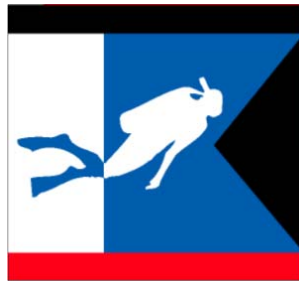




Departmental Diving Safety Procedures



Record of Amendments

#	Date	Subject	Initials
1	2007-10-27	3.3.1.3.c modified to read: “developing, issuing, compliance checklists to assist regional diving safety officers to meet regulatory and departmental policy requirements;”	
2	2007-10-27	3.3.1.4b modified to read: “meet annually or more often, as determined by the chairperson, to receive and review any recommendations on diving safety made by Regional Diving Safety Committees and recommend corrective action to the NSDC and National Policy Health & Safety Committee;”	
3	2007-10-27	3.3.1.4d modified to read: “when necessary, make amendments to this document, and forward by way of the DDSO recommended changes to the NSDC.	
4	2007-10-27	Inserted new 3.3.2.5 c to read: “coordinate Diver-in-Charge training and competency checks and assist managers/supervisors to ensure that a Diver-in-Charge is appointed for each diving operation;”	
5	2007-10-27	4.7 modified to read: “Any diver who has less than 10 open water dives or less than 7.5 hours logged and who has yet to complete the necessary competency checks is a Diver-in-Training and must remain under the direct supervision of the Area Diving Safety Officer or qualified designee.”	
6	2007-10-27	9.9.1 modified to read: “A dive team consisting of at least two divers must be present at every dive site but free swimming solo diving is not permitted.”	
7	2007-10-27	10.8.6 a-c modified to read: “There shall be at least three (3) persons present at a surface supply dive site, specifically: a) diver; b) stand-by diver / tender; c) Diver-in Charge / manifold operator”	
8	2007-10-27	11.4.1 a-c modified to read: “There shall be at least three (3) persons present at a surface supply dive site, specifically: a) diver; b) stand-by diver / tender; c) Diver-in Charge / manifold operator.”	
9	2007-10-27	10.9 Removed sentence: “Towed Diving shall not be conducted at depths in excess of 15 metres”	
10	2007-10-27	10.9.5 Removed sentence: “Sledding shall not be	

		conducted at depths in excess of 15 metres.”	
11	2007-10-27	10.9.4b Removed reference to length of line	
12	2007-10-27	9.18a Modified to read: “12 hours following a no-decompression dive or time required by tables or whichever is greater;”	
13	2007-10-27	7.8 paragraph 2 Modified to read “All Scuba cylinders shall be visually inspected annually both internally and externally. For aluminum cylinders the annual VIP must also include an eddy current test to check for hairline cracks in the neck threads if recommended by the manufacturer.”	
13	2007-10-27	7.8 Added statement: “Transportation of the Department’s cylinders must be conducted in accordance with the Transport Dangerous Goods (TDG) Regulations, including proper labelling.”	
14	2007-10-27	2.1 Deleted Section	
15	2007-10-27	7.2 Section heading modified to read: Design Requirements for Diving Equipment	
16	2007-10-27	7.2 ammended to read: “All diving equipment used by employees must be designed for its intended use and maintained in a condition that ensures its safe operation for the purpose and at the depth for which it was designed.”	
17	2007-10-27	7.3 Deleted list item a) and modified paragraph 1 to read: “All diving equipment used by employees must be inspected, tested, maintained and calibrated by a qualified person at intervals recommended by the manufacturer and whenever the equipment is thought to be defective. “	
18	2007-10-27	4.2 Revised heading to read “Diving Safety Officer”	
19	2007-10-27	4.2 paragraph 1 modified to read: “The Diving Safety Officer must be an experienced DFO diver and:”	
20	2008-09-22	6.2.2 paragraph 2 revised to read: “Divers must be trained in the use of oxygen equipment for therapeutic purposes.”	
21	2008-09-22	6.3.4 Diver-in-Charge Evaluation. Deleted Section.	
22	2008-09-22	6.3.5 Area Diving Safety Officer Evaluation. Deleted Section.	
23	2008-09-22	2.13 Diving Safety Officer – Regional. Revised to read “An individual who, because of knowledge, training and experience is appointed by the Regional Director General...”	
24	2008-09-22	2.14 Revised to read “An individual who, because of knowledge, training and experience is appointed by regional director(s)...”	
25	2008-09-22	10.7 Enriched Air Nitrox (EANx) Diving : Added statement “This procedure was written in accordance with the DAN Nitrox Workshop Consensus	

		Recommendations, November 3-4, 2000.”	
26	2008-09-22	10.7.5 paragraph 1 modified to read: “The partial pressure O2 exposure limit for any diver shall not exceed 1.6 ATA.”	
27	2008-09-22	Section 6.3.6 Snorkel Diving has been renumbered to 6.3.4	
28	2008-09-22	Section 6.3.7 Non-DFO Divers has been renumbered to 6.3.5	

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FOREWORD

The Department maintains an underwater diving program in support of its mandate to conserve and sustain the utilization of fishery resources and to deliver safe effective and environmentally sound marine services.

The Departmental Diving Safety Procedures identify the administrative and operational requirements that are necessary to ensure that DFO employees who dive comply with the Canada Labour Code Part II and the Canadian Occupational Safety and Health Regulations, Part XVIII Diving Operations.

Diving allows direct observation and in water experimentation and produces essential data that cannot be obtained by other means. Diving also complements the rescue activities available to the crew members of the Canadian Coast Guard Hovercraft unit which operates in the Strait of Georgia.

All managers must ensure that any diving program that involves DFO employees who dive is conducted according to the procedures contained within this document. Managers can be assisted in this task by utilizing the expertise offered by their Regional Diving Safety Officer.

DFO divers who deploy from and/or in support of CCG vessels must also follow the Diving Operations Section of the CCG Fleet Safety Manual and operational compliance will be verified by way of a pre-dive checklist.

Chapter 1. INTRODUCTION

All persons involved in diving operations have an individual responsibility to support a safe diving program and to follow the procedures contained within this document. These procedures list the specific requirements and restrictions that apply to all DFO employees who dive in support of scientific research, construction, inspection, and rescue diving operations.

These procedures are designed to prevent accidents and injuries, and they are also provided to ensure that DFO divers comply with the Canada Labour Code and Regulation XVIII on Diving Operations. The document therefore provides information to enhance dive site safety and operational effectiveness but it also lists the responsibilities of managers and divers and reviews their legal obligations. Training, competency, medical, and equipment requirements are listed to identify and control the wide variety of occupational risks and hazards common to diving operations.

However, this Departmental Diving Safety Procedures document does not stand alone and the following DFO OSH manuals should also be consulted:

- a) Occupational Safety and Health Loss Control Manual;
- b) Occupational Health & Safety Awareness Supervisor's Guide
- c) Occupational Health & Safety Awareness Handbook for Employees

Divers must be trained and properly equipped for the task being performed and on an annual basis must demonstrate that they are competent to perform the types of dives in which they are likely to participate. Managers must acknowledge that training, instruction, competency and in water experience are essential components of the diving safety program. They must be knowledgeable about these procedures and must ensure that their divers follow them.

Accurate records must be kept in order to show that all reasonable steps have been taken to safely control the diving activities conducted on behalf of the department. The Diver Administration Program (DAP) and Maintenance and Inventory Control (MIC), computer software applications, have been made available to each region, to facilitate and standardize these record keeping requirements.

Although it is expected that all persons involved in the diving safety program will voluntarily comply with the procedures contained within this document, disciplinary protocols have been included to control those who do not. These procedures are a necessary part of the due diligence process and represent an essential component for defence in the event of any subsequent legal proceedings.

Owing to the complex and highly variable nature of diving operations, specialized diving safety procedures, reflecting specific activities and hazards may be developed as required. At no time however are standards to fall below the basic requirements set out in this document.

Chapter 2. DEFINITIONS

2.1. Bottom Time

The total elapsed time in minutes between leaving the surface in descent to the time that final ascent begins.

2.2. Buddy System

A system where two free-swimming Scuba divers are deployed as a buddy pair and where the divers are responsible for maintaining effective communication with each other and rendering assistance when necessary.

2.3. Contaminated Environment

Contaminated environment means:

- a) a point of discharge of effluent from a sewer, a water or sewage treatment plant or an industrial plant;
- b) a site where chemical or biological effluent has accumulated; or
- c) the site of an oil or radioactive spill.

2.4. Dive – Type 1

Is a dive, the primary purpose of which is to:

- a) conduct scientific, archaeological or other research operations; or
- b) gather evidence or information relating to a crime.

2.5. Dive – Type 2

Is any dive that extends outside the restriction of a Type 1 dive.

2.6. Dive Program

The assemblage of operational and administrative procedures used to organize and control an establishment's diving activities. This includes training, equipment maintenance, diving project approval, record keeping, and competency checks for divers.

2.7. Dive Tender

A competent person at the dive site who tends the diver(s), controls surface requirements and monitors the progress of the dive.

2.8. Diver

A person who has completed the administrative, medical and training requirements and who has been declared competent to perform work underwater.

Specialty dives may require additional training and competency checks.

2.9. Diver-in-Charge

A qualified person who has been designated by the project manager to be in charge at the dive site.

2.10. Diver-in-Training

A diver gaining experience and training under the supervision of the Area Diving Safety Officer or designee.

2.11. Diving Buoy

Is a special purpose buoy which is coloured white and carries a rectangular red flag, each side of which is not less than 50 cm in length, that has a white diagonal stripe extending from the tip of the hoist to the bottom of the flag (see Schedule 1 of the Federal Diving Regulations).

2.12. Diving Safety Officer – Departmental

An individual appointed by the Department to develop departmental diving policy, to ensure regulatory compliance, and to chair the Departmental Diving Safety Committee.

2.13. Diving Safety Officer – Regional

An individual who, because of knowledge, training and experience is appointed by the Regional Director General to coordinate the regional diving program, to ensure regulatory compliance, and to chair the Regional Diving Safety Committee.

2.14. Diving Safety Officer – Area

An individual who, because of knowledge, training and experience is appointed by regional director(s) in consultation with the Regional Diving Safety Officer to be responsible for a branch/establishment diving program.

2.15. Diving Safety Committee – Departmental

A committee composed of the Departmental Diving Safety Officer as chairperson and the Regional Diving Safety Officers.

2.16. Diving Safety Committee – Regional

A committee of competent persons appointed by the Regional Director General to recommend procedures, policy and standards for regional diving operations and to act as a board of review and appeal.

2.17. Free-Swimming

Is a Scuba diving deployment where the diver is not tethered to the surface by a lifeline.

2.18. Hyperbaric Chamber

A pressure vessel and associated equipment designed to subject humans to greater-than-atmospheric pressures.

2.19. International Code Flag Alpha

The white and blue flag referenced in Schedule 1 of the Federal Diving Regulation and in Rule 27 of the Collision Regulations of the Canada Shipping Act.

2.20. Lifeline

Is a line, free of knots or splices, which is used to secure a diver to a safe anchorage point to the surface and which has a breaking strength of not less than 1400 kg.

2.21. Liveboating

The support of a diving operation from a vessel that is not at anchor, made fast to the shore or a fixed structure, or aground.

2.22. Medical Officer

A physician recommended by the Department of Health and Welfare to conduct medical examinations of individuals engaged in diving on behalf of DFO.

2.23. No-Decompression Limit

The maximum bottom time which allows a direct ascent to the surface without requiring decompression stops.

2.24. Repetitive Dive

Is any dive where residual nitrogen influences the calculation of the bottom time recorded for the dive.

2.25. Residual Nitrogen

Nitrogen in excess of normal concentrations that is still dissolved in a diver's tissues after the surface has been reached.

2.26. Surface Interval (SI)

The time which a diver has spent on the surface following a dive. Time begins as soon as the diver surfaces and ends as the diver starts the descent for the next dive.

2.27. Surface Supply Dive

A diving operation where a diver is supplied with breathing mixtures by a life support umbilical from the surface.

