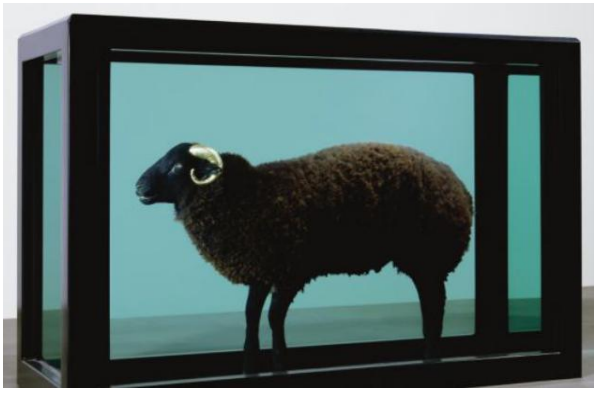
Media Backgrounder (January 2013):

Formalin - Scottish Salmon's Toxic Solution

Summary:
Data obtained by FishyLeaks via Freedom of Information reveals that the Scottish Government sanctioned the discharge of 1,400 litres of the carcinogenic chemical Formalin into a Special Area of Conservation (Loch Roag on the Isle of Lewis in the Outer Hebrides) against the advice of the Scottish Environment Protection Agency. The Global Alliance Against Industrial Aquaculture (GAAIA) has now filed a complaint with the European Commission for breach of the Habitats Directive and illegal use of carcinogenic chemicals.

"I'd rather eat one of Damien Hirst's pickled sharks than chemically embalmed Scottish salmon," said Don Staniford of the Global Alliance Against Industrial Aquaculture.

"The Scottish Government is clearly in a bit of pickle. The FOI documents show that the Scottish Salmon Company, aided and abetted by Marine Scotland, went rogue in Loch Roag. GAAIA is now demanding that the European Commission take swift action against the Scottish Government for speeding up the illegal discharge of toxic chemicals into a Special Area of Conservation. Cheap and nasty Scottish farmed salmon is the black sheep of the family and should be avoided like the plague."



Read the EC complaint in full via "Pickled Scottish Salmon, Anyone?"

The FOI reply from the Scottish Government dated 23 November 2012 detailed 190 pages of documents – read in full online here (same file online here as well). GAAIA has now filed further FOIs requesting information on Formalin use on Scottish Salmon farms. For more background please see GAAIA's website via "Gill Diseases" and "Scotland's Secrets".

Formalin is Carcinogenic:
Formalin is a highly toxic water-based solution of the carcinogenic chemical Formaldehyde which is used as a preservative for biological specimens. The artist Damien Hirst has famously pickled sharks, sheep and cows in Formaldehyde.

According to the National Cancer Institute, formaldehyde has been classified as a known human carcinogen (cancer-causing substance) by the International Agency for Research on Cancer and as a probable human carcinogen by the U.S. Environmental Protection Agency. Research studies of workers exposed to formaldehyde have suggested an association between formaldehyde exposure and several cancers, including nasopharyngeal cancer and leukemia. Formaldehyde is also a component of cigarette smoke - read more via the U.S. EPA's "Toxicity and Exposure Assessment for Children's Health" report online here.

“Toxic By Inhalation” Warns the ‘Safety Data Sheet’:
The FOI documents detail a ‘Safety Data Sheet’ for Formalin (formaldehyde solution) warning that it is a “toxic” and there is a “danger of very serious irreversible effects”:

[redacted]	41
[redacted]	FORMALDEHYDE SOLUTION AVR INTERNATIONAL
[redacted]	GENERAL CHEMICAL REAGENT

[redacted]	Irrigate thoroughly with water for at least 10 minutes. **Obtain medical attention.**
[redacted]	Drench the skin thoroughly with water. Remove any contaminated clothing and wash before re-use. Unless contact has been slight, **obtain medical attention.**
[redacted]	Wash out mouth thoroughly with water and give plenty of water to drink. **Obtain medical attention.**
[redacted]	Remove from exposure, rest and keep warm. In severe cases or if exposure has been great **obtain medical attention.**
[redacted]	Toxic by inhalation, in contact with skin and if swallowed. Causes burns. Toxic – danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.
[redacted]	Wear protective clothing respirator, gloves and goggles or face-shield.

Chemical Giant Merck Classifies Formaldehyde as a "Hazardous Ingredient" and a "Carcinogen":

MERCK
eurolab

41

SAFETY DATA SHEET

1. Identification of the substance/preparation and of the company/undertaking

Identification of the product

Catalogue No: 28421 ID No.: 1011300

Product name: **Formaldehyde solution about 40% w/v GPR (contains 9-11% methanol)**

Manufacturer/supplier identification

Company: Merck Eurolab Ltd, Merck House, Poole, Dorset, BH15 1TD, England
Telephone : 01202 669700 Telefax : 01202 665599

Emergency telephone No.: 01202 669700

2. Composition/information on ingredients

Chemical characterization

Solution in water

Product name: Formaldehyde solution 37-41%

CAS number: 50-00-0 EC-No.: 200-001-8

Hazardous ingredients:

Methanol	10%	
CAS number:	67-56-1	EC-No.: 200-659-6
Symbol:	F T	
R-phrases:	R11-23/24/25-39/23/24/25	
S-phrases:	S7-16-36/37-45	
Formaldehyde	37-41%	
CAS number:	50-00-0	EC-No.: 200-001-8
Symbol:	T	
R-phrases:	R23/24/25-34-40-43	

S-phrases: S26-36/37/39-45-51
Carcinogen, Category 3

3. Hazards identification

Toxic by inhalation, in contact with skin and if swallowed. Causes burns. Toxic: danger of very serious irreversible effects through inhalation,in contact wih skin and if swallowed. Possible risk of irreversible effects. May cause sensitization by skin contact.

4. First aid measures

Eye contact: Irrigate thoroughly with water. If discomfort persists, obtain medical attention.
Inhalation: Remove from exposure.
Skin contact: Wash off thoroughly with soap and water.
Ingestion: Wash out mouth thoroughly with water. In severe cases obtain medical attention.

5. Fire-fighting measures

Special risks:

Combustible.

The Merck 'Safety Data Sheet' also warns that the product is "caustic even in diluted form" and states: "do not allow to enter drinking water supplies, waste water, or soil!":

Further data

LD50 (oral, rat): 100 mg/kg
LC50 (inhalation, rat): 203 mg/m3
LD50 (dermal, rabbit): 270 mg/kg

Has been found to cause cancer in laboratory animals. Evidence of reproductive effects.
Carcinogen, Category 3

12. Ecological information

Do not allow to enter drinking water supplies, waste water, or soil! Caustic even in diluted form.
Biological degradability: good.

13. Disposal considerations

Chemical residues are generally classified as special waste, and as such are covered by regulations which vary according to location. Contact your local waste disposal authority for advice, or pass to a chemical disposal company. Rinse out empty containers thoroughly before returning for recycling.

1,400 Litres of Carcinogenic Chemical Discharged into Loch Roag:

The ‘Discharge Vessel Log of Operations’ included fourteen discharges of 100 litres of Formalin from the Viktoria Viking wellboat into Loch Roag between 6 and 8 November 2011:

DISCHARGE VESSEL LOG OF OPERATIONS*

MARINE (SCOTLAND) ACT 2010

MARINE SCOTLAND, MARINE LABORATORY, ABERDEEN DIS

Discharge Vessel: Viktoria Viking Log Sheet Page Number: 1

Discharge Operation: Fish Treatment – Wellboat Marine Licence Number: 04339/11/0

Discharge Site: Offshore Loch Roag Farm of Operation: Miavaig

Date	Quantity of Chemical discharged (ml or grams)	Chemical(s) or agent(s) discharged	Discharge operation			
			Time and position: Start	Weather, sea state and tidal set	Time and position: Completion	Rate/ duration* discharge
07.11.11	100 litres	Formalin 38%	58° 18.294N 06° 57.680W	Mild, cloudy	Within the drop zone	10 minutes
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08.11.11	100 litres	Formalin 38%	58° 18.294N 06° 57.680W	Mild/cold, clear and cloudy	Within the drop zone	10 minutes
08.11.11	100 litres	Formalin 38%	58° 18.294N 06° 57.680W	Mild/cold, clear and cloudy	Within the drop zone	10 minutes
08.11.11	100 litres	Formalin 38%	58° 18.294N 06° 57.680W	Mild/cold, clear and cloudy	Within the drop zone	10 minutes
08.11.11	100 litres	Formalin 38%	58° 18.294N 06° 57.680W	Mild/cold, clear and cloudy	Within the drop zone	10 minutes
Total	1000 Litres					

MARINE (SCOTLAND) ACT 2010

MARINE SCOTLAND, MARINE LABORATORY, ABERDEEN DIS

Discharge Vessel: Viktoria Viking Log Sheet Page Number: 2

Discharge Operation: Fish Treatment – Wellboat Marine Licence Number: 04339/11/0

Discharge Site: Offshore Loch Roag Farm of Operation: Miavaig

Date	Quantity of Chemical discharged (ml or grams)	Chemical(s) or agent(s) discharged	Discharge operation			
			Time and position: Start	Weather, sea state and tidal set	Time and position: Completion	Rate/ duration* discharge
08.11.11	100 litres	Formalin 38%	58° 18.500N 06° 51.900W	Mild, cloudy	Within the drop zone	10 minutes
08.11.11	100 litres	Formalin 38%	58° 18.500N 06° 51.900W	Mild, cloudy	Within the drop zone	10 minutes
08.11.11	100 litres	Formalin 38%	58° 18.500N 06° 51.900W	Mild, cloudy	Within the drop zone	10 minutes
08.11.11	100 litres	Formalin 38%	58° 18.500N 06° 51.900W	Mild, cloudy	Within the drop zone	10 minutes
Total	400 Litres					

*See Licence Conditions Relating to Discharge Operations

*Delete as appropriate Farm Manager: ______________ Signa

Form Fep6

Overdue Discharge Log for Report to OSPAR:

marinescotland

The Scottish Government

T:+44 (0)1224 295579 F: +44 (0)1224 295524
E: MS.MarineLicensing@scotland.gsi.gov.uk

[redacted]
The Scottish Salmon Company
Mid Strome
Loch Carron
Ross-shire
IV54 8YH

Our Ref: FKB/W112

Date: 30 December 2011

Dear [redacted]

MARINE (SCOTLAND) ACT 2010, PART 4 MARINE LICENSING

SCOTTISH SALMON COMPANY, EMERGENCY WELLBOAT DISCHARGE, OFFSHORE LOCH ROAG

LICENCE NUMBER: 04339/11/0

I am writing to inform you that the above licence expired on 05 December 2011.

Completed logs of the operation are now overdue, in terms of Part 2, section 10 of the schedule to the above licence. The logs should be forwarded to the address below within 14 days of the date of this letter and should be submitted on the enclosed form FEP6.

Under the OSPAR Convention all dumping of waste at sea with Scottish waters is required to be reported annually. Therefore we will require your completed logs to be submitted by no later than close of play on the **24 January 2012**.

Yours sincerely

R Duncan

Rachael Duncan
Licensing Operations Team

Licence to Pollute by Marine Scotland:
Marine Scotland granted the Scottish Salmon Company a "licence for discharging of used chemicals from wellboats" valid from the 7 November to 5 December 2011:

marinescotland

The Scottish Government

T:+44 (0)1224 295579 F: +44 (0)1224 295524
E: MS.MarineLicensing@scotland.gsi.gov.uk

MARINE (SCOTLAND) ACT 2010, PART 4 MARINE LICENSING

LICENCE FOR DISCHARGING OF USED CHEMICALS FROM WELLBOATS

Licence Number: 04339/11/0 Reference Number: FKB/W112

Scottish Ministers (hereinafter referred to as "the licensing authority") hereby authorise:

The Scottish Salmon Company
Mid Strome
Lochcarron
Ross-Shire
IV54 8YH

to deposit in the sea the chemicals or agents particulars of which are described in Part 1 of the attached Schedule. The licence is subject to the conditions of use set out, or referred to, in Part 2 of the said Schedule.

This licence shall be valid from 07 November 2011 until 05 December 2012

Signed: .....

Michael Bland

For and on behalf of the licensing authority

Date: 04 November 2011

The licence permitted the discharge of a total volume of 1600 litres of Formalin in 16 separate discharges of 100 litres:

SCHEDULE TO LICENCE NUMBER: 04339/11/0 DATED: 04 NOVEMBER 2011

Part 1 – Particulars

1. Name and address of the person(s) discharging the used chemical(s) or agent(s):

   The Licensee will discharge the used chemical(s) or agent(s)

2. Name and address of any other agents acting on behalf of the licensee (if appropriate):

   As per Licensee

3. Name(s) of the vessel(s) to be employed to undertake the discharge operations:

   a) Victoria Viking

   The agent or licensee must notify the licensing authority immediately by fax if a vessel not listed on the licence is used for the discharge of used chemicals. The information required by the licensing authority regarding the additional vessel(s) will be the same as the information already provided for the vessels on the existing licence. The licensing authority will respond by fax or e-mail, confirming the addition of the new vessel to a revised licence. The revised licence will then be forwarded to the agent or the licensee by the licensing authority.

4. Location of discharge of the used chemical(s) or agent(s):

An area bounded by the following co-ordinates:

58 17.805'N	**06 52.205'W**	**58 18.271'N**	**06 52.795'W**
58 18.847'N	**06 50.521'W**	**58 18.442'N**	**06 49.931'W**

5. Description of the chemical(s) or agent(s):

16 separate discharges of 100l Formalin Solution (38%) in seawater at 200ppm, as described in the application dated 31 October 2011 and supporting documentation.

6. Quantity for discharge within the period of validity of the licence:

   Total volume discharged to be no more that 1600 litres of Formalin Solution (38%). 16 separate discharges of 100l Formalin solution (38%).

