



Safety Guidelines
for Commercial Shark Cage Diving
December 2014



Disclaimer

Relevant legislation, including the Maritime Transport Act 1994, Maritime Rules and the Health and Safety in Employment Act 1992, is amended from time to time and we intend to update these safety guidelines to reflect such amendments if necessary. However, the onus is on operators to check that they are operating to the latest Maritime Rules and other legislation and they should not rely on these guidelines for currency. The reader should check Maritime New Zealand's website (maritimenz.govt.nz – search for 'guidelines') to ensure they have the most current version of these guidelines.

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1. Introduction

1.1. Purpose and relationship to other guidelines

These safety guidelines have been created to assist operators of commercial shark cage diving operations to develop and implement their safety systems and to deliver their activities safely. They have been developed with input from government departments, operators and associated professionals.

Note: These guidelines are intended to operate alongside Maritime New Zealand's (MNZ's) *Safety Guidelines for Passenger and Non-Passenger Vessels*, which can be found on MNZ's website at maritimenz.govt.nz. They provide activity-specific safety information for operators of commercial shark cage diving operations. This information is not covered in the *Safety Guidelines for Passenger and Non-Passenger Vessels*.

Operators of commercial shark cage diving operations should read the *Safety Guidelines for Passenger and Non-Passenger Vessels* first.

Good safety practice consists of:

- operating to an acceptable safety standard
- complying with applicable legislation
- continually improving safety systems, including keeping up to date with current practice.

The guidelines set out recommended methods of achieving components of what MNZ considers to be an acceptable safety standard. Unless otherwise expressly stated in these guidelines, MNZ expects to see these methods, or comparable methods that can be shown to produce the same safety outcomes, reflected in an operator's Maritime Transport Operator Plan developed under Maritime Rule Part 19. Consistency with these guidelines will be assessed for the issue of a Maritime Transport Operator Certificate by considering whether an operator has implemented the specific recommendations or has developed an alternative approach that the Director of Maritime New Zealand (the Director) considers is likely to produce an equivalent outcome.

Operators should note, however, that these guidelines are of a general nature and do not cover all possible things that MNZ expects to see in any particular safety system. Safety systems will be assessed as a whole, taking into account all relevant issues, including the implementation of this guidance material.

1.2. Intended audience

These guidelines are intended for all operators of commercial shark cage diving operations.

1.3. Relationship to legislative requirements

As an operator of a commercial shark cage diving operation, you have obligations under legislation such as the Maritime Transport Act 1994 (MTA), the Maritime Rules and the Health and Safety in Employment Act 1992 (HSE Act). Operators should make themselves familiar with the requirements of this legislation.

In general, the MTA and the rules made under that Act focus on vessel-related safety, while the HSE Act focuses on the safety of people in the workplace. However, there is a degree of overlap, and Rule Part 19 focuses on whole maritime transport operations.

Maritime Rules and Marine Protection Rules are legal tools made by the Minister of Transport and the Governor-General under the MTA. While the MTA specifies broad principles of maritime law, the rules contain detailed technical standards, requirements and procedures.

In addition, the HSE Act provides for the safety of people in the workplace, including by requiring employers and others to take *all practicable steps* to ensure that no person is harmed in a place of work or through its activities. Vessels and cages involved in commercial shark cage diving operations are places of work. All practicable steps, in this context, will depend on the specific circumstances of the operation's activities.

1.4. These guidelines

Nothing in the guidelines releases operators from their responsibility to meet their full obligations under the law and to ensure that their operations are managed safely.

Maritime Rule Part 19.42(1)(b) states that:

A maritime transport operator must develop and document a maritime transport operator safety system in the Maritime Transport Operator Plan that is consistent with safety guidelines and other safety information provided by the Director of Maritime New Zealand and best practice information contained in relevant industry codes of practice.

