A CODE OF PRACTICE
TO AVOID AND MINIMISE THE IMPACT OF
INFECTIOUS SALMON ANAEMIA (ISA)
FOREWORD

This Code of Practice (CoP) represents the culmination of months of effort by a dedicated number of individuals from within the industry and Government. The sole aim of the CoP is to help to provide a more secure and positive future for our salmon farming industry by creating a framework to minimise the threat from infectious salmon anaemia (ISA) and other diseases. I, and my colleagues in the working group, firmly believe that the contents of the CoP will deliver that security, provided ALL salmon farmers do their utmost to follow its recommendations.

I fully appreciate that for a number of companies, large and small, there will be challenges in adopting every recommendation in the CoP. However, it is vital that all companies continuously strive to do so in order to ensure that the risk of ISA is curtailed. We must demonstrate our commitment to this objective at every opportunity. However, the Government, too, must play a role to develop further an aquaculture infrastructure and regulatory environment that helps to promote good husbandry practices.

Today, fish health stands at a very high level within Scottish salmon farms, however there are recommendations within the CoP, which if followed, could lead to further benefits. Furthermore, this CoP should not be seen as the final word on ISA or fish health management. It is, and should remain, a living document that will be updated by the Aquaculture Health Joint Working Group to reflect changing technical achievements and advancements in fish health management.

Finally, I would like to thank all the contributors and editors who have put in so much effort to see this project come to fruition. To all salmon farmers I would say that their efforts can be your rewards.

Dr Graeme Dear
Vice Chairman, Joint Government/Industry Working Group on ISA
August 2000
INTRODUCTION

The Final Report of the Joint Government/Industry Working Group (JWG) on Infectious Salmon Anaemia\(^1\) (ISA) was published in January 2000. It recommends practical measures for salmon farms to minimise the risk of their becoming infected and developing ISA. While some of the recommendations may require new legislation, many can be implemented immediately. These measures, representing good practice, are valid for the control of any fish disease and this Code of Practice, which covers each phase of salmon farming from hatchery to processing plant, should be adopted by all salmon farmers.

1. VERTICAL TRANSMISSION AND OVA DISINFECTION

What are the risk factors?

It is recognised that there are three ways in which infected broodstock may transmit ISA virus (ISAV) to their progeny by:

- True vertical transmission i.e. within the contents of the eggs and sperm;
- External transmission on the surface of the eggs and sperm and in natural secretions and excretions from the parents, for example, ovarian and seminal fluids, mucus;
- Transmission \textit{via} contamination from infected water, personnel, clothing and equipment associated with stripping broodfish and fertilising ova.

How can the risks of contamination be minimised?

Assessment of the current scientific and technical information indicates that the risk from vertical transmission is unlikely, but as a precaution and as part of good husbandry practice, the following steps are recommended:

- Gametes should not be used from ISAV infected broodstock populations.

When healthy broodfish are being stripped the following protocols should be adopted:

- Avoid contamination of eggs and milt with urine, faeces and blood during stripping;
- Disinfect pre-hardened eggs as soon after fertilisation as possible, using iodophor volume for volume in 0.9% isotonic saline solution to give a free iodine concentration of 100 ppm. Thoroughly rinse disinfected, fertilised eggs using clean isotonic saline followed by fresh water;
- Disinfect eyed eggs using iodophor solution to give a free iodine concentration of 100 ppm, prior to hatch or movement to another water supply;
- Strict protocols and high standards of hygiene with respect to personnel, clothing and equipment used must be maintained during each stage of the stripping and fertilisation process\(^2\).
2. HORIZONTAL (SITE-TO-SITE) TRANSMISSION

What are the risks to and from freshwater farms?

The greatest risks of infection are from the movement of fish, from equipment that has been in contact with marine-reared fish and from contaminated seawater.

How can the risks of contamination be minimised?

- Do not use sea water at any stage in the production phase in fresh water.

- Equipment, personnel and protective clothing should be site specific as far as is practicable. Where transfer between sites is unavoidable cleaning and disinfection in accordance with the Standard Disinfection Protocols (SDP) must be followed.

- Helicopter buckets and road transport equipment used for fish transfer should be operated to the recommended protocols and disinfected according to the SDP.

