

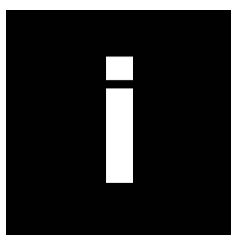
# Section 16 — Dive Supervisor's Course Workbook



Larson <sup>1</sup>

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# 1

## SECTION 1 – ROLE OF THE DIVE SUPERVISOR

### 1.1 ROLE OF THE DIVE SUPERVISOR

1.1.1 Name two primary responsibilities of the dive supervisor

- a) .....
- b) .....

### 1.2 LEGISLATION AND GUIDANCE STUDY QUESTIONS

1.2.1 Which Standard does ADAS training programs conform to as a minimum?

.....  
.....

1.2.2 List at least three examples of legislation or Standards directly applicable to diving.

- a) .....
- b) .....
- c).....

1.2.3 What are the requirements for a diver with overseas qualifications to be eligible to work as an occupational diver in Australia?

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1.2.4 What is the legal relevance of the Standard AS/NZS2299.1:1999 for a dive supervisor?

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## 2

# SECTION 2 - OCCUPATIONAL HEALTH AND SAFETY

## 2.1 LEGISLATION STUDY QUESTIONS

2.1.1 Explain the principle of duty of care and what this means in practical terms for both the employer and the employee.

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2.1.2 What is the general legislative structure in Australia and New Zealand?

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2.1.3 What legal status does AS/NZS 2299.1:1999 have in relation to occupational health and safety law?

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2.1.4 Which OHS Act applies to your location.

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2.1.5 Which regulatory authority is responsible for occupational health and safety in your location?

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## 2.2 FIRE, ACCIDENTS AND EMERGENCIES STUDY QUESTIONS

2.2.1 What are the three general categories of hazardous events?

- a) .....
- b) .....
- c).....

2.2.2 List hazardous events that could occur during a dive operation.

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2.2.3 What are the three common accident types resulting in worker's compensation claims?

- a) .....
- b) .....
- c).....

2.2.4 What are the three main steps to take when dealing with an emergency?

- a) .....
- b) .....
- c).....

2.2.5 What are the minimum first aid competencies required by a dive supervisor under AS/NZS 2299.1:1999?

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2.2.6 What types of accidents or incidents are reportable to management?

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2.2.7 What types of accidents or incidents are reportable by legislation to the relevant authorities?

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## 2.3 OHS RECORDS STUDY QUESTIONS

2.3.1 List the types of OHS records that need to be maintained.

[illegible]

## 2.4 ATTITUDES

## REFLECTION ACTIVITY - ATTITUDES

Reflect on a recent incident involving OHS. This may be an actual accident or incident at a dive site, a casual discussion or a formal meeting or training program on health and safety.

2.4.1 What message do you think your actions or words conveyed with regard to your own attitude to OHS?

.....

.....

#### 2.4.2 What strategies could you use to convey a positive and proactive attitude towards OHS?

[illegible]

# 3

## CHAPTER 3 - CALCULATIONS, DIVING PHYSICS AND PHYSIOLOGY

### 3.1 BREATHING GAS CALCULATIONS

- 3.1.1 Calculate the breathing gas requirements for a diver working at a depth of 27msw, performing a moderate task.

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- 3.1.2 Calculate the time available for the diver to perform the task at 27msw, assuming the use of a typical scuba cylinder of around 2.5m<sup>3</sup>.

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### 3.2 BUOYANCY CALCULATIONS

- 3.2.1 Calculate the buoyant force in seawater on an object that displaces a volume of 87 litres.

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- 3.2.2 If you are trying to lift an object that is at a depth of 10msw, weighs 150 kg and displaces 87 litres, how much air would need to be pumped into bags attached to the object in order to lift it (assuming no suction forces)?

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3.2.3 How much would this volume of air increase as the object was lifted?

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3.2.4 How much air would need to be released between 10msw and 5msw to maintain the same buoyant force on the object at 5msw as at 10msw?

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# 4

## SECTION 4 - MANAGE DIVING ILLNESSES AND MEDICAL EMERGENCIES

### 4.1 DIVING ILLNESSES AND INJURIES STUDY QUESTIONS

4.1.1 List five or more examples of barotrauma injuries.

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4.1.2 Describe the different types of decompression illness.

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4.1.3 List five or more examples of gas poisoning.

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4.1.4 Dangerous marine animals / General illnesses.

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# 5

## SECTION 5 - MANAGE RISK

### 5.1 HAZARD IDENTIFICATION, RISK ASSESSMENT AND CONTROL STUDY QUESTIONS

5.1.1 What steps should be taken in identifying hazards?

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5.1.2 How can risks be assessed?

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5.1.3 What are some of the potential problems or pitfalls with a risk assessment?

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5.1.4 What is the hierarchy of controls and how is it applied?

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5.1.5 What is the purpose of a job safety analysis?

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5.1.6 List the situations which may lead to a change in the level of risk.

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## 5.2 HAZARD IDENTIFICATION, RISK ASSESSMENT AND RISK CONTROL EXERCISES



**Figure 1.** Diving in raw sewage with an AH3 Environmental System.

Looking at the photograph of the diver above, brainstorm the hazards with the group (or in small groups) and come up with a list of hazards.

Assess the level of risk for that hazard before risk controls applied (ie if someone went into raw sewage without protection) using the probability and severity ratings shown in the tables in your manual.

List the risk control(s) applied to mitigate the hazard and categorise them under the headings in the hierarchy of controls

Assess the new level of risk with the risk control in place. (Does the overall risk rating come out to 9 or less – i.e. okay to dive?)

