

Public Comments on Malachite Green Technical Report –Mr. Don Staniford

**To:** Dr Barbara Shane, National Toxicology Program Executive Secretary, National Institute of Environmental Health Sciences, United States Department of Health and Human Services: [shane@niehs.nih.gov](mailto:shane@niehs.nih.gov)

**From:** Don Staniford, Managing Director of The Salmon Farm Protest Group:  
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**Date:** 28<sup>th</sup> December 2003

**Subject: Carcinogenesis of malachite green**

Many thanks for the opportunity to comment (by 30<sup>th</sup> January 2004) on the U.S. National Toxicology Program technical report “Toxicology and Carcinogenesis Studies of Malachite Green Chloride and Leucomalachite Green” which will be discussed at your meeting on 17-18<sup>th</sup> February 2004 (<http://ntp-server.niehs.nih.gov/meetings/2004/2004FebTRRSMtgpgg.html>). Following consideration of the documents (“Toxicology and Carcinogenesis Studies of Malachite Green Chloride and Leucomalachite Green (CAS Nos. 569-64-2 and 129-73-7) in F344/N Rats and B6C3F1 Mice (Feed Studies”): <http://ntp-server.niehs.nih.gov/htdocs/LT-studies/tr527.html> - the full report (322 pages) is available to download via: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>), please find enclosed the public comments of The Salmon Farm Protest Group.

By way of introduction, the Salmon Farm Protest Group (SFPG) is a UK-based organisation although we have members all over the world including Canada, Chile, Norway, Iceland and the United States. It is therefore very much appreciated that this public meeting will be available for viewing on the internet ([http://ntp-server.niehs.nih.gov/htdocs/liason/Feb2004TRRS\\_FR.html](http://ntp-server.niehs.nih.gov/htdocs/liason/Feb2004TRRS_FR.html)). The SFPG have followed the malachite green issue with increasing interest and concern over the last year and have alerted our members and subscribers to our newsletter, The Salmon Farm Monitor (<http://www.salmonfarmmonitor.org>). For example:

“Nutreco caught in malachite scandal” (The Salmon Farm Monitor, October 2003):  
<http://www.salmonfarmmonitor.org/intlnewsoctober2003.shtml#item4>

“Malachite green contamination in Chilean salmon” (The Salmon Farm Monitor, September 2003):  
<http://www.salmonfarmmonitor.org/intlnewsseptember2003.shtml#item1>

“Nutreco fined for illegal use of malachite green” (The Salmon Farm Monitor, September 2003): <http://www.salmonfarmmonitor.org/intlnewsseptember2003.shtml#item2>

“Contaminated Chilean salmon impounded in Europe” (The Salmon Farm Monitor, August 2003): <http://www.salmonfarmmonitor.org/intlnewsaugust2003.shtml#item1>

If you want further information please do not hesitate to ask or visit our web-site (<http://www.salmonfarmmonitor.org>).

Our main concerns and comments are outlined below but, in summary, include:

- 1) International resonance and relevance**
- 2) Exposure to fish farm workers**
- 3) Exposure to consumers**
- 4) Lack of U.S. testing for malachite green residues in farmed salmon**
- 5) Increasing malachite green contamination of farmed salmon in Europe**
- 6) Malachite green contamination in farmed salmon on sale in the U.S.**

**1) International resonance and relevance:**

Given the international implications of malachite green contamination in farmed salmon the SFPG believe that your discussion of “Toxicology and Carcinogenesis of Malachite Green” has international resonance and relevance beyond the bounds of the United States. Background on the cancer-causing properties of malachite green can be found, for example, in papers published by the UK Department of Health’s Committee on Mutagenicity (<http://www.doh.gov.uk/com/malachit.htm>) and Committee on Toxicity (<http://www.doh.gov.uk/cot/malachit.htm>). The Committee on Mutagenicity concluded in 1999 that: “Malachite green should thus be regarded as having mutagenic potential” and that “it would be prudent to assume that malachite green may be a potential in-vivo mutagen” (<http://www.doh.gov.uk/com/malachit.htm>). These papers are sadly not referred to at all in the NTP technical report.

