codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

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ALINORM 01/18

JOINT FAO/WHO FOOD STANDARDS PROGRAMME

CODEX ALIMENTARIUS COMMISSION
Twenty-fourth Session
Geneva, 2 – 7 July 2001

REPORT OF THE TWENTY-FOURTH SESSION OF THE CODEX COMMITTEE ON FISH AND FISHERY PRODUCTS

Bergen, Norway, 5 – 9 June 2000

Note: This document incorporates Circular Letter CL 2000/20-FFP

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CX 5/15 **CL 2000/20-FFP**
June 2000

TO: - Codex Contact Points
- Interested International Organizations

FROM: Secretary, Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, FAO, 00100 Rome, Italy

SUBJECT: **Distribution of the Report of the 24th Session of the Codex Committee on Fish and Fishery Products (ALINORM 01/18)**

A. MATTERS FOR ADOPTION BY THE 24th SESSION OF THE CODEX ALIMENTARIUS COMMISSION

Draft Standard at Step 8 of the Procedure

1. Draft Standard for Crackers from Marine and Freshwater Fish, Crustaceans and Molluscan Shellfish (para 108, Appendix II)

Governments wishing to propose amendments or comments on the above documents should do so in writing in conformity with the Guide to the Consideration of Standards at Step 8 (see Procedural Manual of the Codex Alimentarius Commission) to the Secretary, Joint FAO/WHO Food Standards Programme, FAO, via delle Terme di Caracalla, 00100 Rome, Italy **before 10 March 2001**.

Proposed Draft Standard at Step 5 of the Accelerated Procedure

2. Proposed Draft Amendment to the Standard for Canned Sardines and Sardine-Type Products (Inclusion of an additional species) (para. 15, Appendix III)

Governments wishing to submit comments on the implications which the Proposed Draft Amendment may have for their economic interests should do so in writing in conformity with the Accelerated Procedure for the Elaboration of Codex Standards to the Secretary, Joint FAO/WHO Food Standards Programme, **before 10 March 2001**.

Proposed Draft Standard and Code at Step 5 of the Procedure

3. Proposed Draft Code of Practice for Fish and Fishery Products (specific sections) (para. 82, Appendix V)

4, Proposed Draft Standard for Salted Atlantic Herring and Salted Sprats (para. 128, Appendix VI)

Governments wishing to submit comments on the implications which the Draft Amendment may have for their economic interests should do so in writing in conformity with the Procedure for the Elaboration of World-wide Standards at Step 5 to the Secretary, Joint FAO/WHO Food Standards Programme, FAO, via delle Terme di Caracalla, 00100 Rome, Italy **before 10 March 2001**.

B. REQUEST FOR COMMENTS AND INFORMATION

Draft Standards at Step 6 of the Procedure

5. Draft Standard for Dried Salted Anchovies (para. 96, Appendix IV)

Governments wishing to submit comments should do so in writing the Secretary, Joint FAO/WHO Food Standards Programme, FAO, via delle Terme di Caracalla, 00100 Rome, Italy, **before 15 March 2001.**

Proposed Draft Standards and Related Texts at Step 3 of the Procedure

6. Proposed Draft Standard for Live, Quick Frozen, and Canned Bivalve Molluscs (para. 135, Appendix VII)

Governments wishing to submit comments should do so in writing to Mr. A.L. de Kok, Ministry of Agriculture, Fisheries Department PO Box 2041, 2500 EK The Hague, Fax. +31 70 3786452, Email: a.l.de.kok@viss.agro.nl with a copy to the Secretary, Joint FAO/WHO Food Standards Programme, FAO, via delle Terme di Caracalla, 00100 Rome, Italy, **before 15 January 2001.**

7. Proposed Draft Model Certificate for Fish and Fishery Products (para. 140, Appendix VIII)

Governments wishing to submit comments should do so in writing to Mr. Geir Valset, Directorate of Fisheries, PO Box 185, 5804 Bergen, Norway, Fax. +47 55 238090, Email: geir.valset@fiskeridir.dep.telemax.no with a copy to the Secretary, Joint FAO/WHO Food Standards Programme, FAO, via delle Terme di Caracalla, 00100 Rome, Italy, **before 15 January 2001**

SUMMARY AND CONCLUSIONS

The summary and conclusions of the 24th Session of the Codex Committee on Fish and Fishery Products are as follows:

Matters for adoption by the Commission:

The Committee:

- advanced to Step 8 the Draft Standard for Crackers from Marine and Freshwater Fish, Crustacean and Molluscan Shellfish (para. 108, Appendix II)

- advanced to Step 5 of the Accelerated Procedure the Proposed Draft Amendment to the Standard for Canned Sardines and Sardine-Type Products (inclusion of an additional species: *Clupea bentincki*) (para. 15, Appendix III);

- advanced to Step 5 sections 1, 2 (partially), 3 to 6 and 13 of the Proposed Draft Code of Practice for Fish and Fishery Products and returned the other sections to Step 3 for redrafting and further comments (para. 82, Appendix V);

- advanced to Step 5 the Proposed Draft Standard for Salted Atlantic Herring and Salted Sprats (para. 128, Appendix VI)

Other matters of interest to the Commission:

The Committee:

- agreed to return to Step 6 the Draft Standard for Dried Salted Anchovies (para. 96, Appendix IV);

- agreed to circulate the Proposed Draft Standard for Live, Quick Frozen, and Canned Bivalve Molluscs at Step 3 (para. 135, Appendix VII);

- Agreed to circulate the Proposed Draft Model Certificate for Fish and Fishery Products at Step 3 (para. 140, Appendix VIII)[1];

- agreed that the Proposed Draft Standard for Smoked Fish should be redrafted to cover all types of smoked fish (para. 132);

- decided to proceed with the elaboration of a standards for scallops (para. 144) and an amendment to the Standard for Quick Frozen Lobsters in order to extend its scope to *Pleuroncodes monodon* and *Cervimundia johni* (para. 29);

- agreed to consider at its next session discussion papers on the following subjects: 1) fish content in fish sticks (para. 20) and 2) labelling requirements (name of the product) and the procedure for the inclusion of additional species (para. 13).

[1] Approved as new work by the 21st Session of the Commission (ALINORM 95/37, para. 85; ALINORM 95/4, Appendix II)

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INTRODUCTION

1) The Codex Committee on Fish and Fishery Products (CCFFP) held its Twenty-fourth Session in Alesund, Norway, from 5 to 9 June 2000, at the kind invitation of the Government of Norway. The Session was chaired by Dr Bjorn Rothe Knudtsen, Regional Director of Norwegian Directorate of Fisheries and Aquaculture, Trondheim. The Session was attended by 140 Delegates and Observers representing 43 Member States and 3 Observer Organizations. The complete list of participants is attached to this report.

OPENING OF THE SESSION

2) The Session was opened by Mr Peter Gullestad, Director General of Fisheries, who, on behalf of the Norwegian Minister of Fisheries Mr Otto Gregussen, welcomed the delegates and emphasized the importance of the work of the Codex Alimentarius Commission in general and the Committee on Fish and Fishery Products in particular. He pointed out that currently Codex texts covered both food safety and quality issues and were the main reference under the World Trade Organization Agreement on the Application of Sanitary and Phytosanitary Measures and the Agreement on Technical Barriers to Trade. Mr Gullestad indicated that in the context of expanded world trade and rapid communications, food legislation and control systems had to face new challenges. Noting the importance of the work of the Committee to ensure safety and quality of fishery products, he wished all success to the delegates.

ADOPTION OF THE AGENDA (Agenda Item 1)[1]

3) The Committee adopted the Provisional Agenda as the Agenda for the Session.

MATTERS REFERRED BY THE CODEX ALIMENTARIUS COMMISSION AND OTHER COMMITTEES (Agenda Item 2)[2]

Draft Amendment to the Standard for Canned Sardine and Sardine-Type Products Inclusion of *Clupea bentincki*

4) The Committee recalled that following the request of the 21st Session of the Commission to use the Accelerated Procedure for the inclusion of additional species to current standards, the 22nd Session of the Committee considered the inclusion of Clupea bentincki (proposed by Chile) in the Standard for Canned Sardines and Sardine-Type Products, according to the specific procedure for the inclusion of additional species, as follows. The 22nd Session considered the information provided in writing and appointed the laboratories, and the 23rd Session considered the results of the organoleptic tests, and forwarded the draft amendment to the Commission for adoption, in view of the results of these tests. The 23rd Session of the Commission recognized that there was no consensus on the adoption of the amendment and returned it to Step 3 for further consideration by the Committee.

5) The Delegation of Chile pointed out that Codex standards were intended for international trade and should include relevant species of commercial importance; they should not be limited to species from a specific region, in order to avoid discrimination and unjustified barriers to trade. The Delegation pointed out that all relevant taxonomical and economic information had been provided on Clupea bentincki and the laboratory tests conducted according to the procedure confirmed that it should be included as a sardine-type species.

6) This position was supported by several delegations, who pointed out that sardine and sardine-type species of commercial value existed in several regions, and stressed that *Clupea bentincki* should be included in the Standard. These delegations also stressed that the inclusion of species should be carried out on a scientific basis in order to avoid unjustified barriers to trade which especially affected the exports from developing countries. The Delegation of Indonesia proposed to include *Sardinella fimbriata* and *Sardinella longiceps* in the standard since these species are of commercial value in Asian countries. The Delegation of Peru, referring to *Sardinops sagax*, which was currently included in the standard as a sardine-type species, indicated that when the regulations of some countries differed from the Codex Standard, this created barriers in international trade.

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1 CX/FFP 00/1

2 CX/FFP 00/2, CX/FFP 00-2 Add.2 (Labelling of Fish Sticks), CX/FFP 00/2-Add.3 (comments of Morocco), CX/FFP 00/2-Add.4 (comments of Thailand, EC), CRD 5 (Brazil)

7) The Delegation of Morocco expressed its objections to the inclusion of *Clupea bentincki* in the standard for the following reasons: the procedure had not been fully respected since no samples from Morocco had been examined and the Committee had not agreed in advance on the criteria to be used by the laboratories. The addition of this species would create confusion for the consumer and in international trade, while significantly affecting the economic interests of Morocco. The Delegation indicated that the current standard included species which should not be considered as sardines, and their presence on the market created serious economic prejudice for Morocco and other exporter countries. The Delegation stressed that the current procedure should be reviewed, since organoleptic testing did not provide an adequate scientific basis and could result in the inclusion of many species which were not related to sardine into the standard.

8) This position was supported by the Delegations of Portugal, Spain and Italy, who stressed the need to consider economic implications and current commercial practices to ensure that the quality of sardines on the market was maintained and avoid consumer confusion.

9) As regards the pre-requisite in the current procedure concerning prior definition of the criteria, the Delegation of Germany recalled that the 22nd Session of the Committee had agreed on the mandate given to the laboratories and left them the choice of the sensory methods to be applied. Eventually they applied different methods and reached the same result. It was also noted that the Committee had invited all interested countries to submit samples to the countries carrying out the tests.

10) The Delegation of Spain expressed the view that the name of products should not be determined by their presentation and that the current standard allowed to present as "sardine-type" some products which were known as herring or anchovies when sold as fresh fish. The Delegation of France supported this point of view and pointed out that this was a general problem; it should be addressed through a review of the labelling provision in the standard and the procedure for the inclusion of additional species.

11) The Committee recognized that there were separate issues to be discussed: the inclusion of *Clupea bentincki* in the current Standard, which required action by the current Session, and the need to consider labelling requirements in the standard, and the review the current procedure, which should be considered as future work.

12) The Delegation of Morocco, supported by some other delegations, expressed the view that the Committee should not proceed with the inclusion of a new species until the questions of a general nature had been resolved and the procedure amended. Other delegations emphasized that the inclusion of *Clupea bentincki* should not be held until such time as a new procedure could be established; the current procedure had been applied and its results should be respected, since no new element had been put forward to change the decision.

13) As regards the need to review the current procedure for the inclusion of species, the Committee agreed that the Delegation of France would prepare a discussion paper considering the issues of labelling requirements concerning the name of the product, in view of the need for consistency across Codex standards, and the need to reexamine the current procedure. Interested countries were invited to send their contribution to the Delegation of France to assist in the preparation of the paper, which would be considered by the next session of the Committee

14) As regards the inclusion of *Clupea bentincki*, the Committee agreed with the proposal of the Chairman that as there were no new elements since the last session, the Committee should confirm its earlier decision on the basis of the current procedure, and forward the Proposed Draft Amendment to the Commission for adoption.

Status of the Proposed Draft Amendment to the Standard for Canned Sardine and Sardine-Type Products - Inclusion of *Clupea bentincki*

15) The Committee agreed to forward the Proposed Draft Amendment to the 24th Session of the Commission for adoption at Step 5 of the Accelerated Procedure (see Appendix III). The Delegations of Morocco, Portugal, Spain, Italy, Tunisia, France and Switzerland expressed their opposition to this decision in view of the arguments put forward in the above discussion.

Labelling of Fish Sticks

16) The Committee recalled that the 23rd Session of the Commission had returned to Step 6 the Draft Amendment to the Standard for Quick Frozen Fish Sticks on the declaration of fish core, for consideration by the Committee on Food Labelling for labelling requirements and by the CCFFP for technical aspects. The Secretariat informed the Committee that the last session of the Committee on Food Labelling (May 2000) had agreed in principle that the declaration of fish content should be included in the labelling section and asked the CCFFP to consider a definition of "fish content" and the method for its determination, in order to allow for the finalization of the Draft Amendment.

17) The Delegation of the United Kingdom presented a discussion paper considering different issues related to the definition of fish content and proposed that it should be determined by chemical analysis based on nitrogen content. The Delegation also proposed that the Code of Practice should be amended to include GMP requirements necessary to diminish the loss of nitrogen and excessive uptake of water during fish processing.

18) Several delegations expressed the view that the determination of nitrogen content would create practical difficulties for regulatory agencies, and that even when GMP were followed in the production process, significant variations could be observed, due to natural differences in nitrogen content in species of fish. In addition, the application of a strict nitrogen limit would significantly limit the number of fish species which could be used for the production of fish sticks. It was also proposed to clarify the practical implications of the change from "fish core" to "fish content", as related to consumer information.

19) The Observer from the EC expressed the view that other species should be included in the Tables proposed in the working paper, on the basis of the results obtained in the countries and that all important species for international trade should be listed.

20) The Committee agreed that a Working Group coordinated by the United Kingdom and including Canada, Germany, Norway, South Africa and the United States would proceed with work on the questions related to the declaration of fish content, in order to propose a definition and a method of analysis for consideration by the next session of the Committee.

Methods of Analysis and Sampling

Quick Frozen Fish Sticks: Proportion of Fish Fillet and Minced Fish

21) The Committee noted that there were no new performance data available on the WEFTA method and reconfirmed its decision to use the above method in the standard with the amendment proposed by the Delegation of South Africa.

Quick Frozen Fish Sticks: Proportion of Fish Flesh in Fish Sticks (Fish Core)

22) The Committee decided to confirm the necessity of adjustment factors and referred them back to the Committee on Methods of Analysis and Sampling (CCMAS) for endorsement.

Determination of Salt in Salted Fish of the *Gadidae* Family

23) The Committee recalled that the CCMAS had not endorsed a proposed specific method for the determination of salt content developed by the Delegations of Germany and Norway, as collaborative study data was not available at that time. The Delegation of Germany informed the Committee that the results of two collaborative trials were already available, therefore the Committee decided to refer the proposed method back to the CCMAS for endorsement.

OTHER MATTERS

24) The Representative of WHO informed the Committee about the 53rd Session of the World Health Assembly held in May 2000. The Assembly resolution requested the Director General of WHO to enhance food safety work especially in the following areas:

- Better disease burden estimate;
- Microbiological risk assessment;
- Public health advice on foods derived from Biotechnology;
- Technical support; and
- Codex.

25) The Representative indicated that food safety became one of the priority areas within WHO and that WHO in cooperation with FAO had undertaken major initiatives in Microbiological Risk Assessment. It was pointed out that the last Session of the Codex Committee on Food Hygiene had identified a list of most important foodborne pathogens and commodity combinations and that three pathogen/commodity combinations i.e. *Salmonella* in broilers and eggs and *Listeria monocytogenes* in ready to eat foods including smoked fish, were selected for risk assessment by the Expert Consultation. The Representative informed the Committee that there would be a Workshop on Hazard Characterization (Bilthoven, June 2000) with the aim of developing practical methodology on Hazard Characterization and a Joint FAO/WHO Expert Consultation on Risk Assessment of Microbiological Hazards (July 2000). The Committee was also informed that a Joint FAO/WHO Expert Consultation on Biotechnology had been held from 29 May-2 June 2000, in order to provide scientific advice to the Intergovernmental *Ad hoc* Task Force on Foods Derived from Biotechnology.

INCLUSION OF ADDITIONAL SPECIES IN THE STANDARDS FOR FISH AND FISHERY PRODUCTS: CHILEAN LANGOSTINO (Agenda Item 3)[3]

26) The Committee recalled that at the request of its 23rd Session the Delegation of Chile provided a document containing the background information concerning commercial importance in international trade and taxonomical characteristics of the species *Pleuroncodes monodon* and *Cervimundia johni* for the purpose of elaborating of a specific standard for Chilean langostinos.

27) While considering this matter it was indicated that the above species were of commercial importance and that the name "Chilean langostinos" was not acceptable due to linguistic problems. Some langostinos were already included in the Codex Standards for Canned Shrimps and Prawns and for Quick Frozen Shrimps and Prawns under different names, and langostinos themselves were widely distributed across geographical regions under various names.

28) Some delegations were of the opinion that those species were quite distinct from lobsters therefore a specific standard for *Galatheidae* should be developed. Other delegations while recognizing morphological and taxonomical differences of those species supported their inclusion in the current standard, which already included a wide range of species and indicated that those differences could be addressed by clear specific provisions in the Labelling and other relevant sections of the current Standard for Quick Frozen Lobsters.

29) The Committee agreed that the Standard for Quick Frozen Lobsters should be amended to include both species i.e. *Pleuroncodes monodon* and *Cervimundia johni* subject of approval as new work by the 24th Session of the Codex Alimentarius Commission. It also agreed that the Delegation of Chile would provide a proposed draft amendment including the amendments to be made to the title and relevant sections, including labelling, for consideration by the next session of the Committee.

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[3] CX/FFP 00/3; CX/FFP 00/3-Add.1 (comments of Spain, Peru); CX/FFP 00/3-Add.2 (Ecuador); CRD 5 (Brazil)

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS (Agenda Item 4)[4]

30) The Committee recalled that the last session had decided that the codes which had not been considered so far would be revised and integrated into the single code, in order to cover all fish and fishery products. A Working Group including the lead countries and other interested countries had met in London in 1999, in order to complete the integration of all relevant sections into the revised document. The Delegation of the United Kingdom introduced the Proposed Draft and outlined the main changes made to the earlier version. The " How to Use this Code" section was expanded in order to make the Code more "user-friendly" and the document became more pragmatic in its approach. Some sections were rearranged: e.g. the Prerequisite Section was expanded to identify those GHP technical guidelines that were specific to fish and shellfish. Section 3 was redrafted to reflect the essential elements required prior to initiating hazard and defect analyses, with some items removed from the previous Section 5. Section 4 has become the new Section on the application of HACCP and DAP; Section 5 was rewritten and the "control boxes" were removed from processing sections as there was general agreement to avoid unnecessary prescriptive guidance in the Code.

31) The Committee expressed its appreciation to the United Kingdom, the Drafting Group and the lead countries for their considerable work and recognized that the revised text was now much closer to finalization. The Chairman indicated that for practical reasons it would not be possible to examine the entire Code in detail at the present session and proposed to concentrate on those sections which had been developed more thoroughly, and which had not called for extensive substantial comments. The Committee agreed to consider the general sections (1 to 5) and Section 6 Fresh Frozen and Minced Fish in detail as a first stage, and proceed with Section 13 Canned Fish and Section 14 Frozen Surimi if time allowed.

General aspects

32) The Delegation of Spain, referring to its written comments, stressed the need to separate clearly the aspects related to health protection and those concerning quality, and proposed to divide the code into two parts for this purpose. It was also pointed out that the relationship between the technical guidance provided in the processing sections and the General Principles of Food Hygiene, including the HACCP system should be clarified.

33) The Delegation of Thailand expressed its concerns about the emphasis on the use of HACCP principles to control defects, although this was optional. Defects could be interpreted differently and result in excessive demands for control and documentation where it was not necessary. This would lead to a demand for a HACCP based control programme, not only for product safety but also for quality and economic fraud. Therefore the Delegation suggested that steps for developing DAP should be removed from the main text and presented as an Annex to the Code. The Committee agreed that the current format should be retained and that clarification should be provided where necessary to avoid confusion. The Committee also agreed that a clearer separation between sections related to pre-harvest operations and processing would be appropriate to improve clarity and user-friendliness.

Section 1. Scope

34) The Delegation of Vietnam pointed out that 'production' was not clearly defined and that the code should cover all stages up to the final consumer, especially transportation and retail. The Committee agreed to retain production, which was applied especially to fish farming, and to add processing, transportation and retail in the scope to make it more complete.

Section 2. Definitions
2.1 General Definitions
2.2 Fresh Frozen and Minced Fish
2.9 Canned Fish

35) The Committee agreed that the definition of Clean Sea Water should be expanded to include all types of water (seawater, brackish and freshwater) and that the term "clean water" should cover "water from any source where microbiological contamination, harmful substances and/or toxic plankton are not present in such quantities as may

[4] CX/FFP 00/4; CX/FFP 00/4-Add.1 (comments of Brazil, Canada, Israel, New Zealand, United States); CX/FFP 00/4-Add.2 (comments of Spain); CX/FFP 00/4-Add.3 (comments of Mexico, EC); CX/FFP 00/4-Add.4 (Poland); CRD 3 (Indonesia); CRD 4 (Thailand); CRD 5 (Brazil); CRD 6 (United States); CRD 10 (Denmark).

affect the health quality of fishery products". Consequential amendments were made to all relevant sections by replacing "sea water" with "water".

36) The Committee agreed that the definitions of Cleaning, Contamination and Disinfection should correspond to those used in the General Principles of Food Hygiene. The definition of Control measures was amended to include the prevention of hazards, in addition to their elimination. The definitions of Decomposition and Defect Action Point (DAP) were reworded for clarification purposes. The Committee agreed to refer to "Biotoxins" in general instead of "Marine Biotoxins". The definition of Hazard Analysis was added with the wording included in the General Principles of Food Hygiene. In the definition of shelf life a reference to chemical safety was added to microbiological contamination in order to cover all types of hazards.

37) As regards the definition of Fresh Fish, the Committee discussed the need to add provisions concerning shelf life; it was however recognized that the definition did not describe the quality of the product but should only reflect that no treatment other than chilling had been applied. It was also agreed to use the general term "fish and fishery products" for consistency with the rest of the text.

38) In the definition of *Frozen Fish*, the Committee had an exchange of views on the need to specify the temperature required for frozen fish. A temperature of - 18°C was proposed but it was noted that for brine frozen fish this value was not relevant. As it was recalled that the Standard for Quick Frozen Finfish, Eviscerated and Uneviscerated addressed the question of the temperatures of frozen fish, the Committee agreed to refer to the relevant standard in the definition.

39) As regards the definitions for Canned Fish, it was noted that only the definitions relevant to the current Code and used in section 13 were included in section 2.9

Section 3. Pre-Requisite Programme

40) The Committee agreed to refer to "food safety" instead of safety in this section and wherever applicable throughout the text. A reference to the fact that HACCP principles could be applied to defect action points was added at the end of the introductory section.

41) In section 3.1.2 it was agreed that hand washing and toilet facilities, isolated from the fish handling area, should be available on the vessels "where possible", taking into account that is was not practical for small vessels.

42) The Delegation of South Africa indicated that containers with a fitted lid could be required for offal and waste which did not originate from fish; however this was not practical in the case of fish waste which was continuously disposed off and a distinction should be made between the types of containers used. The Committee had an exchange of views on this question and agreed that this requirement applied "where appropriate" and would depend on the type of waste.

43) The first sentence of section 3.1.4 was amended to clarify that the section applied only to the transport of live fish from aquaculture to processing facilities, when harvested with seines or nets. It was also noted that transport of dead fish would be covered in the relevant processing section.

44) While discussing section 3.2, the Representative of WHO pointed out that the use of the term "facilities" in the text differed from the General Principles of Food Hygiene, which referred to the "Establishment: Design and Facilities". The Secretariat recalled that the Committee on Food Hygiene had recommended to follow the layout of the GPFH and ensure consistency with their provisions. The Representative of FAO indicated that the surroundings of the processing facility should also be taken into account in order to prevent contamination.

45) In section 3.2.2, as regards ventilation, a reference to cross-contamination by aerosols was added. At the end of the section, an additional provision was included to the effect that "water supply should be fitted with a back flow device where appropriate".

46) The introductory paragraph of Section 3.3 concerning equipment and utensils was amended for clarification purposes. The provisions on the implementation of schedules (section 3.4.2) was transferred to the introductory paragraph of section 3.4 Hygiene Control Programme. An additional step to "check the efficiency" of cleaning was added in section 3.4.1. Section 3.5.2 Personnel Hygiene was partially reordered to separate the specific provisions on hand-washing.