### 5.2.1 Hazard ID, risk assessment and risk control record

PHYSICAL HAZARDS	PROBABILITY	SEVERITY	RISK RATING	CONTROLS	TYPE OF CONTROL (From hierarchy of controls)



[illegible]

### 5.3 JOB SAFETY ANALYSIS EXERCISE

## STEP 1

Select one of the following jobs and perform a job safety analysis

## GROUP 1

This group will consider possible hazards and risks associated with a new dive tender their company has just purchased. It is not a purpose built dive boat, and there are fixed metal side rails about 1 metre high all around the vessel, apart from the stern, where twin 220's are mounted. In particular, this group should consider the possible problems associated with access and egress to the water, and diver retrieval problems.



The Hazard ID should include all possible safety problems with these procedures, a Risk Assessment based on this information, and Control measures that will rectify the hazard.

You are to use the JSA format given to you in the manual and reproduced in the following pages.

## **GROUP 2**

This group will look at the moving of a large H.P. Compressor. The compressor is to be transported on a flat top truck and loaded and unloaded at various diving sites. You have a four man team for the contract you are performing, and each job means you must unload the compressor each day, as the truck is required for other tasks within your company.

The Hazard ID should include all possible safety problems with this procedure, a Risk Assessment based on this information and Control measures that will rectify the hazard.

You are to use the JSA format given to you in the manual and reproduced in the following pages.

## **STEP 2**

Break the job into logical steps

Identify simple steps and the sequence they are to be performed

Generally limit to less than ten steps

<b>STEP</b>	<b>JOB STEPS</b>	<b>COMMENTS AND EXISTING CONTROLS</b>
<b>1</b>		
<b>2</b>		
<b>3</b>		
<b>4</b>		
<b>5</b>		



STEP	JOB STEPS	COMMENTS AND EXISTING CONTROLS
6		
7		
8		
9		
10		

### ■ STEP 3

Identify the hazards in each step

Consider the following physical hazards

PHYSICAL FACTORS	PROBABILITY	SEVERITY	COMMENTS AND CONTROLS
Pressure			
Electricity			
Chemicals			
Rotating equipment			
Vehicles			
Moving objects			
Height			
Depth			





PHYSICAL FACTORS	PROBABILITY	SEVERITY	COMMENTS AND CONTROLS
Confined spaces			
Vibration			
Access			
Weather			
Hot/cold objects			
Noise			
Radiation			
Tools/equipment			
Weight of objects			
Bacteria			
Hydrocarbon / Gas release			
Other			

**CONSIDER THE FOLLOWING MECHANISMS OF INJURY:**

MECHANISMS OF INJURY	PROBABILITY	SEVERITY	COMMENTS AND CONTROLS
Struck by			
Caught in / on			
Strain / Overexertion			
Dropped objects			
Strike against			
Slip / Trip / Fall			
Inhalation			
Fire / Explosion			
Exposure to Gas / Heat / Fumes / Dust / Chemicals			
Other			



**OTHER FACTORS**

OTHER FACTORS	PROBABILITY	SEVERITY	COMMENTS AND CONTROLS
Pollution to the environment			
Damage to equipment			
Human factors – ie competency, training, fitness, fatigue etc.			
Simultaneous operations			
Fellow employees			
Other			

**STEP 4**

Develop risk elimination or reduction measures

When determining risk reduction measures use the following “Hierarchy of Control”

- ✓ Elimination or substitution of the process/substance
- ✓ Engineering controls eg. Guards, mechanical aids
- ✓ Administrative controls, eg reducing exposure time, number of employees
- ✓ Personal Protective Equipment (PPE)

**5.4 DECOMPRESSION / RECOMPRESSION**

5.4.1 What action should you take for an omitted stop during a decompression schedule using DCIEM Tables?

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5.4.2 Which table do you consider the safest and with the least incidence of decompression illness? Give reasons.

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5.4.3 What is the procedure used to calculate the decompression requirements for a third dive deeper than 9m in one day using DCIEM Tables?

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#### 5.4.4 What are the restrictions on flying after performing “no-deco” dives using DCIEM tables?

.....

.....

.....

.....

.....

#### 5.4.5 What is the maximum rate of descent using DCIEM?

.....

.....

.....

#### 5.4.6 How was the DCIEM Table tested?

.....

.....

.....

5.4.7 Calculate all the decompression requirements for the following dives using DCIEM tables:

**DIVE 1:** 30M (100ft) for a bottom time 30 minutes.

**SURFACE INTERVAL:** 2 hours 30 minutes.

**DIVE 2 :** 24m (80ft) for 30 minutes.

This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

5.4.8 Calculate all the decompression requirements for the following dives using DCIEM tables:

**DIVE 1:** 40m (160ft) for 17 minutes.

**SURFACE INTERVAL:** 7 hours.

**DIVE 2:** 36m (120ft for a bottom time 14 minutes.

**SURFACE INTERVAL:** 2 hours

**DIVE 3:** 18 Metres (60ft) for 20 minutes.

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# 6

## SECTION 6 – PLAN DIVE OPERATIONS

### 6.1 PLAN DIVE OPERATIONS STUDY QUESTIONS

6.1.1 Name the steps of planning a diving operation.

- 1 .....
- 2 .....
- 3 .....
- 4 .....
- 5 .....
- 6 .....
- 7 .....

6.1.2 Give a short description of each of the above planning steps.

- 1 .....  
.....  
.....  
.....
- 2 .....  
.....  
.....  
.....
- 3 .....  
.....  
.....  
.....
- 4 .....  
.....  
.....  
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- 5 .....  
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- 6 .....
- .....
- .....
- .....
- .....
- 7 .....
- .....
- .....
- .....
- .....

6.1.3 List the duties of the following.

- Dive supervisor .....
- .....
- .....
- .....
- Diver .....
- .....
- .....
- .....
- Divers Attendant .....
- .....
- .....
- .....
- Standby Diver .....
- .....
- .....
- .....

