluded that an exemption was justified for all scientific diving, not just solely scientific diving performed by educational institutions. Therefore, OSHA decided to broaden the exemption to include all segments of the scientific diving community. Based on the record, OSHA's exemption for scientific diving included specified conditions that scientific diving programs must meet before members of the scientific diving community may avail themselves of the exemption. On November 26, 1982, OSHA exempted scientific diving from coverage under 29 CFR Part 1910, Subpart T – Commercial Diving Operations, provided that the diving meets the Agency's definition of scientific diving and is under the direction and control of a diving program utilizing a safety manual and a diving control board meeting certain specified criteria (see Federal Register notice [47 FR 53357](#) and 29 CFR 1910.401(a)(2)(iv)).

The November 1982 scientific exemption was subsequently challenged by the United Brotherhood of Carpenters and Joiners (UBCJ) under Section 6(f) of the [OSH Act](#). The union filed a petition for judicial review of the final rule regarding the scientific exemption, and on April 4, 1984, the U.S. Court of Appeals for the District of Columbia Circuit issued a memorandum and court order that required further action regarding this final rule. In compliance with the court's memorandum and order, OSHA published a notice on July 18, 1984

(see Federal Register notice [49 FR 29105](#)), that reopened the record, and required a determination of the interpretive guidelines that OSHA proposed to use in determining which enterprises may avail themselves of the exemption for scientific diving. Final action regarding this court order was concluded and published by OSHA on January 9, 1985 (see Federal Register notice [50 FR 1046](#)), *Commercial Diving Operations – Exemption for Scientific Diving – Final Guidelines*. This notice established the final guidelines that OSHA uses, in conjunction with the exemption criteria contained in the final rule (see Federal Register notice [47 FR 53357](#) and 29 CFR 1910.401(a)(2)(iv)), to determine whether a scientific diving program can avail itself of the exemption from the OSHA commercial diving standard. The absence of any factor specified in the guidelines (see Appendix B to 29 CFR Part 1910, Subpart T – Commercial Diving Operations), or the final rule (see 29 CFR 1910.401(a)(2)(iv)), renders a diving program ineligible for the exemption.

## SCIENTIFIC DIVING EXEMPTION – DISCUSSION OF THE FINAL RULE AND GUIDELINES

The final rule at 29 CFR 1910.401(a)(2)(iv), which became effective on November 26, 1982, exempts any diving operation that is defined as scientific diving, and that is under the direction and control of a diving program containing at least the following elements:

(A) Diving safety manual that includes, at a minimum: Procedures covering all diving operations specific to the program; procedures for emergency care, including recompression and evacuation; and criteria for diver training and certification.

(B) Diving control (safety) board, with the majority of its members being active divers, which shall, at a minimum, have the authority to: approve and monitor diving projects; review and revise the diving safety manual; ensure compliance with the manual; certify the depths to which a diver has been trained; take disciplinary action for unsafe practices; and assure adherence to the buddy system (i.e., a diver is accompanied by, and is in continuous contact, with another diver in the water) for SCUBA diving.

In addition to the final rule, Appendix B to [29 CFR Part 1910](#), Subpart T – Commercial Diving Operations, titled “Guidelines for Scientific Diving,” became effective on January 9, 1985. This appendix provides guidelines that are used in conjunction with the final rule to determine those scientific diving programs that are exempt from OSHA’s diving standard. The guidelines are as follows:

1. “The Diving Control (safety) Board consists of a majority of active scientific divers and has autonomous and absolute authority over the scientific diving program’s operations.”

The first guideline concerns organizational structure. OSHA concluded that the organizational structure of the scientific diving community’s consensual standard program is not only vital to the integrity of scientific diving programs, but effectively serves to segregate scientific diving from commercial diving. The Diving Control Board required for scientific diving programs must contain several elements that distinguish the exempt scientific diving programs from commercial diving. These distinctive elements include absolute authority over diving operations, the autonomy inherent in the Diving Control Board’s decision making powers and responsibilities, and peer review. OSHA’s intent was for the Diving Control Board, primarily

consisting of the divers themselves, to regulate the diving activities in a manner consistent with that described by the scientific diving community during the rulemaking process. Therefore, OSHA requires that Diving Control Boards have this autonomous and absolute authority over scientific diving operations. OSHA also concluded that the peer review system has successfully regulated scientific diving programs and, therefore, OSHA mandated that the majority of members of the Diving Control Board be active divers. OSHA's intent with respect to this "peer review" was that the active divers required to make up the Diving Control Board would be scientists who actively dive, since at issue was the control of a scientific program. Thus, OSHA interprets the membership requirement as it was intended in the final rule. The "majority of active divers" on the Diving Control Board also must be scientists.

2. "The purpose of the project using scientific diving is the advancement of science; therefore, information and data resulting from the project are non-proprietary."

The second guideline concerns the restricted purpose of the project. In part, the definition of scientific diving is "diving performed solely as a necessary part of a scientific, research, or educational activity" (see Federal Register notice [47 FR 53365](#) and 29 CFR 1910.402). The National Oceanic and Atmospheric Administration (NOAA) Diving Manual notes that "marine research using diving as a tool has been important in understanding the ocean, its organisms, and its dynamic processes." Such diving includes the study of fish behavior, ecological surveys, and benthic surveys (the aggregate of organisms living on or at the bottom of a body of water). Scientific diving is an adjunct used in the advancement of underwater science. For example, representatives from the scientific diving community noted during public hearings and in written comments, "Our objective is to promote the advancement of science and the use of underwater methods," and "Research and the furtherance of scientific knowledge are their (the divers) primary goals," results are "shared worldwide," and, further, that coverage of the scientific diving community by 29 CFR Part 1910, Subpart T – Commercial Diving Operations, may cause "irreparable damage to the underwater scientific effort of the United States." Because of the exemplary safety record, OSHA restricted the purpose of the scientific diving exemption to the advancement of science. OSHA recognizes that the advancement of science cannot occur unless such studies are made available to contribute to, and enhance, scientific knowledge. Therefore, OSHA's intent was to restrict the exemption to scientific research dives that result in non-proprietary information, data, knowledge, or other work product. The requirement that information be non-proprietary applies to scientific, research, and educational activities engaged in by scientific divers. Material available to the public for review is non-proprietary, whether or not it is published; material not available for review is proprietary.

3. "The tasks of a scientific diver are those of an observer and data gatherer. Construction and trouble-shooting tasks traditionally associated with commercial diving are not included within scientific diving."

The third guideline concerns the tasks performed. The scientific diving definition in the standard states that such diving must be done by employees whose sole purpose for diving is to perform scientific research tasks. Also contained in the definition is a list of those tasks that are traditionally considered commercial, with emphasis on construction and the use of construction tools (such as heavy equipment, power tools, explosives, welding equipment, burning equipment). As OSHA discussed in the final rule (see Federal Register notice [47 FR 53357](#)), a commercial diver is typically an underwater construction worker, builder, and troubleshooter; a

scientific diver is an observer of natural phenomena or responses of natural systems, and a gatherer of data for scientific analysis. The tasks performed by the scientific diver usually are light and short in duration; if any hand tools are used, they are simple ones (such as a small hammer, collecting jars, special hand-held measuring devices, plastic core tubes, hand net, suction fish collector, camera, or slate pencil). As was indicated in a Federal Register notice ([49 FR 29105](#)), an example of task distinction might involve a scientific study of kelp. The construction of the kelp bed used in the project is not scientific diving since construction activities are commercial diving tasks; however, the consequent studies made of the kelp would be scientific diving tasks. Another example of task distinction was provided in the discussion of the final guidelines (see Federal Register notice [50 FR 1046](#)). Lowering a large object into the water (such as the Project Aquarius habitat), even though a part of a scientific project, is not scientific diving. The special skills of an underwater scientist, including observation and data-collection skills, do not contribute to the placement of a large object underwater. OSHA avoided the possibility of the exemption applying to scientific divers who undertake such tasks while participating in a scientific research project by focusing the definition on the sole purpose of the dive (i.e., scientific research tasks), eliminating dives with mixed purposes, and further indicating typical examples of what OSHA considers to be commercial tasks. It is noted that the scientific diving community supported this limited definition (see the *amicus* brief in [United Brotherhood of Carpenters and Joiners v. Department of Labor](#), No. 82-2509 (D.C. Cir. 1982)).