To minimise any associated disease risk, it is necessary for empty returned helicopter bins to be disinfected and rinsed before re-use. To maintain continuity of smolt transfer, additional bins may be required. Account should also be taken of the location of the disinfection point in relation to the remainder of the freshwater site. On land-based sites a ‘quarantine’ area should be operated around the disinfection point, but in freshwater cages an on-shore location in the vicinity would be necessary. A similar procedure should be conducted on road transport equipment. Appropriate disinfection protocols are contained in the Disinfection Guide.

- Wellboats should be operated in accordance with this Code of Practice (see pages 4-6).

- Bus stop deliveries may only be made to an empty site or series of empty sites. This does not preclude delivery to a site containing fish as long as the vessel does not subsequently proceed to another site.

- Stress on smolts should be minimised and smolts should be transferred to sea only in good physical condition and when in optimal physiological state. It should be the joint responsibility of the supplier and the purchaser to ensure that this is the case.

- Broodstock and juvenile stock in fresh water must never share the same water mass.

- The risk associated with birds and other predators is reduced by adherence to the recommended predator control measures and mortality disposal procedures.

- Operators should carry out a risk assessment before transferring smolts to sea water. Stocking smolts from multiple freshwater sources should be minimised.
What are the risks associated with seawater (SW) to seawater fish movements?

Due to the high risk associated with SW to SW fish movements there is now a general presumption against them. However, it is accepted that some movements are essential and the risks from movements of fish between or within areas has been assessed and their acceptability determined. The movements that are acceptable are listed below:

Movements between Management Areas (Fig. 2.1)

- Movements from one Management Area to many. Where there is a sole operator, movements of fish from one pre-fallowed Management Area to another fallowed area or areas which hold no fish are acceptable. Where there is more than one operator, a written agreement between operators is required.

- Movements from more than one area into a single Management Area. These should only occur for broodstock or harvesting purposes as outlined below.

**Broodstock.** Live fish may be moved into a SW broodstock farm from another SW farm, but the broodstock farm must be situated at least 5 km or one tidal excursion (whichever is the greatest) from another farm, harvesting station or processing plant. Broodfish must not leave the site for on-growing elsewhere. Movements of live broodfish to freshwater (FW) sites are allowed.

**Harvesting stations.** Live fish may be moved into a harvest station, but live fish must not leave a harvest station. Harvest stations should be 5 km or one tidal excursion (whichever is the greatest) from any other farm.

Movements within Management Areas (Fig. 2.2)

- Movements within a Management Area where there is only one operator are acceptable.

- Movements within a Management Area where there is more than one operator and a single year class may be allowed by agreement between the operators.

- Movements within a Management Area where there is more than one operator and multi-year classes may be allowed by agreement between the operators, however, such movements are considered to increase the likelihood of spread of ISA.

3. WELLBOATS

What are the risks from wellboats?

It is recognised that the biggest risk associated with the use of wellboats lies with contamination from the fish they carry rather than the wellboats. The highest risks arise from those areas of the boat that come into direct contact with the fish and are the hardest to clean, such as pumps, intakes and outlet grids.
Figure 2.1 Examples of fish movements occurring between management areas.

a) Sole operator, single year class. Area A was fallow prior to any smolt input. Any combination of movements is acceptable.

b) Multiple operators, multi-year classes. Movements allowed only by joint agreement. Recommendation against the movement due to the higher risk.

c) Single operator, multi-year classes. Recommendation against the movement due to the higher risk.

Figure 2.2 Examples of fish movements occurring within management areas.

a) Sole operator, single year class. Area A was fallow prior to any smolt input. Any combination of movements is acceptable.

b) Multiple operators, multi-year classes. Movements allowed only by joint agreement. Recommendation against the movement due to the higher risk.

c) Single operator, multi-year classes. Recommendation against the movement due to the higher risk.
How are these risks minimised?

Cleaning and disinfection procedure for wellboats

The cleaning and disinfection procedure for wellboats has three stages. The requirement for different stages will depend on operational circumstances as indicated in Table 1. The most rigorous protocols are required when leaving a Surveillance Zone for a new area, leaving a confirmed or suspicious site, and on entry to Scottish waters.

**The design of pumps must enable routine inspection and disinfection to take place.**

Table 1
Disinfection stages required for wellboats under different operating circumstances.

