The Good Practice Guide for Nephrops Fishermen

Sea Fish Industry Authority
18 Logie Mill
Logie Green Road
Edinburgh EH7 4HG

Seafood Scotland
18 Logie Mill
Logie Green Road
Edinburgh EH7 4HG

Contents

1 Introduction

1.1 Background

This booklet has been produced for fishermen who are engaged in the capture of nephrops from fisheries around the UK and the EU. The booklet is intended as a guide for the nephrops catching sector, regarding applicable UK and EU regulations concerning food safety.

It has been compiled in accordance with the recommendations as prescribed in Regulation 852/2004/EC on the Hygiene of Foodstuffs (Articles 7 and 8) which provide for the development of national guides to good hygiene practice. Primarily fishermen, but also food businesses and industry stakeholders, can use these guides as an aid to compliance with food safety regulations.

In terms of food safety, nephrops are generally considered a low risk product. However, high standards of food safety are important to ensure public confidence in seafood as a safe and wholesome food remains high. The food safety risks most often associated with seafood are physical contamination, chemical contamination, or infestation of the product. Bacterial spoilage will affect the eating quality.

Beyond the basic requirements for hygiene standards that ensure food safety, high standards of care are necessary when handling seafood, which is of a delicate and perishable nature, in order to achieve a level of product quality that will provide for customer satisfaction. Good care of the catch will also reduce waste and help to secure a better return from a finite and regulated resource.

1.2 Purpose and Scope

The purpose of the guide is to help fishermen to comply with food safety law and to secure the best return for their products by meeting the needs of the market in terms of product specification and supply. It sets out means by which the Nephrops fisherman can comply with (EU) Regulation № 852/2004 of the European Parliament and of the Council on the hygiene of foodstuffs, and (EU) Regulation № 853/2004 of the European Parliament and of the Council laying down specific rules for food of animal origin. Only the requirements applicable to the Nephrops catching sector of the fishing industry will be covered in this guide. This guide also provides advice to Nephrops fishermen on achieving the principles of 'best practice' concerning the quality of fish caught and landed from their fishing activity.

Advice is given on the legal responsibilities of owners/skippers, vessel and equipment design and on working practices. It covers the operations from capture to landing of fresh and frozen Nephrops. Live Nephrops will not be covered in this document as there will be a separate Guide produced on the handling and storage of live crustaceans. The guidelines take due account of the Recommended International Code of Practice, General Principles of Food Hygiene, of Codex Alimentarius and the proposed Code of Practice of Fish and Fishery Products.

The document is not intended to be used as a training manual and does not specify detailed prescriptive procedures to be undertaken that cover all trawling, netting and creeling operations. It does not cover Fisheries Control Regulations or Health and Safety, apart from the use of sodium metabisulphite for dipping operations.

The guidelines were produced by Seafish in collaboration with representatives of the trade and official bodies as listed in the 'Acknowledgements' section.

1.3 Summary of Legal Requirements

The legal requirements that apply to the operation of a fishing vessel cover basic issues of food safety, fish marketing, fishery controls and health and safety, most of which meet requirements set by the European Union. Although it could be argued that all of these in some way have an effect on fish quality, it is the food safety regulations that are the most relevant to the handling of fish on board a fishing vessel. It is the interpretation of these regulations and procedures of best practice which are the focus of this guide.

The Food Safety Act, 1990 is the central Act of Food Safety. It establishes the essential principles of food safety, gives powers to the Food Authorities to enforce food safety and provides a means of enacting subsidiary Regulations on more detailed aspects of food safety. All persons in the food industry, including fishermen are subject to the Food Safety Act 1990. This Act establishes the basic requirements not to carry out any act which will render food injurious to health and to trade only in food satisfying food safety requirements.

The Food Safety (Fishery Products and Live Shellfish) (Hygiene) Regulations 1998 Is the current enabling regulation covering all aspects of fish handling and processing from capture up to retail sale. It gives general hygiene requirements for all fishing vessels. In addition, the Regulations establish hygiene requirements for the landing, inspection, storage and transport of fish ashore.They also establish basic standards for the minimum quality of fishery products.

These Regulations and its requirements do not apply to a fisherman who sells all his catch directly to the final consumer or retailer within the UK up to a maximum of 25 tonnes per year. However, in this case, the requirements of the Food Safety (General Food Hygiene) Regulations 1995 apply. These establish basic hygiene requirements but are less detailed than the Fishery Products and Live Shellfish Regulations.

EC Regulation No. 178/2002 on the General Principles of Food Law which came into force on the 1st January 2005. This is enforced by the Food Safety Act 1990 (amendment) Regulations 2004 and the General Food Regulations 2004 which introduce new requirements for traceability and product recall.

EC Regulation No.852/2004 on the Hygiene of Foodstuffs is scheduled to come into force on 1st January 2006. It will establish basic hygiene rules for all food businesses and includes a specific set of hygiene rules for primary production that includes training requirements. The general rules include the registration of food businesses and the implementation of HACCP principles by food operators, although HACCP will not initially be required for primary production. It encourages the development and use of officially approved guides to good practice, particularly for primary production. These guides will take account of HACCP principles.

EC Regulation No.853/2004 laying down specific hygiene rules for food of animal origin is also scheduled for implementation in 2006. It will establish additional, more detailed sets of hygiene rules for specific foods including fishery products. It is similar to and will replace the current fishery products and live shellfish (hygiene) regulations.

Draft Food Hygiene (England) Regulations 2005 and the corresponding regulations for Scotland, Wales and Northern Ireland are to be introduced to enforce the above Regulations and set penalties for offences. It also contains national legislation which member states are required or allowed to make. These new regulations are scheduled to come into force on the 1st January 2006.

1.4 Acknowledgements

In the production of this guide acknowledgements and thanks must be made to the numerous contributors who have assisted in its formation.

Acknowledgement is given to the following industry stakeholders who have participated in reviewing this guide through its development.

It is further acknowledged that this guide was part funded by EU FIFG (Financial Instrument for Fisheries Guidance), delivered through the Scottish Executive and administered by Seafood Scotland.

2 Structure of the Guide

This Guide is laid out in a three column format – see example below

- The first or left hand column details the current legal requirement, The 'Part' or 'Schedule' number is detailed as well as the part or paragraph number, and the actual wording in legislation is detailed in *italics.*
- The second or middle column provides interpretation of the legal requirement using specific language of what must be complied with by nephrops fishermen.
- The third or right hand column details advice on good or best practice, which if undertaken will exceed the minimum requirement of the law.

To use this Guide, consult the appropriate stage of the fishing operation you wish information on – a detailed breakdown appears in the 'contents' page. If an interpretation of the law is required, consult the middle column, or if advice on best practice is required, consult the right hand column.

Example:

3.3 Supply of Ice

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels Schedule 4 Part 1 6. *Ice used for the chilling of products must be made from potable water or clean seawater.*	Ice must be made from potable water or clean seawater.	Ice should be bought from an approved source or made on board using an uncontaminated water source. Harbour or mooring water is not acceptable

For more detailed information on specific topics concerning best practice please refer to the appropriate appendix.

3 Compliance with Specific Requirements for Nephrops Fishermen

The requirements laid out in the following tables are detailed for all types of nephrops fishing vessels. Additionally there are conditions that apply to fishing vessels which are designed and equipped to hold their catch at sea for a duration of 24 hours or more. These are referred to as article 1.2 fishing vessels as defined in The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998.

3.1 Construction and Layout of the Vessel, and Fish Handling and Storage Areas

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Schedule 4 Part I Requirements for all vessels		
1. … sections of vessels or the containers reserved for the storage of fishery products must not contain objects or products liable to transmit harmful properties or abnormal characteristics to the foodstuffs. These sections or containers must be so designed as to allow them to be cleaned easily and to ensure that melt water cannot remain in contact with the fishery products.	Vessels must be configured and constructed so as not to cause contamination of product by bilge water, sewage, waste fish products, smoke, fuel, oil, grease or other substances harmful to human health. The areas where nephrops are handled and stored should be designed and constructed to be easy to clean and be well drained. The design should be simple to avoid the lodging of debris, and the harbouring of vermin.	A supply of clean seawater is required for washing fish and cleaning down surfaces. The intake should be positioned so as to be clear of engine cooling, bilge and waste systems. Construction of the vessel should utilise stainless-steel, aluminium and food-grade plastics in nephrops handling and storage areas. Deck hoses should easily reach all areas that require cleaning and should have sufficient water pressure for effective wash down.