2.28. Therapeutic Recompression

The treatment of a diver in a hyperbaric chamber in accordance with generally accepted tables and practices.

Chapter 3. ROLES & RESPONSIBILITIES

3.1. Introduction

This chapter describes the roles and responsibilities of individuals involved in any diving operation or activity which the Department controls through the involvement of DFO personnel, or the ownership of equipment utilized in such operations.

3.2. General

It is the duty of all those responsible for or associated with diving operations to ensure that the procedures contained within this document are complied with and that the safety of divers and surface support personnel is not jeopardized.

Responsibilities associated with diving operations are to be contained in the statement of duties of Divers, Divers-in-Charge and Diving Safety Officers.

3.3. Roles and Responsibilities

3.3.1. Corporate Level

3.3.1.1. Assistant Deputy Minister

The Assistant Deputy Minister Science is responsible for developing and implementing the departmental diving safety program and ensuring that DFO managers and divers are aware of and comply with the legal requirements of the Canada Labour Code Part II, the Federal Diving Regulation (Part XVIII of the Code) and the Departmental Diving Safety Procedures.

3.3.1.2. Assistant Deputy Ministers

Assistant Deputy Ministers are responsible for ensuring that DFO managers and divers are aware of and comply with the legal requirements of the Canada Labour Code, Part II, the Federal Diving Regulation (Part XVIII of the Code) and the Departmental Diving Safety Procedures.

3.3.1.3. Departmental Diving Safety Officer

The Departmental Diving Safety Officer is responsible for:

- a) developing, issuing and maintaining diving safety, training and competency procedures, and facilitating their implementation throughout the Department;
- b) advising senior management on issues pertaining to diving safety and health and obtaining authorization for departmental diving safety procedures;
- c) developing and issuing, compliance checklists to assist regional diving safety officers to meet regulatory and departmental policy requirements;
- d) representing the Department in negotiations with Human Resources Development Canada, Treasury Board, Health Canada, Provincial regulatory authorities, the Canadian Association for Underwater Sciences and the Canadian Standards Association on issues pertaining to diving safety;
- e) chairing the Departmental Diving Safety Committee; and
- f) preparing an annual diving safety report to the National Science Directors Committee. This report will be presented to the National Policy Health and Safety Committee by way of the Chief, Occupational Health & Safety.

3.3.1.4. Departmental Diving Safety Committee

The Departmental Diving Safety Committee will:

- a) act as a departmental advisory committee in matters pertaining to diving safety, training and competency.
- b) meet annually or more often, as determined by the chairperson, to receive and review any recommendations on diving safety made by Regional Diving Safety Committees and recommend corrective action to the NSDC and National Policy Health & Safety Committee;
- c) act as board of review for diving incidents and accidents;
- d) when necessary, make amendments to this document, and forward by way of the DDSO recommended changes to the NSDC.

3.3.2. Regional / Site Level

3.3.2.1. Regional Director General

Each Regional Director General is responsible for:

- a) implementing the requirements of Part XVIII of the Canada Labour Code Regulation on Diving Operations and the Departmental Diving Safety Procedures within the region;
- b) in consultation with the Regional Diving Safety Committee, appointing an employee to act as the Regional Diving Safety Officer;
- c) providing the funding necessary to run the regional diving office; and
- d) appointing a Regional Diving Safety Committee to recommend procedures, policy and standards for diving operations and to act as a board of review and appeal.

3.3.2.2. Regional Diving Safety Officer

The Regional Diving Safety Officer is responsible for:

- a) advising the Regional Management Committee on issues pertaining to diving safety and health;
- b) ensuring that regional dive programs comply with the Federal Diving Regulation and the procedures outlined in this document;
- c) chairing the annual Regional Diving Safety Committee meeting and submitting an annual diving safety report to the Regional Occupational Safety and Health Committee. This will include records as outlined in this document and incident/accident reports;
- d) attending the annual Departmental Diving Safety Committee meeting and submitting a diving safety report as outlined in c).

3.3.2.3. Regional Diving Safety Committee

The Regional Diving Safety Committee shall:

- a) meet at least once per year to discuss, plan and review the safety of diving operations;
- b) if necessary, make recommendations for amending these procedures and table them at the annual Departmental Diving Safety Committee meeting; and
- c) act as board of review with the authority to approve, restrict, prohibit, suspend or reinstate any diver, diving operation, program, practice or equipment.

3.3.2.4. Regional Directors

Regional Directors employing DFO personnel in diving operations, shall:

- a) appoint, in consultation with the Regional Diving Safety Officer, an employee to act as the Area Diving Safety Officer to provide assistance and advice on diving matters;
- b) where necessary, develop a specialized diving supplement to reference diving activities and procedures not covered in this document. A copy of this supplement must be forwarded to the Regional Diving Safety Officer for initial approval.

3.3.2.5. Area Diving Safety Officer

The Area Diving Safety Officer is responsible for:

- a) the coordination and safety of all diving operations conducted on behalf of a directorate or establishment as outlined in this document;
- b) the coordination of annual diver competency checks;
- c) coordinate Diver-in-Charge training and competency checks and assist managers/supervisors to ensure that a Diver-in-Charge is appointed for each diving operation;
- d) ensuring, in accordance with Chapter 7, that periodic inspection tests are scheduled on all diving equipment and that maintenance records are completed and retained;
- e) ensuring that all air used for diving meets the minimum specifications outlined in Chapter 7;
- f) developing and maintaining dive site emergency contingency and evacuation plans;
- g) maintaining records as outlined in Chapter 8
- h) reporting any incidents or accidents to the Regional Diving Safety Officer.

The Area Diving Safety Officer shall have the authority to suspend divers who fail to comply with Departmental Procedures, and to restrict or prohibit any diving activity that is considered unsafe or imprudent. The Regional Diving Safety Committee shall be immediately informed of any such restrictive actions for review and further action as necessary.

3.3.2.6. Managers / Supervisors

All managers who supervise divers are responsible for maintaining a safe workplace. The Department expects you to diligently promote, manage, and monitor the Diving Safety Program.

Managers are responsible for ensuring:

- a) in consultation with the Area Diving Safety Officer that diver training and project equipment corresponds to the operational requirements of the dive; and
- b) in consultation with the Area Diving Safety Officer, that a Diver-in-Charge is appointed for each diving operation.

3.3.2.7. Diver-in-Charge

The Diver-in-Charge controls on-site diving operations and must ensure that:

- a) all divers on-site have completed the annual administrative, medical, and competency checks required for the dive;
- b) all equipment is in good working order, has had an annual maintenance check and is properly used;

- c) the pre-dive checklist shown in Annex B and contained within the Diver Log Book is completed prior to each dive and that proof of completion is entered in the dive log.
- d) a written emergency evacuation plan has been tested, and is readily available at the dive site; and
- e) any incidents or accidents are immediately reported as per the procedures outlined in section 9.20, and that steps are taken to control such irregularities.

The Diver-in-Charge has the authority to restrict, prohibit or suspend any diving operation. The Diving Safety Officer shall be immediately informed of any such restrictive action.

3.3.2.8. Divers

Ultimate responsibility for diving safety resides with the individual diver. A diver should not dive, nor be allowed to dive if, in the diver's own judgment or in the judgment of the Diver-in-Charge:

- a) the diver feels unfit, or is exhausted, or is impaired by spirits, drugs or other causes;
- b) the conditions are considered unsafe or unfavourable; and
- c) conditions may violate the precepts of safe diving operations and/or the requirements of this document.

A diver shall neither be forced to dive nor be penalized for not diving when the diver, for valid reasons, desires not to do so.

Divers shall:

- a) endeavour to maintain a high degree of mental and physical ability;
- b) be responsible for the safe custody and maintenance of all diving equipment issued to them for their personal use or for the use of the dive team;
- c) record all dives in their DFO log book, and submit an annual log summary to their Area Diving Safety Officer. Log books shall be available for inspection; and
- d) immediately report any incidents or accidents to their supervisor and their Area Diving Safety Officer.

3.3.2.9. Dive Tender

Must, for the duration of a surface supply dive, devote his or her entire time and attention to the work of tending the diver.

3.3.2.10. Boat Operator

Must, for the duration of a type 2 dive, devote his or her entire time and attention to the command of the vessel.

Chapter 4. QUALIFICATIONS OF DIVE TEAM MEMBERS

4.1. Purpose

This chapter outlines the qualifications of managers, divers, and support personnel who are directly involved in the administrative and operational components of the diving program.

4.2. Diving Safety Officer

The Diving Safety Officer must be an experienced DFO diver and:

- a) be thoroughly familiar with the administrative, medical, training and operational requirements for DFO dive operations as outlined in this document;
- b) be capable of planning and implementing comprehensive diver training and competency checks that meet specific program objectives and regulatory compliance;
- c) be knowledgeable in the use of and maintenance requirements for all diving equipment used by branch divers; and
- d) have a comprehensive knowledge of:
 - i. Federal and Provincial regulatory requirements;
 - ii. diver training techniques, including preparation of resource material and examinations;
 - iii. criteria for annual competency checks;
 - iv. diving safety and emergency procedures including the recognition of and the procedures for first aid treatment of diving related illnesses and injuries;
 - v. the physiology and medical requirements of diving;
 - vi. diving tables and their use;
 - vii. local diving conditions and requirements.

4.3. Diver-in-Charge

The Diver-in-Charge should be a DFO approved diver with local operational experience and:

- a) be knowledgeable in the diving safety procedures contained within this document;
- b) be familiar with the administrative, medical, training and operational prerequisites for DFO approval to dive;
- c) be familiar with Federal and Provincial regulatory requirements;
- d) be capable of implementing all aspects of the diving program for each project supervised;
- e) be knowledgeable in the use and maintenance of all diving equipment used by divers employed on each diving project supervised;
- f) be knowledgeable of diving safety and emergency procedures applicable to the requirements of each diving operation supervised.

4.4. Diver

The diver should be experienced with field operational requirements and must:

- a) be knowledgeable of and agree to conform to the diving safety procedures contained within this document;

- b) have completed the administrative, medical, training, and competency prerequisites for approval to dive for DFO;
- c) be knowledgeable in the use, care, and pre-dive check requirements of all diving equipment used; and
- d) be knowledgeable of diving safety and emergency procedures applicable to the requirements of each diving operation.

4.5. Stand-by Diver

In addition to the requirements noted in section 4.4, the stand-by diver shall:

- a) be selected from the more experienced divers present;
- b) be fully versed on emergency search procedures; and,
- c) be fully versed on recovery procedures for an unconscious diver.

4.6. Dive Tender

The dive tender must:

- a) be knowledgeable about safe diving procedures and techniques;
- b) be knowledgeable of the diving safety procedures contained within this document;
- c) be knowledgeable in the use, care, and operational pre-dive check of all diving equipment used by the diver; and
- d) be knowledgeable of diving safety and emergency procedures applicable to the requirements of each diving operation.

4.7. Diver-in-Training

Any diver who has less than 10 open water dives or less than 7.5 hours logged and who has yet to complete the necessary competency checks is a Diver-in-Training and must remain under the direct supervision of the Area Diving Safety Officer or qualified designee.

4.8. Boat Operator

The boat operator must:

- a) be knowledgeable in boat operation procedures and techniques;
- b) have passed a nationally recognized competency test and hold as a minimum the Canadian Coast Guard Pleasure Craft Operator Card; and
- c) be knowledgeable about the Departmental Diving Safety Procedures, specifically as it relates to the responsibilities and duties of a boat operator.

Chapter 5. MEDICAL STANDARDS

5.1. Purpose

This chapter provides departmental diving medical examination guidelines.

5.2. Medical Requirements

Every diver must receive a medical examination every two years and be declared fit to dive using the protocols contained in Section VII of Health Canada's Occupational Health Assessment Guideline.

Assessments are best conducted by physicians with diving medical experience.