Under 'Conditions' the licence specified:

7. The method of discharge shall be:

   Pumped discharge via pipe/hatches from Wellboat at a depth of surface to 4 metres below sea surface whilst steaming within the location of discharge in accordance with Condition 4 of this licence. Only one well containing 100l of Formalin Solution at 38% to be discharged at any one time.

Under 'Notes' the licence stated that "the issue of the licence does not absolve the licensee from obtaining such authorisation, consents etc which may be required by any other legislation":

NOTES

1. You are deemed to have satisfied yourself that there are no barriers, legal or otherwise, to the carrying out of the licensed operations. The issue of the licence does not absolve the licensee from obtaining such authorisations, consents etc which may be required under any other legislation.

2. In the event that the licensee wishes any of the particulars set down in the Schedule to be altered, the licensing authority shall be immediately notified of the alterations. It should be noted that changes can invalidate a licence, and that an application for a new licence may be necessary.

3. Under Section 30 of the Marine (Scotland) Act 2010, the licensing authority may vary, suspend or revoke the licence, if it appears to the authority that there has been a breach of any of the provisions of the licence or for any other reason that appears to be relevant to the authority.

4. Under Section 39 of the Marine (Scotland) Act 2010, it is an offence to carry on a licensable marine activity or cause or permit any other person to carry on such an activity without a marine licence or fails to comply with any condition of a marine licence. It is a defence for a person charged with an offence under Section 40 in relation to any activity to prove that the activity was carried out for the purpose of saving life, or for the purposes of securing the safety of a vessel, aircraft or marine structure ('*force majeure*'), and that the person took steps within a reasonable time to provide full details of the incident to the licensing authority. (Under Annex II, Article 7 of the Convention for the Protection of the Marine Environment of the North-east Atlantic, the licensing authority is obliged to immediately report '*force majeure*' incidents to the Convention Commission).

5. All correspondence or communications relating to the licence should be addressed to:

Licensing Operations Team
Marine Scotland
Marine Laboratory
375 Victoria Road
Aberdeen
AB11 9DB

Tel: (01224) 295579
Fax: (01224) 295524

Marine Scotland also wrote to the Scottish Salmon Company:

[redacted]
The Scottish Salmon Company
Mid Strome
Lochcarron
Ross-shire
IV54 8YH

Our Ref: FKB/W112

Date: 04 November 2011

Dear [redacted]

MARINE (SCOTLAND) ACT 2010, PART 4 MARINE LICENSING

DISCHARGE OF USED SEALICE TREATMENT CHEMICALS FROM, TARANISH AND EUGHLAM, LEWIS

I refer to your application for a licence in respect of the above proposals.

I am pleased to inform you that the licensing authority has no objections to the issue of the requested licence, and I therefore enclose Licence 04339/11/0. You are advised to carefully check the licence and schedule documents. Please contact me immediately if you have any concerns regarding the conditions of the enclosed licences.

Please be aware that this licence has been granted for a specific disease outbreak and MS-LOT will contact you at a later date regarding your intentions should further outbreaks occur.

You should note that the licences include conditions that the licensing authority must be notified of the dates of commencement and completion of the proposed disposal operations. You should also note that the licence includes conditions requiring you to maintain a log of disposal operations, and that written reports, summarising all disposal operations undertaken under authority of the licence, should be submitted to the licensing authority. Information for inclusion in the log(s) of disposal operations is detailed in the schedule to each licence, and an example of a suitable log format, form FEP6, is enclosed.

Under the Marine Licensing Appeals (Scotland) Regulations 2011 (S.S.I. 2011/203), you are entitled to appeal if you are dissatisfied with any condition in the licence. An appeal may be lodged in any sheriff court in Scotland and must be lodged no later than 21 days after the date of this letter.

All correspondence or communications relating to this letter or the licence document should be sent to the address below.

Yours sincerely

Alan Keir
Marine Scotland
Marine Laboratory

Formalin is so toxic that Marine Scotland advised staff to stay inside the wheelhouse of the wellboat during use:

From: Bland M (Michael) (MARLAB)
Sent: 04 November 2011 14:52
To: Mckenzie G (Gregor)
Cc: McKie J (Jim) (MARLAB); Downie D (Douglas)
Subject: Formalin MSDS and advice from MS H&S

Attachments: DisplayMSDSPage.pdf

Dear Gregor,

Within Marine Scotland Science Formalin is used for a variety of activities such as as a preservative for biological samples. The implications of using formalin have been assessed by staff at MSS using MSDS (attached). In consultation with H&S adviser of MSS it is apparent that the best means of controlling exposure is though isolating the member of staff from the chemical. The best way to achieve this is for the member of MS staff to remain in the wheelhouse of the vessel during the both the discharge activity and any steaming.

In addition to this information, the attention of the Wellboat operator should be drawn to the first aid measures as laid down in section 4 of the MSDS, the fire fighting measures as laid down in Section 5 of the MSDS and the accidental release measures in section 6 of the MSDS. As the discharge to the marine environment will be permitted under the marine licence, spillages on the decks of the vessel must be washed overboard to ensure no secondary exposure.

If the member of MS staff stays in the wheelhouse for the whole duration of the inspection the risk of exposure would be reduced to an acceptable level.

DisplayMSDSPage.pdf (50 KB)

Kind regards

Mike

Secret Scotland:
The Scottish Government has attempted to hide the full truth about the illegal use of Formalin on salmon farms. In a letter dated 27 November 2012 (in reply to a FOI on Formalin use on Scottish salmon farms), the Scottish Environment Protection Agency (SEPA) denied possessing any information on Formalin use. SEPA failed to disclose any documents - despite another FOI reply from Marine Scotland including documents from SEPA – and instead passed the buck onto Marine Scotland:

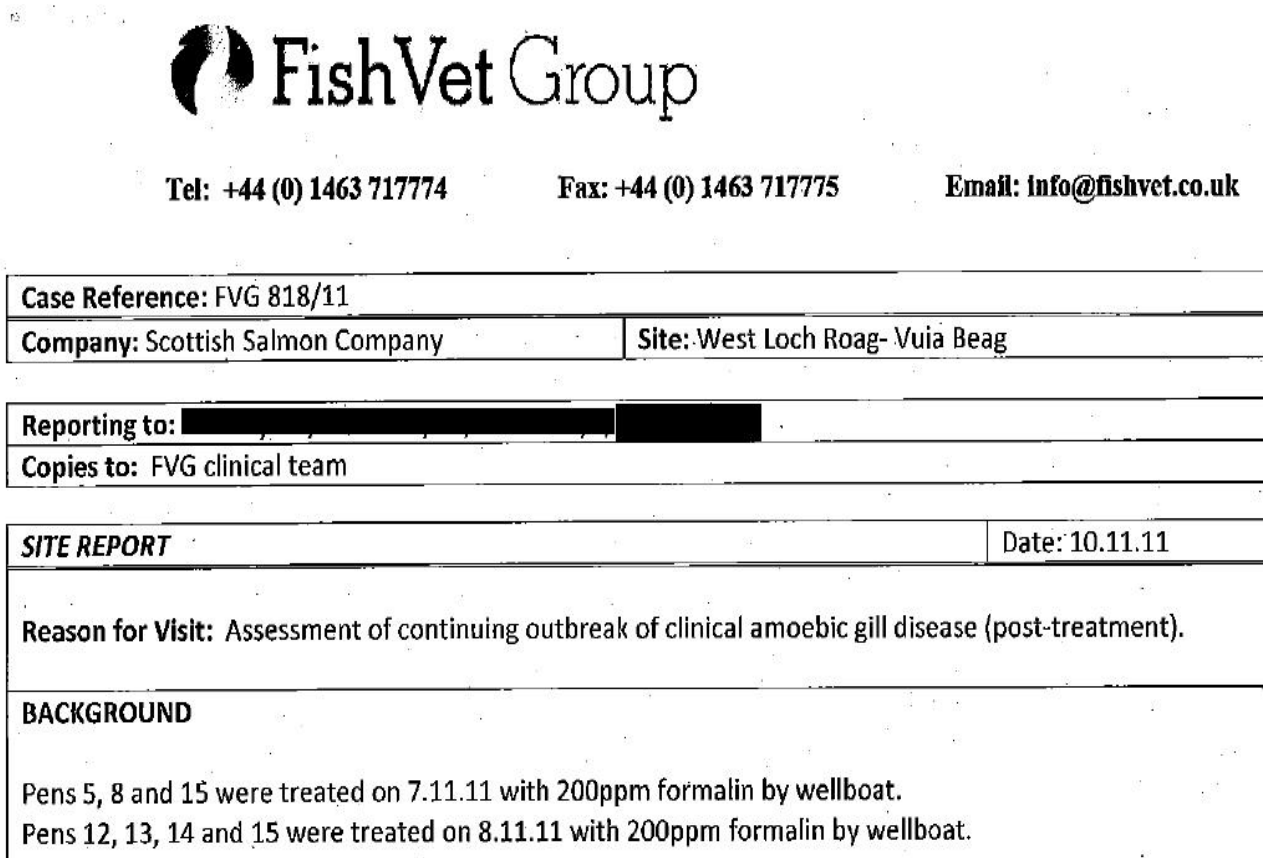
SEPA are aware of a consultation for a marine licence from Marine Scotland about the use of formalin in a wellboat to treat salmon at some sites in the Loch Roag, Western Isles (the sites Eughlam and Taranaish owned by The Scottish Salmon Company). We advise that you contact Marine Scotland directly because they licence well boat discharge. Therefore in accordance with the terms of The Environmental Information (Scotland) Regulations 2004 section 14 b we advise that the contact details are;

Marine Scotland
1st Floor Victoria Quay
Edinburgh
EH6 6QQ
08457 741 741
0131 556 8400
marinescotland@scotland.gsi.gov.uk

In January 2013, GAAIA asked that SEPA conduct a review of their response on the Formalin FOI and also filed a new FOI with the Scottish Government for further documentation.

By contrast, the Scottish Government's FOI reply dated 23 November 2012 detailed 190 pages of documents – read in full online here (same file online here as well).

Formalin Discharges into a 'Special Area of Conservation':
The FOI data included reference to Formalin use in Loch Roag by the Scottish Salmon Company in November 2011 - Loch Roag Lagoons and Tràigh na Berie are both classified as a Special Area of Conservation (SAC) protected by the European Commission via the Habitats Directive.



FishVet Group

Tel: +44 (0) 1463 717774 Fax: +44 (0) 1463 717775 Email: info@fishvet.co.uk

Case Reference: FVG 818/11

Company: Scottish Salmon Company | **Site:** West Loch Roag- Vuia Beag

Reporting to: [redacted]

Copies to: FVG clinical team

SITE REPORT | Date: 10.11.11

Reason for Visit: Assessment of continuing outbreak of clinical amoebic gill disease (post-treatment).

BACKGROUND

Pens 5, 8 and 15 were treated on 7.11.11 with 200ppm formalin by wellboat.
Pens 12, 13, 14 and 15 were treated on 8.11.11 with 200ppm formalin by wellboat.

The Fish Vet Group's report on Formalin use in Loch Roag stated that "the treatment certainly appears to have been successful":

Comments

An improving picture on the site following treatment.

At the last visit, peracute clinical disease was being experienced onsite: evidenced by large numbers of fish high in the water showing respiratory disease symptoms, large mortalities, high amoebae burdens in gill tissues and yellow-ish livers suggesting hepatic pathology secondary to the AGD. Histopathology taken from pens 5 and 8 at the last visit confirmed this liver necrosis- suggesting pale livers are indicative of an acutely bad AGD problem.

While it is still an early stage following treatment, mortality rates in all treated cages have improved, and this may be as strong an indicator as any other of treatment success.

Cages 5 and 8 were the two pens examined prior to and after treatment (ie. on 3.11.11 and 10.11.11). My subjective impression was that there was an improvement in sampled fish from both pens, more obvious in pen 5. Fish from both pens had healthier-coloured livers, and it will be interesting to hear [redacted] comments on follow-up histopathology. Gill scores in these pens (and all pens on site) did not look distinctly different or improved from my previous visit, although this is difficult to gauge. My impression was that amoebae numbers identified in mucoid lesions were not clearly different to pre-treatment levels, but filaments outside of mucoid lesions showed lower levels of stray amoebae. It *may* be the case that formalin treatment was successful in removing these thin films of amoebae from the relatively healthier gill tissue, but unsuccessful in removing them from the mucoid lesions: probably unsurprising given the thick, almost caseous consistency of some of these. The observation from [redacted] and [redacted] that the fish appeared to visibly improve following formalin treatment seems to me consistent with the hypothesis that amoebae in thin mucoid films are being removed from otherwise functional gill tissue, resulting in a quick improvement.

Although the treatment certainly appears to have been successful, it is probably important to note that this doesn't prove (in the scientific sense) the efficacy of formalin against *Neoparamoeba perurans*, which we believe is likely to be the aetiological agent here. Temperature change, mortality removal and other factors could have a bearing that may have contributed to the improvement observed here. Despite this, going forward it might be worth considering in future reviews of AGD management strategy the arrangement of formalin discharge consents in high-risk sites prior to disease detection. *In vitro* demonstration of efficacy or field trial data would be very useful in improving confidence in this strategy.

Illegal Use of Formalin?:

The Scottish Salmon Company may not have had a proper licence to discharge Formalin.

From: Bland M (Michael) (MARLAB)
Sent: 14 November 2011 16:24
To: [redacted]
Cc: McKie J (Jim) (MARLAB); Megginson C (Colin) (MARLAB); Cartney M (Matthew)
Subject: RE: Emergency Treatment Application

Dear [redacted]

Thank you for your application to release formalin from a wellboat. As per my e-mail of 10th Nov, Marine Scotland wish to agree a way forward with other relevant bodies and relevant stakeholders as there are issues with the discharge of formalin that MS-LOT need to understand fully before we can consider the implications of licensing the discharge from wellboats. More information than an EQS is required before a licensing mechanism can be put in place. MS-LOT will not be in a position to progress any applications for the discharge of formalin to the marine environment until the relevant regulators, stakeholders and legitimate users of the sea have agreed an appropriate way forward.