Schedule 4 Part II Requirements applicable to article 1.2 fishing vessels		
1. Fishing vessels must be equipped with holds, tanks or containers for the storage of refrigerated or frozen fishery products at the temperature laid down by these Regulations.	Vessels must have a hold, tank or be supplied with specific containers in which to store fish in a chilled condition. Fresh nephrops products must be held at a temperature approaching that of melting ice.	Chilled fishrooms should be fitted with a temperature recording device, ideally linked to a computer in the wheelhouse for continuous monitoring. All fishrooms should be adequately insulated to prevent heat from the engine compartment, ambient deck conditions and the surrounding sea warming-up the nephrops.
These holds shall be separated from the machinery space and the quarters reserved for the crew by partitions which are sufficiently impervious to prevent any contamination of the stored fishery products.	Holds must be separated from engine compartments and crew quarters by suitable partitions and/or bulkheads which prevent the nephrops from any possible source of contamination.	Refrigerated fishrooms should use bulkhead and/or ceiling coils or plates to achieve the required level of chilling.
2. The inside surface of the holds, tanks or containers shall be waterproof and easy to wash and disinfect. It shall consist of a smooth material or, failing that, smooth paint maintained in good condition, not being capable of transmitting to the fishery products substances harmful to human health.	Containers and equipment that come into contact with nephrops must be made of, or coated in, a material that is waterproof, resistant to decay, smooth and easy to clean and disinfect. They should be designed and constructed to avoid dirt traps and to facilitate drainage. Painted surfaces must not be in a blistered or flaking condition, as this constitutes a contamination hazard.	A dedicated chute for the collection and/or disposal of offal should be incorporated in the handling system. Non-corrosive metal finishes of any structure or equipment on which the fish come into contact should not be painted.

3. The holds shall be designed to ensure that melt water cannot remain in contact with the fishery products.	Fish holds and containers used for storage of catch must allow for efficient drainage and removal of melt-water and drip loss. The drainage system should allow melt water to drain away into a sump from where it can be pumped overboard.	Melt-water is full of bacteria, and if it remains in contact with the nephrops, the spoilage processes will be accelerated. Care must be taken in the design and construction of the sump to ensure that it can be accessed easily and cleaned out thoroughly.

3.2 Fish Handling Equipment

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels *4. The fishery products shall be handled in such a way as to prevent bruising.*	Crew handling practices, handling systems, chutes, conveyors, graders, washers etc., should be designed to prevent physical damage caused by throwing nephrops, long drops or by crushing.	Any chutes should be angled to ensure that fish does not suffer physical damage.
Schedule 4 Part 1 9. *……and containers and equipment in contact with the fishery product, must be made of or coated with a material which is waterproof, resistant to decay, smooth and easy to clean and disinfect.*	Fish containers, knives, tailing boards, fish washers, hoppers, tables and any other equipment coming into contact with the product must be made of materials which are waterproof, rustproof, smooth and easy to clean. Surface finishes must be durable and non-toxic. Before use, surfaces must be thoroughly cleaned as prescribed in section 3.4.	Stainless steel, aluminium and food-grade plastics are recommended. Wooden tailing boards and wooden boxes are not suitable. The presence of glass in product handling and holding areas should be avoided where possible; where unavoidable, it should be suitably protected against damage, and any cracked or broken glass replaced.

3.3 Supply of Ice

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels Schedule 4 Part 1		
6. *Ice used for the chilling of products must be made from potable water or clean seawater.*	Ice must be made from potable water or clean seawater.	Ice should be bought from an approved source or made on board using an uncontaminated water source. Harbour or mooring water is not acceptable.
Before use, it must be stored under conditions which prevent its contamination.	When storing ice, it must be held in clean surroundings. The ice must either be covered with a clean impervious cover, such as plastic, or stored away from the elements under the shelter deck or in the hold. Ice must not be left open to contamination from birds and the environment on the deck, or to contamination from crew, chemicals, glass or other contaminants in the hold.	If ice is not directly available from the quayside it should be transported to the vessel under cover in clean and preferably insulated conditions. Ice machines should be operated in such a way to prevent contamination and be regularly cleaned. Containers and shovels used to store and dispense ice should be regularly cleaned and disinfected.
	Ice should be made, transported and handled under hygienic conditions to avoid it becoming contaminated.	Ice can be made from seawater; however, freshwater ice is preferable as the temperature of seawater ice can initially be as low as $-6^{o}C$. Its temperature may subsequently rise to $0^{o}C$ as the salt in the meltwater drains away. However, there is a risk of some of the nephrops becoming partially frozen.

3.4 Pre-Fishing

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels Schedule 4 Part 1 2. *When used, the sections of vessels or the containers reserved for the storage of fishery products must be completely clean…..*	The vessel and equipment, especially catch reception areas, sorting tables, washers, handling conveyors and boxes etc, must all be clean. Containers for the storage of product must be stowed prior to use in an area of the vessel which is not liable to suffer contamination from fuel or bilge water. Stale or contaminated ice must be discarded and the storage area thoroughly cleaned.	Cleaning should follow a documented schedule that specifies the cleaning agents and their application. Prior to the start of any fishing trip the skipper or a designated crew member should check the standard of hygiene of all nephrops handling and storage areas. Contaminated ice can increase the bacterial load on the nephrops.
Schedule 4 Part 1 5. *Fishery products other than those kept alive must undergo cold treatment as soon as possible after loading.*	Refrigerated holds on vessels should be suitably cold prior to product being placed in them.	Prior to the start of any fishing trip the refrigeration should be switched on, so the hold is running between 0ºC and +4^{o}C before any product is stored in it. If colder than this, partial freezing can occur, which can be detrimental to quality. Where holds are not refrigerated, a sufficient quantity of ice should be available to offset external heat gain for the length of the trip.

		If nephrops are to be frozen on board, the cold store should also be operating at -18ºC or colder.

3.5 Fishing

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels – Fishing Operations		Consideration should be given to the use of separator trawls or panels or to the gear design (mesh sizes, mesh shape, twine size and cod-end configuration etc.) to ensure they are consistent with the principles of responsible fishing to target nephrops and minimise discards. Trawl tow-times should be kept as short as practical. Long tow times result in damage and quality loss of product. Trip duration should also be kept as short as practical. Where bottom conditions are muddy, the net may be towed for a short time to wash away mud and other sea-bottom detritus. As the temperature of the surface water may be higher than that at which nephrops are caught, the period should be short.

Requirements applicable to article 1.2 fishing vessels Schedule 4 Part 1 5. *The working decks, the equipment and the holds, tanks and containers shall be cleaned each time they are used. Potable water or clean seawater shall be used for this purpose.*	Between hauls, hoppers, deck-pounds, conveyors, tables and any equipment coming into contact with product must be rinsed down with clean seawater. Any debris trapped in the net and/or creels must be removed.	All nephrops should be handled and stowed before taking the next haul onboard so that cleaning can take place. This is also particularly important in maintaining nephrops quality.

3.6 Bringing Onboard

All activities under this section occur at sea; with this in mind all legal interpretation of water use will be taken to mean the use of clean seawater.

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels Schedule 4 Part 1 3. *As soon as they are taken on board, the fishery products must be protected from contamination and from the effects of the sun or any other source of heat.*	Once taken on board, all nephrops on deck must be protected from temperature gain, the drying effects of wind and other potential sources of contamination and heat.	Spray bars and the application of ice are recommended to keep the catch moist and cool.

3.7 Onboard Handling

All activities under this section occur at sea. With this in mind all legal interpretation of water use will be taken to mean the use of clean seawater. Practically, the use of fresh or potable water for fish handling and cleaning operations whilst at sea will not occur.

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels Schedule 4 Part 1 *3. …When they are washed, the water used must be either fresh water or clean seawater, so as not to impair their quality or wholesomeness.*	Fishwashers and/or deck hoses, must be supplied with clean seawater which are used exclusively for washing the catch.	Fishwashers themselves must be kept clean.
Schedule 4 Part 1 4*. The fishery products shall be handled and stored in such a way as to prevent bruising.*	Nephrops should be handled gently during grading, washing, tailing, dipping and packing, to prevent unnecessary damage to the product.	During any handling procedures associated with nephrops, great care is necessary, as any damage will accelerate the spoilage process and thus reduce their market value. Nephrops should be packed carefully to avoid any ice or product being proud of the box. This will prevent crushing when boxes are stacked. Tailed nephrops should not include any head parts, internal organs or legs.