6.1.4 List the advantages and disadvantages of using SCUBA and SSBA diving equipment on a diving operation.

- SCUBA Advantages .....
- .....
- .....
- .....
- SCUBA Disadvantages .....
- .....
- .....
- .....
- SSBA Advantages .....
- .....
- .....
- .....
- SSBA Disadvantages .....
- .....
- .....
- .....



6.1.5 List eight areas of importance that should be included in an emergency checklist.

- 1 .....
- 2 .....
- 3 .....
- 4 .....
- 5 .....
- 6 .....
- 7 .....
- 8 .....

6.1.6 List the three most important areas associated with each of the above checklist areas.

- 1 .....
- 2 .....
- 3 .....

6.1.7 List ten points associated with establishing operational tasks.

- 1 .....
- 2 .....
- 3 .....
- 4 .....
- 5 .....
- 6 .....
- 7 .....
- 8 .....
- 9 .....
- 10 .....

6.1.8 List seven basic points required when selecting equipment and supplies.

- 1 .....
- 2 .....
- 3 .....
- 4 .....
- 5 .....
- 6 .....
- 7 .....

6.1.9 List nine points that should be included in the briefing of the dive team.

- 1 .....
- 2 .....
- 3 .....
- 4 .....
- 5 .....
- 6 .....
- 7 .....



8 .....

9 .....

6.1.10 Discuss why it is important to plan every operation.

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6.1.11 How long does a dive plan need to be retained?

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6.1.12 What determines the size of the dive team and the allocation of roles?

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## 6.2 EXERCISE - DETAILED TASK INSTRUCTIONS

Read the following task details and answer the questions.

### **TASK:**

Removing blind flange on riser

Note - The riser may have greater or less than ambient water pressure and/or contain product.

### **STEP 1:**

The dive supervisor shall ensure the following:

- ✓ That the site has been completely flushed and is free of any product;
- ✓ That all valves are isolated and tagged to prevent accidental start up;
- ✓ That the type of product is known and precautions are taken to protect the divers.
- ✓ The diver shall be fully briefed on the type of product, and likely pressure and precautions to be taken to ensure the dive is conducted safely.

Once it has been determined that the pipeline and riser has been depressurised and thoroughly flushed through, inform diver to undertake step 2:





**STEP 2:**

Diver to remove blind flange

- ✓ The diver shall remove all bar 4 bolts with the 4 bolts remaining being at 12, 3, 6 & 9 o'clock positions with 12 o'clock being the highest point.
- ✓ The 12 o'clock bolt shall then be cracked and the diver shall observe for product and pressure. When feeling for pressure the diver shall place a cloth, a handful of sand or similar item over the flange. The diver shall not place his hand or any other part of his body in contact with the gap on the flanges.
- ✓ The diver shall also position himself up current to the flange.
- ✓ If no product leak or pressure differential is observed, the diver shall then crack 3 & 9 o'clock position and observe as above. This shall then be followed by cracking 6 o'clock position and with the same observations applying.
- ✓ The diver shall advise all observations during the task and advise on completion of task.

6.2.1 What other items could be included in this task sequence?

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6.2.2 What hazards have been identified and what risk controls applied?

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## 6.3 EXERCISE – WRITING A DIVE PLAN

### ■ GENERAL

Note that these scenarios may be substituted for a more relevant scenario for the workplace, or an actual task, which may be carried out in the practical sessions.

You are to plan a dive operation from the following details. Make assumptions where necessary and state the assumptions you have used. Plan your dive, considering all relevant factors. Use the case study as a guide and the following forms to record the details.

You will then organise to carry out a dive operation based on your plan – the dive operation will, if possible, be undertaken in the practical sessions. The tasks are to:

- ✓ Identify equipment and consumables requirements.



- ✓ Identify personnel requirements.
- ✓ Select personnel and ensure qualifications and experience are adequate and current.
- ✓ Communicate resource requirements to appropriate personnel to ensure availability at the required time. (Your instructor will assist with information on personnel and resources if you are not in your usual workplace.)
- ✓ Prepare a briefing based on the dive plan, including any necessary sketches, diagrams, and safety information.

## ■ GROUP 1

Your team has the task to swim the pipeline from the end of Pt. Stanvac jetty out to the fuel receiving mooring. It is a monthly inspection of the fuel receiving pipe to check for cracks, loose fittings etc. It is about 300 metres in length. Water depth varies from 18 metres to 22 metres. You can perform it anytime in the next week, depending on weather etc. You have as many divers as you need for the task available, and whatever equipment you need is also available to you. You have a 22 foot dive tender at your disposal.

## ■ GROUP 2

Your team has the task of inspecting a leak in some lock gates in the Murray River. Lock 4 gates have been losing water and not sealing during their recent operation. You must inspect the gates, and report back on the problem. Water depth is 4 metres. You have as many divers as you need for the task available, and whatever equipment you need is also available to you. You have a 22 foot dive tender at your disposal.

## ■ GROUP 3

Your team is required to perform a search for an item that has been thrown into the Yarra River, Melbourne. You have the details of an eyewitness who states that it was thrown from the east side of a bridge near the MCG. You are able to further question the eyewitness if necessary.

