INTERNATIONAL
OIL POLLUTION
COMPENSATION
FUND

SEVENTH INTERSESSIONAL
WORKING GROUP
Agenda item 2

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SAMPLING OF CONTAMINATED FISH

Note by the Director

1 Introduction

1.1 In the light of the discussion concerning the destruction of the 1992 salmon intake in the BRAER case, the Executive Committee took the view, at its 36th session, that it would be useful if the Intersessional Working Group considered in depth the problems relating to the contamination of farmed fish and shellfish, in order to spell out the sampling and technical requirements to assess claims for compensation for destroyed fish (document FUND/EXC.36/10, paragraph 3.4.12). These issues are dealt with in the present document.

1.2 Following the AEGEAN SEA and BRAER incidents, the Executive Committee examined the question as to the admissibility of claims for compensation based on the destruction of farmed fish or shellfish as a result of orders issued by public authorities in the form of fishing bans and exclusion zones. It was considered that the fact that a government had imposed a fishing ban or exclusion zone should not be regarded as conclusive. The Executive Committee took the view that such claims should be admissible if and to the extent that:

- the destruction of the produce was reasonable on the basis of scientific and other evidence available

1.3 The Executive Committee stated that the following aspects should be taken into account when assessing whether the destruction was reasonable, ie whether:

- the produce was contaminated
- it was likely that the contamination would disappear before the normal harvesting time
- the retention of the produce in the water would prevent further production
- it was likely that the produce would be marketable at the time of normal harvesting

2 Tainting and Health Issues

2.1 Oil pollution may affect fishing and mariculture activity in several ways. The most common form of claims for compensation in respect of such activities relate to the interference with capture fishing. Fishermen whose boats, nets or other gear are oiled may be prevented from fishing and thereby suffer an economic loss until their equipment is cleaned, repaired or replaced. Mariculture operators may face similar interference, as well as damage to cultivated stock in the form of increased mortality, tainting or impaired growth. Other parts of the fisheries sector may also be affected through loss of market confidence in produce from a certain area perceived, rightly or wrongly, to have been contaminated by an oil spill. In this connection the importance of determining the presence or absence of taint in fishing and mariculture products is often crucial.

2.2 Where the edible parts of fish and shellfish become contaminated or tainted, either in mariculture facilities or, more rarely, in wild stocks, the question of whether such seafood is suitable for human consumption inevitably arises. The process of contamination of tissues and the development of taint is not precisely understood, but in broad terms some hydrocarbon components can be taken up through the gills from oil dispersed in sea water and are retained within the flesh. When water quality returns to normal, the hydrocarbon components within the flesh are progressively lost by a process known as depuration, returning in due course to background levels in a matter of weeks or months or occasionally longer, depending on the degree of taint, the species concerned and ambient temperatures.

2.3 As far as the IOPC Fund is aware, no country has laid down criteria for judging whether the presence of oil contamination presents any threat to public health. Polynuclear aromatic hydrocarbons (PAHs) have been a focus of attention because some of these compounds are known carcinogens. However, the particular PAHs in crude oil and distillates are almost all compounds of low or no potential for causing cancer. Scientific studies have shown that levels of such compounds found in fish and shellfish after oil spills are unlikely to be a health hazard, especially when compared to levels found in other common foodstuffs (eg smoked fish, meats and cabbage). Evidence from one recent crude oil spill indicated that the half-life for PAHs in fish tissues was about 12 days.

2.4 Little information is available on the concentrations of dispersed oil that result in tainting of fish exposed to contaminated water, but it is probably less than 0.1 mg/litre (100 ppb). It is not known which chemicals in petroleum are causing the oily taint but it is probably not those routinely measured in oil fingerprinting or other analyses. Fish and shellfish can still be tainted when hydrocarbon contents as measured by chemical analysis are at or below background levels. Thus, tainting is a sensitive indicator of contamination by oil, and seafood can still be tainted and *unfit* to eat even though it is *safe* to eat.

2.5 It should be appreciated that, aside from contamination by oil spills, many sea food products would constitute a potential health hazard if they were sold without any control. For example, in many parts of the world mussels are subject to strict cleaning procedures to reduce levels of pathogens (disease-causing micro-organisms) prior to being sold. In some countries the sale of mussels is banned at certain times of the year because it is known that the mussels contain potentially lethal toxins generated by a natural marine organism. In such an event, screening programmes on a limited number of samples are carried out to ascertain when the mussels are free of contamination and their sale can be resumed. Government authorities around the world recognise as a matter of course that, after a period of self-cleaning, products that were once unsuitable for sale can be fit to eat. It is submitted that a similar approach should be taken in respect of fish and shellfish affected by oil spills.