The cancer-causing potential of malachite green is therefore of serious international concern. This was reported several years ago in The Independent on Sunday (25<sup>th</sup> March 2001):

“The Food Standards Agency admits it has concerns about the potential health risks posed by the chemical malachite green, a cheap dye routinely used as a fungicide and disinfectant on trout and salmon eggs. Fears that the dye could cause mutations rose after scientific tests in the United States showed the chemical and a by-product called leucomalachite green can cause ‘severe effects’ in the cells and organs of rats and mice” (in “Mutant chemicals used in fish farms - fish farm dye link to animal mutation”: <http://list.zetnet.co.uk/pipermail/seatrout-rev/2002-June/000181.html>)

And in November 2002 the UK’s Veterinary Medicines Directorate stated that: “The Government recognises that there are continuing concerns about its potential effect on human health, and is closely monitoring the long-term toxicological studies of malachite green currently taking place in the USA” (<http://www.vmd.gov.uk/mavis/news/malgreen.pdf>).

Here in the UK, scientists and government agencies have been awaiting and referring to your study for the last seven years. Writing in Fish Farmer in April/May 1997 Dr David Alderman of the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) referred to the US study:

“Although a major study of malachite green has now been started by the Food and Drugs Administration (FDA) in the USA, results from this study will not be available in less than five years” (<http://www.ctu.edu.vn/colleges/aquaculture/emailnew/n33.htm>)

And in 2001, the UK’s Food Standard’s Agency “stated that the US NTP’s study which reports next year should enable a better definition of the risks to operators and consumers” (UK Veterinary Medicines Directorate meeting: 20<sup>th</sup> February 2001: [http://www.vmd.gov.uk/old\\_vmd\\_web\\_pages/liaisonmeeting.pdf](http://www.vmd.gov.uk/old_vmd_web_pages/liaisonmeeting.pdf)). The UK Veterinary Residues Committee also reported that the U.S. studies would be available in 2002:

“Jack Kay reported that the results of the long-term American studies into Malachite green were expected by the end of the calendar year. The Committee stressed the need for the results to be obtained as soon as possible as this was an area of concern” (UK Veterinary Residues Committee, 7th March 2002: <http://www.vet-residues-committee.gov.uk>)

The SFPG therefore very much appreciates the fact that these scientific studies are finally being presented in the public domain. As The Oregonian (14<sup>th</sup> August 2003) states:

“The FDA commissioned studies of the compounds in 1996 because they resemble others known to cause cancer, said John Bucher, deputy director of the environmental toxicology program at the National Institute of Environmental Health Sciences in Research Triangle Park, N.C. The results are not available yet, but will be presented to a scientific board in November. The FDA would not allow The Oregonian to speak with scientists conducting the research, and required the newspaper to submit questions in writing. Without the studies, FDA officials said they do not know whether malachite green or leucomalachite green presents a public health risk. Earlier studies, however, found toxic effects and genetic damage in rats and rabbits” ([http://www.oregonlive.com/news/oregonian/index.ssf?/base/front\\_page/1063454304187750.xml](http://www.oregonlive.com/news/oregonian/index.ssf?/base/front_page/1063454304187750.xml))

The European Commission’s Health and Consumer Protection Directorate (DG SANCO) are also aware of the carcinogenic potential of malachite green (I have copied you into my correspondence with the EC). And, according to The Oregonian (14<sup>th</sup> September 2003): “a European Commission science panel in January recommended classifying malachite green as a toxin that poses a risk of birth defects and harm to public health” ([http://www.oregonlive.com/news/oregonian/index.ssf?/base/front\\_page/1063454304187750.xml](http://www.oregonlive.com/news/oregonian/index.ssf?/base/front_page/1063454304187750.xml)). In September 2003, at the EC’s Standing Committee on the Food Chain and Animal Health, “the Dutch delegation proposed a risk evaluation (of malachite green) by

the European Food Safety Authority”

([http://europa.eu.int/comm/food/fs/rc/scfcah/controls/rap04\\_en.pdf](http://europa.eu.int/comm/food/fs/rc/scfcah/controls/rap04_en.pdf)). The SFPG very much hopes that food safety authorities in Europe, Japan, Chile, Norway and Canada will all assist you in your public consultation exercise.