Kindest regards

Mike

It seems that some discharges licenses may have been granted AFTER the event (although from the FOI – which have been blackened out – it is difficult to know for sure):

From: Michael.Bland@scotland.gsi.gov.uk [mailto:Michael.Bland@scotland.gsi.gov.uk]
Sent: 11 November 2011 11:39
To: [redacted]
Subject: Data from this week's treatment

[redacted]

As you know you are required to submit information relating to the discharge of formalin under the Marine Licence.

In order to establish the justification for the discharge could you please furnish me with additional information relating to how successful the treatment was. In this way Marine Scotland can assess the validity of such activity.

Kind regards

Mike
Mike Bland
Marine Licensing Casework Manager
Licensing Operations Team
Marine Scotland - Marine Planning & Policy

Another email from the Scottish Environment Protection Agency (sent AFTER the use of Formalin in Loch Roag) stated that "we are some way from being able to licence these discharges":

Bland M (Michael) (MARLAB)

From: Sinclair, Douglas [douglas.sinclair@sepa.org.uk]
Sent: 10 November 2011 11:58
To: Bland M (Michael) (MARLAB)
Cc: Gubbins M (Matthew) (MARLAB); Megginson C (Colin) (MARLAB)
Subject: RE: Formalin discharge at sea

Yes Mike, I think this is a topic worthy of further discussion.

We have had this draft standard worked up for formaldehyde in seawater for other purposes but coincicentally it may be useful ion dealing with the use of the substance for dealing with AGD in cage farmed salmon.

From my perspective though, we are some way from being able to license these discharges albeit that the reality is that the industry want/need access to the chemical to deal with that particular problem. Under normal circumstances we need a great deal more information than an EQS before we would put in place a licensing mechanism and we would normally get the pharmaceutical firm developing the medicinal product to undertake much of the work required to derive that information. Mainly we would be looking for information and data that gives us a propoer handle on the fate and behaviour of the chemical in the environment following release.

For example, for something like formaldehyde that is to be used in a bath type formulation:
Is the product likely to fully mix with the water/effluent stream leaving the cage;
Does it float or does it sink;
Does it strongly adsorb to particles/fish/cage structures;
Does it decay rapidly due to light/pH/other mechanisms;
Which particular groups of animals/plants are at particular risk and so on.

In this case, clearly the use of formaldehyde is being taken forward by the farmers or their vets rather than any pharmaceutical firm and the imperative to use is driving the licensing process at a rather rapid rate meaning we have a cart before horse type situation. I am not even clear on how the formaldehyde is formulated, if it is not already part of a medicine, it is not clear to me (although that may be due to inadequacies of understanding on my part) how the chemical can be administered in a way that complies with Veterinary Medicines Regulations – although of course that is probably a matter for the VMD rather than us.

Our draft EQS is clearly a reasonable starting point but in developing a regulator approach, we would need to decide on what timescale such a standard should be met or indeed whether it could be met within a reasonable timescale. We are currently having an internal discussion about standards and timescales in relation to cypermethrin, the upshot of which may be a more sophisticated way of dealing with this conundrum.

We have obviously had occasional liaison meetings dealing with various subjects in the past and it may be that the formaldehyde issue may provide the spur to have another where we can look to formulate a unified approach among other issues.

Maybe we should try to set a date for a sit down?

Douglas Sinclair

In December 2011, three weeks AFTER the use of Formalin in Loch Roag, the UK's Veterinary Medicines Directorate advised the Scottish Government that "Formalin is not an authorised veterinary medicinal product in the UK" and that "as Formalin is not an authorised product then we have no information on its fate or effects in the environment and no 'position' regarding its use from an environmental perspective."

From: Mills, Jennifer [j.mills@vmd.defra.gsi.gov.uk]
Sent: 01 December 2011 15:57
To: Bland M (Michael) (MARLAB)
Cc: Shelley, Lorna; Reynolds, Lea
Subject: FW: Use of formalin to treat Atlantic salmon suffering from Amoebic Gill Disease

Dear Mike

Thank you for your query which has been passed to me for reply. Formalin is not an authorised veterinary medicinal product in the UK, however, we are content that formalin may be administered under the direction of a veterinary surgeon as a specific course of treatment administered in accordance with the prescribing cascade. As formalin is not an authorised product then we have no information on its fate or effects in the environment and no 'position' regarding its use from an environmental perspective.

VMD concluded their advice by advising the Scottish Government to contact SEPA:

It may be advisable to also contact the Scottish Environment Protection Agency (SEPA) to ensure that the release of formalin would not have any wider environmental implications.

Kind regards
Jennifer Mills

The request for advice from the VMD occurred AFTER Marine Scotland sanctioned the use of Formalin in Loch Roag (i.e. the use of Formalin took place AGAINST the advice of SEPA and WITHOUT even contacting the VMD!):

From: Michael.Bland@scotland.gsi.gov.uk [mailto:Michael.Bland@scotland.gsi.gov.uk]
Sent: 10 November 2011 11:27
To: Baker, Amanda
Subject: Use of formalin to treat Atlantic salmon suffering from Amoebic Gill Disease

Dear Amanda,

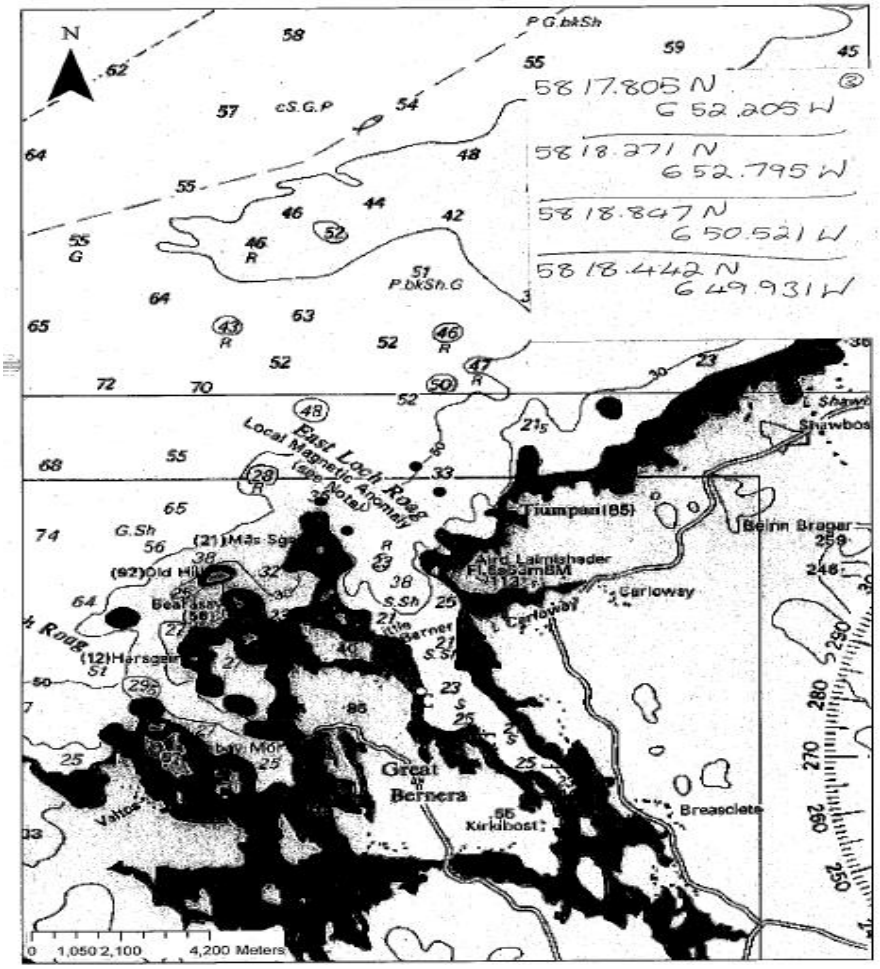
You provided some information to me regarding hydrogen peroxide product for use in treating sea lice some time back.

I work in the marine licensing team at Marine Scotland and we licence discharges in the sea. Several salmon companies have asked to discharge formalin into the marine environment after treating Atlantic salmon for amoebic gill disease. We licensed one series of discharges to deal with one specific outbreak after information from the vet stated it was the best solution available to the company.

Does the VMD have a position on the treating of post smolt to adult Atlantic salmon with formalin?

Any advice or information you could provide would be most welcome.

Rogue Discharges of Formalin in Loch Roag:



Cover-Up by Marine Scotland of Unlicensed Use of Formalin:
Marine Scotland was concerned "to nip in the bud" suggestions that the use of Formalin was "against SEPA advice":

From: Bland M (Michael) (MARLAB)
Sent: 10 November 2011 09:53
To: Weatherston R (Robin)
Cc: McKie J (Jim) (MARLAB)
Subject: RE: URGENT HELP REQUEST

Robin

Thanks for this.

It is most definitely worth pointing out that the phrase 'against SEPA advice' is not factually correct and is something that should be nipped in the bud.

Mike

However, the 'Best Practicable Environmental Option' Assessment from Marine Scotland (October 2011) admitted that SEPA did NOT permit the use of Formalin:

Formalin is not currently permitted under SEPA CAR authorisations for either of these East Loch Roag sites.

Even the Fish Vet Group (acting on behalf of the Scottish Salmon Company) acknowledged in October 2011 that the Formalin was "not presently licensed for use":

From: [redacted]
Sent: 12 October 2011 13:28
To: Duncan R (Rachael) (MARLAB)
Cc: [redacted] Megginson C (Colin) (MARLAB); douglas.sinclair@sepa.org.uk; [redacted]
Subject: AGD at Lamlash, Arran

Dear Rachael,

[redacted] forwarded a copy of your email regarding the use of chemotherapeutants for treatment of amoebic gill disease at Lamlash, so I wanted to update Marine Scotland with what's presently going on. I accompanied [redacted] (a veterinary colleague here at Fish Vet Group) on a site visit to Lamlash on 2.10.11., where there was a rising pattern of mortality in all cages and very high numbers of amoebae parasitising the gill tissue of all fish we examined. Given the severity of losses experienced in previous years, we expect this outbreak to go on and cause similar severe mortality and welfare problems without therapeutic intervention.

Following your email we plan to examine further using hydrogen peroxide (Paramove 35) as an in-situ bath treatment. Based on clinical examination and histopathology the fish may be too compromised to wait for the availability of a wellboat, and may not survive such a treatment. At present we are trying to arrange delivery of an IBC to the site in order to perform a small field trial on affected fish- probably in harvest bins- to assess the effects of 3 different concentrations on severely AGD-compromised fish. We intend to draft a trial protocol with the input of the product distributors (Aquapharma). In addition to considering the therapeutic efficacy of Paramove 35, availability in terms of timescale and sufficient quantities to go on and potentially treat the site still need to be established.

Should treatment with hydrogen peroxide prove non-efficacious or practically impossible, at that point it may warrant consideration of alternative treatments not presently licensed for use such as formalin.
Regards,
[redacted]

[redacted]
Veterinary Surgeon
Description: Description: Description: FishVet Group
Mobile: +44(0)7769 266156

Marine Scotland knew in mid-October 2011 (prior to sanctioning the use of Formalin in Loch Roag) that SEPA had conducted “no modelling” and were not sure Formalin was a VMD authorized medince:

From: Duncan R (Rachael) (MARLAB)
Sent: 17 October 2011 16:57
To: Bland M (Michael) (MARLAB)
Subject: Use of formalin
Attachments: ObjRef.obr

Hi Mike,

Since I won't see you till I get back in November I thought I better make you aware that The Scottish Salmon Company contacted us to use Formalin in a wellboat treatment. As you can see from the file note and emails we refused them permission as suggested that they tried treatment with H2O2 which they are allowed. The vet is doing tests but they may come back and ask again if that doesn't work.

SEPA say no modelling has been done in the marine environment to date and Douglas Sinclair isn't sure if it is a VMD authorised medicine.
You'll see my response to TSSC too.

Rachael

However, Marine Scotland sought to cover up the illegal and unauthorized use of Formalin in Loch Roag by requesting documentation from the Scottish Salmon Company AFTER the event:

From: Michael.Bland@scotland.gsi.gov.uk [mailto:Michael.Bland@scotland.gsi.gov.uk]
Sent: 11 November 2011 11:39
To: [redacted]
Subject: Data from this week's treatment

[redacted],

As you know you are required to submit information relating to the discharge of formalin under the Marine Licence.

In order to establish the justification for the discharge could you please furnish me with additional information relating to how successful the treatment was. In this way Marine Scotland can assess the validity of such activity.

Kind regards

Mike
Mike Bland
Marine Licensing Casework Manager
Licensing Operations Team
Marine Scotland - Marine Planning & Policy

Scottish Government | Marine Laboratory, PO Box 101 | 375 Victoria Road | Aberdeen AB11 9DB

Direct Line: 01224 295529

Marine Scotland also reached out to the VMD and SEPA the week AFTER the use of Formalin in Loch Roag:

From: Bland M (Michael) (MARLAB)
Sent: 11 November 2011 11:33
To: Cartney M (Matthew)
Cc: Stewart JB (Bruce); Megginson C (Colin) (MARLAB)
Subject: The discharge of formalin from Wellboats

Matt,

Last week we speedily turned around an application for a one-off series of discharges of formalin from a wellboat. The formalin had been used to treat an outbreak of Amoebic Gill Disease in farmed Atlantic salmon in Loch Roag, Lewis.

Formalin is a biocide and is not often licensed for discharge from fish farms under CAR. It is commonly used in freshwater aquaculture to remove parasites from fish gills. There is interest from the rest of the industry to get a licence for the same and we will come under increasing pressure to repeat the licensing.

I have approached SEPA and the Veterinary Medicines Directorate to establish their take on the issue and we should meet with SEPA to discuss a way forward.

Bruce, I have copied you in as you may be interested in the developments here. When we set up the licensing of chemotherapeutants for sealice we took our lead from SEPA, this time it looks as though the industry is only looking for wellboat discharges and we will therefore have to take the lead, despite SEPA's long history of assessing such activities.