### 6.3.1 DIVE PLAN SUMMARY

<b>Site</b>				
<b>Structure</b>				
<b>Task</b>				
<b>Team</b>				
<b>Supervisor</b>		<b>Water Temperature</b>		
<b>Dive Depth</b>		<b>Gas Mixture</b>		
<b>Duration proposed</b>		<b>Decompression</b>		
<b>Chamber availability</b>		<b>Altitude</b>		
<b>Emergency Planning Sheet completed</b>		<b>Yes</b>		<b>No</b>
<b>Risk Assessment completed</b>		<b>Yes</b>		<b>No</b>



Communication Established

☐

Yes

☐

No

Special Equipment

Specific consideration of Risk Assessment

### 6.3.2 EXTRA STAFFING RESPONSIBILITIES

Log Keeping

Operate panel/comms

Operate other plant

First Aid/DMT

Boat Handling

Chamber Operation

Chamber Attendant

Extra Standby

Extra Attendant

Crane or winches  
Boat winch

If not specifically nominated:

Supervisor – controls panel, comms, First aid & log keeping.  
Attendant – Looks after compressor and other plant.

### 6.3.3 THE METHOD OF PERFORMING THE TASK

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### 6.3.4 THE DUTIES OF EACH PERSON INVOLVED

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### 6.3.5 THE DIVING EQUIPMENT, BREATHING GASES AND PROCEDURES TO BE USED, INCLUDING INTENDED BOTTOM TIMES AND DECOMPRESSION PROFILES

Diving equipment

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.....



Breathing gases

Communications

Procedures – General

Dive/work procedures

The order of diving



**6.3.6 SPECIFIC HAZARDS AND THE METHODS USED TO ADDRESS THEM****Risk Assessment Pro Formas**

Hazard identification, risk assessment and proposed controls is as per the following ADAS Risk Assessment Pro Forma.

Location \_\_\_\_\_ Date    /    /    .

Structure \_\_\_\_\_

Job Description \_\_\_\_\_

Risk Score \_\_\_\_\_

Break the job into logical steps

Identify simple steps and the sequence they are to be performed

Generally limit to less than ten steps

STEP	JOB STEPS	COMMENTS AND EXISTING CONTROLS
<b>1</b>		
<b>2</b>		
<b>3</b>		
<b>4</b>		
<b>5</b>		
<b>6</b>		
<b>7</b>		



STEP	JOB STEPS	COMMENTS AND EXISTING CONTROLS
<b>8</b>		
<b>9</b>		
<b>10</b>		

**STEP 3**

Identify the hazards in each step

Consider the following physical hazards

PHYSICAL FACTORS	PROBABILITY	SEVERITY	COMMENTS AND CONTROLS
Pressure			
Electricity			
Chemicals			
Rotating equipment			
Vehicles			
Moving objects			
Height			
Depth			
Confined spaces			
Vibration			
Access			
Weather			



	PROBABILITY	SEVERITY	
PHYSICAL FACTORS			COMMENTS AND CONTROLS
Hot/cold objects			
Noise			
Radiation			
Tools/equipment			
Weight of objects			
Bacteria			
Hydrocarbon / Gas release			
Other			

**CONSIDER THE FOLLOWING MECHANISMS OF INJURY:**

	PROBABILITY	SEVERITY	
MECHANISMS OF INJURY			COMMENTS AND CONTROLS
Struck by			
Caught in / on			
Strain / Overexertion			
Dropped objects			
Strike against			
Slip / Trip / Fall			
Inhalation			
Fire / Explosion			
Exposure to Gas / Heat / Fumes / Dust / Chemicals			
Other			

**OTHER FACTORS**

	PROBABILITY	SEVERITY	
OTHER FACTORS			COMMENTS AND CONTROLS
Pollution to the environment			



OTHER FACTORS	PROBABILITY	SEVERITY	COMMENTS AND CONTROLS
Damage to equipment			
Human factors – ie competency, training, fitness, fatigue etc.			
Simultaneous operations			
Fellow employees			
Other			





# 7

## SECTION 7 - CONDUCT DIVE OPERATIONS

### 7.1 BRIEFING

7.1.1 Describe the purpose of briefings and debriefings.

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### 7.2 EXERCISE - BRIEFING

#### ■ EXERCISE

You are to develop, write and deliver a briefing to the class, and assume they are the members of your dive team. You may be provided with a specific task to perform or you can make up your own details of a fictional dive job. Use a common task that you perform in your area of expertise. The briefing should only take about 5 minutes to deliver to the class, who may ask questions of you if they don't understand their role in the operation.

You may use the format below, or an alternative format. If you use an alternative format, justify your selection to the class.

Space is provided here for notes for your briefing.

#### ■ AIM

The Supervisor is to provide an overall description of task. This is in effect a mission statement.

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## ■ PERSONNEL

The role of each member of the team is defined for the dive or diving operations for the day. Roles to be included are that of the Supervisor, Panel Operator, Standby Diver, Standby Diver Attendant, Divers and Attendants. Every member of the team must be aware of his specific job. There is to be no confusion as to who is in charge of the diving operation.

If two divers are used, appoint one diver to be the "Boss Diver" and confirm that all communications shall be through him.

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## ■ DESCRIPTION OF DIVE SITE

Inform the dive team of the dive site name, depth range, main features, main biological features, bottom time, type of decompression, likely currents and visibility. Any good points and hazards must be included. The results of the detailed risk assessment should also be discussed at this point of the brief.

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## ■ PROFILE

A detailed brief on the specifics of the task is to be done. The brief shall include type of task to be performed, with direction and advice on how it is to be done. The Supervisor and diver shall, either through discussion or direction, agree on a plan of action and prepare for the dive based on that plan. The best sequence for this aspect of the brief follows the logical progression outlined below

Entry .....

Descent .....

On reaching the bottom .....

Tasks on bottom .....

On completion of task .....

On returning to the shot/job line .....

On ascent .....

Decompression stop .....

On surface .....



Surface Decompression.....  
Exit.....

## ■ **DIVE TERMINATION PROCEDURES & EMERGENCY PROCEDURES**

Be aware of any likely hazards and difficulties and discuss them prior to the dive, incorporating a plan of action should they occur.

