CHAPTER 11

CONTROL OF MARINE BIOTOXINS

Shellfish areas on both the Atlantic and Pacific coasts of Canada have been affected by marine biotoxins. The toxins are produced by certain species of naturally occurring microscopic algae that bloom under favourable hydrographic conditions. Filter-feeding molluscan shellfish accumulate the toxins when utilizing toxic algae as a food source. The consumption of toxic shellfish can lead to illness and even death. The toxins do not kill the shellfish nor cause any discernible changes in the appearance, smell or taste of shellfish that would alert consumers of toxicity. As hydrographic conditions become less favourable, the bloom subsides and with time, shellfish rid themselves of toxin and are once again safe to eat.

Any filter feeding bivalve can acquire the toxins, and in Canada, many species of clams, oysters, mussels and scallops have been affected. The rates at which toxins are accumulated and eliminated varies with species. Also, animals that feed on bivalves may become toxic, and toxins have been detected in lobsters, crabs, and whelks and other predatory gastropods.

Canadian shellfish have been contaminated with three types of biotoxins: Paralytic Shellfish Poison (PSP), Amnesic Shellfish Poison (ASP) and Diarrhetic Shellfish Poison (DSP). The toxins are named for the most notable symptom they cause, i.e., paralysis, amnesia and diarrhea, respectively. No deaths have been recorded for DSP, but deaths have resulted from PSP and ASP intoxications.

Programs to monitor biotoxin levels and control the harvesting of toxic shellfish have been established. The Canadian Food Inspection Agency (CFIA) is responsible for collecting and analysing shellfish samples, and making recommendations for the opening and closing of shellfish areas to the Department of Fisheries and Oceans (DFO) which implements and enforces closures.

11.1 Program responsibilities and Reporting

The CFIA is responsible for overall program implementation while the Regional Inspection Divisions manage specific programs within their geographic limits, in cooperation

with DFO Fishery Officers responsible for enforcement and patrol.

Reports of all activities are centrally maintained at the Regional level. Because of the risk of serious illness and death, reports of suspected cases of poisoning are closely investigated. A Consumer Complaint Record (Annex 11A) is required to be completed for each person who may have been involved. Any incident is to be reported to the Regional Director, CFIA by telephone and followed as soon as possible with a detailed report, including a Consumer Complaint Record.

11.2 Sampling of Harvesting Areas

Each Fisheries Region has established sampling stations and frequencies to monitor changes in PSP and ASP.

DSP testing will only occur in suspect harvesting areas or as a result of consumer complaints where symptoms would indicate possible DSP intoxication. If no DSP related illnesses occur within a year of initial testing, an area would not remain defined as suspect and sampling could be discontinued.

The toxicity levels in shellfish vary depending on the location of the actual sampling site. It is important that sampling sites for monitoring toxicity levels be carefully chosen after a thorough analysis of toxicity score data.

The following conditions must be considered in site selection:

a) accessibility to the site at all times of the year;

b) the supply of shellfish available in a localised area;

c) a location which can be readily identified or marked; and

d) assessment of the site by past records of toxicity.

In order to maintain reliability of bioassay results, the period of time between the digging of shellfish and extraction should be uniform and limited. Each sample must be properly identified with the area of digging, the species, the date of digging and the sampling officer's name. Samples should be stored at refrigerated

temperatures 2 ° to 7 °C (35 ° to 45 °F) until extracted.

In the case of aquaculture operations, samples may be collected at the establishment if the same standards of continuity and sample handling are maintained.