Mike

Further "Emergency" Formalin Use?:
Following the use of Formalin in Loch Roag in November 2011, further applications were received regarding the use of Formalin. Marine Scotland admitted that "more information than an EQS is required before a licensing mechanism can be put in place":

From: Bland M (Michael) (MARLAB)
Sent: 14 November 2011 16:24
To: [redacted]
Cc: McKie J (Jim) (MARLAB); Megginson C (Colin) (MARLAB); Cartney M (Matthew)
Subject: RE: Emergency Treatment Application

Dear [redacted]

Thank you for your application to release formalin from a wellboat. As per my e-mail of 10th Nov, Marine Scotland wish to agree a way forward with other relevant bodies and relevant stakeholders as there are issues with the discharge of formalin that MS-LOT need to understand fully before we can consider the implications of licensing the discharge from wellboats. More information than an EQS is required before a licensing mechanism can be put in place. MS-LOT will not be in a position to progress any applications for the discharge of formalin to the marine environment until the relevant regulators, stakeholders and legitimate users of the sea have agreed an appropriate way forward.

The "emergency" application detailed above for Formalin use in a well-boat related to discharges in Scallastle Bay on the Isle of Mull by Scottish Sea Farms (a site described as in "immediate danger"):

From: [redacted]
Sent: 11 November 2011 17:33
To: [redacted]
Cc: Bland M (Michael) (MARLAB)
Subject: Re: Emergency Treatment Application

Sorry please ignore the application form below. I have updated the Wellboat details and attached below.

(See attached file: Scallastle AGD application form v2.doc) Regards,

[redacted]
Environmental Analyst
Scottish Sea Farms Ltd

[redacted]

Dear Mike,

Please find attached the BPEO and application form for an emergency treatment of Amoebic Gill Disease at our Scallastle Site, Sound of Mull for the targeted treatment of 5 cages, This site is currently the one in the most immediate danger, there are currently three other sites in the Sound of Mull on watching briefs.

[attachment "Wellboat AGD BPEO SSF.doc" deleted by [redacted] [attachment "Scallastle AGD application form.doc" deleted by [redacted]

Regards,

[redacted]
Environmental Analyst
Scottish Sea Farms Ltd

[redacted]

****

Registered Office
Scottish Sea Farms Ltd
Equitable House
47 King William Street
London
EC4R 9AF
Company No. 958001

Please address all post to:
Scottish Sea Farms Ltd
Laurel House
Laurel Hill Business Park
Stirling
FK7 9JQ

Marine Scotland admitted that “its effects in the marine environment have not been modelled”:

From: Bland M (Michael) (MARLAB)
Sent: 14 November 2011 10:45
To: Cartney M (Matthew)
Subject: RE: The discharge of formalin from Wellboats

Matt,

I believe that it is because its effects in the marine environment have not been modelled.

Regards

Mike

From: Cartney M (Matthew)
Sent: 14 November 2011 10:27
To: Bland M (Michael) (MARLAB)
Cc: Stewart JB (Bruce); Megginson C (Colin) (MARLAB)
Subject: RE: The discharge of formalin from Wellboats

Mike,

Thanks for this. Can you confirm if Formalin is not often licensed for well-boat discharge due to some nature of the chemical that makes it less suitable for marine use or simply because its use is new to this particular environment?

Matt

Reservations from SEPA:
It seems clear that the use of Formalin took place without the proper approval of SEPA and with "reservations" about the high environmental risk:

Bland M (Michael) (MARLAB)

From: Gubbins M (Matthew) (MARLAB)
Sent: 27 July 2012 14:44
To: Bland M (Michael) (MARLAB); 'Sinclair, Douglas'
Subject: RE: Formalin 2012

My understanding of where we are with formalin is that we provided a one off consent in the past using the draft EQS values recommended by SEPA, with reservations that the robustness of those values were not great. We therefore wanted to adopt a presumption against and prefer operators to use methods with less environmental risk (fresh water where possible). I don't think we are any further on from this view at present, although we could probably consider applications for small treatment quantities. These are wellboat discharges?

Formalin Use "Against SEPA Advice":
Despite such high environmental risks, Marine Scotland staff assisted the Scottish Salmon Company in an "URGENT HELP REQUEST" to speed up the use of Formalin in Loch Roag SAC – with Robin Weatherston informing the Scottish Salmon Company's CEO Stewart McLelland that "credit" lay with Michael Bland and Jim McKie of the Marine Laboratory:

From: Weatherston R (Robin)
Sent: 10 November 2011 09:04
To: Bland M (Michael) (MARLAB)
Cc: McKie J (Jim) (MARLAB)
Subject: FW: URGENT HELP REQUEST

Mike

See below.

I've made clear to Stewart that any credit lies essentially with you guys!

An email, understood to be from the Scottish Salmon Company's CEO Stewart McLelland, referred to the use of Formalin in Loch Roag with the approval of Marine Scotland but "against SEPA advice". The CEO of the Scottish Salmon Company also thanked Marine Scotland for speeding up the process. "I will still need to follow through process and procedures but will do so at a later date," said the Scottish Salmon Company CEO appearing to suggest that not all the paperwork and proper approvals had been in place prior to the use of Formalin:

From: [redacted]
Sent: 10 November 2011 08:55
To: Weatherston R (Robin)
Subject: RE: URGENT HELP REQUEST

Robin,
Quick update, in that we had Marine Scotland with us on a formalin treatment this week, which they gave approval for against SEPA advice. I think from the time we got the forms in it took about 4 or 5 days for approval which I am told is very fast compared to the norm. I also was aware of more activity after our email exchange. So thanks for whatever you did I am sure it speeded the process. I will stil need to follow through process and procedures but will do so at a later date. Please pass on to all who helped etc.

Regards
[redacted]

The Scottish Salmon Company's CEO contacted the Scottish Government in late October 2011 asking for assistance in "fast tracking" an application to use Formalin "within the next 24 hours" – rather like a desperate contestant phones a friend on 'Who Wants to Be a Millionaire?':

From: [redacted]
To: Weatherston R (Robin)
Cc: [redacted]
Sent: Thu Oct 27 21:38:44 2011
Subject: URGENT HELP REQUEST

Robin,

[redacted] here from Scottish Salmon Company. We met down in Leith and also on the Minister's visit earlier this year to the Hebrides. I was actually going to email Willie Cowan but did not have his email address. I wonder if you can help me and also pass on this email to Willie.

I am looking for your support in fast tracking a license for a treatment procedure my team and our vets in the Fish Vet Group have been discussing with staff in Marine Scotland. I believe they have been talking with the Marine Licensing team including Colin Megginson and Rachael Duncan.

The issue we have is that we have an immediate animal welfare situation at our Lamlash site where we have lost 65% (c 250,000) of the fish to ameobic gill disease. This is a natural water borne infection which has had a disastrous effect at this location. In addition to the animal welfare issue this will probably cost us c £5m in turnover and c £750k in profit in 2012. There is no real treatment for this infection although the use of Formalin is one that has been known to have some success.

However despite the fact that formalin is a well known treatment in freshwater we cannot get approval to use formalin in this dire animal welfare situation because it has not been modeled in the marine environment. Also we were told that the process would take 8 weeks, which is not much good to the dying fish who need treated now.

In fairness our Fish Vet Group are again in contact with your colleagues at the moment and I understand there is a realisation that they will try and move fast on this. The reason we are keen to get approval quickly is that we have now seen this ameobic gill issue in a small number of cages in sites in Loch Roag in the Hebrides. The mortality is low and the situation is nowhere near the issue at Lamlash but I really cannot afford to sit and wait to find out what is going to develop. I really need to act proactively on fish welfare grounds and treat these cages with formalin.

The reason for this email is to request your and Willies help in getting this approval within the next 24hrs. I realise I do not understand the procedures and bureaucracy but I do know that I have seen fish die potentially unnecessarily and I do not want this to happen on other locations. The Fish Vet Group and our own staff are currently completing the forms. What I need is a rapid conclusion from the information provided.

It is this sort of issue where the Industry really needs the effective support of Government to help prevent these significant naturally occurring losses and I ask that you please look at my request and action matters quickly on my behalf.

I apologise if I should be directing my request elsewhere but Robin you were the only contact I knew and had details of within Marine Scotland. Sorry you drew this short straw but please help us with this request.

I look forward to hearing from you.

Regards

[redacted]

[redacted]
Chief Operating Officer

8 Melville Crescent, Edinburgh, Scotland. EH3 7JA www.scottishsalmon.com
TEL: +44 (0)131 225 5679 DD: Mobile: +44 (0)7803 743905

Marine Scotland also pointed out to the Scottish Salmon Company:

Bland M (Michael) (MARLAB)

From: Bland M (Michael) (MARLAB)
Sent: 07 November 2011 11:26
To: [redacted]
Subject: RE: Contact for formalin discharge

Dear [redacted]

Your proposal would need to be put out for consultation and this would take a period of several weeks.

You have stated in the below correspondence that you wish to change the site of origin. As this has no bearing on the quantity of formalin discharged then this is permitted under your licence.

I can therefore confirm that you can discharge the licensed quantity of formalin within the location stated in your licence following treatment of fish from Vuiabeag.

The period of the current licence is wrongly stated on the licence issued to you. A new licence will be issued today with the correct validity period.

Please feel free to call and discuss.

This followed a last-minute request from the Scottish Salmon Company to change the terms of any proper license (if they even had one at the time of Formalin use):

From: [redacted]
Sent: 07 November 2011 10:42
To: Bland M (Michael) (MARLAB)
Subject: Re: Contact for formalin discharge

Hi Mike, unfortunately no internet signal here via the boat. As discussed on the phone the mortality from amoeba has increased considerably in Vuia Beag in west loch road. We would like to treat cages from this site rather than east loch roag. There would be the same volume of formalin discharged and although we can use the specified drop zone as specified in the license we would prefer one at the seaward side of west loch roag due to heavy swell outside the loch. Could you please email me back if this is possible. If not then could you confirm we are ok to use the existing license and conditions but with fish from vuia beag? Thanks.

Marine Scotland pointed out that they wanted to be aboard the well-boat when the first discharges of Formalin into Loch Roag took place:

Bland M (Michael) (MARLAB)

From: Bland M (Michael) (MARLAB)
Sent: 04 November 2011 15:59
To: Morrison D (Donald) (Fisheries)
Cc: Mckenzie G (Gregor); MS Marine Licensing; Megginson C (Colin) (MARLAB)
Subject: Wellboat inspection

Attachments: lic_04339.pdf

lic_04339.pdf (232 KB)

Hi Donald,

Thanks for offering to go to the wellboat inspection on Monday morning.

As stated earlier what we really need is for you to be on the vessel for the first discharge. The fish will be pumped into the wells and the formalin added. They should then steam to the discharge location that is in the licence (attached) and discharge, one well at a time. Could you please inspect the location of the discharges? They will make two discharges per trip out of the loch and the discharge zone is out past Carloway.

"Urgent" licence application fast-tracked in a week not 8 weeks:
Marine Scotland rushed through the Scottish Salmon Company's licence to discharge Formalin in Loch Roag in a week instead of the period of "at least 8 weeks" that is "normally required to process the application":

Licence Start Date

(a)	When do you wish the licence to start? **(At least 8 weeks are normally required to process the application)**	ASAP
(b)	When are deposit operation(s) likely to be completed? ***(Licences are generally issued for a period of 12 months***	Annual renewal maybe requested
(c)	Does the application cover an emergency operation? **(If YES, please explain in the covering letter)**	YES ☒ NO ☐

See attached letter from the Fish Vet Group 31.10.2011.

offshore discharge permitted.
58 17·81N 06 52·21W
58 18·29N 06 52·80W
58 18·85N 06 50·52W
58 18·44N 06 49·93W

8. Discharge Location Details

Site name	Zone	Coordinates	Water Depth (m)	Distance from Land (m)	Tidal Streams/ Residual Currents (if known)
Taranish	6A	58°14.042 06°48.302	24	110	Full hydrographic report submitted with application (Annex 3)
Eughlam	6A	58°15.107 06°50.363	25	222	Full hydrographic report submitted with application (Annex 3)

9. Rationale for Proposed Discharge

For the effective and urgent treatment of Amoebic Gill Disease

10. Details of Material(s) to be Discharged (Please provide Material Safety Data Sheets for each chemical to be discharged).

Proprietary Name of Chemicals or Agents	Chemical Name of Chemicals or Agents
Formalin Solution (38%)	Formaldehyde

Applicant Details

Title	Initials	Surname	
Trading Title (if appropriate)	The Scottish Salmon Company		
Address	Mid Strome, Lochcarron, Ross-Shire, IV54 8YH		
Name of contact (if different)	Mr. Alan Dykes		
Position within Company (if appropriate)	Senior Biologist		
Telephone No. (inc. dialing code)	01499 600223 07789 754 064	Fax No. (inc. dialing code)	
Company Registration No.	SC107275	Email	Alan.dykes@scottishsalmon.com

Is the licence Applicant the proposed licensee? YES ☒

Declaration

I declare to the best of my knowledge and belief that the information given in this form and related papers is true.

WARNING

It is an offence under the Act under which this application is made to fail to disclose information or to provide false or misleading information.

Signature		Date	31.10.2011
Name in BLOCK LETTERS	ALAN DYKES on behalf of The Scottish Salmon Company		

Lobbying from the Scottish Salmon Company's CEO Stewart McLelland:
Other documents detail emails from the Scottish Salmon Company's CEO Stewart McLelland lobbying Marine Scotland to fast-track the use of Formalin.