Review Emergency Plan; this should include diving emergency, non diving emergency, contact details, medivac points and Job Safety Analysis

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Equipment Malfunction.....

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Entanglement .....

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Lose Job Line / Shot.....

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Cold .....

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Need Assistance – Emergency .....

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Need Assistance to the Surface .....

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Low on Air.....

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Out of Air .....

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Unexpected Hazards .....

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## ■ **COMMUNICATIONS**

The Supervisors shall review hand and lifeline signals, voice communications procedures (including call signs) and what to do if communications fail.

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## ■ SPECIAL EQUIPMENT

The Supervisor should outline the list of special equipment to be used. If rigging is involved or tools have to be lowered to the job site, prepare them before the dive commences and ensure the diver is familiar with them.

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## 7.3 DIVING COMMUNICATIONS STUDY QUESTIONS

7.3.1 List at least five communication rules for communication with inwater divers.

- a) .....
- b) .....
- c).....
- d) .....
- e).....

7.3.2 Describe situations where you should not talk to the diver.

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7.3.3 Write the word or phrase used in voice communication that means the following:

- 1. "Yes, you are clear to proceed"; .....
- 2. "Message ended and waiting for reply"; .....
- 3. "No, or, you are not clear to proceed"; .....
- 4. "Repeat the message as received"; .....
- 5. "I understand your message" .....

7.3.4 Write the phonetic spelling for each of the following letters:

- J .....
- O .....
- P.....
- T .....
- W.....
- Y.....



7.3.5 Write the meaning of each of the following hand signals:

“Point one finger up and rotate it”; .....

“A clenched fist”. .....

## **7.4 CONDUCT DIVE OPERATIONS STUDY QUESTIONS**

7.4.1 Briefly outline the main steps involved in conducting a dive operation

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7.4.2 In what situations will the supervisor order the standby diver into the water?

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7.4.3 In what circumstances will the dive be terminated?

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7.4.4 Outline the main steps in handling problems and emergencies.

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7.4.5 Outline main steps in concluding the dive operation.

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## 7.5 EXERCISE – WRITING OF CHECKLISTS

Conducting a dive operation is often made substantially easier by using checklists. In this exercise, the class may divide into two groups to develop a checklist. The checklist will then be presented to the class and reasons given for each item on the checklist. Each group will produce a checklist of the setting up procedures for the following equipment:

### 7.5.1 Air Panel Set-up Checklist

Checklist to include all aspects of setting up the air panel for a dive operation.

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### 7.5.2 Low Pressure (L.P.) Compressor Set-up Checklist

Checklist to include all aspects of setting up L.P. Compressor for a dive operation.

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## 7.6 APPRECIATION EERCISE 1

### ■ GENERAL

You have just won a contract to remove a container from the sea bed at the end of the Pt. Lincoln jetty. The container was empty of cargo but was accidentally dropped over side during loading. It is sitting in about 18 metres of water, about 5 metres out from the side of the wharf. You have a five man dive team.

The contract stipulates that you must have the container removed by 5.00pm on the 3rd of December. Due to equipment breakdowns, you couldn't start the job until the day before. Quite a large amount of silt has built up around the container, and you spent the first day air dredging around it, to ensure it wouldn't get stuck. You have planned to get in a crane with the required lifting capacity to move the container from the sea bed and get it back onto the wharf.

You have two divers on SSBA in the water hooking up chains to the lifting points on the container. One standby, one attendant and yourself as supervisor. The divers have moved back under the wharf with clear umbilicals as the crane begins to haul, just to ensure the load is going to be even when the strain is taken up. Suddenly, the cable of the crane snaps and the container, which was just clear of the bottom, sinks again. Your divers are well away under the jetty, as you safely planned, and no harm has come to them. You advise them to surface so you can re-assess.

Then one of them reports, "Listen, sorry about this but I think my umbilical is stuck under the container, I thought it was clear." Sure enough the other diver reports the umbilical is under the container.

### ■ CONSIDERATIONS

- ✓ It is now 3.00 pm. Your divers commenced the dive at 2.20 pm.
- ✓ The Ports Corp. Harbour Master arrives on the scene and says 'We have a grain boat coming in at 5.00pm – you're contracted to have that out of the water by then. If you don't get it out then, and the ship can't moor, it's going to cost you \$2,000 an hour for it to sit off and wait to unload.'
- ✓ You have enough air to support the two divers for 45 more minutes.
- ✓ The crane driver advises it will take about an hour and a half to go and get another cable, fix it up and be ready to go.
- ✓ Your trapped diver is fine, not bothered about being stuck, and is calmly awaiting your plan.

### ■ EXERCISE

Perform an appreciation process, ensuring all the steps are followed, and come up with the best plan to resolve this situation.



## 7.7 APPRECIATION EXERCISE 2

### ■ GENERAL

You are the supervisor in charge of a four man dive team, performing an inspection of a one of the submarine moorings off Thistle Island. You have been contracted by Subcorp as they believe one of the moorings may have split up after a severe storm. It is a fairly simple task – descend to 28 metres, inspect the mooring block, shackles, chains and wire ropes and video them. The dive should only take about 20 minutes.

You have one diver in the water on SSBA, running off an air bank, one standby dive dressed in, one attendant and yourself. You are operating from a 24 foot dive tender, with twin outboards. A few minutes after the dive commences, the attendant says, “He’s made bottom, everything is okay, I’ll just check the fuel tanks to see if we need to pour in that extra jerry.”

As he unscrews the fuel tank lid, you notice a smoke in his mouth. As the fuel vapor rises from the tank, WHOOMP, there is a huge explosion and the attendant is blown back into the water, the rear of the boat catches on fire, the standby has jumped into the water to avoid the flames, you see the hull of the boat is cracked and it’s taking on water, the attendant surfaces and says “ I’m stuffed, help me”, and the comms. crackles, “Diver One, start up the geni. to run the camera, I’m ready to commence video taping.”