## **2) Exposure to fish farm workers:**

The potential for malachite green to affect fish farm workers is highly significant and further studies must be conducted as a matter of urgency. As the NTP technical report “Toxicology and Carcinogenesis Studies of Malachite Green Chloride and Leucomalachite Green” states:

“The National Occupational Exposure Survey (1981-83) estimated that more than 180,000 workers are potentially exposed to malachite green annually (NIOSH: 1990)” (p16: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

And:

“Malachite green has been reported to be injurious to the human eye (Grant 1974). In addition, six of 11 eczema patients were found to be sensitised to patch tests using a 2% aqueous solution of malachite green (Bielicky and Novak, 1969)” (p23: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

Moreover:

“During the conduct of these studies, the FDA was contacted by the US Fish and Wildlife Service and the Centre for Diseases Control and Prevention regarding a possible correlation between the formation of acoustic neuromas and malachite green exposure in USFWS hatchery workers (K. Rosa, USFWS; E Page, CDC; personal communication). Acoustic neuromas are histologically benign tumors derived from the Schwann cells of the 8<sup>th</sup> cranial nerve, which can lead to hearing loss, imbalance, and brainstem compression” (p83: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

In January 2001, the NTP stated that:

“Because of its effectiveness this chemical is considered to have a high probability of abuse....the use of this product could result in significant worker exposure and the effluent from the aquaculture facility could enter the water supply resulting in exposure of the general public through recreational activities and drinking water. Finally, the use of malachite green in food fish could result in human consumption of malachite green residues” (9th Report on Carcinogens: Chemicals Nominated to the NTP for In-Depth Toxicological Evaluation or Carcinogenesis Testing in Fiscal Years 1988-1998: Malachite green , p85: U.S. Department of Health and Human Services, National Toxicology Program, January 2001: <http://ehp.niehs.nih.gov/roc/toc9.html>)

In 1997 an IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP report – “Towards safe and effective use of chemicals in coastal aquaculture” – published by the FAO stated that malachite green’s use “is not permitted in the USA, the European Union and some Southeast Asian countries (e.g., Thailand) due to human health concerns relating to its role as a respiratory enzyme poison” (<http://list.zetnet.co.uk/pipermail/seatrout-rev/2002-June/000181.html>).

It is therefore disappointing that the NTP technical report reveals a paucity of studies relating to human exposure:

“No toxicity studies or reports of health effects related to exposure to leucomalachite green in humans were found in the literature” (p23: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

And:

“No studies of reproductive or developmental effects of malachite green chloride or leucomalachite green in humans were found in a review of the literature” (p 24: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

And:

“No epidemiologic studies of malachite green chloride or leucomalachite green have been reported” (p25: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

### **3) Exposure to consumers:**

The risks of malachite green exposure to consumers of farmed salmon are all too real. As the NTP technical report “Toxicology and Carcinogenesis Studies of Malachite Green Chloride and Leucomalachite Green” states:

“The general public in the US may become exposed to malachite green through the consumption of treated fish. Additional consumer exposure can occur via fish imported from Europe and Canada, where the use of malachite green has been documented. While fish sold in the United States have not been tested routinely for malachite green, random sampling from markets in the United Kingdom indicates the continued use of malachite green in the United Kingdom (VMD, 1996)” (p16: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

Moreover:

“Human exposure to leucomalachite green has also been documented (Doerge et al 1998, VMD, 1999). Doerge et al (1998) analysed edible flesh from trout purchased from retail outlets in the United Kingdom during 1994 and 1995 as part of a non-regulatory food

surveillance program. Eight of the 12 samples were positive for malachite green (0.4 to 3.4 ppb) and leucomalachite green (9.0 to 96 ppb). Most noteworthy, the concentration of leucomalachite green in the samples was 12 to 37 times higher than that of malachite green” (p17: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

However, the NTP technical report omits mention of more recent VMD surveillance monitoring in farmed salmon. In fact, the UK’s VMD only started testing for malachite green in farmed salmon in 2001 (testing of farmed trout began in ca. 1994). Since then the results have been alarming. In October 2003, for example, the VMD reported that:

“Two samples of salmon have confirmed positive for residues of malachite green and leucomalachite green at concentrations of 8.4  $\mu\text{g}/\text{kg}$  (malachite green) and 376  $\mu\text{g}/\text{kg}$  (leucomalachite green). Two further samples contained residues of leucomalachite green at concentrations of 2.3  $\mu\text{g}/\text{kg}$  and 5  $\mu\text{g}/\text{kg}$ ” (MAVIS 48: October 2003, p15): <http://www.vmd.gov.uk/mavis/publications/Mavis48.pdf>

And in July 2003:

“Five samples of salmon have been confirmed as positive for residues of malachite/leucomalachite green. Two samples contained residues of malachite green at concentrations of 4.8  $\mu\text{g}/\text{kg}$  and 8.4  $\mu\text{g}/\text{kg}$  and leucomalachite green at concentrations of 19  $\mu\text{g}/\text{kg}$  and 367  $\mu\text{g}/\text{kg}$  respectively” (MAVIS 47: July 2003, p13): <http://www.vmd.gov.uk/mavis/publications/Mavis47.pdf>

