MARINE (SCOTLAND) ACT 2010, PART 4: MARINE LICENSING

BEST PRACTICABLE ENVIRONMENTAL OPTION (BPEO) ASSESSMENT: DISCHARGE OF FISH FARM CHEMICAL TREATMENT AGENTS FROM A WELLBOAT

1. Introduction

1.1 Background to application

This Best Practicable Environmental Option (BPEO) Assessment has been prepared in support of a Discharge of Treatment application under the Marine Licence (Discharge of treatment agents), for sea lice bath treatments at a number of marine fish farms throughout the west coast of Scotland. In order to achieve more effective treatments to control sea lice (*Lepeophtheirus salmonis)* infection, with less potential for environmental impact due to the greater control and lower concentration of medicine required, The Scottish Salmon Company (SSC) has made an application for the use of licensed sea lice medicine bath treatments using well boats.

In line with the National Marine Plan, SSC are committed to exploring alternative methods which explore the use of sustainable, biological controls for sea lice (Policy - Aquaculture 12). A copy of SSC's sea lice strategy which will be used for all sites is presented in Annex 5.

To ensure protection of stock, it is also a necessary contingency to have a range of medicines available to maintain effective sea lice treatment programmes. Sea lice chemotheraputents currently consented for use within Scotland are in-feed treatments (SLICE) and bath treatments (Excis, Salmosan/SalmosanVet, Azasure and Alphamax). It is essential that all available products and all possible treatment methods are an option to the Industry to maintain effective sea lice control. SSC are applying for the use of the following bath treatment medicines to be administered in well boats.

- Excis™, (Cypermethrin)
- Azasure (Azamethiphos)
- Salmosan or Salmosan Vet ™ (Azamethiphos)
- Alphamax ™ (Deltamethrin)
- Paramove (Hydrogen Peroxide).

SSC currently holds a Scottish Environment Protection Agency (SEPA) CAR Permit for the use of sea lice control chemicals at the Gometra marine fish farm site (Annex 1) which provides strict threshold concentrations on the quantities of these chemicals which can be used in the treatment of sea lice.

The location of the marine fish farm can be seen on the attached plans (Annex 7). The Isle of Mull has had incidences of sea lice infection in the past and SSC has made use of bath treatments at its sites on Mull using both tarpaulins and well boats, in addition to in-feed treatments. Having all options available is likely to improve control and reduce infestation. Bath and well boat treatment methods are provided in the standard operating procedures (SOPs) presented in Annex 2. Records of the treatments at each site in this area, including chemicals used and volumes, for the past five years is presented as Annex 3.

1.2 Source of materials

Agent	Supplier	Supplier Address
Exis	Novartis Animal Vaccines Ltd	4 Warner Drive Springwood Industrial Estate Braintree Essex CM7 2YW
Salmosan	Fish Vet Group	22 Carsegate Inverness IV3 8EX
Azasure	Neptune Pharma Ltd	Regus House Victory Way Admirals Park Crossways DA2 6QD
Alphamax	PHARMAQ AS	Skogmo Industriområde N 7863 Overhalla Norway
Hydrogen Peroxide	c/o Aqua Pharma Ltd	Aurora House 8 Inverness Campus Inverness IV2 5NA

Use of chemotherapeutant medicines for the control of sea lice is under prescription only. Therefore, only a veterinarian can prescribe the treatment for animals under his/her care.

1.3 Description (nature and volume) of materials

Please refer to Product Data Sheets and Material Safety data Sheets (Annex 4).