### ■ CONSIDERATIONS

- ✓ You are in 27 metres of water.
- ✓ Estimated time for your vessel to sink from the unplugged crack to the hull – 12 minutes.
- ✓ Your attendant is badly burnt, conscious, but not able to retrieve himself into the boat.
- ✓ The standby diver is fine, but in the water too – he is on SCUBA.
- ✓ Diver one is at 27 metres, is fine, and doesn’t know what is going on.
- ✓ The panel, air bank and comms. are about 2.5 metres from the fast approaching fire.
- ✓ The fuel tank is ruptured and the remaining fuel has spread about the sea.
- ✓ The engines are on fire also.
- ✓ The flames are about 6 foot high, covering the rear section of the vessel.
- ✓ The crack in the hull is just outside the area of the flames.
- ✓ Your UHF radio is still working.
- ✓ You are 1 km from shore.
- ✓ You have all standard safety equipment on the vessel, but no life raft.

### ■ EXERCISE

Perform an appreciation process, ensuring all the steps are followed, and come up with the best plan to resolve this situation.





## 7.8 ACCIDENT / INCIDENT INVESTIGATION AND RECORDS

Using the scenarios in the appreciation exercises in the previous two activities, discuss the following:

- ✓ What records may be useful in an accident / incident investigation.
- ✓ The likely steps for an accident / incident investigation.
- ✓ The likely outcomes – i.e. what caused the accident or incident.
- ✓ What will change to prevent it occurring again?

You may assume that the appreciation you performed meant that you managed to contain the incident without further harm.

This means that in appreciation exercise one, no one was injured and the job was completed with two minutes to spare.

In appreciation Exercise 2, the fire was contained, you were able to organise evacuation of the injured attendant and the rest of the crew. The attendant is being treated for serious burns in hospital and is in a critical condition.



# 8

## SECTION 8 – PLANT, EQUIPMENT AND MAINTENANCE PROCEDURES

### 8.1 PLANT AND EQUIPMENT STUDY QUESTIONS

8.1.1 List minimum dive equipment requirements for a SCUBA dive operation.

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8.1.2 List minimum dive equipment requirements for a SSBA dive operation.

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8.1.3 Describe requirements for access to compression chamber for SSBA no decompression dives to the following depths: 25m, 35m.

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8.1.4 List situations requiring a chamber to be located on site.

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- 8.1.5 Describe methods for finding out the basic function and correct use of plant and equipment.

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## **8.2 MIXED GAS STUDY QUESTIONS**

- 8.2.1 Explain the risks of nitrox, and why it should not be used below 40 msw.

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## **8.3 MAINTENANCE STUDY QUESTIONS**

- 8.3.1 What needs to be taken into account when troubleshooting plant and equipment malfunction on-site?

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- 8.3.2 Describe, in detail, the on-site maintenance procedures related to one of the following items of equipment: portable compressors; regulator maintenance.

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## **8.4 TRAINING AND QUALIFICATIONS STUDY QUESTIONS**

- 8.4.1 Describe methods of keeping up to date with new dive equipment and procedures.

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8.4.2 What minimum qualification would a diver need to undertake a dive requiring the fixing of a flange to a pipe using hand tools to a depth of 45 m?

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8.4.3 What minimum qualification would a diver need to undertake a dive using SSBA requiring underwater welding at a depth of 28 m?

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8.4.4 What minimum qualification would a diver need to undertake an inspection SCUBA dive to a depth of 27 m?

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8.4.5 What circumstances would require re-training of a diver undertaking a welding task underwater?

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8.4.6 What training is the dive supervisor qualified to provide?

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## 8.5 EXERCISE – DEMONSTRATING EQUIPMENT TO DIVE TEAM

### ■ GENERAL

You will be provided with an item of plant or equipment, along with the manufacturer's manuals.



You are required to explain how it operates, what things could go wrong and what basic on-site maintenance you or they would be able to perform. Explain the tagging procedures if there a major malfunction which needs to be repaired off site.

This exercise may be done in pairs, in small groups or in front of the whole group.



# 9

## SECTION 9 – MANAGE PEOPLE

### 9.1 SUPERVISE DIVE TEAMS STUDY QUESTIONS

9.1.1 Explain the relevance of employment law to the dive supervisor.

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9.1.2 Explain the benefits of performance monitoring.

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### 9.2 COMMUNICATION STUDY QUESTIONS

9.2.1 Define the types and forms of communication and where these are best applied.

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9.2.2 List three ways of ensuring that a message has been understood.

- a) .....
- b) .....
- c).....

9.2.3 Describe some active listening strategies.

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### 9.3 RESOLVING CONFLICT STUDY QUESTIONS

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9.3.1 List methods of resolving conflict.

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### 9.4 WRITTEN COMMUNICATION AND PRESENTING INFORMATION STUDY QUESTIONS

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9.4.1 Describe the advantages and disadvantages of checklists.

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9.4.2 Describe methods for brainstorming.

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9.4.3 List the essential components of meeting minutes.

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### 9.5 PRESENTING INFORMATION STUDY QUESTIONS

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9.5.1 List at least five examples of visual aids used in verbal presentations.

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## 9.6 EXERCISE - ROLE PLAY – MESSAGE

### ■ GENERAL

Making sure that your message is understood.

You have been asked to speak to a member of the team regarding turning up late for work and appearing to be unwell. You need to find out what the problem is, make it clear what the company policies are concerning alcohol use and diving when sick or under the influence of alcohol. You will need to ensure that the employee understands the policies and the consequences of not following them and get agreement to abide by them.