Schedule 4 Part 1 8. *Where fish is headed and/or gutted on board, such operations must be carried out hygienically ….*		Marketable fish by-catch should be treated with the same level of care as that given to nephrops and in accordance with the Good Practice Guidelines for Demersal Fishermen.
…. and the products must be washed immediately and thoroughly with potable water or clean seawater.	Nephrops must be carefully and thoroughly cleaned using only clean seawater to remove all traces of mud and sand etc.	Purpose-designed washers are recommended but where a fish basket and deck hose is used, then the deck hose should be of low pressure. The basket should only be half-filled (5-6kg) and gently shaken. Where a washer is used, care must be taken not to overload it and not to leave product in the washer for excessive time, as this will lead to damage and ultimately quality loss. If tailed, nephrops should be washed after tailing. Harbour or dock water must never be used for washing any nephrops.

Requirements applicable to article 1.2 fishing vessels Schedule 4 Part 2 7. *If fishery products are frozen on board, this operation must be carried out in accordance with the conditions laid down in paragraphs 1 and 3 of Section II of Chapter IV of Schedule 3*.	Nephrops must be frozen down rapidly - the freezing equipment on board must be capable of doing this. Frozen storage rooms must be able to keep frozen product at a temperature below -18^{o}C no matter what the ambient temperature is. These storage rooms must be fitted with a temperature recording device, in a place where it can be easily read, and the temperature charts must be available for supervisory authorities to inspect if required.	Freezing nephrops at sea may offer financial benefits, particularly for vessels working remote grounds that require long steaming times. It also allows for a greater proportion of the catch to be retained whole, compared with vessels working long fresh trips. Rooms for frozen storage should be fitted with a temperature recording device, ideally linked to a computer in the wheelhouse for continuous monitoring. After grading and washing, whole nephrops should be pre-chilled in refrigerated or iced-water prior to blast freezing. Nephrops should be handled and frozen in rigid containers to prevent the shedding of limbs or damage when handling frozen. Core temperatures should be brought down to –25^{o}C within 4 hours.

3.8 Onboard Storage

All activities under this section occur at sea, with this in mind all legal interpretation of water use will be taken to mean the use of clean seawater. Practically, the use of fresh or potable water for nephrops handling and cleaning operations whilst at sea will not occur.

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels *5. Fishery products…must undergo cold treatment as soon as possible after loading. However, in the case of fishing vessels where cooling is not possible from a practical point of view, the fishery products must not be kept aboard for more than 8 hours.*	When packing nephrops, ice should be used to bring their temperature down as quickly as possible. The iced boxes should then be stored in the hold, to maintain the product temperature as close to 0^{o}C as possible. Where vessels do not have a refrigerated hold, or access to ice, nephrops must not be held on board for more than 8 hours.	Both tailed and whole nephrops should be thoroughly iced throughout the box. If the hold is refrigerated, the equipment should be operational before nephrops are brought on board. Pre-chilling nephrops by immersion for a short period of time, in an ice-water mix or slurry ice, before boxing and icing, will aid rapid cooling. Using papers between the ice and nephrops reduces the effectiveness of chilling, by preventing the ice meltwater draining through the product. Clean plastic mesh materials are ideal for placing on the top of the product prior to applying the top layer of ice. This lets the meltwater flow freely through the product, and allows easy removal of ice ashore.

Requirements applicable to article 1.2 fishing vessels Schedule 4 Part 2 4. *Containers used for storage of products must ensure their preservation under satisfactory conditions of hygiene and, in particular allow drainage of melt water.*	Containers used for packing and holding nephrops on board must be made of food-grade materials. Where containers such as fish boxes are intended to be re-used, they must be capable of being cleaned satisfactorily without causing them damage. For fresh product, the containers must be able to drain meltwater freely.	After boxing and icing or freezing, nephrops should be stored under prescribed conditions of hygiene and temperature control. See appendix 4.1. Fresh nephrops must be maintained at the temperature of melting ice, and frozen nephrops held at -18^{o}C or colder. Boxes of nephrops not held below deck must be covered to protect them from the elements and sources of contamination, at all times. Meltwater remaining in contact with nephrops will increase the bacterial load on the product.

3.9 Post-Fishing

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels Schedule 4 Part 1 7. *After the fishery products have been unloaded, the containers, equipment and sections of vessels which are directly in contact with the fishery products must be cleaned with potable water or clean seawater.*	At the end of each fishing trip and after landing of the catch, all fish handling and stowage areas, equipment and boxes etc., must be thoroughly cleaned.	Food-safe detergents and sanitisers should be used for cleaning operations. The use of marine degreasants is not recommended for fish contact surfaces. It is recommended that the crews' gloves, oilskin jackets and trousers are cleaned and sanitised daily after use.
Requirements applicable to article 1.2 fishing vessels *5. …Disinfection, the removal of insects or rat extermination shall be carried out whenever necessary.*	Containers, knives, tailing boards, fish washers, hoppers, tables, conveyors, dip tanks and any other equipment coming into contact with the nephrops should be disinfected with a food safe disinfectant.	For a detailed guide to best practice please refer to appendices 4.3 and 4.4.
6. Cleaning products, disinfectants, insecticides and all potentially toxic substances shall be stored in locked premises or cupboards. Their use must not present any risk of contamination of fishery products.	A lockable facility must be provided for the secure storage of cleaning products and potentially toxic substances separate from fish handling/storage areas.	The crew should be fully trained in the correct storage and use of all chemicals carried on board the vessel. They should also be trained in the use of the cleaning schedule.

3.10 Landing

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels Schedule 3 Chapter II		
2. *During unloading and landing, contamination of fishery products must be avoided. It must in particular be ensured that -*	Contamination of nephrops from birds, animals, the elements, environmental conditions and people must be avoided during landing.	Do not leave the catch on the open quayside unattended for any length of time.
- unloading and landing operation proceed rapidly	Unloading and landing operations must proceed without delay.	Any delays at this stage can lead to the nephrops warming up.
-fishery products are placed without unnecessary delay in a protected environment at the temperature required on the basis of the nature of the product and, where necessary, in ice in transport, storage or market facilities, or in an establishment.	Once off the vessel, the catch must be transferred to a place of storage which will maintain the product at a chilled or frozen temperature, such as a covered lorry, a market, or other premises where fishery products are handled.	Re-icing of boxes may be necessary.
	If the place of storage is not refrigerated then adequate ice must be used on the product to ensure it remains at a temperature approaching that of melting ice.	Re-ice all boxes of nephrops as necessary, especially if the place of storage is not refrigerated.
- equipment and handling practices that cause unnecessary damage to the edible parts of the fishery products are not authorised.	No tools or implements which cause damage to the nephrops during landing are to be used.	Manual handling must also be carried out carefully, to prevent unnecessary damage to the nephrops, as this can reduce their market value.

3.11 Displaying for Sale

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels – displaying for sale. Part III – 36 Placing fishery products on the market	Where fish is repacked and/or graded ashore, these operations must be carried out under hygienic conditions, to prevent any contamination of the fish. Packaging materials must not taint or transfer toxic substances to the fish and must be strong enough to protect the fish from damage and contamination. Re-usable packaging containers must be made of smooth, impervious and corrosion-resistant materials which are easy to clean and disinfect.	Size grading, weighing and boxing of nephrops at sea is recommended, to eliminate the need for de-icing, grading and weighing before sale, which risks temperature gain and damage caused by additional handling. As an aid to compliance with traceability regulations, it is strongly recommended that containers are labelled at sea. For a detailed guide to best practice please refer to appendix 4.1. Where size grading and other handling activities take place before sale, such work should be carried out in hygienic conditions without delay, and care taken to minimise physical damage. Boxes contaminated with diesel must not be used. Boxes should not be stacked on top of each other if ice is proud of the box. Boxes should not be walked on.

	Boxes used to hold iced nephrops must allow for adequate drainage of melt water.	All boxes should be re-iced once fully presented for sale. Meltwater in contact with fish will increase the bacterial load on the fish.

3.12 Hygiene of the Crew

Legal Requirement	Interpretation	Recommended 'best practice'
The Food Safety (Fishery Products & Live Shellfish) (Hygiene) Regulations 1998. Requirements for all vessels Schedule 4 Part 1 10. *Staff assigned to the handling of fishery products shall be required to maintain a high standard of cleanliness for themselves and their clothes.*	Crew clothing must be kept clean, and oilskins should be washed down after each haul is cleared. Crew must wash their hands and gloves prior to any fish handling activity, particularly after going to the toilet. Smoking or spitting in the fish handling or storage areas is not permitted. Wounds on hands or exposed parts of the body must be covered with waterproof dressings.	All crew members should be trained in Introductory Food Hygiene and have a clear understanding of the importance of high standards of cleanliness and the means of achieving them. Crew members should also be trained in care of the catch and quality procedures. Blue waterproof plasters are the preferred choice wherever possible. Skippers should familiarise themselves with the concept and use of hazard analysis to help minimize the risk of catch contamination. For a detailed guide to best practice please refer to appendix 4.6

4 Appendices

4.1 Dipping, Weighing, Packing and Labelling at Sea

Whole chilled nephrops which will be older than 48 hours from catch when landed, may be dipped. Tailed nephrops must not be dipped. Any whole nephrops which have been dipped must not be subsequently tailed. Any whole nephrops which have been dipped must be identified as such.