- Excis is a clear, yellow tinted, cutaneous solution for water born use, with an alcoholic odour containing 1 % w/v Cypermethrin (cis40:trans60). It is to be administered by addition to seawater. Treatment dose: 0.5 mL/m3 seawater. This is equivalent to 5 µg Cypermethrin/ Litre sea water.
- Azasure is a beige powder that is dispersible in water, and stable under normal conditions. It contains ~ 50% w/w Azamethiphos. It is to be administered by addition to seawater. Treatment dose: 0.2g/m3 seawater. This is equivalent to 2 µg Azamethiphos/ Litre seawater.
- Salmosan or Salmosan Vet is a beige powder that is dispersible in water, and stable under normal conditions. It contains ~ 50 % w/w Azamethiphos. It is to be administered by addition to seawater. Treatment dose: 0.2 g/m^3 seawater. This is equivalent to two µg Azamethiphos/ Litre seawater.
- Alphamax is a slightly opaque, pale yellow liquid containing 10 mg/ml Deltamethrin. It is supplied in concentrated form, and is diluted and administered by addition to seawater. Treatment dose: 0.2mL/m^3 seawater. This is equivalent to 2 µg Deltamethrin/Litre seawater.

- Hydrogen Peroxide is a colourless liquid and it is supplied at a concentration of approximately 50%.

The volumes that are permitted for use under the SEPA CAR authorisation for Gometra fish farm are summarised as follows:

Site	Volume of Excis (g)	Volume of Salmosan/ Salmosan Vet or Azasure(g)	Volume of Alphamax
Gometra	70.65 (3 hour)	318.3 (3 hour)	26.49 (3 hour)

1.4 Details of previous operations including current practice

Please refer to the SSC SOPs for bath treatments in full tarpaulins and well boat treatment operations (Annex 2).

2. Discussion of Available Disposal Options

2.1 Land Discharge via an Outfall

The volumes of water involved, operational requirements, and staff and boat time implications, make land discharge practically and technically unfeasible. Furthermore, the depth of waters close to the shore of the Gometra site does not allow a large vessel to come up to shore. Therefore, this option has not been considered further in this assessment.

2.2 Sea Disposal

2.2.1 Within fish farm pens via CAR consent (Discharge of treatment agents) (Tarpaulin)

This was the disposal option previously in use, following treatment in pens (by way of tarpaulins) on the farm site, under the specifications of the CAR consent. This will continue to be a disposal option, however other options are more commonly used.

2.2.2 Fish farm pens via Marine Licence (Discharge of treatment agents) (Well boat)

This is the preferred disposal option and the licence renewal is currently being applied for through this Marine License (Discharge of treatment agents). This involves the treatment within a well boat and then discharge at the site. The advantages of this method will be discussed fully in the following section.

2.2.3 Location other than at fish farm pens

This involves the treatment within a well boat and then discharge of treatment agents away from the fish pens or in transit between farms. This option is not approved by Marine Scotland and thus this method is not currently being applied for through this Marine Licence (discharge of treatment agents).

2.3 Pre-treatment options prior to discharge at sea

Industry research has suggested that there are a number of pre-discharge options although trials have not been successfully completed. These include resin based filters and the addition of organic matter for particulate binding. These could be considered and SSC would be keen to be involved in research trials if these were initiated within Scotland.

3. Aspects to be taken into consideration

3.1 Strategic considerations

3.1.1 Within Fish Farm Pens via CAR Consent (Discharge of treatment agents) (Tarpaulins)

The SEPA CAR consent requires the use of full enclosure tarpaulins but these can be difficult to handle due to the size of nets and the number of fish within them. Weather, in particular wind and wave action, and tidal conditions restrict the use of full tarpaulins. The most effective and efficient treatment strategy is to treat the whole site in a short period of time, which can be challenging when using full tarpaulins, especially if treatment times are restricted to slack water tides.

Oxygen demand may increase during treatments and it is important to maintain adequate oxygen levels in the water. The stress levels in fish are monitored during treatments, and there is a greater risk of aborted treatments using full tarpaulins as a result of observed oxygen stress in the fish. Treatments stopped before completion are predominantly ineffective and increase the likelihood of target resistance emerging since the shortened treatment does not allow eradication of the sea lice infection. The risk of fish mortality is increased significantly when using full tarpaulins, through oxygen stress and overcrowding. Furthermore, the equipment required to supply adequate oxygen (diffusers, ladders, and oxygen crates) is an additional obstruction in the shallowed pens that may damage and stress the fish. This oxygenation kit is also expensive, and physically very difficult to transport, and manoeuvre around the pens.