Regions should have in place a monitoring program to adequately monitor marine biotoxins. As levels begin to rise, sampling frequency is to be increased in accordance with the speed of the rise to ensure timely closure. Areas that have been closed are to be monitored on a regular basis but with increased frequency as PSP scores decline toward acceptable levels. The objective is to ensure that shellfish areas are closed when:

i) PSP toxin levels reach 80 µg/100 g and are opened only when toxin levels are consistently below 80 µg/100 g;

ii) ASP toxin levels reach 20 µg/g and are opened only when toxin levels are consistently below 20 µg/g; and

iii) DSP chemical analysis gives okadaic acid and/or DTX-1, singly or in combination, of less than 1 microgram per gram (µg/g) of digestive tissue (equivalent to approximately 20 µg/100g soft tissue) and are opened only when consistently below this level.

Should departures from the scheduled sampling and/or analyses occur, due to weather conditions, absence of staff, diversion of sampling/analytical resources to areas of higher concern, then factors such as previous toxic history, harvesting activity and other supporting results should be considered and documented in a derogation report for the justification in not closing an area.

In addition to normal sampling, when certain species are used for canning (e.g., butter clams in British Columbia) a special Harvesting License (Annex 11B) is required, and the shellfish must be tested for PSP prior to release for sale.

11.3 Sampling from Processing Plants

As an additional safety measure samples are periodically taken for toxin analysis from plants processing shellfish. Shellstock shippers, shucker-packers and other registered shellfish plants are monitored and the following enforcement policy is applied.

a) Where a shellfish sample collected from a plant shows a PSP level ≥ 80 µg/100 g, and/or an ASP level ≥ 20 µg/g, and/or DSP chemical analysis gives okadaic acid and/or DTX-1, singly or in combination, of ≥ 1 microgram per gram (µg/g) of digestive tissue (equivalent to approximately 20 µg/100g soft tissue), the production lot should be detained if still available at the plant. If the lot is unavailable the inspector should consult with his/her supervisor on the need for a possible product recall. Any recalls should follow the appropriate CFIA Food Emergency Response Manual requirements. National Headquarters (National Manager, Product Inspection, and National Manager, Aquaculture and Shellfish Inspection) is to be advised with Regional recommendations and actions taken.

b) Recent results from the suspect harvest area should be reviewed and additional harvest area samples taken, if necessary, to determine if toxin levels have exceeded allowable limits. If limits have been exceeded then the area should be closed immediately.

c) Until such time as samples from the suspect harvest area are analysed, all production lots (originating from the suspect area) from all plants should be detained and sampled.

d) Should the harvest area samples be acceptable and there are no additional high results in samples from other plants, all efforts would be re-directed at the original plant. Detention and sampling shall continue at the original plant until three consecutive lots are shown to have less than 80 µg/100 g PSP or less than 20 µg/g ASP or DSP chemical analysis gives okadaic acid and/or DTX-1, singly or in combination, of less than 1 microgram per gram (µg/g) of digestive tissue (equivalent to approximately 20 µg/100g soft tissue).

e) If, throughout the fishing season there are five occurrences at a plant in which production had to be placed under detention as a result of lots being ≥ 80 µg/100 g PSP or ≥ 20 µg/g ASP, or DSP chemical analysis gives okadaic acid and/or DTX-1, singly or in combination, of ≥ 1 microgram per gram (µg/g) of digestive tissue (equivalent to approximately 20 µg/100g soft tissue), consideration will be given to taking further enforcement action under Section 10 of the Fish Inspection Act.

Note: For the purpose of this section each consecutive lot should be indicative of a "normal day's production". This would be equivalent to an average of the last 14 days' production.

In connection with in-plant toxin sampling, sea scallop processing deserves special mention. The adductor muscle of the sea scallop (Placopecten magellanicus) is free from toxin, however, the gonads and roe may be toxic. The marketing of sea scallops with roe attached is not permitted in the Bay of Fundy. In addition, all lots of sea scallops harvested in the Gulf of St. Lawrence, Northumberland Strait, George's Bank and other areas, and which are packed whole or with roe attached, are sampled for toxicity content prior to release for market. To ensure adequate control of this problem, fish processing plants must, prior to packing any scallop whole or with roe on, obtain special permission from the CFIA.