These guidelines are provided by the Director. For this reason, operators operating under Rule Part 19 will need to ensure that their safety system is consistent with these guidelines. For operators operating under a deemed Maritime Transport Operator Certificate (see

section 2.1), compliance with these guidelines is voluntary, but operators are strongly encouraged to give them full consideration.

1.5. Health and Safety in Employment Act 1992

The HSE Act places duties on employers, people who control a place of work, self-employed people, principals and employees to ensure that nobody is harmed in a place of work or by a person who is at work.

The HSE Act requires you to ensure that your employees are adequately trained to perform their duties and adequately supervised. The HSE Act further requires employers to take a systematic approach to the management of hazards, including identifying and assessing the significance of hazards, as well as implementing management strategies and processes that either eliminate, isolate or minimise hazards. Hazards in this case are all factors that have the potential to cause harm to people.

1.6. Health and Safety in Employment (Adventure Activities) Regulations 2011

Commercial vessels involved in shark cage diving operations are not covered by the requirements of the Health and Safety in Employment (Adventure Activities) Regulations 2011 (which require adventure activity operators to obtain a safety audit and be registered) under Regulation 4(3)(a) to the extent that, as commercial vessels, they are covered by a maritime document.

However, there may be aspects of your operation that are covered by the Adventure Activities Regulations or other legislation, and you should ensure that you are aware of and comply with any legal requirements that apply.

1.7. Other matters

These guidelines are developed solely for the safety of people and do not replace or discharge operators' broader responsibilities under legislation managed by other agencies such as the Department of Conservation and regional councils.

For example, matters relating to great white sharks are managed by the Department of Conservation under the *Commercial Great White Shark Cage Diving New Zealand Code of Practice*.

2. Prerequisites for operating

2.1. Safety system

The Director is responsible for assessing an operator's Maritime Transport Operator Plan in accordance with the process outlined in Maritime Rule Part 19. No person may operate a commercial vessel without a valid Maritime Transport Operator Certificate. The Maritime Transport Operator Certificate is a maritime document for the purposes of the MTA. Subpart D of Maritime Rule 19 sets out the provisions for holders of Safe Ship Management Certificates as they transition into the Maritime Operator Safety System (MOSS).

2.2. Fit-for-purpose certificate / certificate of survey

All commercial vessels must have a valid fit-for-purpose certificate or certificate of survey¹ in force at all times applying to the vessel and its equipment in accordance with Maritime Rule 44.

2.3. Audit

The Director will audit the Maritime Transport Operator Plan from time to time to determine whether it is:

- implemented effectively
- suitable to achieve the safety management system objectives
- compliant with the applicable requirements of Maritime Rule Parts 19 and 44.

3. General harm prevention

As well as being aware of specific hazards and having an effective safety management system to manage them, there are a range of general steps that can be taken to reduce the risk of harm to anybody involved in a shark cage diving operation. MNZ's *Safety Guidelines for Passenger and Non-Passenger Vessels* cover most of these, but specific safety guidance for operators of commercial vessels used in shark cage diving operations is set out below.

3.1. Operating areas

Commercial vessels must operate within the operating limits assigned to them according to Maritime Rule Part 20 (Operating Limits). In general, this is likely to be within inshore limits.

¹ Under Safe Ship Management, a vessel is issued with a fit-for-purpose certificate. From 1 July 2014, the fit-for-purpose certificate is a deemed certificate of survey until the vessel enters into MOSS and a certificate of survey is granted.

3.2. Safety briefings and information

All crew should be familiar with and appropriately trained in safety procedures. Clear and comprehensive briefings and safety information should be provided to passengers and divers both for the trip and the diving. This should include:

- A verbal briefing at the start of the trip (and at subsequent passenger pick-up points, if any), with relevant parts repeated immediately before each dive
- written material, stylised visual displays and clear and comprehensive safety signage in languages or pictorial forms designed to be understood by as many passengers as reasonably possible. This should include clearly visible signage attached to the cage (readable from both inside and outside the cage) reminding the diver not to place any body parts outside the cage.