SEPA CAR consents allow a specified number of pens to be treated per day. However, there is a conflict arising through this restriction specifying the number of pens that can be treated in a day, and the known effectiveness of treatment regimens being carried out over a short a time as possible. The number of days it takes to treat some farms as a result of the restriction imposed by the CAR consent likely increases the risk of re-infection on the farm due to sea lice spread from the untreated pens back to the treated pens.

3.1.2 Fish farm pens via Marine Licence (Discharge of treatment agents) (Well boat)

One of the advantages of using well boats for treatments is that the well volume is absolute and known, and the number of fish pumped into a particular well can be counted, and thus the treatment volume required is clearly defined. The well and biomass information allows the dose to be calculated more accurately, giving a more effective treatment. Due to the difference between well volume and full tarpaulin volume, there is a reduction in the amount of medicine required to treat a given biomass and it is estimated that less than half the dose is required for well boat treatments, relative to full tarpaulins.

Well boat treatment is particularly useful if grading or transporting of fish operations are taking place, since the use (and cost) of the well boat is already accounted for (although weather conditions will influence the availability of well boats).

Although there are no proven pre-discharge treatment options prior to discharge at sea, there will be significant dilution of medicinal compounds before discharge from the wells. During treatment there is a continuous circulation of water being pumped through the closed wells and following treatment, there is a continuous circulation of seawater into the wells. There is a possibility that discharge periods could be worked around tide timetables, since the well boats can control discharge timings and rates. This control is not possible following full tarpaulin treatments, since discharge is immediate and continuous.

Furthermore, the disadvantages highlighted in the above section regarding treatment time restrictions, oxygen stress, operational difficulties, fish health concerns and mortality are removed, or significantly reduced during well boat treatment operations.

3.2 Strategic Considerations

3.2.1 Operational aspects, including handling, transport etc.

All treatments are administered under veterinary supervision and/or instruction. All operations are carried out following written Standard Operating Procedures (please refer to enclosed documents Annex 2).

3.2.2 Availability of suitable sites/facilities

This falls under the responsibility of the Area Manager. It consists of booking a suitable well boat, for a defined period and a defined task.

3.2.3 Legislative implications, both national and international

This BPEO supports a Marine Licence (Discharge of treatment agents) for the Gometra site. The SEPA CAR Consent for medicinal products which is held and used at the sites is presented in Annex 1.

3.2.4 Summary of the outcome of discussions with third parties (If possible, copies of consultees replies should be appended to the assessment)

There have been no formal discussions with third parties out with the planning application process however, all stakeholders (including wild fisheries) strive to achieve control over sea lice infection.

3.3 Environmental considerations

3.3.1 Safety implications

Please refer to the Material Safety Data Sheets (Annex 4).

3.3.2 Public health implications

The only Public Health implication identified relates to Food Safety, with that being the consumption of medicated fish.

- As Excis is a Prescription Only Medicine, all treated fish undergo a withdrawal period of 10 degree days (as per manufacturer's instructions) prior to slaughter.
- Salmosan or Salmosan Vet is a Prescription Only Medicine, all treated fish undergo a withdrawal period of 5 degree days (as per manufacturer's instructions) prior to slaughter.
- Azasure is a Prescription Only Medicine, all treated fish undergo a withdrawal period of 10 degree days (as per manufacturer's instructions) prior to slaughter.
- Alphamax is a Prescription Only Medicine, all fish undergo a withdrawal period of 5 degree days (as per manufacturer's instruction) prior to slaughter.