From: Weatherston R (Robin)
Sent: 28 October 2011 06:51
To: Cowan WJ (Willie); Pendrey D (Daniel); Bland M (Michael) (MARLAB); Raynard R (Rob) (MARLAB)
Subject: Fw: URGENT HELP REQUEST

All

A bit more info/commentary from Stewart McLelland

Robin

From: Stewart McLelland <Stewart.McLelland@scottishsalmon.com>
To: Weatherston R (Robin)
Sent: Thu Oct 27 23:07:53 2011
Subject: Re: URGENT HELP REQUEST

Robin,
Apologies for another late evening email but my understanding is that Freshwater hatcheries that use Formalin already discharge to the sea and have consent to do so.
So perhaps the general information is already within the system.

Regards
Stewart

The original email from the Scottish Salmon Company's CEO was not

From: Stewart McLelland <Stewart.McLelland@scottishsalmon.com>
To: Weatherston R (Robin)
Cc: Brian Floyd <Brian.Floyd@scottishsalmon.com>
Sent: Thu Oct 27 21:38:44 2011
Subject: URGENT HELP REQUEST

Robin,

Stewart McLelland here from Scottish Salmon Company. We met down in Leith and also on the Minister's visit earlier this year to the Hebrides. I was actually going to email Willie Cowan but did not have his email address. I wonder if you can help me and also pass on this email to Willie.

The Fish Vet Group lobbied for the use of Formalin on behalf of the Scottish Salmon Company:

Fish Vet Group
22 Carsegate Rd
Inverness
IV3 8EX
Scotland UK

tel. +44 (0) 1463 717774
fax. +44 (0) 1463 717775

e. info@fishvet.co.uk
w. www.fishvet.co.uk

FishVet Group

31st October 2011

Re: Application for Discharge of Treatment Agents in the Territorial Sea and UK Controlled Waters Adjacent to Scotland by Scottish Salmon Company

With reference to the above application, outlined here is the veterinary advice that we have provided Scottish Salmon Company regarding management of an outbreak of amoebic gill disease at two adjacent sites at East Loch Roag, Lewis. This includes a short review of possible therapeutic options for amoebic gill disease, and the reasons we have advised that treatment with formalin may be indicated.

Background to application

Histopathological samples were taken by site staff from fish at Taranaish and Eughlam, East Loch Roag, Lewis on 11.10.11, and amoebic gill disease (AGD) subsequently diagnosed by our histopathology service. Following this, a clinical visit by one of our veterinary surgeons took place on 20.10.11. At this time, site staff were reporting a decline in feeding rates in some cages. Mortality rates were not significantly raised at this point, although subsequent to this visit these have risen. On gross inspection, most fish examined were found to have relatively mild focal mucoid patches throughout the gill lamellae, consistent with amoebic gill disease, and it was concluded that both sites at this point were in the relatively early stages of a clinical amoebic gill disease outbreak.

Recently, our practice has also been involved in providing veterinary advice to Scottish Salmon Company regarding a severe clinical AGD outbreak at another site at Lamlash, Arran. It was our opinion that by the time of diagnosis of clinical disease on this site, the fish were compromised to a degree that bath or wellboat treatment with a chemotherapeutant agent would have been contraindicated. In support of this, a very limited initial treatment of 10 representative fish in a harvest bin with 500mg/L hydrogen peroxide for 20 minutes demonstrated unacceptable mortality and morbidity for what was subjectively deemed to be a very modest improvement in amoebae numbers. As a result, the fish were left untreated and the site has, to date, experienced loss of half the stock.

In our experience, the identification of gill amoebae on histopathological sections does not always mean a site will experience losses associated with AGD. While clinical AGD has not yet, to our knowledge, been reported in Scotland in the veterinary literature our practice has identified gill amoebae (putatively

Neoparamoeba perurans) on at least ten sets of histopathological material over the last few years. Of these, we estimate that only 3-4 experienced severe losses. We note that in 2007 severe losses occurred at both Lamlash, Arran and East Loch Roag from a gill disease likely to have been AGD.

East Loch Roag 2011

By contrast with the AGD case at Arran, this year clinical disease has been identified at an earlier stage at both East Loch Roag sites. It is our firm opinion that if treatment is to be considered, the fish must have the required functional gill reserve required to withstand stressful well boat or bath treatments. As this disappears with progressing gill disease severity, any treatment must necessarily be prompt and early.

We (Fish Veterinary Group) and the license applicants (Scottish Salmon Company) understand that even in emergency situations any application for discharge of treatment agents into the marine environment must be subject to a period of consultation and review. Clearly, the clinical situation at East Loch Roag may have advanced by the time of a decision to the point that treatment becomes inappropriate. Furthermore, falling sea temperatures may improve the situation to the point that treatment is not required. Despite this, we endorse the application as fish may still be at a point where treatment is beneficial, and trust that under the circumstance every effort will be made to provide a decision on the application as quickly as possible.

Therapeutic options for Amoebic Gill Disease (AGD)

1) Freshwater bathing

   The recommended treatment for AGD is a 2-3 hour freshwater bath, based on work done in the Tasmanian industry [1]. In Tasmania, freshwater protocols are exclusively performed using tarpaulins rather than well boats. The standard treatment has been shown to remove 86% of live amoebae from gills, but the remaining live amoebae act as a reservoir for re-infection, which typically occurs within 1 week [2].

2) Oxidative disinfectants

   Hydrogen peroxide has been evaluated as an additive to freshwater baths [3], but high toxicity was found along with equivocal results. The same authors found that chlorine dioxide and chloramine-T showed some promise as additives to freshwater baths.

   Very little data are available on the efficacy of oxidative disinfectants against AGD in seawater. Protocols using hydrogen peroxide are currently the subject of a research project at the University of Tasmania, but as yet no published results have emerged. Based on discussions with colleagues in Tasmania, our practice attempted a very low-scale initial treatment of 10 Scottish AGD-affected fish at Lamlash, Arran with 500mg/L hydrogen peroxide for 20 minutes, and found unacceptable mortality and morbidity with this dose. We understand that 500mg/L for 20 minutes is the lowest effective *in vitro* dose from unpublished data provided from Tasmania.

3) Other chemotherapeutants

   Formalin has been used as a bath treatment (200ppm for 45mins) on two farms during an Irish epizootic in 1995 [4]. One farm saw a reduction in mortalities, and results were equivocal in the other.

1. Parsons H., Nowak B., Fisk D. & Powell M. (2001) Effectiveness of commercial freshwater bathing as a treatment against amoebic gill disease in Atlantic salmon. Aquaculture 195, 205–210.

2. Clark G., Powell M. & Nowak B. (2003) Effects of commercial freshwater bathing on reinfection of Atlantic salmon Salmo salar, with amoebic gill disease. Aquaculture 219, 135–142.

3. Powell M.D. & Clark G.A. (2004) Efficacy and toxicity of oxidative disinfectants for the removal of gill amoebae from the gills of amoebic gill disease affected Atlantic salmon (Salmo salar L.) in freshwater. Aquaculture Research 35, 112–123.

4. Rodger H.D. & McArdle J. (1996) An outbreak of amoebic gill disease in Ireland. The Veterinary Record 139, 348–349.

The Fish Vet Group referred to "anecdotal accounts that Formalin is used in Norwegian outbreaks of AGD":

Possible treatment at East Loch Roag

Our practice has advised Scottish Salmon Company that freshwater bathing is the treatment of choice for amoebic gill disease, and remains the best-understood therapeutic option. However, freshwater bathing is technically difficult and at present it appears that a freshwater protocol- either in a tarp or well boat- is not practically achievable at this site.

We do not advise the use of hydrogen peroxide at East Loch Roag, based on:

1) Equivocal results and high toxicity observed following small-scale treatment at Lamlash, Arran.

2) Absence of clear advice on a dose rate likely to be effective and safe.

By contrast, the dose rate for formalin as an anti-protozoal is well-understood (200ppm for 45 minutes). While formalin has not yet been demonstrated to be efficacious against *Neoparamoeba perurans* specifically, we believe it is strongly likely to be so based on its effect against other protozoa. There is an existing precedent in the literature for its use against amoeba in seawater [4], and we understand from anecdotal accounts that formalin is used in Norwegian outbreaks of AGD. From discussion with the senior biologist at Scottish Salmon Company, treatment with formalin could potentially be achieved using a well boat.

Clearly, all chemotherapeutants potentially efficacious against amoebae will also have negative effects on gill tissue. As a result, gills require existing 'functional reserve' (relatively functional, non-diseased tissue) in order to tolerate treatment. The significant stress caused by well boat pumping will similarly require the fish to use any remaining functional gill reserve.

Potential treatment with formalin at East Loch Roag could only proceed immediately following a final assessment of the gill tissue of fish intended for treatment, and their likely ability to tolerate treatment. At the time of the last visit (28.10.11), gill tissue in all examined affected cages did appear to have significant reserve and these populations are likely to tolerate treatment. Importantly, we note it is

impossible to fully predict the effect of any treatment on a diseased population. On balance, however, we believe that clinically affected pens are strongly likely to benefit from treatment.

[redacted]

Pickling Procedures in Loch Roag:
A briefing report on Marine Scotland's visit to a Formalin treatment by the Scottish Salmon Company in Loch Roag in November 2011 includes:

SITE VISIT – LOCH ROAG. 7TH - 8TH NOVEMBER 2011

Karen Whelton, Fishery Officer, Stornoway and I arrived at The Scottish Salmon Companys' shore base at East Loch Roag at 0815hrs on 7th November 2012. The wellboat, Viktoria Viking, was tied up at the pier.
We were told that, due to mortality on other sites in the Loch, it had been decided that the site at Vuia Beag in West Loch Roag would be treated rather than a site in East Loch Roag. We were instructed to proceed to Miavaig in West Loch Roag.
At Miavaig, we met [redacted] (Biologist, TSSC) who had flown in from the mainland.
At 1010hrs, [redacted], Karen Whelton and I were transported by fast boat to the Wellboat, Viktoria Viking, which had steamed from East Loch Roag to West Loch Roag.
On board we met [redacted]. I formally identified myself to Mr [redacted] and [redacted] by showing my Marine Enforcement Officer warrant. I gave [redacted] a copy of the Chemical Data Sheet for the Formalin Solution (38%) that was to be used in the treatment, and drew his attention to the first aid measures, fire fighting measures and accidental release measures contained within the document.
I also inspected the 'License To Discharge Used Chemicals' (Licence Number 04339/11/0) which had been signed by Michael Bland on 4th November and was valid from 7th November 2011.
We then plotted the boundaries of the area of discharge, as stated on the licence, onto the vessels plotter. It was apparent that the area allowed of discharge was not close to the site which was to be treated. [redacted] was concerned that the extra steaming time and the swell in the area of discharge could cause additional stress to the fish. He asked whether Condition 3 ("Force Majeure") of the Licence, which allows the discharge to take place in an area other than that specified on the license, would apply. I replied that "Force Majeure" did not apply in this case, and that the treatment should not commence if he felt that the sea conditions were not suitable for the operation.
[redacted] phoned and e mailed Marine Licensing Branch to ask whether the area of discharge could be altered. At 1130hrs we were informed that there would be no amendment to the area of discharge.
At 1200hrs, Viktoria Viking began pumping aboard fish from the first cage. When this was completed, Viktoria Viking steamed out of the loch towards the discharge area. At 1300hrs, the treatment was added to the port tank and then, 10 minutes later, to the starboard tank. Mrs Whelton and I viewed the application of the treatment from the wheelhouse. The fish were to remain in the treatment for 40 minutes.
We arrived at the discharge area at 1338hrs and the portside well was opened in position 58 18 294N 06 51 680W. The vessel then steamed slowly through the area until the water in the well had been completely replaced. The vessel then turned, opened the starboard well, and steamed back through the box. I was able to see the discharge area on the vessels plotter and can confirm that the vessel remained within

its boundaries for the entire duration of each discharge. Upon completion, the vessel steamed back to the Vuia Beag site and, at 1500hrs, began pumping the fish back into the same cage they had been taken from.
Viktoria Viking then began pumping the second cage of fish to be treated. There was a shift changeover at 1630hrs and Karen Whelton and I took the opportunity to get ashore. Meanwhile, treatment and discharges were to continue overnight.

We returned to the site at 0800hrs on 8th November, we found that a total of five treatments/discharges had been completed and that two treatments remained.
We boarded Viktoria Viking at 0830 and remained aboard until the last two treatments and discharges had been completed. The procedure on each occasion was exactly the same as had been witnessed the previous day, and I can confirm that all the discharges witnessed by us took place within the permitted areas.
Mrs Whelton and I came ashore at 1900 and returned to Stornoway. Viktoria Viking also left West Loch Roag and was tied up in Stornoway on the morning of 9th November 2011.

Marine Scotland conducted a 'Best Practicable Enviromnental Option' (BPEO) Assessment for Formalin discharges into Loch Roag (October 2011):

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 (Scotland) Act 2010, for the treatment of amoebic gill disease (AGD) at two Scottish Salmon Company (hereafter referred to as TSSC) marine fish farms in East Loch Roag (Lewis). The sites in which AGD has been diagnosed are Eughlam and Taranish and it is anticipated that 2 cages will require treatment at each site. In order to achieve effective treatment of AGD whilst maintaining control of potential environmental impacts, The Scottish Salmon Company (TSSC) have made an application for the licensed use of Formalin solution (38%) using well boats.

1.1.1 Current AGD Occurrences in East Loch Roag

AGD was diagnosed at the TSSC sites Taranish and Eughlam in East Loch Roag on 20th October 2011. This was detected on histopathological samples taken at both sites (spilt between two groups of cages) at these two sites. This diagnosis coincided with a decline in feeding rates (typical of early signs of AGD akin to that reported in Lamlash, Arran in October, detailed further below), rises in mortalities and amoebae present in all cages.

1.1.2 Treatment Proposed

For any therapy to be successful it will need to be carried out promptly while this population still has some functional gill reserve left, which is required to deal with stressful events and chemotherapeutants.

The recommended treatment for AGD is a 2-3 hour freshwater bath (using tarpaulin or wellboat), which has been considered by TSSC, in conjunction with the Fish Vet Group and wellboat operator Solvtrans but this appears not to be practically achievable in this instance. Solvtrans states that they cannot set up the wellboats to de-water the fish in and out. This means that a new load of freshwater would be required each time, which is not practical.