3.3. Age limits

Operators should determine appropriate and safe age limits for their operation, based on the risk of the activity. Age limits should be introduced using the established criteria of the World Recreational SCUBA Training Council (www.wrsc.com). If people under 15 are allowed to dive, specific training should be provided for this age group.

3.4. Fitness to take part in operation

A process should be in place to ensure that skippers, crew members and other staff are mentally and physically fit to undertake their duties. The process should be sufficient to ensure that skippers, crew members and other staff do not participate in the operation when they are impaired by fatigue, medical condition, or by the consumption of alcohol or drugs to a degree that they may be a risk to the safety of themselves or passengers.

3.5. Equipment

All equipment should be fit for purpose (including suitable for the conditions).

All diving equipment, including wetsuits, buoyancy aids and the hookah breathing system, should be fitted, inspected, maintained, replaced and used in accordance with the manufacturers' specifications, or to a higher safety standard if it is needed to maintain safety.

No equipment should be used by any person if the operator knows or suspects the equipment is unsafe. Examples of unsafe equipment are when equipment may have been

weakened by ultraviolet light or damaged, or the equipment is ill fitting or incorrectly sized for the user.

All equipment should be listed in the operation's maintenance plan to ensure the equipment's condition is routinely inspected. Any repairs or replacement of equipment should be recorded.

3.6. Emergency response plans and procedures

Appropriate emergency response plans and procedures should be in place for emergency situations that may arise, even if these emergencies are unlikely to occur. All crew should be familiar with and trained in emergency response and procedures, including undergoing regular drills. Operators should ensure that on each trip, all crew and passengers are aware of what to do in an emergency.

Emergency situations that should be addressed include: capsizing; damage or engine failure of the ship; the cage breaking away from the vessel; shark attack; and diver incapacitation.

Emergency response plans should also include a record of emergency equipment carried on board, and provide for the equipment to be regularly checked and maintained.

3.7. Recall of divers

Divers should be recalled and the dive terminated if:

- the water surface becomes too choppy or the current becomes too strong
- any diver becomes chilled.

An audible dive-recall signal should be given and the cage pulled onto the vessel if the dive supervisor considers that the dive should be terminated early for any reason.

3.8. Staffing

Maritime Rules establish required crewing ratios, and these must be complied with. However, there may be aspects of your operation that mean a higher ratio of crew and other staff would be appropriate for safety purposes. The ratio of crew and other staff to divers and passengers should be appropriate for the circumstances, taking into account the weather conditions, age and experience of the divers, type of sharks being viewed, and any other relevant factors.

3.9. Training, skills and experience

The operator/skipper, crew and other staff providing the activity should be adequately trained to address the potential risks of providing shark cage diving operations. This training should include:

- safe transfer of divers into and out of the cage
- safety and diving briefings
- knowing the signs of hypothermia and how to manage it
- life saving and first aid
- passenger care
- diving at sea
- use of equipment
- passenger counts
- use of dive flags
- minimum staffing levels
- dealing with sharks
- recognising distressed divers
- recognising hand signals (such as international dive signals) or other suitable communication methods to be used, should any diver need help in the water
- what to do in an emergency.

All crew should have a current first aid certificate, and if a vessel carries oxygen for emergencies (or any other specialised equipment, such as a defibrillator), at least one crew member on each trip should be trained in its use.

Other personnel involved in the diving activity should be adequately trained, skilled and experienced for the roles they perform.

A written or electronic record should be kept of the relevant qualifications, training and experience of each person involved in conducting the shark cage diving operation.

3.10. Post trip/dive procedures

Post trip/dive procedures (undertaken before the next trip/dive) should include:

- visually inspecting all breathing equipment, hoses and connections
- performing a breathing test on all regulators
- inspecting the cage to ensure that all components are in good condition, including checking lines, tethers and crane strops for any chafing or damage.