Farming traceability system ensures this period is adhered to prior to harvesting. Shellfish farming interests located within the vicinity of the fish farm pens are consulted through the planning and SEPA application processes.

3.3.3 Pollution/contamination implications, including discussion on: accumulation, toxicity, hazards, persistence, short and long-term impacts, dilution and dispersion, etc.

SEPA consents specific amounts of medicines to treat sea lice infestations in marine fish farms.

These medicinal products have been fully tested and approved for use in the marine environment and extensive eco-toxicity testing has been carried out. The licensed concentrations stated in the SEPA CAR consent are controlled and regulated by SEPA. The concentration permitted in the CAR consent is based on precautionary Environmental Quality Standard (EQS) limits. AutoDepomod modelling of site specific conditions determines an allowable concentration that ensures EQS limits will not be breached.

Modelling guidance can be found at:

https://www.sepa.org.uk/media/113498/fish-farm-manual-annex-g.pdf

The SEPA CAR Consent for medicinal products which is held and used at the sites is presented in Annex 1.

3.3.4 Interference with other legitimate activities, e.g. fishing operations, other aquaculture interests

A Farm Management Statement (FMS) outlines the measures taken at a site to reduce and manage the risks posed by infectious agents and parasites which can be present in the environment, in wild and farmed fish, and in other naturally occurring biota. Farming activities will be carried out in accordance with the Code of Good Practice for Scottish Finfish Aquaculture.

An FMS has been created for Gometra and is presented in Annex 6.

3.3.5 Amenity/aesthetic implications

There have been no amenity or aesthetic implications identified.

3.3.6 Best practice guidance and mitigation measures

A more effective treatment is achieved with well boat treatments relative to full tarpaulin treatments.

A well boat treatment allows the use of fewer chemicals than enclosed tarpaulins. Given the discontinuous nature of the discharge and the mobility of the vessel it is possible to discharge at precise times (i.e. taking tides into consideration) or at precise locations. Fish health and well-being is also less at risk in a well boat, as detailed in Section 3.1.2.

3.4 Cost considerations

3.4.1 Capital costs, e.g. site costs, transport hire/purchase costs, equipment hire/purchase costs etc.

Costs are calculated over and above the infrastructure SSC already has in place. Costs are as calculated, as best as possible, on an individual pen treatment.

	Tarpaulin Treatment	Well boat Treatment
Treatment boat	£2500	Already in place for other company operations
Additional Company boat from other site	£1200	Not required
Staff	£150 x 12	£150 x 3
Chemical Cost	£1133 per pen	£3289 per pen
Total	**£6633**	**£3739**

4. Conclusions

4.1 Summary of available options

The options to discharge treatments from the Gometra site are either under SEPA CAR consent conditions (full tarpaulins) or under Marine Licence (Discharge of treatment agents). If a Marine Licence (Discharge of Treatment Agents) was granted the full tarpaulin method would continue to be used but when appropriate and available well boat treatments would also be carried out.

4.2 Summary of pros and cons of each option

The following table summarise aspects of each scenario:

Option	Cost	Chemical usage	Technical difficulty	Logistics	Environmental impact	Treatment efficacy	Risk to livestock	Strategic acceptability
Tarpaulins - CAR consent	High	High	Very labour intensive	Weather and tidal restrictions apply	Moderate	Good	Very high	Low
Wellboat - Marine licence	High	Moderate	Less labour intensive and more efficient	Boat availability	Low	Good	Moderate	High

The risk to livestock is higher with tarpaulin treatments compared to well boat treatments. Tarpaulin treatments can result in crowding of fish, with potentially less oxygen, less control and more obstructions. Well boat treatments allow for more control of oxygen and temperature, and more control on numbers and volume.

4.3 Identification of BPEO

This document outlines that discharge from a vessel (i.e. a well boat) is the best option in terms of environmental impact, chemical usage and fish welfare. It is therefore considered an acceptable option under the terms of the Food and Environment Protection Act 1985.