4. “Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment and, therefore, are scientists or scientists in training.”

The fourth guideline concerns special qualifications. As was previously noted, a scientific diver is an observer and data gatherer involved in studying the underwater environment, its organisms, and its dynamic processes, to promote underwater science. OSHA concluded, based on the nature of these activities, that these divers must be able to use scientific expertise in studying and analyzing the underwater environment. Consequently, OSHA requires these divers to be scientists or scientists in training. For example, a project to map segments of the ocean floor might hire commercial divers to undertake certain mapping tasks. These commercial divers are neither scientists nor scientists in training as prescribed by this guideline and, therefore, would not be eligible for the exemption. If, however, scientific expertise was needed to effectively accomplish tasks associated with the mapping (such as specialized geological knowledge), and a geologist trained as a diver performed the special geological tasks associated with the mapping, then such diving tasks would meet this particular criterion. As stated previously, however, all program criteria and guidelines must be met for this diving scenario to qualify for the exemption. In promulgating the exemption, OSHA rejected using credentials to determine who is a scientist. However, the Agency accepted the limitation that divers covered by the exemption had to be scientists because this limitation reflects the scientific diving community’s underwater activities, and it prevents obvious commercial diving from being construed as scientific diving.

## **APPENDIX D: No-Decompression Limits and Repetitive-Group Designation Table for No-Decompression Air Dives**

The information in this appendix (including the table on page D-3) was adapted from the U.S. Navy Diving Manual (Revision 6), Volume 2 (“Air Decompression”), Section 9-7 (“No-Decompression Limits and Repetitive Group Designators for No-Decompression Air Dives”).

The table (Table 9-7) at the end of this appendix serves three purposes. First, it shows that dives to 20 fsw and shallower have unlimited (no-decompression) bottom times. Second, it summarizes all the depth and bottom-time combinations for which the no-decompression limits apply. Third, it provides the repetitive-group designation for each of these dives. Any dive to 25 fsw or deeper that has a bottom time greater than the no-decompression limits provided in this table is a decompression dive, and must comply with the appropriate air decompression table.

Even though decompression is not required when diving within the no-decompression limits listed in the table, some nitrogen remains in the diver’s tissues for up to 12 hours following an air dive. Consideration must be given to this residual nitrogen in the diver’s tissues when calculating decompression for subsequent (i.e., repetitive) dives.

Each depth listed in the table has a corresponding no-decompression limit listed in minutes. This limit is the maximum bottom time that a diver can spend at that depth without requiring decompression. Use the columns to the right of the column marked “No-Stop Limit” to obtain the repetitive-group designation. A repetitive-group designation must be assigned to a diver after every dive. To find repetitive-group designations, follow these steps:

1. Enter the table at the depth equal to, or next greater than, the recorded maximum depth of the dive.

NOTE: 2 fsw is added to the recorded maximum depth of the dive.

2. Follow that row to the right to find the bottom time equal to, or just greater than, the actual bottom time of the dive.

NOTE: Seconds of time are rounded to the next greater minute of time.

3. Follow the column up to the repetitive-group letter designation.

Example. The employer wants a diver to conduct a brief inspection of the work site, located at a depth of 152 fsw. Determine the maximum no-decompression limit (bottom time) and the repetitive-group designation for the diver.

1. Locate the dive depth in the column marked “Depth (fsw).” Since no entry is provided for 154 (152 +2) fsw, round the depth to the next deepest depth shown in the column (i.e., 160 fsw).
2. Move horizontally across the table to find the maximum no-decompression limit in the column marked “No-Stop Limits.” The maximum no-decompression limit for this depth is 5

minutes. Therefore, to avoid decompression, the diver must descend to 152 fsw, make the inspection, and begin the ascent within 5 minutes of leaving the surface.

3. To find the repetitive-group designation for this dive, move horizontally to the right of the 160-fsw entry in the "Depth (fsw)" column to the figure "5" under the columns marked "Repetitive Group Designation" ("5" represents the 5-minute bottom time for this dive). Then move upwards in this column to the letter ("C") at the top of the column. "C" is the repetitive-group designation for this dive.

NOTE: This table, "No-Decompression Limits and Repetitive Group Designators for No-Decompression Air Dives" is based on an ascent rate of 60 feet per minute or 1 foot per second.

**Table 9-7. No-Decompression Limits and Repetitive Group Designators for No-Decompression Air Dives.**

Depth (fsw)	No-Stop Limit	Repetitive Group Designation															
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Z
10	Unlimited	57	101	158	245	426	*										
15	Unlimited	36	60	88	121	163	217	297	449	*							
20	Unlimited	26	43	61	82	106	133	165	205	256	330	461	*				
25	595	20	33	47	62	78	97	117	140	166	198	236	285	354	469	595	
30	371	17	27	38	50	62	76	91	107	125	145	167	193	223	260	307	371
35	232	14	23	32	42	52	63	74	87	100	115	131	148	168	190	215	232
40	163	12	20	27	36	44	53	63	73	84	95	108	121	135	151	163	
45	125	11	17	24	31	39	46	55	63	72	82	92	102	114	125		
50	92	9	15	21	28	34	41	48	56	63	71	80	89	92			
55	74	8	14	19	25	31	37	43	50	56	63	71	74				
60	60	7	12	17	22	28	33	39	45	51	57	60					
70	48	6	10	14	19	23	28	32	37	42	47	48					
80	39	5	9	12	16	20	24	28	32	36	39						
90	30	4	7	11	14	17	21	24	28	30							
100	25	4	6	9	12	15	18	21	25								
110	20	3	6	8	11	14	16	19	20								
120	15	3	5	7	10	12	15										
130	10	2	4	6	9	10											
140	10	2	4	6	8	10											
150	5	2	3	5													
160	5		3	5													
170	5			4	5												
180	5			4	5												
190	5			3	5												

\* Highest repetitive group that can be achieved at this depth regardless of bottom time.

This table is from the U.S. Navy Diving Manual (Revision 6).

## **APPENDIX E: Requirements and Typical Duties of Diver Tenders**

### **Requirements for Tending a Diver**

Tending a diver is addressed in 29 CFR Part 1910, Subpart T – Commercial Diving Operations, as follows:

- 29 CFR 1910.424(b)(3) requires SCUBA divers to be line-tended against currents exceeding one (1) knot (1.689 feet per second, or about 17 feet per 10 seconds).

NOTE: This requirement applies even when one diver is accompanied by another diver. One surface-tending line (safety line) is sufficient provided that the two divers are connected via a “buddy-line.”

NOTE: Currents are typically measured at the surface. However, currents may be stronger below the surface, depending on what is generating the current and the geometric layout of the flow. For example, the maximum current in a small tidal estuary stream with brackish water is typically located at  $\frac{1}{3}$  of the total depth of the water column (e.g., 8 feet below the surface in a 24-foot deep channel).

- 29 CFR 1910.424(b)(4) and 1910.424(c)(3) require SCUBA divers to be line-tended when they are in an enclosed or physically confining space, and a diver must be stationed at the underwater point of entry to the enclosed or physically confining space.
- 29 CFR 1910.424(c)(2) requires SCUBA divers to be either line-tended from the surface, or accompanied by another diver in the water who is in continuous visual contact with the SCUBA diver during the diving operation.
- 29 CFR 1910.425(c)(1) requires that each diver be continuously tended during surface-supplied air dives of 100 fsw or less.
- 29 CFR 1910.425(c)(4) requires that a separate dive-team member tend each diver in the water during surface-supplied air dives deeper than 100 fsw, or that exceed the no-decompression limits.
- 29 CFR 1910.426(c)(1) requires that a separate dive-team member shall tend each diver in the water for all mixed-gas diving.

### **Typical Duties of a Diver Tender**

The following discussion details the typical duties of a diver tender for a surface-supplied diving operation.

