

# Environmental Quality Standards:

## A review of the marine Emamectin Benzoate standards

Globally, our oceans are under stress. This was powerfully emphasised at the recent *United Nations Ocean Conference* in New York. One of the many pressures on our marine environment is the harvesting of wild fish stocks. Aquaculture, including caged fish farming, represents one way to reduce this pressure but only if it is done well. If done poorly, it can also cause damage to the marine environment. SEPA's role is to ensure that aquaculture in Scotland's marine environment operates responsibly and with minimum environmental impact. As a result, we intend to modernise and strengthen the way we regulate aquaculture. As part of that process we are reviewing the Environmental Quality Standard for the sea louse medicine Emamectin Benzoate, and we want your input to help ensure the outcome is sufficiently robust for us to use as the basis for our regulatory position.

### 1. Introduction

- 1.1. SEPA sets or observes Environmental Quality Standards (EQS) in connection with the protection or improvement of the water environment. EQS are derived following a standard methodology. This methodology uses scientific information from laboratory and field tests on the effects of the chemical on a range of species to understand the potential for harm to the water environment. A numeric limit or EQS is then set on the concentrations of chemicals in the water environment to protect it from harm. This document relates to the limits on the concentrations of Emamectin Benzoate that are allowed to be present in various compartments of the marine environment.
- 1.2. SEPA commissioned a review of the current EQS in relation to Emamectin Benzoate. The commissioned report from WRc (formerly known as the Water Research Centre) proposes new EQS values. SEPA is now seeking wider input for the purposes of obtaining any relevant scientific data and any additional relevant information, comments or concerns on the report. WRc will be asked to consider any scientific data received and, if appropriate, undertake a review of its report. SEPA will instruct an external peer review of the final report and, taking account of that and other information from the consultation, make a recommendation to Scottish Government on the appropriate EQS. Scottish Government will then make a decision on the appropriate EQS and issue a Direction to SEPA.

### 2. The role of EQS

- 2.1. In water EQS are matched to the objectives of the Water Framework Directive, EU legislation designed to protect and improve the water environment in the European Union. SEPA uses EQS such as those discussed in this document to suggest a safe limit on how much of that pollutant can enter the environment. In this way, SEPA can assess and control the impact of discharges of pollutants on the environment.

### 3. Deriving EQS

- 3.1. EQS for certain types of substances that are widely used across the whole UK that may harm the water environment are typically derived by a group of experts known as the United Kingdom Technical Advisory Group (UKTAG). For other substances which may cause harm to the water environment, such as those used in only one country, individual environment protection agencies derive EQS for their own use and these may be adopted by other environmental regulators.

- 3.2. There is guidance provided in order to ensure a consistent approach in the derivation of EQS for polluting substances. This is set out in the [Common Implementation Strategy for the Water Framework Directive \(2000/60/EC\) Guidance Document No. 27 Technical Guidance for Deriving Environmental Quality Standards](#) known as the EQS TGD.
- 3.3. For pollutants such as Emamectin Benzoate, the derivation of an EQS can be quite a complex and involved process. It will, however, typically include examining data on the effects of the substance upon organisms in the environment where the substance may be discharged. The concentration that affects or kills the most sensitive species will be used, in conjunction with other data, and an appropriate safety margin known as an assessment factor, to define the safe EQS i.e. the concentration of that substance that will pose no risk to the environment. Such EQS will normally be subject to scientific peer review before they are adopted and used to protect the water environment.

#### **4. Rational for the review of the existing EQS**

- 4.1. Existing EQS may need to be revised for a number of reasons. In this case, SEPA was aware that the existing EQS had been derived some time ago, before the publication of the European technical guidance document (EU TGD).
- 4.2. SEPA was also aware that the use of Emamectin Benzoate had changed over the years and that the risks posed to the environment from its use may have changed.
- 4.3. It was therefore likely that the EQS would benefit from the adoption of improved scientific understanding set out in the EU TGD and the application of data that had been derived in the years since the adoption of the existing EQS.
- 4.4. In this way, SEPA is seeking to ensure that the EQS for Emamectin Benzoate are as well matched to the ecological quality and protection of the water environment as they could be. SEPA commissioned an independent consultant, WRc, to examine the existing EQS and to undertake a literature and data review for Emamectin Benzoate. Details on revisions to the EQS, methodology and review are provided in the attached technical report. A brief summary is presented in this document.

#### **5. Emamectin Benzoate**

- 5.1. Emamectin Benzoate is present in certain medicines and pesticides used to deal with parasite infections in animals and pests on crops. It is toxic to a range of animals but particularly invertebrates such as insects and crustaceans.
- 5.2. In Scotland, a major use of Emamectin Benzoate is in medicines used for the treatment of sea lice infestations on farmed salmon. Sea lice are small crustacean parasites related to crabs and lobsters that live on the outside of salmon, feeding on the skin and blood of the fish. If left untreated, they can flourish on the farmed salmon causing health and welfare problems, potentially leading to other infections and ultimately the death of the infected salmon.
- 5.3. Emamectin Benzoate is the active ingredient in certain medicines which are incorporated into the feed given to farmed fish when sea louse infestation occurs. After eating the medicated feed, Emamectin is distributed into the fish's tissue via the bloodstream. As a result, lice feeding on the fish's blood and skin are exposed to the chemical. Emamectin Benzoate works by altering nerve impulses sent through the body of the louse, ultimately leading to paralysis. As the chemical is retained in the fishes' tissues for a number of months it is able to offer protection to the fish from lice for several weeks to months.