Note: The purple-hinged rock scallop (Crassedoma giganteum ≡ Hinnites multirugosus) accumulates PSP toxin in the adductor muscle.

11.4 Sample Priority

To ensure the timely analysis of samples, a system has been established to assist laboratory personnel in determining priorities for toxin analyses. The system is based upon immediate analysis of product that may go directly to the consumer.

Priority 1 - These are samples from a suspected illness, approved areas where toxicity may be increasing, samples that were delayed in analysis and from detained shellstock or fresh shucked product shipments. Samples are shipped by the most rapid means possible, are analysed immediately upon receipt and results are reported by telephone with mail or fax follow-up.

Priority 2 - These are samples from approved areas where levels are stable, closed areas which are showing changes, commercial lots of frozen products or heat-processed canned meats. Samples are shipped by regular means and are analysed within 24 hours of receipt.

Priority 3 - These are samples for research purposes, shipped by regular means and fitted into laboratory workloads.

11.5 Standards Applied and Procedures for Controlling Harvesting

A PSP toxin level ≥ 80 µg/100 g, or ASP toxin level ≥ 20 µg/g, or okadaic acid and/or DTX-1, singly or in combination, ≥ 1 microgram per gram (µg/g) of digestive tissue (equivalent to approximately 20 µg/100 g soft tissue) in a sample, will require the area from which the sample is taken to be closed. The area may be re-opened only when three consecutive acceptable values are obtained during a minimum period of 14 days, i.e., 1st sample on day 1 and the 3rd sample no earlier than day 14. Test results must contain < 80 µg/100 g PSP or < 20 µg/g ASP or okadaic acid and/or DTX-1, singly or in combination, of ≤ 1 microgram per gram (µg/g) of digestive tissue (equivalent to approximately 20 µg/100g soft tissue). In the past, grid samples taken at the end of the 14-day period have been found effective in some areas in reducing the likelihood of product having unacceptable biotoxin levels reaching the marketplace.

A closure or opening is implemented in the following manner.

a) Where mouse bioassay or chemical analysis results indicate an opening or closure is required, an order is prepared, under the Management of Contaminated Fisheries Regulations, for the signature of the Regional Director General (DFO) (see Appendix VII for details).

b) A news release is issued to local media. Departmental staff, fishermen's associations and shellfish processors are notified by telephone. All normal access points to the area are prominently posted with closure signs specifying the area affected or, closure signs are removed in the case of an opening.

c) Patrols are arranged to ensure effective closure.

As the canning process reduces PSP toxin, licences may be issued to harvest clams and mussels under the following specific criteria and conditions.

Soft shell clams and mussels (Atlantic) may be harvested

when PSP toxin levels exceed 80 µg/100 g and are less than 160 µg/100 g.

Butter clams on the West Coast may be harvested and canned, subject to the following conditions, when the PSP toxin levels (µg/100 g) are:

> 300 to ≤ 500 ..... entire siphon must be removed
> 80 to ≤ 300 .....distal half of the siphon must be removed
≤ 80 .....black tip of the siphon must be removed.

ANNEX 11A

Amend.no.1 25/03/94

INSTRUCTIONS FOR COMPLETING THE CONSUMER COMPLAINT RECORD

PLEASE PRINT ALL INFORMATION. WHEN NO INFORMATION IS AVAILABLE ENTER "N/A" (NOT AVAILABLE) IN THE BOX.

1. Enter the name of the Fisheries and Oceans laboratory or Inspection office and the region where the complaint was received.