<table>
<thead>
<tr>
<th>Operational circumstance</th>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arriving from outwith UK waters other than from EU waters with equivalent zone status*</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Operating within a Surveillance Zone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaving a Surveillance Zone on shuttle returns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaving a confirmed or suspicious site for any location</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Leaving a Surveillance Zone for a new operating location</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Operating between sites on shuttle returns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leaving an existing site to start at a new site</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General deliveries (non-fish)</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

NB not all sites will have equal status within a Surveillance Zone

Stage 1 (daily hygiene when working with fish)

Brush/clean solids from all surfaces.

Hot-water pressure clean (with detergent) the following areas:

- deck;
- wells;
- equipment;
- protective clothing;
- pumps.

Follow the instructions given in the Disinfection Guide.²

Stage 2

Complete Stage 1 and carry out the following additional tasks:

- internally inspect and disinfect the fish pump** and remove and clean all organic material from it before carrying out the normal disinfection procedure;

- steam clean and disinfect with iodophor, the deck, well and hull above the waterline;

- complete the checklist (Appendix I)

- sign the checklist (Appendix I) with duplicates for each party. Copies should be retained at reception site for auditing.

* As defined in Directive 91/67/EEC
**The design of pumps must enable routine inspection and disinfection to take place.
Stage 3
Complete all of Stages 1 and 2 and carry out the following additional task:

- Slip the vessel, clean and disinfect the hull below the waterline.

- Every wellboat operator should carry out an assessment of the design of each of their wellboats, with regard to the practicalities of efficient cleaning and disinfection. Each wellboat should have its own copy of the current edition of the SDP[^2], including any supplements, to take account of particular design features;

- Bus stop deliveries may only be made to an empty site or series of empty sites. This does not preclude delivery to a site containing fish as long as the vessel does not subsequently proceed to another site;

- Wellboats must travel closed (ie with no water exchange) when located within 5km of any fin fish farm site;

- Ballast water must not be discharged within 5km or one tidal excursion (whichever is greater) of a farm site. This means that ballasting and pump cleaning need to be part of a vessel’s passage plan, and are sequential operations;

- Compliance with the above procedures should be audited by the receiving site management using the wellboat movement records, the disinfection logs and the corresponding fish movement records.

4. OTHER EQUIPMENT

What are the risks associated with the movement of other equipment?

The risks from other equipment are due to contamination by organic material.

How can these risks be minimised?

- **Workboats and other vessels.** The inter-site movement of any vessels should be kept to a minimum and where such movements are required, suitable disinfection procedures should be followed.

It is strongly recommended that the operators of any such vessels entering the area of a farm should be contacted and made aware of the potential risk that their action may pose with a view to minimising the contact.

- **Equipment and personnel.** Equipment, personnel and protective clothing should be site specific as far as is practicable. Where transfer between sites is unavoidable, cleaning and disinfection in accordance with the SDP[^2] must be followed.

When equipment is transferred from one site to another, the receiving site is responsible for auditing and signing-off equipment disinfection while it remains on the donor site. Further disinfection on arrival at the new site should also be considered. The frequency of equipment movement should be kept to a minimum to reduce the risk of disease transmission.
Inter-site contact of organic material (for example, fish health samples, decomposed fish material from mortality collection in undisinfected containers, undisinfected non site-specific harvest tubs, etc.) should be prevented through strict hygiene protocols and auditing.

5. DIVING

What are the risks associated with diving?

Divers encounter high-risk organic material on a daily basis. This material and all their equipment pose a risk of transferring disease.

How can the risk associated with diving be minimised?

- Remove organic material from all suits and equipment;
- Immerse suits and equipment in fresh water containing iodophor (minimum 100mg/l free iodine) for 20 minutes or heat treat by immersing equipment in clean fresh water so that the gear is maintained at a temperature higher than 55 °C for at least 5 minutes;
- Rinse thoroughly with clean fresh water;
- These specific disinfection routines for divers must be implemented and should be audited and documented by site staff on each occasion.

6. HARVESTING OPERATIONS

What are the risks associated with harvesting operations?

Risks are from proximity to infected farms, harvest stations or slaughter houses and from the movement of infected live or dead fish, contamination with blood, body fluids and offal, equipment and personnel.

How can these risks be minimised?

- Separation distances. Production units must not be sited within 5km or one tidal excursion (whichever is greater) of a harvest station or, in the case of processing plants, unless effluent disinfection has been installed.
- Containment and disinfection. It is a requirement under the Welfare of Animals (Slaughter and Killing) Regulations 1995 that fish must be dead or deeply unconscious when their gills are cut. Compliance also reduces blood splashing which is beneficial from a disease containment perspective. Gill cutting must take place on a facility where the blood water can be caught and disinfected. This may mean using guttering and bins particularly when slaughtering at sea. The use of covers to reduce volume variations caused by rain is
required when these processes occur in the open. At the end of each day, all equipment requires disinfection according to the SDP\(^2\).