And in April 2003:

“Twelve samples of salmon muscle have been found to contain residues of leucomalachite green at concentrations of 2  $\mu\text{g}/\text{kg}$  (2 samples), 3  $\mu\text{g}/\text{kg}$  (3 samples), 4  $\mu\text{g}/\text{kg}$  (2 samples), 5  $\mu\text{g}/\text{kg}$ , 6  $\mu\text{g}/\text{kg}$ , 10  $\mu\text{g}/\text{kg}$ , 14  $\mu\text{g}/\text{kg}$  and 35  $\mu\text{g}/\text{kg}$  ....One sample of trout contained confirmed residues of both malachite green and leucomalachite green at concentrations of 12  $\mu\text{g}/\text{kg}$  and 460  $\mu\text{g}/\text{kg}$  respectively” (MAVIS 46: April 2003, p14): <http://www.vmd.gov.uk/mavis/publications/Mavis46.pdf>

According to information obtained from the VMD, in 2001 6 out of 30 samples of farmed salmon tested positive for leucomalachite green at levels of 4, 5 (4 times) and 17  $\mu\text{g}/\text{kg}$ . In 2002, 8 out of 52 tested positive for leucomalachite at levels of 2(2), 3(3), 4, 5 and 35  $\mu\text{g}/\text{kg}$ .

Nor is Scottish salmon the only farmed salmon contaminated with malachite green. For example, the UK’s Veterinary Medicines Directorate reported in October 2003 that:

“Three samples of salmon imported from Chile and two samples of catfish imported from Taiwan were found to contain residues of leucomalachite green, a metabolite of malachite green, at concentrations between 2.6  $\mu\text{g}/\text{kg}$  and 20  $\mu\text{g}/\text{kg}$ ” (MAVIS 48: October 2003, p22): <http://www.vmd.gov.uk/mavis/publications/Mavis48.pdf>

And in January 2003 the VMD reported that malachite green was found in three samples of Chilean farmed salmon:

“Three samples of salmon [out of 14 tested] imported from Chile and collected by Port Health official at a Border Inspection Post were found to contain residues of leucomalachite green, a metabolite of malachite green at concentrations between 4-18  $\mu\text{g}/\text{kg}$ . Malachite green has never been authorised as a veterinary medicine in the EU and should not be present in imported farmed fish. This information has been passed to the Food Standards Agency for further action. The Chief Veterinary Officer has been asked to write to the Chilean authorities to ask them to investigate this matter” (MAVIS 45, p23: <http://www.vmd.gov.uk/mavis/publications/mavis45.pdf>).

In 2002 the VMD also reported that two samples of Faroese farmed salmon had tested positive at 10  $\mu\text{g}/\text{kg}$  and 11  $\mu\text{g}/\text{kg}$  (<http://www.vmd.gov.uk/mavis/news/malgreen.pdf>). And salmon farmers in Norway have also been found guilty of illegally using malachite green:

“Malachite (green copper ore) is used, among others, in solutions against fungus on ova and juveniles salmonids. According to an overview from Norsk Medisinaldepot ASA, 27 kilos of malachite were used on Norwegian farmed fish in 2000. The figure for the previous year was 24 kilos, in 1998 23 kilos, in 1997 36 kilos. The top year was 1991 when a total of 114 kilos was used” (“Illegal medicine used in Norwegian marine farming: a medicine - use of which in marine fish farming is prohibited by both the EU Commission and Norwegian authorities for the past 18 months - has been used in Norway”: Intrafish, 3rd August 2001: <http://www.intrafish.com/articlea.php?articleID=14738>)

Given the increasing contamination of farmed salmon with malachite green across Europe (up from 9% in 2001 to 14% in 2002: see point 5), it is therefore extremely worrying that:

“No studies on the absorption, distribution, metabolism, or excretion of malachite green chloride or leucomalachite green in humans were found in a review of the literature” (p18: <http://ehp.niehs.nih.gov/ntp/docs/tr527/tr527Babs.pdf>)

The absence of human and consumer exposure studies is something that surely must be rectified as a matter of urgency.