3.11. Periodic reviews

A review of procedures should be undertaken at least every 12 months and as soon as practical after every incident, accident or mishap to check that:

- the operation's Maritime Transport Operator Plan is being followed
- the correct and full safety training is being provided to crew
- a clear and comprehensive safety briefing is being given to passengers
- any poor practices are identified and improved procedures implemented as soon as possible.

Reviews should also determine what could be learnt when accidents happen among other operators or new knowledge about risks or equipment becomes available.

Note that under the MTA and HSE Act there are obligations to report accidents, incidents or mishaps involving serious harm. Under the MTA, the master of a New Zealand ship (or a foreign ship in New Zealand waters) must report these matters to MNZ as soon as practicable. Other people may also be required to report under Maritime Rules. Under the HSE Act, an employer, self-employed person or principal must report serious harm or accidents involving a ship as a place of work to the Director of MNZ as soon as possible after they become aware of the occurrence. Further information on the requirement to report can be found at <http://maritimenz.govt.nz/Commercial/Accidents-and-investigations/Accidents-and-investigations.asp>

The practices of the skipper and staff delivering the shark cage diving operation should be periodically peer reviewed. The reviews should be of a sufficient scope and frequency to ensure that the skipper and staff are adequately trained, current and proficient for their duties, and should not be undertaken as a self-assessment. Where a review identifies any

adjustments needed to safety measures, those adjustments should be carried out as soon as practical.

4. Specific identified hazards

4.1. Load shifting

The principal safety issue for crew, passengers and divers for this type of operation is the potential for load shifting because of the weight and dimensions of the shark cage. Load shifting could cause instability of the vessel.

All vessels should have:

- sufficient deck space to store the cage while in transit without impeding vessel safety or performance
- suitably robust straps or ropes, and adequate attachment points for securing the cage to the deck while travelling.

Maritime Rule Part 40A specifies stability and freeboard tests to be used when a surveyor surveys your vessel for a fit-for-purpose certificate or a certificate of survey. However, as part of meeting your health and safety obligations, you may ask a surveyor to undertake more rigorous tests that take into account the special vessel stability concerns associated with commercial shark cage diving.

Appendix A provides a suggested more rigorous stability test. Alternatively, you should take other steps to ensure your vessel will remain stable while providing commercial shark cage diving operations.

4.2. Passenger crowding

Commercial shark cage diving operations may be especially vulnerable to passengers crowding at a single place on the vessel to view sharks. Crowding on one side of the vessel may cause instability of the vessel. Crowding at any point on the edge of the vessel may result in a passenger falling overboard, which could be particularly dangerous if the fall is from the bow while the vessel is making way, or if a passenger is out of sight of the crew and other passengers (for example, in the case of a small child falling overboard).

Strategies you may wish to consider to reduce the risk and possible consequences of passenger crowding include:

- having a procedure in place to minimise the risks from people moving as a group to one side of the vessel if it would affect the vessel's stability
- taking other steps to reduce the risks of passengers falling overboard
- denying passengers access to the bow section while the vessel is making way at more than 5 knots.

4.3. Sharks and other sea creatures, and shark cages

4.3.1. Trauma management equipment

Vessels involved in commercial shark cage diving operations should carry an appropriately stocked trauma kit capable of dealing with severe life-threatening bleeding, and appropriate first aid equipment for jellyfish and other sea creature stings. (Note that vinegar is no longer recommended for treating jellyfish stings because it may make things worse by activating unfired stinging cells.)

It is recommended that a supply of oxygen is also available on board to provide victims with supplementary oxygen support until professional medical aid is accessed (carrying oxygen is not, however, essential for Maritime Transport Operator Certificate purposes).

4.3.2. Diver protocols

Diver protocols should include:

- no diving outside the cage
- no placing of limbs or any part of a diver's body outside the cage
- the dive supervisor controlling the dive and all cage divers abiding by the dive supervisor's decisions.