The general duties of a tender are to: assist the diver with checking and donning equipment; continuously tend the diver’s umbilical during water entry/exit; continuously tend the diver’s umbilical and be aware of the diver’s depth and location at all times while the diver is in the water; assist the diver in undressing; and continually monitor the diver after completion of the

dive as directed by the DPIC (i.e., designated person-in-charge; commonly referred to as the diving supervisor) (NOTE: the diver normally is monitored for a minimum period of ten minutes following a dive). The tender shall not be assigned any task other than tending the diver, unless specifically directed to do otherwise by the DPIC and properly relieved as tender by another dive-team member. Specifically, the diver tender:

- Assists the diver in donning diver-worn equipment. The following is a typical dressing procedure for surface-supplied diving operations:
  - Don diving dress (such as a wet suit, dry suit, hot-water suit, or chaffing garment).
  - Don diver's harness, secure, and adjust.
  - If weighted diving shoes or ankle weights are used, they are placed on the diver by the tender and secured.
  - Don necking and secure if helmet is to be used.
  - Don and adjust weight belt.
  - Secure knife to belt, leg, or arm as per diver's preference.
  - With the diver or a second dive-team member holding the mask or helmet, secure the emergency gas cylinder (when used).
  - Secure the umbilical assembly to harness.
  - Don mask or helmet and secure mask harness or helmet clamp.
  - After properly dressing the diver, ensure that all equipment is functioning properly, and inform the DPIC that the diver is ready.
  
- When the diver is ready to dive, the tender directs and assists the diver from the dressing area to the water-entry point (such as an inwater stage, ladder, or ramp). The tender always keeps one hand on the umbilical close to the diver, and the other hand on the diver's helmet or body harness, while assisting the diver during water entry (i.e., maintains positive control of the diver to check the diver should the diver slip or begin to fall).
  
- As the diver enters the water, the tender handles the umbilical. The tender must be careful to keep the diver's umbilical away from sharp edges, rotating machinery, and other hazards that could result in damage to, or fouling of, the umbilical. The umbilical must never be allowed to run free or be secured around a cleat, bitt, or other object. The tender must pay out the umbilical at a steady rate to permit the diver to enter the water smoothly and in a controlled manner (i.e., the tender must hold the umbilical tightly enough to check a fall or slip, but allow sufficient slack for the diver to move freely).
  
- When ready to leave the surface, the diver communicates by voice (such as "Leaving the surface") via the diver's intercom with the DPIC or the dive-team member assigned as the diver's phone-talker, and by using line-pull signals with the tender. The tender then notifies the DPIC that the diver has left the surface. The DPIC is responsible for maintaining the diving logs and records, and keeping track of the diver's bottom time for each dive conducted. When a descending line is used by the diver, the tender should handle the umbilical from a point at least ten feet from the descending line. When an inwater stage is being used, the tender must coordinate with the stage-winch operator or line handlers to ensure a smooth descent for the diver.
  
- During the dive, the tender must be alert for, and immediately report to the DPIC, conditions

or situations that may be hazardous or unsafe to the diving operations.

- During the dive, the tender must maintain continuous, positive control of the umbilical by having at least one hand on the umbilical at all times, and never allowing it to run free or be secured around a cleat, bitt, or other object. The tender also must control the diver's rate of descent by keeping excess slack out of the umbilical, and track the diver's relative position by continuously monitoring the tautness and location of the umbilical, direction and movement of surface bubbles, and the diver's depth (by using a pneumofathometer). Throughout the dive, the tender must keep slack out of the umbilical while at the same time holding it taut, but not so taut as to interfere with the ability of the diver to work. Two or three feet of slack will permit the diver freedom of movement, while preventing the diver from being pulled off his/her feet by surging of the support craft or the force of any current acting on the umbilical. Occasionally, the tender should "fish" the diver by drawing in gently on the short slack until the tender senses the weight of the diver, and then pay out several feet of slack to the diver. This procedure ensures that movement by the diver has not resulted in excessive slack. (See NOTE below for hull-scrubbing operations.) Too much slack in the line will make signaling difficult, hinder the tender from catching a falling diver, and increase the possibility of fouling the umbilical. When the diver is underwater, umbilical line-pull signals are the only communications link with the diver if the intercom fails; therefore, the tender must always hold the diver's umbilical firmly with at least one hand to receive the line-pull signals.

NOTE: During hull-scrubbing operations, a diver typically operates a hydraulic or high-pressure water-blasting machine to remove marine growth. If a tender was to "fish" for the diver and pull the diver away from the hull or the equipment, then severe injury could occur. Also during hull-scrubbing operations, it is common for the diver's air hose and umbilical to be married to the lines of the hull-scrubbing equipment. This arrangement results in an extremely heavy umbilical that may not be practical for a tender to manipulate by hand. However, a tender still needs to remain on station at the dive location to "keep an eye" on the diver by monitoring air bubbles and ensuring that the umbilical does not get fouled or snagged. In addition, the tender needs to be aware of surface hazards such as a crane working nearby and any surface traffic (e.g., boats or debris) that could affect the diver.

- When appropriate, the tender should make use of umbilical-management techniques to ensure diver safety. Some techniques include: (1) the location of the tender, and (2) limiting the scope of umbilical that can be paid out to the diver. For example, a diver is tasked with cleaning the trash racks at a dam with four upstream gates. Assume the trash rack at Gate No. 1 (i.e., the westernmost gate) was recently cleaned and must remain open to allow flow through the dam. To ensure the safety of the diver, the tender should first locate himself/herself at a point away from the water flow (i.e., Gate No. 4 – the easternmost gate). Secondly, the tender should determine the maximum length of umbilical the diver will need to reach Gate No. 2. The tender should then devise a positive means to ensure the diver's umbilical does not exceed that maximum length. This action will prevent the diver from reaching the dangerous area near Gate No. 1, which may have significant water current.
- To detect a diver's line-pull signals during the dive, the tender must monitor the umbilical using at least one hand, and monitor by sight any descending line or marker buoy used by the diver. As directed by the DPIC, the tender communicates with the diver using the diver's intercom. Periodically, the tender should seek a "Diver okay" acknowledgement from the

diver by voice communication or by using line-pull signals (such as sending the diver one line-pull signal and receiving one line-pull signal). Line-pull signals consist of a series of sharp, distinct pulls, strong enough for the diver or tender to detect, but not so strong as to pull the diver away from his/her work. When communications are lost with the diver via the intercom (such as a bad connection or flooded mask), line-pull signals provide the only available communications with the diver; therefore, line-pull signals must be maintained continuously during the dive by keeping at least one hand on the umbilical. In the event that a diver does not respond to any voice or line-pull signal communications, it should be repeated. If the diver still does not respond to voice or line-pull signal communications, or responds incorrectly, the DPIC shall terminate the dive as required by 29 CFR 1910.422(i).

- Throughout the dive, the tender constantly monitors the diver's progress and keeps track of the diver's relative position by:
  - Watching and tracking the diver's exhaust bubbles. For example, bubbles surfacing in a single location indicate that the diver is working in place, while bubbles moving in a regular pattern indicate that the diver is searching the bottom. Bubbles moving rapidly in a straight line in one direction could mean that the diver has fallen.
  - Using his/her hands to monitor the line-pull signals on the umbilical (discussed above).
  - Watching the pneumofathometer pressure gauge to keep track of the operating depth. The gauge provides a direct reading (without the need to add air to the gauge) when the diver remains at a constant depth or ascends. However, when the diver descends, the pneumofathometer hose must be cleared by adding air before making a new reading.
  - Monitoring the gauges on powered equipment and other cues. For example, the ammeter on an electric-welding unit indicates a power drain when the arc is in use, and the gas-pressure gauges for a gas torch will register fuel flow. Additionally, the "pop" made by a gas torch being lighted probably will be audible over the diver intercom, and bubbles from the torch will break on the surface, releasing small quantities of smoke.
  - Detecting vibrations in the air-powered lines of pneumatic tools.
- The tender must monitor the diver's activity continually. For example, if the tender is near the communications box, then he/she can frequently evaluate the diver's exertion by counting the number of breaths the diver takes per minute. In this regard, experienced tenders know the diver's normal breathing rate. A significant increase in the diver's breathing rate may indicate an over-exertion situation. When necessary, the tender advises the DPIC to stop the diver's work, allow the diver to rest, and ventilate the diver's mask or helmet. A tender also could monitor and evaluate the diver's exertion based on when, and how frequently, the diver activates the free flow of the mask or helmet.
- When the diver leaves the bottom, he/she notifies topside by voice (e.g., "Leaving the bottom") via the diver's intercom with the DPIC or the dive-team member assigned as the diver's phone-talker, and by line-pull signals with the tender. The tender then notifies the DPIC that the diver has left the bottom. During surfacing, the tender closely monitors and tends the diver's umbilical as the diver ascends, and helps control the rate of ascent as directed by the DPIC.
- When the dive is complete and the diver is ready to leave the water, the tender: assists the diver to the water-exit point (such as an inwater stage, ladder, ramp); keeps excess slack out