### ■ QUESTIONS

- 9.6.1 Make a few notes on how you would go about presenting the information and getting feedback.

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This may be carried out in the classroom as a role play between two people.

- 9.6.2 Observe the role play and comment on how well the supervisor did the following:

Sought Feedback

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Displayed Active Listening Skills

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Asked Appropriate Questions

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## 9.7 EXERCISES - CONFLICT RESOLUTION

### ■ DRUNK DIVER ARRIVES ON SITE

You are the supervisor of a dive team.

The dive team has set up on site and one diver, who is employed as a casual, has not arrived for work. The team is briefed to perform a search for an expensive propeller that has been lost in the area. There are enough people to make up a safe dive team, so you decide to go ahead with the dive.

Shortly after commencing the dive, the missing team member arrives on site and wants to know why the dive started without him. He attempts to dress in and says he is diving next. You suggest he sit this one out and waits until you are able to discuss the situation with him after the dive. He becomes aggressive and hostile towards you and the attendant. He appears to be under the influence of alcohol.

The drunk diver continues to argue with you and continues to try and dress in. He wants to know if he will still be paid for the job, since you have refused to let him dive. You respond that since he appears to be under the influence of alcohol he is not fit to dive and that you will discuss it further with him when the dive is completed. He does not become physical, just argumentative. After about five minutes, the person says he will leave the dive site, and walks towards his car with his keys in his hands.

9.7.1. What issues do you need to consider in this situation?

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9.7.2 What actions should you take at the start when the person arrives?

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9.7.3 What actions should you take now?

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## ■ ARGUMENT BETWEEN TWO DIVERS

Ask for three volunteers – supervisor and two divers.

Scenario is an argument between two divers. They are arguing over who is standby and who is diving first. One is feeling a bit crook as he went out drinking last night – the other is tired of his excuses for avoiding the first dive.

9.7.3 What actions would you take as supervisor?

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9.7.4 How could procedures be improved to avoid this situation?

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## ■ DISAGREEMENT OVER TASK

This scenario involves a supervisor who wants to get a diver to complete a search task underwater. The diver has surfaced saying he thinks that they have searched a large enough area; they are never going to find it anyway, and there is no point going on. He refuses to get back in the water.

9.7.5 What actions would you take as supervisor?

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9.7.6 How could procedures be improved to avoid this situation?

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## 9.8 EXERCISE – ROLE PLAY COUNSELLING CONVERSATION

In the previous exercise, we had the scenario of a person arriving to work late and appearing unwell. You may assume that you have successfully explained the policies for arriving on time, reporting any illness and for alcohol use.

You now have the situation that the person has arrived late on two further occasions and again appeared to be suffering a mild hangover on one occasion. You need to discuss their performance with them.

This counselling conversation can be carried out as a role play between two or three people (note that an employee is generally entitled to have someone of their choice with them in any counselling conversation).

## 9.9 EXERCISE – REPORT FOR CLIENT

### ■ SURVEY DETAILS FOR REPORT

You have been contracted to perform a survey for the Pt. Lincoln Marina. They have an application from the Marina Hotel to extend their outdoor drinking area 3 metres out into the boating channel. Your team was contracted to perform a survey to determine if the placement of the new pylons is possible i.e. there are no rocks, pipes or other impediments in the way of driving pylons.

You have performed this task and have rough measurements and bottom reports that your divers have supplied (see below). You have also taken several photos of the area, to clearly show your client the area surveyed.

You are to formulate this information into a short report, using the headings and format that are shown in the manual. You are to draw up the rough measurements into a neat, scale diagram and attach as an appendix to the report. You may assume that you have photographs to attach to the report. The report should be typed and presented at the end of the course. It will be assessed.

### ■ DIVER'S REPORT

We finished the dive okay. We measured out 3 metres from the end posts, put in a peg, measured the 5 metres distances between the four posts and then triangulated it to get the distances exact. We drove a peg into the exact place where the pylons will need to be driven. The first position on the western end (nearest the carpark,) is fine. The man-made rock wall is about 1 metre from this position, so won't cause a problem. Likewise for the next one along. The third position has a massive rock right where the pile needs to be driven. It will need to be blasted out of the way. We dug down in the silt and it appears to go down at least 60 cms into the mud. It is about 4 metres by 2 metres by 2 metres. There is no way we could lift it out with an air bag or anything. The final position on the western end is clear, but the man-made rock retaining wall goes right up to the position where the pile will be driven, so we will have to place heavy metal shutters against these rocks so they don't roll forward and interfere with the pile driving process. The sea floor is soft silty mud, and there isn't any other obstruction in the way. We went out about 10 metres into the channel, just to check the whole area.



## ROUGH PLAN

Make a few notes here on required sections in the report.

[illegible]

# 10

## SECTION 10 - USE OF TOOLS & EXPLOSIVES IN A DIVE OPERATION

### 10.1 TOOLS

10.1.1 What three things should the supervisor be able to do with regard to tools?

- a).....
- b).....
- c).....

### 10.2 EXPLOSIVES

10.2.1 List three types of explosives

- a).....
- b).....
- c).....

10.2.2 Give five examples of commonly used explosives

- a).....
- b).....
- c).....
- d).....
- e).....

10.2.3 List at least three precautions that should be taken at the site when explosives are being used.

- a).....
- b).....
- c).....