4.3.3. Cage design and construction

The design of the cage should be approved by an engineer who is a chartered professional engineer registered with the Institution of Professional Engineers New Zealand (IPENZ). That approval should be based on the design specifications outlined below and should also cover the cage's lifting and recovery mechanism.

Cage dimensions should be appropriate for the maximum number of divers to be enclosed.

Cages should have a well-engineered frame design with sufficient bracing to form a rigid and very strong structure. They should ideally be constructed from thick-walled, large-diameter marine grade aluminium with certified welds. Round tubing should be fillet cut and welded for

maximum strength. The strength (ability to withstand impact) of the cage material should be appropriate for the type and size of sharks to be viewed.

For tourist operations, the cage should have integral (welded) flotation chambers of sufficient buoyancy to ensure the cage is unsinkable. The floats should also be of sufficient buoyancy to ensure the cage floats with its roof at or above the water level.

The cage should have access/egress at the top only. The access/egress space should be at least half of the surface area of the top of the cage and provide sufficient space for as many divers as the cage contains to be able to hold their heads above water. There should also be no obstruction that hinders divers from exiting the cage quickly in an emergency. This means that if the cage has a lid, it should be open at all times when the cage is in the water.

If the cage floats with its roof above the water level so there is air space between the water level and the roof of the cage, it should be designed so that divers do not hit their heads against the roof of the cage if they rise with the swell.

Cages should have raised bars above the top edges of the three exposed sides to prevent any possibility of a shark getting over the top of the cage.

Vertical bar spacing should be sufficiently close to provide good structural integrity.

All viewing apertures should be kept small enough to prevent a shark entering (nominally 320mm), and there should be welded handrails inside the cage to allow divers to stabilise themselves without hands protruding through the cage.

Heavy-gauge aluminium security mesh should be welded across the floor and up the cage sides to approximately chest height, to prevent hands and feet slipping through the cage frame.

Care should be taken in design and construction to ensure there are no hazards such as sharp protrusions, edges or corners inside or outside the cage that could injure divers or sharks.

If a cage is constructed solely for documentary filming and requires larger openings, additional safety measures should protect the camera operator. This may, for example, be through having experienced shark safety divers present and controlling cage doors during filming.

4.3.4. Diver entry and exit

Guard rails or supports of some kind should be available to support the entry and exit of divers from the cage.

Diver entry procedures should include:

- divers not being permitted to stand on top of the cage at any time
- a crew member/safety diver accompanying any first-time divers in the cage for a short period to ensure compliance with shark cage protocol, and to assess their ability to dive and their comfort level
- full training and briefings given to each diver before the cage is launched when a crew member is not accompanying divers in the cage. This briefing should include information about any recall signals that might be used to terminate the dive
- only entering the cage through the top when it is above or on the water surface, directly from the dive platform while the cage is drawn hard up against the platform
- pulling the cage tight against the duckboard, and crew members assisting divers into the cage slowly, one at a time
- although divers breathe off a hookah system, ensuring that the top of the cage is always open so that divers in the cage can breathe directly at the surface at any time.

Diver exit procedures should include:

- the diver raising their head from inside the cage to signal readiness
- divers passing straight from the dive platform onto the back deck of the vessel, and not remaining on the platform
- where necessary, the diver being assisted by crew members.

4.3.5. Attachment to vessel

The cage should be attached to the vessel at all times while in the water. Ideally, this should be through rigid means, such as pins or hinges.

If tethers are used, there should be four separate tethers that have been approved as having sufficient breaking strain for the cage in the event of any two tethers failing, and they should be kept as short as practically possible to minimise the chance of a shark going between the vessel and the back of the cage. The four anchor points used on the vessel should be of sufficient strength to ensure there is no possibility of the cage being separated from the vessel.

If using tethers, chains, wires or other such methods, special care should be taken that they cannot: be bitten through by sharks, harm sharks by being accessible to biting, or entangle sharks.