2. Enter the date the complaint was received (e.g. Y/A 93 (1993); M 06 (June); D/J 15).

3. Enter the laboratory identification number. The ten-digit number is generated as follows:

   i) the first two digits identify the region and district where the complaint originated. The first digit is to indicate the region. The second digit should be zero (0) if the complaint was received at the Regional Office or the correct digit if the complaint was received in one of the area offices in the region.

i.e. Headquarters	NHQ	70
Newfoundland	NFLD	10
Scotia-Fundy	SCFU	20
Gulf	GULF	30
Central and Arctic	C+A	50
Pacific	PAC	60
Quebec	QUE	80

   ii) the third to eighth digits identify the date the complaint was recorded:

   - third and fourth digits - the year (e.g. 93)
   - fifth and sixth digits - the month (01 (January) to 12 (December))
   - seventh and eighth - the day of the month (01 to 31)

   iii) the ninth and tenth digits are used to indicate the number of the complaints in consecutive order as they are received each day (e.g. 50-930615-01 would mean the first complaint received by Central and Arctic regional office on the fifteenth of June, 1993).

   iv) trade complaints are to be identified by the addition of the letter T to the end of the consumer complaint number, (e.g. 50-930615-01T)

   If other than Canada, enter the country of origin in the

second part of box #3.

4. Check the box which indicates how the complaint was received. Did the consumer contact the department directly or was the complaint received through another department such as the Health Protection Branch (HPB) of Health Canada (HC), Industry Canada, a provincial ministry/department of health, etc.

5. If the complaint was received from another agency, enter the name and address.

6. Check if the complainant reported illness as a result of eating fish or fish products. If yes, complete the Supplementary Form for Suspected Food Poisoning (FP1580, reverse).

7. Print the complainant's name.

8. Print the complainant's home telephone number.

9. Print the complainant's home address.

10. Print the complainant's business telephone number.

11. Print the product brand name as printed on the product label.

12. Print the common name of the product including descriptive terms, noting the species name first (e.g. tuna chunk light, or shrimp peeled, deveined). Note packing medium (e.g. tuna chunk light vegetable broth).

13. Enter the net weight of the product package unit.

14. Enter the unit price of the item, or the retail price paid by the consumer.

15. Enter the manufacturer's container code placed on the packing carton or individual product package.

16. Identify the container pack type (e.g. canned, packaged, bulk).

17. Print the name and address of the manufacturer/distributor of the product as it appears on the product label. (If the manufacturer or distributor is also the responsible agent, enter "the same" on the form.)

18. Print the name and address of the dealer/vendor where the item was purchased.

19. Enter the date of purchase (e.g. Y/A 93 M 06 D/J 15).

20. Briefly describe the nature of the complaint, providing all pertinent details. If possible, the following terms should be used in the description:

    a) illness;
    b) odour/flavour;
    c) appearance;
    d) foreign material;
    e) extraneous matter;
    f) parasites;
    g) label;
    h) other.

21. Check if the original complaint sample was examined by Fisheries and Oceans personnel. Note under what conditions the sample was stored, e.g. unopened, frozen, refrigerated, etc.

22. Enter the date the sample was inspected or examined.

23. Check if additional sample units were taken for investigation from any of the locations listed. Note the number of additional samples taken and from where.

24. Record the results of the inspection of the original product and the additional sample units, providing observations, action and comments.

25. Check the method of communication used to advise the complainant of the inspection results.

26. The Inspector is to print his/her name and sign the form.

27. Record if the complaint was referred to the Regional Office, the distributor, the manufacturer, HPB, etc.

28. Enter the date the report was completed.

29. If illness was involved, complete the supplementary form for suspected food poisoning.

11	A-5	
New	31/03/92	

INSTRUCTIONS FOR COMPLETING THE SUPPLEMENTARY FORM FOR SUSPECTED FOOD POISONING

PLEASE PRINT ALL INFORMATION. WHEN NO INFORMATION IS AVAILABLE ENTER "N/A" (NOT AVAILABLE) IN THE BOX.

1. Enter the name of the Fisheries and Oceans laboratory or Inspection office and the region where the complaint was received.