47) In section 3.6 Transportation, the Committee noted some proposals for amendment but recalled that the section described only the design and construction of the vehicle, not the conditions of transportation, which would be addressed in Section 17. It was agreed that the reference to protection from contamination and exposure to extreme temperatures adequately covered relevant hazards.

48) In section 3.7 Traceability and Recall Procedures, the Observer from the EC, supported by some delegations, proposed to require the indication of the country of origin on containers and packages in order to ensure the traceability. Other delegations indicated that, for the purposes of inspection, official authorities referred to the information provided in the certificate but that the indication of country of origin would create several practical difficulties. In addition the determination of the country of origin or production was subject to different interpretations according to national legislation. The Committee also recalled that the GPFH required the identification of the producer and the lot for the purposes of identification and recall, and referred to the General Standard for the Labelling of Prepackaged Foods as regards labelling, but did not require the declaration of origin.

49) After an exchange of views the Committee agreed on the following marking requirements, in order to ensure traceability: "each container intended for the final consumer or for further processing should be clearly marked to ensure the traceability of the producer and the lot".

50) The Committee discussed the proposal of the Delegation of New Zealand to replace the current Section 3.8 Training with the corresponding section of the General Principles of Food Hygiene. It was noted that the current section included requirements on the training on HACCP, which did not appear in the GPFH. The Committee however agreed to retain the section as currently drafted.

Section 4. General Considerations for the Handling of Fish and Fishery Products

51) The Committee agreed with the proposal of the Chairman to reorder the sections for clarification purposes including all biotoxins under Biological Hazards, since some of them were included under Chemical Hazards, and the section was renumbered accordingly.

52) In the introductory section, the Committee agreed with the proposal of New Zealand that fish and shellfish which were found unfit for human consumption could be either reworked or disposed of. In section 4.1.1.1 Parasites, it was agreed that brining would reduce the parasite hazard if the product is kept in brine long enough, but that it may not eliminate it.

53) In section 4.1.1.2 Bacteria, reference was made to bacteria that are 'normally or incidentally' present in the aquatic environment since this was the case in particular for *Listeria monocytogenes*. In section 4.1.1.4 (now section 4.1.1.3), the Committee agreed that viral contamination was not limited to the harvesting area and that other sources of contamination should be controlled during processing.

54) In the section on Chemical Hazards, it was agreed to include the hazards related to organochlorine compounds (e.g. dioxins and PCBs), veterinary drugs (instead of antibiotics) and contamination by detergents and residues of disinfectants when incorrectly eliminated.

55) In the section on Phycotoxins, the Committee included a reference to Amnesic Shellfish Poisoning (ASP) and Neurotoxin Shellfish Poisoning (NSP), and a separate section on Tetradotoxin in Tetraodontidae (puffer fish).

56) As regards Ciguatoxin, the Representative of FAO pointed out that the ban in trading of such fishery products was not the only effective control measure. Other criteria should be taken into account like seasonal and species variability, geographical location and the size of fish. The Committee agreed that ban in trading was 'one of the control measures'. Other editorial or limited changes were made to the sections for the purposes of clarification.

Section 5. HACCP and DAP Analysis

57) In section 5.1, the Committee agreed that the seven HACCP principles should be included in their entirety in view of their importance and since the Code was a stand-alone document. The Delegation of New Zealand proposed to delete the additional Step 13 concerning the Review of the HACCP Plan since it was part of Step 11 Establish Verification Procedure in the basic HACCP plan. The Delegation of the United Kingdom pointed out that an external review of the entire plan was required in practice, and this was different from the regular review of the different steps within the logical sequence. The Committee noted that the addition of a new step would entail a

reconsideration of the current HACCP sequence in the General Principles of Food Hygiene, and such a change would require detailed consideration in the Committee on Food Hygiene.

58) After an exchange of views, the Committee agreed that a new section (5.3.11) would clarify that upon completion of all the steps a full review of HACCP and DAP plans should be conducted to verify that these plans achieved their expected objectives; this would also be reflected in the diagram, but not as a separate step.

59) In section 5.3, the Delegation of Finland indicated that in the case of aquaculture it would be preferable to refer to good aquaculture practice than to HACCP. The Committee noted that the question of pre-harvest conditions would be further considered and that hazard analysis could be conducted in the case of aquaculture.

60) As regards the identification of hazards, the Committee agreed that individual establishments should gather scientific and technical data 'where practical and feasible' and list all relevant potential hazards, as proposed by the Delegation of Thailand.

61) The Committee agreed that Table 5.2 referred to examples of hazards and the title was amended accordingly. Biological toxins were included in biological hazards, as previously agreed, and other amendments were made for clarification purposes. As regards pathogenic bacteria, the reference to the strain of *E.coli* was deleted and the other examples were retained.

62) In Table 5.4, it was noted that the second column should describe the nature of the hazard involved, and the presence of foreign material was included as a physical hazard in raw material.

63) Section 5.3.4 Significance of Hazards and Defects was reworded as proposed by the Delegation of the United States to determine the significance of hazards in relation to the severity of the adverse health effect and its probability and decide accordingly whether the application of HACCP was warranted.

64) Table 5.6 was amended to describe the hazard (Clostridium *botulinum*: viable spores), to specify that the product should be commercially sterile and that the control measures was 'to ensure adequate heat applied for proper time at retort'. A similar amendment was made to Table 5.8. Table 5.7 (example of defect) was reworded to indicate as a Justification that the product does not meet quality or customer requirements. In Table 5.9 some control measures were deleted since they were already covered in the pre-requisite programme.

65) In section 5.3.6 it was agreed that the effectiveness of critical limits related to controlling the hazard or defect 'to the determined level'. Section 5.3.9 was amended to clarify that verification activities should be carried out by competent personnel, and to include relevant examples. A reference to documentation was added to the title of section 5.3.10 on record keeping procedures.

66) In table 5.10, the checks of sterilization schedule were transferred to the Verification column (instead of Monitoring Procedure), and the 'Corrective Action' column was corrected to describe the personnel involved and its action. The Conclusion was amended, as proposed by the Delegation of New Zealand to reflect that the process, the objectives of the process, its environment and agreed outcomes should be assessed; and that the example illustrated how to apply the principles in terms of an agreed outcome.

Section 6. Processing of Fresh, Frozen and Minced Fish

Section 6.1 Finfish Preparation

67) In section 6.1.1 information about the harvesting area was added as one of the relevant characteristics in the 'technical guidance'. As regards Sensory Evaluation (6.1.1.1) a reference to the Guidelines for the Sensory Evaluation of Fish in Laboratories was included and it was agreed to replace 'evaluation charts' with 'evaluation criteria' used to evaluate the acceptability of fish. In Section 6.1.2 Chilled Storage, it was agreed that fish should be stored with ice or with a mixture of ice and water.

68) In section 6.3.1 the provisions concerning rejection of fish (7th bullet point) were deleted since this should have occurred before reaching this stage, and a similar amendment was made to section 6.3.2

69) Some additional amendments were made to section 6.4 Processing of Minced Fish (defects description) and to Section 6.5 Packaging Labels and Ingredients, for clarification purposes.

Section 13. Processing of Canned Fish and Shellfish

70) In section 13.1 Addition to the pre-Requisite Programme, the provisions concerning the devices used for handling containers (bullets one and three) were combined into a single paragraph, and 'retort controls' was replaced with 'steam controller valves'.

71) The section on Hazards was reorganized under biological hazards, chemical hazards and physical hazards. As regards *Clostridium botulinum*, inadequate container integrity was added to inadequate heat processing as one of the hazards to be considered. The physical hazards were identified as metal or glass fragments found in the containers.

72) In section 13.3.5.1 Fish Preparation, Clostridium botulinum was deleted from the list of hazards since it was not relevant at that stage and microbiological contamination and histamine were retained.

73) In section 13.4 Pre-Cooking and other treatments, it was specified that temperature abuse of scombrotoxic species should be avoided (at the end of 13.4.6.1). A reference to the Codex standards for fats and oils was included in square brackets in relation to the control of quality of Pre-Cooking Oils.

74) In section 13.4.7.1.Filling, its was agreed that 'a representative number of containers' should be inspected before filling, to clarify that such inspection was not systematic for all containers. Further requirements were added to section 13.4.3 Coding in order to prevent damage to the container in the coding operation.

75) In section 13.4.8 Handling of Containers after closure, the reference to a specific temperature was deleted and replaced with 'temperature conditions that minimize microbial growth'. In section 13.4.9.2 Heat Processing Operation, it was agreed that the process should be sufficient to provide commercial sterility to different sizes of cans, when they were processed together.

76) In section 13.4.10 Cooling, provisions for the prevention of contamination for heat processed canned fish and shellfish were transferred from section 13.4.12 (now 13.4.11) As regards monitoring the application of stability tests was left as optional.

General Conclusion

77) The Committee noted that due to time constraints it had not been possible to consider the section on Frozen Surimi, although it was also in an advanced stage. It was noted that some sections which had been added to the code more recently would need further elaboration and that the sections on Aquaculture and Molluscan Shellfish, which included pre-harvest requirements had not been discussed in detail so far.

78) The Committee expressed its appreciation for the considerable carried out by the Working Group and co-ordinating countries in the redrafting of the code since the last session, which had allowed for substantial progress at the session. In view of the progress made and the consensus reached on the sections considered, the Committee agreed that Sections 1, 2 (2.1, 2.2 and 2.9), 3 to 6 and 13 should be forwarded to the Commission for adoption at Step 5.

79) As regards the other sections, the Committee agreed that the Working Group composed of the co-ordinating countries would proceed with their revision, as follows: Netherlands (Molluscan Shellfish), Japan/USA (Frozen Surimi), Norway (Salted Fish), Denmark (Smoked Fish), Mexico (Shrimps and prawns), Brazil (Lobsters and Crabs), New Zealand (Cephalopods), Germany/USA (Frozen Coated products, FAO/WHO (Aquaculture).

80) In addition, the Delegations of France and the United States agreed to develop respectively the sections on Transportation and Retail, which required further elaboration. The Delegation of the United States asked for assistance from other countries, especially on activities such as auctioning and wholesaling. The Delegations of Thailand, Netherlands, Norway, Ireland offered to participate in the work on aquaculture, and the Delegations of Morocco and South Africa in the work on transportation. The lead countries, FAO and WHO invited all interested countries to provide their contribution to their respective work on the code.

81) The Committee agreed that the overall coordination would be ensured by the United Kingdom, France and Canada, as a Drafting Group that would consolidate the submissions from the co-ordinating countries and revise the remaining sections as required for consideration by the next session of the Committee.

Status of the Proposed Draft Code of Practice for Fish and Fishery Products

82) The Committee agreed to forward the Proposed Draft Code, sections 1, 2 (2.1, 2.2 and 2.9), 3 to 6 and 13 to the 24th Session of the Commission for adoption at Step 5 (see Appendix V), with the understanding that it would be forwarded to the Committee on Food Hygiene for endorsement. The other sections were returned to Step 3 for redrafting and further consideration by the next session.

DRAFT STANDARD FOR DRIED SALTED ANCHOVIES (Agenda Item 5)[5]

83) The Committee recalled that this standard had been developed initially by the Coordinating Committee for Asia and was forwarded by the Executive Committee to the CCFFP for finalization. The Committee discussed the Draft Standard section by section and made the following changes.

Section 1. Scope

84) The Committee amended the Scope to clarify that the Draft Standard did not cover products of " enzymatic maturation in brine" as proposed by the Delegation of France; clarified the intended use as proposed by the Delegation of Malaysia; and deleted the reference to processing as it was covered by the following section.

Section 2.2 Process Definition

85) The Committee accepted the proposal by the Delegation of Thailand to clarify provisions regarding the usage of boiling water and replace "salt water" by "brine or clean sea water".

86) In order to be consistent with other standards for fishery products, the Section on Packing was moved to this Section and amended in order to include packing requirements to prevent oxidation.

Section 2.3 Handling Practice

87) In order to address the formation of the toxin of *Clostridium botulinum*, the Committee decided to insert a warning sentence regarding the timing of the drying process, as follows: "the drying process must be sufficiently controlled to preclude the formation of *Clostridium botulinum* toxin".

88) The Delegation of Brazil stressed the need to eviscerate fish of a size superior to 6.5cm to avoid risks to human health and proposed to include this requirement in the standard.

Section 3.2 Final Product

89) The Committee noted that the wording of Section 3.2.1 was different from other standards and for the purpose of consistency decided to use the wording of *the Standard for Quick Frozen Fish Sticks (Fish Fingers) and Fish Portions and Fish Fillets - Breaded or in Batter* with reference to sections on Examination, Sampling and Analysis, Defectives, and Lot Acceptance.

90) The Representative of FAO drew the attention of the Committee to the fact that distinction should be established between breakage and belly burst due to the risk of histamine.

Section 3.4 Decomposition

91) The Committee had an extensive debate regarding the role and the level of histamine as a quality indicator in this section. The Delegation of Thailand drew the attention of the Committee to the fact that there was no section on decomposition in the standards under development and that histamine related to quality is not an appropriate

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[5] ALINORM 99/18 Appendix IV; CX/FFP 00/5 (comments of Canada, France, Malaysia, Poland); CX/FFP 00/5-Add.1 (comments of USA); CX/FFP 00/5-Add.2 (comments of Thailand, Mexico, EC); CRD 4 (comments of Thailand); CRD 5 (comments of Brazil); CRD 8 (comments of Denmark).

indicator for these products. Therefore it was not practical to have two levels of histamine in one standard, for quality and for safety, and this section should be deleted. This view was supported by the Delegations of Indonesia and Vietnam.

92) The Observer from the EC pointed out that the provision of 10mg/100g of histamine was very important as a decomposition indicator for those products and the need for two levels of histamine was well substantiated scientifically. This view was supported by some other delegations.

93) The Delegation of Norway referred to the Proposed Draft Standard for Salted Herring with "enzymatic maturation" in brine and questioned whether histamine was adequate as a quality indicator in all Codex standards.

94) The Chairman noted that the provision for histamine had been included at the last session for consistency with the standard for sardines and sardine-type products, which covered species of the same family (Engraulidae).

95) The Committee noted that it was not possible to reach consensus on the level of histamine as a quality indicator for dried salted anchovies at this stage and therefore decided to adjourn the consideration of the Draft Standard at this session. The Committee agreed that this matter would be subject to further discussion by its next session, on the basis of additional information.

Status of the Draft Standard for Dried Salted Anchovies

96) The Committee agreed that the Draft standard as amended during the present session would be returned to Step 6 for further comments, especially on the Decomposition section and also sections which were not discussed, for consideration by the next session of the Committee (see Appendix IV).

DRAFT STANDARD FOR CRACKERS FROM MARINE AND FRESHWATER FISH, CRUSTACEAN AND MOLLUSCAN SHELFISH (Agenda Item 6)[6]

97) The Committee recalled that the draft standard had been prepared initially by the Codex Coordinating Committee for Asia, and forwarded to the CCFFP for further elaboration after its adoption at Step 5 by the Executive Committee in 1996.

98) The Committee was invited to focus the discussion especially on whether the Scope should be restricted to single material/ingredient; whether the standard should contain grades or only minimum requirements; how to deal with packaging; and the incorporation of new sections proposed by Malaysia. The Committee reviewed the standard section by section and made the following amendments.

99) The Delegation of Malaysia proposed to limit the Scope to single ingredient products only. The Delegation of Thailand pointed out that this standard should not be limited to high protein products only. Most Delegations supported the elaboration of a more general Standard as there were various types of crackers on the market. The Committee agreed that the Scope should not be limited to single ingredient products and that relevant consumer concerns could be addressed in the Labelling section.

Section 2.1 Product Definition

100) The Committee was of the opinion that the reference to "snack" before "food" was rather unnecessary as a description of food, therefore it was deleted.

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[6] ALINORM 99/18 Appendix V, CX/FFP 00/6 (comments of Malaysia and Poland); CX/FFP 00/6-Add.1 (comments of USA); CX/FFP 00/6-Add.2 (comments of Malaysia and EC); CRD 4 (comments of Thailand)

Section 2.2 Process Definition

101) The reference to phosphates as food ingredients was deleted as proposed by the Delegation of Germany because they belonged in the Additives Section.

102) In order to be consistent with its previous decision concerning the Standard for Dried Salted Anchovies, the Committee decided to move the Section on Packing to this section with the same wording.

Section 3.2 Optional Ingredients

103) For the sake of consistency the Committee accepted the proposal of the Delegation of Canada to use the wording currently used in other relevant standards.

Section 4 Food additives

104) The Committee agreed that polyphosphates were used for this type of fishery products as "sequestrants" with the maximum level in the final product of 5g/kg expressed as P_2O_5 (singly or in combination) and therefore made the relevant substitution in this section, subject to endorsement by the Codex Committee on Food Additives and Contaminants. The Committee noted that Monosodium glutamate was already included in Table 3 of the General Standard for Food Additives.

Section 4 Hygiene

105) The Committee replaced the current Food Hygiene provisions by those approved by the 23rd Session of the Commission and used for commodity standards, as contained in the 11th edition of the Procedural Manual, while maintaining the reference to the Recommended International Code of Practice for Fresh Fish (CAC/RCP 9-1976).

Section 7 Labelling

106) The Committee accepted the proposal of the Delegation of the United Kingdom, supported by some other delegations, that the use of scientific names in this section would have no real value for the consumer and therefore decided to delete this section and renumbered the subsequent sections accordingly.

Other Sections

107) The Committee noted that some sections such as sensory assessment, definition of defectives or lot acceptance were missing from the Draft Standard and accepted the proposal of the Delegation of Malaysia to insert them as presented in document CX/FFP 00/5-Add.2.

Status of the Draft Standard for Crackers from Marine and Freshwater Fish, Crustacean and Molluscan Shellfish

108) The Committee agreed to advance the Draft Standard to Step 8 for final adoption by the 24th Session of the Commission (see Appendix II).

PROPOSED DRAFT STANDARD FOR SALTED ATLANTIC HERRING AND SALTED SPRATS (Agenda Item 7)[7]

109) The Committee recalled that the last session had agreed to include sprats in the scope of the standard and noted that further discussion would be required on hygiene aspects, sampling and analysis. The Committee considered the text section by section and made the following amendments.

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[7] ALINORM 99/18, Appendix VII, CX/FFP 00/7 (comments of Canada, Poland); CX/FFP 00/7-Add.1 (comments of United States, EC); CRD 3 (comments of Indonesia); CRD 4 (comments of Thailand); CRD 5 (comments of Brazil); CRD 7 (comments of Denmark).

Section 1. Scope

110) The Committee agreed that the Scope should include the list of products which were excluded from the standard and the relevant paragraph was transferred from section 2.1.

Section 2.2 Process Definition

111) The Delegation of Indonesia, referring to earlier discussions on the safety of dried salted anchovies, stressed that evisceration should be required for salted herring since the fish was much larger and intended for direct consumption, which significantly increased health hazards for consumers. The Delegation of Germany pointed out that evisceration would change the nature of this traditional product, which had a long history of safe consumption.

112) After an exchange of views, the Committee agreed with the proposal of the Chairman to use the same wording as in the standard for dried salted anchovies, indicating that the salting process should be sufficiently controlled to prevent the development of *Clostridium botulinum*. The Delegation of Brazil expressed the view that in order to ensure health protection, evisceration should be generally requested, especially since it was technically feasible for salted herring.

Section 2.2.2 Types of salted fish

113) Some delegations indicated that heavily salted fish was not currently found on the market and proposed to delete this category. After an exchange of views, the Committee agreed to retain the current types, since they corresponded to current practice in several countries, and to add a new category 'Very lightly salted fish' containing less than 4 g of salt /100g (water phase).

Section 2.2.4 Storage Temperatures

114) The Committee discussed the need to clarify the requirements for refrigerated or frozen storage according to the type of product concerned. The section was revised to reflect that the time/temperature combination should ensure the safety and quality of the product.

Section 3 Essential Composition and Quality Factors

115) The Committee agreed with the proposal of the Delegation of Canada to include a new section 3.4 Decomposition to address histamine as a quality factor and specify a maximum level of 10mg/100g. As pointed out in the discussion on histamine as a quality indicator for salted anchovies, the Delegation of Norway questioned whether histamine was adequate as a quality indicator in all Codex standards (see also para. 93).

Section 4. Food Additives

116) Some delegations pointed out that the additives currently listed in the standard did not correspond to current use and the Committee agreed to delete them.

117) The Secretariat informed the Committee that the following additives were included in the adopted or draft sections of the General Standard for Food Additives (GSFA), for use in the food category which included salted fish[8]

Colours

143 Fast Green FCF 100 mg/kg (adopted)

Antioxidants

310 Propyl Gallate 200 mg/kg (Step 8)

Preservatives

210-213Benzoates 200 mg/kg (Step 6)

[8] Category 09.2.5: Smoked, dried, fermented, and/or salted fish and fish products, including mollusks, crustaceans, and echinoderms

118) The Delegation of Israel pointed out that colours were not allowed in salted fish and the Committee noted that since several colours might be ultimately included in the GSFA for use in different fishery products, this question would require further consideration. The Committee recalled that the GSFA established additive levels on the basis of food categories which included several types of foods, as in the case of salted fish. The Committee agreed to ask the advice of the Committee on Food Additives and Contaminants to address the situation where an additive allowed in a food category of the General Standard with a maximum level was not allowed in a particular product within that category.

119) The Committee agreed to include the above mentioned additives in the text, for further comments and consideration at the next session.

Section 5. Hygiene and Handling

120) The Committee agreed to replace general provisions with the new section on food hygiene included in the Procedural Manual, and to add specific references to the relevant Codes of practice.

121) The Committee had an exchange of views on the presence of Nematodes. Some delegations pointed out that no visible larvae should be accepted, and that the product should be frozen to kill nematodes in general. Other delegations proposed that the determination of the viability of nematodes be carried out first before deciding on the treatment. The Committee agreed to amend section 5.2 to reflect that no obvious infestation was allowed, that when the presence of living nematodes was confirmed (method in Annex I), the product must not be marketed unless treated in accordance with the procedures described in Annex II.

Section 7. Sampling, Examination and Analysis

122) The Delegation of Germany indicated that a study on a method to check the viability of nematodes, carried out in cooperation with Denmark, would soon be finalized and could be used for inclusion in the standard as Annex I.

123) The Committee noted that the reference for the determination of histamine had been updated and that the determination of salt content (Annex III) was the same as in the Standard for Salted Fish of the *Gadidae* Family.

124) The Committee welcomed the offer of the Delegation of Norway to elaborate methods of analysis for water content (Annex IV), net weight and drained weight.

Section 8. Definition of Defectives

125) Some delegations noted that this section included provisions relating both to hygiene and to quality; however the Committee recalled that the determination of defectives was not particularly related to quality 'defects', but addressed compliance with all provisions in the standard.

126) In section 8.1.2 Parasites, defectives were defined by 'the presence of visible parasites in a sample unit detected by visual inspection', in the light of the earlier decision on the presence of nematodes. Section 8.1.3 on Living Larvae of Nematodes was consequently deleted.

127) The Committee expressed its appreciation to the Delegations of Germany and Norway for their work on this standard and recognized that substantial progress had been made on the Proposed Draft, especially on complex issues related to the safety of the product.

Status of the Proposed Draft Standard for Salted Atlantic Herring and Salted Sprats

128) The Committee agreed to forward the Proposed Draft to the 24th Session of the Commission for adoption at Step 5 (see Appendix VI).

PROPOSED DRAFT STANDARD FOR SMOKED FISH (Agenda Item 8)[9]

129) The Chairman, while introducing the matter recalled that due to time constraints it was not possible to examine the Proposed Draft Standard in detail and invited the Committee to concentrate only on general issues: clarifying the Scope as regards the inclusion of hot smoked fish; and whether the Scope should be limited to certain species or cover all relevant species, as this would facilitate the elaboration of the standard in the future.

130) The Delegation of South Africa expressed the view that the Scope should cover all hot smoked fish and offered assistance in the further elaboration of the Proposed Draft. This general approach was supported by the Delegation of Germany, other delegations and the Observer from the EC.

131) The Delegation of the Netherlands drew the attention of the Committee to the fact that liquid smoking was not permitted in some countries and that it was difficult for consumer to differentiate among types of smoking. The Delegation proposed to include liquid smoking in the Scope and also offered assistance in the elaboration of the standard. The Delegation of France pointed out that the technologies involved were very different, as were the criteria for safety and quality, which would require careful consideration.

Status of the Proposed Draft Standard for Smoked Fish

132) The Committee agreed that the Scope should be more general and should cover both cold and hot smoking without excluding specific species and that clarification on the integration of liquid smoking into the Scope should be addressed. The Committee agreed to return the Proposed Draft Standard to Step 3 for redrafting by the Delegation of Denmark, with all interested Member Countries, for further consideration at the next session of the Committee.

PROPOSED DRAFT STANDARD FOR MOLUSCAN SHELLFISH (Agenda Item 9)[10]

133) The Delegation of the Netherlands introduced the document and indicated that the Scope had been narrowed down to cover bivalve molluscs, fresh, canned and frozen.

134) The Committee expressed its appreciation to the Delegation of the Netherlands for the preparation of the Proposed Draft Standard and noted that due to late reception of the document Member Governments were unable to send their comments.

Status of the Proposed Draft Standard for Live, Quick Frozen and Canned Bivalve Molluscs

135) The Committee agreed to circulate the attached Proposed Draft Standard at Step 3 for government comments and redrafting by the Delegation of the Netherlands, and for consideration by the next session of the Committee (see Appendix VII).