of the umbilical while the diver is lifted by stage to the deck; maintains a taut-tension on the umbilical while the diver climbs the ladder; and provides assistance as requested by the diver when the diver exits by other means. When the diver returns to the dive location, the tender always keeps one hand on the umbilical close to the diver and one hand on the diver's helmet or body harness (i.e., positive control of the diver) while assisting the diver to the derigging/undressing area.

### **Additional Duties of a Diver Tender**

Other duties that are commonly assigned to the diver tender during commercial diving operations include:

- As directed by the DPIC, assemble and test the diving equipment (such as an air compressor, high-pressure cylinders, umbilical assembly, diver-worn equipment, communications equipment, non-return valves on diver's masks or helmets) and related support equipment (such as a welding generator and equipment, or cutting equipment).
- When no decompression chamber is at the diving station and the DPIC so directs, contact the nearest operational decompression-chamber facility to verify and confirm chamber availability and other contact information. Available modes of transportation must be identified, and a route from the dive location to the chamber should be mapped out.
- When a decompression chamber is available at the diving station, and as directed by the DPIC, ensure that the decompression chamber is clean, properly outfitted, and ready for use.
- Assist in topside work as required, or as specifically directed by the DPIC, during the dive (such as lower or retrieve tools and equipment for the diver, bleed moisture from diver's air-supply volume tank).

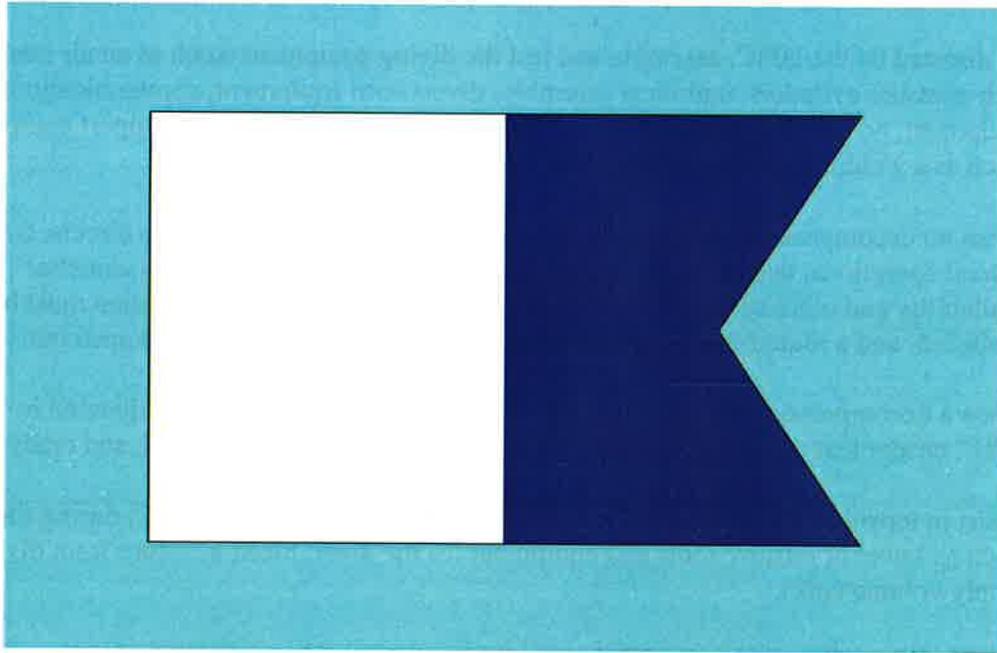
NOTE: When directed by the DPIC to perform other specific tasks while the diver is underwater, the tender must be able to continuously tend the diver while performing the tasks. If not, the tender must be relieved properly as the tender by another dive-team member. The DPIC is allowed to relieve the tender and perform the tender's duties for short periods of time while the tender performs the assigned tasks.

- Perform routine maintenance and repair of diving equipment as directed by the DPIC.
- When qualified, and as directed by the DPIC, operate a decompression chamber for surface decompression or emergency treatment.

## APPENDIX F: International Code Flag “A” (“Alpha” Flag)

29 CFR 1910.421(h) *Warning signal*. When diving from surfaces other than vessels in areas capable of supporting marine traffic, a rigid replica of the international code flag “A” at least one meter (3’-3½”) in height shall be displayed at the dive location in a manner which allows all-round visibility, and shall be illuminated during night diving operations.

**International Code Flag “A”:** Alfa;  
Diver below (when stationary);  
Keep clear.



**Color: White and Blue (notched portion)**



NOTE: The red flag with a white diagonal stripe commonly used by recreational SCUBA divers does not satisfy the 29 CFR 1910.421(h) requirements. However, it can be used in addition to the “Alfa” flag to alert others who are familiar with the recreational SCUBA diving flag (e.g., recreational divers and boaters).

## APPENDIX G: OSHA Injury and Illness Reporting and Recordkeeping

**REPORTING.** Under [29 CFR 1904.39](#) *Reporting fatalities and multiple hospitalization incidents to OSHA*, employers are required to report any occupational fatality or incident involving inpatient hospitalization of three (3) or more employees within eight (8) hours of the incident. The report must include the following information: company name; location and time of the incident; number of fatalities or hospitalized employees; contact person for the company; phone number(s) for the company contact person; and a brief description of the incident.

NOTE: States operating under OSHA-approved safety and health plans have injury and illness recordkeeping and reporting regulations comparable to those of Federal OSHA (for the names of these States, see the section titled *Federal and State Authority* in [Appendix B](#) of this instruction). State Plans may have different rules covering recordkeeping exemptions (see the section titled *Recordkeeping* below), procedures for reporting of fatalities and hospitalizations, record retention, and other procedural requirements. Employers conducting activities within a State-Plan State must comply with the requirements of that State Plan, and must report fatalities and multiple injuries to the appropriate State agency.

Reporting is required by employers who have employees aboard vessels (such as ships and barges), or on off-shore oil rigs and platforms, when such vessels or rigs and platforms are located on or within U.S. navigable waterways and State territorial seas.

- State territorial seas extend three (3) nautical miles from the general coastline for all States and U.S. Territories except: Texas, Puerto Rico, and the Gulf Coast of Florida, which extend nine (9) nautical miles from the general coastline; and the Great Lakes and St. Lawrence Seaway States where the U.S. Inland “navigable waters” include all waters up to the international boundary line with Canada.
- Reporting to OSHA is required when the incident occurs within OSHA’s authority, regardless of which federal agency regulates the working conditions.
- Determination of geographical authority shall be based on the location of the employee at the time of the incident.
- Exemptions from fatality and multiple-hospitalization reporting do not exist. Although exemptions apply for some illness and injury recordkeeping requirements (such as employers with 10 or fewer employees, and “low-hazard” industries), these exemptions do not apply to the requirement to report fatality and multi-hospitalization incidents to OSHA.
- Employers must report fatalities and multiple hospitalizations by telephone or in person to the nearest OSHA Area Office, or by using OSHA’s toll-free hotline at 1-800-321-OSHA. The caller making the accident report must talk directly to a person at OSHA (i.e., they cannot leave a message on the phone, send a fax, or send an e-mail).