Additional medical examinations must be given and written clearance for further diving must be provided by the examining physician:

- a) after any major injury or illness;
- b) after a diver has been treated for a pressure-related injury or illness;
- c) at the request of the Area Diving Safety Officer, the Diver-in-Charge or the diver's supervisor;
and
- d) at the discretion of the examining physician.

5.3. Restrictions

Where a diver has been declared fit to dive with specified restrictions, the Diver-in-Charge must ensure that the diver dives in accordance with the specified restrictions.

Chapter 6. TRAINING, COMPETENCY, & APPROVAL REQUIREMENTS

6.1. Purpose

This chapter sets out the training, competency and approval requirements needed to dive on behalf of the Department.

6.2. Training Requirements

6.2.1. Diving

Diving courses offered by external agencies qualify as entry level training for DFO divers.

Additional training procedures are specified in the document titled DFO Training and Competency Procedures that is updated periodically to reflect current best practices.

However, such training may not ensure adequate skill levels and on an annual basis, DFO divers must demonstrate that they are competent to perform the types of dives in which they will participate.

Additional training may be required for dives outside the excursions, equipment, or breathing mixture restrictions outlined in Chapter 9.

Log book review, pool and openwater checkouts are suggested procedures for assessing competency levels and for establishing remedial training requirements.

6.2.2. First Aid and CPR

DFO divers must be trained in first aid and Cardio-Pulmonary Resuscitation and in the recognition of the symptoms and the management of diving related illness and injuries.

Divers must be trained in the use of oxygen equipment for therapeutic purposes.

6.3. Competency Requirements

The following criteria must be used when conducting annual competency checks. Additional competency procedures are specified in the document titled DFO Training and Competency Procedures that is updated periodically to reflect current best practices.

6.3.1. Diver Evaluation

6.3.1.1. Theory

All divers must have knowledge in:

- a) rudimentary diving physics and physiology;
- b) basic diving equipment;
- c) underwater hand signals;
- d) emergency procedures; and
- e) dive table use.

6.3.1.2. Pool

All divers must:

- a) demonstrate acceptable watermanship ability;
- b) demonstrate ability to assemble, disassemble and maintain diving equipment;
- c) enter the water with full equipment;
- d) alternate between snorkel and Scuba while swimming;
- e) clear face mask;
- f) demonstrate share air procedures as both a donor and recipient;
- g) demonstrate ability to remove and replace equipment while submerged;
- h) demonstrate understanding of underwater signs and signals; and
- i) rescue and transport a passive simulated accident victim.

6.3.1.3. Open Water

Divers must:

- a) demonstrate judgment adequate for safe diving;
- b) enter and leave open water wearing Scuba gear;
- c) kick on the surface while wearing Scuba gear, but not breathing from the Scuba unit;
- d) surface dive to a depth of 3 m (10 feet) in open water without Scuba;
- e) achieve and maintain neutral buoyancy;
- f) demonstrate clearing of mask and regulator while submerged;
- g) demonstrate proficiency in share air breathing as both donor and receiver in stationary and swimming modes;
- h) demonstrate techniques of self-rescue and buddy rescue.

6.3.1.4. Additional Requirements – Special Operations

Dive operations outside the excursion or equipment restrictions outlined in Chapter 9 may require additional training, experience and competency checks. Specialty requirements and operational procedures are summarized in Chapter 10 and Chapter 11.

6.3.2. Tender Evaluation

Dive tenders must:

- a) demonstrate ability to assemble, disassemble, and maintain diving equipment;
- b) demonstrate judgment adequate for safe diving;
- c) be trained in CPR, first aid and in the administration of oxygen.

6.3.3. Standby Diver Evaluation

6.3.3.1. Theory

The standby diver must have theory knowledge as specified for Divers, (6.3.1.1), plus knowledge in:

- a) diver rescue techniques and emergency search procedures;
- b) recovery procedures for the unconscious diver;
- c) emergency scene management.

6.3.3.2. Pool

The Standby Diver must have pool skills as specified for Divers, (6.3.1.2), plus skills in:

- a) advanced rescue techniques for both surface and underwater recoveries;
- b) emergency management through scenario practice.

6.3.3.3. Open Water

The Standby Diver must have open water skills as specified for Divers, (6.3.1.3), plus skills in:

- a) open water rescue techniques for both surface and underwater recoveries;
- b) open water recovery procedures for the unconscious diver.

6.3.4. Snorkel Diving

Although snorkel diving falls outside the scope of this document, both managers and employees must ensure that safe working practices occur for this activity.

Managers must ensure that:

- a) snorkel divers have received medical approval as per the protocol established by Health Canada;
- b) snorkel divers have above average swimming ability;
- c) the buddy system is strongly enforced;
- d) thermal protection is provided and if needed, weight belts are fitted with a quick-release closure; and
- e) each snorkel diver is equipped with a whistle, knife, and inflatable buoyancy device.

6.3.5. Non-DFO Divers

Persons who are not DFO employees and who dive with employees must also demonstrate that they are competent to perform the types of dives in which they will participate.

6.4. DFO Approval to Dive

As a basic minimum, employees who wish to dive must satisfy their respective Area Diving Safety Officer that they:

- a) are required to dive in support of DFO objectives;
- b) have passed at least one nationally recognized diving certification;

- c) have been declared medically fit to work as a diver as outlined in Chapter 5;
- d) are thoroughly familiar with the operational requirements for DFO dive operations as outlined in this document; and
- e) have completed an annual competency check.

All divers must be trained in first aid and CPR, and be familiar with rescue diving procedures, including recognition and management of diving related illness.

6.4.1. Rescinding of Diving Privileges

Divers who fail to comply with conditions specified in this document shall have their diving privileges rescinded.

A diver's permission to dive may also be rescinded or restricted by the Regional Diving Safety Committee for:

- a) non-compliance with any of the diving regulations; and
- b) deliberate violation of safe diving procedures.

Rescinded divers may apply to the Regional Diving Safety Committee for re-approval to dive. They must however satisfy all the required conditions, and depending on circumstances, may require additional training.

Chapter 7. DIVING EQUIPMENT MAINTENANCE AND INVENTORY CONTROL

7.1. Purpose

This chapter outlines the requirements for diving equipment maintenance and provides standards for breathing air purity.

7.2. Design Requirements for Diving Equipment

All diving equipment used by employees must be designed for its intended use and maintained in a condition that ensures its safe operation for the purpose and at the depth for which it was designed.

7.3. Maintenance Requirements

All diving equipment used by employees must be inspected, tested, maintained and calibrated by a qualified person at intervals recommended by the manufacturer and whenever the equipment is thought to be defective.

Diving equipment used by persons who are not employees but who are granted access to the workplace and who dive with employees must be in a condition that ensures its operation for the purpose and at the depth for which it was designed.

7.4. Defective Equipment

Where a diver finds a defect in any diving equipment, including pressure gauges and depth gauges, that may render it unsafe for use, the diver shall immediately report the defect to the Diver-in-Charge.

The Diver-in-Charge shall mark or tag as unsafe and remove from service any diving equipment, including pressure gauges and depth gauges, that may be used by divers where a defect may render it unsafe for use.

7.5. Breathing Supply

7.5.1. Air Compressors

Only air compressors specially designed for filling cylinders shall be used for this purpose.

Air intakes shall be well screened and equipped with a filter and shall be located to ensure a supply of clean air, free from contamination by fumes, smoke, etc. Extensions to the intake manifold should have the hose upwind from any exhaust pipe.

The discharged compressed air shall be passed to a Scuba cylinder (or an air reservoir) through frequently cleaned and recharged filters that are designed to remove dust, oil, CO, water, and other contaminants with the resultant breathing air meeting the specification of paragraph 7.5.2.

The compressor shall have an operation time-elapsed clock and/or log book listing dates, running times, filter and maintenance schedules.

Annually, an air sample from each DFO compressor shall be sent to a testing laboratory for analysis.

7.5.2. Breathing Air Standards

Breathing air shall meet the specifications outlined in the CAN/CSA Z 275.2-92 Occupational Safety Code for Diving Operations.

7.5.3. Air from Commercial Sources

Breathing air from commercial sources shall be certified by the supplier as being suitable for breathing in accordance with section 7.5.2.

7.6. Regulators

Regulators shall be serviced at least annually by a qualified technician according to manufacturers' specifications.

Regulators used by DFO divers shall be fitted with a submersible pressure gauge for monitoring Scuba cylinder pressure unless otherwise dictated by circumstances.

All Scuba regulators used by DFO divers shall be checked before use by individual divers.

The Area Diving Safety Officer will ensure that an inspection record is maintained for each regulator as outlined in Chapter 8.

7.7. Gauges

Gauges shall be inspected and calibrated by a qualified person before first use and at least annually thereafter, or whenever it is thought to be defective.

The Area Diving Safety Officer will ensure that an inspection record is maintained for each gauge as outlined in Chapter 8.

7.8. Scuba Cylinders

All compressed air cylinders must bear a valid test date and shall be tested in accordance with the Canadian Transport Commission or equivalent agency. They shall be hydrostatically tested every five years and stamped to that effect by the testing facility.

All Scuba cylinders shall be visually inspected annually both internally and externally. For aluminum cylinders the annual VIP must also include an eddy current test to check for hairline cracks in the neck threads if recommended by the manufacturer.

DFO divers shall not use a cylinder which is not stamped with proper marking and a valid test date nor charge a cylinder to a pressure greater than that marked on it.

The Area Diving Safety Officer will ensure that an inspection record is maintained for each cylinder as outlined in Chapter 8.

Transportation of the Department's cylinders must be conducted in accordance with the Transport Dangerous Goods (TDG) Regulations, including proper labeling.

Chapter 8. RECORD KEEPING REQUIREMENTS

8.1. Purpose

This chapter outlines the record keeping requirements for the Department's diving program. Record keeping is an essential component for regulatory compliance. It also forms a critical element of a due diligence defence.

8.2. Records

The Area Diving Safety Officer shall ensure that a file is kept for each diver verifying that:

- a) diving is identified as a job requirement, medical clearance has been received, competency checks have been completed, first aid and CPR training have been given, a log book has been issued and dive records are being maintained;
- b) regular maintenance and calibration records are kept for cylinders, regulators, gauges, compressors, and air analysis as per the manufacturer's recommendations. Records must include serial numbers and the certified technician's signature.

8.3. Diving-Related Incident / Injury

- a) Every diver shall report to the Area Diving Safety Officer any unusual incident that occurred or diving-related injury.
- b) The Area Diving Safety Officer shall investigate the occurrence reported pursuant to a), keep a written record of the findings, and forward them to the Regional Diving Safety Officer.
- c) The Regional Diving Safety Officer shall immediately report all diving related injuries to the Departmental Diving Safety Officer.

8.4. Dive Records

Dive records must be kept and maintained for every diver. Divers must log all dives and submit these records to their Area Diving Safety Officer annually or on demand.

This dive record shall contain, for each dive:

- a) the date of the dive;
- b) the location of the dive;
- c) the name of the diver;
- d) the name of the standby diver, if any;
- e) the name of the diver's tender, if any;
- f) the signature of the diver and Diver-in-Charge; and
- g) the breathing mixture used, if other than air.

8.4.1. Type I Dives

The record referred to in 8.4 shall also contain, for each type 1 dive:

- a) total elapsed time, measured in minutes, from the time the diver leaves the surface to the time the diver begins final ascent, rounded to the next whole minute;
- b) maximum depth reached; and
- c) any unusual incident or condition, including emergency decompression time.

8.4.2. Type 2 Dives

The record referred to in section 8.4 shall also contain, for each type 2 dive:

- a) type of diving equipment used;
- b) the time the diver leaves the surface;
- c) the maximum depth reached;
- d) the time the diver begins final ascent;
- e) the time the diver reaches the surface;
- f) the decompression schedule used, if any; and
- g) any unusual incident or condition including emergency decompression time.