MODEL CERTIFICATE FOR FISH AND FISHERY PRODUCTS (Agenda Item 10)[11]

136) The Committee recalled that the last session had discussed the essential elements to be included in the certificate and agreed that the Delegations of Norway and Canada should proceed with their work in this area. The Committee noted that the Committee on Food Import and Export Inspection and Certification Systems had forwarded to Step 5 Proposed Draft General Guidelines for Generic official Certificate Formats and the Production and Issuance of Certificates, which would provide useful guidance in the current work on fishery products. However, the CCFICS would not be working on the establishment of model certificates covering the requirements for specific commodities.

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9 CX/FFP 00/8; CX/FFP 00/8-Add.1 (comments of Canada, Spain, USA, EC); CX/FFP 00/8-Add.2 (New Zealand, Thailand); CRD 2 (comments of Thailand); CRD 5 (comments of Brazil); CRD 9 (comments of Denmark).

10 CX/FFP 00/9; CRD 5 (comments of Brazil).

11 CX/FFP 00/10 CRD 5 (comments of Brazil); CRD 7 (comments of Denmark).

137) The Delegation of Norway, supported by other delegations, stressed the difficulties faced by exporting countries due to the multiplicity of certificates from one importing country to another. In order to solve this problem, it would be desirable to develop a standard certificate that could refer to Codex standards and Codes of Practice.

138) Some delegations and the Observer from the EC expressed the view that the certificate should not be too generic in practice, but needed to refer to the requirements of the importing country since the exporter had to comply with the legislation of the country of destination. In addition, the importing country had to take into account the specific situation in the exporting country.

139) Some delegations pointed out that the Attestation section should be further developed, that the reference to laboratories could be taken into account, and that the need for certificates covering specific requirements should further discussed. Several countries informed the Committee of their experience in the harmonization of requirements and certificates and proposed to contribute to the work in this area.

Status of the Proposed Draft Model Certificate for Fish and Fishery Products

140) The Committee noted that the document had not been circulated for comments due to time constraints and agreed that it should be circulated at Step 3 for comments[12]. Governments were invited to provide comments especially on the Attestation section and the certification requirements, to allow the Delegations of Norway and Canada, with the assistance of interested countries, to revise the text for consideration by the next session if necessary.

DISCUSSION PAPER ON THE DEVELOPMENT OF A STANDARD FOR SCALLOPS (Agenda Item 11)[13]

141) The Delegation of Canada while introducing the document informed the Committee that the review of world trade statistics data during the last years indicated a constant increase in trade of scallop meat as expressed per net weight of the product as well as in number of countries engaged in trade. The Delegation also outlined major issues that could be taken into account while deciding whether developing one or two standards for the above products: accumulation of marine biotoxins, use of sodium tripolyphosphate as a food additive, accumulation of moisture and use of bovine fibrinogen to bind pieces of scallop meat.

142) The Committee had an exchange of views regarding the elaboration of one or two standards. The Delegation of France pointed out the differences existing between the species concerned and supported the elaboration of separate standards for molluscs and for scallop meat. This approach was supported by some other delegations. The Delegations of Canada, France, Ireland, Japan, and Thailand expressed their willingness to participate in the elaboration of the Proposed Draft Standard for Scallops. The Delegation of France drew the attention of the Committee to the existence of a significant trade of scallop muscle with roe and expressed the view that the inclusion of this product in the standard should be considered.

143) The Delegation of Denmark indicated that the scientific data regarding the contamination of scallop muscle with biotoxins were limited and that the addition of bovine fibrinogen to this product might create misunderstanding among consumers. The Delegation was of the opinion that the title of the standard needed clarification and that it was important to assure the traceability of fibrinogen.

144) The Committee agreed to initiate the elaboration of a standard for scallops as new work, subject to approval by the Commission. All interested Member Governments were invited to participate in the drafting of the above standard led by Canada.

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12 This had been approved as new work by the 21st Session of the Commission (ALINORM 95/37, para. 85; ALINORM 95/4, Appendix II)

13 CX/PR 00/11; CRD 1 (comments of EC); CRD 2 (comments of Mexico); CRD 8 (comments of Denmark).

DISCUSSION PAPER ON THE DEVELOPMENT OF A STANDARD FOR STURGEON CAVIAR (Agenda Item 12)

145) The Committee was informed that the Delegation of the Russian Federation had not been able to attend the meeting and that no paper was made available for consideration by this session of the Committee. Further action on this matter would be determined as new information become available.

DISCUSSION PAPER ON THE USE OF CHLORINATED WATER (Agenda Item 13)[14]

146) The Representative of WHO introduced the discussion paper which attempted to address two major issues: risks to consumers' health that may result from chlorine by-products arising from elevated levels of chlorine in water used for washing fish and fishery products; and gaps in knowledge concerning current practices at industry level in different countries. The Representative indicated that fish handling practices varied from country to country and from region to region. Chlorinated water up to 10mg/l was widely used in the fish processing sector, in direct contact with fish to prevent microbiological contamination and ensure the relevant sanitation. The Representative concluded that while additional work in this area was recommended, current scientific evidence did not warrant the change of the Codex recommended level of 10mg/l for water in direct contact with fishery products.

147) The Observer from the EC and some Delegations expressed the view that further risk assessment should be conducted in order to determine benefits of the use of elevated levels of chlorine in the fish industry. It was pointed out that the use of potable water, application of good manufacturing practices and the HACCP System fully ensured hygienic production of fish products.

148) The Delegation of Brazil supported by other delegations pointed out that chlorine was very commonly used in the world as a disinfectant in order to reduce contamination, especially in developing countries, and that there were no scientific evidence of health hazards regarding its use at the current levels. This position was supported by several delegations, who concurred with the conclusion presented in the document.

149) The Committee agreed to accept the conclusion of the document and concluded that no further action was necessary on this matter

OTHER BUSINESS, FUTURE WORK AND DATE AND PLACE OF THE NEXT SESSION (Agenda Item 14)

150) The Committee noted that, as a result of the discussions at the current session, the next session would consider the following items:

- Code of Practice for Fish and Fishery Products (Draft and Proposed Draft Sections)
- Draft Standard for Dried Salted Anchovies
- Draft Standard for Salted Atlantic Herring and Salted Sprats
- Proposed Draft Standard for Smoked Fish
- Proposed Draft Standard for Live, Quick Frozen and Canned Bivalve Molluscs
- Proposed Draft Standard for Scallops
- Proposed Draft Model Certificate for Fish and Fishery Products
- Proposed Draft Amendment to the Standard for Quick Frozen Lobsters (to include *Cervimundia johni* and *Pleuroncodes monodon*)

[14] CX/FFP 00/13 Document prepared by WHO with cooperation of FAO; CRD 1 (comments of European Community); CRD 3 (comments of Indonesia); CRD 5 (comments of Brazil).

- Discussion paper on the procedure for the inclusion of additional species and on the labelling requirements related to the "name of the product" in Codex standards

- Discussion paper on Fish Content in Fish Sticks

Date and Place of the Next Session

151) The Committee noted that the next Session was tentatively scheduled to be held in Norway in the Spring of 2002, the exact arrangements to be finalized by the host country and the Codex Secretariat.

152) Several delegations indicated that it would be useful to consider the possibility of holding more frequent meetings of the Committee, in view of the considerable workload and especially the importance of the work on the Code of Practice for governments. It was also noted that additional meetings would put additional pressure on the resources of member countries. The Committee noted that the practical implications of holding the next meeting before the Spring of 2002 would be further considered by the host country and the Codex Secretariat.

SUMMARY STATUS OF WORK

Subject Matter	Step	Action by	Document Reference in ALINORM 01/18
Draft Standard for Fish Crackers	8	Governments 24th CAC	para. 108 Appendix II
Inclusion of additional species (Proposed Draft Amendment to the Canned Sardines Standard)	5[15]	Governments 24th CAC	para. 15 Appendix III
Draft Standard for Dried Salted Anchovies	6	Governments 25th CCFFP	para. 96 Appendix IV
Proposed Draft Code of Practice for Fish and Fishery Products (sections 1, 2.1, 2.2, 2.9, 3 to 6 and 9)	5	Governments 24th CAC	para. 82 Appendix V
Proposed Draft Code of Practice for Fish and Fishery Products (other sections)	3	Governments 25th CCFFP	para. 82
Proposed Draft Standard for Salted Atlantic Herring and Salted Sprats	5	Governments 24th CAC	para. 128 Appendix VI
Proposed Draft Standard for Live, Quick Frozen and Canned Bivalve Molluscs	3	Governments 25th CCFFP	para. 135 Appendix VII
Proposed Draft Model Certificate for Fish and Fishery Products	3	Governments Norway/Canada 25th CCFFP	para. 140 Appendix VIII
Proposed Draft Standard for Smoked Fish	3	Denmark Governments 25th CCFFP	para. 132
Proposed Draft Amendment to the Standard for Quick Frozen Lobsters	1/2/3	Chile Governments 25th CCFFP	para. 29
Proposed Draft Standard for Scallops	1/2/3	Netherlands Governments 24th CCFFP	paras. 95-96

[15] Accelerated Procedure

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DRAFT STANDARD FOR CRACKERS FROM MARINE AND FRESHWATER FISH, CRUSTACEAN AND MOLLUSCAN SHELLFISH

(At Step 8 of the Procedure)

1. SCOPE

This standard shall apply to crackers prepared from marine and freshwater fish, crustacean and molluscan shellfish. It does not include ready-to-eat fried as well as artificially flavoured fish, crustacean and molluscan shellfish crackers.

2. DESCRIPTION

2.1 PRODUCT DEFINITION

The product is a traditional food made from fresh fish or frozen minced flesh of either marine (including both the red meat and white meat species) or freshwater fish, crustacean (including prawns and shrimps) and molluscan shellfish (including squids, cuttlefish, oysters, clams, mussels and cockles) as described in section 3.1 and other ingredients as described in section 3.2.

2.2 PROCESS DEFINITION

2.2.1 The product shall be prepared by mixing all the ingredients, forming, cooking, cooling, slicing and drying.

2.2.2 The product shall be packed in a suitable packaging material which is moisture proof and gas impermeable. It shall be processed and packaged so as to minimize oxidation.

2.3 HANDLING PRACTICE

Fresh marine and freshwater fish, crustacean and molluscan shellfish shall be preserved immediately after harvesting by chilling or icing to bring its temperature down to 0°C (32°F) as quickly as possible as specified in the Recommended International Code of Practice for Fresh Fish (CAC/RCP 9-1976) and kept at an adequate temperature to prevent spoilage and bacterial growth prior to processing.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 RAW MATERIAL

Fresh marine and freshwater fish, crustacean and molluscan shellfish shall mean freshly caught, chilled or frozen marine and freshwater fish, crustacean and molluscan shellfish. Frozen minced flesh shall mean freshly caught, chilled or frozen marine and freshwater fish, crustacean and molluscan shellfish which has been appropriately processed. The marine and freshwater fish, crustacean and molluscan shellfish shall have a characteristic fresh appearance, colour and odour.

3.2 OTHER INGREDIENTS

Other ingredients shall be of food grade quality and conform to all applicable Codex Standards.

3.3 OPTIONAL INGREDIENTS

The product may contain sugar as well as suitable spices.

3.4 FINAL PRODUCT

3.4.1 The product shall display a uniform size, shape, colour, thickness and texture.

3.4.2 The product shall comply with the requirements prescribed in Table 1.

Table 1 : Requirements for Crackers From Marine and Freshwater Fish, Crustacean and Molluscan Shellfish

Characteristics	Grade	Fish	Crustacean and Molluscan Shellfish
Crude protein (N x 6.25), percent w/w min.	I	12	8
	II	8	5
	III	5	2
Moisture content, percent w/w	I	)	)
	II	) 8 to 14	) 8 to 14
	III	)	)

4. FOOD ADDITIVES[1]

Additives		Maximum Level in the Final Product
Sequestrants		
	Polyphosphates	5g/kg expressed as P_2O_5 in single or in combination
Flavour enhancers		
621	Monosodium glutamate	Limited by GMP

5. HYGIENE

5.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1985, Rev 2-1997), and the Recommended International Code of Practice for Fresh Fish (CAC/RCP 9 - 1976).

5.2 The products should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

6. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985 Rev 3 -1999), the following specific provisions apply:

6.1 THE NAME OF THE FOOD

The name of the product from marine and freshwater fish shall be "Fish Crackers" and those from crustacean and molluscan shellfish shall depict the common name of the species, like "Prawn Crackers" or "Squid Crackers".

6.2 GRADES

When declared by grade, the package shall declare the grade as prescribed in Table 1.

6.3 ADDITIONAL REQUIREMENTS

The package shall bear clear directions for keeping the product from the time it is purchased from the retailer to the time of its use and directions for cooking.

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[1] Subject to endorsement by the Codex Committee on Food Additives and Contaminants.

7. SAMPLING, EXAMINATION AND ANALYSIS

7.1 SAMPLING

Sampling of lots for examination of the products shall be in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (1969) (AQL-6.5) (Ref.CAC/RM 42-1977).

7.2 DETERMINATION OF CRUDE PROTEIN

According to AOAC 920.87 or 960.52.

7.3 DETERMINATION OF MOISTURE

According to AOAC 950.46B (air drying).

7.4 SENSORY AND PHYSICAL EXAMINATION

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance with Annex A.

8. DEFINITION OF DEFECTIVES

The sample unit shall be considered defective when it exhibits any of the properties defined below:

8.1 FOREIGN MATTER

The presence in the sample unit of any matter which has not been derived from materials specified in section 3.1, 3.2, 3.3, does not pose a threat to human health and is readily recognized without magnification that indicates non-compliance with good manufacturing and sanitation practices.

8.2 ODOUR AND FLAVOUR

Unfried crackers affected by persistent and distinct objectionable odours and fried crackers affected by persistent and distinct objectionable flavours indicative of decomposition (such as putrid), or contamination by foreign substances (such as fuel oil and cleaning compound).

8.3 BONES

Crackers with more than one bone greater than 3 mm in diameter and 5mm in length that affects more than 25% of the sample unit.

8.4 DISCOLOURATION

Pronounced black, whitish or yellowish discolouration indicative of mould or fungal growth on the surface of crackers that affects more than 10% of the sample unit.

9. LOT ACCEPTANCE

A lot shall be considered as meeting the requirements of this standard when:

1. the total number of defectives as classified according to Section 8 does not exceed the acceptable number of the appropriate sampling plan in the Sampling Plans for Prepackaged Foods (1969) (AQL-6.5) (Ref.CAC/RM 42-1977).
2. the average net weight of all sample units is not less than the declared weight, provided no individual container is less than 95% of the declared weight; and
3. the Food Additives, Hygiene, Packing and Labelling requirements of Section 4, 5, 2.2 and 6 are met.

"ANNEX A" SENSORY AND PHYSICAL EXAMINATION

The sample used for sensory evaluation should not be same as that used for other examination.

1. Examine the sample unit for foreign matter, bones and discolouration.

2. Assess the odour in the uncooked sample in accordance with the Guidelines for the Sensory Evaluation of Fish and Shellfish In Laboratories (CAC/GL 31-1999).

3. Assess the flavour in cooked sample in accordance with the Guidelines for the Sensory Evaluation of Fish and Shellfish In Laboratories (CAC/GL 31-1999).

The sample shall be deep-fried in fresh cooking oil at 190°C for 20-60 seconds as appropriate to the thickness of the crackers.

PROPOSED DRAFT AMENDMENT TO THE STANDARD FOR CANNED SARDINES AND SARDINE-TYPE PRODUCTS
(At Step 5 of the Accelerated Procedure)

2. Description
2.1 Product Definition

2.1.1 Canned sardines or sardine type products are prepared from fresh or frozen fish of the following species:

Clupea bentincki[2]

[2] To be added to the current list

DRAFT STANDARD FOR DRIED SALTED ANCHOVIES

(At Step 6 of the Procedure)

1. SCOPE

This standard shall apply to all commercial species of fish belonging to the family *Engraulidae* that have been salted, boiled and dried. This product is intended for cooking before consumption. This Standard does not cover products which have undergone an enzymatic maturation in brine.

2. DESCRIPTION

2.1 PRODUCT DEFINITION

The product shall be prepared from fresh fish of the family *Engraulidae* obtained from the raw material described in Section 3.1.

2.2 PROCESS DEFINITION

2.2.1 The product shall be prepared by either washing fresh fish in brine or clean sea water and drying or washing followed by boiling in brine or clean sea water and drying. The drying process shall mean sundrying or artificial drying.

2.2.2 The product shall be packed in a suitable packaging material which is moisture proof and gas impermeable. It shall be processed and packaged so as to minimize oxidation.

2.3 HANDLING PRACTICE

Fresh anchovies that are not processed immediately after harvesting shall be handled under such hygienic conditions as will maintain the quality during transportation and storage up to and including the time of processing. It is recommended that the fish shall be properly chilled or iced to bring its temperature down to 0°C (32°F) as quickly as possible as specified in the "Recommended International Code of Practice for Fresh Fish" (CAC/RCP 9-1976) and kept at an adequate temperature to prevent spoilage and bacterial growth prior to processing. The drying process must be sufficiently short to preclude the formation of *Clostridium botulinum* toxin.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 RAW MATERIAL

3.1.1 Fish

The product shall be prepared from clean, sound fish which have characteristic fresh appearance, colour and odour.

3.1.2 Salt

Salt shall mean sodium chloride of suitable quality as specified in sub-section 5.4.2 of the "Recommended International Code of Practice for Salted Fish" (CAC/CRP 26-1979).

3.2 FINAL PRODUCT

3.2.1 Products shall meet the requirements of this standard when lots examined in accordance with Section [ ] comply with the provisions set out in Section [.] Products shall be examined by the methods given in Section [ ].

3.2.2 The product shall comply with the requirements prescribed in Table 1.

Table 1: Requirements for Dried Salted Anchovies

Characteristics	Requirement
Sodium chloride, percent by weight, max (d.b.)	15
Water activity (a_w), max	0.75
Acid insoluble ash, percent by weight, max. (d.b.)	1.5

3.3 BREAKAGE

3.3.1 Breakage shall mean fish (excluding fins and scales) which is not intact. The percentage of breakage is determined by the number of broken fish over the total number of fish in the test sample.

3.3.2 The percent breakage defined in section 3.3.1 shall not exceed the limits specified in section 3.5.

3.4 DECOMPOSITION

The products shall not contain more than 10 mg/100g of histamine based on the average of the sample unit tested.

3.5 SIZE CLASSIFICATION

According to Annex A

4. HYGIENE

4.1 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 2-1997), and the Recommended International Code of Practice for Fresh Fish (CAC/RCP 9 - 1976).

4.2 The products should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

4.3 No sample unit shall contain histamine that exceeds 20 mg/100g

6. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 3-1999), the following specific provisions apply:

6.1 THE NAME OF THE FOOD

The name of the product shall be "Dried Salted Anchovies".

6.2 GRADE AND SIZE OF PRODUCT

The grade and size of the product shall be declared.

6.3 SCIENTIFIC AND COMMON NAMES

The scientific and common names of the fish shall be declared.

6.4 ADDITIONAL REQUIREMENTS

The package shall bear clear directions for keeping the product from the time they are purchased from the retailer to the time of their use and directions for cooking.

7. SAMPLING AND ANALYSIS

7.1 SAMPLING

According to the Codex Sampling Plan for Prepackaged Foods.

7.2 DETERMINATION OF SODIUM CHLORIDE

According to AOAC 937.09 (volumetric method).

7.3 DETERMINATION OF WATER ACTIVITY

According to AOAC 978.18.

7.4 DETERMINATION OF ACID INSOLUBLE ASH

According to method set out in Annex B.

ANNEX A

1. SIZING

Size shall be determined by the length of the product (whole fish).

Size Designation	Length
Small	less than 3.5 cm
Medium	3.5 - 6.5 cm
Big	greater than 6.5 cm

2. GRADING

Each size of dried salted anchovies shall be classified into two grades as defined below:

Characteristics	Grade	
	A	B
Breakage	Less than 5%	Less than 15%
Colour (comparison of colour must be among the same species of fish)	Whitish or bluish or yellowish (characteristic of species)	Off colour
Odour	No foul or rancid smell	No foul or rancid smell

ANNEX B

DETERMINATION OF ACID INSOLUBLE ASH

1. PREPARATION OF SAMPLE

1.1 Use sample from A1.1

2. REAGENT

2.1 Dilute hydrochloric acid, 1:1

3. PROCEDURE

3.1 Weigh accurately about 2 g of the dried sample (from A1.1) in a tared porcelain, silica or platinum dish. Ignite with a burner for about 1 hour. Complete the ignition by putting sample in a muffle furnace at 600 ± 20°C until grey ash results.

3.2 Cool and add 25 ml of dilute hydrochloric acid, cover with a watch-glass and heat on a water bath for 10 min.

3.3 Cool and filter through Whatman filter paper No. 42 or its equivalent.

3.4 Wash the residue with hot water until the washings are free from chlorides as tested with silver nitrate solution and return the filter paper and residue to the dish. Keep it in an electric air oven maintained at 135 ± 2°C for about 3 hours.

3.5 Ignite it in a muffle furnace at 600 ± 20°C for 1 hour. Cool in a desiccator and weigh. Ignite the dish again for 30 min, cool and weigh. Repeat this procedure until the difference between two successive weightings is less than 1 mg. Record the lowest weight.

3.6 CALCULATION

$$\text{Acid insoluble ash, per cent by weight} = \frac{(W_2 - W)}{(W_1 - W)} \times 100$$

where,

W is the weight in grammes, of the empty dish

W_1 is the weight in grammes, of the dish with the dried sample taken from the test

W_2 is the lowest weight in grammes, of the dish with the acid insoluble ash.

ALINORM 01/18
APPENDIX V

PROPOSED DRAFT CODE OF PRACTICE FOR FISH AND FISHERY PRODUCTS

(At Step 5 of the Procedure)

TABLE OF CONTENTS

INTRODUCTION

This Code of Practice for Fish and Fishery Products has been developed by the Codex Committee on Fish and Fishery Products from the merging of the individual codes of listed in Appendix XII plus a section on aquaculture and a section on frozen surimi. These codes were primarily of a technological nature offering general advice on the production, storage and handling of fish and fishery products on board fishing vessels and on shore. It also deals with the distribution and retail display of fish and fishery products.

This combined Code of practice has been further modified to incorporate the Hazard Analysis Critical Control Point (HACCP) approach described in the *Recommended International Code of Practice – General Principles of Food Hygiene* (CAC/RCP 1-1969, Rev.3 1997), Annex: *HACCP System and Guidelines for its Application* (Supplement to Codex Volume 1B). A pre-requisite programme is described in the Code covering technological guidelines and the essential requirements of hygiene in the production of fish and fishery products, which are safe for human consumption, and otherwise meets the requirements of the appropriate Codex product standards. The Code also contains guidance on the use of HACCP, which is recommended to ensure the hygienic production of fish and fishery products to meet health and safety requirements.

Within this Code a similar systematic approach has been applied to essential quality, composition and labelling provisions of the appropriate Codex product standards. Throughout the code this is referred to as "Defect Action Point (DAP) Analysis".

The Codex Committee on Fish and Fishery Products recommended at its Twentieth Session that defects of a commercial nature, i.e. workmanship defects, which had been removed from Codex fish product standards, be transferred to the appropriate Codex Code of practice for optional use between buyers and sellers during commercial transactions. The Committee further recommended that this detail should be described in a section on Final Product Specifications, which now appear as Appendices II - XI of this document. A similar approach to HACCP has been incorporated into the Code as guidelines for the control of defects (DAP Analysis).

This Code will assist all those who are engaged in the handling and production of fish and/or fishery products, or are concerned with their storage, distribution, export, import and sale in attaining safe and wholesome products which can be sold on national or international markets and meet the requirements of the Codex Standards (see Appendix XII).

HOW TO USE THIS CODE

The aim of this Code is to provide a user-friendly document as background information and guidance for the elaboration of fish and shellfish process management systems which would incorporate Good Management Practice (GMP) as well as the application of HACCP in countries where these, as yet, have not been developed. In addition, it could be used for training of fishermen and employees of the fish processing industry.

The practical application of this *international* Code, with regard to *national* fisheries, would therefore require some modifications and amendments, taking into account local conditions and specific consumer requirements. This Code, therefore, is not intended to replace the advice or guidance of trained and experienced technologists regarding the complex technological and hygienic problems which might be unique to a specific geographical area or specific fishery and, in fact, is intended to be used as a supplement in such instances.

This Code is divided into separate, though interrelated, Sections. It is intended that in order to set up a HACCP or DAP programme these should be consulted as appropriate:

(a) *Section 2 - Definitions* – Being acquainted with the definitions is important and will aid the overall understanding of the Code.

(b) *Section 3 - Pre-requisite Programme* - Before HACCP or a similar approach can properly be applied to a process it is important that a solid foundation of good hygienic practice exists. This Sections covers the groundwork which should be regarded as the minimum requirements for a processing facility prior to the application of hazard and defect analyses.