**RECORDKEEPING.** Employers, including employers covered by [29 CFR Part 1910](#), Subpart T, must establish and retain the employee illness and injury records required by [29 CFR Part 1904](#). As specified by 29 CFR 1904.31, employees include temporary employees (such as

employees hired from temporary-employment agencies or leasing companies) who are not on an employer's payroll, but whom the employer supervises on a day-to-day basis.

OSHA exempts the following employers from some of these illness and injury recordkeeping requirements: (1) employers who had no more than 10 employees (including temporary employees) at any time during the last calendar year (see 29 CFR 1904.1); or (2) employers classified in "low-hazard" industries specified by 29 CFR 1904.2. Nevertheless, even these exempted employers must comply with the following recordkeeping requirements:

- Under 29 CFR 1904.39, report any work-related fatality or the inpatient hospitalization of three (3) or more employees resulting from a single work-related incident; and
- Maintain a log of occupational injuries and illnesses under 29 CFR Part 1904, and make reports under 29 CFR 1904.41 and 1904.42, upon being notified in writing by OSHA or the U.S. Bureau of Labor Statistics of having been selected to participate in a survey of occupational injuries and illnesses.

**DIVING INDUSTRY REPORTING AND RECORDKEEPING.** The North American Industrial Classification System (NAICS) Code for "Diving Services on a Contract or Fee Basis" is 561990 (previously SIC 7389). This classification is part of NAICS Code 56199 "All Other Support Services," which is defined as a "low-hazard" industry. Therefore, a diving company with a primary NAICS Code 561990 is exempted from most OSHA recordkeeping requirements under 29 CFR 1904.2 (NOTE: Minnesota and Puerto Rico do not allow this "low-hazard" industry exemption). A company that performs diving, but has multiple NAICS Codes and is classified under a primary NAICS Code other than 561990, will be subject to all OSHA recordkeeping requirements if not covered by an exemption (such as employs 10 or fewer employees, or is in a "low-hazard" industry). The primary NAICS Code is defined as the major work function or process performed by the establishment. OSHA may challenge the company's assignment of a primary NAICS Code if it appears that such an NAICS Code assignment was made erroneously or arbitrarily.

For diving companies under primary NAICS Code 561990, the following reporting and recordkeeping requirements apply:

- Must report to OSHA within eight (8) hours any work-related accident, occurring within OSHA's geographical authority that results in a fatality or the hospitalization of three (3) or more employees.
- Must comply with the requirements of 29 CFR 1903.2 *Posting of notice; availability of the Act, regulations and applicable standards.*
- Must comply with the recordkeeping requirements of 29 CFR 1910.1020 *Access to employee exposure and medical records* (in 1996, 29 CFR 1910.20 was redesignated as 29 CFR 1910.1020).
- Must comply with any recordkeeping and reporting requirements specified by other OSHA occupational safety and health standards (such as the recordkeeping requirements specified

by 29 CFR Part 1910, Subpart T – Commercial Diving Operations).

- If notified by OSHA in writing, must participate in OSHA's Annual Occupational Injury and Illness Survey. Participation in this survey involves maintaining a log of occupational injuries and illnesses under 29 CFR 1904.4 (OSHA 300 Log), and making reports under 29 CFR 1904.41.
- If the employer receives a Survey of Occupational Injuries and Illnesses Form from the Bureau of Labor Statistics (BLS), or a BLS designee, the employer must promptly complete the form and return it following the instructions contained on the survey form and as specified by 29 CFR 1904.42.

For diving companies under primary NAICS Code 561990, the following reporting and recordkeeping requirements do not apply:

- Requirement as per 29 CFR 1904.4 to maintain a log and summary of all recordable occupational injuries and illnesses at each of its establishments (OSHA 300 Log, or equivalent).
- Requirement as per 29 CFR 1904.29 to complete a supplemental record for each occupational injury or illness that occurs at each of its establishments (OSHA 301 Incident Report, or equivalent).
- Requirement as per 29 CFR 1904.29 to post an annual summary of occupational injuries and illnesses for each of its establishments.

## APPENDIX H: Comparison of Requirements for the Primary Diving Modes

Symbols:			
knot = 1 nautical mile per hour      fsw = feet of sea water      < = less			
thanno-D = no-decompression limits      DPIC = Designated Person In Charge      > = greater than			
>no-D = decompression required			
Requirements	SCUBA	Surface-supplied Air	Mixed-Gas
Limits	Maximum depth = 130 fsw; >1 knot, then line-tended; enclosed space, then line-tended.	Maximum depth = 190 fsw; except for dives <30 minutes, may dive up to 220 fsw.	Not applicable.
Tender	Either line-tended from surface or by another diver in continual visual contact.	Continually tended at all depths; 1 tender per diver when >100 fsw or >no-D.	1 tender per diver. 1 diver in bell as tender.
Standby	Yes	>100 fsw or >no-D.	Yes
Diver-Carried Reserve	Yes (manual reserve or independent reserve cylinder).	>100 fsw or >no-D. No direct ascent (except heavy gear and no space).	>100 fsw or >no-D. No direct ascent (except heavy gear and no space).
Dive-Location Reserve	Not applicable.	>100 fsw or >no-D.	Yes
Inwater Stage	Not applicable.	Heavy gear.	Heavy gear >100 fsw or >no-D (if no bell).
Chamber	>100 fsw or >no-D.	>100 fsw or >no-D.	Yes
Bell	Not applicable.	Open or closed bell >120 minutes (except heavy gear and confined space).	Open or closed bell >220 fsw or >120 minutes (except heavy gear and confined space). Closed bell >300 fsw (except confined space).
Communications	Emergency assistance.	Emergency assistance. Between diver and dive location, diver and bell, bell and dive location.	Emergency assistance. Between diver and dive location, diver and bell, bell and dive location.
Miscellaneous	Diver at point of confined space entry. Require DPIC.	Diver at point of confined space entry. For heavy gear need extra hose at dive location. Require DPIC.	Diver at point of confined space entry. For heavy gear need extra hose at dive location. Require DPIC.

## APPENDIX I: Checklist for Commercial Diving Operations

This checklist consists of the 29 CFR Part 1910, Subpart T standards (verbatim) in a matrix format. The checklist can be used “as is” or copied into a Word® document and tailored for a specific inspection by deleting unnecessary paragraphs. For example, if the diving operation only involves SCUBA diving, then paragraphs such as 1910.425 *Surface-supplied air diving*; 1910.426 *Mixed-gas diving*; and 1910.427 *Liveboating*, can be deleted. As a Word® document, the column widths can be adjusted and the user has the option of selecting a “landscape” or “portrait” layout.

	<b>1910.410 QUALIFICATIONS OF DIVE TEAM.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b>	
	(1) Each dive-team member shall have the experience or training necessary to perform assigned tasks in a safe and healthful manner.	
	(2) Each dive-team member shall have experience or training in the following: (i) The use of tools, equipment and systems relevant to assigned tasks; (ii) Techniques of the assigned diving mode; and (iii) Diving operations and emergency procedures.	
	(3) All dive-team members shall be trained in cardiopulmonary resuscitation and first aid (American Red Cross standard course or equivalent).	
	(4) Dive-team members who are exposed to or control the exposure of others to hyperbaric conditions shall be trained in diving-related physics and physiology.	
	<b>(b) Assignments.</b>	
	(1) Each dive-team member shall be assigned tasks in accordance with the employee's experience or training, except that limited additional tasks may be assigned to an employee undergoing training provided that these tasks are performed under the direct supervision of an experienced dive-team member.	
	(2) The employer shall not require a dive-team member to be exposed to hyperbaric conditions against the employee's will, except when necessary to complete decompression or treatment procedures.	
	(3) The employer shall not permit a dive-team member to dive or be otherwise exposed to hyperbaric conditions for the duration of any temporary physical impairment or condition which is known to the employer and is likely to affect adversely the safety or health of a dive-team member.	
	<b>(c) Designated person-in-charge.</b>	
	(1) The employer or an employee designated by the employer shall be at the dive location in charge of all aspects of the diving operation affecting the safety and health of dive-team members.	
	(2) The designated person-in-charge shall have experience and training in the conduct of the assigned diving operation.	
	<b>1910.420 SAFE PRACTICES MANUAL.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b> The employer shall develop and maintain a safe practices manual which shall be made available at the dive location to each dive-team member.	
	(1) The safe practices manual shall contain a copy of this standard and	

	the employer's policies for implementing the requirements of this standard [29 CFR Part 1910, Subpart T].	
	(2) For each diving mode engaged in, the safe practices manual shall include: (i) Safety procedures and checklists for diving operations; (ii) Assignments and responsibilities of the dive-team members; (iii) Equipment procedures and checklists; and (iv) Emergency procedures for fire, equipment failure, adverse environmental conditions, and medical illness and injury.	