8.4.3. Long Term Record Keeping

The Area Diving Safety Officer shall keep a dated dive record for each diver that shall include:

- a) the year in which the dive occurs;
- b) the maximum depth reached;
- c) the total elapsed time, measured in minutes, from the time the diver leaves the surface to the time the diver begins final ascent, rounded to the next whole minute.
- d) breathing mixture used, if other than air;
- e) any unusual incident or condition;
- f) any occurrence reported pursuant to subsection 8.3 a); and
- g) a copy of any record referred to in subsection 8.3 b).

8.4.4. Provision of Dive Records

- a) The Diver-in-Charge is responsible for submitting a copy of the dated dive records to the Area Diving Safety Officer at the end of the dive operation.
- b) The Area Diving Safety Officer shall forward on an annual basis the dated dive records to the Regional Diving Safety Officer.
- c) The Regional Diving Safety Officer shall annually supply the record referred to in 8.4.3 to the diver.

8.4.5. Instruction, Training & Competency Records

The Area Diving Safety Officer shall keep a record of all instruction and training received by the diver and all competency demonstrations given pursuant to Chapter 6 for as long as the diver is employed by DFO as a diver.

8.4.6. Record Keeping Duration

The Area Diving Safety Officer shall:

- a) keep the record referred to in sections 8.4, 8.4.1, and 8.4.2 for a period of 12 months after the date of the dive;
- b) keep a copy of the record referred to in section 8.4.3 for a period of five years after the date on which the diver ceases to be employed.

- c) keep a copy of the record referred to in section 8.4.5 for as long as the diver is employed as a diver.

8.5. Diver Administration Program

The Department has developed a personal computer software application called Diver Administration Program (DAP) to facilitate and standardized the record keeping requirements for DFO divers as established in the Federal Diving Regulations.

DAP supports the processes and record-keeping requirements for:

- a) registering and renewing divers administrative clearances to dive;
- b) tracking medical clearances and expiry;
- c) tracking training received;
- d) competency demonstrations, and
- e) long term record keeping of dive log records.

8.6. Records of Air Quality Tests

The Area Diving Safety Officer shall maintain a record of each air quality test performed pursuant to section 7.5.1 for a period of five years after the date on which the test was made.

8.7. Records of Equipment Inspection, Test, Maintenance, & Calibration

The Area Diving Safety Officer shall maintain a record of each equipment inspection, test, maintenance and calibration performed pursuant to Chapter 7 for a period of five years after the date on which the inspection, test, maintenance or calibration was performed.

8.8. Maintenance and Inventory Control Program

The Department has developed a personal computer software application called Maintenance and Inventory Control Program (MIC) to facilitate and standardize the record keeping requirements for diving equipment as established in the Federal Diving Regulation.

MIC supports the record keeping requirements by:

- a) providing a method to inventory DFO diving equipment;
- b) printing a work sheet for each piece of diving equipment that allows inspections to be properly documented.

Chapter 9. GENERAL OPERATIONAL PROCEDURES AND REQUIREMENTS – TYPE 1 AND TYPE 2 DIVES

9.1. Purpose

This chapter outlines the general procedures and requirements that must be followed for Type 1 and Type 2 dives performed by departmental divers.

Chapter 10 lists additional procedures for Type 1 dives that occur outside the excursion and equipment restrictions described in this chapter.

Chapter 11 lists additional requirements needed for Type 2 dives.

9.2. Restrictions

9.2.1. Depth

Maximum depth for any DFO dive operation is 40 m.

For dives at depths greater than 20 m, the special requirements outlined in section 10.4 must be included in the dive plan.

9.2.2. Decompression

Decompression dives are not permitted unless approved by the Departmental Diving Safety Committee.

9.2.3. Type 1 Dives

Type 1 dives:

- a) cannot require decompression;
- b) cannot occur in the vicinity of underwater pressure differentials;
- c) cannot involve the search, construction, repair or inspection of ships, bridge piers, wharves, dry docks, underwater tunnels, or water control and water intake facilities;
- d) cannot involve using underwater welding or cutting equipment or explosives;
- e) cannot exceed 40 m in depth.

9.2.4. Type 2 Dives

In addition to all of the general requirements listed in this chapter, Type 2 dives must also follow the special requirements listed in Chapter 11.

9.3. Hazards

Immediately before each dive, the Dive Team must discuss the nature of all conditions and hazards likely to be encountered and the Diver-in-Charge must ensure that they are understood and controlled.

9.3.1. Currents / Tides

Water flow conditions of greater than one knot should be considered beyond the diver's ability to comfortably resist by swimming. Water movement at sea can be complex for divers because surface water may move in a different direction and at different velocities than deeper bottom waters. Each diver should be as streamlined as possible and equipment should be low profile and snag resistant.

The main risk of diving in flowing water is being swept away, either offshore or along-shore into hazardous conditions (e.g., surf or rapids). Risks can be compounded by low visibility due to increased likelihood of entanglement.

The progress of the dive can be monitored by watching bubbles but whenever possible dive teams should pull a surface float to facilitate tracking.

9.3.2. Low Visibility

The basic premise of the buddy system is that free-swimming divers can observe each other and immediately render assistance if required. However, in low visibility situations this advantage is lost and the risk of buddy separation and entrapment increases dramatically. Therefore in low visibility situations, a three-person dive team should be deployed as follows:

- a) a single diver with a lifeline supported by a tender; and
- b) a standby diver on the surface.

Whenever possible, voice communication systems should also be used.

9.3.3. Altitude Diving

Diving at altitude requires careful planning and preparation and should not be undertaken lightly. Special dive tables and acclimation will be required and generally, the higher the dive site, the more remote it is. For an added level of safety, nitrox should be considered.

9.4. Specialized Equipment

Additional training may be required for:

- a) dry suits;
- b) full face masks.

9.5. Dive Site Records

Log Books facilitate in-field record keeping, promote regulatory compliance and represent an essential element of a due diligence defence. The following books must be used at each dive site:

- a) Diver Log Book;
- b) Diver's-in-Charge Instruction Manual.

9.5.1. Diver Log Book

In addition to the logging of individual dive statistics on a dive log page, the Diver Log Book also provides:

- a) verification attesting to the diver's administrative clearance and competency;
- b) instruction to the Diver on operational procedures and requirements;
- c) emergency procedures, evacuation numbers and key medical information to facilitate emergency medical treatment;
- d) instructions and procedures to be followed in case of accident or injury;
- e) pre-dive check list;
- f) dive tables;
- g) evidentiary value in the case of accident or injury.

A DFO Diver Log Book must be issued to each DFO employee who dives, but it remains the property of the department and must be surrendered by the diver on demand.

It is the duty of all divers to be familiar with all information contained within their Log Book and to maintain complete and accurate records of all dives and competency checks.

9.5.2. Diver-in-Charge Instruction Manual

The Diver-in-Charge Instruction Manual promotes and documents effective on-site supervision and control of the diving operations.

The Instruction Manual contains a pre-dive checklist (see Annex B) that must be reviewed prior to each dive as part of the compliance check.

Verification of this review must be recorded as a dive log entry.

The Instruction Manual also contains:

- a) emergency procedures and control information;
- b) instructions and procedures to be followed in case of accident or injury; and
- c) dive tables.

It is the duty of the Diver-in-Charge to maintain complete and accurate records for all diving operations.

9.6. Equipment Check

Immediately before each dive, every diver shall check that all the equipment required is present, properly fastened in place and functioning.

Once in the water and before beginning a descent, every diver shall repeat the pre-dive check.

9.7. Reserve Breathing Supply

A reserve breathing supply sufficient to allow the safe termination of a dive must be immediately available to the diver.

9.7.1. Free-Swimming Scuba Deployment

For free-swimming buddy pair Scuba deployments, the reserve breathing supply can be immediately made available to the out of air diver through a redundant second stage regulator (commonly called an octopus or safe-second) carried by the buddy diver.

Each diver must therefore be equipped with a redundant second stage “octopus” regulator or the team must carry at least one independent pony bottle / regulator system.

9.7.2. Independent Air System

Anytime a single diver of the dive team is deployed using Scuba, an independent pony bottle / regulator system must be carried by the diver.

Manifolded twin tanks with two regulators and an isolation valve is also acceptable and whenever possible voice communication systems should be used.

9.8. Emergency Procedures

When a diver shows any indication of a pressure-related injury or requires therapeutic recompression, the necessary first aid treatment must be initiated and medical support notified immediately.

Therefore, an emergency procedure which contains addresses, telephone numbers and radio frequencies for recompression chambers, medical facilities and ambulance services shall be at site and readily available to the dive team.

The procedure must identify the location of the nearest emergency medical facility and operational hyperbaric chamber and contact information for emergency transportation in the event of an accident.

A template for this information is provided in Annex C and is also included in the Diver Log Book and the Diver-in-Charge Instruction Manual.

The procedures must provide medical support on a 24 hour-a-day basis and a suitable means of communication between the dive site and medical support.

Although the flying after diving restriction does not apply to an emergency air evacuation, pressurized aircraft should be used whenever possible. In the event of an emergency air evacuation, provision shall be made to furnish the diver with oxygen, and the flight altitude and in-flight conditions shall be those recommended by the attending physician or Diver-in-Charge. However, a 1000 ft (307.7 metres) maximum should be maintained whenever possible.

These procedures must be tested periodically.

9.9. Dive Team Requirements

9.9.1. Basic Requirement

A dive team consisting of at least two divers must be present at every dive site but free swimming solo diving is not permitted.

9.9.2. Diver-in-Charge

One diver at every dive site must be designated as the Diver-in-Charge and this individual is responsible for supervising the entire diving operation.

The Diver-in-Charge shall ensure that the pre-dive checklist is reviewed and recorded as an entry in the dive log prior to every dive.

9.9.3. Communications

All members of the dive team shall have a comprehensive knowledge of hand, rope, and electronic signals designated for use on the dive site.

9.9.4. Tethered Dives

In a diving operation where the diver is tethered to the surface by a lifeline, there shall be at least three persons present at the dive site, of whom:

- a) one is a diver's tender; and
- b) one is a standby diver.

9.9.5. Diver's Tender

Where a diver's tender is needed, he/she shall devote all of his or her time and attention to the work of a diver's tender.

9.9.6. Standby Diver

Where a standby diver is needed, the standby diver shall:

- a) be trained and equipped to operate at the depth at which and in the circumstances in which a submerged diver is operating;
- b) be readily available to assist the submerged diver in the event of an emergency; and
- c) not dive or be required to dive except in an emergency.

9.9.7. Boat Operator

In addition to the two person dive team, a qualified boat operator must be present at any dive carried out from a boat or vessel.

9.10. Additional Safety Equipment

9.10.1. Knives

All DFO divers must wear a sheathed and sharpened knife when diving.

It is strongly recommended that knives be worn on or above the waist.

9.10.2. Lifeline

If a lifeline is required by the dive plan, it must:

- a) be free of knots and splices, other than knots and splices necessary to attach the lifeline to the diver and the dive site;
- b) have a breaking strength of not less than 1400 kg;
- c) be secured to the diver so as to prevent loss of contact with the diver; and
- d) be secured at the surface to a safe point of anchorage.

A lifeline shall always be used in dives taking place under ice.

A lifeline must be tended at all times by a diver's tender.

9.10.3. Surface Equipment

Where identified by the dive plan, the following equipment must be present on the dive site:

- a) dive tables;
- b) first aid kit;
- c) demand-type oxygen dispensing system;
- d) adequate quantity of oxygen;
- e) additional full air cylinders;
- f) surface communications equipment sufficient to contact medical assistance while still in the field; and
- g) rope.

9.11. Signals Displayed while Diving

Whenever diving operations are being conducted in areas in which marine traffic is probable, the Diver-in-Charge shall ensure that the following signals are prominently displayed from a vessel, boat, pier or another conspicuous object:

- a) the International Code Flag A, hoisted from any vessel, boat or platform used in support of a dive in such a manner as to ensure all-round visibility of the dive site; and
- b) a diver's buoy for each free-swimming dive team.
- c) for night dive operations the diver's buoy should be equipped with:
 - i. a light, in which case the light shall be yellow and flashing, and
 - ii. reflecting material, in which case the reflecting material shall be yellow.