4.1.1 Dipping Best practice

- 10-12kg of nephrops should be immersed in a 2.5% solution of sodium metabisulphite for 3 minutes.
- Only clean nephrops should be dipped, as organic matter reacts with sodium metabisulphite and stops its action.
- The volume of nephrops to sodium metabisulphite should not exceed 1:2.
- The solution should be made by dissolving 1kg (2.2lbs) in 40 litres (8 gallons).
- The solution should be changed every 10^{th} basket.
- The solution should only be used in a well-ventilated area, and suitable protective equipment should be worn to protect the handler's skin and eyes.
- The solution should not be discharged to the bilge or via seacocks, as it is highly corrosive.

4.1.2 Weighing Best practice

- It is recommended that nephrops are weighed and labelled in the hold wherever practical. If this is not possible, then the scales should be located on deck.
- Ensure the scales are correctly tared for the container used to weigh the nephrops.
- Keep a calibration weight onboard, and check the scales daily for accuracy. If possible, record details of each calibration check.
- Allow nephrops to stand for a suitable time to allow excess wash-water to drain off before weighing.
- The crew must be instructed, or the weighing equipment set, to ensure that a minimum target weight of nephrops is achieved before a box is labelled and packed.

- The crew must be instructed not to make up boxes which are excessively heavier than the desired minimum target weight, otherwise high give-away and quality-loss could result.

4.1.3 Packing Best practice

- Add a good layer of ice to the bottom of the box. Avoid using old, solid ice.
- Place layers of nephrops in the box - handling carefully to avoid damage – and add ice in the middle to ensure that nephrops are chilled rapidly throughout the box.
- Top-off with ice. Do not use excessive amounts of ice, or the pre-weighed nephrops will be proud of the box.
- A properly-filled box should be below the rim, and be made up with 1/3rd ice.
- The recommended maximum weights for a 70 litre box are:
    - chilled whole nephrops – 20kg (approx. 3 stone).
    - nephrops tails – 25kg (approx. 4 stone).
- Nephrops packed in this manner will not be subject to compression and therefore unnecessary damage.
- Label each box – see guidelines below.
- Packed boxes of fresh nephrops should be stored around 0ºC, and no warmer than 5ºC.

4.1.4 Labelling Best Practice

As an aid to compliance with traceability regulations it is strongly recommended that containers of fish are labelled at sea with the following information:

- Vessel identification,
- Species of fish (Latin and common name),
- Size grade (where applicable),
- Date of capture,
- Unit weight,
- Area of capture.
- If nephrops have been treated with sodium metabisulphite.

Any additional information such as haul number, fish code, etc may be applied at the discretion of the individual, but is not mandatory.

Labels should be attached or displayed on each box in such a way that all information is clearly visible to the buyer on the marketplace.

4.2 Traceability

4.2.1 The Meaning of Traceability

There are several definitions but in this context 'traceability' is effectively the ability to determine the movement of particular goods through a distribution chain. Traceability has to work both ways: it has to work back through a chain from particular end-products sold to consumers in order to determine their origins, and it has to work forward through a chain from particular raw materials to determine their end-product destinations. Also, for food, and particularly for perishable food, traceability should sensibly include knowing what has happened to it in the chain, i.e. its processing history, as well as where it has been and who was responsible for it. In this context, the 'processing history' also includes conditions of storage and transport.

To achieve traceability, goods need to be labelled or otherwise identified and information recorded on their movement through the chain (and on their processing history if required). This can necessitate the generation and holding of a considerable amount of data, only some of which can feasibly be put on a label (e.g. the species and catch area).

It should be noted that traceability concerns only the ability to access this information. The information does not necessarily have to be with the goods or be generally available.

The demands for traceability are both legal and commercial, as outlined below:

4.2.2 The Legal Requirements

There are explicit legal requirements for traceability and a number of further legal requirements that relate to traceability. The explicit requirements are for reasons of product and food safety: to help identify the cause of any problem and to enable product recall if necessary.

Regulation 178/2002/EC laying down the principles and requirements of food law will require the traceability of food through all stages of production, processing and distribution. Specifically it will require food to be labelled or identified to facilitate its traceability and that food businesses will have to keep records of persons who have supplied them with food and of businesses they supply food to. Compliance with this basic 'one up, one down' traceability should be relatively straightforward. A fishermen typically puts a tally on each box to identify the vessel and supplies to an agent, the next food business, who will then bear the responsibility of recording the individual buyers of the fish. Fish processors already have to identify their products with an establishment number and, for obvious commercial reasons, already record who they receive from and supply to. However, it should be noted that the legislation also applies to intermediate food businesses such as haulage companies and cold store operators who must also record who they receive from and supply to. The Regulation does not require 'internal traceability' within each business, i.e. the ability to trace particular products dispatched to particular raw materials received, and neither does it require records of processing history.

Further legal requirements that relate to traceability include labelling and record keeping requirements in a wide range of fisheries management, fish marketing and food legislation. They include skippers log book and reporting requirements, the system of first sale notes and the forthcoming registration of first sellers and buyers and their responsibility to keep records, the labelling of fish species, production method and catch area and the requirement for lot marking.

4.2.3 The Commercial Requirements

There is considerable pressure from the corporate food industry for traceability through their supply chains. This is to maximise their operating efficiency, to assure their product safety and quality, to support their claims in product labelling and, most importantly, to protect their brand image. The commercial consequences of a food safety or mis-labelling issue for a multiple or manufacturer's brand can be enormous. Similarly, food safety problems have at times necessitated massive product recalls and even closure of businesses when traceability has not been in place, rather than being able to identify, isolate and deal with the specific part of the business or the particular supplier causing the problem. A level of internal traceability within businesses and knowledge of production history are crucial in meeting these commercial requirements, which are well beyond the basic legal requirements.

These commercial requirements are in many instances the real drivers for change. Put in stark terms, if these increasingly important large food businesses cannot get the information they want from their suppliers, they will source elsewhere. Suppliers can view this as a threat or as an opportunity to help secure a place in the market.

The ethical aspects of food production are also becoming of increasing concern to consumers and hence to the businesses that sell to them. This means that important aspects of production history can include the sustainability of the fisheries and the use of responsible fishing techniques. Indeed, for businesses wishing to capitalise on responsible fishing, product quality or regional origin schemes, traceability is a basic requirement to support and protect their claims.

Furthermore, the general experience of businesses that have introduced effective traceability into their operations is that they have also found considerable efficiency benefits in stock control, production planning, quality assurance and their office systems, etc.

4.2.4 Traceability Developments

In an ideal world, one set of information could efficiently satisfy all the various legal and commercial needs for traceability. In reality, the distortions resulting from the EU fisheries management regime have worked against this and have discouraged traceability in much of the catching sector and in the trading sectors handling the fish landed. This reflected immediate financial necessity for many businesses but it is counter to the sound commercial development of the industry to meet the needs of its markets. However, fisheries controls are being tightened, the tools for

traceability are being put in place and they are being increasingly adopted, in the UK and abroad.

Most large food businesses have some form of internal traceability but achieving chain traceability has been a problem, particularly in the seafood industry. The EU-funded Tracefish project has addressed this problem.

For seafood, traceability has to start at sea; Tracefish-compliant systems for vessels are now produced commercially in the UK and are being increasingly adopted. These systems provide the vessels with marketing benefits and also generate the necessary fisheries control data.

Sorting at sea and the use of weighing, labelling and information systems are not considered feasible on small inshore vessels. However, for vessels making short trips to local grounds these functions can be carried out on landing, with little loss of traceability.

4.2.5 Further Sources of Information

Further information on Tracefish can be found on the Seafish website www.seafish.org.uk - search for Tracefish.

The Food Standards Agency has been preparing general guidance on traceability for the food industry and Seafish has contributed to the drafting of this. The guidance recommends best practice on traceability, not merely compliance with the limited requirements of the law. It was consulted on some time ago but has yet to be published.

'Directive 2001/95/EC on general product safety' and 'Regulation EC/178/2002 on the principles and requirements of food law' can be downloaded from www.europa.eu.int/eur-lex.