- **Risk of escapes.** Before commencing harvest at sea or transporting fish from a farm to a harvest station, the cage net should be examined for holes or signs of weakness. This should be carried out before crowding the fish. The method of crowding the fish and removing them to the slaughter point should be assessed for risk and contingency arrangements made to prevent fish escaping. Examples of the types of contingency arrangements are the establishment of a ‘safety net’ system to catch fish escaping from the lifting method (braille bags should not be operated outside the area of containment) and a hand net to recapture fish lost at sea from the killing table.

- **Uplifting and transportation of harvested fish.** Risk reduction measures should be directed at preventing the following:
  - Leakage from harvest bins by using, harvest bins in good condition, sealed bin liners and secure lids and bindings;
  - Loss of harvest bins at sea by maintaining rafts in good repair, having contingency arrangements for poor weather conditions, ensuring harvest bins are properly loaded and secured and using harvest bins which are buoyant and therefore recoverable;
  - Cross-infection by having a clear identification system in place for those harvest bins originating in high risk areas (for example, the use of colour-coded harvest bins) and ensuring that all harvest bins are subject to the SDP\(^2\) prior to re-use.

Plastic pallets should be used where possible and the use of wooden pallets phased out by treating them as ‘single-use’ only.

- **On-site harvest stations.** Additional risks associated with on-site harvesting arise from transfer of equipment and personnel between sites, and the vulnerability of some sites to adverse weather conditions. The following risk reduction measures are specific to this type of harvesting operation:
  - Equipment should be site-specific or if moved between sites must be disinfected in compliance with the SDP\(^2\);
  - Rafts made of wood or other materials not readily disinfected should be avoided;
  - Contingency arrangements for deteriorating weather should be in place before commencing harvest. Rigorous procedures should be established to minimise the likelihood of damage from rafts, and equipment moored alongside cages. Blood water containment equipment should be covered to prevent the ingress of rain water.

- **Harvest station at sea.** Additional risks arise from the movement of live fish and the maintenance of a population of live fish at the station. Risks may be reduced by having permanent harvest equipment and containment methods, and by siting such stations in sheltered locations.
• There should be a presumption against a harvest station in a Management Area unless by agreement with the operators;

• Use of wellboats to move fish to harvest stations should be in accordance with this Code of Practice;

• The use of transport cages for moving fish from farm to harvest station should be limited to transport of fish through safe water over short distances within zones;

• To avoid attracting wild fish, there should be no feeding at a harvest station;

• To reduce the risk of virus transmission and the development of disease, fish should not be held on a harvest station for more than seven days;

• Fish must never be transferred from a harvest station back to a production site.

• **Shore-based harvest stations.** The principal risks associated with this method of harvest are in the uplifting and movement of live fish and the disinfection of a large quantity of water from the wellboat. These facilities must make provision for disinfection of wellboat water or its safe disposal at sea.

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**7. PROCESSING OPERATIONS**

**What are the risks associated with processing operations?**

**Reception and off-loading**
Risks include spillage in off-loading bays, either in routine tipping of harvest bins or in accidental ‘catastrophic’ release, for example, where a harvest bin bursts or falls. There may also be contamination of personnel (workers, visitors and/or passers-by) and contamination of vehicles which leave the site.

**Effluent management, including blood water**
Contamination of personnel, equipment or vehicles by blood water or wash water leads to spread of disease, as does seepage of potentially infected material to ground water or water courses.

**Waste solids**
Risks are associated with access by and contamination of vermin (for example, birds and rodents). The use of waste material as bait (for example, in creels) could lead to infection of new areas and/or the contamination of protective clothing.

**Equipment and vehicles leaving the processing plant**
There is a risk of contaminated equipment, harvest bins or pallets (particularly wooden ones) being carried on vehicles leaving the facility. Spread of disease could also occur through the contaminated wheels and decks of lorries, and *via* workers leaving with contaminated clothing.
How can these risks be minimised?