9.12. Unfit to Dive

If a diver considers himself or herself unfit to dive owing to illness, fatigue or any other cause, the diver shall inform the Diver-in-Charge of this fact.

A Diver-in-Charge shall not permit the diver to dive.

9.13. Adherence to Planned Depth-Time Procedures

Diving operations, repetitive dives, and treatment of divers shall be carried out in strict accordance with approved tables and procedures. Except in the case of accidents or unavoidable circumstances, a diver shall not be permitted to remain at any depth longer than the maximum time planned for that depth nor to reach a greater depth than the maximum depth planned for that dive.

9.14. Termination of Dive

The diver should not proceed with a dive if:

- a) the Diver-in-Charge requests termination;
- b) a diver requests termination;
- c) a diver loses contact with or fails to respond correctly to communications from a buddy team member;
- d) a diver fails to respond correctly to communications from the tender;
- e) a diver's primary breathing supply fails;
- f) a diver is aware of any sign of malfunction of gear or sign or symptom of distress; or
- g) any dive team member is aware of any unusual or unplanned situation which threatens the health or safety of any dive team member.

9.15. Diving from CCG Vessels

The Master of every vessel from which divers are deployed, shall have overall responsibility for all diving operations conducted from the vessel.

The diving protocol contained within section 7.D.16 of the CCG Fleet Safety Manual will be used to screen divers prior to their deployment.

The master shall have the authority to terminate any diving operation which may endanger the vessel, its crew, or those involved in the diving operation.

The vessel shall not be moved or relocated while a diver is in the water unless the Diver-in-Charge agrees to the move or relocation.

Vessel inspection is outside the parameters of a Type 1 dive, and the procedures contained in Chapter 11 must be used for this type of operation.

9.16. Floating Platforms

When a floating platform, vessel or boat is used in support of the dive, it must remain on site at all times while a diver is in the water.

9.17. Elevated Entries

Whenever diving operations are carried out from a diving station located more than 2 m above the water, the divers must be transported through the air-water interface by a cage, basket or platform.

This equipment and any associated hoisting devices and tackle must be:

- a) used for the purpose for which they were designed; and
- b) do not in themselves create a hazard.

Any cage, basket or platform and any associated equipment shall be dedicated to the diving operations until the dive is completed.

9.18. Flying After Diving

A diver cannot fly at altitudes greater than 300 m above the altitude of the dive site unless the following period of time has elapsed:

- a) 12 hours following a no-decompression dive or time required by tables or whichever is greater;
- b) such time as is specified by a physician who treated the diver for a pressure-related injury.

If low level flying is required for transporting divers between dive sites, altitude procedures can be used to ensure an extra margin of safety.

9.19. Observation After Diving

The Diver-in-Charge shall ensure that, on completion of a dive, a diver remains under observation for at least one hour to ensure the safety and health of the diver.

9.20. Incident/Accident Reporting

Unusual incidents, emergencies or accidents must be logged by the diver on the form provided in the Diver Log Book. This information must be forwarded immediately to the Area Diving Safety Officer and thereafter to the Regional and Departmental Diving Safety Officers.

Accidents must also be reported as outlined in the Departmental Occupational Safety and Health Loss Control Manual.

9.21. Diving after Treatment for a Pressure-related Illness

Any diver who has suffered pressure-related illness shall not dive unless approval for further diving is given by a medical officer.

Chapter 10. SPECIAL OPERATIONAL PROCEDURES AND REQUIREMENTS – TYPE 1 DIVES

10.1. Purpose

This chapter establishes the procedures and requirements that apply to underwater activities that fall outside the excursion or equipment restrictions outlined in Chapter 9.

10.2. Special Procedures

Special procedures are needed when it is recognized that an underwater project falls outside the restrictions outlined in Chapter 9. As required, the project shall be analysed and written procedures shall be established to identify the additional risks, instruction, training, competency, equipment, operational requirements and minimum crew needed for the dive.

Prior to commencing specialty operations, these written procedures shall be submitted to the Regional Diving Safety Officer who will distribute them to the Regional Diving Safety Committee for review and approval.

Thereafter, they can then be submitted to the Departmental Diving Safety Committee for final approval and inclusion in this chapter.

10.3. Specialty Operations

Potentially hazardous conditions which warrant special equipment, techniques, and/or skills and which require additional training, include but are not limited to:

- a) deep diving (10.4);
- b) night diving (10.5);
- c) ice diving (10.6);
- d) enriched air nitrox (EANx) diving (10.7);
- e) surface supplied diving (10.8);
- f) towed diving (10.9);
- g) contaminated environment diving (10.10).

Decompression dives are prohibited during all type 1 specialty operations.

10.3.1. Specialty Approval

To receive DFO approval for specialty operations, the employee shall:

- a) be a DFO approved diver;
- b) have received the instruction and training required to perform the specialty dive;
- c) be declared competent to perform the specialty dive by the Area Diving Safety Officer or his/her designee.

10.3.2. Re-Qualification

In order to re-qualify for a DFO specialty approval, employees shall on an annual basis, demonstrate competency for the types of dives in which they will participate.

10.4. Deep Diving

Deep Diving is defined as a dive conducted at a depth between 20 and 40 metres.

The maximum depth for a Type 1 Deep Dive is 40 metres.

10.4.1. Additional Risks

There are additional risks associated with Deep Diving. These risks include:

- a) air depletion due to an increased rate of air consumption;
- b) decompression illness due to increased gas loading;
- c) nitrogen narcosis due to increased gas loading;
- d) over exertion due to increased gas density;
- e) a loss of thermal protection capability due to suit compression; and
- f) a decrease in visibility due to depth.

10.4.2. Instruction and Training

Deep Diver instruction and training shall include at least four dives and the following topics:

- a) the proper use of the DCIEM tables;
- b) gas consumption calculations for increased depth;
- c) proper Deep Diving techniques, which shall include: top-side coordination, dive team deployment, descents, buddy contact, air management, safety stops, emergency decompression procedures, ascents;
- d) the signs, symptoms and treatment of pressure-related injuries; and
- e) a review of the therapeutic use of oxygen and the equipment used to dispense it.

10.4.3. Competency Requirements

In order to be declared competent to perform Deep Dives, the diver shall be able to:

- a) plan a Deep Dive using the DCIEM tables;
- b) execute a descent, when possible, using a tactile or visual guide (either a line or sloping bottom);
- c) ascend at a rate not to exceed the ascent rate specified by the table used (e.g., 60 fpm or 18 mpm) using a depth gauge and timing device (or a dive computer with ascent rate indicator);
- d) perform at least a three-minute safety stop at 5 metres before surfacing;
- e) execute an alternate air source ascent, with buddy's alternate air source from 5 metres, when possible, using a tactile or visual guide (either a line or sloping bottom); and
- f) simulate a pressure-related incident and rescue.

10.4.4. Equipment Requirements

In addition to the equipment required for general operations (see Chapter 9), the following shall be used whenever a diver is working deeper than 20 metres:

- a) plastic version of DCIEM tables;
- b) reserve air supply;
- c) redundant regulator; and
- d) first aid kit and O₂.

10.4.5. Operational Requirements

- a) For dives greater than 20 metres, the risk of decompression illness increases and for this reason, oxygen equipment and an adequate quantity of oxygen must be immediately available at the dive site.
- b) Should the dive exceed 30 metres, a reserve air supply must be carried by each diver.
- c) Free dives through the water column should be avoided on deep dives. Where structure is not available to guide in the descent a shot line should be utilized.
- d) Appropriate exposure protection shall be considered and if necessary a dive light should be carried.

10.4.6. Minimum Crew

At least three persons shall be present during all Deep Diving operations and shall be deployed as follows:

- a) two shall be divers, one of whom shall be designated as the Diver-in-Charge; and
- b) one shall control the site and this person shall not enter the water.

10.5. Night Diving

Night Diving is defined as any dive, taking place between sunset and sunrise.

The maximum depth for Night Diving is 30 metres.

Should the night dive exceed 20 m, the diver shall also be deep diver approved.

10.5.1. Additional Risks

There are additional risks associated with Night Diving. These risks include:

- a) disorientation and buddy separation underwater; and
- b) an increased level of stress due to darkness.

10.5.2. Instruction and Training

Night Diver instruction and training shall include at least three dives and the following topics:

- a) avoiding and coping with stress;
- b) proper buddy separation procedures;
- c) underwater navigation at night;
- d) proper Night Diving techniques (i.e. top-side coordination, dive team deployment, descents, buddy contact, communication, light failure protocols, disorientation, use of diver recall signals, ascents); and
- e) the proper use and maintenance of dive lights.

10.5.3. Competency Requirements

In order to be declared competent to perform Night Dives, the diver shall be able to:

- a) demonstrate how to avoid and cope with stress, and proper buddy separation procedures;
- b) execute a descent, when possible using a tactile or visual guide (either a line or sloping bottom);

- c) demonstrate how to communicate with hand signals and dive lights;
- d) demonstrate the proper use of a personal dive light, submersible pressure gauge, compass, timing device and depth gauge at night;
- e) navigate to a predetermined location using a compass/natural features and return to the starting point;
- f) demonstrate proper buddy procedures by maintaining buddy contact throughout the Night Dive; and
- g) perform an ascent, when possible using a tactile or visual guide (either a line or sloping bottom).

10.5.4. Equipment Requirements

In addition to the equipment required for general operations (see Chapter 9), the following shall be used whenever the diver is working at night:

- a) a primary dive light;
- b) a back up dive light;
- c) a whistle;
- d) navigation/orientation surface lights, and
- e) a diver recall signal device.

10.5.5. Operational Requirements

Navigation/orientation surface lights may include existing, permanent shore lights for orientation, strobe lights, or required lighting when diving from a vessel.

When diving from any vessel, boat or platform at night three vertical lights shall be hoisted to ensure all-around visibility. The highest and lowest of these lights shall be red and the middle light shall be white.

10.5.6. Minimum Crew

At least three persons shall be present during all Night Diving operations and shall be deployed as follows:

- a) two shall be divers one of whom shall be designated as the Diver-in-Charge; and
- b) one shall control the site and this person shall not enter the water.

10.6. Ice Diving

Ice Diving is defined as any dive in, through, under, or in the vicinity of ice.

Should the ice dive exceed 20 m, the diver shall also be deep diver approved.

10.6.1. Additional Risks

There are additional risk associated with Ice Diving and these risks include:

- a) increased risk of entrapment while working in an overhead environment;
- b) impact with underside of the ice; and,
- c) regulator free flow due to super cooling.

Additional risk factors are associated with site preparation and involve the use of chain saws, wrecking bars and ice tongs in a slippery environment.

10.6.2. Instruction and Training

Ice Diver instruction and training shall include at least three dives and the following topics:

- a) site preparation and safe use of associated tools;
- b) line signals and basic rigging;
- c) configuring a bail-out air supply and regulator;
- d) cold water regulator and free flow procedures;
- e) tender duties; and,
- f) dry suit diving.

10.6.3. Competency Requirements

In order to be declared competent to perform ice dives, the diver shall be able to:

- a) demonstrate (prior to participation in an ice dive) competency in the use of a dry suit;
- b) demonstrate a thorough knowledge of, and carry out the safe use of associated tools in site preparation;
- c) demonstrate a thorough knowledge of, and the ability to use line signals in ice diving;
- d) demonstrate a thorough knowledge of, and carry out equipment configuration for ice diving to include, harnesses, bail-out air supply and line attachment; and
- e) demonstrate a thorough knowledge of, and carry out tender duties for ice diving.

10.6.4. Equipment Requirements

In addition to the equipment required for general operations (see Chapter 9), the following shall be used whenever the diver is working under ice:

- a) ice harnesses;
- b) carabineers;
- c) 50 metre 3/8" diver's lifeline;
- d) 75 metre 3/8" polypropylene stand-by line;
- e) redundant air supply; and
- f) environmentally sealed regulators.