Seafish Report 538 'Development of an integrated weighing, labelling and forward information system for fishing vessels'

Seafish Report 553 'An integrated traceability, marketing and back-office system for inshore ports'

4.3 Cleaning Schedules

The use of a simple cleaning schedule can act as a straightforward tool to improve and maintain a high standard of hygiene aboard any type of fishing vessel. The use of a cleaning schedule is good practice as it provides a step by step instruction as to the systematic cleaning of the working areas.

A good cleaning schedule will usually detail:

- What is to be cleaned,
- How often it should be cleaned,
- Any chemicals to be applied, together with their dilutions and contact time,
- The method of cleaning,
- Details of any Chemical Safety Data sheets.

4.3.1 Vessel Cleaning Guidelines

A simple code of practice has been put together to improve the standard of cleanliness of vessels fish handling areas.

If the crew are aware of the importance of good basic hygiene practices then the overall quality and safety of the catch should be improved. It is important to make crewmembers aware of this, as there will be no visible evidence at sea if fish has been excessively contaminated through poor hygiene standards. However once landed, fish that has a high bacterial count will spoil more rapidly than fish that has been handled through a hygienic operation and has a lower bacterial load.

This set of guidelines explains why certain hygiene practices are important to the fisherman. It is felt that if people are aware of and have an understanding as to what can potentially spoil the catch then they will be in a better position to prevent this occurring in the first instance.

4.3.2 Working areas.

4.3.2.1 Net Pounds and the Tailing and Deck Areas

Proper cleaning practices must take place here to maintain a clean environment.

An effective ‘clean-as- you- go’ policy throughout the trip, and once fishing has been completed, will keep these areas in a suitably clean condition. Nets can be stowed, and nephrops can be tailed, graded and washed within an environment with minimal bacterial contamination.

4.3.2.2 Equipment

The variety of equipment held on board for handling nephrops can on some vessels be quite extensive. All equipment that comes into direct contact with

nephrops during the handling process should be given particular attention when cleaning. Each piece of equipment is a potential source of contamination, especially if it is not maintained in a clean state.

4.3.2.3 Receiving Hoppers or Pounds, Conveyors, Elevators and Chutes

In transporting the catch from the hopper to the working area this equipment will become coated with much fish and aquatic debris. If not kept in a good state of cleanliness such debris will build up and dry on to the equipment making future effective cleaning that much more difficult to achieve.

4.3.2.4 Tailing tables/boards/knives/grading bins

This is the most intensive work area on the vessel, where the crew are separating the tails of the Nephrops from the body cavity and gutting any by catch. Heads, fish entrails and organs have high contents of bacteria and enzymes, which will rapidly contribute to fish spoilage if not removed thoroughly.

- Tables, boards and knives should be cleaned regularly and effectively to prevent excessive build up of residues.
- It is recommended here that tailing and gutting boards should be made from a non-porous, readily cleanable material such as polypropylene. Wooden boards in time become waterlogged, thus harboring bacteria and making them difficult to clean effectively. They are also prone to splintering through wear, which in turn is a potential foreign body risk to the catch; as such they should not be used.
- It is also recommended that plastic handled knives are used for similar reasons.

4.3.2.5 Nephrops and Fish Washers

- Clean off scum and other fish residues from around the edge of the washer.

4.3.2.6 Baskets and scales

- Nephrops in these baskets will generally be un-iced. Therefore, given that there is no temperature control, it is essential that they are kept as clean as possible to minimise the effect of contact contamination.
- Boats with weighing systems aboard should not overlook the cleaning of their scales.
- If electronic scales and labelling systems are used on board, care should be taken in ensuring that the button interface is not water or chemically damaged.
- Operate a ‘clean-as-you-go’ system with these items of equipment, cleaning frequently when in continuous use.

4.3.2.7 Hold

The catch may be stowed in the fishroom from anywhere between one to seven days at a time. The conditions under which nephrops are maintained in the fishroom are essential in preserving quality throughout the trip. The fishroom must be well insulated; it must have good drainage; all contact surfaces must be easily washable and it must be free from taints and odours.

- Ensure that the hold is thoroughly cleaned and rinsed at the end of every trip.

4.3.3 Chemicals

t is highly recommended that the correct chemicals be sourced for the applications outlined above. There are a number of companies who specialise in the supply of heavy duty reagents.

Vessels are strongly advised to take professional advice when sourcing the correct choice of chemical for a number of reasons:

- It can make a significant improvement to the boat's hygiene standard, even if the effects of this are not visible.
- It should be borne in mind that some chemicals may react with certain metals such as aluminium, which may be present in equipment on board.
- The use of the wrong chemical such as an engine room degreasant does not provide any sanitising effect on work contact surfaces.
- The correct dilution rates and application methods will be advised.
- Never use chemicals that have a strong residual taint such as bleach as this will more than likely taint some product at some point on board the boat.
- Always ensure that your supplier provides you with the relevant Chemical Data Sheets for the products you use.
- Always ensure the persons involved in the application of these products during cleaning are instructed in their correct method of application.
- Always keep chemicals correctly stored away from working and nephrops storage areas.

4.3.4 Records

As part of a well-managed cleaning schedule boats should keep a record of the cleaning activity that takes place aboard. This provides a record of the 'due diligence' the boat has undertaken to ensure that the nephrops landed have been handled and packed on a vessel which is operating a regular cleaning schedule. The record then forms part of the traceable quality history of the product landed by the boat.

The record should also incorporate a check on the working and storage areas and equipment of the boat to ensure that once the cleaning activity has taken place that the work has been done to satisfactory level.

4.3.5 Methods of Application and Frequency

The method by which areas and equipment of a vessel should be cleaned will depend upon their use, and how heavily soiled they become during use.

- In many cases simple hosing down of work areas at regular intervals to prevent build up of fish and marine debris is sufficient.
- When it comes to thorough clean downs a number of applications can be used.
  - Areas can be manually scrubbed down with cleaning solutions;
  - vessels may utilise the use of a power hose to apply high pressure cleaning with built in chemical applicators.
- Some items of equipment can be soaked in sanitising dips - rinsing off should be carried out with either clean seawater or freshwater.
- A thorough clean down at the end of a trip is essential. Failure to effectively clean at this time will result in a high build up of bacteria. The first Nephrops on the next trip will pick up these bacterial residues and spoil more readily. These first Nephrops it must be remembered will be the oldest of the following trip and must be preserved well.
- It is recommended that a refresh clean is carried out on a vessel before fishing starts at the beginning of the next trip.

A Cleaning Schedule Summary for use on Nephrops Vessels

Area or Item of Equipment	Recommended Frequency of Clean	Method of Application
Net Pounds	*When nets are shot away from stowage area.* *One full clean per trip.*	*Hose down* *Wash down, hose rinse.*
Deck area	*As necessary.* *Significant breaks in fishing.* *End of trip.*	*Hose down.* *Clean, hose down.* *Chemical clean, soak, rinse*
Hoppers and Pounds	*Between hauls.* *Significant breaks in fishing.* *End of trip.*	*Hose down.* *Clean, hose down.* *Chemical clean, soak, rinse*
Conveyors and Elevators	*Between hauls.* *Significant breaks in fishing.* *End of trip.*	*Hose down.* *Clean, hose down.* *Chemical clean, soak, rinse*
Tables and Boards	*As necessary.* *Significant breaks in fishing/when not in use.* *End of trip.*	*Rinse.* *Clean, hose down.* *Chemical clean - leave boards in sanitising dip till next trip.*
Grading Bins	*Between hauls.* *Significant breaks in fishing.* *End of trip.*	*Hose down.* *Clean, hose down.* *Chemical clean, soak, rinse*
Gutting Machine (if on board)	*As necessary.* *Significant breaks in fishing.* *End of trip.*	*Hose out.* *Clean, hose out.* *Chemical clean, soak, hose out.*
Nephrops and Fish Washers	*Between hauls.* *Significant breaks in fishing.* *End of trip.*	*Hose down.* *Clean, hose down.* *Chemical clean, soak, rinse.*
Baskets	*Between hauls.* *Significant breaks in fishing.* *End of trip.*	*Hose down.* *Clean, hose down.* *Chemical clean, soak, rinse.*
Scales	*As necessary.* *End of trip.*	*Rinse platform.* *Chemical clean and rinse platform, wipe down keypad.*
Hold	*End of trip.*	*Chemical clean all surfaces, soak, and rinse off.* *Ensure no residual taint, and use freshwater to rinse.*

NB:

- **It must be noted that in reference to applications referring to a hose and rinse down, seawater or, if in harbour, freshwater should be used.**
- **Harbour water must never be used for cleaning applications.**

4.4 Pest Control

Fishing vessels have a legal responsibility to ensure that the presence of pests does not present a food-safety risk to the catch. However, the approach a vessel must take to comply with this requirement is rather different than that of a shore-based food establishment by the nature of the vessel's operating conditions.