#### **4) Lack of U.S. testing for malachite green residues in farmed salmon:**

It is worrying, however, that the United States do not even test farmed salmon for malachite green. According to The Oregonian (14<sup>th</sup> August 2003), “the FDA tests no incoming salmon for the fungicide” although “FDA officials said they expect to begin testing seafood for more drugs, including malachite green and ivermectin, later this year”

[http://www.oregonlive.com/news/oregonian/index.ssf?/base/front\\_page/1063454304187750.xml](http://www.oregonlive.com/news/oregonian/index.ssf?/base/front_page/1063454304187750.xml)).

According to The Oregonian:

“European countries this year seized dozens of tons of farmed salmon from Chile found to be contaminated with malachite green, a fabric dye banned in the United States since 1991 and suspected of causing cancer. But the United States imports thousands of tons of salmon from Chile without testing for malachite green, which also acts as a fungicide, and other chemicals used at foreign fish farms. It is unclear whether salmon tainted with such compounds is entering U.S. markets. Earlier this year, however, Canadian inspectors found malachite green in smoked salmon they believe was first imported to the United States and packaged here. And Northwest-based Costco, which annually sells more than 30 million pounds of mostly Chilean farmed salmon, said Friday that it will soon begin screening for the fungicide”

Moreover:

“The FDA tests less than one half of 1 percent of all imported foods for the few drugs it looks for, its records show. Example: More than 177,000 tons of seafood, 40 percent of it salmon, entered the United States through Seattle-area ports last year. That would fill almost 10,000 tractor-trailer rigs. But the FDA has 31 inspectors handling all imports, from lipstick to microwaves. They test fewer than 400 samples -- only some of them seafood -- for drugs. "We're spread pretty thin," a local FDA official said. The FDA allowed him to speak to The Oregonian only on the condition he not be named”

Furthermore:

“Limited controls on seafood allow its trade around the world, from one country to the next, before it ever goes on sale. That was underscored when officials in Canada screened imports for malachite green late last year and found smoked salmon from the United States with traces of the chemical. The salmon was probably farmed in another country, shipped to the United States without testing, smoked and sent to Canada, said Glenn McGregor, manager of seafood product inspection for the Canadian Food Inspection Agency. A West Coast processor smoked the salmon, he said. He would not identify the company. No Canadian farmed salmon contained malachite green, he said. About 40 percent of farmed salmon entering the United States last year came from Canada”

The vast majority of the rest (ca. 60 percent of all U.S. farmed salmon imports) comes from Chile where there are serious malachite green contamination problems. During 2003, for example, the European Commission have issued at least ten ‘Rapid Food Alerts’ for Chilean farmed salmon contaminated with malachite green:

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10<sup>th</sup> November 2003 (Week 46): (Information Notification) Malachite green in salmon from Chile (United Kingdom): [http://europa.eu.int/comm/food/fs/sfp/ras\\_week46\\_en.pdf](http://europa.eu.int/comm/food/fs/sfp/ras_week46_en.pdf)

12<sup>th</sup> August 2003 (Week 33): (Information Notification) Malachite green in frozen Atlantic salmon from Chile (Netherlands):

12<sup>th</sup> August 2003 (Week 33): (Information Notification) Malachite green in frozen Atlantic salmon and hake from Chile (Netherlands):

13<sup>th</sup> August 2003 (Week 33): (Information Notification) Malachite green in frozen Atlantic salmon from Chile (Netherlands):

[http://europa.eu.int/comm/food/fs/sfp/ras\\_week33\\_en.pdf](http://europa.eu.int/comm/food/fs/sfp/ras_week33_en.pdf)

9<sup>th</sup> July 2003 (Week 28): (Information Notification): Malachite green in frozen Atlantic salmon (*Salmo salar*) from Chile (Netherlands)

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[http://europa.eu.int/comm/food/fs/sfp/ras\\_week28\\_en.pdf](http://europa.eu.int/comm/food/fs/sfp/ras_week28_en.pdf)

19<sup>th</sup> March 2003: UK – Frozen Atlantic salmon fillets: Malachite green (Chile):  
Manufacturer: Sociedad Jimenez Guitierrez Y CIA Ltda – AP – No. 10658 (1 notification)

19<sup>th</sup> March 2003: UK – Frozen Atlantic salmon fillets: Malachite green (Chile):  
Manufacturer: Salmones Multiexport Ltda – AP – No. 10637 (2 notifications)

19<sup>th</sup> March 2003: UK – Frozen Atlantic salmon fillets: Malachite green (Chile):  
Manufacturer: Salmones Multiexport Ltda – AP – No. 10637 (2 notifications)  
<http://www.knt.no/Hadeland/RASFF%20monthly%20for%20products%20from%20third%20countries-2003.pdf>