Risk reduction methods:

• Off-loading bays must be equipped with a waterproof apron, draining to a collection point and should be surrounded by a bund or similar structure;

• Roofing over reception areas is recommended to avoid the problem of rainwater run-off becoming contaminated. Drainage from dirty areas must feed into a disinfection facility;

• Sprays or wheel baths must be available to treat vehicles leaving a site;

• Full protective clothing must be provided for staff and should be retained on the premises. The provision of disposable protective clothing should be considered where possible. Laundering of clothes should be at a temperature that will inactivate ISAV (at least 55°C for longer than five minutes). Rubber overalls need to be disinfected in a soak bath;

• Plastic pallets should be used whenever possible. The use of wooden pallets should be phased out. When wooden pallets have been used, they should be for ‘single use’ only;

• Site boundaries must be clear and access to dirty areas restricted;

• Processing areas dealing with high-risk material must be identified and restricted. All surfaces must be waterproof and amenable to disinfection, and drainage from dirty areas must feed into a disinfection facility;

• Waste solids must be ensiled before disposal.

8. FISH FARM ESCAPES

What can be done to minimise the risks from escaped fish?

• The conclusions and recommendations of the Farmed Fish Escapes Working Group must be followed.

• In addition, cage security inspection must be implemented immediately ISA is suspected or confirmed on a site, and a net inspection programme with increased frequency is followed until all fish are removed from the cages.

• Additional safety measures to prevent escapes must be implemented whenever ISA infected or suspected stocks are being moved.

• Particular effort must be directed at attempts to recapture escaped sexually mature salmon in line with any recapture methods proposed by the Farmed Fish Escapes Working Group.
9. OTHER BIOLOGICAL VECTORS OF ISA

What are the risks from other ISAV vectors?

Fish. It has been suggested that sea trout may well be a natural reservoir of ISAV. Many species of non-salmonid fish have been examined and in Scotland ISAV has been detected in eel caught in fresh water and in saithe caught within a cage. While no evidence yet exists of infection in wrasse, the use of wrasse should be treated with caution.

Sea lice. Sea lice of both species (Lepeophtheirus salmonis and Caligus elongatus) have been demonstrated to transfer ISAV infection. The mobility of pre-adult and adult sea lice is well known and there may be a significant risk of transmitting ISA between sites.

Birds. The main risks from birds include passive viral transfer through body contact or the dropping of infective material and regurgitation of partly digested food.

Marine mammals. The biggest risk is thought to be from escapes resulting from nets damaged by predators.

How can these risks be minimised?

Fish
• The risk from wrasse will be reduced if use is restricted to those caught within the salmon farm's hydrographically defined area.

Sea lice
• Synchronous sea louse treatments should be used without prejudice to environmental safety throughout a hydrographic area;
• There should be full enclosure of sea cages during bath treatments;
• Farmers should conduct weekly on-site lice inspections to select optimal timing;
• Regular compound resistance testing should be carried out;
• Post-treatment lice inspection should be carried out to verify efficacy of treatment;
• The use of hydrogen peroxide or other non-effective compounds should be minimised.

Birds
The risk of passive transmission of ISAV by birds should be minimised by:
• Attention to measures designed to exclude birds from direct in-cage contact;
• Good hygiene routines in handling mortalities;
• Good feeding practice which minimises wastage.
Marine mammals

- The risk of damage to nets by seals should be minimised through the use of appropriate deterrent measures, for example, suitable net strength, acoustics and predator mesh.

10. AREA MANAGEMENT

Management Areas and agreements within them are based on simple, yet fundamental aspects of the oceanographic conditions found in Scottish waters. They are able to take into account specific local conditions, and can also be applied widely to the entire Scottish industry. They should be adopted as the basis for dealing with outbreaks of any waterborne disease, as well as forming the basis for a sustainable and planned approach to managing the industry in the future. However, they must first be scrutinised on a case-by-case basis to take into account local conditions and planned occupancy of farms.

Guidelines on how to set up management agreements are given in the Final Report of the Joint Government/Industry Working Group on Infectious Salmon Anaemia (ISA), but there are certain fundamentals that can be defined in this Code of Practice.

- **Single year classes.** Modern farming techniques mean that smolts can be transferred to sea water in virtually any month of the year and it is therefore important to define what is meant by a ‘single year class’. Figure 10.1 shows how the various combinations of $S_2$ and $S_1$ inputs should be managed to ensure a fallow period within a reasonable space of time. Subsequent stocking of $S_2$ and $S_1$s or vice versa is possible under these regimes.

- **Fallowing.** Dates should be agreed between all parties and should be obligatory.