Special care should also be taken to ensure that any gaps between the cage and the dive platform or vessel do not put divers or personnel at risk (for example, by having fingers severed).

4.3.6. Baiting

Any baiting procedure should include the following instructions:

- Never loop bait lines around wrists or hands.
- Coil bait lines neatly, with no loose loops on deck.
- Keep a knife easily accessible and close by.
- Do not feed sharks unnecessarily and use minimal bait once a shark is present, as baits are to attract them only.
- Use biodegradable products during the baiting process (such as hemp ropes).
- Take every care with positioning baits to avoid sharks making physical contact with the cage or vessel.
- Bait should never be dragged over the cage.
- Do not dispense bait from the cage under any circumstances.
- Only crew members are to bait for large shark species. No non-crew should be within one metre of the crew member undertaking the baiting activity.

If baiting by passengers is permitted for small shark species, participating passengers should be given a specific safety briefing and safety instructions before the baiting occurs.

4.3.7. Cage launch

Cage launch procedures should include:

- any additional openings (for example, for filming purposes) being closed and secured prior to launch, to prevent them from being opened during the dive
- cage launch carried out by crew only, with divers and non-participants staying clear of the back deck area until the cage is in the water, the crane is turned off, and a supervising crew member or the skipper gives the all-clear for entry

- the crane being operated by an experienced operator and according to regulations and safety standards
- cage tethers used by crew members to control the cage while in the air, with no one standing underneath the cage at any time, and lines kept taut to minimise cage swing
- all due care when operating the crane and launching or retrieving the cage, with passengers moving to clear the area
- appropriate personal protection equipment (such as hard hats) being used by crew during the cage launch process
- all gear checked and breathing tests performed on all regulators prior to divers entering the cage.

4.4. Drowning

A possible hazard for shark cage diving operations is to lose a diver through drowning.

Reasons a diver may drown include medical conditions (such as heart disease). Strategies to consider include:

- ensuring that participants are fit, both physically and mentally, for the diving activity, and having clear procedures for assessing participants' ability. Part of this assessment should include assessing whether participants are likely to be under the influence of alcohol or recreational drugs
- having training and assessment systems to ensure that participants have the competence to dive safely. This should include being able to use equipment safely and being able to take appropriate action in an emergency
- ensuring that adequate crew supervision and management of the diving operation takes place, along with clear responsibilities for maintaining a watch over divers and other appropriate monitoring
- identifying and communicating to divers any hazards the divers need to be aware of
- not allowing diving to take place if the water conditions are dangerous, for example if tidal flows are excessive, the sea or swell conditions increase the risk to divers to unsafe levels when entering, inside or departing the cage, or if divers express discomfort from sea conditions when in the cage
- having clear parameters and procedures in the operation's safety system to identify when operations will cease due to increased risk to divers from any external influences

- teaching divers a simple set of hand signals (such as international dive signals) or other suitable communication methods to use if any diver needs help in the water
- advising divers that diving may put people suffering from medical conditions at heightened risk of harm (for example, stress from sudden exposure to cold water or panic aggravating heart disease, which could result in cardiac arrest and possibly death)
- ensuring your operation's website, crew and passenger safety briefings, and passenger information sheets discuss the importance of disclosing medical conditions (and perhaps asking divers to complete a medical questionnaire)
- recording divers' medical conditions and sensibly managing them during the trip
- discouraging divers from entering the cage if they are seasick, and never pressuring a diver to enter the cage
- having throw bags available from the vessel at all times., with buoyancy aids also recommended to aid divers if required
- having policies in place describing how you intend to ensure that any particularly young or elderly swimmers, or people with physical limitations or conditions that potentially put them at higher risk, are kept safe
- having on board a list of the names of passengers/divers.

A hookah system is the most practical air supply solution given the shallow diving (less than two metres depth). This should be backed up by SCUBA tanks secured in the cage with a contents gauge and a regulator for each diver in the cage – although if the diver can stand up in the cage with their head above the water, no back-up SCUBA system is required.