(c) *Section 4 – General Considerations for the Handling of Fresh Fish and Shellfish* – This Section provides an overall view of the potential hazards and defects which may have to be considered when building up a HACCP or DAP plan. This is not intended to be an exhaustive list but is designed to help a HACCP or DAP team to think about what hazards or defects should be considered in the fresh fish or shellfish, and then it is up to the team to determine the significance of the hazard or defect in relation to the process.

(d) *Section 5 – Hazard Analysis Critical Control Point (HACCP) and Defect Action Point (DAP) Analysis* - Only when the groundwork in Section 3 has been satisfactorily achieved should the application of the principles outlined in *Section 5* be considered. This Section uses an example of the processing of a canned tuna product to help illustrate how the principles of HACCP should be applied to a process.

(e) *Section 6 - Processing of Fresh, Frozen and Minced Fish* – This Section forms the foundation for most of the subsequent fish and shellfish processing Sections. It deals with the major process steps in the handling of raw fish through to cold storage and gives guidance and examples on the sort of hazards and defects to expect at the various steps. This Section should be used as the basis for all the other fish processing operations (Sections 7-14) which give additional guidance specific to the appropriate product sector.

Although potential hazards and potential defects are listed for most steps in the Processing Sections, it should be noted that this is only for guidance and the consideration of other hazards and/or defects may be appropriate. Also, the format in these Processing Sections has been designed for maximum 'ease of use' and therefore the **'potential hazards'** or **'potential defects'** are listed only where they may be introduced into a product or where they are controlled, rather than repeating them at all the intervening processing steps.

Additionally, it must be stressed that hazards and defects, and their subsequent control or action points, are product and line specific and therefore a full critical analysis based on *Section* 5 must be completed for each individual operation.

(f) *Sections 7 to 15 – Specific Fish and Shellfish Processing Sections* – Processors operating in particular sectors will need to consult the appropriate Section to find additional information specific to that sector.

(g) *Section 16 – Aquaculture Production* deals with aquaculture production.

(h) *Sections 17 and 18 – Transportation and Retail* cover general transportation and retail issues.

(i) Additional information will be found in the *Appendices.*

SECTION 1 SCOPE

This Code of practice applies to the growing, harvesting, handling, production, processing, storage transportation and retail of fish and fishery products from marine and freshwater sources, which are intended for human consumtion.

SECTION 2 DEFINITIONS

For the purpose of this Code:

2.1 GENERAL DEFINITIONS

Chilled Water is clean water in which the temperature is maintained at approximatelly 0°C (32°F) or slightly colder by the addition of ice;

Chilling is the process of cooling fish to a temperature approaching that of melting ice;

Clean Water means water from any source where harmfull microbiological contamination, substances and/or toxic plankton are not present in such quantities as may affect the health quality of fishery products;

Cleaning means the removal of soil, food residues, dirt, grease or other objectionable matter;

Contaminant means any biological or chemical agent, foreign matter, or other substances not intentionally added to food which may compromise food safety or suitability;

Contamination the introduction or occurence of a contaminant in fish;

Control Measure means any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level. For the purposes of this Code a control measure is also applied to a defect.

Corrective Action means any action to be taken when the results of monitoring at the CCP indicate a loss of control. For the purposes of this Code this also applies to a DAP.

Critical Control Point (CCP) a step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Critical Limit is a criterion, which separates acceptability from unacceptability. For the purpose of this Code this also applies to a DAP;

Decision Tree a sequence of questions applied to each process step with an identified hazard to identify which process steps are CCPs. For the purpose of this Code this also applies to a DAP;

Decomposition is the deterioration of fish including texture breakdown and causing a persistant and distinct objectionable odour or flavour;

Defect means a condition found in a product which fails to meet essential quality, composition and/or labelling provisions of the appropriate Codex product standards;

Defect Action Point (DAP) a step at which control can be applied and a defect can be prevented, eliminated or reduced to acceptable level, or a fraud risk eliminated;

Disinfection means the reduction, by means of chemical agents and/or physical methods, the number of micro-organisms in the environment, to a level that does not compromise food safety or suitability;

Dressed means that portion of fish remaining after heading and gutting;

Fish means any of the cold-blooded aquatic vertebrates and aquatic invertebrates. Aquatic mammals and amphibians are not included;

Hazard a biological, chemical or physical agent in, or condition of, food with the potential to cause an adverse health effect;

Hazard Analysis the process of collecting and evaluating information on hazards and conditions leading to their presence to decide which are significant for food safety and therefore should be addressed in the HACCP plan;

Hazard Analysis Critical Control Point (HACCP) a system which identifies, evaluates, and controls hazards which are significant for food safety;

Biotoxins means poisonous substances accumulated by fish and shellfish feeding on toxin producing algae, or in water containing toxins produced by such organisms;

Monitor the act of conducting a planned sequence of observations or measurements of control parameters to assess whether a CCP is under control. For the purpose of this Code this also applies to a DAP;

Potable Water is fresh water fit for human consumption. Standards of potability should not be lower than those contained in the latest edition of the "International Standards for Drinking Water", World Health Organisation;

Pre-Requisite Programme is a programme that is required prior to the application of the HACCP system to ensure that a fish processing facility is operating according to the Codex Principles of Food Hygiene, the appropriate Code of Practice and appropriate food safety legislation;

Processing Facility means any premises where fishery products are prepared, processed, chilled, frozen, packaged or stored. For the purposes of this Code, premises also includes vessels;

Raw Material are fresh and frozen fish and/or parts of fish which may be utilised to produce fish and fishery products intended for human consumption;

Refrigerated Water is clean water cooled by a suitable refrigeration system;

Shelf-Life the period during which the product maintains its microbiological and chemical safety and sensory qualities at a specific storage temperature. It is based on identified hazards for the product, heat or other preservation treatments, packaging method and other hurdles or inhibiting factors that may be used;

Shellfish means those species of molluscs and crustaceans including cephalopods that are usually used for food;

Step is a point, procedure, operation or stage in the food chain including raw materials, from primary production to final consumption;

Validation means obtaining evidence that the elements of the HACCP plan are effective;

Verification the application of methods, procedures, tests and other evaluations, in addition to monitoring to determine compliance with the HACCP plan. For the purposes of this Code this also applies to a DAP;

Whole Fish are fish as captured, ungutted.

2.2 FRESH, FROZEN AND MINCED FISH

Candling Is passing fillets of fish over a translucent table illuminated from below to detect parasites and other defects

Dehydration Is the loss of moisture from frozen products through evaporation. This may occur if the products are not properly glazed, packaged or stored. Deep dehydration adversely affects the appearance and surface texture of the product and is commonly known as "freezer burn";

Fillet Is a slice of fish of irregular size and shape removed from the carcase by cuts made parallel to the backbone;

Freezer Is equipment designed for freezing fish and other food products, by quickly lowering the temperature so that after thermal stabilisation the temperature in the thermal centre of the product is the same as the storage temperature;

Freezing Process Is a process which is carried out in appropriate equipment in such a way that the range of temperature of maximum crystallisation is passed quickly. The quick freezing process shall not be regarded as complete unless and until the product temperature has reached -18°C (0°F) or lower at the thermal centre after thermal stabilisation;

Fresh Fish are fish or fishery products which have received no preserving treatment other than chilling;

Frozen Fish re fish which have been subjected to a freezing process sufficient to reduce the temperature of the whole product to a level low enough to preserve the inherent quality of the fish and which have been maintained at this low temperature, as specified in the Standard for Quick Frozen Finfish, Eviscerated and Uneviscerated during transportation, storage and distribution up to and including the time of final sale. For the purpose of this Code the terms "frozen", "deep frozen", "quick frozen", unless otherwise stated, shall be regarded as synonymous;

Glazing The application of a protective layer of ice formed at the surface of a frozen product by spraying it with, or dipping it into, clean sea water, potable water, or potable water with approved additives, as appropriate;

Minced Fish Is comminuted flesh produced by separation from skin and bones;

Modified Atmosphere Packaging (MAP) means packaging in which the atmosphere surrounding the fish is different from the normal composition of air;

Separation Is a mechanical process for producing minced fish whereby the skin and bone is substantially removed from the flesh;

Separator Is a mechanical device used for separation;

Steak Is a section of fish, removed by cutting approximately at right angle to the backbone.

2.9 CANNED FISH

For the purpose of this Code, only the definitions of the main terms related to canning industry and used in section 13 are given. For an overall set of definitions; please refer to the Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Food (CAC/PRC 23-1979, Rev. 2 (1993)).

Canned Food means commercially sterile food in hermetically sealed containers ;

Commercial sterility of thermally processed food means the condition achieved by application of heat, sufficient, alone or in combination with other appropriate treatments, to render the food free from micro-organisms capable of growing in the food at normal non-refrigerated conditions at which the food is likely to be held during distribution and storage ;

Hermetically Sealed Containers are containers which are sealed to protect the content against the entry of micro-organisms during and after heat processing ;

Retort means a pressure vessel designed for thermal processing of food packed in hermetically sealed containers ;

Scheduled Process (or Sterilisation schedule) means the thermal process chosen by the processor for a given product and container size to achieve at least commercial sterility ;

Sterilisation Temperature means the temperature maintained throughout the thermal process as specified in the scheduled process;

Sterilisation time means the time between the moment sterilisation temperature is achieved and the moment cooling started ;

Thermal Process means the heat treatment to achieve commercial sterility and is quantified in terms of time and temperature ;

Venting means thorough removal of the air from steam retorts by steam prior to a scheduled process ;

SECTION 3 PRE-REQUISITE PROGRAMME

Prior to the application of HACCP to any segment of the fish processing chain, that segment must be supported by pre-requisite programmes based on good hygienic practice or as required by the competent authority.

The establishment of pre-requisite programmes will allow the HACCP team to focus on the HACCP application to food safety hazards which are directly applicable to the product and the process selected, without undue consideration and repetition of hazards from the surrounding environment. The pre-requisite programmes would be specific within an individual establishment or for an individual vessel and will require monitoring and evaluation to ensure their continued effectiveness.

Reference should be made to the *International Recommended Code of Practice – General Principles of Food Hygiene* (CAC/RCP 1-1969, Rev.3 1997), Annex: *HACCP System and Guidelines for its Application* for further information to assist with the design of the pre-requisite programmes for a processing facility or vessel.

It should be noted that some of the issues listed below, e.g. those related to damage, are designed to maintain quality rather than food safety and are not always essential to a pre-requisite programme for a food safety oriented HACCP system.

HACCP principles can also be applied to defect action points.

3.1 FISHING AND HARVESTING VESSEL DESIGN AND CONSTRUCTION

There are many different types of fishing vessel used throughout the world which have evolved in particular regions to take account of the prevailing economics, environment and types of fish caught or harvested. This Section attempts to highlight the basic requirements for cleanability, minimising damage, contamination and decomposition to which all vessels should have regard to the extent possible in order to ensure hygienic, high quality handling of fresh fish intended for further processing and freezing.

The design and construction of a fishing vessel and vessels used to harvest farmed fish should take into consideration the following:

3.1.1 For Ease of Cleaning and Disinfection

- vessels should be designed and constructed to minimise sharp inside corners and projections to avoid dirt traps;
- construction should facilitate ample drainage;
- a good supply of clean water or potable water[1] at adequate pressure.

3.1.2 To Minimise Contamination

- all surfaces in fish handling areas should be non-toxic, smooth impervious and in sound condition, to minimise the build-up of fish slime, blood, scales and guts and to reduce the risk of physical contamination;
- where appropriate, adequate facilities should be provided for the handling and washing of fish and should have an adequate supply of cold potable water or clean water for that purpose;
- adequate facilities should be provided for washing and disinfecting equipment, where appropriate;
- the intake for clean water should be located to avoid contamination;
- all plumbing and waste lines should be capable of coping with peak demand;
- non-potable water lines should be clearly identified and separated from potable water to avoid contamination;
- objectionable substances, which could include bilge water, smoke, fuel oil, grease, drainage and other solid or semi-solid wastes should not contaminate the fish;

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[1] WHO Guidelines for Drinking Water Quality , 2nd edition, Geneva, 1993

- where appropriate, containers for offal and waste material should be clearly identified, suitably constructed with a fitted lid and made of impervious material;
- separate and adequate facilities should be provided to prevent the contamination of fish and dry materials, such as packaging, by:
  - poisonous or harmful substances;
  - dry storage of materials, packaging etc.;
  - offal and waste materials;
- adequate hand washing and toilet facilities, isolated from the fish handling area, should be available where appropriate;
- prevent the entry of birds, insects, or other pests, animals and vermin, where appropriate.

3.1.3 To Minimise Damage to the Fish

- in fish handling areas, surfaces should have a minimum of sharp corners and projections;
- in boxing and shelving fish storage areas, the design should preclude excessive pressure being exerted on the fish;
- chutes and conveyors should be designed to prevent physical damage caused by long drops or crushing;
- the fishing gear and its usage should minimise damage and deterioration to the fish.

3.1.4 To Minimise Damage during Harvesting of Aquacultured Fish

When aquacultured fish are harvested using seines or nets and are transported live to processing facilities:

- seines, nets and traps should be carefully selected to ensure minimum damage during harvesting;
- harvesting areas and all equipment for harvesting, catching, sorting, grading, conveying and transporting of live fish should be designed for rapid and efficient handling of live fish without causing mechanical damage;
- conveying equipment for live and slaughtered fish should be constructed of suitable corrosion-resistant material which does not transmit toxic substances and should not cause mechanical injuries to fish;
- where fish are transported live, care should be taken to avoid overcrowding and to minimise bruising.
- Ice should be provided for handling of harvested fish not allived.

3.2 PROCESSING FACILITY DESIGN AND CONSTRUCTION

The processing facility should include a product flow-through pattern that is designed to prevent potential sources of contamination, minimise process delays which could result in further reduction in fish quality, and prevent cross-contamination of finished product from raw materials. Fish are highly perishable foods and should be handled carefully and chilled without undue delay. The fish processing facility, therefore, should be designed for the rapid processing and storage of fish and fishery products.

The design and construction of a fish processing facility should take into consideration the following:

3.2.1 For Ease of Cleaning and Disinfection

- the surfaces of walls, partitions and floors should be made of impervious, non-toxic materials;
- all surfaces with which fish might come in contact should be of corrosion resistant, impervious material which is light-coloured, smooth and easily cleanable;
- walls and partitions should have a smooth surface up to a height appropriate to the operation;
- floors should be constructed to allow adequate drainage;
- ceilings and overhead fixtures should be constructed and finished to minimise the build-up of dirt and condensation, and the shedding of particles;
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- windows should be constructed to minimise the build-up of dirt and, where necessary, be fitted with removable and cleanable insect-proof screens. Where necessary, windows should be fixed;
- doors should have smooth, non-absorbent surfaces;
- joints between floors and walls should be constructed for ease of cleaning (round joints).

3.2.2 To Minimise Contamination

- processing facility layout should be designed to minimise cross-contamination and may be accomplished by physical or time separation;
- all surfaces in fish handling areas should be non-toxic, smooth impervious and in sound condition, to minimise the build-up of fish slime, blood, scales and guts and to reduce the risk of physical contamination;
- working surfaces that come into direct contact with fish should be in sound condition, durable and easy to maintain. They should be made of smooth, non-absorbent and non-toxic materials, and inert to fish, detergents and disinfectants under normal operating conditions;
- adequate facilities should be provided for the handling and washing of fish and should have an adequate supply of cold potable water for that purpose;
- suitable and adequate facilities should be provided for storage and/or production of ice;
- ceiling lights should be covered or otherwise suitably protected to prevent contamination by glass or otherwise suitably protected to prevent contamination by glass or other material;
- ventilation should be sufficient to remove excess steam, smoke and objectionable odours and cross contamination through aerosols should be avoided;
- adequate facilities should be provided for washing and disinfecting equipment, where appropriate;
- non-potable water lines should be clearly identified and separated from potable water to avoid contamination;
- all plumbing and waste lines should be capable of coping with peak demands;
- accumulation of solid, semi-solid or liquid wastes should be minimised to prevent contamination of fish;
- where appropriate, containers for offal and waste material should be clearly identified, suitably constructed with a fitted lid and made of impervious material;
- separate and adequate facilities should be provided to prevent the contamination of fish by:
  - poisonous or harmful substances;
  - dry storage of materials, packaging etc.;
  - offal and waste materials;
- adequate hand washing and toilet facilities, isolated from the fish handling area, should be available;
- prevent the entry of birds, insects, or other pests and animals;
- water supply lines should be fitted with back flow devices, where appropriate.

3.2.3 To Provide Adequate Lighting

- to all work surfaces.

3.3 DESIGN AND CONSTRUCTION OF EQUIPMENT AND UTENSILS

The equipment and utensils used for the handling of fishery products on a vessel or in a processing facility will vary greatly depending on the nature and type of operation involved. During use, they are constantly in contact with the fish. The condition of the equipment and utensils should be such that it minimises the build-up of residues and prevents them becoming a source of contamination.

The design and construction equipment and utensils should take into consideration the following:

3.3.1 For Ease of Cleaning and Disinfection

- equipment should be durable and movable and/or capable of being disassembled to allow for maintenance, cleaning, disinfection and monitoring;
- equipment, containers and utensils coming into contact with fish should be designed to provide for adequate drainage and constructed to ensure that they can be adequately cleaned, disinfected and maintained to avoid contamination;
- equipment and utensils should be designed and constructed to minimise sharp inside corners and projections and tiny crevices or gaps to avoid dirt traps;
- a suitable and adequate supply of cleaning utensils and cleaning agents, approved by the official agency having jurisdiction, should be provided.

3.3.2 To Minimise Contamination

- all surfaces of equipment in fish handling areas should be non-toxic, smooth, impervious and in sound condition, to minimise the build-up of fish slime, blood, scales and guts and to reduce the risk of physical contamination;
- accumulation of solid, semi-solid or liquid wastes should be minimised to prevent contamination of fish;
- adequate drainage should be provided in storage containers and equipment;
- drainage should not be permitted to contaminate fish.

3.3.3 To Minimise Damage

- surfaces should have a minimum of sharp corners and projections;
- chutes and conveyors should be designed to prevent physical damage caused by long drops or crushing;
- fish storage equipment should be fit for the purpose and not lead to crushing of the fish.

3.4 HYGIENE CONTROL PROGRAMME

The potential effects of harvesting and handling of products, on-board vessel handling or in-plant production activities on the safety and suitability of fish should be considered at all times. In particular this includes all points where contamination may exist and taking specific measures to ensure the production of a safe and wholesome product. The type of control and supervision needed will depend on the size of the operation and the nature of its activities.

Schedules should be implemented to:

- prevent the build up of waste and debris;
- protect the fish from contamination;
- dispose of any rejected material in a hygienic manner;
- monitor personal hygiene and health standards;
- monitor the pest control programme;
- monitor cleaning and disinfecting programmes;
- monitor the quality and safety of water and ice supplies.

The hygiene control programme should take into consideration the following :

3.4.1 A Permanent Cleaning and Disinfection Schedule

A permanent cleaning and disinfection schedule should be drawn up to ensure that all parts of the vessel, processing facility and equipment therein are cleaned appropriately and regularly. The schedule should be reassessed whenever changes occur to the vessel, processing facility and/or equipment. Part of this schedule should include a ‘clean as you go’ policy.

A typical cleaning and disinfecting process may involve as many as seven separate steps:

Pre-cleaning	Preparation of area and equipment for cleaning. Involves steps such as removal of all fish or fish products from area, protection of sensitive components and packaging materials from water, removal by hand or squeegee of fish scraps, etc.
Pre-rinse	A rinsing with water to remove remaining large pieces of loose soil.
Cleaning	Treatment of surfaces with an appropriate detergent to loosen and remove any remaining soil.
Rinse	A rinsing with potable water or clean water, as appropriate, to remove all soil and detergent residues.
Disinfection	Application of chemicals, approved by the official agency having jurisdiction and/or heat to destroy most microorganisms on surface
Post-rinse	As appropriate a final rinse with potable water or clean water to remove all disinfectant residues
Storage	Cleaned and disinfected equipment, container and utensils should be stored in a fashion which would prevent its contamination
Check of the eficiency of the cleaning	The efficiency of the cleaning should be controlled as appropriate

Fish handlers or cleaning personnel as appropriate should be well trained in the use of special cleaning tools and chemicals, methods of dismantling equipment for cleaning and should be knowledgeable in the significance of contamination and the hazards involved.

3.4.2 Designation of Personnel for Cleaning

- In each processing plant or vessel a trained individual should be designated to be responsible for the sanitation of the processing facility or vessel and the equipment within.

3.4.3 Maintenance of Premises, Equipment and Utensils

- buildings, materials, utensils and all equipment in the establishment - including drainage systems - should be maintained in a good state and order;
- equipment, utensils and other physical facilities of the plant or vessel should be kept clean and in good repair;
- procedures for the maintenance, repair, adjustment and calibration, as appropriate, of apparatus should be established. These procedures should specify for each equipment, the methods used, the persons in charge of their application, and their frequency.

3.4.4 Pest Control Systems

- good hygienic practices should be employed to avoid creating an environment conducive to pests;
- pest control programmes could include preventing access, eliminating harbourage and infestations, and establishing monitoring detection and eradication systems;
- physical, chemical and biological agents should be properly applied by appropriately qualified personnel.

3.4.5 Supply of Water, Ice and Steam

3.4.5.1 Water

- an ample supply of cold and hot potable water[2] and/or clean water under adequate pressure should be provided where appropriate;
- potable water should be used wherever necessary to avoid contamination to the fish and shellfish.

3.4.5.2 Ice

- ice should be manufactured using potable water[3] or clean water;
- ice should be protected from contamination.

3.4.5.3 Steam

- for operations which require steam, an adequate supply at sufficient pressure should be maintained;
- steam used in direct contact with fish or shellfish or food contact surfaces should not constitute a threat to the safety or suitability of the food.

3.4.6 Waste Management

- offal and other waste materials should be removed from the premises of a processing facility or vessel on a regular basis;
- facilities for the containment of offal and waste material should be properly maintained;
- vessel waste discharge should not contaminate vessel water intake system or incoming product.

3.5 PERSONAL HYGIENE AND HEALTH

Personal hygiene and facilities should be such to ensure that an appropriate degree of personal hygiene can be maintained to avoid contaminating fish

3.5.1 Facilities and Equipment:

Facilities and equipment should include:

- adequate means of hygienically washing and drying hands;
- adequate toilet and changing facilities for personnel should be suitably located and designated.

3.5.2 Personnel Hygiene

- no person who is known to be suffering from, or who is a carrier of any communicable disease or has an infected wound or open lesion should be engaged in the preparation, handling or transporting of fish or fishery products;
- where necessary, adequate and appropriate protective clothing, headcovering and footwear should be worn;
- all persons working in a processing facility should maintain a high degree of personal cleanliness and should take all necessary precautions to prevent the contamination of the fish or their products or ingredients;
- hand-washing should be carried out by all personnel working in a processing area:
  - at the start of fish handling activities and upon re-entering a processing area;
  - immediately after using the toilet;
- the following should not be permitted in fish handling and processing areas:
  - smoking
  - spitting
  - chewing or eating

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[2] WHO Guidelines for Drinking Water Quality, 2nd edition, Geneva, 1993

- sneezing or coughing over unprotected food
- the adornment of personal effects such as jewellery, watches, pins or other items that, if dislodged, may pose a threat to the safety and suitability of the fish.

3.6 TRANSPORTATION

Vehicles should be designed and constructed:

- such that walls, floors and roofs, where appropriate, are made of a suitable corrosion-resistant material with smooth non-absorbent surfaces. Floors should be adequately drained;
- where appropriate with chilling equipment to maintain chilled fish during transport to a temperature as close as possible to 0°C or, for frozen fish and fishery products, to maintain a temperature of -18°C or colder;
- to provide the fish with protection against contamination, exposure to extreme temperatures and the drying effects of the sun or wind;
- to permit the free flow of chilled air around the load when fitted with mechanical refrigeration means.

3.7 TRACEABILITY AND RECALL PROCEDURES

Experience has demonstrated that a system for recall of product is a necessary component of a pre-requisite programme because no process is fail-safe. Traceability, which includes lot identification, is essential to an effective recall procedure.

- managers should ensure effective procedures are in place to effect the complete traceability and rapid recall of any lot of fishery product from the market;
- appropriate records of processing, production and distribution should be kept and retained for a period that exceeds the shelf-life of the product;
- each container of fish or fishery product intended for the final consumer or for further processing should be clearly marked to ensure the traceability of the producer and of the lot;
- where there is an immediate health hazard, products produced under similar conditions, and likely to present a similar hazard to public health, may be withdrawn. The need for public warnings should be considered;
- recalled products should be held under supervision until they are destroyed, used for purposes other than human consumption, or reprocessed in a manner to ensure their safety.

3.8 TRAINING

Fish hygiene training is fundamentally important. All personnel should be aware of their role and responsibility in protecting fish from contamination and deterioration. Fish handlers should have the necessary knowledge and skill to enable them to handle fish hygienically. Those who handle strong cleaning chemicals or other potentially hazardous chemicals should be instructed in safe handling techniques.

Each fish processing facility should ensure that individuals have received adequate and appropriate training in the design and proper application of a HACCP system and process control. Training of personnel in the use of HACCP is fundamental to the successful implementation and delivery of the programme in fish processing establishments. The practical application of such systems will be enhanced when the individual responsible for HACCP has successfully completed a course given by or certified by a competent authority. Managers should also arrange for adequate and periodic training of every employee in the establishment so that they understand the principles involved in HACCP.