Hydrogen Peroxide has been trialed (at Lamlash) but is not efficacious on compromised fish and produces high mortality, and thus is not believed it to be an appropriate treatment at East Loch Roag at this point. While hydrogen peroxide as a treatment for amoebae is the subject of some interest in the Tasmanian industry, previous studies have found equivocal results and high toxicity (Powell and Clark [2004] Aquaculture Research 35 112-123). Furthermore, the huge variation in dose rates believed to be efficacious (based on the extremely limited published data and discussions between veterinarians) makes it difficult to confidently to consider the effective use of hydrogen peroxide or any other oxidative agents such as chloramine T.

It is suggested that strategic treatment of worst-affected cages at East Loch Roag using formalin at 200ppm for 45minutes in a well boat is likely to be the most efficacious and practical solution for the AGD identified. The correct dosage for use of formalin as a topical anti-protozoal is better understood than hydrogen peroxide, however the final decision to treat would need to be a clinical judgment between the senior company biologist at TSSC and the veterinary surgeons at the Fish Vet Group based on the health status of the fish and their likely ability to tolerate treatment.

treating the worst-affected pens (alongside the natural decrease in temperature expected over the following period) it is hoped to reduce the infective burden on the site in order to avoid the severity of losses observed at Arran (detailed below). Formalin is currently being used to treat protazoa like amoeba at TSSC hatcheries which discharge directly to sea and thus there is precedent for the use of this treatment.

We would use on a 650m^3 wellboat with 130 litres per treatment and most cages would need two loads per cage equating to 260 litres per cage. In terms of discharge we can reduce the effect by discharging one well at a time thus discharging only 65 litres at a time.

Further details of treatment are provided in a letter from the Fish Vet Group dated 31 October 2011, which is attached to this Marine License application.

1.1.3 Recent AGD Outbreak at Lamlash, Arran

On 14th October 2011, a small-scale treatment trial for AGD was conducted by the Fish Vet Group in conjunction with TSSC at the Lamlash site, Arran. Ten affected fish were treated with hydrogen peroxide at 500mg/L for 20 minutes. The dose rate was based on the lowest dose thought to have an anti-amoebic effect *in vitro* from as-yet unpublished work provided by Tasmanian fish veterinarians. The treated fish did not respond well to this treatment, with 20% dying, and all fish showed respiratory distress. There was only a modest subjective improvement in gill amoebae numbers detectable by light microscopy of wet gill preparations and histology. Based on these results, along with clinical examination of the fish and subsequent histology, it was judged that hydrogen peroxide at this dose did not appear to be an appropriate treatment in this population and that the gill disease was too advanced to consider any other therapy such as formalin.

Fish at this site have since been managed to reduce stress and ensure as prompt mortality removal as possible, but ongoing losses of 65% of fish at this untreated site are reported (circa 250,000 fish). This equates to an approximate £750,000 loss in profit and £5,000,000 loss in turnover (2012) for TSSC. Thus TSSC are keen not to have a repeat of the AGD outbreak at Lamlash.

1.1.4 Locations

The location of the marine fish farms, Eughlam and Taranish can be seen on the attached plans (Annex 3). Well boat treatment methods are provided in the standard operating procedures (SOPs) presented in Annex 2.

The hydrographic and climatic conditions, the large size of the pens and the tonnage of fish held in East Loch Roag make full tarpaulin treatments technically and logistically very difficult.

1.2 Source of Materials

	Supplied by:	Manufactured by:
Formalin -	Merck Eurolab Merck House Poole Dorset BH15 1TD	Merck Eurolab Merck House Poole Dorset BH15 1TD

Chemotherapeutants for the control of AGD are 'Prescription Only' Medicines. This means only a veterinarian can prescribe the treatment for animals under his/her care. Formalin is a chemotherapeutant licensed in the UK and has full marketing authorisation.

SEPA did NOT authorize the discharge of Formalin in Loch Roag:

The BPEO Assessment admitted that SEPA did NOT permit the use of Formalin:

Formalin is not currently permitted under SEPA CAR authorisations for either of these East Loch Roag sites.

3.1.3 Legislative implications, both national and international

This BPEO supports a Marine licence application for the East Loch Roag area for the use of Formalin. This chemical is not currently permitted for use at these sites under the SEPA CAR Regulations for the discharge of medicinal products.

Marine Scotland admitted that they did NOT consult with third parties:

3.1.4 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. However, these sites are part of an Area Management Agreement, covering Loch Roag and all stakeholders (including wild fisheries) strive to achieve control over infections, in particular sea-lice. If requested, advice from Western Isles Fisheries Trust could be sought.

Marine Scotland admitted that no modelling had been conducted:

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

NO MODELLING?

A draft EQS of 5µg/l has been suggested by SEPA/Marine Scotland Science

Formalin is currently discharged from landbased hatcheries directly into the sea.

Discussions between Marine Scotland and SEPA started with a "beffuddled conversation" and calculations "on the back on an envelope":

From: Sinclair, Douglas [douglas.sinclair@sepa.org.uk]
Sent: 26 October 2011 15:17
To: Bland M (Michael) (MARLAB)
Subject: Dilution

Hi Mike

Following our increasingly befuddled conversation:

For formaldehyde, a treatment concentration of 200 ppm = 200mg/l

If you are seeking to get this down to an EQS of 5ug/l (our draft marine standard)

You will require a dilution of 200/0.005 = 40000x

Comparing this to Excis

Cypwermthrin treatment concenrtration is 5ug/l

Seeking to get this to an EQS of 16ng/l

Requires a dilution of 5000/16 = 312.5x

So a site which provides adequate dispersion to allow usable amounts of cypermethrin to be released will not necessarily allow usable amounts of formaldehyde to be released, indeed it is probably unlikely to do so.

Cautions:

1) I am not a modeller and these are therefore no more than back of envelope sums!
2) The numbers above are for formaldehyde, this is normally sold as "formalin" which contains 40% formaldehyde in buffered aqueous solution. Therefore if the 200ppm figure refers to formalin you will have 60% less formaldehyde to worry about and only be requiring 80/0.005 = 16000x dilutions to get from working concentration to EQS – but still a tall order I think.

Give me a call if need be.

Douglas Sinclair
Specialist I (Aquaculture)
SEPA Orkney Office
Norlantic House
KIRKWALL
Orkney
KW15 1RE

Tel: 01856 871080
Mob: 0797 9245513
Fax: 01856 871090
SEPA Extn: 2729
E-mail: douglas.sinclair@sepa.org.uk

Marine Scotland admitted to having "no idea" when asked by the Fish Vet Group (acting on behalf of the Scottish Salmon Company) for feedback on the use of Formalin:

From: Keir A (Alan) (MARLAB) on behalf of MS Marine Licensing
Sent: 26 October 2011 12:26
To: Bland M (Michael) (MARLAB)
Subject: FW: Amoebic Gill Disease at East Loch Roag, Lewis

Hi Mike,

As below, with fish farms and disease I'm afraid I've no idea.

Thanks

Alan

From: [redacted]
Sent: 26 October 2011 12:13
To: MS Marine Licensing
Cc: Megginson C (Colin) (MARLAB); [redacted] Duncan R (Rachael) (MARLAB)
Subject: Amoebic Gill Disease at East Loch Roag, Lewis

Hi- I'm resending this to the marine licensing mailbox after receiving out-of-office replies from Rachel Duncan and Colin Megginson's addresses.

Thanks

[redacted]

Further to our recent correspondence regarding amoebic gill disease at Lamlash, Arran (dated 12.10.11), [redacted] and myself visited the site (14.10.11) to perform a very small-scale initial treatment with hydrogen peroxide at 500mg/L for 20 minutes on ten fish in a clean harvest bin. The dose rate was based on the lowest dose thought to have an anti-amoebic effect *in vitro* from as-yet unpublished work provided to us by Tasmanian colleagues.

Disappointingly, the fish did not cope well with this treatment- 2/10 fish died, and all fish showed respiratory distress. Following 20 minutes of treatment, fish were placed in a tank of untreated seawater for a further 20 minutes and after this time euthanased and taken for examination. There was only a modest subjective improvement in gill amoebae numbers detectable by light microscopy of wet gill preparations and histology. Based on these results, along with clinical examination of the fish and subsequent histology, it was judged that hydrogen peroxide at this dose did not appear to be an appropriate treatment in this population and that the gill disease was too advanced to consider any other therapy such as formalin. Fish at this site have since been managed to reduce stress and ensure as prompt mortality removal as possible, but ongoing losses of roughly half the population are reported.

Subsequently, amoebic gill disease has been diagnosed at a Scottish Salmon Company site at East Loch Roag, Lewis. This was detected on histopathological samples sent by the site (spilt between two groups of caged at Taranaish and Eughlam) and subsequently confirmed by myself on a clinical visit on 20.10.11. At the time of visit, the site staff were reporting a decline in feeding rates in some cages (similar to early signs reported in Arran), although over this weekend mortalities have risen. Our limited experience in Scottish amoebic gill disease cases is that observation of amoebae on histopathological sections does not always mean that severe AGD will develop; however given the signs at East Loch Roag (amoebae present in all cages, inappetance and rising mortality pattern) we expect to see considerable mortality in this case also.

In terms of treatment, it's very clear to us that for any therapy to be successful it will need to be carried out promptly while this population still has some functional gill reserve left, which is required to deal with stressful events and chemotherapeutants. The recommended treatment for AGD is a 2-3 hour freshwater bath, which we have examined with Scottish Salmon Company and appears not to be practically achievable in this instance.

Based on the results of the treatment at Arran with hydrogen peroxide, we do not believe it to be an appropriate treatment at East Loch Roag at this point. We note that while hydrogen peroxide as a treatment for amoebae is the subject of some interest in the Tasmanian industry, previous studies have found equivocal results and high toxicity (Powell and Clark [2004] Aquaculture Research 35 112-123). Furthermore, the huge variation in dose rates believed to be efficacious (based on the extremely limited published data and discussions with veterinary colleagues) makes it difficult to confidently advise our clients on hydrogen peroxide or any other oxidative agents such as chloramine T.

By contrast, the correct doseage for use of formalin as a topical anti-protozoal is better understood. Based on the unavailability of a freshwater treatment protocol, following discussion amongst the clinical staff here at Fish Vet Group, we suggest that strategic treatment of worst-affected pens at East Loch Roag using formalin at 200ppm for 45minutes in a well boat be considered. Should consent be granted by Marine Scotland, the final decision to treat would need to be a clinical judgement between the senior company biologist and ourselves as veterinary surgeons based on the health status of the fish and their likely ability to tolerate treatment. By treating the worst-affected pens (alongside the natural decrease in temperature expected over the following period) we would hope to reduce the infective burden on the site in order to avoid the severity of losses observed at Arran.

Obviously we understand that this matter requires a period of consideration, but we'd greatly appreciate your response at the earliest opportunity.

Best wishes,

[redacted]

[redacted]
Veterinary Surgeon

Description: Description: Description: FishVet Group

Mobile: +44(0)7769 266156

Marine Scotland's formal consultation was "extremely short" (48 hours):

From: Alan.Keir2@scotland.gsi.gov.uk [mailto:Alan.Keir2@scotland.gsi.gov.uk]
Sent: 01 November 2011 16:05
To: Oceanmod
Cc: Williams, Mark; Michael.Bland@scotland.gsi.gov.uk; Sinclair, Douglas
Subject: 1/2 04399 scottish salmon company: Wellboat discharge operation , Eughlam and Taranish, Lewis

Dear Sir/Madam,

As discussed with Mike Bland, please find as attached (and background below) the application details for this wellboat discharge operation.

I apologise for the extremely short consultation on this application and would be grateful if you could advise if unable to reply by **Thursday 03 November 2011.**

Any comments you may have would be very welcome.

Due to the size of the supporting information this is email 1/2

Kind regards

Alan Keir
Licensing Officer
Marine Scotland – Marine Policy and Planning
Scottish Government | Marine Laboratory, PO Box 101| 375, Victoria Road | Aberdeen AB11 9DB
Tel: +44 (0)1224 295579
S/B: +44 (0)1224 876544
Fax: +44 (0)1224 295524
e: Alan.Keir2@scotland.gsi.gov.uk
w: http://www.scotland.gov.uk/marinescotland

SEPA concluded that Formalin use in Loch Roag "is likely to result in significant short term impact" and "may prove toxic to marine ecology" for 6 hours:

From: Oceanmod [Oceanmod@sepa.org.uk]
Sent: 03 November 2011 15:36
To: Keir A (Alan) (MARLAB)
Subject: RE: 1/2 04399 scottish salmon company: Wellboat discharge operation , Eughlam and Taranish, Lewis
Follow Up Flag: Follow up
Flag Status: Completed

Hi Alan,

please find some comments below on the proposed discharge. Any questions, please let me know

best wishes
ted

The proposed discharge totals 8,000m3 of formalin solution at 200ppm (or 1,600 litres of undiluted formalin). This corresponds to a concentration of 2x10^5 ug/l formalin. Given that the EQS is 5 ug/l, a dilution of 40,000 times is required to achieve the EQS concentration. Diluting the discharge this much would require 40,000 x 8,000 = 3.2 x 10^8 m^3 of receiving waters.

From the hydrographic surveys provided, the typical depth of the sea-loch appears to be 20m. A volume of water with this depth corresponds to an area of 16 km^2 - roughly the area of the entire Loch Roag.

To achieve the EQS concentration, therefore, the discharge would have to be uniformly mixed throughout the entire loch. In reality, because of the low currents in the area (mean speeds in hydrographic surveys are less than 5cm/s), the discharge patch will be advected north and south on the ebbing / flooding tides respectively, with slow vertical and transverse mixing. Jeremy Spurway has advised that residual currents in the area are clockwise, so a discharge to east Loch Roag is likely to drift round to wester Loch Roag rather than directly to the open ocean.