	<b>1910.421 PRE-DIVE PROCEDURES.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b> The employer shall comply with the following requirements prior to each diving operation, unless otherwise specified.	
	<b>(b) Emergency aid.</b> A list shall be kept at the dive location of the telephone or call numbers of the following:	
	(1) An operational decompression chamber (if not at the dive location);	
	(2) Accessible hospitals;	
	(3) Available physicians;	
	(4) Available means of transportation; and	
	(5) The nearest U.S. Coast Guard Rescue Coordination Center.	
	<b>(c) First aid supplies.</b>	
	(1) A first aid kit appropriate for the diving operation and approved by a physician shall be available at the dive location.	
	(2) When used in a decompression chamber or bell, the first aid kit shall be suitable for use under hyperbaric conditions.	
	(3) In addition to any other first aid supplies, an American Red Cross standard first aid handbook or equivalent, and a bag-type manual resuscitator with transparent mask and tubing shall be available at the dive location.	
	<b>(d) Planning and assessment.</b> Planning of a diving operation shall include an assessment of the safety and health aspects of the following:	
	(1) Diving mode;	
	(2) Surface and underwater conditions and hazards;	
	(3) Breathing-gas supply (including reserves);	
	(4) Thermal protection;	
	(5) Diving equipment and systems;	
	(6) Dive-team assignments and physical fitness of dive-team members (including any impairments known to the employer);	
	(7) Repetitive dive designation or residual inert-gas status of dive-team members;	
	(8) Decompression and treatment procedures (including altitude corrections); and	
	(9) Emergency procedures.	
	<b>(e) Hazardous activities.</b> To minimize hazards to the dive-team, diving operations shall be coordinated with other activities in the vicinity which are likely to interfere with the diving operation.	
	<b>(f) Employee briefing.</b>	
	(1) Dive-team members shall be briefed on: (i) The tasks to be undertaken; (ii) Safety procedures for the diving mode; (iii) Any unusual hazards or environmental conditions likely to affect the safety of the diving operation; and (iv) Any modifications to operating procedures necessitated by the specific diving operation.	

	(2) Prior to making individual dive-team member assignments, the employer shall inquire into the dive-team member's current state of physical fitness, and indicate to the dive-team member the procedure for reporting physical problems or adverse physiological effects during and after the dive.	
	<b>(g) Equipment inspection.</b> The breathing-gas supply system including reserve breathing-gas supplies, masks, helmets, thermal protection, and bell handling mechanism (when appropriate) shall be inspected prior to each dive.	
	<b>(h) Warning signal.</b> When diving from surfaces other than vessels in areas capable of supporting marine traffic, a rigid replica of the international code flag "A" at least one meter in height shall be displayed at the dive location in a manner which allows all-round visibility, and shall be illuminated during night diving operations.	

	<b>1910.422 PROCEDURES DURING DIVE.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b> The employer shall comply with the following requirements which are applicable to each diving operation unless otherwise specified.	
	<b>(b) Water entry and exit.</b>	
	(1) A means capable of supporting the diver shall be provided for entering and exiting the water.	
	(2) The means provided for exiting the water shall extend below the water surface.	
	(3) A means shall be provided to assist an injured diver from the water or into a bell.	
	<b>(c) Communications.</b>	
	(1) An operational two-way voice communication system shall be used between:	
	(i) Each surface-supplied air or mixed-gas diver and a dive-team member at the dive location or bell (when provided or required); and	
	(ii) The bell and the dive location.	
	(2) An operational, two-way communication system shall be available at the dive location to obtain emergency assistance.	
	<b>(d) Decompression tables.</b> Decompression, repetitive, and no-decompression tables (as appropriate) shall be at the dive location.	
	<b>(e) Dive profiles.</b> A depth-time profile, including when appropriate any breathing-gas changes, shall be maintained for each diver during the dive including decompression.	
	<b>(f) Hand-held power tools and equipment.</b>	
	(1) Hand-held electrical tools and equipment shall be de-energized before being placed into or retrieved from the water.	
	(2) Hand-held power tools shall not be supplied with power from the dive location until requested by the diver.	
	<b>(g) Welding and burning.</b>	
	(1) A current supply switch to interrupt the current flow to the welding or burning electrode shall be:	
	(i) Tended by a dive-team member in voice communication with the diver performing the welding or burning.	
	(ii) Kept in the open position except when the diver is welding or burning.	
	(2) The welding machine frame shall be grounded.	
	(3) Welding and burning cables, electrode holders, and connections shall be capable of carrying the maximum current required by the work, and shall be properly insulated.	
	(4) Insulated gloves shall be provided to divers performing welding and	

	burning operations.	
	(5) Prior to welding or burning on closed compartments, structures or pipes, which contain a flammable vapor or in which a flammable vapor may be generated by the work, they shall be vented, flooded, or purged with a mixture of gases which will not support combustion.	
	<b>(h) Explosives.</b>	
	(1) Employers shall transport, store, and use explosives in accordance with this section and the applicable provisions of 29 CFR 1910.109 and 29 CFR 1926.912.	
	(2) Electrical continuity of explosive circuits shall not be tested until the diver is out of the water.	
	(3) Explosives shall not be detonated while the diver is in the water.	
	<b>(i) Termination of dive.</b> The working interval of a dive shall be terminated when:	
	(1) A diver requests termination;	
	(2) A diver fails to respond correctly to communications or signals from a dive-team member;	
	(3) Communications are lost and cannot be quickly re-established between the diver and a dive-team member at the dive location, and between the designated person-in-charge and the person controlling the vessel in liveboating operations; or	
	(4) A diver begins to use diver-carried reserve breathing gas or the dive-location reserve breathing gas.	

	<b>1910.423 POST-DIVE PROCEDURES.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b> The employer shall comply with the following requirements which are applicable after each diving operation, unless otherwise specified.	
	<b>(b) Precautions.</b>	
	(1) After the completion of any dive, the employer shall: (i) Check the physical condition of the diver; (ii) Instruct the diver to report any physical problems or adverse physiological effects including symptoms of decompression sickness; (iii) Advise the diver of the location of a decompression chamber which is ready for use; and (iv) Alert the diver to the potential hazards of flying after diving.	
	(2) For any dive outside the no-decompression limits, deeper than 100 fsw or using mixed-gas as a breathing mixture, the employer shall instruct the diver to remain awake and in the vicinity of the decompression chamber which is at the dive location for at least one hour after the dive (including decompression or treatment as appropriate).	
	<b>(c) Recompression capability.</b>	
	(1) A decompression chamber capable of recompressing the diver at the surface to a minimum of 165 fsw (6 ATA) shall be available at the dive location for: (i) Surface-supplied air diving to depths deeper than 100 fsw and shallower than 220 fsw; (ii) Mixed-gas diving shallower than 300 fsw; or (iii) Diving outside the no-decompression limits shallower than 300 fsw.	
	(2) A decompression chamber capable of recompressing the diver at the surface to the maximum depth of the dive shall be available at the dive location for dives deeper than 300 fsw.	
	(3) The decompression chamber shall be:	