- **Health status of new smolts.** There should be agreement on the quality of smolts to be stocked into a Management Area, which may include: physiological status of smolts; use of vaccines; and tests for specific pathogens.

- **Good husbandry practices.** These will be agreed by the participants but will include: adherence to stocking density limits; stock inspection; daily dead fish removal; veterinary input; proper disposal of dead fish (by ensiling in the first instance); net changing regimes; general hygiene and site cleanliness.

- **Exchange of information.** Information exchange may include: veterinary reports; mortality rates; timing and types of medicines used; and mutual inspections for assurance purposes.

- **Tailoring an Area Management Agreement (AMA).** In drawing up an AMA farmers may find that their situation does not easily fit into the template and that they will require a tailored Area Management Agreement. For example, to enable synchrony, farmers may agree to grow each other’s fish, or, in the absence of notifiable disease, farmers may choose to use a shorter fallow period of 4-6 weeks, or, in a case where a farm cannot fit into the required regime, it may have to close and efforts made to mitigate the loss.
A CODE OF PRACTICE TO AVOID AND MINIMISE THE IMPACT OF INFECTIOUS SALMON ANAEMIA (ISA)

**Figure 10.1** Fallowing strategies on salmon farms with different regimes.

<table>
<thead>
<tr>
<th>Year</th>
<th>S1</th>
<th>S1/2</th>
<th>S1 &amp; S1/2</th>
<th>S1/2 &amp; S1</th>
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<tbody>
<tr>
<td>1</td>
<td>Fish movements on-site</td>
<td>Fish movements off-site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>3</td>
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<td>4</td>
<td></td>
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</tr>
</tbody>
</table>

**Unacceptable strategies**

- **S1, S1/2, S1**
- **S1/2, S1, S1/2**

**NB**  
S1/2 refers to any smolt transferred to sea prior to the normal March - May S1 smolt input. S1/2s are also known as S0s, PP smolts, autumn input smolts.
11. TRAINING AND PROCEDURES

Staff should be given appropriate training. Highly trained and disciplined staff are essential for maintaining the required level of hygiene and adherence to protocols. Written protocols, including risk assessments, which are regularly audited will increase security and are particularly important for activities on remote sites. These should be formally audited through existing quality assurance schemes such as the Scottish Quality Salmon scheme or an equivalent. The SDP should be followed.

12. REFERENCES


## APPENDIX I

### Checklist for Cleaning and Disinfection of Wellboats

<table>
<thead>
<tr>
<th>Cleaning</th>
<th>Tick</th>
<th>Disinfection</th>
<th>Tick</th>
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<tbody>
<tr>
<td>Hull below waterline</td>
<td></td>
<td>Hull below waterline</td>
<td></td>
</tr>
<tr>
<td>Hull above waterline</td>
<td></td>
<td>Hull above waterline</td>
<td></td>
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<tr>
<td>Wells</td>
<td></td>
<td>Wells</td>
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</tr>
<tr>
<td>Grid plates</td>
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<td>Grid plates</td>
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<tr>
<td>Pumps (including vacuum pump)</td>
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<td>Pumps (including vacuum pump)</td>
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<tr>
<td>Bilge pumps</td>
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<td>Bilge pumps</td>
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<td>Sea valves</td>
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<td>Sea valves</td>
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<td></td>
<td>Deck</td>
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<tr>
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<td>Railings</td>
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<tr>
<td>Bulkhead/casings</td>
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<tr>
<td>Hatches and covers</td>
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<tr>
<td>Derrick</td>
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</tr>
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<tr>
<td>Ballast tanks</td>
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<td>Ballast tanks</td>
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<tr>
<td>Other equipment (specify)</td>
<td></td>
<td>Other equipment (specify)</td>
<td></td>
</tr>
</tbody>
</table>

| Water temperature used                |      | Disinfectant used             |      |
|                                      |      | Disinfectant concentration   |      |
|                                      |      |                               |      |
|                                      |      |                               |      |
|                                      |      |                               |      |
|                                      |      |                               |      |

I, ....................................................................... skipper of the ..............................................................................

have overseen the Cleaning and Disinfection procedures outlined in FRS Marine Laboratory Aberdeen. *Disinfection Guide with regard to the ISA Virus*: Version II.

Signed ............................................................. (Skipper) (Witness) .......................................... .................

Date................................................................ Date ....................................................... ............