It should always be remembered that any type of animal onboard a fishing vessel will constitute a pest. Furthermore, pests will generally be attracted to the vessel either because of the availability of food and/or the provision of shelter from the environment.

Pests have the potential to carry two types of contamination hazard into the fish handling and storage areas. Firstly, they harbour and carry germs, both in terms of food related illness and other types of disease. Secondly, they present a foreign body risk to the fish; this can be from dead specimens of the pests themselves, or faeces, fur, feathers, etc.

Whilst at sea, arguably the greatest pest problem will be encountered from seabirds. When vessels are in harbour however, infestation from insects and rodents may also present a significant hazard in addition to the risks from birds.

Food premises ashore can be proofed very effectively against pest ingress. This however, is not possible with fishing vessels; therefore other preventative measures are needed:

Ashore

- Ensure all working areas have been fully cleaned and no waste-fish matter remains on deck areas.
- Ensure that all nets and gear are free from waste fish-matter and debris.
- Ensure all handling equipment is clean and free from waste fish-matter.
- Ensure all containers are clean and stored in an area where they cannot be contaminated from seabird faeces.
- Do not take on board clean boxes until the vessel is ready to sail.
- Vessels with holds should keep the hatch doors shut when not in use.
- Doors to accommodation and/or wheelhouse should be kept shut.
- Open-decked boats should be washed down when re-sailing.
- Any evidence of pests must be investigated and appropriate action taken.
- Any sightings of pests must be reported to the skipper.
- Any infestation of pests must be eliminated. Affected areas must be disinfected.
- The services of a competent, professional pest-control company should be sought, if necessary, to eliminate the problem.

At Sea

- During fishing all waste fish and offal must be discarded from the vessel.
- 'Clean-as-you-go' policies must be followed between hauls.
- Bird faeces deposited on open deck areas and equipment must be washed off in a timely manner.
- The protective clothing of the crew must be cleaned of bird faeces as necessary.
- Nets and gear must be regularly checked and kept free from waste fish-matter and debris.

- Any evidence of pests must be investigated, and appropriate action taken.
- Any sightings of pests must be reported to the skipper.
- Any infestation of pests must eliminated. Affected areas must be disinfected.

4.5 Temperature Monitoring and Control

Many vessels operating in the industry today are equipped with insulated and refrigerated holds. Such equipment aids the preservation of the catch in an optimum condition when landed. The correct setting and maintenance of the fish-room temperature is essential if the nephrops are to be held over time with minimal quality loss.

If set too warm, the catch will be stored at a temperature which does not fully inhibit the growth of naturally occurring spoilage bacteria on the nephrops. This will result in a faster quality-loss of the catch, thereby reducing its shelf-life. If the temperature is set too cold, then the ice applied to the boxes or bins may freeze solid. This will occur at temperatures below freezing and will prevent melt water from the ice cooling the product effectively. Furthermore, surface layers of nephrops which are exposed to temperatures below 0°C will probably crust-freeze over time in the fish room. The results from the slow freezing of nephrops often leads to high water loss when processed.

Refrigerated fish rooms will generally have cooling plates or coils which are fitted to the bulkheads and ceiling of the room. The temperature will vary from area to area within the fish room. Such temperature variations will be dependant on a number of factors:

- the pattern of air circulation in the hold,
- the efficiency of the refrigeration unit,
- the number of times and the duration in time that the hatch door is open,
- the external ambient conditions,
- the duration of any defrost cycle on the plant.

It is due to these reasons that it is extremely important to carry out checks that the fishroom temperature is within a range which will hold the product suitably chilled. It is also important to ensure that the measured temperature is a good reflection of the overall fishroom temperature.

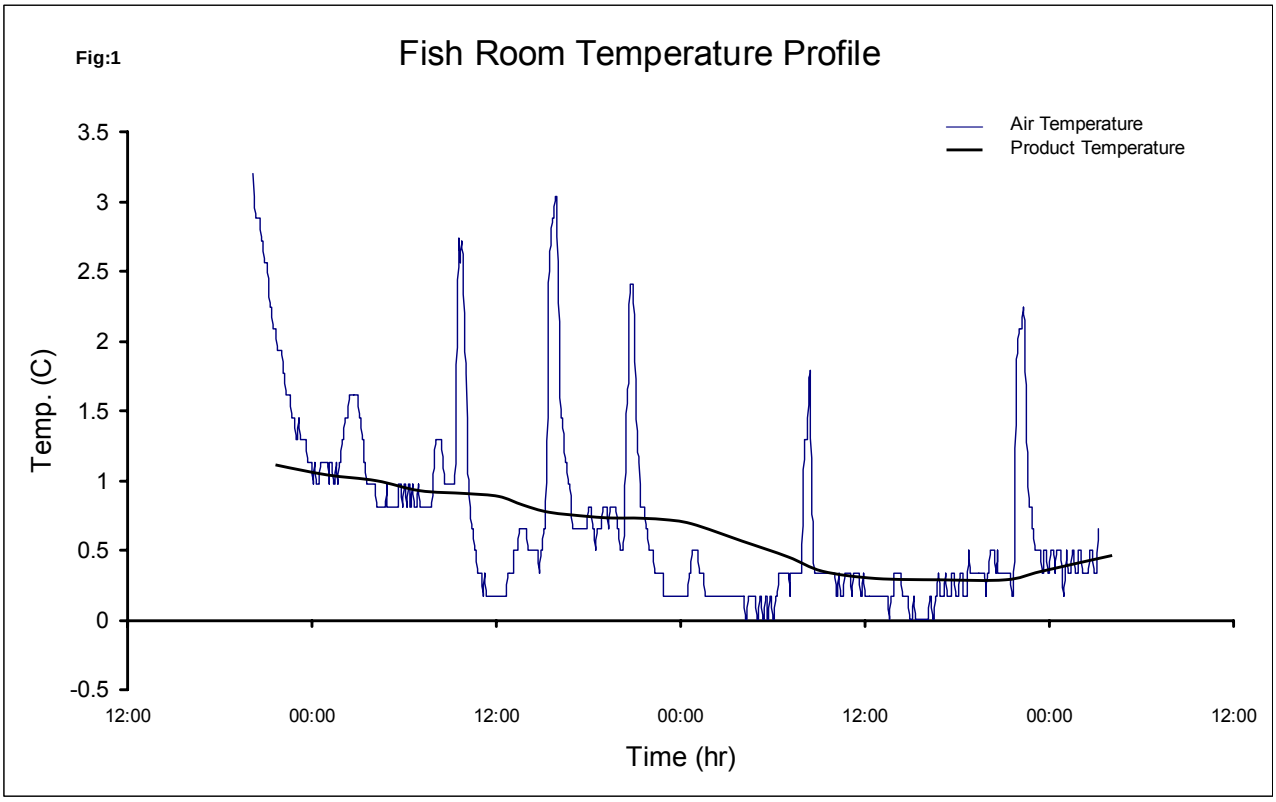
It is strongly recommended that vessels fitted with refrigerated holds have a display thermometer or recorder, ideally located in the wheelhouse. These provide a means of monitoring the hold temperature provided the sensor is accurate and is located in an appropriate position. The fishroom will have ‘hot’ and ‘cold’ locations within it, depending on its design. The sensor should be fitted in an area which neither reflects the warmest or coldest location. It should not be situated near the hatch where it will be effected by the intake of warm air when the hatch is open. Similarly, it should not be located in close proximity to a cooling pipe or plate as this may then reflect an unrealistically cold temperature.

Ideally a damped sensor should be used – these are designed to react a little slowly in response to fluctuations in air temperature, rather than one which varies quickly with any rapid temperature variations which may occur. In most cases, one well placed sensor will be sufficient; however, in large vessels with sizeable fish rooms, it may be desirable to have more than one monitoring sensor.

A regular temperature-checking procedure should be implemented, and a record of the temperatures kept as a matter of good practice. Many modern monitoring

systems have the facility to record temperatures automatically, and this data can be stored on a wheelhouse computer.

Smaller vessels and those without a display thermometer can still monitor and record fishroom temperatures by using a hand-held probe. Alternatively, data loggers have been successfully used to measure both air and product temperature in fishrooms.