SECTION 4 - GENERAL CONSIDERATIONS FOR THE HANDLING OF FRESH FISH AND SHELLFISH

Unless they can be reduced to an acceptable level by normal sorting and/or processing, no fish and shelfish should be accepted if it is known to contain parasites, undesirable microorganisms, pesticides, veterinary drugs or toxic, decomposed or extraneous substances known to be harmfull to human health. When fish and shellfish determined as unfit for human consumption are found they should be removed and stored separately

from the catch and either reworked and/or disposed of in a proper manner. Potential hazards, which have been known to be associated with fresh fish and shellfish, are described in Section 4.1. All fish and shellfish deemed fit for human consumption should be handled properly with particular attention being paid to time and temperature control.

4.1 POTENTIAL HAZARDS ASSOCIATED WITH FRESH FISH AND SHELLFISH

4.1.1 Biological Hazards

4.1.1.1 Parasites

The parasites known to cause disease in humans and transmitted by fish or crustaceans are broadly classified as helminths or parasitic worms. These are commonly referred to as Nematodes, Cestodes and Trematodes. Fish can be parasitised by protozoans, but there are no records of fish protozoan disease being transmitted to man. Parasites have complex life cycles, involving one or more intermediate hosts and are generally passed to man through the consumption of raw, minimally processed or inadequately cooked products that contain the parasite infectious stage, causing foodborne disease. Freezing at [-20°C or below for 7 days or -35°C for about 20 hours] for fish intended for raw consumption will kill parasites. Processes such as brining or pickling may reduce the parasite hazard if the products are kept in the brine for a sufficient time but may not eliminate it. Candling, trimming belly flaps and physically removing the parasite cysts will also reduce the hazards but may not eliminate it.

Nematodes

Many species of nematodes are known to occur worldwide and some species of marine fish act as secondary hosts. Among the nematodes of most concern are *Anisakis* spp., *Capillaria* spp., *Gnathostoma* spp., and *Pseudoteranova* spp., which can be found in the liver, belly cavity and flesh of marine fish. An example of a nematode causing disease in man is *Anisakis simplex;* as the infective stage of the parasite is killed by heating ([60°C] for 1 minute) and by freezing ([-20°C] for 24 hours) in the fish core.

Cestodes

Cestodes are tapeworms and the species of most concern associated with the consumption of fish is *Diphyllobotrium latum.* This parasite occurs worldwide and marine fish are intermediate hosts. Similar to other parasitic infections, the foodborne disease occurs through the consumption of raw or under-processed fish. Similar freezing and cooking temperatures as applied to nematodes will inactivate the infective stages of this parasite.

Trematodes

Fish-borne trematode (flatworm) infections are major public health problems that occur endemically in about 20 countries around the world. The most important species with respect to the numbers of people infected belong to the genera *Clonorchis* and *Ophisthorchis* (liver flukes), *Paragonimus* (lung flukes), and to a lesser extent *Heterophyes* and *Echinochasmus* (intestinal flukes). The most important definitive host of these trematodes is man or other mammals. Freshwater fish are the second intermediate host in the life cycles of *Clonorchis* and *Ophistorchis*, and freshwater crustaceans in the case of *Paragonimius.* Foodborne infections take place through the consumption of raw, undercooked or otherwise under-processed products containing the infective stages of these parasites. Freezing fish at -20°C for 7 days or at -35°C for 24 hours will kill the infective stages of these parasites.

4.1.1.2 Bacteria

The level of contamination of fish at the time of capture will depend on the environment and the bacteriological quality of the water in which fish are harvested. Many factors will influence the microflora of finfish, the more important being water temperature, salt content, proximity of harvesting areas to human habitations, quantity and origin of food consumed by fish, and method of harvesting. The edible muscle tissue of finfish is normally sterile at the time of capture and bacteria are usually present on the skin, gills and in the intestinal tract.

There are two broad groups of bacteria of public health importance that may contaminate products at the time of capture - those that are normally or incidentaly present in the aquatic environment, referred to as the indigenous

microflora, and those introduced through environmental contamination by domestic and /or industrial wastes. Examples of indigenous bacteria, which may pose a health hazard, are *Aeromonas hydrophyla*, *Clostridium botulinum*, *Vibrio parahaemolyticus*, *Vibrio cholerae*, *Vibrio vulnificus*, and *Listeria monocytogenes*. Non-

indigenous bacteria of public health significance include members of the Enterobacteriaceae, such as *Salmonella* spp., *Shigella* spp., and *Escherichia coli*. Other species that cause foodborne illness and which have been isolated occasionally from fish are *Edwardsiella tarda*, *Pleisomonas shigeloides* and *Yersinia enterocolitica*.

Indigenous pathogenic bacteria, when present on fresh fish, are usually found in fairly low numbers, and where products are adequately cooked prior to consumption, food safety hazards are insignificant. During storage, indigenous spoilage bacteria will outgrow indigenous pathogenic bacteria, thus fish will spoil before becoming toxic and will be rejected by consumers. Hazards from these pathogens can be controlled by heating seafood sufficiently to kill the bacteria, holding fish at chilled temperatures and avoiding post-process cross-contamination.

Vibrio species are common in coastal and estuarine environments and populations can depend on water depth and tidal levels. They are particularly prevalent in warm tropical waters and can be found in temperate zones during summer months. *Vibrio* species are also natural contaminants of brackish water tropical environments and will be present on farmed fish from these zones. Hazards from *Vibrio* spp. associated with finfish can be controlled by thorough cooking and preventing cross-contamination of cooked products. Health risks can also be reduced by rapidly chilling products after harvest, thus reducing the possibility of proliferation of these organisms.

4.1.1.3 Viral Contamination

Molluscan shellfish harvested from inshore waters that are contaminated by human or animal faeces may harbour viruses that are pathogenic to man. Enteric viruses that have been implicated in seafood-associated illness are the hepatitis A virus, caliciviruses, astroviruses and the Norwalk virus. The latter three are often referred to as small round structured viruses. All of the seafood-borne viruses causing illness are transmitted by the faecal-oral cycle and most viral gastro-enteritis outbreaks have been associated with eating contaminated shellfish, particularly raw oysters.

Generally viruses are species specific and will not grow or multiply in foods or anywhere outside the host cell. There is no reliable marker for indicating presence of the virus in shellfish harvesting waters. Seafood-borne viruses are difficult to detect, requiring relatively sophisticated molecular methods to identify the virus.

Occurence of viral gastro-enteritis can be minimized by controlling sewage contamination of shellfish farming areas and pre-harvest monitoring of shellfish and growing waters as well as controlling other sources of contamination during processing. Depuration or relaying are alternative strategies but longer periods are required for shellfish to purge themselves clean of viral contamination than for bacteria. Thermal processing (85-90°C for 1.5 min.) will destroy viruses in shellfish.

4.1.1.4 Biotoxins

There are a number of important biotoxins to consider. Around 400 poisonous fish species exist and, by definition, the substances responsible for the toxicity of these species are biotoxins. The poison is usually limited to some organs, or is restricted to some periods during the year.

For some fish, the toxins are present in the blood; these are ichtyohaemotoxin. The involved species are eels from the Adriatic, the moray eels, and the lampreys. In other species, the toxins are spread all over the tissues (flesh, viscera, skin); these are ichtyosarcotoxins. It concerns tetrodotoxic species responsible for several poisonings, often lethal.

Biotoxins are often heat-stable and the only possible control measure is to check the identity of the used species.

Scombrotoxin

Scombroid intoxication, sometimes referred to as histamine poisoning, results from eating fish that have been incorrectly chilled after harvesting. Scombrotoxin is attributed mainly to *Enterobacteriaceae* which produce high levels of histamine in the fish muscle when products are not immediately chilled after catching. The main susceptible fish are the scombroids such as tuna, mackerel, and bonito, although it can be found in other species. The intoxication is rarely fatal and symptoms are usually mild. Rapid refrigeration after catching and a high

standard of handling during processing should prevent the development of the toxin. The toxin is not inactivated by normal cooking temperatures or by canning. In addition, fish may contain toxic levels of histamine without exhibiting any of the usual sensory parameters characteristic of spoilage.

Phycotoxins

Ciguatoxin

And the other important toxin to consider is ciguatoxin, which can be found in a wide variety of mainly carnivorous fish inhabiting shallow waters in or near tropical and subtropical coral reefs. The source of this toxin is dinoflagellates and over 400 species of tropical fish have been implicated in intoxication. The toxin is known to be heat stable. There is still much to be learnt about this toxin and the only control measure that can reasonably be taken is to avoid marketing fish that have a known consistent record of toxicity.

PSP / DSP / ASP / NSP

These toxins concern especially the bivalve shellfish; the toxicity is due to the ingestion by the shellfish of phytoplanktonic species, which are able to synthesise toxic substances. The shellfish concentrates the toxin to a level such as it becomes potentially toxic. The principal toxins are the Paralytic Shellfish Poison (PSP) produced by dinoflagellates genus *Alexandrium,* the Diarrheic Shellfish Poison (DSP) produced by other dinoflagellates genus *Dinophysis* Amnesic Shelfish Poisoning (ASP) in which Nitzchi spp produce domoic acid or Neurotoxic Shelfish Poisoning (NSP) produced by Gymnodium spp.

All these toxins are known to keep in general their toxicity through processing, even in canned fish products, so the knowledge of the species identity and/or origin of fish or shellfish intended for processing is important.

Tetrodotoxin

Fish mainly belonging to the family Tetradontidea (" puffer fishes") may accumulate this toxin which is resposible for several poisonings, often lethal. The toxin is generally found in the fish liver, roe and guts, and less freequent in the flesh. Diffrently from most other fish biotoxins that accumulate in the live fishor shelfish, algae do not produce this toxin. The mechanism of toxin production is still not clear, however, apparently there are often indications of the involvement of symbiotic bacteria.

4.1.2 Chemical hazards

Fish may be harvested from coastal zones and inland habitats that are exposed to varying amounts of environmental contaminants. Of greatest concern are fish harvested from coastal and estuarine areas rather than fish harvested from the open seas. Chemicals, organochloric compounds and heavy metals may accumulate in products that can cause public health problems. Veterinary drug residues can occur in aquaculture products when correct withdrawal times are not followed or when the sale and use of these compounds are not controlled. Fish can also be contaminated with chemicals such as diesel oil, when incorrectly handled and detergents or disinfectants when not properly rinsed out.

4.1.3 Physical Hazards

These can include material such as metal or glass fragments, shell, bones, etc.

4.2 TIME AND TEMPERATURE CONTROL

Temperature is the single most important factor affecting the rate of fish deterioration and multiplication of micro-organisms. For species prone to scombroid toxin production, time and temperature control may be the most effective method in controlling food safety. It is therefore essential that fresh fish, fillets and other and shellfish and their products which are to be chilled should be held at a temperature as close as possible to 0ºC.

4.2.1 Minimise the Deterioration of Fish - Time

To minimise the deterioration of fish, it is important that:

- chilling of fish should commence as soon as possible;
- fresh fish should be kept chilled, processed and distributed with care and minimum delay.

4.2.2 Minimise the Deterioration of Fish - Temperature Control

Where temperature control is concerned:

- sufficient and adequate icing, or chilled or refrigerated water systems where appropriate, should be employed to ensure that fish are kept chilled at a temperature as close as possible to 0ºC;
- fish should be stored in shallow layers and surrounded by finely divided melting ice;
- chilled or refrigerated water systems and/or cold storage systems should be designed and maintained to provide adequate cooling and/or freezing capacities during peak loads;
- fish should not be stored in refrigerated water systems to a density which impairs its working efficiency;
- monitoring and controlling the time and temperature and homogeneity of chilling should be performed regularly.

4.3 MINIMISE THE DETERIORATION OF FISH - HANDLING

Poor handling practices can lead to damage of fresh fish which can accelerate the rate of decomposition and increase unnecessary post-harvest losses. Handling damage can be minimised by:

- fish should be handled and conveyed with care particularly during transfer and sorting in order to avoid physical damage such as puncture, mutilation, etc.;
- where fish are held or transported live, care should be taken to maintain factors that can influence fish health (e.g. CO_2, O_2, temperature, nitrogenous wastes, etc.);
- fish should not be trampled or stood upon;
- where boxes are used for storage of fish they should not be overfilled or stacked too deeply;
- while fish are on deck, exposure to the adverse effects of the elements should be kept to a minimum in order to prevent unnecessary dehydration;
- finely divided ice should be used where possible, which can help minimise damage to fish and maximise cooling capacity;
- in refrigerated water storage areas, the density of the fish should be controlled to prevent damage.

SECTION 5 HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) AND DEFECT ACTION POINT (DAP) ANALYSIS

The Hazard Analysis Critical Control Point (HACCP) is a science-based system which is aimed to prevent food safety problems from occurring rather than reacting to non-compliance of the finished product. The HACCP system accomplishes this by the identification of specific hazards and the implementation of control measures. An effective HACCP system should reduce the reliance on traditional end-product testing. Section 5 explains the principles of HACCP as it applies to the handling and processing of fish and fishery products, but the Code can only provide guidance on how to use these principles and offer suggestions as to the type of hazards which may occur in the various fish and fishery products. The HACCP plan, which should be incorporated into the food management plan should be well documented and be as simple as possible. This section will demonstrate one format, which may be considered in the development of the HACCP plan.

Section 5 also explains how a similar approach involving many of the principles can apply to the broader application covering the essential quality, composition and labelling provisions of Codex standards or other non-safety requirements which in this case are referred to as **Defect Action Point Analysis**. This approach for defect analysis is optional and other techniques, which achieve the same objective, may be considered.

Figure 5.1 summarises how to develop a HACCP and Defect Analysis system.

5.1 HACCP PRINCIPLES

The HACCP system consists of seven principles[3], which are:

PRINCIPLE 1
Conduct a hazard analysis.

PRINCIPLE 2
Determine the Critical Control Points (CCPs).

PRINCIPLE 3
Establish critical limit(s).

PRINCIPLE 4
Establish a system to monitor control of the CCP.

PRINCIPLE 5
Establish the corrective action to be taken when monitoring indicates that a particular CCP is not under control.

PRINCIPLE 6
Establish procedures for verification to confirm that the HACCP system is working effectively.

PRINCIPLE 7
Establish documentation concerning all procedures and records appropriate to these principles and their application.

These principles have to be followed in any consideration of HACCP.

HACCP is an important management tool, which can be used by operators for ensuring safe, efficient processing. It must also be recognised that personnel training is essential in order that HACCP will be effective. In following HACCP principles, users are requested to list all of the hazards that may be reasonably expected to occur for each product type at each step or procedure in the process from point of harvest, during unloading, transport, storage or during processing, as appropriate to the process defined. It is important that HACCP principles be considered on a specific basis to reflect the risks of the operation.

5.2 DEFECT ACTION POINT ANALYSIS

Since the Code is intended to cover not only those hazards associated with safety but to include other aspects of production including the essential product quality, composition and labelling provisions as described in product standards developed by the Codex Alimentarius Commission, not only are critical control points (CCP) described but also defect action points (DAP) are included in the Code. The HACCP principles may be applied to the determination of a DAP, with quality instead of safety parameters being considered at the various steps.

5.3 APPLICATION

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[3] *International Recommended Code of Practice – General Principles of Food Hygiene* (CAC/RCP 1-1969, Rev.3 - 1997), Annex: *HACCP System and Guidelines for its Application.*

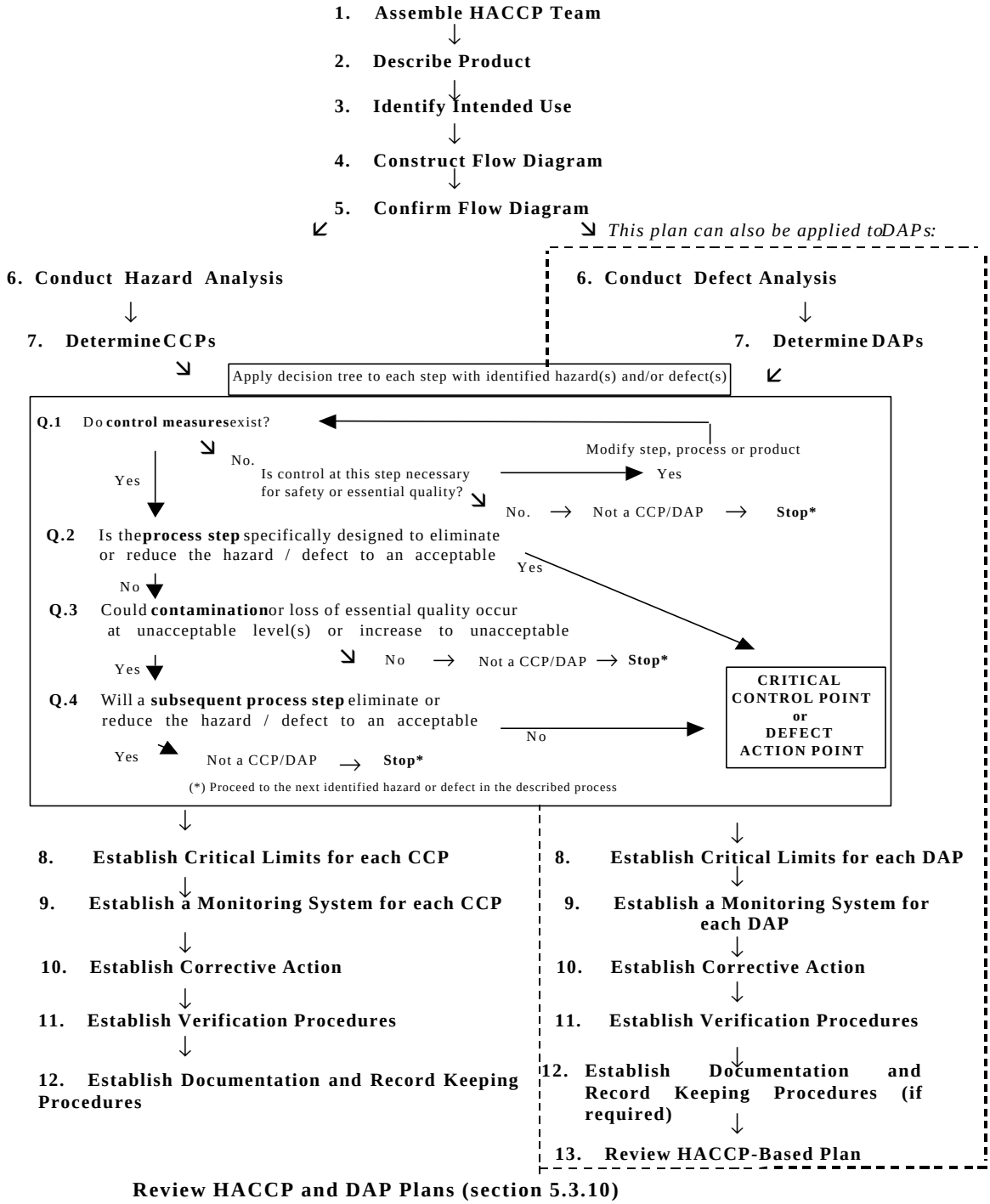

Figure 5.1 Summary of how to implement a HACCP and Defect Analysis

Each aquaculture, molluscan shellfish, and fish processing facility should ensure that the provisions of the appropriate Codex standards are met. To accomplish this, each facility should implement a food safety management system based on HACCP principles and should at least consider a similar approach to defects, both of which are described in this code. Prior to the application of HACCP to any segment of the growing, handling and processing chain of fish and fishery products, that segment must be supported by a pre-requisite programme based on good hygienic practice (see Section 3). It should be noted that parts of the pre-requisite programme may be classified as a CCP or DAP within a particular process.

The food management system developed should indicate responsibility, authority and the interrelationships of all personnel who manage, perform and verify work affecting the performance of such systems. It is important that the collection, collation and evaluation of scientific and technical data should be carried out by a multi-disciplinary team. Ideally, a team should consist of people with the appropriate level of expertise together with those having a detailed knowledge of the process and product under review. Examples of the type of personnel to include on the team are the processing facility manager, a microbiologist, a quality assurance/quality control specialist, and others such as buyers, operators, etc., as necessary. For small-scale operations, it may not be possible to establish such a team and therefore external advice should be sought.

The scope of the HACCP plan should be identified and should describe which segments of the food chain is involved and the general classes of hazards to be addressed.

The design of this programme should identify critical control points in the operation where the processing facility or product will be controled, the specification or standard to be met, the monitoring frequency and sampling plan used at the critical control point, the monitoring system used to record the results of these inspections and any corrective action when required. A record for each critical control point that demonstrates that the monitoring procedures and corrective actions are being followed should be provided. The records should be maintained as verification and evidence of the plant's quality assurance programme. Similar records and procedures may be applied to DAPs with the necessary degree of record keeping. A method to identify, describe, and locate the records associated with HACCP programmes should be established as part of the HACCP programme.

Verification activities include the application of methods; procedures (review/audit) and tests in addition to those used in monitoring to determine:

- the effectiveness of the HACCP or DAP plan in delivering expected outcomes i.e. validation;
- compliance with the HACCP or DAP plan, e.g. audit/review;
- whether the HACCP or DAP plan or its method of application need modification or revalidation."

Table 5.1 A product description for Canned Tuna in Salted Water

	Objective	Example
Product name(s)	Identify the species and method of processing.	Canned tuna in salted water
Source of raw material	Describe the origin of the fish	Yellowfin tuna caught by purse seine in the Gulf of Guinea Whole brine frozen
Important final product characteristics	List characteristics that affect product safety and essential quality, especially those that influence microbial flora.	Compliance with Codex Standard Canned Tuna and Bonito; 'low-acid' food; can seal integrity.
Ingredients	List every substance added during processing. Only ingredients approved by the official agency having jurisdiction may be used.	water, salt
Packaging	List all packaging materials. Only materials approved by the official agency having jurisdiction may be used.	Container in coated chromium steel, capacity : 212 ml, total net weight : 185 g, fish weight : 150 g Traditional opening
How the end product is to be used	State how the final product is to be prepared for serving, especially whether it is ready to eat.	Ready to eat
Shelf life (if applicable)	State the date when the product can be expected to begin to deteriorate if stored according to instructions.	3 years
Where the product will be sold	Indicate the intended market. This information will facilitate compliance with target market regulations and standards.	Domestic retail market.
Special labelling instructions	List all instructions for safe storage and preparation	"Best before the date shown on label."
Special distribution control	List all instructions for safe product distribution.	None

The implementation of HACCP principles is better identified in the Logic Sequence for implementation of HACCP (Figure 5.1).

This flow chart is for illustrative purposes only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process.

References correspond to relevant Sections of the Code.

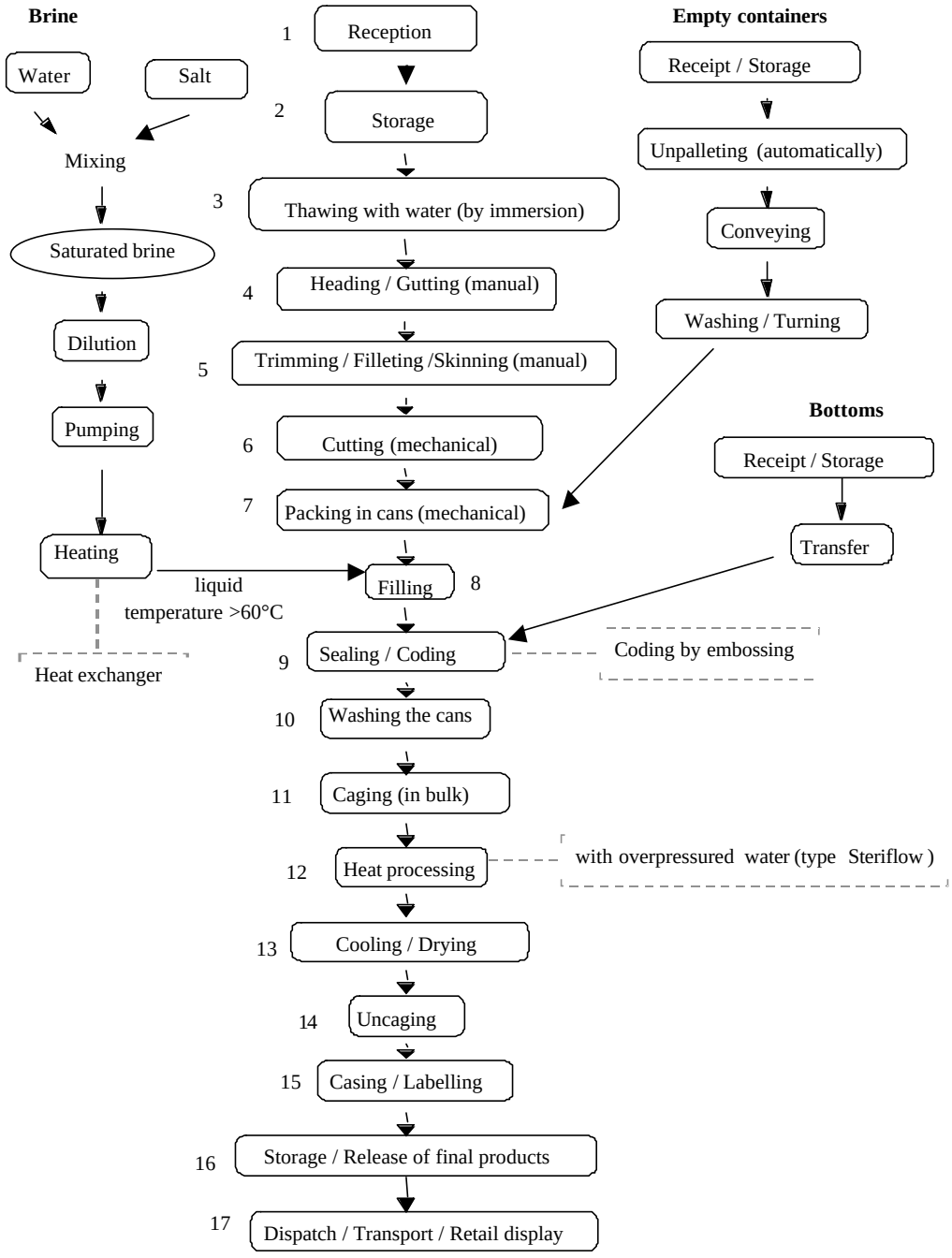

Figure 5.2 Example of a flow diagram for a canned tuna fish processing line

5.3.1 Describe Product

In order to gain a greater understanding and knowledge of the product under review, a thorough product description evaluation should be carried out. This exercise will facilitate in the identification of potential hazards or defects. An example of the type of information used in describing a product is given in Table 5.1.