# 11

## SECTION 11 – SUPERVISE ON SITE CHAMBER OPERATION

### 11.1 EXERCISE - CHECKLISTS FOR CHAMBER OPERATION

11.1.1 Prepare a chamber (as a group, taking turns carrying out the required steps). Fill in the following checklist.

#### PRE-DIVE CHECKLIST

- |   |  |                          |
|---|--|--------------------------|
| ✓ | All nominated persons in attendance.                   | <input type="checkbox"/> |
| ✓ | Both locks clean and no unnecessary materials in locks | <input type="checkbox"/> |
| ✓ | View ports checked and undamaged.                      | <input type="checkbox"/> |
| ✓ | Door seals clean – lubricated and undamaged.           | <input type="checkbox"/> |
| ✓ | Internal lights working in both locks.                 | <input type="checkbox"/> |
| ✓ | Bibs clean and fitted (2)                              | <input type="checkbox"/> |
| ✓ | All internal valves open                               | <input type="checkbox"/> |
| ✓ | Check fire extinguisher.                               | <input type="checkbox"/> |
| ✓ | Communications working in both locks.                  | <input type="checkbox"/> |
| ✓ | All external valves shut.                              | <input type="checkbox"/> |
| ✓ | Both depth gauges read zero.                           | <input type="checkbox"/> |
| ✓ | Check primary air supply                               | <input type="checkbox"/> |
| ✓ | Check secondary air supply – compressor.               | <input type="checkbox"/> |
| ✓ | Set primary air supply regulator to 8 Bar (800Kpa)     | <input type="checkbox"/> |
| ✓ | Check O <sub>2</sub> supply – 168 Bar                  | <input type="checkbox"/> |
| ✓ | Set O <sub>2</sub> supply regulator to 8 Bar (800Kpa)  | <input type="checkbox"/> |
| ✓ | Test BIBS  | <input type="checkbox"/> |
| ✓ | Calibrate the O <sub>2</sub> analyser                  | <input type="checkbox"/> |
| ✓ | Mobile phone at the chamber.                           | <input type="checkbox"/> |



✓	Patient briefed and waiver signed.	<input type="checkbox"/>
✓	Are the following available?	<input type="checkbox"/>
✓	Protective clothing	<input type="checkbox"/>
✓	Timers	<input type="checkbox"/>
✓	Dive torch	<input type="checkbox"/>
✓	Blankets	<input type="checkbox"/>
✓	Waste bucket	<input type="checkbox"/>
✓	Manuals	<input type="checkbox"/>
✓	Ear muffs	<input type="checkbox"/>
✓	Urinal	<input type="checkbox"/>
✓	Tables	<input type="checkbox"/>
✓	Chamber medical kits	<input type="checkbox"/>
✓	Mallet	<input type="checkbox"/>
✓	Check lists	<input type="checkbox"/>
✓	Log sheets	<input type="checkbox"/>
✓	Slate and pencils	<input type="checkbox"/>

## 11.2 EXERCISE - THERAPEUTIC RECOMPRESSION

A diver complains of mild pain and slight numbness in the right arm 5 minutes after surfacing from a no deco dive.

11.2.1 Briefly describe your actions and decision-making steps in dealing with this event:

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11.2.2 Select the appropriate table and plan a therapeutic recompression. Record the details below.



## DDC OPERATIONS

SUPERVISOR

CHAMBER ATTENDANT

DIVER 1

DIVER 2

DIVER 3

DIVER 4

DIVER 5

DIVER 6

DIVER 7

DIVER 8

DAY

DATE

REG NO

## BREATHING GAS PRESSURES

BREATHING AIR

MAIN SUPPLY

RESERVE SUPPLY

MEDICAL OXYGEN

MAIN SUPPLY

RESERVE SUPPLY

PRE DIVE PRES	VOLUME	LINE PRESSURE	POST DIVE

## DIVE PROFILE DETAILS

LEFT SURFACE  
ARRIVED CHAMBER BOTTOM  
LEFT CHAMBER BOTTOM  
ARRIVED 1ST STOP  
LEFT 1ST STOP  
ARRIVED 2ND STOP  
LEFT 2ND STOP  
ARRIVED 3RD STOP  
LEFT 3RD STOP  
ARRIVED 4TH STOP  
LEFT 4TH STOP  
ARRIVED SURFACE

DEPTH IN METRES	ELAPSED TIME	REAL TIME	ELAPSED TIME	
			ON O <sub>2</sub> AT	ON AIR AT
0 m	00 : 00	:	:	:
m	:	:	:	:
	:	:	:	:
m	:	:	:	:
	:	:	:	:
m	:	:	:	:
	:	:	:	:
m	:	:	:	:
	:	:	:	:
m	:	:	:	:
	:	:	:	:
0 m	:	:	:	:

FLUSH THROUGH FOR ONE MINUTE EVERY FOUR MINUTES AND WHEN LEAVING CHAMBER BOTTOM OR STOP

## WORK DESCRIPTION AND REMARKS

SUPERVISOR SIGNATURE:

REPETITIVE GROUP DESIGNATION:

ATTENDANTS SIGNATURE:

FLYING RESTRICTIONS:





- 11.2.3 After 20 minutes, the patient becomes irritable and complains of feeling dizzy and nauseous.

Describe the possible causes and the steps you would take.

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- 11.2.4 Two minutes later, the patient has a seizure.

Describe the possible causes and the steps you would take.

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- 11.2.5 Describe all the steps you would take in liaising with a hyperbaric medical officer (MO) over the phone. Include the following:

- ✓ When would you initiate contact?
- ✓ What observations and records you would keep to inform the MO of the patient's condition and the treatment undertaken?
- ✓ List the questions that the medical officer is likely to ask, and your responses to those questions.

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# 12

## SECTION 12 - WET BELL DIVING & EMERGENCY PROCEDURES

### WET BELLS

12.1.1 List at least three uses of the wet bell

- a).....
- b).....
- c).....

12.1.2 List at least five safe working procedures for wet bell diving

- a).....
- b).....
- c).....
- d).....
- e).....

12.1.3 List at least five potential emergencies with wet bell diving

- a).....
- b).....
- c).....
- d).....
- e).....