Depending on the circumstance of the diving operation and the environmental conditions expected, surface support equipment may be required. Specifically,

- a) chain saw with ice chain;
- b) wrecking bars;
- c) ice tongs;
- d) ice screws;
- e) modular tentage;

- f) diesel/kerosene heaters; and
- g) shovels.

10.6.5. Operational Requirements

All personnel operating at or around the hole shall wear a floater suit or jacket and ice harness.

The lifeline shall be attached to the diver's harness by locking carabineer A bight will be tied in the line at the divers end with a figure-eight knot. The knot will be reinforced with use of tie-wraps or duct tape.

The standby diver shall have a buoyant emergency rescue line 30% longer than the lifeline being used by the primary diver.

The stand-by diver will be fully dressed (exception of mask) and immediately ready for the water in all ice diving operations.

In situations where free-swimming operations are occurring in areas where there is ice movement, a constant surface vigil shall be maintained and a diver recall system deployed.

10.6.6. Minimum Crew

At least three persons shall be present during all Ice Diving operations and shall be deployed as follows:

- a) two shall be divers, one of whom shall be a standby diver; and
- b) one shall control the site and this person shall not enter the water.

10.7. Enriched Air Nitrox (EANx) Diving

This procedure was written in accordance with the DAN Nitrox Workshop Consensus Recommendations, November 3-4, 2000.

Enriched Air Nitrox (EANx) Diving includes any dive where the breathing gas used is 22% to 40 % oxygen (O₂), with the remaining percentage of the gas being nitrogen (N₂).

Breathing gas with an oxygen content higher than 40% shall not be used.

Should the Nitrox Dive exceed 20 m, the diver shall also be deep diver approved.

10.7.1. Additional Risks

There are additional risks associated with the use of EANx. The most common of which is oxygen toxicity. This is the result of exposure to a high partial pressure of O₂, generally caused by inaccurate gas analysis or by exceeding the maximum operating depth of a specific nitrox mix.

Due to the presence of 100% O₂ at a filling station there is the additional risk of fire and explosion when blending EANx.

10.7.2. Instruction and Training

Instruction and training in the use of EANx shall include at least two dives and the following topics:

- a) application, advantages and disadvantages;
- b) signs and symptoms of oxygen toxicity;

- c) DCIEM or NOAA partial pressure & exposure time limits;
- d) oxygen exposure calculations;
- e) maximum operating depth (MOD) calculations;
- f) optimal gas mix equation;
- g) equivalent air depth (EAD) concept and calculations;
- h) use of EANx tables;
- i) equipment concerns and marking; and,
- j) gas analysis.

10.7.3. Competency Requirements

In order to be declared competent to perform nitrox dives, the diver shall be able to:

- a) calculate oxygen CNS% for a specific time and depth;
- b) perform required calculations to determine O₂ exposure, MOD, and optimal gas mix;
- c) calculate EAD for two EANx mixes;
- d) demonstrate use of EANx tables in a repetitive dive using two different EANx mixes; and
- e) demonstrate use of an O₂ analyzer on two different EANx mixes.

10.7.4. Equipment Requirements

In addition to the equipment required for general operations (see Chapter 9), the following equipment is required for a nitrox dive:

- a) O₂ analyzer;
- b) EANx dedicated and labeled cylinders; and
- c) approved EANx tables for the gas mix being used.

10.7.5. Operational Requirements

The partial pressure O₂ exposure limit for any diver shall not exceed 1.6 ATA.

Divers shall conduct their own analysis of the nitrox in each cylinder they intend to dive. The O₂ content and MOD of the mix shall be duly noted on both the cylinder and in the nitrox log at the filling station.

Gas blending shall only be undertaken by trained and qualified personnel.

The Departmental Diving Safety Officer shall approve the EANx tables used.

10.7.6. Minimum Crew

The minimum crew for an EANx dive not in excess of 20 metres is two (2).

Minimum crew for a deep EANx dive (20 to 40 metres) is three (3). Personnel shall be deep dive qualified and will be deployed in accordance with section 10.4.5.

10.8. Surface Supply Diving

Surface Supply Diving is any operation where the diver is supplied with breathing gas by an umbilical from the surface.

Should the Surface Supply Dive exceed 20 m, the diver shall also be deep diver approved.

10.8.1. Additional Risks

Surface supplied diving can provide a greater margin of safety than open-circuit free swimming Scuba for certain applications such as those described in section 10.10. Numerous redundant safety systems, hard-wire communication and protection from contaminants can enhance diver safety. However additional instruction, training, equipment, and competency are required to assure safe surface supply diving.

10.8.2. Instruction and Training

Instruction and training for surface supplied diving shall include at least ten dives and the following topics:

- a) operational use of the DSI Superlite series of demand diving helmets;
- b) operational use of the Divator IIG (AGA) full-face mask with harness block bail-out assembly;
- c) operational use of both 2-wire and 4-wire divers communication system;
- d) operational use of a divers air delivery manifold, including umbilical line pressure calculations for depth;
- e) tender duties and responsibilities;
- f) line pull signals;
- g) emergency procedures; and
- h) first line maintenance of surface supplied diving equipment.

10.8.3. Competency Requirements

In order to be declared competent to conduct surface supplied operations the diver shall be able to:

- a) demonstrate a thorough knowledge of and the ability to carry out pre-dive site set-up and equipment pre-dive checks on a manifold, umbilical, helmets, masks, harness blocks and communications equipment.
- b) as tender, demonstrate a thorough knowledge of and carry out dress-in procedure for a surface supplied diver.
- c) as tender, demonstrate umbilical handling from a figure-eight coil, line signals and emergency procedures.
- d) demonstrate a thorough knowledge of and carry out manifold operations for surface supplied diving, including line pressure calculations and emergency procedures.
- e) as a diver, demonstrate a thorough knowledge of and the ability to perform surface supplied diving with a demand diving helmet and full-face mask with harness block, including emergency procedures and line signals.
- f) as a stand-by diver demonstrate a thorough knowledge of and the ability to carry out emergency procedures in cases of trapped and unconscious diver.
- g) demonstrate a thorough knowledge of and the ability to carry out post-dive procedures and first-line maintenance on surface supplied diving equipment.

10.8.4. Equipment Requirements

The Regional Diving Safety Officer shall approve all surface supplied diving equipment for use.

All diving helmets and surface supply diving masks shall be fitted with non-return valves and shall be checked daily before the commencement of diving operations in accordance with manufacturer's recommendations.

Surface supply equipment shall include a voice communication system between the diver and the surface that shall allow the diver's breathing to be heard at the surface.

The life support umbilical shall incorporate a lifeline rigged to prevent stress on the air line.

Each diver shall carry a reserve breathing supply appropriate for the dive.

10.8.5. Operational Requirements

An emergency signal system shall be in effect during a diving operation to supplement the primary communication system.

Surfaced supplied live boating is prohibited unless written approval is obtained from the Departmental Diving Safety Officer.

10.8.6. Minimum Crew

There shall be at least three (3) persons present at a surface supply dive site, specifically:

- a) diver;
- b) stand-by diver / tender;
- c) Diver-in Charge / manifold operator

For the duration of the surface supply dive, the diver's tender shall devote his or her full attention to the work of a diver's tender.

For the duration of the dive the manifold operator shall devote his or her full attention to the duties of operating the manifold, communications box and supervising the dive.

Except in an emergency, each surface supply diver in the water shall have a separate diver's tender.

10.9. Towed Diving

Towed Diving permits a rapid and systematic bottom survey to be conducted in clear shallow water.

10.9.1. Additional Risks

There are additional risks associated with the use of towed diver sleds. These risks include:

- a) pulmonary over-inflation injury due to rapid uncontrolled ascent;
- b) decompression sickness due to rapid uncontrolled ascent;
- c) eardrum rupture due to uncontrolled decent or inability to valsalva; and
- d) physical injury resulting from impact with u/w objects or the bottom.

10.9.2. Instruction and Training

Instruction and training in the use of towed diver sleds shall include:

- a) safe boating operation for towed diver sledding;
- b) application and restrictions for towed diver sledding;
- c) planning an underwater search with sleds;
- d) types of sleds;
- e) ascending and descending procedures while sledding; and
- f) emergency and lost diver procedures.

10.9.3. Competency Requirements

In order to be declared competent to conduct underwater sledding operations the diver shall:

- a) demonstrate a thorough knowledge of and carry out a site survey for towed diver operations including, maps, charts and depth soundings;
- b) as a diver, demonstrate and carry out safe sledding operations; and
- c) as boat operator, demonstrate a thorough knowledge of safe boat handling respective to towed diver operations.

10.9.4. Equipment Requirements

In addition to the equipment required for general operations (see Chapter 9), the following equipment is also required for towed diver sledding:

- a) approved underwater sled;
- b) 3/8" polypropylene line;
- c) hand held depth sounder or hand lead-line;
- d) area charts or maps; and
- e) lost diver line.

10.9.5. Operational Requirements

Sledding shall not be conducted where underwater visibility is less than 6 metres.

The Stand-by diver shall be fully dressed and ready for the water.

10.9.6. Minimum Crew

Minimum crew to conduct under-water sledding operations is four (4), and shall be deployed as follows:

- a) diver;
- b) stand-by diver;
- c) spotter; and
- d) boat operator.

The Diver-in-Charge shall act as spotter or boat operator.

10.10. Contaminated Environments

Water pollution has become a not-uncommon obstacle for DFO divers and it is therefore important to recognize and analyse the risks.

Contaminants can manifest themselves in a variety of pollutants and sewage effluent that can contain pathogenic microorganisms and toxic chemicals and these risks have increased drastically over recent years.

Where contamination is suspected, expert advice shall be obtained prior to diver deployment and this should involve consultation with a Health Canada Physician.

In all cases, DFO personnel who have a dive project at a contaminated site shall have written permission from the Regional Diving Safety Officer prior to proceeding with the work.

Should the Contaminated Environment Dive exceed 20 m, the diver shall also be deep diver approved.

10.10.1. Additional Risks

There are additional risks associated with Contaminated Environment Diving. These risks include:

- a) biological hazards;
- b) chemical hazards; and
- c) thermal hazards.

10.10.1.1. Biological Hazards

Microbial pathogens such as bacteria, viruses, worms, protozoa, fungi, and algae may occur naturally within the specific environment or they may have been introduced into the area via an external source such as sewage or chemical wastes from industrial sources, commercial ships, or agricultural run-off. The risks these hazards may carry for the diver include:

- a) ear/eye infections;
- b) respiratory tract infections;
- c) inflammation of the intestinal tract;
- d) warts or skin infections;
- e) parasitic infections;
- f) central nervous system effects; and
- g) systemic or pulmonary fungus infections

10.10.1.2. Chemical Hazards

Chemical and petroleum product spills occur as a result of incidents involving the collision of commercial vessels or in other marine accidents, such as oil well blowouts and spills from storage facilities. Industrial chemicals commonly found in polluted water include:

- a) phosphates;
- b) chlorates;
- c) peroxides;
- d) acids; and

- e) solvents (benzene, xylene, toluene).

A diver is likely to have one or more of the following physical reactions to a toxic chemical exposure:

- a) upper respiratory tract infection;
- b) difficulty in breathing;
- c) skin reactions;
- d) nausea;
- e) burns;
- f) severe allergic reactions;
- g) tingling of the limbs; and
- h) headache, dizziness, confusion.

10.10.1.3. Thermal Hazards

The majority of divers who encounter hyperthermia problems will be those persons who are working in tropical waters or in the heated environment normally found in cooling water out-falls. Warm to hot water can also contain higher than normal levels of pathogenic organisms, necessitating additional layers of protective clothing and equipment. Heat prostration may also occur because divers are generally unaware of the extent of their own overheating and may not exhibit the signs or symptoms of hyperthermia until after their core temperature has risen to a level that is considered medically unsafe. The dangers of hyperthermia can present as:

- a) rapid pulse;
- b) vomiting;
- c) convulsions;
- d) unconsciousness; and
- e) death.