- 5.4. A consequence of Emamectin Benzoate's persistence and oral administration to the fish is that residues are excreted in the faeces of treated salmon. These faeces, along with untreated medicated feed can settle on the sea bed, where Emamectin Benzoate becomes incorporated into the sediment. This often has implications for the animals that live and feed on marine sediments. EQS for Emamectin Benzoate are set in order to ensure that where it is used this effect is not too severe or widespread. EQS are set for both water and sediment to capture the two media where exposure is most likely and for the period over which exposure may occur (e.g. short-term in the water and both short and long-term in the sediment due to the persistent nature of the chemical).
- 5.5. This document seeks comments on the review of the existing EQS and the recommended revision of the standards as described in the accompanying technical document Annex A.

## 6. The proposals

- 6.1. Major changes are recommended to the EQS for Emamectin Benzoate (based on the attached technical report, Annex A). These are set out in table 1 below. The EQS are for marine water and marine sediment (the seabed), for both long and short term time scales. Put simply, short-term EQS are intended to protect aquatic life from short or acute (i.e. hours to a few days) exposure and long-term EQS are intended to protect aquatic life from long or chronic exposure (i.e. of weeks to months or longer).
- 6.2. To determine the appropriate EQS to set, it is important to understand the chemical, where it goes in the environment, how long it persists, which organisms come into contact with it and what the impact on those organisms may be. In the case of Emamectin Benzoate in marine fin fish aquaculture, it is necessary to have EQS for the water column, and as the substance is found in particles of food or in the fish faeces which fall to the seabed, sediment EQS are also required.
- 6.3. The EQS relating to water and sediment are set out differently. For water it is a weight of the pollutant that is present in a litre of water, either as suspended particles or dissolved in the water. For sediment, it relates to the weight of Emamectin Benzoate that is present in a kilogramme of sediment. As the amount of water in sediment varies quite a lot from place to place, it is normal for sediment EQS to be stated as weight of substance per dry weight of sediment.
- 6.4. The sediment EQS suggested in the review follow this convention and are based on dry weight of sediment, whereas the existing EQS are based on wet sediment as the original data from which the standard was derived did not account for the water content of the sediment. This means that the numbers are not directly comparable.

Table 1: Existing and proposed revised environmental quality standards for Emamectin Benzoate in the marine environment

<b>Environmental compartment and exposure scenario</b>	<b>Existing EQS</b>	<b>Proposed EQS</b>
Long term marine water		0.435 ngl <sup>-1*</sup>
Short term marine water	0.22 ngl <sup>-1</sup>	0.8 ngl <sup>-1</sup>
Long term marine sediment (or far field)	763 ngkg <sup>-1</sup> (wet weight)	12 ngkg <sup>-1</sup> (dry weight)
Short term (or near field) marine sediment	7630 ngkg <sup>-1</sup> (wet weight)	120 ngkg <sup>-1</sup> (dry weight)

\* a “ng” is a nanogram or one billionth of a gram.

6.5. Taking the example of the “long term marine water” EQS, it means that provided that there is less than 0.435 billionths of a gram of Emamectin Benzoate present in a litre of water then animals or plants living in that water will be protected. If the level is above this concentration then it is possible that harm might occur.

6.6. As Emamectin Benzoate is most likely to persist in marine sediment, the long term marine sediment EQS is most often used by SEPA to ensure that the environment is protected.

6.7. As discussed above, the new EQS are based upon the amount of Emamectin Benzoate present in dry sediment. Currently the EQS used by SEPA is based on the amount of Emamectin Benzoate present in wet sediment. The water content of marine sediments can be very variable and is also affected by the sediment type (fine sediments are generally wetter than those which contain more coarse particles) and the amount of organic material present, the use of a dry weight sediment EQS helps to reduce this variability.

### **What next?**

This open call for information is for the purposes of informing the ongoing review of our existing EQS for Emamectin Benzoate in the marine environment and the development of a recommendation to Scottish Government.

The feedback from this open call for information will inform SEPA’s conclusions and recommendation to Scottish Government.

### **How to respond to this open call for information**

This paper seeks information and data in respect of the review of the current EQS for the regulation of the release of Emamectin Benzoate to the marine environment from its use as a veterinary medicine in aquaculture for the control of sea lice to ensure that environmental quality standards are derived using the best available data and information. We want to get it right so that all stakeholders can benefit.

The questions on which we are seeking your views are summarised below:

**Question 1 - The proposed EQS have been developed in accordance with EU Water Framework Directive methodology. Has the review used the best information and data currently available? If not, please indicate what other information or data should be included.**

**Question 2 – Do you have any concerns in respect of the detail of this document or the implications of its findings?**

## **How to respond and by when**

You can respond open call for information in writing to the following address:

Anne Anderson  
EQS Review  
Scottish Environment Protection Agency  
Strathallan House  
The Castle Business Park  
Stirling  
FK9 4TZ

Or by email to:

[egsreview@sepa.org.uk](mailto:egsreview@sepa.org.uk)

Responses should be submitted to us by 31 August 2017. Earlier responses would be welcome.

## **Handling Your Response**

We would like to know if you are happy for your response to be made public.

If responding online, please complete the confidentiality questions where prompted. If responding by post, please complete and return the Respondent Information Form with your response.

If you ask for your response not to be published it will be regarded as confidential and treated accordingly.