More information on ‘Rapid Food Alerts’ issued by the European Commission can be found at: [http://europa.eu.int/comm/food/fs/sfp/ras\\_index\\_en.html](http://europa.eu.int/comm/food/fs/sfp/ras_index_en.html)

According to the Alaskan Journal of Commerce (29<sup>th</sup> September 2003):

“Chile is the world's second largest salmon farming nation after Norway, and last year exported more than 660 million pounds of salmon worth close to \$1 billion. Chilean imports to the U.S. have increased nearly 200 percent over the last five years, and accounted for 60 percent of all U.S. salmon imports” (“Japan cracks down on Chilean

farmed salmon after toxin found”:

[http://www.alaskajournal.com/stories/092903/fis\\_20030929012.shtml](http://www.alaskajournal.com/stories/092903/fis_20030929012.shtml)

### **5) Increasing malachite green contamination of farmed salmon in Europe:**

The trend for increasing malachite green contamination in farmed salmon sold in Europe is of serious public health concern. Data supplied by the EC’s Health and Consumer Protection Directorate in August 2003 show that malachite green contamination of farmed fish has risen from 9% in 2001 to 14% in 2002 (2001 figures first, 2002 figures second):

Austria: 0/20; 18/74  
Belgium: 5/70; 3/60  
Finland: 0/3; 2/39  
France: 21/316; 25/248  
Germany: 6/56; 6/84  
Greece: 0/8; 0/9  
Ireland: 0/9; 32/49  
Italy 0; not reported  
Luxembourg (no production): 0; 0  
Portugal: 0; 0/10  
Spain: 0/47; 0  
Sweden: 0/5; 1/5  
The Netherlands: 3/40; 2/25  
United Kingdom: 33/186; 16/141

I have since asked for the 2003 figures but it is clear from the current testing by the VMD in the UK that Scottish farmed salmon is still contaminated with malachite green – perhaps as much as 19% (see “Contaminated salmon on sale to public”: The Scotsman, 5<sup>th</sup> August 2003: <http://www.news.scotsman.com/topics.cfm?id=844672003&tid=15>).

### **6) Malachite green contamination in farmed salmon on sale in the U.S.:**

The contamination of farmed salmon sold in Europe begs the obvious question: what are the comparable figures of farmed salmon sold in the United States? Since ca. 60% of salmon sold in the United States is farmed in Chile the harsh truth could be that farmed salmon sold in the United States is even more contaminated than farmed salmon on sale in Europe. As The Oregonian (14<sup>th</sup> August 2003) states:

“At least two of the Chilean companies that had tainted salmon seized in Europe also export to the United States, federal records show”

([http://www.oregonlive.com/news/oregonian/index.ssf?/base/front\\_page/1063454304187750.xml](http://www.oregonlive.com/news/oregonian/index.ssf?/base/front_page/1063454304187750.xml))

Nor will the problem go away overnight. An expert at the UK's Veterinary Medicines Directorate told The Scotsman earlier this year (5<sup>th</sup> August 2003):

“Although the use of malachite green was banned in the UK last year, estimates indicate that we can expect to see residues up to around June 2006, and possibly for longer”  
 (“Contaminated salmon on sale to public”:  
<http://www.news.scotsman.com/topics.cfm?id=844672003&tid=15>)

In the meantime, what action is the United States taking to protect consumers (and fish farm workers)?

Finally, what proportion of farmed salmon sold in the United States exceeds the new 'Minimum Required Performance Limits'? A 2µg/kg limit was, according to the WTO, adopted at the end of November 2003 and comes into force in December 2004. A 'Notification' of the WTO's Committee on Sanitary and Phytosanitary Measures on 15<sup>th</sup> October 2003 stated that the EC proposed “to facilitate trade by setting European Community's harmonized minimum required performance limits (MRPLs) of 2 micrograms per kg (µg/kg) for the analytical determination of the sum of malachite green and leucomalachite green in the meat of fish from aquaculture”  
(<http://66.102.11.104/search?q=cache:84uYEjoiXeQJ:www.sfs.fi/standard/notifikaatiot/sps/eec219.doc+Document+SANCO/4163/2003&hl=en&ie=UTF-8> or <http://www.sfs.fi/standard/notifikaatiot/sps/eec219.doc>).

Many thanks. If you require any further information or clarification please do not hesitate to contact me directly or visit our web-site: <http://www.salmonfarmmonitor.org>