10.10.2. Instruction and Training

Instruction and training of a diver in preparation for exposure to contaminated water conditions should include the following topics:

- a) recognition of contamination hazards (biological, chemical and thermal);
- b) pre-exposure medical precautions;
- c) appropriate equipment selection criteria;
- d) polluted-water diving procedures and precautions; and
- e) decontamination procedures.

10.10.3. Competency Requirements

In order to be declared competent to conduct diving operations involving contaminated water sites, the diver shall be able to:

- a) demonstrate the ability to identify a dive site which would raise a contamination concern;

- b) demonstrate a thorough knowledge of, and an ability to carry out safe polluted-water diving procedures and precautions; and
- c) demonstrate a thorough knowledge of, and an ability to carry out all required decontamination procedures.

10.10.4. Equipment Requirements

Once an area is known to be contaminated it is then necessary to determine the type, concentration and degree of hazard that the pollutant presents to the diver. Expert advice shall be obtained and this information shall be recorded. Knowing the level of risk and the type of contaminant will facilitate the decision regarding what type of equipment will be most appropriate for the dive exposure. Standard SCUBA equipment affords little protection for the diver working in a contaminated environment because it allows the diver's mouth, eyes, and ears to be directly exposed to the water. This situation allows water droplets to be drawn into the diver's mouth and on into the respiratory tract. Therefore, the diver is vulnerable via inhalation and ingestion, as well as skin, eye, and ear contact.

The ideal dress for a diver who will be exposed to a contaminated dive site will be a drysuit complete with attached hood, boots, gloves and full face mask.

In extreme cases, the diver shall use a surface supply dive system incorporating a full-face mask or helmet. Airborn contaminants at the site should be considered and a high-pressure air bank may be needed, rather than a local air compressor.

If the diver cannot be adequately protected from the pollutant hazard at the intended site with the equipment available to the dive team, then the dive shall not take place. Therefore in addition to the equipment required for required for general operations (see Chapter 9), the following shall be used whenever a diver is working within a contaminated environment:

- a) a full face mask or helmet;
- b) a drysuit with attached boots and hood as a minimum;
- c) any other equipment required to keep the diver protected;
- d) suitable apparel and equipment shall be worn to prevent exposure of surface support personnel to any contaminate;
- e) appropriate equipment at the surface of the dive site, to allow for effective decontamination of personnel; and
- f) a contingency plan for emergencies shall be made and be available at the dive site and will include:
 - i. measures to decontaminate the diver rapidly, at least partially, and
 - ii. to institute resuscitation and treatment;
 - iii. measures to prevent contamination of surface staff;
 - iv. measures to minimize contamination of surface equipment;
 - v. notification to the physician of an emergency involving contamination;
 - vi. notification to the emergency hospital facility that a diver who is injured, and has been contaminated with specific and/or nonspecific contaminants is being sent to the facility; and
 - vii. notification to the ambulance or emergency transport service that the diver/victim is contaminated.

10.10.5. Operational Requirements

10.10.5.1. Dive Plan

Before diving commences in a contaminated environment, an operational plan shall be produced and it shall identify:

- a) the contaminants present;
- b) any special clothing or equipment to be used;
- c) the potential adverse health effects to persons and special medical precautionary measures;
- d) the exclusion zone, contamination reduction zone, support zone including the protective clothing and equipment to be used in them;
- e) the procedures to be followed by personnel when moving from one zone to another;
- f) the special first aid measures associated with exposure to the specific contaminants; and
- g) the emergency telephone numbers to secure qualified assistance within adequate response times.

This plan shall be available at the dive site.

10.10.5.2. Diver-in-Charge

The Diver-In-Charge shall ensure that:

- a) emergency breathing apparatus is provided for surface support personnel if there is risk of inhaling dangerous contaminants during the diving operations;
- b) suitable apparel and equipment is worn by surface support personnel to prevent exposure to contaminants;
- c) an appropriate means of safely decontaminating personnel is available at the dive site;
- d) the dive site has the means and facilities to safely dispose of contaminated clothing and equipment;
- e) all diving systems and equipment exposed to the contaminant are inspected for deterioration before each dive;
- f) diaphragms of the first and second stage regulators and associated exhaust valves are inspected for deterioration before each dive; and
- g) contaminated diving systems and equipment are not removed from the dive site unless authorized by the Diver-In-Charge, and are not used in any subsequent diving operation unless found free of all contaminants.

10.10.5.3. Surface Supply Equipment Requirements

Where appropriate for the degree of contamination; for dives in contaminated environments, the Diver-In-Charge shall ensure that divers use surface supply equipment including:

- a) a surface supply diving helmet designed and suitable for such work;
- b) a totally enclosed diving suit, made of nonabsorbent material which mates to the helmet with a positive seal and locking device;
- c) a two-way voice communication system; and
- d) protective devices, where practicable, to minimize contaminant exposure to diving equipment.

10.10.5.4. Contaminant Zones

For dives in contaminated environments, the following zones shall be established on site:

- a) a dedicated contamination reduction zone with suitable means to decontaminate personnel;
- b) a dedicated support zone with suitable means to decontaminate or dispose of apparel and equipment; and
- c) a dedicated exclusion zone to handle the contaminant, accessible only to authorized and protected personnel.

Workers entering the exclusion zone shall wear appropriate personal protective equipment.

Workers shall enter and leave the exclusion zone only through the contamination reduction zone.

No food, drink, or tobacco may be taken into the exclusion zone or the contamination zone.

10.10.6. Minimum Crew

A minimum crew of 4 workers shall be present at a diving operation in a contaminated environment, one of whom shall be a diver, one a diver-in-charge, one a diver's tender, and one a standby diver.

Chapter 11. SPECIAL OPERATIONAL PROCEDURES AND REQUIREMENTS – TYPE 2 DIVES

11.1. Purpose

This chapter outlines the procedures and requirements (in addition to those listed in Chapter 9) that must be followed for all Type 2 Dives performed by DFO divers.

Type 2 dives include but are not limited to:

- a) decompression dives (see restriction section 11.2.6);
- b) dives in the vicinity of underwater pressure differentials including water control and water intake facilities;
- c) dives related to the search, construction, repair or inspection of ships (includes cleaning transducers), bridge piers, wharves, dry docks, and underwater tunnels;
- d) dives that involve using underwater welding or cutting equipment or explosives; and
- e) dive rescue programs.

11.2. General Requirements

11.2.1. Approach to Water Control and Intake Facilities

Diving where underwater pressure differentials may be encountered is strictly prohibited unless the flow of water is stopped and not re-established until the diver leaves the water.

11.2.2. Boat Dive

For the duration of a Type 2 dive carried out from a boat or vessel, the dive boat operator must devote his or her entire time and attention to the work as a dive boat operator.

11.2.3. Use of Explosives

Use of underwater explosives by DFO divers is strictly prohibited unless written approval is obtained from the Departmental Diving Safety Officer.

In the event that approval is ever obtained, a two-way voice communication system must be used unless this equipment is in itself a hazard to the diver.

11.2.4. Machinery and Equipment

All machinery and equipment that could be a hazard to the diver must be secured against inadvertent movement and made inoperable for the duration of the dive.

11.2.5. Entrapment

Where there is a likelihood that a diver may be trapped, the Diver-in-Charge shall ensure that:

- a) a two-way voice communication system between the diver and the diver's tender is provided; and
- b) a second dive team, equipped to rescue a diver in the event of an emergency, is present at the dive site.

11.2.6. Decompression Dives

Decompression dives are strictly prohibited unless written approval is obtained from the Departmental Diving Safety Committee.

11.2.7. Hyperbaric Chamber

If decompression dives are approved, a hyperbaric chamber meeting the requirements of CSA Standard CAN/CSA Z275.1-93 must be available and in operable condition.

The hyperbaric chamber must be operated by a qualified person.

11.2.8. Alternative Energy Sources

If any life support equipment used at the dive site has a power source requirement then a second source must also be available and be capable of being rapidly brought on line.

11.3. Scuba Dives

11.3.1. Tethered

In a diving operation where the diver is tethered to the surface by a lifeline or float, there shall be at least three persons present at the dive site, of whom:

- a) one is a standby diver; and
- b) one is a diver's tender.

The Diver-in-Charge of a Type 2 Scuba diving operation must remain on the surface.

11.3.2. Untethered

In a Type 2 Scuba diving operation where the diver is not tethered to the surface by a lifeline or float, there shall be:

- a) a through-water, two-way voice communication system between the divers and the surface; and
- b) at least four persons present at the dive site, of whom:
 - i. three are divers, one of whom is a standby diver; and
 - ii. one is a diver's tender.

The Diver-in-Charge of a Type 2 Scuba diving operation must remain on the surface.

11.4. Surface Supply Diving

All requirements contained in section 10.8 with respect to a Type 1 surface supplied dive shall be followed for Type 2 surface supplied dives.

11.4.1. Minimum Crew

There shall be at least three (3) persons present at a surface supply dive site, specifically:

- a) diver;
- b) stand-by diver / tender;
- c) Diver-in Charge / manifold operator.

For the duration of the surface supply dive, the diver's tender shall devote his or her full attention to the work of a diver's tender.

For the duration of the dive the manifold operator shall devote his or her full attention to the duties of operating the manifold, communications box and supervising the dive.

Except in an emergency, each surface supply diver in the water must have a separate diver's tender.

11.5. Hull Inspection

Hull inspection diving may be necessary due to a known problem or it may be requested in order that a vessel's Captain or Chief Engineer can generate an up-to-date pre-sailing report on the state of the vessel's hull. The work may take several paths and require a variety of pre-dive plans. The tasks requested may be anything from a simple report based on a Close Visual Inspection (CVI) to the repair, removal or cleaning of a specific component. In all cases, when a dive crew is assembled to carry out work on a ship's hull, the work must be planned, and then conducted according to the plan.

11.5.1. Additional Risks

There are additional risks associated with Hull Inspection Diving. These risks include:

- a) increased risk of entrapment while working in an overhead environment;
- b) increased risk of being crushed while working between the bottom of the vessel and the seabed;
- c) hand lacerations due to marine growth on the hull;
- d) working in the vicinity of the ship's intake, discharge and propulsion systems;
- e) over exertion due to increased workload caused by long swims; and
- f) loss of buoyancy control, i.e. falling from the bottom of the vessel to the seabed.

11.5.2. Instruction and Training

Hull Inspection diver instruction and training should include the following topics:

- a) ship's nomenclature;
- b) reporting terminology;
- c) switching to back-up air supply;
- d) emergency recovery to surface support vessel or area; and
- e) buoyancy control.

11.5.3. Competency Requirements

In order to perform Hull Inspection Dives, the diver must be able to:

- a) demonstrate a knowledge of a ship's nomenclature;
- b) demonstrate the rigging arrangements commonly used during hull surveys;
- c) communicate via line signals;
- d) demonstrate the emergency contingencies contained in the pre-dive plan; and
- e) maintain a specified depth by controlling buoyancy.

11.5.4. Equipment Requirements

In addition to the equipment required for general operations (see Chapter 9), the following must be used whenever a diver is working under the hull of a ship:

- a) a bail out bottle; and
- b) any tools identified in the dive plan.

11.5.5. Operational Requirements

11.5.5.1. Dive Plan

Prior to any diving, a survey of the location shall be conducted and the following considered:

- a) the clearance between the bottom of the ship and the seabed;
- b) the current and tidal influences at the location;
- c) the visibility of the location;
- d) the weather, prevailing and expected, must be acceptable for the dive exposure.

Prior to the commencement of diving operations, the dive crew shall meet with the Vessel Master and the Chief Engineer to discuss and finalize the dive plan and implement safety plans. At this meeting, the ship plans/drawings will be consulted in order to familiarize the dive crew with construction of the ship's hull.

In conjunction with Chief Engineer, the Diver-in-Charge shall ensure intakes and propulsion systems are locked out.

Flags and shapes shall be hoisted and the ships compliment shall be advised that diving is about to commence.

All over-the-side working shall cease until the dive operation is complete.

As a pre dive requirement, the Diver-in-Charge must ensure that every member of the dive team is familiar with the dive plan, that all members of the dive team agree on signals and emergency procedures, and that all the necessary equipment is available and in good operating condition.