The half-life of formalin has been found to range from 1-7 days so is not likely to persist long term. However, given the high levels of dilution required (more than 15 half-lifes are required to achieve 40,000 times dilution) and weak mixing in the area, concentrations could exceed the EQS concentration for days or even weeks. More sophisticated modelling would be required to provide a more detailed quantitative assessment. This could be done, for example, using the 'wellauto' tool adapted for well-boat applications by Jeremy Spurway (based on the 'bathauto' fish farm model).

The EQS value of 5ug/l is an Annual Average. Because the treatment is supposed to be a 'one-off', the EQS in the loch is likely to be achieved, despite the potentially lengthy period of exceedence. There does not appear to be a Maximum Allowable Concentration value for marine waters (such as the 50ug/l value in freshwater). However, the Coshh No 41 report supplied indicates a Maximum Exposure Limit (MEL) concentration of 2ppm. Given that the EQS has a safety factor, and is an annual average, this MEL value may be a more appropriate indication of short-term environmental impact.

To achieve MEL concentrations, the discharge will need to be diluted by a factor of 100x. The discharge will have the essentially the same density as the receiving waters, so there will be no buoyancy effects to enhance dilution. Mixing will therefore be dominated by the currents in the receiving waters which, as noted above, are generally small.

A preliminary assessment using Visual Plumes (dilution model developed by the United States Environmental Protection Agency) indicates that, for the proposed discharge volumes and flow rates, a dilution of 100x will be achieved after around half a tidal cycle (~ 6hours) and a within a distance of about 1km from the well boat. During this time-period and area of impact, the discharged formalin solution will exceed the MEL and may prove toxic to marine ecology.

The proposed discharge is to a confined sea-loch with low currents, but only a few miles from open water where much more rapid mixing would be expected. The environmental impact of the formalin solution would therefore be much reduced if it were discharged outwith the sea-loch after treating the fish. The impact of a discharge could also be reduced somewhat by prediluting the discharge (e.g. discharging a fraction of the well, refilling with clean sea water, discharging another fraction, and repeating).

To conclude, the proposed discharge of 1600 litres of formalin to loch Roag is likely to result in a significant short term impact, though the annual average EQS is likely to be achieved. The environmental impact could be significantly reduced by discharging to the open water (north-west of Loch Charlabhaigh) rather than Loch Roag itself.

Scottish Natural Heritage stated that "it is clear there is potential for significant toxicological impacts on marine life of Loch Roag":

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

Alan Keir
Licensing Operations Team
Marine Scotland
PO Box 101
375 Victoria Road
Aberdeen
AB11 9DB

Our ref: CNS/MSA/WI/RM

Date: 03 November 2011

By email via: alan.keir2@scotland.gsi.gov.uk

Dear Alan

MARINE (SCOTLAND) ACT 2010, PART 4 MARINE LINCENSING
SCOTTISH SALMON COMPANY: EUGHLAM & AIRD TARANAIS FISH FARMS
DISCHARGE OF FORMALIN FROM WELLBOAT, EAST LOCH TARBERT, ISLE OF LEWIS.

Thank you for consulting SNH on the above licence application. The treatment of fish in the marine environment for amoebic gill disease in this way using formalin is a first in Scotland at this scale, and therefore there is a degree of uncertainty (and risk) with such proposal.

The BPEO Assessment provided by the applicant discounts the treatment of the affected fish by freshwater bath as being impracticable in East Loch Roag. However it is our opinion that this should be explored more fully and unless it can be demonstrated that it is totally impracticable (in a way that the BPEO Assessment does not do), freshwater treatment should be the preferred option. Freshwater supplies are available within 4km of the Eughlam site and 2km of the Aird Taranais site, at Kirkibost pier. If that is unsuitable Breascleit pier is a further 2km away. The BPEO Assessment is limited in its discussion of the environmental impacts which highlights the uncertainties of a formalin discharge of this scale into the marine environment. We consider that the summary table's conclusions, stating that environmental impacts from formalin well boat treatment are low, to be unsupported.

Should the discharge of formalin be licensed by Marine Scotland, it is clear there is the potential for significant toxicological impacts on marine life of Loch Roag. Loch Roag is a Marine Consultation Area, in recognition of the high biodiversity value of the loch. In addition the Langavat system at the head of the loch is designated as a Special Area of Conservation for its wild Atlantic salmon interest. We have limited information on the specific natural heritage interest within the area likely to be affected, although some MNCR survey data points close by indicate a shoreline which is composed of kelp forests on boulders/bedrock slopes, with associated reef species being particularly rich in shallower waters. We suggest that the following mitigation measures are likely to reduce environmental impacts if formalin is to be discharged:

I. Flushing: the sites are characterised by a relatively low current speeds (< 5cm/s), with residual currents within the system rotating clock wise. This means that the discharge plume is likely to be drawn slowly south and through into West Loch Roag, rather than out into the open sea. It is clear that there would be significant benefit in considering

Scottish Natural Heritage, 32 Francis Street, Stornoway, Isle of Lewis, HS1 2ND
Tel: 01851 705258 Fax: 01851 704900

e-mail: roddy.macminn@snh.gov.uk
www.snh.org.uk

discharging to the open water to the north of Craigeam, where mixing and dilution would likely be more rapid. Should this be impossible, hydrographic modelling should be used to identify the optimal state of the tide to aid flushing and discharges timed to coincide with those.

II. Depth: there is likely to be an increased risk of negative natural heritage impacts with discharge to shallower waters, closer to the shoreline. Our advice on this would be to discharge in as deep water as possible and far away from the shoreline, again preferably outwith the loch altogether to mitigate risks further.

III. Dilution: The impact of a discharge could also be reduced somewhat by pre-diluting the discharge (e.g. discharging a fraction of the well, refilling with clean sea water, discharging another fraction, and repeating).

I hope you find the above comments useful, but please feel free to contact me should you wish to discuss these matters further.

Yours sincerely

Roddy MacMinn
Operations Officer
SNH - Argyll & Outer Hebrides

The Scottish Salmon Company failed to detail any consultation with conservation bodies despite admitting in their application that discharges took place within a SAC and a National Scenic Area:

Consultation with Conservation Bodies

Please provide details of any consultation with Conservation Bodies and, if appropriate, include copies of any correspondence with your application.

Are any parts of the proposed deposit/discharge operations located within the boundaries of a designated conservation area? YES ☒ NO ☐

If **YES**, please indicate approximate distance of the operations from the boundary of the nearest conservation area(s)	Sites is within Traigh na Berie SAC and South Lewis, Harris and North Uist NSA

The Scottish Salmon Company's Lamlash Bay site on the Isle of Arran was "too compromised to survive a Formalin treatment":

From: Bland M (Michael) (MARLAB)
Sent: 04 November 2011 13:10
To: Palmer DJ (David); Weatherston R (Robin); McKie J (Jim) (MARLAB)
Cc: Megginson C (Colin) (MARLAB)
Subject: Formalin discharge at Taranish and Eughlam

All,

You are all aware of the amoebic gill disease problems at several Scottish Salmon Co salmon sites. The infection has caused problems at Lamlash where the fish are now too compromised to survive a formalin treatment (as reported by the company vet). 250000 fish have reportedly died at lamlash as a result of this infection. The company have applied for marine licences to discharge formalin (post treatment) at two sites in east loch roag (lewis) as earlier stages of the infection have reportedly been observed here. MS-LOT have consulted on these application in a very short turnaround time and, following the advice from both SEPA and SNH, will licence the discharge of formalin in a rectangle zone or point to point line outside east loch roag. This will be a one-off licence for the duration of this treatment only.

The granting of this licence has no bearing on MS-LOT's position on remote discharge of chemotherapeutant for sealice.

The company say that they won't treat until Monday, I will arrange some inspection of the activity.

Another email exchange stated that "it is too late for those fish on the Lamlash site":

From: [redacted]
Sent: 28 October 2011 12:10
To: Bland M (Michael) (MARLAB)
Cc: McKie J (Jim) (MARLAB); [redacted]
Subject: RE: TSCC Lamlash

Hi Mike,

I can confirm to you that the request is aimed at the East Loch Roag populations; it is too late for those fish on the Lamlash site. As indicated on [redacted] original mail we are seeing infestation with amoeba in both Eughlam and Taranish and would like to be able to treat the fish with formalin in the wellboat. As discussed on the phone the minimum amount of formalin solution (38%) which would be used would equate to one wellboat well at a time. Wellboats have varying capacity but if we use a 650m3 boat then this would equate to two wells of 325m3 each and would mean 65 litres of formalin per well. I will get the applications off to you with accompanying BPEO's and justification as soon as I can. Thanks.

[redacted]

Marine Scotland refused an application for Formalin use in Lamlash Bay, Isle of Arran in October 2011 because "its use in the marine environment has not been modelled":

From: Duncan R (Rachael) (MARLAB)
Sent: 11 October 2011 17:12
To: [redacted]
Cc: Megginson C (Colin) (MARLAB); 'douglas.sinclair@sepa.org.uk'
Subject: Use of formalin at Lamlash, Firth of Clyde
Importance: High

Tracking:

Recipient	Delivery	Read
[redacted]		
Megginson C (Colin) (MARLAB)	Delivered: 11/10/2011 17:12	Read: 12/10/2011 07:24
'douglas.sinclair@sepa.org.uk'		

Hi [redacted]

Following discussions with colleagues here and within SEPA I'm afraid at this stage we cannot permit the use of Formalin in the treatment of amoebic gill disease at Lamlash. Considering the urgency with which treatment is required, the procedure to allow for the use of this chemical would take too long. We are aware that is is used in the treatment at freshwater farms however its use in the marine enviroment has not been modelled to date. We are also aware that there are alternatives available. From advice we have received, it has been suggested hydrogen peroxide is effective at least *in vitro* and should be considered as an alternative for use in this situation.

In order for us to continue to consider the use of Formalin we would require The Scottish Salmon Company to justify the rejection of alternative treatments which are already consented for use, either under the CAR or Marine Licence. Also, we would require in writing justification from your vet for the use of this treatment over others. Could you please confirm whether Formalin is a medicinal chemical?

Thank you for consulting us on this matter.

Regards

Rachael

Rachael Duncan
Licensing Officer
Marine Scotland – Marine Planning & Policy
Scottish Government | Marine Laboratory, PO Box 101| 375, Victoria Road | Aberdeen AB11 9DB
Tel: +44 (0)1224 295579
S/B: +44 (0)1224 876544
Fax: +44 (0)1224 295524
e: Rachael.Duncan@scotland.gsi.gov.uk
w: http://www.scotland.gov.uk/marinescotland

Marine Scotland also reported in a letter:

marinescotland

The Scottish Government

T:+44 (0)1224 295579 F: +44 (0)1224 295524
E: MS.MarineLicensing@scotland.gsi.gov.uk

File Note

File reference : FKB/W76
Date : 11 October 2011

Subject : Use of Formalin to treat fish from a wellboat

MARINE (SCOTLAND) ACT 2010, PART 4 MARINE LICENSING

SCOTTISH SALMON COMPANY: WELLBOAT DISCHARGE, LAMLASH, FIRTH OF CLYDE

Marine Scotland received a telephone call from [redacted] at Scottish Salmon Company early afternoon. She explained that they required to use a wellboat to treat fish at Lamlash, Firth of Clyde as an emergency. They wished to use Formalin, a chemical not currently authorised under their CAR or Marine Licence. [redacted] stated that the vet had suggested this treatment as the best to use in the situation.

I explained that we would have to look into it as it was a chemical we don't regularly deal with, however she was asked to submit in writing the request by the vet to use Formalin and the reasoning behind it along with details of the operational procedure with concentrations etc. She explained that she had all this to hand and would forward it shortly.

In the meantime, I spoke with Patrick Grey of the FHI who said that it was used regularly at freshwater farms however they had no record of it being used in the marine environment.

SEPA: After failing to get hold of Douglas Sinclair I spoke with Simon Kirk the officer who dealt with the CAR licence for that site. He was not aware of any problems at the site and was surprised not to have heard from them. He confirmed that no modelling had been done to date so couldn't say for sure it would be suitable or what concentrations etc should be used. He had to speak with [redacted] anyway so would discuss the situation with her and find out what is going on.

Later in the afternoon after 4pm. I got hold of Douglas who had spoken with Simon Kirk in the interval. It seemed that Scottish Salmon Company were requiring to treat for amoebic gill disease and if this was the best treatment the vet was suggesting then it was up to us if we wished to proceed and licence it as part of their Marine Licence. However, he had done some research and found that Hydrogen Peroxide may work just as well (which is currently licensed for use) and if we were to let them use it we should ask for justification as to why they are rejecting the alternatives. He also made the point that SEPA only authorise VMD authorised medicines only and he didn't believe Formalin was, he thought it was a biocide and that may cause additional problems if this was decided to be discharged. Justification required.

I responded to Scottish Salmon Company explaining that we aren't in a position to permit the use of Formalin at this point and recommend finding and alternative which is currently licensed. If they wished to go ahead with Formalin the process would be quite extensive.

Rachael

Marine Scotland cleared the path for a "successful" application in Loch Roag:

From: Bland M (Michael) (MARLAB)
Sent: 28 October 2011 11:30
To: Weatherston R (Robin)
Cc: Cowan WJ (Willie); Pendrey D (Daniel); Allan C (Charles) (MARLAB); Palmer DJ (David); McKie J (Jim) (MARLAB); Raynard R (Rob) (MARLAB)
Subject: RE: URGENT HELP REQUEST

Robin,

I have spoken to both [redacted] f the Fish Vet Group and [redacted] of The Scottish Salmon Co.

According to [redacted], TSSC are not going to apply for a marine licence to discharge formalin at their Lamlash site on Arran. The FVG's advice to them was not to treat severely affected fish.

Alan intends to submit an application on Monday for a site in East Loch Roag. This site is reportedly in an earlier stage of infection and it is suggested b[redacted] that treatment with formalin is more likely to succeed at this site.