2. Enter the date the complaint was received (e.g. Y/A 93 (1993); M 06 (June); D/J 15).

3. Enter the ten digit laboratory identification number (see Section 3, Appendix A of this chapter).

4. Enter the date the illness occurred (e.g. Y/A 93; M 06; D/J 15).

5. Enter the date the illness was reported (e.g. Y/A 93; M 06; D/J 15).

6. Record the number of people affected.

7. Record the total number of people that consumed the food containing fish or fish products.

8. Check the symptoms reported by the complainant. Print any other symptoms not listed but experienced by the complainant.

9. Indicate the length of time which elapsed from the time of eating to the time the symptoms occurred.

10. Indicate the length of time the illness lasted.

11. Check if a doctor was consulted.

12. Print the doctor's diagnosis.

13. Print the doctor's name, business address and business telephone.

14. Check where the food was eaten. If applicable, provide the name of the public establishment.

15. Check if the meal was catered.

16. Print: "see attached". On a separate page(s) list the complainant's 24-hour food recall noting all foods and beverages, including the food suspected of causing food poisoning, and all meals and snacks consumed immediately prior to the illness.

Note: Items 17 to 32 inclusive deal primarily with fish or fish products purchased and prepared at home or in a private residence.

17. Check the form in which the fish or fish product was purchased.

18. Indicate the period of time which elapsed from purchase to consumption (generally in hours for fresh product and in months for canned or frozen product).

19. Indicate the amount of time that elapsed following opening of the package until consumption.

20. Enter the cooking time in hours or minutes.

21. Enter the cooking temperature or microwave power level.

22. If frozen, indicate if the product was thawed prior to cooking.

23. Indicate how the product was thawed.

24. Describe how the product looked prior to cooking.

25. Record the size or approximate weight of the portions consumed.

26. Check if there was a noticeable "off" odour prior to cooking.

27. Record the method used for cooking, e.g. baking, broiling, frying, sautéeing, steaming.

28. Record the product odour when the food was served. The following examples may serve as a guide:

Taint - rancid, abnormal, contaminated;
Decomposition - fruity, vegetable, sour, yeasty fermented, ammonia, putrid or faecal.

29. Record in minutes, hours or days the time delay between cooking and serving.

30. Check if the product was refrigerated between cooking and serving.

31. Record in minutes, hours, days, etc., how long the product was refrigerated.

32. Check which ingredients were used in the food preparation. Note any special ingredients.

33. Check if a sample of the suspect product was collected for bacteriological or chemical testing.

34. Record the date the analysis was completed. (e.g. Y/A 93 M 06 D/J 15)

35. Summarise the results of the analyses indicating possible causative agents. Attach bacteriological and/or chemical work sheets, if available.

36. Evaluate the validity of the complaint and record action taken.

37. Enter the date of the report. (e.g. Y/A 93 M 06 D/J 06)

38. The officer finalizing the investigation is to print his/her name and sign the report.

ANNEX 11B

EXAMPLE

MOLLUSCS HARVESTING LICENCE

Pursuant to Section 4(1) of the Management of Contaminated Fisheries Regulations made under the Fisheries Act, permission is hereby granted to harvest_____ _____, for _____ _____ subject to the following conditions:

1) That the vessel and/or digger be duly registered with the Department of Fisheries & Oceans.

2) That the local Fishery Officer be advised when the molluscs are to be harvested.

3) That, in the case of harvesting for canning purposes, all molluscs be used for canning only, and are not to be sold as fresh.

4) That the identity of the molluscs harvested under this licence must be maintained at all times, from the time they are harvested until they are in possession of the buyer.

5) That the Licence be produced immediately for examination, upon demand by a Fishery Officer.

6) That this License will not be valid when PSP scores exceed _____ µg/100 g and/or when Domoic Acid scores exceed _____ µg/ g.

7) That the area of operation be _____.

8) That non-compliance with any of the conditions of this Permit or pertinent Regulations will result in its immediate cancellation (Section 9 of the Fisheries Act).

Issued at _____ this _____ day of _____ 19__

_____ _____

Holder Fisheries Officer