11.5.5.2. Tethered Dives

Where the diver is tethered to the surface by a lifeline or float, there shall be at least three persons present at the dive site and shall be deployed as follows:

- a) two shall be divers, one of whom shall be the standby diver; and
- b) one shall be the diver's tender.

A voice communication system sufficient to monitor the diver's breathing must be used.

11.5.5.3. Untethered Dives

Where the diver is not tethered to the surface by a lifeline or float, there shall be a through-water, two-way voice communication system between the divers and the surface, and at least four persons present at the dive site and shall be deployed as follows:

- a) three shall be divers, one of whom shall be the standby diver; and
- b) one shall be the diver's tender.

11.5.5.4. Diver-in-Charge

The person not diving shall be designated as the Diver-in-Charge. This person will control the site and shall not enter the water.

Annex A Regulatory Concordance

Regulations on Diving Operations (SOR/98-456), Canada Occupational Safety and Health Regulations Part XVIII, Canada Labour Code.	Fisheries and Oceans Canada Departmental Diving Safety Procedures.
Regulation Reference	Section Number Reference
18.1	2.1 Bottom Time 2.3 Contaminated Environment 2.4 Dive – Type 1 2.5 Dive – Type 2 2.7 Dive Tender 2.8 Diver 2.9 Diver-in-Charge 2.11 Diving Buoy 2.18 Hyperbaric Chamber 2.19 International Code Flag A 2.21 Liveboating 2.23 No-Decompression Limit 2.27 Surface Supply Dive 2.28 Therapeutic Recompression
18.2	— Not Applicable —
18.3 (1)	— Not Applicable —
18.3 (2)	— Not Applicable —
18.4 (1) (a)	Chapter 9 GENERAL OPERATIONAL PROCEDURES AND REQUIREMENTS – TYPE 1 AND TYPE 2 DIVES Chapter 10 SPECIAL OPERATIONAL PROCEDURES AND REQUIREMENTS – TYPE 1 DIVES Chapter 11 SPECIAL OPERATIONAL PROCEDURES AND REQUIREMENTS – TYPE 2 DIVES
18.4 (1) (b)	9.3 Hazards Chapter 10 SPECIAL OPERATIONAL PROCEDURES AND REQUIREMENTS – TYPE 1 DIVES Chapter 11 SPECIAL OPERATIONAL PROCEDURES AND REQUIREMENTS – TYPE 2 DIVES
18.4 (1) (c)	9.8 Emergency Procedures
18.4 (2)	9.8 Emergency Procedures
18.4 (3)	— Entire Document —
18.5 (1) (a) (b)	6.2.1 Diving 9.4 Specialized Equipment 10.3 Specialty Operations 10.4.2 Instruction and Training 10.5.2 Instruction and Training 10.6.2 Instruction and Training 10.7.2 Instruction and Training 10.8.2 Instruction and Training 10.9.2 Instruction and Training

Regulations on Diving Operations (SOR/98-456), Canada Occupational Safety and Health Regulations Part XVIII, Canada Labour Code.	Fisheries and Oceans Canada Departmental Diving Safety Procedures.
Regulation Reference	Section Number Reference
	10.10.2 Instruction and Training
18.5 (2)	6.3 Competency Requirements
18.5 (3)	6.3.5 Non-DFO Divers
18.6 (1)	6.2.2 First Aid and CPR
18.6 (2)	6.2.2 First Aid and CPR
18.7 (1) (a) (b)	5.2 Medical Requirements 5.3 Restrictions 9.12 Unfit to Dive
18.7 (2)	— Covered by OHAG—
18.7 (3)	5.3 Restrictions
18.7 (4)	5.2 Medical Requirements
18.8 (1)	9.12 Unfit to Dive
18.8 (2)	9.12 Unfit to Dive
18.9 (1) (a-l)	Annex B Pre-Dive Checklist
18.9 (2)	Annex B Pre-Dive Checklist
18.9 (3)	Annex B Pre-Dive Checklist 9.2.2 Decompression 11.2.6 Decompression Dives
18.10 (1)	9.9.1 Dive Team - Basic Requirement
18.10 (2)	9.9.2 Dive Team - Diver-in-Charge
18.10 (3)	10.8.6 Minimum Crew
18.10 (4)	9.9.7 Boat Operator
18.11	10.8.6 Minimum Crew
18.12	11.2.2 Boat Dive
18.13	11.3.1 Tethered 11.3.2 Untethered 11.4.1 Minimum Crew 11.5.5.2 Tethered Dives 11.5.5.3 Untethered Dives
18.14 (a) (b) (c)	9.9.6 Standby Diver
18.15 (a) (b) (c)	9.8 Emergency Procedures
18.16 (a) (b)	9.8 Emergency Procedures
18.17	9.13 Adherence to Planned Depth-Time Procedures 9.2.2 Decompression
18.18 (a) (b) (i) (ii)	9.11 Signals Displayed while Diving 10.5.5 Operational Requirements
18.19	9.9.2 Diver-in-Charge
18.20 (a) (b) (c) (d)	9.9.2 Diver-in-Charge
18.21	9.3 Hazards
18.22 (a) (b)	9.9.2 Diver-in-Charge 9.9.3 Communication
18.23 (1) (2)	9.7 Reserve Breathing Supply 9.7.1 Free-Swimming Scuba Deployment 9.7.2 Independent Air System 11.5.4 Equipment Requirements
18.24	7.5.1 Air Compressors

Regulations on Diving Operations (SOR/98-456), Canada Occupational Safety and Health Regulations Part XVIII, Canada Labour Code.	Fisheries and Oceans Canada Departmental Diving Safety Procedures.
Regulation Reference	Section Number Reference
	7.5.2 Breathing Air Standards 7.5.3 Air from Commercial Sources
18.25 (a) (b)	Annex B Pre-Dive Checklist 9.10.3 Surface Equipment 10.4.4 Equipment Requirements
18.26 (1) (a) (b)	Error! Reference source not found. Error! Reference source not found. 7.3 Maintenance Requirements 7.4 Defective Equipment
18.26 (2)	7.3 Maintenance Requirements
18.27 (1)	9.6 Equipment Check Annex B Pre-Dive Checklist
18.27 (2)	9.6 Equipment Check
18.28 (1)	9.17 Elevated Entries
18.28 (2) (a) (b)	9.17 Elevated Entries
18.28 (3)	9.17 Elevated Entries
18.29	9.15 Diving from CCG Vessels
18.30	9.16 Floating Platforms
18.31 (1) (a) (b) (c)	9.10.2 Lifeline
18.31 (2)	9.10.2 Lifeline 10.6.4 Equipment Requirements
18.31 (3)	9.10.2 Lifeline
18.32 (a) (b) (c)	7.7 Gauges
18.33 (1)	7.4 Defective Equipment
18.33 (2)	7.4 Defective Equipment
18.34 (a) (b) (c) (d) (e)	9.14 Termination of Dive
18.35	9.19 Observation After Diving
18.36 (1) (a) (b) (c)	9.18 Flying After Diving
18.36 (2)	9.8 Emergency Procedures
18.36 (3)	9.8 Emergency Procedures
18.37 (1)	8.3 Diving-Related Incident / Injury
18.37 (2)	8.3 Diving-Related Incident / Injury
18.38 (1)	8.4 Dive Records
18.38 (2) (a) (b) (c) (d) (e) (f) (g)	8.4 Dive Records
18.38 (3) (a) (b) (c)	8.4.1 Type I Dives
18.38 (4) (a) (b) (c) (d) (e) (f) (g)	8.4.2 Type 2 Dives
18.38 (5)	8.4.6 Record Keeping Duration
18.39 (1) (a) (b) (c) (d) (e) (f) (g)	8.4.3 Long Term Record Keeping
18.39 (2)	8.4.4 Provision of Dive Records 8.4.6 Record Keeping Duration
18.40	8.4.5 Instruction, Training & Competency
18.41	8.6 Records of Air Quality Tests
18.42	8.7 Records of Equipment Inspection, Test, Maintenance, & Calibration
18.43	11.2.1 Approach to Water Control and Intake Facilities
18.44	11.2.1 Approach to Water Control and Intake

Regulations on Diving Operations (SOR/98-456), Canada Occupational Safety and Health Regulations Part XVIII, Canada Labour Code.		Fisheries and Oceans Canada Departmental Diving Safety Procedures.
Regulation Reference		Section Number Reference
		Facilities
18.45		11.2.1 Approach to Water Control and Intake Facilities
18.46 (1) (a) (b)		11.2.1 Approach to Water Control and Intake Facilities
18.47 (2)		11.2.1 Approach to Water Control and Intake Facilities
18.47		11.2.4 Machinery and Equipment
18.48 (a) (b)		11.2.5 Entrapment
18.49 (1)		11.2.3 Use of Explosives
18.49 (2)		11.2.3 Use of Explosives
18.50 (a) (b)		11.2.7 Hyperbaric Chamber 11.2.6 Decompression Dives 9.2.1 Depth
18.51		11.2.7 Hyperbaric Chamber
18.52 (1)		11.2.8 Alternative Energy Sources
18.52 (2) (a) (b)		11.2.8 Alternative Energy Sources
18.53		— Not Applicable —
18.54 (a) (b)		10.8.6 Minimum Crew 11.4.1 Minimum Crew
18.55		10.8.6 Minimum Crew 11.4.1 Minimum Crew
18.56 (a) (b) (c)		9.2.1 Depth
18.57		10.8.6 Minimum Crew
18.58 (1) (a)		10.8.4 Equipment Requirements
18.58 (1) (b)		9.2.1 Depth
18.58 (2)		10.8.5 Operational Requirements
18.59		10.8.4 Equipment Requirements
18.60 (a) (b)		10.8.4 Equipment Requirements
18.61		10.8.4 Equipment Requirements
18.62 (a) (b) (c)		10.8.5 Operational Requirements
18.63		— Not Applicable —
18.64 (a) (b)		10.8.6 Minimum Crew 11.4.1 Minimum Crew
18.65 (a) (b)		11.3.2 Untethered
18.66		11.3.1 Tethered 11.3.2 Untethered
18.67 (1)		9.2.1 Depth
18.67 (2) (a) (b)		9.2.1 Depth

Annex B Pre-Dive Checklist

PRE-DIVE CHECKLIST

This list identifies dive plan requirements that must be reviewed by the dive team before each dive:

- ☐ Diver-in-Charge designated.
- ☐ If needed, dive tender(s) assigned.
- ☐ If needed, standby diver(s) assigned.
- ☐ Divers feel physically and mentally fit to dive.
- ☐ Duties of each dive team member understood.

- ☐ Surface & underwater conditions and hazards reviewed, control contingencies established.
- ☐ Emergency procedures reviewed.
- ☐ Dive termination protocols reviewed.
- ☐ Communication methods reviewed.
- ☐ Repetitive dive factor determined.
- ☐ No decompression limit determined.

- ☐ Diving equipment requirements established.
- ☐ Breathing supply requirements established.
- ☐ Reserve breathing supply requirements established.
- ☐ Thermal protection requirements established.
- ☐ If needed, lifeline requirements established.
- ☐ Emergency equipment requirements established.
- ☐ All diving equipment checked.

- ☐ **Checklist completion verified in log book.**

<p>After entering the water but before beginning descent, every diver shall check that all equipment is present, properly fastened, and functioning.</p>

Annex C Emergency Information Template

EMERGENCY RESPONSE & EVACUATION BY SITE

Emergency planning is an essential component of pre-dive planning and one of your responsibilities as a DFO diver. This page must be completed for each site and must be reviewed at least once a year.

Site Info

Site / Location: _____

Area Diving Safety Officer: _____

Ambulance

Phone: _____

Comment: _____

Hospital

Phone: _____

Contact Person: _____

Comment: _____

Hyperbaric Facility

Location: _____

Phone: _____

Contact Person: _____

Comment: _____

Divers Alert Network (DAN)

(919) 684-8111