5.3.2 Flow Diagram

For Hazard and Defect Analysis, it is necessary to carefully examine both the product and the process and produce a flow diagram(s). Any flow diagram should be as simple as possible. Each step in the process, including process delays from the selection of raw materials through to the processing, distribution, sale and customer handling, should be clearly outlined in sequence with sufficient technical data to avoid ambiguity. If a process is too complex to be easily represented by a single flow diagram, then it can be sub-divided into constituent parts, provided the relationship between each of the parts is clearly defined. It is helpful to number and label each processing step for ease of reference. An accurate and properly constructed flow diagram will provide the multi-disciplinary team with a clear vision of the process sequence. Once CCPs and DAPs have been identified they can be incorporated into the flow diagram specific for each processing facility. Figure 5.2 represents an example of a flow diagram for a canned tuna fish processing line. For examples of different processes see Figures 6.1 to 15.1 in the individual processing sections of the code.

5.3.3 Conduct Hazard and Defect Analysis

The purposes of hazard analysis are to identify all such food safety hazards at each Step, to determine their significance and to assess whether control measures for those hazards are available at each Step. Defect analysis serves the same purpose for potential quality defects.

5.3.3.1 Identification of Hazards and Defects

It cannot be stressed enough that where practical and feasible each individual facility should gather sound scientific and technical data relevant to the businesses for each step, from primary production, processing, manufacture, storage and distribution until the point of consumption. The assembly and nature of this information should be such to ensure that the multi-disciplinary team is able to identify and list, at each step of the process, all relevant potential hazards and defects that, in the absence of control measure(s), may likely result in the production of an unacceptable food. Table 5.2 summarises possible pre-harvest and harvest safety hazards in incoming fish & molluscan shellfish and Table 5.3 summarises possible safety hazards introduced in the post harvest and further processing of fish & molluscan shellfish.

It is important to identify potential hazards and defects in the operation from the point of view of plant construction, equipment used in the plant and hygienic practices, including those which may be associated with the use of ice and water. This is covered by the pre-requisite programme and is used to denote hazards that are common to almost any point in the process.

Table 5.2 Examples of Pre-harvest and Harvest Hazards in Incoming Fish & Shellfish

Biological		Chemical		Physical	
Parasites:	Parasites of public health significance: Trematodes, Nematodes, Cestodes	**Chemicals:**	Pesticides, herbicides, algicides, fungicides, anti-oxidants (added in feeds);	**Foreign Matter**	fish hooks
Pathogenic bacteria:	Salmonella, Shigella, E.coli, Vibrio cholerae, Vibrio parahaemolyticus, Vibrio vulnificus,	**Veterinary drug residues:**	Antibiotics, growth promoters (hormones), other feed additives		
Enteric Viruses:	Norwalk virus	**Heavy metals:**	Metals leached from marine sediments and soil, from industrial wastes, from sewage or animal manures		
Biological toxins:	Tetrodotoxin; Ciguatoxin, [Paralytic Shellfish Poisoning (PSP), Diarrheic Shellfish Poisoning (DSP), Neurotoxic Shellfish Poisoning (NSP), Amnesic Shellfish Poisoning (ASP)]				
		Miscellaneous:	Petroleum		

Table 5.3 Examples of Hazards Introduced in the Post Harvest and Further Processing of Fish & Shellfish*.

Biological		Chemical		Physical	
Pathogenic bacteria:	Listeria monocytogenes, Clostridium botulinum, Staphylococcus aureus	**Chemicals:**	Disinfectants, Sanitizers or Lubricants (Misapplication)	**Foreign Matter**	Metal fragments; hard or sharp objects
Enteric Viruses:	Hepatitis A, Rotovirus		Disinfectants, Sanitizers or Lubricants (non-approved)		
Biological toxins:	Scombrotoxin, Staph. Enterotoxin, botulinum toxin				
		Ingredients and Additives:	Misapplication and non-approved		

Note: For biological hazards, environmental factors (for example: temperature, oxygen availability, pH and A_w) play a major role in their activity and growth, therefore the type of processing the fish will undergo, and its

subsequent storage, will determine their risk to human health and inclusion in a food safety management plan. In addition, some hazards may show a certain degree of overlap between the two levels of operation through their existence and manifestation into the water supply.

* For hazards relating to specific products see the relevant processing section.
For the example on canned tuna developed in this section, the following essential potential hazards can be identified:

Table 5.4: An example of potential hazards for canned tuna

	In raw materials (frozen tuna)	During processing or storage or transportation
Biological	Presence of *Cl. botulinum,* Presence of histamine	Contamination by *Cl. Botulinum,* Growth of *Cl. Botulinum,* Survival of spores of *Cl. Botulinum,* Contamination and growth of *Staphylococcus aureus* Microbial recontamination after heat processing Production of histamine during processing, Production of staphylotoxin
Chemical	Presence of heavy metals	Recontamination by metals coming from the cans Recontamination by cleaning agents, by the brine, by mechanical grease, …
Physical	Presence of foreign material	Recontamination during processing (pieces of knives, by the cans, …)

For the example on canned tuna developed in this section, the following potential defects can be identified:

Table 5.5 An example of potential defects of canned tuna

	In raw materials (frozen tuna)	During processing or storage or transportation of cans
Biological	Decomposition	Decomposition, survival of micro-organisms responsible of decomposition, …
Chemical		oxidation during storage, …
Physical		Objectionable matters (viscera, scales, skin, …), formation of struvite crystals, container defects (panelled container, …)
Others	species substitution	abnormal flavours, incorrect weight, incorrect coding, incorrect labelling

5.3.3.1.1 Hazards

It is equally important to consider, naturally occurring food safety hazards in the environment from which fish are harvested. In general, risks to consumer health from seafoods captured in unpolluted marine environments are low, provided these products are handled in line with principles of Good Manufacturing Practice. However, as with all foods, there are some health risks associated with the consumption of certain products, which may be increased when the catch is mishandled after harvest. Fish from some marine environments, such as tropical reef fish, can pose a consumer risk from natural marine toxins, such as ciguatera. The risk of adverse health effects from certain hazards might be increased under certain circumstances in products from aquaculture when compared with fish from the marine environment. The risks of foodborne disease associated with products from aquaculture are related to inland and coastal ecosystems, where the potential of environmental contamination is greater when compared to capture fisheries. In some parts of the world, where fish are consumed either raw or partially cooked, there is an increased risk of foodborne parasitic or bacterial disease. In order to perform a hazard analysis as part of the process of developing a HACCP plan, fish processors must have scientific information on potential hazards associated with raw material and products for further processing.

5.3.3.1.2 Defects

Potential defects are outlined in the essential quality, labelling and composition requirements described in the Codex Standards listed in Appendix XII. Where no Codex Standard exists regard should be made to national regulations and/or commercial specifications.

End product specifications outlined in Appendices II - XI, describe optional requirements which are intended to assist buyers and sellers in describing those provisions which are often used in commercial transactions or in designing specifications for final products. These requirements are intended for voluntary application by commercial partners and not for application by governments.

5.3.3.2 Significance of Hazards and Defects

One of the most important activities, which must be performed in a processing facility as part of the food safety management system is to determine if an identified hazard or defect is significant. The two primary factors that determine whether a hazard or defect is significant for HACCP purposes are probability of occurence of an adverse health effect and the severity of the effect. A hazard that has a high severity of effect, such as death from *Clostridium botulinum* toxin, may impose a societallu unacceptable risk at very low probability of occurence, and thus warrant the application of HACCP controls (i.e., be a significant hazard for purposes of HACCP). Thus, in the processed canned tuna, *Clostridium botulinum* should be considered a significant hazard to be controlled through the application of a validated thermal process schedulle. On the other hand, a hazard with a relatively low severity, such as mild gastroenteritis, might not warrant the HACCP controls at the same very low probaility of occurence, and thus not be significant for purposes of HACCP.

Information gathered during the product description exercise (refer to Section 5.3.1 – Describe Product) could also help facilitate the detrmination of significance since the likelihood of occurence of hazard or defect can be affected by factors such as how the consumer will likely use the product (e.g., to consumed or cooked raw); the types of consumers who will likely consume it (e.g., immuno-compromised, eldery, chlidren, etc.) and the method of storage and distribution (e.g., refrigeratyed or frozen).

Once significant hazard and defects have been identified, consideration needs to be given to assess their potential to be introduced or controlled at each step of the process. The use of a flow diagram (refer to Section 5.3.2 – Flaw Diagram) is beneficial for this purpose. Control measures must be considered for significant hazard(s) or defect(s) associated with each step with the aim of eliminating its possible occurence or to reduce it to an acceptable level. A hazard or defct may be controlled by more that one control measure. For illustrative purposes, tables 5.6 and 5.7 demonstrate an approach to listing significant hazards and defcts and the related control measures for the procesing step, ”Heat Processing”.

Table 5.6 An example of the significant hazard survival of *Cl. Butulinum* at the step of heat processing for canned tuna

Processing step	Potential hazard	Is the potential hazard significant?	Justification	Control measures
12. Heat processing	*Cl. botulinum* viable spores	Yes	A non-efficient heat processing may result in survival of *C. botulinum* spores and therefore, possibility of toxin production. A product must be commercially sterile	Ensure adequate heat applied for proper time at retort

Table 5.7: An example of the significant defect rancidity during the storage of frozen tuna for canned tuna

Processing step	Potential defect	Is the potential defect significant?	Justification	Control measures
2. Storage of frozen tuna	Persistent and distinct objectionable odours or flavours indicative of rancidity	Yes	Product does not meet quality or customer reiquirements	Controlled temperature in the storage premises Stock management procedure Maintenance procedure of the refrigeration system Personnel training and qualification

Table 5.8 A schematic example of a hazard analysis with corresponding control measures and the application of the Codex decision tree for the determination of a critical control point at processing step 12 of the example process as set out in Figure 5.2.

Processing Step N° 12 Heat processing		**Application of Codex Decision Tree**			
Potential Hazards	Control Measures				
Cl. botulinum viable spores	Ensure adequate heat applied for proper time at retort	**Q1**: Do control measures exist? **If yes** – go to Q2. **If no** – consider whether control measures are available or necessary within the process. Proceed to next identified hazard.	**Q2**: Is the step specifically designed to eliminate or reduce the likely occurrence of *Cl. botulinum* to an acceptable level? **If yes** – this step is a CCP. **If no** – go to Q3.	**Q3**: Could contamination occur in excess of acceptable levels or could these increase to unacceptable levels? **If yes** – go to Q4. **If no** – not a CCP.	**Q4**: Will a subsequent step eliminate or reduce the hazard to an acceptable level? **If yes** – not a CCP. **If no** – CCP. *What about consideration of a previous step?*
		A: Yes: a heat processing procedure (schedule, method) is clearly defined.	**A**: Yes, this step was specifically designed to eliminate spores.		
		Decision: Processing step N°12 « Heat processing » is a **Critical Control Point**			

5.3.4 Determine Critical Control Points and Defect Action Points

A thorough and concise determination of Critical Control Points and Defect Action Points in a process is important in ensuring food safety and compliance with elements related to essential quality, composition and labelling provisions of the appropriate Codex standard. The Codex decision tree (Figure 5.1, step 7) is a tool , which can be applied, to the determination of CCPs and a similar approach may be used for DAPs. Using this decision tree, a significant hazard or defect at a step can be assessed through a logical sequence of questions. Where CCPs and DAPs have been identified at a step, that point in the process must be controlled to prevent, reduce or eliminate the likely occurrence of the hazard or defect to an acceptable level. For illustrative purposes, an example of the application of the Codex decision tree to a hazard and defect using the canned tuna fish processing line, are shown in Tables 5.4 & 5.5, respectively.

Table 5.9 A schematic example of a defect analysis with corresponding control measures and the application of the Codex decision tree for the determination of a defect action point at processing step 2 of the example process as set out in Figure 5.2.

<table>
<tr><th colspan="2">Processing Steps N°2
Storage of frozen tuna</th><th colspan="4">Application of Codex Decision Tree</th></tr>
<tr><td>Potential Defects</td><td>Control Measures</td><td colspan="4"></td></tr>
<tr><td rowspan="2">Persistent and distinct objectionable odours or flavours indicative of rancidity</td><td rowspan="2">Controlled temperature in storage premises.
Stock managemnt procedure.</td><td>Q1: Do control measures exist?

If yes – go to Q2.

If no – consider whether control measures are available or necessary within the process.

Proceed to next identified hazard.</td><td>Q2: Is the step specifically designed to eliminate or reduce the likely occurrence of rancidity to an acceptable level?

If yes – this step is a DAP.

If no – go to Q3.</td><td>Q3: Could rancidity occur in excess of acceptable levels or could it increase to unacceptable levels?

If yes – go to Q4.

If no – not a DAP.</td><td>Q4: Will a subsequent step eliminate rancidity or reduce its likely occurrence to acceptable level?

If yes – not a DAP.

If no – DAP. What about consideration of a previous step?</td></tr>
<tr><td>A: Yes, the storage temperature is controlled, procedures exist</td><td>A: No</td><td>A : Yes, if the storage time is too long and/or the storage temperature is too high</td><td>A : No</td></tr>
<tr><td colspan="4">Decision: Processing Step N°2 « Storage of frozen tuna » is a Defect Action Point</td></tr>
</table>

5.3.5 Establish Critical Limits

For each CCP and DAP, critical limits for the control of the hazard or defect must be specified. For any given hazard or defect, it may be necessary to have more than one critical limit designated for each control measure. The establishment of critical limits should be based on scientific evidence and validated by appropriate technical

experts to ensure its effectiveness in controlling the hazard or defect to the determined level. Table 5.10 illustrates critical limits for a CCP and a DAP using a canned tuna fish processing line as an example.

5.3.6 Establish Monitoring Procedures

Any monitoring system developed by the multi-disciplinary team should be designed to detect loss of control at a CCP or DAP relative to its critical limit. The monitoring activity of a CCP or DAP should be documented in a concise fashion providing details regarding the individual responsible for the observation or measurement, the methodology used, the parameter(s) being monitored and the frequency of the inspections. The complexity of the monitoring procedure should also be carefully considered. Considerations include optimising the number of individuals performing the measurement and selection of appropriate methods, which will produce rapid results (for example: time, temperature, pH). For CCPs, records of monitoring should be acknowledged and dated by a responsible person for verification.

Because each process is unique for each fish product, it is possible only to present, for illustrative purposes, an example of a monitoring approach for a CCP and DAP using the canned tuna fish processing line. This example is shown in Table 5.10.

5.3.7 Establish Corrective Action

An effective HACCP or DAP plan is anticipatory by nature and it is recognised that corrective action may be necessary from time to time. A documented corrective action program should be established to deal with instances where the critical limit has been exceeded and loss of control has occurred at a CCP or DAP. The goal of this plan is to ensure that comprehensive and specific controls are in place and can be implemented to prevent the affected lot(s) from reaching the consumer. Of equal importance, is an assessment by plant management and other appropriate personnel to determine the underlying reason(s) why control was lost. For the latter, a modification to HACCP and DAP plans may be necessary. A record of investigation results and actions taken should be documented by a responsible person for each instance where loss of control occurred at a CCP or DAP. The record should demonstrate that control of the process has been re-established. An example of a corrective action approach for a CCP and DAP using a canned tuna fish processing line is illustrated in Table 5.10.

5.3.8 Establish Verification Procedures

A processing facility should establish a verification procedure carried out byqualified individuals, to periodically assess if the HACCP and DAP plans are adequate, implemented and working properly. This step will help determine if CCPs and DAPs are under control. Examples of verification activities include: validation of all components of the HACCP plan including: a paper review of HACCP system, its procedures and records; review of corrective actions and product disposition actions when critical limits are not met and validation of established critical limits. The latter is particularly important when an unexplained system failure has occurred, when a significant change to the process, product or packaging is planned or when new hazards or defects have been identified. Observation, measurement and inspection activities within the processing facility should also be incorporated as a part of the verification procedure, where applicable. Verification activities should be carried out by qualified competent individuals. The verification frequency of the HACCP and DAP plans should be sufficient to provide assurance that their design and implementation will prevent food safety problems as well as issues associated with essential quality, composition and labelling provisions of the appropriate Codex standard to enable problems to be detected and dealt with in a timely manner. For illustration purposes, an example of a verification procedure approach for a CCP and DAP using the canned tuna fish processing line is shown in Table 5.10.

5.3.9 Establish Documentation and Record Keeping Procedures

Documentation may include Hazard Analysis, CCP determination and verification procedures.

A current, accurate and concise record keeping system will greatly enhance the effectiveness of a HACCP program and facilitate in the verification process. Examples of the elements of a HACCP plan that should be documented have been provided in this section for illustrative purposes. Inspection and corrective action records should be practical and collect all the appropriate data necessary to demonstrate “real-time” control or deviation control of a CCP. Records are recommended but not required for a DAP except where a loss of control occurred. For illustration purposes, an example of a record keeping approach for a CCP and DAP using the canned tuna fish processing line is shown in Table 5.10.

5.3.10 Review of HACCP and DAP Plans

Upon completion of all the steps for the development of HACCP and DAP plans as outlined in Figure 1 a full review of all components should be conducted. The purpose of these reviews is to verify that the plans are capable of meeting their objectives.

Table 5.10 An example of the results of the application of HACCP principles to the two specific steps in the canned tuna process (Tables 5.8 & 5.9), for a CCP & a DAP, respectively.

CCP				
Processing Step No. 12 : Heat Processing Hazard: *Clostridium botulinum* viable spores				
Critical Limit	Monitoring Procedure	Corrective Action	Records	Verification
Those specific parameters associated with heat processing.	**Who**: Qualified person assigned to heat processing **What**: All parameters **Frequency**: every batch **How**: Checks of sterilisation schedule and other factors	Who: qualified personnel What: Personnel retraining New heat processing or batch destruction Corrective maintenance of equipment Hold product until safety can be evaluated. Who: Appropriate trained personnel	Monitoring records, corrective action records, product evaluation records, calibration records, validation records, audit records, HACCP plan review record	Validation, finished product evaluation, internal audit, review of records, calibration of machinery (may be a prerequsite), review of HACCP plan, external audit

DAP				
Processing Step No. 2 : Storage of frozen tuna Defect: Persistent and distinct objectionable odours or flavours indicative of rancidity				
Critical Limit:	Monitoring Procedure	Corrective Action	Records	Verification
Number of rancid sample units cannot exceed acceptance number of established sampling plan. Storage temperature and time.	**Who**: Appropriate trained personnel **How** : Organoleptic examination Chemical tests Checking of the storage premise temperature Checking of stock forms **What**: fish quality and acceptability based on product Codex standard. **Frequency**: as required	What: Application of an intensified monitoring According to the results of this intensified inspection, immediate processing, sorting or reject of frozen tuna exceeding the critical limits. Adjust storage temperature. Personnel retraining Who: Appropriate trained personnel	Analysis results Stock forms Temperature records	On-site audit Review of monitoring and corrective action reports

Conclusion

Section 5 has demonstrated the principles of HACCP and how they should be applied to a process to ensure safe product. The same principles can be used to determine the points in a process where it is necessary to control defects. Since every processing facility and each processing line is different it is possible within this Code only to demonstrate the types of potential hazards and defects that must be considered. Furthermore, because of the nature of the significance of hazards and defects it is not possible to categorically determine which steps in a process will be CCPs and/or DAPs without actually assessing the process, the objectives of the process, its environment and expected outcomes. The example of the canned tuna fish processing line is intended to illustrate how to apply the principles, given the outcome of a commercially sterile product, and why a HACCP and DAP plan will be unique to each operation.

The remaining Sections in the Code concentrate on fish and fishery product processing and attempt to illustrate the potential hazards and defects at the various stages in a wide range of processes. In developing a HACCP or DAP plan it will be necessary to consult Sections 3 & 5 before turning to the appropriate processing section for specific advice. It should also be noted that Section 6 refers to processing of fresh, frozen and minced fish and will provide useful guidance for most fish processing operations.

SECTION 6 PROCESSING OF FRESH, FROZEN AND MINCED FISH

In the context of recognising controls at individual processing steps, this section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective action. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

In general, the processing of fresh, frozen fish and minced fish, will range in sophistication. In its simplest form, the processing of fresh and frozen fish may be presented in a raw state such as dressed, fillets, and minced to be distributed in markets and institutions or used in processing facilities. For the latter, the processing of fresh, frozen and minced fish is often an intermediate step to the production of value added products (for example, smoked fish as described in section 12, canned fish as described in section 13, frozen breaded or battered fish as described in section 15). Traditional methods often prevail in the design of a process. However, modern scientific food technology is having an increasingly important role in enhancing the preservation and shelf-stability of a product. Regardless of the complexity of a particular process, the fabrication of the desired product relies on the consecutive execution of individual steps. As stressed by this Code, the application of appropriate elements of the pre-requisite program (Section 3) and HACCP principles (Section 5) at these steps will provide the processor with reasonable assurance that the essential quality, composition and labelling provisions of the appropriate Codex standard will be maintained and food safety issues controlled.

The example of the flow diagram (Figure 6.1) will provide guidance to some of the common steps involved in a fish fillet preparation line, and three examples of final product types: modified atmosphere packaging (MAP), minced and frozen fish. As in the further processing of fresh fish in a MAP product, or minced or frozen fish, the section labelled "Fish Preparation" is used as the basis for all the other fish processing operations (Sections 7-15), where appropriate.

This flow chart is for illustrative purposes only. For in-factory HACCP implementation a complete and comprehensive flow chart has to be drawn up for each process.

References correspond to relevant Sections of the Code.

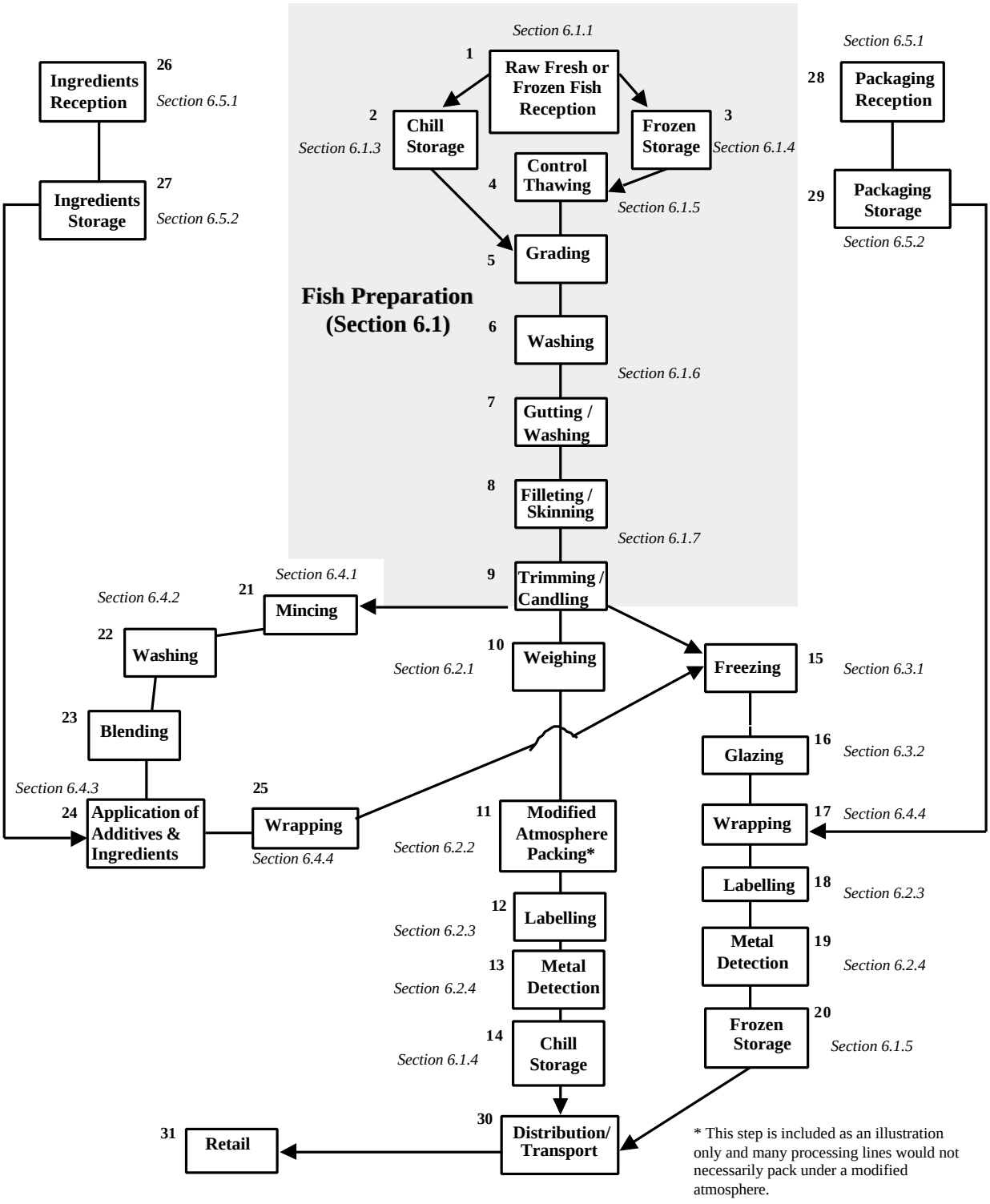

Figure 6.1 Example of a flow chart of a fish fillet preparation line, including MAP, mincing and freezing operations

6.1 FINFISH PREPARATION

The hygienic conditions and technical manner in which fish are prepared is similar and is not influenced greatly by its intended purpose (for direct distribution or for further processing). However, variations will exist in the form in which the fresh fish flesh is to be utilised. The forms may include, but not limited to, dressed, fillets or steaks.