The compressor running the hookah should be set up with a continuous power source or fuel supply, and a means of quickly changing to a back-up power source or fuel supply. The air inlet for the compressor should be positioned to draw in clean, dry air and be isolated from any exhaust fumes. Compressed air quality should be maintained and tested in accordance with AS/NZS 2299.1:2007 *Occupational diving operations – Standard operational practice*. In all other respects, the operation should be consistent with best practice for compressor use.

The hookah system and any back-up SCUBA tanks should be properly maintained and tested, and SCUBA regulators and equipment serviced regularly. All breathing equipment, hoses and so on should be visually inspected and tested before each dive.

4.5. Cold sea and air temperatures

Divers are at risk of hypothermia in cold seas. To reduce the risk, you should have available for use wetsuits or dry suits in suitable sizes, and of a length and gauge appropriate for the local conditions and proposed time in the water, plus gloves, boots and hoods if operating in particularly cold seas. Other strategies you should consider include having spaces that provide shelter from the weather and mitigate wind chill for all of the divers.

Appropriate equipment for treating mild hypothermia should be carried on board, such as hot packs, thermal blankets, showers or warm water containers or other methods of applying heat.

Crew and other staff delivering or enabling the diving operations should know how to treat hypothermia and administer treatment in an emergency, but *professional medical help should be sought as soon as practicable*.

4.6. Vessel drift

There are strong tidal currents and frequently strong wind conditions in areas suitable for shark cage operations, so it is important to anchor vessels securely.

The skipper should maintain an appropriate anchor watch during the entire operation.

4.7. Other vessels in the area

Dive flags should be displayed. These warn other boat users to keep well clear and to move at a slow speed when divers are in the water.

A watchkeeper or boatman left on the dive boat should be instructed to wave the flag so that it can be seen by any approaching vessel.

There should be radio contact with other people in the area of the dive to ensure that other vessels do not come within 200m of the dive, and there is at least 1km separation from other diving or swimming activities.

5. Where to get further information

Commercial Great White Shark Cage Diving New Zealand Code of Practice (go to www.doc.govt.nz)

Health and Safety in Employment Act 1992 (go to www.legislation.govt.nz)

Health and Safety in Employment (Adventure Activities) Regulations 2011: Guidance for operators, 2012 (go to the Worksafe New Zealand website at www.business.govt.nz/worksafe and search for 'Adventure Activities Guidance')

Maritime Transport Act 1994 (go to www.legislation.govt.nz)

Maritime Transport Rules (go to www.maritimenz.govt.nz and click on 'Rules')

'Support Adventure', the website for the adventure tourism and outdoor commercial sector (for assistance to develop your safety system for your swimming operation, go to www.supportadventure.co.nz)

Appendix A: Optional procedure and test for intact stability of commercial shark cage diving vessels

The vessel should be subjected to a practical test, with the ship in its worst anticipated service load condition to establish the angle of heel and the minimum freeboard on the low side.

With the crane or other lifting device operating at its maximum load moment, the angle of heel should not exceed the lesser of the following angles:

1. 7 degrees
2. the angle of heel that results in a freeboard on the low side of 250mm.

When an angle of heel greater than 7° but not exceeding 10° occurs, a surveyor may accept the lifting condition if all of the following criteria are satisfied when the crane or lifting device is operating at its maximum load moment:

- a) the range of stability from the angle of static equilibrium is equal to or greater than 20°
- b) the area under the curve of the residual righting lever, up to 40° from the angle of static equilibrium or the downflooding angle, if that angle is less than 40°, is equal to or greater than 0.1m radians
- c) the minimum freeboard fore and aft throughout the lifting operations is not less than half the assigned freeboard at amidships
- d) for vessels with less than 1000mm assigned freeboard amidships, the freeboard fore or aft should not be less than 500mm.