The above temperature profile illustrates how air temperature in the refrigerated hold of a vessel will fluctuate rapidly due to continuous hatch opening during fishing operations. The temperature of the catch, which has already cooled primarily due to action of the ice melt-water, remains relatively stable.

4.6 Hazard Analysis Covering Nephrops Fishing Operations

Hazard Analysis is a *systematic* approach to identifying and controlling hazards and risks associated with food, to help ensure that consumers are not presented with food which is contaminated, and therefore potentially unsafe to eat.

At each stage of the operation, from catching nephrops, through grading, tailing, washing, icing and boxing, to unloading the catch:

- Hazards are identified - physical, chemical or bacterial contaminants which can potentially make the catch unsafe to eat.
- Control measures are identified to prevent food safety problems arising.

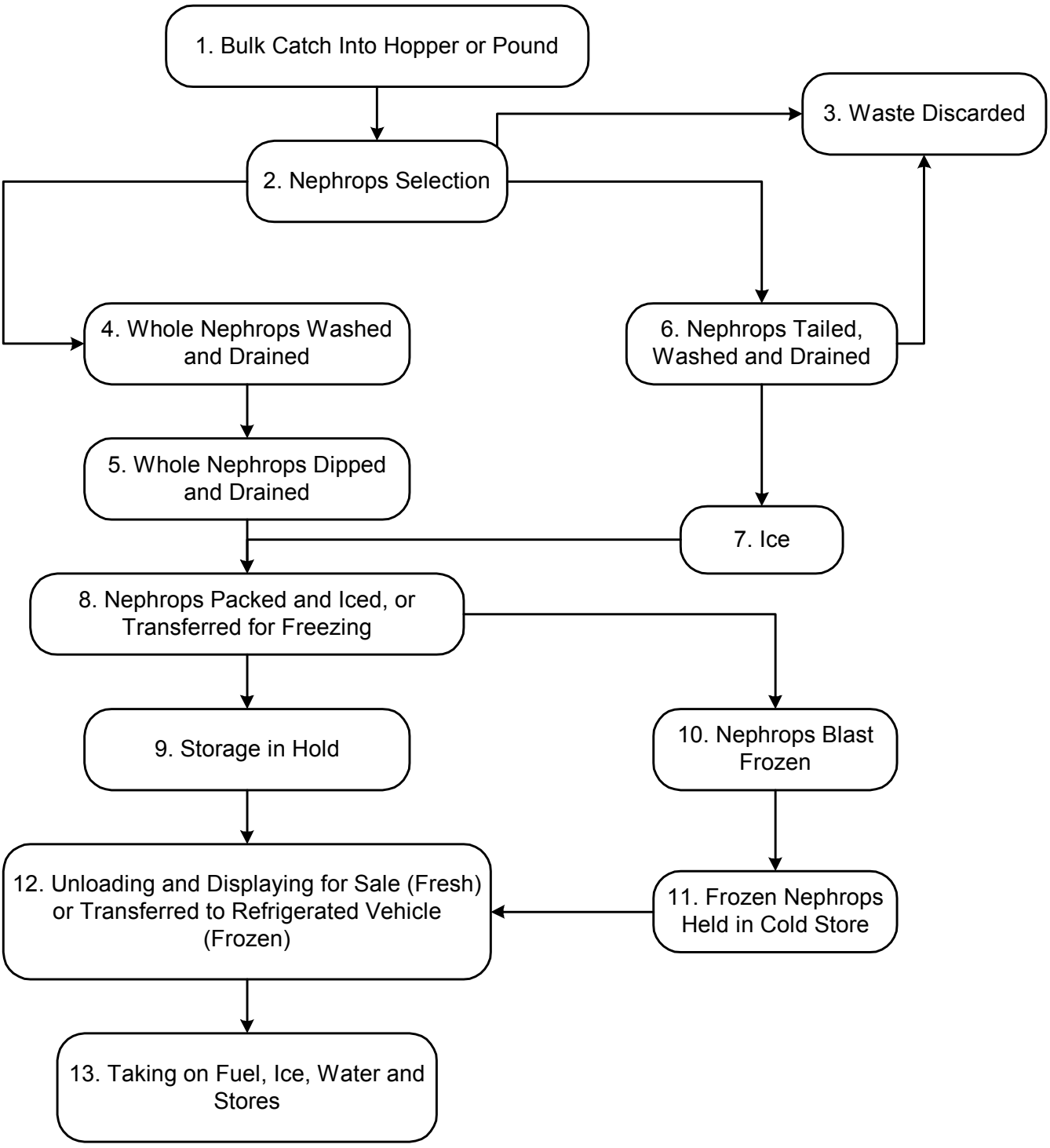
4.6.1 Common hazards which may affect the catch during a fishing operation:

There are three general types of hazards – physical, chemical, and bacterial.

- Physical hazards include dangerous or unwanted foreign bodies such as slivers of glass, splinters of wood, rust, bits of netting, or flakes of paint.
- Examples of chemical hazards are diesel, oils, or greases, dipping chemicals such as sodium metabisulphite, and cleaning chemicals.
- Sources of bacterial hazards include dirty fish rooms, equipment, boxes, and poor hygiene standards on the part of your crew. Bacteria already present on nephrops will multiply much more rapidly if they are not iced as soon as possible after being caught. Bacterial spoilage is the major factor affecting freshness.

The flow diagram which follows is an example of an onboard nephrops handling and packing operation, covering fresh nephrops (whole and tailed) and frozen whole nephrops.

An Example of an Onboard Handling Operation for Fresh and Frozen Nephrops



From the flow diagram it is then possible to conduct the hazard analysis for the handling activities of the vessel:

Stage	Hazard	Controls
1. Bulk Catch Into Hopper or Pound.	**Physical** Dangerous or unwanted foreign bodies found in nets.	Constant checks by crew at all times while working with nephrops or nets. Clear away any objects from nets before any further trawls are made. High standards of crew hygiene.
	Chemical Contamination from any diesel spillages, or other chemicals, on deck.	Clean any spillages immediately, and before any hauls are brought on board. Store all chemicals well away from nephrops handling or storage areas.
	Bacterial Bacterial growth caused by high temperatures or delay in working Nephrops. Also, introduction of bacteria from poor staff hygiene, or dirty nephrops holding areas.	Ensure nephrops are washed, boxed and iced as soon as possible after each haul is landed. Ensure staff hygiene standards remain high, and nephrops unloading areas are kept clean and in good condition.
2. Nephrops Selection.	**Physical** Dangerous or unwanted foreign bodies.	Constant visual checks by crew when working with nephrops. Keep nephrops working areas clean and in good condition.
	Chemical Contamination from any diesel spillages, or other chemicals on deck.	Clean any spillages immediately, and before any hauls are brought on board.
	Bacterial Bacterial growth caused by high temperatures or delay in working nephrops. Also, introduction of bacteria from poor staff hygiene, or dirty Nephrops holding areas.	Ensure nephrops are graded or tailed, washed, boxed and iced as soon as possible after haul is landed. Ensure staff hygiene standards remain high, and nephrops holding or working areas are kept clean and in good condition.
3. Waste Discarded.	**Physical** Dangerous or unwanted foreign bodies in nephrops working areas.	Keep all nephrops working areas and items of equipment clean and in good condition.
	Bacterial Contamination of un-worked nephrops from guts and nephrops heads.	Ensure guts removed from fish by-catch and nephrops heads are discarded frequently and kept separate from product for sale.

4. Whole Nephrops Washed and Drained.	**Physical** Dangerous or unwanted foreign bodies introduced during washing.	Keep washing equipment clean and in good condition.
	Chemical Contamination from contaminated water.	Use only clean seawater or potable water for dipping.
	Bacterial Introduction of bacteria from contaminated water or dirty equipment. Also, growth of bacteria arising from temperature rises.	Use only clean seawater. Keep dipping equipment clean. Wash and drain nephrops without unnecessary delay.
5. Whole Nephrops Dipped and Drained.	**Physical** Dangerous or unwanted foreign bodies in dipping equipment and/or solution.	Keep dipping equipment clean and in good condition.
	Chemical Contamination from excessive dip strength or contaminated water.	Prepare dip solution according to recommended best practice. Train crew in correct preparation and use of dip. Use only clean seawater or potable water for dipping.
	Bacterial Introduction of bacteria from dip solution or dirty equipment. Also, growth of bacteria arising from temperature rises.	Renew dip solution every 10th basket throughout the trip. Use only clean seawater or potable water. Keep dipping equipment clean. Drain nephrops without unnecessary delay.
6. Nephrops Tailed, Washed and Drained.	**Physical** Dangerous or unwanted foreign bodies introduced during washing.	Keep washing equipment clean and in good condition.
	Chemical Contamination from contaminated water.	Use only clean seawater or potable water for dipping.
	Bacterial Introduction of bacteria from contaminated water or dirty equipment. Also, growth of bacteria arising from temperature rises.	Use only clean seawater. Keep dipping equipment clean. Wash and drain nephrops without unnecessary delay.