6.1.1 Raw, Fresh or Frozen Fish Reception (Processing Steps 1)

Potential Hazards: *Microbiological pathogens, viable parasites, biotoxins, chemicals (including veterinary drug residues) and physical contamination.*

Potential Defects: *Decomposition, parasites, physical contamination*

Technical Guidance:

- for raw fish material, product specifications could include the following characteristics:
  - organoleptic characteristics such as appearance, odour, texture, etc;
  - chemical indicators of decomposition and/or contamination, for example, TVBN, histamine, heavy metals, pesticide residues, nitrates etc;
  - microbiological criteria, in particular for intermediate raw materials, to prevent the processing of raw material containing microbial toxins;
  - foreign matter;
  - physical characteristics such as size of fish;
  - species homogeneity.
- training in species identification and communication in product specification should be provided to fish handlers and appropriate personnel to ensure a safe source of incoming fish where written protocols exist. Of special consideration, are the reception and sorting of fish species that poses a risk of biotoxins such as ciguatoxin in large carnivorous tropical and sub-tropical reef fish or scombrotoxin in scombroid species or parasites;
- skills should be acquired by fish handlers and appropriate personnel in sensory evaluation techniques to ensure raw fish meet essential quality provisions of the appropriate Codex standard;
- fish requiring gutting on arrival at the processing facility should be gutted efficiently, without undue delay and with care to avoid contamination (see Section 6.1.5 - Washing & Gutting);
- fish should be rejected if it is known to contain harmful, decomposed or extraneous substances, which will not be reduced or eliminated to an acceptable level by normal procedures of sorting or preparation;
- information about the harvesting area.

6.1.1.1 Sensory Evaluation of Fish

The best method of assessing the freshness or spoilage of fish is by sensory evaluation techniques[4]. It is recommended that appropriate sensory evaluation criteria be used to evaluate the acceptability of fish and to eliminate fish showing loss of essential quality provisions of the appropriate Codex standards. As an example, fresh white fish species are considered unacceptable when showing the following characteristics:

Skin / Slime:	dull, gritty colours with yellow brown dotting slime.
Eyes:	Concave, opaque, sunken discoloured.
Gills:	grey – brown or bleached, slime opaque yellow, thick or clotting.
Odour:	flesh odour amines, ammonia, milky lactic, sulphide, faecal, putrid, rancid.

[4] Guidelines for Sensory Evaluation of Fish and Shelfish in Laboratories (CAC/GL 31-1999)

6.1.2 Chilled Storage (Processing Steps 2 & 14)

Potential Hazards: *Microbiological pathogens and biotoxins.*

Potential Defects: *Decomposition, physical damage.*

Technical Guidance:

- fish should be moved to the chill storage facility without undue delay;
- the facility should be capable of maintaining the temperature of the fish between [0ºC - +4ºC];
- the chill room should be equipped with a calibrated indicating thermometer. Fitting of a recording thermometer is strongly recommended;
- stock rotation plans should ensure proper utilisation of the fish;
- the fish should be stored in shallow layers and surrounded by sufficient finely divided ice or with a mixture of ice and of water before processing;
- fish should be stored such that damage will be prevented from over-stacking or over-filling of boxes;
- fish should be rejected if known to contain harmful, decomposed or extraneous substances, which will not be eliminated or reduced to an acceptable level by normal procedures of sorting or preparation. An appropriate assessment should be carried out to determine the reason(s) for loss of control and the HACCP or DAP plan should be modified where necessary;
- where appropriate replenish ice supply on the fish or alter temperature of the room.

6.1.3 Frozen Storage (Processing Steps 3 & 20)

Potential Hazards: *Unlikely. Microbiological pathogens, toxins, viable parasites*

Potential Defects: *Dehydration, rancidity, loss of nutritional quality*

Technical Guidance:

- the facility should be capable of maintaining the temperature of the fish at or colder than -18ºC, and with minimal temperature fluctuations;
- the store should be equipped with a calibrated indicating thermometer. Fitting of a recording thermometer is strongly recommended;
- a systematic stock rotation plan should be developed and maintained;
- product should be glazed and/or wrapped to protect it from dehydration;
- fish should be rejected if known to contain defects, which subsequently cannot be reduced or eliminated to an acceptable level by re-working. An appropriate assessment should be carried out to determine the reason(s) for loss of control and the DAP plan modified where necessary.

6.1.4 Control Thawing (Processing Step 4)

Potential Hazards: *Microbiological pathogens and biotoxins*

Potential Defects: *Decomposition*

Technical Guidance:

- the thawing method should be clearly defined and should address the time and temperature of thawing, temperature measuring instrument used and placement of device for measurement. The thawing schedule (time and temperature parameters) should be carefully monitored. Selection of the thawing method should take into account in particular the thickness and uniformity of size of the products to be thawed;
- thawing time and temperature and fish temperature critical limits should be selected so as to control the development of micro-organisms, histamine, where high risk species are concerned or persistent and distinctive objectionable odours or flavours indicative of decomposition or rancidity;
- where water is used as the thawing medium, it should be of potable quality;
- where recycling of water is used, care should be taken to avoid the build up of microorganisms;
- where water is used, circulation should be sufficient to produce even thawing;

- during thawing, according to the method used, products should not be exposed to excessively high temperatures;
- particular attention should be paid to controlling condensation and drip from the fish. An effective drainage should be made;
- after thawing, fish should be immediately processed or refrigerated and kept at the adequate temperature (temperature of melting ice);
- fish should be rejected if known to contain harmful, decomposed or extraneous substances, which will not be eliminated or reduced to an acceptable level by normal procedures of sorting or preparation. An appropriate assessment should be carried out to determine the reason(s) for loss of control and the HACCP or DAP plan should be modified where necessary;
- the thawing schedule should be reviewed as appropriate and amended where necessary.

6.1.5 Washing and Gutting (Processing Steps 6 & 7)

Potential Hazards: *Microbiological pathogens and biotoxins*

Potential Defects: *Presence of viscera, bruising, off-flavours, cutting faults.*

Technical Guidance:

- gutting is considered complete when the intestinal tract and internal organs have been removed;
- an adequate supply of clean sea water or potable water should be available for washing of:
  - whole fish to remove foreign debris and reduce bacterial load prior to gutting;
  - gutted fish to remove blood and viscera from the belly cavity;
  - surface of fish to remove any loose scales;
  - gutting equipment and utensils to minimise build-up of slime and blood and offal;
- depending on the vessel or processing facility product flow pattern and where a prescribed critical limit for staging time and temperature regime has been established for the control of histamine or a defect, the gutted fish should be drained and well iced or appropriately chilled in clean containers and stored in specially designated and appropriate areas within the processing facility;
- separate and adequate storage facilities should be provided for the fish roe, milt and livers, if these are saved for later utilisation.

6.1.6 Filleting, Skinning, Trimming and Candling (Processing Steps 8 & 9)

Potential Hazards: *Viable parasites, microbiological pathogens and biotoxins, presence of bones.*

Potential Defects: *Parasites, presence of bones, objectionable matter (e.g. skin, scales, etc.), decomposition.*

Technical Guidance:

- to minimise time delays, the design of the filleting line and candling line, where applicable, should be continuous and sequential to permit the uniform flow without stoppages or slow-downs and removal of waste;
- an adequate supply of clean sea water or potable water should be available for washing of:
  - fish prior to filleting or cutting especially fish that have been scaled;
  - fillets after filleting or skinning or trimming to remove any signs of blood, scales or viscera;
  - filleting equipment and utensils to minimise build-up of slime and blood and offal;
  - for fillets to be marketed and designated as boneless, fish handlers should employ appropriate inspection techniques and use the necessary tools to remove bones not meeting Codex standards[5,6] or commercial specifications;
- The candling of skinless fillets by skilled personnel, in a suitable location which optimises the illuminating effect, is an effective technique in controlling parasites (in fresh fish) and should be employed when implicated fish species are being used;

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[5] Codex Standard for Quick Frozen Blocks of Fish Fillet, Minced Fish Flesh and Mixtures of Fillets and Minced Fish Flesh (Codex Stan. 165-1989, Rev.1-1995)

[6] Codex Standard for Quick Frozen Fish Fillets (Codex Stan. 190-1995)

- the candling table should be frequently cleaned during operation in order to minimise the microbial activity of contact surfaces and the drying of fish residue due to heat generated from the lamp;
- where a prescribed critical limit for staging time and temperature regime has been established for the control of histamine or a defect, the fish fillets should be well iced or appropriately chilled in clean containers, protected from dehydration and stored in appropriate areas within the processing facility.

6.2 PROCESSING OF MODIFIED ATMOSPHERE PACKED FISH

This section is designed to augment the processing of fresh fish section with additional operation steps pertaining specifically to the modified atmosphere packing of fish (see also Appendix I).

6.2.1 Weighing (Processing Step 10)

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect net weight*

Technical Guidance:

- weigh scales should be periodically calibrated with a standardised mass to ensure accuracy.

6.2.2 Modified Atmosphere Packaging (Processing Step 11)

Potential Hazards: *Subsequent microbiological pathogens and biotoxins, physical contamination (metal).*

Potential Defects: *Subsequent decomposition*

Technical Guidance:

The extent to which the shelf-life of the product can be extended by MAP will depend on the species, fat content, initial bacterial load, gas mixture, type of packaging material and, especially important, the temperature of storage. Refer to Appendix I for process control issues in modified atmosphere packaging.

- modified atmosphere packaging should be strictly controlled by:
  - monitoring the gas to product ratio;
  - types and ratio of gas mixtures used;
  - type of film used;
  - type and integrity of the seal;
  - temperature control of product during storage;
- fish flesh should be clear of the seam area;
- packaging material should be inspected prior to use to ensure that it is not damaged or contaminated;
- packaging integrity of the finished product should be inspected at regular intervals by an appropriately trained personnel to verify the effectiveness of the seal and the proper operation of the packaging machine;
- following sealing, MAP products should be transferred carefully and without undue delay to chilled storage.

6.2.3 Labelling (Processing Steps 12 & 18)

Potential Hazards: *Unlikely*

Potential Defects: *Incorrect labelling*

Technical Guidance:

- prior to their application, labels should be verified to ensure that all information declared meet, where applicable, the Codex General Standard for the Labelling of Pre-packaged Foods[7], labelling provisions of the appropriate Codex Standard for products and/or other relevant national legislative requirements;

[7] Codex General Standard for the Labelling of Pre-packaged Foods (Codex Stan 1-1985, Rev. 2-1999)

- in many cases it will be possible to re-label incorrectly labelled products. An appropriate assessment should be carried out to determine the reason(s) for incorrect labelling and the DAP plan should be modified where necessary;

6.2.4 Metal Detection (Processing Steps 13 & 19)

Potential Hazards: *Metal contamination*

Potential Defects: *Unlikely*

Technical Guidance:

- it is important that line speeds are adjusted to allow for the proper functioning of a metal detector;
- routine procedures should be initiated to ensure product rejected by the detector is investigated as to the cause of the rejection;
- metal detectors, if used, should be periodically calibrated with a known standard to ensure proper operation;

6.3 PROCESSING OF FROZEN FISH

This section is designed to augment the processing of fresh fish section with additional operation steps pertaining specifically to the processing of frozen fish.

6.3.1 Freezing Process (Processing Step 15)

Potential Hazards: *Viable parasites.*

Potential Defects: *Texture deterioration, development of rancid odours, freezer burn*

Technical Guidance:

The fish product should be subjected to a freezing process as quickly as possible since unnecessary delays before freezing will cause temperature of the fish products to rise, increasing the rate of quality deterioration and reducing shelf-life due to the action of micro-organisms and undesirable chemical reactions.

- a time and temperature regime for freezing should be established and should take into consideration the freezing equipment and capacity; the nature of the fish product including thermal conductivity, thickness, shape and temperature and the volume of production, to ensure that the range of temperature of maximum crystallisation is passed through as quickly as possible;
- the thickness, shape and temperature of fish product entering the freezing process should be as uniform as possible;
- processing facility production should be geared to the capacity of freezers;
- frozen product should be moved to the cold storage facility as quickly as possible;
- the core temperature of the frozen fish should be monitored regularly for completeness of the freezing process;
- frequent checks should be made to ensure correct operation of freezing;
- accurate records of all freezing operations should be kept.

6.3.2 Glazing (Processing Step 16)

Potential Hazards: *Microbiological pathogens, biotoxins*

Potential Defects: *Subsequent dehydration, incorrect net weight*

Technical Guidance:

- glazing is considered complete when the entire surface of the frozen fish product is covered with a suitable protective coating of ice and should be free of exposed areas where dehydration (freezer-burn) can occur;
- if additives are used in the water for glazing, care should be taken to ensure its proper proportion and application with product specifications;
- where the labelling of a product is concerned, information on the amount or proportion of glaze applied to a product or a production run should be kept and used in the determination of the net weight which is exclusive of the glaze;

- where appropriate monitoring should ensure that spray nozzles do not become blocked;
- where dips are used for glazing it is important to replace the glazing solution periodically to minimise the bacterial load and build-up of fish protein, which can hamper freezing performance;

6.4 PROCESSING OF MINCED FISH

This section is designed to augment the processing of fresh fish section (prior to mincing) and processing of frozen fish section (after mincing) with additional operation steps pertaining specifically to the processing of minced fish.

6.4.1 Mincing Fish Using Mechanical Separation Process (Processing Step 21)

Potential Hazards: *Microbiological pathogens and biotoxins, physical contamination (metal, bones, rubber from separator belt, etc).*

Potential Defects: *Incorrect separation (i.e. objectionable matter), decomposition, presence of defect bones, parasites.*

Technical Guidance:

- the separator should be fed continuously but not excessively;
- candling is recommended for fish suspected of high infestation with parasites;
- split fish or fillets should be fed to the separator so that the cut surface contacts the perforated surface;
- fish should be fed to the separator in a size that it is able to handle;
- in order to avoid time-consuming adjustments of the machinery and variations in quality of the finished product, raw materials of different species and types should be segregated and processing of separate batches should be carefully planned;
- the perforation sizes of the separator surface as well as the pressure on the raw material should be adjusted to the characteristics desired in the final product;
- the separated residual material should be carefully removed on a continuous or near-continuous basis to the next processing stage;
- temperature monitoring should ensure undue temperature rises of the product are avoided.

6.4.2 Washing of Minced Fish (Processing Step 22)

Potential Hazards: *Microbiological pathogens and biochemical toxins.*

Potential Defects: *Poor colour, poor texture, excess of water*

Technical Guidance:

- if necessary the mince should be washed and should be adequate for the type of product desired;
- stirring during washing should be carried out with care, but it should be kept as gentle as possible in order to avoid excessive disintegration of the minced flesh which will reduce the yield due to the formation of fines;
- the washed minced fish flesh may be partially de-watered by rotary sieves or centrifugal equipment and the process completed by pressing to appropriate moisture content;
- if necessary, and depending on eventual end-use, the de-watered mince should be either strained or emulsified;
- special attention should be taken to ensure mince being strained is kept cool;
- the resulting waste water should be disposed of in a suitable manner.

6.4.3 Blending and Application of Additives and Ingredients to Minced Fish (Processing Steps 23 & 24)

Potential Hazards: *Physical contamination, non-approved additives and/or ingredients.*

Potential Defects: *Physical contamination, incorrect addition of additives.*

Technical Guidance:

- if fish, ingredients and /or additives are to be added, they should be blended in the proper proportions to achieve the desired sensory quality;

- additives should comply with the requirements of the Codex General Standard for Food Additives;
- the minced fish product should be packaged and frozen immediately after preparation; if it is not frozen or used immediately after preparation it should be chilled.

6.4.4 Wrapping and Packing (Processing Steps 17 & 25)

Potential Hazards: *Unlikely.*

Potential Defects: *Subsequent dehydration, decomposition*

Technical Guidance:

- packaging material should be clean, sound, durable, sufficient for its intended use and of food grade material;
- the packaging operation should be conducted to minimise the risk of contamination and decomposition;
- products should meet appropriate standards for labelling and weights.

6.5 PACKAGING, LABELS & INGREDIENTS

6.5.1 Reception – Packaging, Labels & Ingredients (Processing Steps 26 & 28)

Potential Hazards: *Microbiological pathogens biotoxins, chemical and physical contamination*

Potential Defects: *Misdescription*

Technical Guidance:

- only ingredients, packaging material and labels complying with the processors' specification should be accepted into the processing facility;
- labels which are to be used in direct contact with the fish should be fabricated of a non-absorbent material and the ink or dye used on that label should be approved by the official agency having jurisdiction;
- ingredients and packaging material not approved by the official agency having jurisdiction should be investigated and refused at reception;

6.5.2 Storage - Packaging, Labels & Ingredients (Processing Steps 27 & 29)

Potential Hazards: *Microbiological pathogens, biotoxins, chemical and physical contamination.*

Potential Defects: *Loss of quality characteristics of packaging materials or ingredients.*

Technical Guidance:

- ingredients and packaging should be stored appropriately in terms of temperature and humidity;
- a systematic stock rotation plan should be developed and maintained to avoid out of date materials;
- ingredients and packaging should be properly protected and segregated to prevent cross-contamination;
- defective ingredients and packaging should not be used.

SECTION 13 PROCESSING OF CANNED FISH AND SHELLFISH

In the context of recognising controls at individual processing steps, this section provides examples of potential hazards and defects and describes technological guidelines, which can be used to develop control measures and corrective action. At a particular step only the hazards and defects, which are likely to be introduced or controlled at that step, are listed. It should be recognised that in preparing a HACCP and/or DAP plan it is essential to consult Section 5 (Hazard Analysis Critical Control Point (HACCP) and Defect Action Point (DAP) Analysis) which provides guidance for the application of the principles of HACCP and DAP analysis. However, within the scope of this Code of Practice it is not possible to give details of critical limits, monitoring, record keeping and verification for each of the steps since these are specific to particular hazards and defects.

This section concerns the processing of heat processed sterilised canned fish and shellfish products which have been packed in hermetically sealed rigid or semi-rigid containers[8] and intended for human consumption.

As stressed by this Code, the application of appropriate elements of the pre-requisite program (Section 3) and HACCP principles (Section 5) at these steps will provide the processor with reasonable assurance that the essential quality, composition and labelling provisions of the appropriate Codex standard will be maintained and food safety issues controlled. The example of the flow diagram (Figure 13.1) will provide guidance to some of the common steps involved in a canned fish or shellfish preparation line.

[8] Aseptic filling is not covered by this Code. Reference of the relevant code is made in Appendix XI.

This flow chart is for illustrative purpose only. For in-factory implementation of HACCP principles, a complete and comprehensive flow chart has to be drawn up for each product.

References correspond to relevant Sections of the Code.

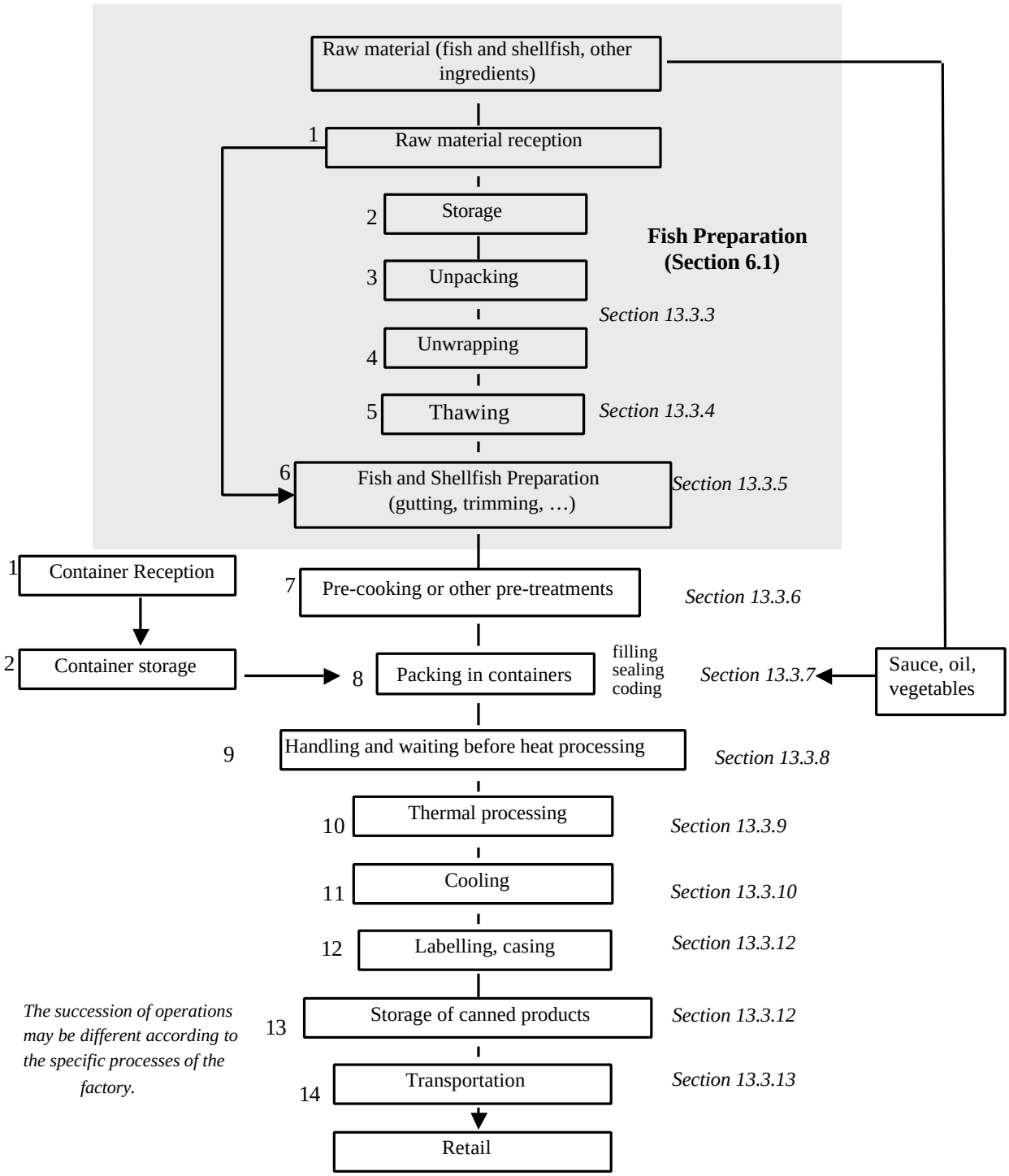

Figure 13.1 Example of a flow chart for the processing of canned fish and shellfish

13.1 GENERAL - ADDITION TO PRE-REQUISITE PROGRAMME

Section 3 (Pre-requisite programme) gives the minimum requirements for good hygienic practices for a processing facility prior to the application of hazard and defect analyses.

For fish and shellfish canneries, additional requirements to the guidelines described in Section 3 are necessary due to the specific technology involved. Some of them are listed below, but reference should also be made to the Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Food (CAC/PRC 23-1979, Rev. 2 (1993)) for further information.

- design, working and maintenance of baskets and handling and loading devices aimed at retorting should be appropriate for the kind of containers and materials used. These devices should prevent any excessive abuse to the containers.
- an adequate number of efficient sealing machines should be available to avoid undue delay in processing;
- retorts should have a suitable supply of energy, vapour, water and/or air so as to maintain in it sufficient pressure during the heat treatment of sterilisation ; their dimensions should be adapted to the production to avoid undue delays;
- every retort should be equipped with an indicating thermometer, a pressure gauge and a time and temperature recorder,
- an accurate clearly visible clock should be installed in the retorting room;
- canneries using steam retorts should consider installing automatic steam controller valves;
- Instruments used to control and to monitor in particular the thermal process should be kept in good condition and should be regularly verified or calibrated. Calibration of instruments used to measure temperature should be made in comparison with a reference thermometer. This thermometer should be regularly calibrated. Records concerning the calibration of instruments should be established and kept.