	(i) Dual-lock; (ii) Multi-place; and (iii) Located within 5 minutes of the dive location.	
	(4) The decompression chamber shall be equipped with: (i) A pressure gauge for each pressurized compartment designed for human occupancy; (ii) A built-in-breathing-system with a minimum of one mask per occupant; (iii) A two-way voice communication system between occupants and a dive-team member at the dive location; (iv) A viewport; and (v) Illumination capability to light the interior.	
	(5) Treatment tables, treatment gas appropriate to the diving mode, and sufficient gas to conduct treatment shall be available at the dive location.	
	(6) A dive-team member shall be available at the dive location during and for at least one hour after the dive to operate the decompression chamber (when required or provided).	
	<b>(d) Record of dive.</b>	
	(1) The following information shall be recorded and maintained for each diving operation: (i) Names of dive-team members including the designated person-in-charge; (ii) Date, time, and location; (iii) Diving modes used; (iv) General nature of work performed; (v) Approximate underwater and surface conditions (visibility, water temperature and current); and (vi) Maximum depth and bottom time for each diver.	
	(2) For each dive outside the no-decompression limits, deeper than 100 fsw or using mixed-gas, the following additional information shall be recorded and maintained: (i) Depth-time and breathing-gas profiles; (ii) Decompression table designation (including modification); and (iii) Elapsed time since last pressure exposure if less than 24 hours or repetitive dive designation for each diver.	
	(3) For each dive in which decompression sickness is suspected or symptoms are evident, the following additional information shall be recorded and maintained: (i) Description of decompression sickness symptoms (including depth and time of onset); and (ii) Description and results of treatment.	
	<b>(e) Decompression procedure assessment.</b> The employer shall:	
	(1) Investigate and evaluate each incident of decompression sickness based on the recorded information, consideration of the past performance of the decompression table used, and individual susceptibility;	
	(2) Take appropriate corrective action to reduce the probability of recurrence of decompression sickness; and	
	(3) Prepare a written evaluation of the decompression procedure assessment, including any corrective action taken, within 45 days of the incident of decompression sickness.	
	<b>1910.424 SCUBA DIVING.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b> Employers engaged in SCUBA diving shall comply with the following requirements, unless otherwise specified.	

	<b>(b) Limits.</b> SCUBA diving shall not be conducted:	
	(1) At depths deeper than 130 fsw;	
	(2) At depths deeper than 100 fsw or outside the no-decompression limits unless a decompression chamber is ready for use;	
	(3) Against currents exceeding one (1) knot unless line-tended; or	
	(4) In enclosed or physically confining spaces unless line-tended.	
	<b>(c) Procedures.</b>	
	(1) A standby diver shall be available while a diver is in the water.	
	(2) A diver shall be line-tended from the surface, or accompanied by another diver in the water in continuous visual contact during the diving operation.	
	(3) A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.	
	(4) A diver-carried reserve breathing-gas supply shall be provided for each diver consisting of: (i) A manual reserve (J-valve); or (ii) An independent reserve cylinder with a separate regulator or connected to the underwater breathing apparatus.	
	(5) The valve of the reserve breathing-gas supply shall be in the closed position prior to the dive. [For a J-valve, this is the up position.]	

	<b>1910.425 SURFACE-SUPPLIED AIR DIVING.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b> Employers engaged in surface-supplied air diving shall comply with the following requirements, unless otherwise specified.	
	<b>(b) Limits.</b>	
	(1) Surface-supplied air diving shall not be conducted at depths deeper than 190 fsw, except that dives with bottom times of 30 minutes or less may be conducted to depths of 220 fsw.	
	(2) A decompression chamber shall be ready for use at the dive location for any dive outside the no-decompression limits or deeper than 100 fsw.	
	(3) A bell shall be used for dives with an inwater decompression time greater than 120 minutes, except when heavy gear is worn or diving is conducted in physically confining spaces.	
	<b>(c) Procedures.</b>	
	(1) Each diver shall be continuously tended while in the water.	
	(2) A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.	
	(3) Each diving operation shall have a primary breathing-gas supply sufficient to support divers for the duration of the planned dive including decompression.	
	(4) For dives deeper than 100 fsw or outside the no-decompression limits: (i) A separate dive-team member shall tend each diver in the water; (ii) A standby diver shall be available while a diver is in the water; (iii) A diver-carried reserve breathing-gas supply shall be provided for each diver except when heavy gear is worn; and (iv) A dive-location reserve breathing-gas supply shall be provided.	
	(5) For heavy gear diving deeper than 100 fsw or outside the no-decompression limits: (i) An extra breathing-gas hose capable of supplying breathing gas to the diver in the water shall be available to the standby diver. (ii) An inwater stage shall be provided to divers in the water.	
	(6) Except when heavy gear is worn or where physical space does not permit, a diver-carried reserve breathing-gas supply shall be provided	

	whenever the diver is prevented by the configuration of the dive area from ascending directly to the surface.	
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	<b>1910.426 MIXED-GAS DIVING.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b> Employers engaged in mixed-gas diving shall comply with the following requirements, unless otherwise specified.	
	<b>(b) Limits.</b> Mixed-gas diving shall be conducted only when:	
	(1) A decompression chamber is ready for use at the dive location; and	
	(i) A bell is used at depths greater than 220 fsw or when the dive involves inwater decompression time of greater than 120 minutes, except when heavy gear is worn or when diving in physically confining spaces; or	
	(ii) A closed bell is used at depths greater than 300 fsw, except when diving is conducted in physically confining spaces.	
	<b>(c) Procedures.</b>	
	(1) A separate dive-team member shall tend each diver in the water.	
	(2) A standby diver shall be available while a diver is in the water.	
	(3) A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.	
	(4) Each diving operation shall have a primary breathing-gas supply sufficient to support divers for the duration of the planned dive including decompression.	
	(5) Each diving operation shall have a dive-location reserve breathing-gas supply.	
	(6) When heavy gear is worn:	
	(i) An extra breathing-gas hose capable of supplying breathing gas to the diver in the water shall be available to the standby diver; and	
	(ii) An inwater stage shall be provided to divers in the water.	
	(7) An inwater stage shall be provided for divers without access to a bell for dives deeper than 100 fsw or outside the no-decompression limits.	
	(8) When a closed bell is used, one dive-team member in the bell shall be available and tend the diver in the water.	
	(9) Except when heavy gear is worn or where physical space does not permit, a diver-carried reserve breathing-gas supply shall be provided for each diver:	
	(i) Diving deeper than 100 fsw or outside the no-decompression limits; or	
	(ii) Prevented by the configuration of the dive area from directly ascending to the surface.	

	<b>1910.427 LIVEBOATING.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b> Employers engaged in diving operations involving liveboating shall comply with the following requirements.	
	<b>(b) Limits.</b> Diving operations involving liveboating shall not be conducted:	
	(1) With an inwater decompression time of greater than 120 minutes;	
	(2) Using surface-supplied air at depths deeper than 190 fsw, except that dives with bottom times of 30 minutes or less may be conducted to depths of 220 fsw;	
	(3) Using mixed-gas at depths greater than 220 fsw;	
	(4) In rough seas which significantly impede diver mobility or work function; or	
	(5) In other than daylight hours.	
	<b>(c) Procedures.</b>	
	(1) The propeller of the vessel shall be stopped before the diver enters or	

	exits the water.	
	(2) A device shall be used which minimizes the possibility of entanglement of the diver's hose in the propeller of the vessel.	
	(3) Two-way voice communication between the designated person-in-charge and the person controlling the vessel shall be available while the diver is in the water.	
	(4) A standby diver shall be available while a diver is in the water.	
	(5) A diver-carried reserve breathing-gas supply shall be carried by each diver engaged in liveboating operations.	