Early conversations with SEPA regarding TSSC's initial request suggested that the dose discussed would not meet the Environmental Quality Standards. TSSC are aware of this. They must have regard to the EQS if a licence application is to be successful.

Mike

Precedent for Illegal Use of Formalin?:
Marine Scotland voiced concerns that the "emergency" use of Formalin in Loch Roag would establish a precedent:

From: Michael.Bland@scotland.gsi.gov.uk [mailto:Michael.Bland@scotland.gsi.gov.uk]
Sent: 09 November 2011 16:01
To: Sinclair, Douglas
Cc: Matthew.Gubbins@scotland.gsi.gov.uk; Colin.Megginson@scotland.gsi.gov.uk
Subject: Formalin discharge at sea

Douglas,

Following the licensing of a discharge of formalin in Loch Roag following emergency treatment of AGD last week, MS-LOT have had several queries from fish farming companies to discharge formalin at their sites. We maintain the line that last week must not be permitted to set a precedent. If this is something we are likely to encounter a lot then it requires more consideration.

You mentioned your draft marine standard. Can I ask if this is something that SEPA will use as a guide for the advice given for any further applications of this nature? Is it to remain in draft form for long? I'm just really trying to ascertain if SEPA and MS can have a unified approach to applications for formalin.

Not to be too presumptive but the amount of formalin used to treat a full site could be in exceedance of the EQS. This being the case it would be good to have a unified strategy and some idea of the extent of the AGD problem.

Another email from Marine Scotland referred to "speedily" turning around a "one-off series of discharges of Formalin from a wellboat" in Loch Roag – and to "increasing pressure to repeat the licensing":

From: Bland M (Michael) (MARLAB)
Sent: 11 November 2011 11:33
To: Cartney M (Matthew)
Cc: Stewart JB (Bruce); Megginson C (Colin) (MARLAB)
Subject: The discharge of formalin from Wellboats

Matt,

Last week we speedily turned around an application for a one-off series of discharges of formalin from a wellboat. The formalin had been used to treat an outbreak of Amoebic Gill Disease in farmed Atlantic salmon in Loch Roag, Lewis.

Formalin is a biocide and is not often licensed for discharge from fish farms under CAR. It is commonly used in freshwater aquaculture to remove parasites from fish gills. There is interest from the rest of the industry to get a licence for the same and we will come under increasing pressure to repeat the licensing.

I have approached SEPA and the Veterinary Medicines Directorate to establish their take on the issue and we should meet with SEPA to discuss a way forward.

Bruce, I have copied you in as you may be interested in the developments here. When we set up the licensing of chemotherapeutants for sealice we took our lead from SEPA, this time it looks as though the industry is only looking for wellboat discharges and we will therefore have to take the lead, despite SEPA's long history of assessing such activities.

Scottish Sea Farms Use of Formalin?:

At around the same time as the use of Formalin by the Scottish Salmon Company, Scottish Sea Farms also contacted Marine Scotland:

From: Bland M (Michael) (MARLAB)
Sent: 10 November 2011 10:58
To: [redacted]
Subject: FW: Draft EQS

Dear [redacted]

Thanks for your query. As stated on the phone the EQS discussed was a draft. Marine Scotland wish to agree a way forward with other relevant bodies prior to distributing such information. I will be in touch with you regarding this when I have more information.

Apologies that this may take a bit of time but there are issues with the discharge of formalin that MS-LOT need to understand fully before we can consider the implications of licensing the discharge from wellboats.

Kind Regards

Mike

From: [redacted]
Sent: 10 November 2011 10:09
To: Duncan R (Rachael) (MARLAB)
Subject: Draft EQS

Sorry to use you as a go between but I don't have Mike's email address. He was going to send me some information on the draft EQS for Formalin yesterday but apparently our system is having problems with external emails. Could you ask him to please forward it to [redacted]

Thanks

Regards,

[redacted]
Environmental Analyst
Scottish Sea Farms Ltd

[redacted]

****

Registered Office
Scottish Sea Farms Ltd
Equitable House
47 King William Street
London
EC4R 9AF
Company No. 958001

Please address all post to:
Scottish Sea Farms Ltd
Laurel House
Laurel Hill Business Park
Stirling
FK7 9JQ

Flood of Formalin Applications in 2012:

In January 2012, there were further applications to use Formalin at salmon farms in North Moine and Bheachan (sites believed to be operated by Lakeland Marine/Meridian Salmon).

From: [redacted]
Sent: 19 January 2012 16:09
To: Bland M (Michael) (MARLAB); Duncan R (Rachael) (MARLAB)
Subject: License to discharge Formalin

Hi Mike/ Rachel

I was contacted today by our Fish Health team requesting to see if we can get permission to use Formalin on site at the following sites. North Moine and Bheachan.
Both sites currently have smolts onsite at approximately 200g.
Unfortunately because of the size of fish involved Hydrogen peroxide treatments are not considered to be the best treatment available as this is to harsh a treatment for the fish.
As such is it possible to get Formalin added to the existing licenses.

If you could contact me asap to discuss or drop me an email with what you require.

Thanks,

[redacted]
Environmental and Development Manager
[redacted]

Further Formalin Applications During Summer of 2012:
In July 2012, the Scottish Government's Marine Laboratory admitted that it was still "struggling to get advice" following further requests by the industry to use Formalin:

From: Bland M (Michael) (MARLAB)
Sent: 27 July 2012 14:20
To: Gubbins M (Matthew) (MARLAB)
Subject: FW: Formalin 2012

Matt,

Craig had nothing and Douglas has helped a little. We are being asked for formalin discharge licences as last year. We have a strong presumption against but I am struggling to get advice, are there any other avenues you think I could consider?

Mike

Formalin Use Induces Memory Loss:
As late as July 2012 (over six month AFTER the use of Formalin of in Loch Roag SAC), SEPA admitted that they "can't remember where we left the possible marine standard for formaldehyde" (and joked that Google was their "font of all information"):

From: Sinclair, Douglas [mailto:douglas.sinclair@sepa.org.uk]
Sent: 27 July 2012 12:18
To: Bland M (Michael) (MARLAB)
Subject: RE: Formalin 2012

Hi Mike

I can't remember where we left the possible marine standard for formaldehyde but the proposed draft PNECs that we have are:

0.58ug/l as a long term standard
5.8ug/l for a short term standard

For intermittent discharges the short term standard would probably what would be used for regulation.

I haven't heard of Halcomed either indeed it doesn't throw up anything on Google (my font of all information) at all!

Douglas Sinclair
Specialist I (Aquaculture)
SEPA Orkney Office
Norlantic House
KIRKWALL
Orkney
KW15 1GR

Tel: 01856 871080
Mob: 0797 9245513
Fax: 01856 871090
SEPA Extn: 2729
E-mail: douglas.sinclair@sepa.org.uk

SEPA was responding to Marine Scotland who had received "a few prospective enquiries about Formalin discharge post AGD treatment" which was "much earlier in the year than before":

From: Michael.Bland@scotland.gsi.gov.uk [mailto:Michael.Bland@scotland.gsi.gov.uk]
Sent: 27 July 2012 11:25
To: Sinclair, Douglas
Subject: Formalin 2012

Hi Douglas,

Hope all is well.

MS-LOT has received a few prospective enquiries about formalin discharge post AGD treatment. This is much earlier in the year than before.

Have there been developments on the draft marine EQS that we discussed last autumn?

Another query I have received related to Halcomed, not heard of it before but making the assumption it's a Cloramine T type product, any ideas?

Mike

Mike Bland
Marine Licensing Casework Manager
Licensing Operations Team
Marine Scotland - Marine Planning & Policy

Scottish Government | Marine Laboratory, PO Box 101 | 375 Victoria Road | Aberdeen AB11 9DB

Formalin As A Solution to Amoebic Gill Disease?:
Data disclosed by Marine Scotland following a Freedom of Information request on Amoebic Gill Disease also included reference to the use of Formalin:

From: [redacted]
Sent: 26 October 2011 12:00
To: Duncan R (Rachael) (MARLAB)
Cc: Megginson C (Colin) (MARLAB); [redacted]
Subject: Amoebic Gill Disease at East Loch Roag, Lewis
Follow Up Flag: Follow up
Flag Status: Red

Further to our recent correspondence regarding amoebic gill disease at Lamlash, Arran (dated [redacted] nd myself visited the site (14.10.11) to perform a very small-scale initial treatment with hydrogen peroxide at 500mg/L for 20 minutes on ten fish in a clean harvest bin. The dose rate was based on the lowest dose thought to have an anti-amoebic effect *in vitro* from as-yet unpublished work provided to us by Tasmanian colleagues.

Subsequently, amoebic gill disease has been diagnosed at a Scottish Salmon Company site at East Loch Roag, Lewis. This was detected on histopathological samples sent by the site (spilt between two groups of caged at Taranaish and Eughlam) and subsequently confirmed by myself on a clinical visit on 20.10.11. At the time of visit, the site staff were reporting a decline in feeding rates in some cages (similar to early signs reported in Arran), although over this weekend mortalities have risen. Our limited experience in Scottish amoebic gill disease cases is that observation of amoebae on histopathological sections does not always mean that severe AGD will develop; however given the signs at East Loch Roag (amoebae present in all cages, inappetance and rising mortality pattern) we expect to see considerable mortality in this case also.

The email – which has been blacked out by Marine Scotland – concludes by requesting to use Formalin:

Based on the results of the treatment at Arran with hydrogen peroxide, we do not believe it to be an appropriate treatment at East Loch Roag at this point. We note that while hydrogen peroxide as a treatment for amoebae is the subject of some interest in the Tasmanian industry, previous studies have found equivocal results and high toxicity (Powell and Clark [2004] Aquaculture Research 35 112-123). Furthermore, the huge variation in dose rates believed to be efficacious (based on the extremely limited published data and discussions with veterinary colleagues) makes it difficult to confidently advise our clients on hydrogen peroxide or any other oxidative agents such as chloramine T.

By contrast, the correct doseage for use of formalin as a topical anti-protozoal is better understood. Based on the unavailability of a freshwater treatment protocol, following discussion amongst the clinical staff here at Fish Vet Group, we suggest that strategic treatment of worst-affected pens at East Loch Roag using formalin at 200ppm for 45minutes in a well boat be considered. Should consent be granted by Marine Scotland, the final decision to treat would need to be a clinical judgement between the senior company biologist and ourselves as veterinary surgeons based on the health status of the fish and their likely ability to tolerate treatment. By treating the worst-affected pens (alongside the natural decrea[redacted]d) we would hope to reduce the infective burden on the site in order to avoid the severity of losses observed at Arran.

Obviously we understand that this matter requires a period of consideration, but we'd greatly appreciate your respo[redacted]

Best wishes,

[redacted]

Another email refers to a salmon farmer wanting to use Formalin in July 2012 and that AGD "has reared its head again as a serious issue in Scottish salmon farms over the last few months":

From: [redacted]
Sent: 16 July 2012 13:37
To: Duncan R (Rachael) (MARLAB)
Subject: Amoebic Gill Disease
Follow Up Flag: Follow up
Flag Status: Red

We had some correspondence last year regarding amoebic gill disease treatment- unfortunately as you may be aware it has reared its head again as a serious issue in Scottish salmon farms over the past few months. Since the spring, most affected farms have been treating with hydrogen peroxide with reasonable success, although my experience is that as water temperature increases a few sites are finding that they need to re-treat- we expect this shortening of treatment intervals to continue until water temperatures peak in the autumn.

While we're not presently keen to use formalin for AGD, and it seems that the opinion amongst the very few vets who have used it for this purpose is that the results are ambiguous, I wondered if it would be possible to get comment from Marine Scotland (from a licensing perspective) regarding the use of formalin in wellboats for AGD. As you're aware, permission was granted for it's use by the Scottish Salmon Company at Loch Roag last year. While I did not attend the treatment myself, the opinion of the attending biologist was that it was beneficial, severely diseased fish coped remarkably well with it, and it interupted the mortality pattern on the site. Unfortunately the chance wasn't taken to collect detailed efficacy results at the time. We expect that as the weeks go on our practice (and also Marine Scotland) may well receive inquiries from salmon producers regarding the feasibility of using formalin to treat AGD cases if hydrogen peroxide becomes unacceptably hazardous to fish. I should add that formalin also becomes more hazardous at higher temperatures, and our advice to our clients is likely to remain that peroxide is the best understood treatment presently (excluding fresh water), but it would be good to have comment from Marine Scotland regarding formalin at this point.

Lastly, one of our clients has indicated that if MS were prepared to consider permission for an isolated treatment of one or two cages with formalin (perhaps during site treatment with peroxide), they'd be pleased to co-operate with any attempt to compare or benchmark the two treatments- perhaps this might be of interest to the MS pathologists etc?

Kind regards

[redacted]

[redacted]VM&S MSc MRCVS
Veterinary Surgeon
FishVet Group
Mobile: +44(0)7769 266156

Read the FOI documents on AGD in full online here

Useful Documents:

Read the press release in full via "Pickled Scottish Salmon, Anyone?"

The FOI reply from the Scottish Government dated 23 November 2012 detailed 190 pages of documents – read in full online here (same file online here as well). GAAIA has now filed

further FOIs requesting information on Formalin use on Scottish Salmon farms – read more via FishyLeaks.

For more details on Amoebic Gill Disease please read "Gill Diseases: Scottish Salmon's Dirty Big Secret" (November 2012)

For more background please visit http://salmonfarmingkills.com/gill-diseases and http://salmonfarmingkills.com/scotlands-secrets

For more food for thought on the toxic chemicals used on Scottish salmon farms please read:

"Scottish Salmon's Toxic Toilets Named & Shamed!" (GAAIA, 11 September 2012)

"Media Backgrounder: Chemical Culture in Scotland" (GAAIA, September 2012)

"Loch Duart: The Toxic Salmon Company" (GAAIA, September 2012)

"Scottish fish farmers use record amounts of parasite pesticides" (The Guardian, 10 September 2012)

FishyLeaks, 20 January 2013