3 Taste Testing

3.1 It has not been possible to reproduce the complexity of the human sense of taste by the most elaborate analytical techniques. Nevertheless a simple taste test, conducted with proper controls to eliminate subjective effects, can establish the presence of taint conclusively and rapidly.

3.2 It is submitted that taste tests should be carried out by a taste panel in accordance with the following procedure which is based on procedures commonly used in previous cases of tainting:

- The panel should consist of 6–10 persons familiar with the product to be tested, and preferably impartial. Alternatively, the panel could be made up of representatives of all the interested parties in equal proportions. The panellists need not have any prior tasting experience.

- The panel should be composed of the same individuals throughout the monitoring of the taint, in order to ensure continuity and consistency.

- Both samples from an area affected by the oil spill ("suspect samples") and control samples from outside that area should be tested at the same time and preferably in equal numbers.

- Taste testing should be competently supervised and conducted in such a way that the panellists are not given any clues about the identity of the sample being tasted, ie whether suspect or control sample. Such a procedure is known as "blind" test.

- Procedures should be agreed before the test for evaluating and recording taint and for defining when a sample is classified as being tainted.

4 Fishing Bans and Exclusion Zones

4.1 Although oil can have toxic effects, or can taint a seafood product so that it becomes unpalatable for a period of time, evidence collected after previous spills indicates such effects to be rare in wild stocks. Consequently, in most cases, economic loss for fishermen catching wild stocks would be limited to the period whilst oil is present on the water surface in sufficient quantities to risk the direct contamination of fishing gear.

4.2 The presence of floating oil, the risk of contamination of gear, or the confirmed presence of taint can make it necessary to impose fishing bans or harvesting bans in order to reduce contamination of fishing gear or catch, or to prevent any potentially contaminated seafood products from reaching the consumer. When properly applied, fishing and harvesting bans serve an important function, but they can rapidly outlive their purpose. Hence rigorous monitoring is vital to ensure that such restrictions continue to meet their original aims. Obviously, such restrictions should not be imposed or maintained without proper justification.

4.3 Fishing bans imposed to prevent contamination of fishing gear or catch can generally be lifted as soon as the sea surface is free of visible traces of oil. However, restrictions imposed on the basis of proven tainting are likely to be more prolonged and will require careful monitoring to establish when the taint has disappeared. Very different conditions apply to the characteristics and probability of tainting in a population of free-swimming fish, as compared with farmed fish or a shellfish bed composed of stationary individuals. Bivalve shellfish, such as mussels and oysters, are filter feeders and so may be exposed to tainting for longer periods through ingestion of contaminated particulate material. In any event, a sampling programme with defined objectives will be necessary to determine the degree, geographical extent and duration of the problem.

4.4 There are some fundamental points to be considered when determining the statistical basis for lifting a fishing or harvesting restriction. As depuration progresses, contaminated and tainted organisms are encountered progressively less often in samples. A small sample from a large population will, in statistical terms, give a lesser degree of certainty that fish are untainted than a larger sample. Absolute certainty that there are no tainted fish would be obtained only by sampling every fish, which would clearly be absurd.

4.5 It is submitted that the reasonable approach should be to establish at what point in time a representative number of samples from the polluted area are no more tainted than an *equal number*

of samples from a *nearby* commercial outlet *outside* the area affected by the spill. This approach recognises that tainted samples (not necessarily due to oil spills) can occur in any population. The comparison of suspect and control samples is normally made using a so-called confidence test, which seeks to demonstrate statistically that there is at least 95% certainty that the two samples do not differ in terms of taint. The *confidence in accepting* that the fish or shellfish are clean and safe comes from an adequate time-series of monitoring data showing the progressive reduction in taint, and *not from* 'proof' that every fish is free from taint.

4.6 It is submitted that once the statistical tests show that there is no difference between the suspect and control samples, restrictions can be removed or the scope of the ban adjusted as produce from a distinct area or a particular species is shown to be free of taint. This type of approach has been used by the competent authorities with good results in managing bans on sales in instances where serious health hazards have arisen from contamination, for example, by natural algal blooms resulting in shellfish poisoning.

5 Action to be Taken by the Working Group

The Working Group is invited to:

(a) take note of the information contained in this document; and

(b) make such recommendations to the Assembly as to taint testing as the Working Group may deem appropriate.