	<b>1910.430 EQUIPMENT.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) General.</b>	
	(1) All employers shall comply with the following requirements, unless otherwise specified.	
	(2) Each equipment modification, repair, test, calibration or maintenance service shall be recorded by means of a tagging or logging system, and include the date and nature of work performed, and the name or initials of the person performing the work.	
	<b>(b) Air compressor system.</b>	
	(1) Compressors used to supply air to the diver shall be equipped with a volume tank with a check valve on the inlet side, a pressure gauge, a relief valve, and a drain valve.	
	(2) Air compressor intakes shall be located away from areas containing exhaust or other contaminants.	
	(3) Respirable air supplied to a diver shall not contain: (i) A level of carbon monoxide (CO) greater than 20 ppm; (ii) A level of carbon dioxide (CO <sub>2</sub> ) greater than 1,000 ppm; (iii) A level of oil mist greater than 5 milligrams per cubic meter; or (iv) A noxious or pronounced odor.	
	(4) The output of air compressor systems shall be tested for air purity every 6 months by means of samples taken at the connection to the distribution system, except that non-oil lubricated compressors need not be tested for oil mist.	
	<b>(c) Breathing-gas supply hoses.</b>	
	(1) Breathing-gas supply hoses shall: (i) Have a working pressure at least equal to the working pressure of the total breathing-gas system; (ii) Have a rated bursting pressure at least equal to 4 times the working pressure; (iii) Be tested at least annually to 1.5 times their working pressure; and (iv) Have their open ends taped, capped or plugged when not in use.	
	(2) Breathing-gas supply hose connectors shall: (i) Be made of corrosion-resistant materials; (ii) Have a working pressure at least equal to the working pressure of the hose to which they are attached; and (iii) Be resistant to accidental disengagement.	
	(3) Umbilicals shall: (i) Be marked in 10-foot increments to 100 feet beginning at the diver's end, and in 50-foot increments thereafter; (ii) Be made of kink-resistant materials; and (iii) Have a working pressure greater than the pressure equivalent to the maximum depth of the dive (relative to the supply source) plus 100 psi.	
	<b>(d) Buoyancy control.</b>	
	(1) Helmets or masks connected directly to the dry suit or other	

	buoyancy-changing equipment shall be equipped with an exhaust valve.	
	(2) A dry suit or other buoyancy-changing equipment not directly connected to the helmet or mask shall be equipped with an exhaust valve.	
	(3) When used for SCUBA diving, a buoyancy compensator shall have an inflation source separate from the breathing-gas supply.	
	(4) An inflatable flotation device capable of maintaining the diver at the surface in a face-up position, having a manually activated inflation source independent of the breathing supply, an oral inflation device, and an exhaust valve shall be used for SCUBA diving.	
	<b>(e) Compressed gas cylinders.</b> Compressed gas cylinders shall:	
	(1) Be designed, constructed and maintained in accordance with the applicable provisions of 29 CFR 1910.101 and 1910.169 through 1910.171;	
	(2) Be stored in a ventilated area and protected from excessive heat;	
	(3) Be secured from falling; and	
	(4) Have shut-off valves recessed into the cylinder or protected by a cap, except when in use or manifolded, or when used for SCUBA diving.	
	<b>(f) Decompression chambers.</b>	
	(1) Each decompression chamber manufactured after the effective date of this standard, shall be built and maintained in accordance with the ASME Code or equivalent.	
	(2) Each decompression chamber manufactured prior to the effective date of this standard shall be maintained in conformity with the code requirements to which it was built, or equivalent.	
	(3) Each decompression chamber shall be equipped with:	
	(i) Means to maintain the atmosphere below a level of 25 percent oxygen by volume;	
	(ii) Mufflers on intake and exhaust lines, which shall be regularly inspected and maintained;	
	(iii) Suction guards on exhaust line openings; and	
	(iv) A means for extinguishing fire, and shall be maintained to minimize sources of ignition and combustible material.	
	<b>(g) Gauges and timekeeping devices.</b>	
	(1) Gauges indicating diver depth which can be read at the dive location shall be used for all dives except SCUBA.	
	(2) Each depth gauge shall be dead-weight tested or calibrated against a master reference gauge every 6 months, and when there is a discrepancy greater than two percent (2 percent) of full scale between any two equivalent gauges.	
	(3) A cylinder pressure gauge capable of being monitored by the diver during the dive shall be worn by each SCUBA diver.	
	(4) A timekeeping device shall be available at each dive location.	
	<b>(h) Masks and helmets.</b>	
	(1) Surface-supplied air and mixed-gas masks and helmets shall have:	
	(i) A non-return valve at the attachment point between helmet or mask and hose which shall close readily and positively; and	
	(ii) An exhaust valve.	
	(2) Surface-supplied air masks and helmets shall have a minimum ventilation rate capability of 4.5 acfm at any depth at which they are operated or the capability of maintaining the diver's inspired carbon dioxide partial pressure below 0.02 ATA when the diver is producing carbon dioxide at the rate of 1.6 standard liters per minute.	
	<b>(i) Oxygen safety.</b>	

	(1) Equipment used with oxygen or mixtures containing over forty percent (40%) by volume oxygen shall be designed for oxygen service.	
	(2) Components (except umbilicals) exposed to oxygen or mixtures containing over forty percent (40%) by volume oxygen shall be cleaned of flammable materials before use.	
	(3) Oxygen systems over 125 psig and compressed air systems over 500 psig shall have slow-opening shut-off valves.	
	<b>(j) Weights and harnesses.</b>	
	(1) Except when heavy gear is worn, divers shall be equipped with a weight belt or assembly capable of quick release.	
	(2) Except when heavy gear is worn or in SCUBA diving, each diver shall wear a safety harness with: (i) A positive buckling device; (ii) An attachment point for the umbilical to prevent strain on the mask or helmet; and (iii) A lifting point to distribute the pull force of the line over the diver's body.	

	<b>1910.440 RECORDKEEPING REQUIREMENTS.</b>	<b>Comments/Remarks/Notes</b>
	<b>(a) Recording diving-related injuries and illnesses.</b>	
	(1) [Reserved]	
	(2) The employer shall record the occurrence of any diving-related injury or illness which requires any dive-team member to be hospitalized for 24 hours or more, specifying the circumstances of the incident and the extent of any injuries or illnesses.	
	<b>(b) Availability of records.</b>	
	(1) Upon the request of the Assistant Secretary of Labor [for OSHA], or the Director, National Institute for Occupational Safety and Health, Department of Health and Human Services or their designees, the employer shall make available for inspection and copying any record or document required by this standard.	
	(2) Records and documents required by this standard shall be provided upon request to employees, designated representatives, and the Assistant Secretary in accordance with 29 CFR 1910.1020 (a)-(e) and (g)-(i) (in 1996, 29 CFR 1910.20 was re-designated as 29 CFR 1910.1020). Safe practices manuals (29 CFR 1910.420), depth-time profiles (29 CFR 1910.422), decompression procedure assessment evaluations (29 CFR 1910.423), and records of hospitalizations (29 CFR 1910.440) shall be provided in the same manner as employee exposure records or analyses using exposure or medical records. Equipment inspections and testing records which pertain to employees (29 CFR 1910.430) shall also be provided upon request to employees and their designated representatives.	
	(3) Records and documents required by this standard shall be retained by the employer for the following period: (i) Dive-team member medical records (physician's reports) (29 CFR 1910.411) – 5 years; [NOTE: No longer required since 29 CFR 1910.411 was deleted from the standard]; (ii) Safe practices manual (29 CFR 1910.420) – current document only; (iii) Depth-time profile (29 CFR 1910.422) – until completion of the recording of the dive, or until completion of decompression procedure assessment where there has been an incident of decompression sickness; (iv) Recording of dive (29 CFR 1910.423) – 1 year, except 5 years where there has been an incident of decompression sickness;	

	<p>(v) Decompression procedure assessment evaluations (29 CFR 1910.423) – 5 years;</p> <p>(vi) Equipment inspections and testing records (29 CFR 1910.430) – current entry or tag, or until equipment is withdrawn from service;</p> <p>(vii) Records of hospitalizations (29 CFR 1910.440) – 5 years.</p>	
	<p>(4) After the expiration of the retention period of any record required to be kept for five (5) years, the employer shall forward such records to the National Institute for Occupational Safety and Health, Department of Health and Human Services. The employer shall also comply with any additional requirements set forth at 29 CFR 1910.1020(h) (in 1996, 29 CFR 1910.20 was re-designated as 29 CFR 1910.1020).</p>	
	<p>(5) In the event the employer ceases to do business:</p> <p>(i) The successor employer shall receive and retain all dive and employee medical records required by this standard; or</p> <p>(ii) If there is no successor employer, dive and employee medical records shall be forwarded to the National Institute for Occupational Safety and Health, Department of Health and Human Services.</p>	