7. Ice for Packing Whole and Tailed Nephrops.	**Physical** Dangerous or unwanted foreign bodies in ice.	Constant checks during nephrops packing operations.
	Chemical Contaminants present in ice.	Ensure ice is made from clean seawater or potable water, and stored in clean surroundings.
	Bacterial Introduction of bacteria from ice.	Ensure ice is made from clean seawater or potable water, and stored in clean surroundings. Ice shovels must also be kept clean.
8. Nephrops Packed and Iced, or Transferred for Freezing.	**Physical** Dangerous or unwanted foreign bodies in boxes.	Constant checks during nephrops packing operations.
	Chemical Contaminants present in boxes.	Use no boxes that have been contaminated with diesel.
	Bacterial Introduction of bacteria from dirty boxes. Also, growth of bacteria due to temperature rises.	Check the cleanliness of all boxes before placing nephrops in them. Pack nephrops without delay, and transfer immediately to hold.
9. Iced Nephrops Stored in Hold.	**Physical** Introduction of dangerous or unwanted foreign objects.	Ensure hold is maintained in a good state of repair, and kept clean, and free from any objects that might pose a foreign body risk.
	Chemical Contaminants present in hold.	Store all cleaning chemicals well away from the hold. Clean up any spillages immediately.
	Bacterial Introduction of bacteria from dirty hold. Also, growth of bacteria due to temperature rises.	Ensure hold is thoroughly clean before any boxes are placed in it. The hold temperature should be maintained at around +2ºC. Add ice to boxes as necessary, especially if hold is not refrigerated.

10. Nephrops Blast Frozen.	**Physical** Introduction of dangerous or unwanted foreign objects.	Ensure freezing equipment is maintained in a good state of repair, and kept clean, and free from any objects that might pose a foreign body risk.
	Chemical Contaminants present in freezing equipment.	Store all cleaning chemicals well away from freezing equipment. Clean up any spillages as necessary.
	Bacterial Introduction of bacteria from dirty hold. Also, growth of bacteria due to temperature rises.	Ensure freezing equipment is kept clean. Freeze nephrops without delay to at least -18ºC, and transfer immediately to cold store.
11. Storage of Frozen Nephrops.	**Physical** Introduction of dangerous or unwanted foreign objects.	Ensure cold store is kept clean and in good condition. Remove any objects that might pose a foreign body risk.
	Chemical Contaminants present in cold store.	Store all cleaning chemicals well away from cold store. Clean up any spillages as necessary.
	Bacterial Introduction of bacteria from dirty cold store Also, growth of bacteria due to temperature rises.	Ensure cold store is kept clean. Ensure frozen nephrops are stored at -18ºC or colder.
12. Unloading and Displaying for Sale (Fresh), or Transferred to Refrigerated Vehicle (Frozen).	**Physical** Dangerous or unwanted foreign bodies.	Constant visual checks, and high standards of crew hygiene.
	Chemical Contamination from any diesel spillages in harbour or market hall.	Constant visual checks during unloading operation. Do not unload nephrops onto contaminated areas.
	Bacterial Rapid growth of bacteria caused by warm temperatures.	Ensure fresh nephrops are adequately iced, especially if boxes are landed several hours before the sale commences, or the fish is to loaded onto vehicles. Ensure frozen nephrops are transferred without delay into a refrigerated vehicle.

13. Taking on Fuel, Ice, Water and Stores.	**Physical** Dangerous or unwanted foreign bodies brought on board.	Constant visual checks by crew during loading operations, and when working with catches later on trip.
	Chemical Contamination of nephrops working or storage areas, boxes or equipment with spillages of diesel.	Take care when refuelling – clean up any spillages immediately. Clean any boxes or other items of equipment that may have been contaminated.
	Bacterial Contamination of fish working or storage areas, boxes or equipment.	Careful loading practices, and immediate cleaning of any dirty surfaces.

4.7 Personal Hygiene for Crew

Crew on board fishing vessels are of course thought of first and foremost as fishermen. It is well worth remembering, however, that they are all also classed as food handlers. As a food handler they have both legal and moral responsibility in handling the fish in such a way as to prevent its contamination.

Food handlers may be classed according to the level of risk associated in the handling of a particular type of food. Fishermen are involved at the very start of the food supply chain; they harvest a natural resource and bring it ashore for further processing. The food safety risks in handling the fish at this stage are considered low. The Chartered Institute of Environmental Health, (CIEH) have classified food handlers according to this level of risk. Most fishermen would be considered as a Category A(2) food handler. This is defined as a person who is involved in working with produce which is subject to basic grading and washing but which will be subject to further processing prior to consumption.

Nephrops will spoil more quickly if contaminated as a result of poor crew hygiene. Crew must be aware that they have their role to play in assuring the quality of the product. Good personal hygiene awareness should form the basis of a pre-work hygiene induction, and new crew should not be allowed to start handling nephrops until the skipper or master is happy that they understand and accept the rules.

Following the initial induction training onboard, it is recommended that fishermen gain an Introductory Food Hygiene Certificate. Contact your local Seafish Group Training Association for more details. Training has been proved to be beneficial for crew morale and efficiency, and trained crew require less supervision and will handle fish properly, leading to improved quality and prices.

A basic list of good hygiene rules for all persons handling fish onboard and during landing operations is illustrated on the following page. The skipper or master should ensure that all crew are fully aware of these rules and that they adhere to them when handling, packing, storing and landing the catch.

Crew Hygiene Work and Work Rules

The hygiene rules below will apply to all crew when handling, storing and landing nephrops:

- All crew must wear protective clothing and keep it clean.
- Hats should be worn which cover the hair.
- Crew must only eat, drink, or smoke outside the handling and storage areas.
- Crew must wash and dry their hands before handling fish, and particularly after visits to the toilet.
- Gloves used for handling fish and nephrops must be washed frequently.
- Crew must not, blow noses, cough, sneeze or spit over fish when handling it.
- Waterproof plasters must be used to cover cuts and grazes.
- Crew must inform the skipper if they are suffering from vomiting, diarrhoea or other stomach upsets.

5 Glossary

Ambient	The temperature of the surrounding environment.
Bacteria	A group of single cell living organisms. Some may spoil food and some may actually cause illness.
Cleaning	The removal of food residues, dirt, grease and other undesirable debris.
Cleaning Schedule	Written document setting out how a vessel is to be kept clean. It will detail each area and piece of equipment to be cleaned; the cleaning product to be used; person/s with responsibility for carrying out cleaning; standard of cleanliness required; frequency; and Health and Safety precautions to be taken. All persons concerned must be aware of their individual responsibilities. A supervisor is responsible for checking the total cleaning process.
Cold Store or Freezer	Equipment for keeping food at frozen temperatures. Usually set around -18^{o}C.
Compliance	Actions that satisfy the legal requirement
Contact Surface	Any surface which comes, or may come, into contact with fish, either directly or in such close proximity that it could contaminate the food if dirty. Includes work surfaces, containers and equipment.
Contamination	The introduction or occurrence in food of any microbial pathogens, chemicals, foreign material, spoilage agents, taints, unwanted or diseased matter, which may compromise its safety or wholesomeness.
Core Temperature	The temperature at the centre of a mass or piece of food.
Disinfection	Reduction in levels of contamination on food equipment or in food premises, normally by the use of chemicals to kill micro-organisms. Disinfectants used must be suitable for use in food premises.
Infestation	Entry and survival of pest animals and insects on board the vessel or within equipment or products.
Hygiene	Measures to ensure the safety and wholesomeness of food.
Personal Cleanliness	Measures taken by food handlers to protect food from contamination.
Pest	Animal life unwelcome in food premises, especially insects, birds, rates, mice and other rodents capable of contaminating food directly or indirectly.
Protective Clothing	Clothing – hats, boots, waterproofs - worn by the crew when handling fish to prevent contamination of fish by the individual.
Potable	Usually related to water supply. Safe to drink and acceptable for use in food preparation.
Refrigerated Hold	Area of the vessel fitted with equipment to keep product cold. Normally between 0ºC and 2^{o}C.
Spoilage	Fish deterioration resulting in off flavours, odours and possibly appearance indicating products are unsuitable for sale or to eat.
Taint	Contamination of food with undesirable flavours or odours.