13.2 IDENTIFICATION OF HAZARDS AND DEFECTS

Refer also to Section 4.1 (Potential Hazards Associated with Fresh Fish and Shellfish)
This section describes the main potential hazards and defects specific to canned fish and shellfish.

13.2.1 Hazards

A Biological Hazards
A1 Naturally occurring marine toxins

Biotoxins such as tetrodotoxines or ciguatoxines are known to be generally heat-stable, so the knowledge of the identity of the species and/or the origin of fish intended for processing is important.

Phycotoxins such as DSP, PSP or ASP are also heat stable, so it important to know the origin and the status of the area of origin of molluscan shellfish or other affected species intended for processing.

A2 Microbiological toxins

Histamine
Histamine is heat-stable, and so its toxicity remains practically intact in containers. Good practices for the conservation and handling from capture to heat processing are essential to prevent the histamine production. The Codex Commission adopted in its standards for some fish species maximum levels tolerated for histamine.

Clostridium botulinum
The botulism risk usually appears after an inadequate heat processing and inadequate container integrity. The toxin is heat-sensitive, on the other hand, the destruction of *Clostridium botulinum* spores, in particular from proteolytic strains, requires high sterilisation values. The heat processing effectiveness depends on the contamination level at the time of the treatment. Therefore, it is advisable to limit proliferation and the contamination risks during processing.

Staphylococcus aureus
Toxins from *Staphylococcus aureus* can be present in a highly contaminated raw material or can be produced by bacterial proliferation during processing. These toxins are heat-resistant, so they have to be taken into account in the hazard analysis.

B Chemical Hazards

Care should be taken to avoid contamination of the product from components of the containers (e.g. lead…).

C Physical Hazards

Containers prior to filling may contain materials such as metal or glass fragments.

13.2.2 Defects

Potential defects are outlined in the essential quality, labelling and composition requirements described in the relevant Codex Standards listed in Appendix XII. Where no Codex Standard exists regard should be made to national regulations and/or commercial specifications.

End product specifications outlined in Appendix IX describe optional requirements specific to canned products.

13.3 PROCESSING OPERATIONS

Processors can also refer to the Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods (CAC/RCP 23-1979, Rev. 2 (1993)) in order to obtain detailed advice on canning operations.

13.3.1 Raw Materials reception

13.3.1.1 Fish and shellfish (Processing step 1)

Potential Hazards: *Chemical and biochemical contamination (DSP, PSP, histamine, heavy metals...)*

Potential Defects: *Species substitution, decomposition, parasites*

Technical Guidance:

Refer to section 6.1.1 (Raw Fresh or Frozen Fish Reception); and also:

- When live shellfish (crustaceans) are received for canning processing, inspection should be carried out in order to discard dead or badly damaged animals.

13.3.1.2 Container and packaging materials (Processing step 1)

Potential Hazards: *Subsequent microbiological contamination*

Potential Defects: *Tainting of the product*

Technical Guidance:

Refer to section 6.5.1 (Raw Material Reception – Packaging, Labels & Ingredients); and also:

- containers and packaging materials should be suitable for the type of product, the conditions provided for storage, the filling, sealing and packaging equipment and the transportation conditions;
- the containers in which fish and shellfish products are canned should be made from suitable material and constructed so that they can be easily closed and sealed to prevent the entry of any contaminating substance;
- containers for canned fish and shellfish should meet the following requirements:
  - they should protect the contents from contamination by micro-organisms or any other substance;

- their inner surfaces should not react with the contents in any way that would adversely affect the product or the containers ;

- their outer surfaces should be resistant to corrosion under any likely conditions of storage;

- they should be sufficiently durable to withstand the mechanical and thermal stresses encountered during the canning process and to resist physical damage during distribution;

13.3.1.3 Other ingredients (Processing step 1)

Refer to section 6.5.1 (Raw Material Reception – Packaging, Labels & Ingredients).

13.3.2 Storage of raw material, containers and packaging materials

13.3.2.1 Fish and shellfish (Processing step 2)

Refer to sections 6.1.2 (Chilled storage), 6.1.3 (Frozen storage and 7.6.2 Conditioning and storage of molluscan shellfish in sea water tanks, basins, etc.)

13.3.2.2 Containers and packaging (Processing step 2)

Potential Hazards: *Unlikely*

Potential Defects: *Foreign matters*

Technical Guidance:

Refer to section 6.5.2 (Raw Material Storage - Packaging, Labels & Ingredients); and also:

- all materials for containers or packages should be stored in satisfactory clean and hygienic conditions;
- during storage, empty containers and covers should be protected from dirt, moisture and temperature fluctuations, in order to avoid condensations on containers and in the case of tin cans, the development of corrosion;
- during loading, stowing, transportation and unloading of empty containers, any shock should be avoided. Containers shouldn't be stepped on. These precautions become more imperative when containers are put in bags or on pallets. Shocks can deform the containers (can body or flange), that can compromise tightness (shocks on the seam, deformed flange) or be prejudicial to appearance.

13.3.2.3 Other ingredients (Processing step 2)

Refer to section 6.5.2 (Raw Material Storage - Packaging, Labels & Ingredients).

13.3.3 Unwrapping, unpacking (Processing steps 3 and 4)

Potential Hazards: *Unlikely*

Potential Defects: *Foreign matters*

Technical Guidance:

- During unwrapping and unpacking operations, precautions should be taken in order to limit product contamination and foreign matters introduction into the product. To avoid microbial proliferation, waiting periods before further processing should be minimised.

13.3.4 Thawing (Processing step 5)

Refer to section 6.1.4 (Control Thawing)

13.3.5 Fish and shellfish preparatory processes (Processing step 6)

13.3.5.1 Fish preparation (gutting, trimming...)

Potential Hazards: *Microbiological contamination biochemical development (histamine)*

Potential Defects: *Objectionable matters (viscera, skin, scales, ... in certain products), off flavours, presence of bones, parasites...*

Technical Guidance:

Refer to sections 6.1.5 (Washing and Gutting) and 6.1.6 (Filleting, Skinning, Trimming and Candling); and also:

- when skinning of fish is operated by soaking in soda solution, a particular care should be taken to carry out an appropriate neutralisation.

13.3.5.2 Preparation of molluscs and crustaceans

Potential Hazards: *Microbiological contamination, hard shell fragments*

Potential Defects: *Objectionable matters*

Technical Guidance:

Refer to sections 7.7 (Heat Treatment/Heat Shocking of Molluscan Shellfish in Establishment; and also:

- when live shellfish are used, inspection should be carried out in order to discard dead or badly damaged animals;
- particular care should be taken to ensure that shell fragments are removed from shellfish meat.

13.4 PRE-COOKING AND OTHER TREATMENTS

13.4.6 Pre-Cooking

Potential hazards : *chemical contamination (polar components of oxidised oils), microbiological or biochemical (scombrotoxin) growth.*

Potential defects : *water release in the final product (for products canned in oil), abnormal flavours.*

Technical guidance:

13.4.6.1 General Considerations

- methods used to pre-cook fish or shellfish for canning should be designed to bring about the desired effect with a minimum delay and a minimum amount of handling; the choice of method is usually strongly influenced by the nature of the treated material. For products canned in oil such as sardines or tunas, pre-cooking should be sufficient in order to avoid excessive release of water during heat processing;
- means should be found to reduce the amount of handling subsequent to pre-cooking, wherever practical;
- if eviscerated fish is used, then the fish should be arranged in the belly down position for pre-cooking to allow for the drainage of fish oils and juices which may accumulate and affect product quality during the heating process;
- where appropriate, molluscan shellfish, lobsters and crabs, shrimps and prawns and cephalopods should be pre- cooked according to technical guidance laid down in sections 7 (Processing of Molluscan Shellfish), 8 (Processing of Lobsters and Crabs), 9 (Processing of Shrimps and Prawns) and 10 (Processing of Cephalopods);
- care should be taken to prevent temperature abuse of scombrotoxic species before pre-cooking.

13.4.6.1.2 Pre-cooking Schedule

- the pre-cooking method, in particular, in terms of time and temperature, should be clearly defined. The pre-cooking schedule should be checked;
- fish pre-cooked together in batches should be very similar in size. It also follows that they should all be at the same temperature when they enter the cooker.

13.4.6.1.3 Control of Quality of Pre-cooking Oils and Other Fluids

- only good quality vegetable oils should be used in pre-cooking fish or shellfish for canning [refer to relevant Codex Standard for vegetable oils];
- cooking oils should be changed frequently in order to avoid the formation of polar compounds. Water used for pre-cooking should also be changed frequently in order to avoid contaminants;
- care must be taken that the oil or the other fluids used such as vapour or water do not impart an undesirable flavour to the product.

13.4.6.1.4 Cooling

- except for products, which are packed when still hot, cooling of pre-cooked fish or shellfish should be done as quickly as possible to bring the product temperatures in a range limiting proliferation or toxin production, and under conditions where contamination of the product can be avoided;
- where water is used to cool crustacea for immediate shucking, it should be potable water or clean seawater. The same water should not be used for cooling more than one batch.

13.4.6.2 Smoking

- refer to section 12 (Processing of smoked fish)

13.4.6.3 Use of Brine and Other Dips

Potential hazards : *microbiological and chemical contamination by the dip solution*

Potential defects : *adulteration (additives), abnormal flavours.*

Technical guidance:

- Where fish or shellfish are dipped or soaked in brine or in solutions of other conditioning or flavouring agents or additives in preparation for canning, solution strength and time of immersion should both be carefully controlled to bring about the optimum effect;
- dip solutions should be replaced and dip tanks and other dipping apparatus should be thoroughly cleaned at frequent intervals;
- care should be taken to ascertain whether or not the ingredients or additives used in dips would be permitted in canned fish and shellfish by the related Codex Standards and in the countries where the product will be marketed.

13.4.7 Packing in Containers (Filling, Sealing and Coding) (Processing Step 8)

13.4.7.1 Filling

Potential hazards : *[microbiological growth (waiting period)], microbiological growth and recontamination after heat processing due to incorrect filling or faulty containers.*

Potential defects : *incorrect weight, foreign matter.*

Technical guidance

- a representative number of containers and covers should be inspected immediately before delivery to the filling machines or packing tables to ensure that they are clean, undamaged and without visible flaws;
- if necessary, empty containers should be cleaned. It is also a wise precaution to have all containers turned upside down to make certain that they do not contain any foreign material before they are used;

- care should also be taken to remove faulty containers, because they can jam a filling or sealing machine, or cause trouble during heat processing (bad sterilisation, leaks);
- empty containers should not be left on the packing tables or in conveyor systems during clean up of premises to avoid contamination or splashes;
- where appropriate, to prevent microbial proliferation, containers should be filled with hot fish and shellfish (> 63°C, for example for fish soups) or should be filled quickly (the shortest possible waiting period) after the end of the pre-treatments;
- if the fish and shellfish must be held for a long time before packing into containers, they should be chilled;
- containers of canned fish and shellfish should be filled as directed in the scheduled process;
- mechanical or manual filling of containers should be checked in order to comply with the filling rate and the headspace specified in the adopted sterilisation schedule. A regular filling is important not only for economical reasons, but also because the heat penetration and the container integrity can be affected by excessive filling changes;
- the necessary amount of headspace will depend partly on the nature of the contents. The filling should also take into account the heat processing method. Headspace should be allowed as specified by the container manufacturer;
- furthermore, containers should be filled such as the end product meets the regulatory provisions or the accepted standards concerning weight of contents;
- where canned fish and shellfish is packed by hand, there should be a steady supply of fish, shellfish and eventually other ingredients. Build-up of fish and shellfish, as well as filled containers at the packing table should be avoided;
- the operation, maintenance, regular inspection, calibration and adjustment of filling machines should received particular care. The machine manufacturers' instructions should be carefully followed;
- the quality and the amount of other ingredients such as oil, sauce, vinegar...should be carefully controlled to bring about the optimum desired effect;
- if fish has been brine-frozen or stored in refrigerated brine, the amount of salt absorbed should be taken into consideration when salt is added to the product for flavouring;
- filled containers should be inspected:

  - to ensure that they have been properly filled and will meet accepted standards for weight of contents
  - and to verify product quality and workmanship just before they are closed;
- manual filled products such as small pelagic fish should be carefully checked by the operators to verify that container flanges or closure surface have not any product residues, which could impede the formation of a hermetic seal. For automatic filled products, a sampling plan should be implemented.

13.4.7.2 Sealing

Sealing the container is one of the most essential processes in canning.

Potential hazards : *subsequent contamination due to a bad seam*

Potential defects : *unlikely*

Technical guidance

- the operation, maintenance, regular inspection and adjustment of sealing machines should received particular care. The sealing machines should be adapted and adjusted for each type of container and each closing method which are used. Whatever the type of sealing equipment, the manufacturers or equipment supplier's instructions should be followed meticulously;
- seams and other closures should be well formed with dimensions within the accepted tolerances for the particular container;
- qualified personnel should conduct this operation;

- if vacuum is used during packing, it should be sufficient to prevent the containers from bulging under any condition (high temperature or low atmospheric pressure) likely to be encountered during the distribution of the product. This is useful for deep containers or glass containers. It is difficult and hardly necessary to create a vacuum in shallow containers that have relatively large flexible covers;
- excessive vacuum may cause the container to panel, particularly if the headspace is large, and may also cause contaminants to be sucked into the container if there is a slight imperfection in the seam;
- to find the best methods to create vacuum, competent technologists should be consulted;
- regular inspections should be made during production to detect potential external defects on containers. At intervals sufficiently close to each other in order to guarantee a closure in accordance with specifications, the operator, the supervisor of the closure or any other competent person should examine the seams or the closure system for the other types of containers, which are used. Inspections should consider for example vacuum measurements and seam teardown. A sampling plan should be used for the checks;
- in particular, at each start of the production line and at each change in container dimensions, after a jamming, a new adjustment or a restarting after a prolonged stop of the sealing machine, a check should be carried out;
- all appropriate observations should be recorded.

13.4.7.3 Coding

Potential hazards: *subsequent contamination due to damaged containers*

Potential defects: *loss of traceability due to an incorrect coding.*

Technical guidance

- each container of canned fish and shellfish should bear indelible code markings from which all-important details concerning its manufacture (type of product, cannery where the canned fish or shellfish was produced, production date, etc.) can be determined
- coding equipment must be carefully adjusted so that the containers are not damaged and the code remains legible;
- coding may sometimes be carried out after the cooling step.

13.4.8 Handling of Containers After Closure - Staging Before Heat Processing (Processing Step 9)

Potential hazards: *[microbiological growth (waiting period)], subsequent contamination due to damaged containers.*

Potential defects: *Unlikely*

Technical guidance

- containers after closure should always be handled carefully in such a way as to prevent every damage capable to cause defects and microbiological recontamination;
- if necessary, filled and sealed metal containers should be thoroughly washed before heat processing to remove grease, dirt and fish or shellfish stains on their outside walls;
- to avoid microbial proliferation, the waiting period should be as short as possible;
- if the filled and sealed containers must be held for a long time before heat processing, the product should be held at temperature conditions which minimise microbial growth;
- every cannery should develop a system, which will prevent non heat-processed canned fish and shellfish from being accidentally taken past the retorts into the storage area.

13.4.9 Thermal Processing (Processing Step 10)

Heat processing is one of the most essential operations in canning.
Canners can refer to the Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods (CAC/RCP 23-1979, rev. 2 in 1993) in order to obtain detailed advice on heat processing. In this Section, only some essential elements are pointed out.

Potential hazards: *survival of spores of Clostridium botulinum.*

Potential defects: *survival of micro-organisms responsible of decomposition*

Technical guidance

13.4.9.1 Sterilisation Schedule

- to determine the sterilisation schedule, at first, the heat process required to obtain the commercial sterility should be established taking into account some factors (microbial flora, dimensions and nature of the container, product formulation, etc.). A sterilisation schedule is established for a certain product in a container of a given size;
- then, competent canning technologist to take into account the sterilisation equipment at disposal and the product quality, which is desired, should carry out heat penetration tests. This heat penetration in the product must be established in the most unfavourable conditions likely to occur during processing. Standard heat processing procedures and experimentally established sterilisation schedules should be checked and validated by an expert to confirm that the values are appropriate for each product and retort;
- before any changes in operations (initial temperature of filling, product composition, size of containers, fullness of the retort, etc.) are made, competent technologists should be consulted as to the need for re-evaluation of the process.

13.4.9.2 Heat Processing Operation

- only qualified and properly trained personnel should operate retorts. Therefore it is necessary that retort operators control the processing operations and ensure the sterilisation schedule is closely followed, including meticulous care in timing, monitoring temperatures and pressures, and in maintaining records;

- it is essential to comply with the initial temperature described in the schedule process to avoid under-processing. If the filled containers were held at refrigerated temperatures because of a too long waiting period before heat processing, the sterilisation schedule should take into account these temperatures;
- in order that the heat processing is effective and process temperature is controlled, air must be evacuated from the retort through a venting procedure that is deemed efficient by a competent technologist. Container size and type, retort installation and loading equipment and procedures should be considered;
- the timing of the heat processing should not commenced until the specified heat processing temperature has been reached, and the conditions to maintain uniform temperature throughout the retort achieved, in particular, until the minimum safe venting time has elapsed;
- for other types of retorts (water, steam/air, flame, etc.) refer to the Recommended International Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned Foods (CAC/RCP 23-1979, rev. 2 in 1993);
- if canned fish and shellfish in different size containers are processed together in the same retort load care must be taken to ensure the process schedule used is sufficient to provide commercial sterility for all container sizes processed;
- when processing fish and shellfish in glass containers, care must be taken to ensure that the initial temperature of the water in the retort is slightly lower than that of the product being loaded. The air pressure should be applied before the water temperature is raised.

13.4.9.3 Monitoring of Heat Processing Operation

- during the application of heat processing, it is important to ensure that the sterilisation process and factors such as container filling, minimal internal depression at closing, retort loading, initial product temperature, etc. are in accordance with the sterilisation schedule;
- retort temperatures should always be determined from the indicating thermometer, never from the temperature recorder;
- permanent records of the time, temperature and other pertinent details should be kept concerning each retort load;
- the thermometers should be tested regularly to ensure that they are accurate. Calibration records should be maintained;
- inspections should be made periodically to ensure that retorts are equipped and operated in a manner that will provide thorough and efficient heat processing, that each retort is properly equipped, filled and used, so that the whole load is brought up to processing temperature quickly and can be maintained at that temperature throughout the whole of the processing period;
- the inspections should be made under the guidance of a competent technologist.

13.4.10 Cooling (Processing Step 11)

Potential hazards : *recontamination due to a bad seam and contaminated water*

Potential defects : *formation of struvite crystals, buckled containers, scorch.*

Technical guidance:

- after heat processing, canned fish and shellfish should, wherever practical, be water cooled under pressure to prevent deformations, which could result in a loss of tightness. In case of recycling, only potable chlorinated water should be used for this purpose. The residual chlorine level in cooling water and the contact time during cooling should be checked in order to minimise the risk of post-processing contamination;
- in order to avoid organoleptic defects of the canned fish and shellfish, such as scorch or overcooking, the internal temperature of containers should be lowered as quickly as possible;
- for glass containers, the temperature of the coolant in the retort should be, at the beginning, lowered slowly in order to reduce the risks of breaking due to thermal shock;
- where canned fish and shellfish products are not cooled in water after heat processing, they should be stacked in such a way that they will cool rapidly in air.

- heat processed canned fish and shellfish should not be touched by hand or articles of clothing unnecessarily before they are cooled and thoroughly dry. They should never be handled roughly or in such a way that their surfaces, and in particular their seams, are exposed to contamination;
- rapid cooling of canned fish and shellfish avoids the formation of struvite crystals ;
- every cannery should develop a system to prevent unprocessed containers being mixed with processed containers.

13.4.10.1 Monitoring After Heat Processing and Cooling

- canned fish and shellfish should be inspected for faults and for quality assessment soon after it is produced and before labelling;
- representative samples from each code lot should be examined to ensure that the containers do not exhibit external defects and the product meets the standards for weight of contents, vacuum, workmanship and wholesomeness. Texture, colour, odour, flavour and condition of the packing medium should be assessed;
- if desired, stability tests could be made in order to verify in particular the heat processing;
- this examination should be made as soon as practical after the canned fish and shellfish have been produced, so that if there are any faults due to failings on the part of cannery workers or canning equipment, these failings can be corrected without delay. Segregating and properly disposing of all defective units or lots that are unfit for human consumption should be ensured.

13.4.11 Labelling, Casing and Storage of Finished Products (Processing steps 12 and 13)

Potential hazards : *subsequent recontamination due to the damage of containers or to an exposition to extreme conditions*

Potential defects : *incorrect labelling*

Technical guidance

- the materials used for labelling and casing canned fish and shellfish should not be conducive to corrosion of the container. Cases should have an adequate size in order that the containers fit them and are not damaged by any move inside. Cases and boxes should be the correct size and strong enough to protect the canned fish and shellfish during distribution;
- code marks appearing on containers of canned fish and shellfish should also be shown on the cases in which they are packed;
- the labelling should be made as referred in 6.2.3;
- storage of canned fish and shellfish should be made in order not to damage the containers. In particular, pallets of finished products should not be stacked excessively high and the forklift trucks used for the storage should be used in a proper manner;
- canned fish and shellfish should be so stored that they will be kept dry and not exposed to extremes of temperature.

13.4.12 Transportation of Finished Products (Processing step 14)

Potential hazards : *subsequent recontamination due to the damage of containers or to an exposition to extreme conditions*

Potential defects : *Unlikely*

Technical guidance

Refer to section 17 (Transportation); and also :

- transportation of canned fish and shellfish should be made in order not to damage the containers. In particular, the forklift trucks used during the loading and unloading should be used in a proper manner;
- cases and boxes should be completely dry. In fact, moisture has effects on the mechanical characteristics of boxes and the protection of containers against damages during transportation couldn't be sufficient;
- metal containers should be kept dry during transportation in order to avoid corroding and/or rust.

PROPOSED DRAFT STANDARD FOR SALTED ATLANTIC HERRING AND SALTED SPRATS

(At Step 5 of the Procedure)

1. SCOPE

The standard applies to salted Atlantic herring (*Clupea harengus*) and sprats (*Sprattus sprattus*)[9]. Fish products produced by use of added natural or artificial enzymic preparations, acids and/or artificial enzymes are not covered by this standard.

2. DESCRIPTION

2.1 Product definition

The product is prepared from fresh or frozen fish. The fish is salted as whole fish or as headed or nobbed or headed and gutted or gibbed or filleted (skin-on or skin-off) fish. Spices, sugar and other optional ingredients may be added. The product is either intended for direct human consumption or for further processing.

2.2 Process definition

The fish after any suitable preparation shall be subjected to a salting process and shall comply with the conditions laid down hereafter. The salting process should be sufficiently controlled to prevent the development of *Clostridium botulinum.*

2.2.1 Salting

Salting is the process of mixing fish with the appropriate amount of food grade salt, sugar spices and all optional ingredients and/or of adding the appropriate amount of salt-solution of the appropriate concentration. Salting is performed in watertight containers (barrels etc.).

2.2.2 Types of salted fish

5.3.1.1 Very lightly salted fish

The salt content in the fish muscle is below 4 g/100 g water phase.

2.2.2.2 Lightly salted fish

The salt content in the fish muscle is above 4 g/100 g water phase and below or equal to 10 g salt/100 g.

2.2.2.3 Medium salted fish

The salt content in the fish muscle is above 10 g salt/100 g water phase and below or equal to 20 g salt/100 g.

2.2.2.4 Heavily salted fish

The salt content of the fish muscle is above 20 g salt /100 g water phase.

2.2.4 Storage temperatures

The products shall be kept frozen or refrigerated at a time/temperature combination which ensures their safety and quality in conformity with Sections 3 and 5.

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[9] For the purpose of the standard, fish includes herring and sprats

2.3 Presentation

Any presentation of the product shall be permitted provided that it:

2.3.1 meets all requirements of this standard, and

2.3.2 is adequately described on the label to avoid confusing or misleading the consumer.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Fish

Salted Atlantic herring and salted sprats shall be prepared from sound and wholesome fish which are of a quality fit to be sold fresh for human consumption after appropriate preparation.

3.2 Salt and other ingredients

Salt and all other ingredients used shall be of food grade quality and conform to all applicable Codex standards.

3.3 Final Product

Products shall meet the requirements of this standard when lots examined in accordance with Section 9 comply with the provisions set out in Section 8. Products shall be examined by the methods given in Section 7.

3.4 Decomposition

The products shall not contain more than 10mg /100 mg of histamine based on the average of the sample unit tested

4. FOOD ADDITIVES

Only the use of the following additives is permitted.

	Maximum level in the final product
Colour	
143 Fast Green FCF	100 mg/kg
Antioxidant	
310 Propyl gallate	200 mg/kg
Preservatives	
210-213 Benzoates	200 mg/kg

5. HYGIENE AND HANDLING

5.1 It is recommended that the products covered by the provisions of this standard be prepared and handled in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1985, Rev.3, 1997) and other relevant Codex texts such as codes of practice and codes of hygienic practice, as follows;

(i) the Recommended International Code of Practice for Salted Fish (CAC/RCP 26-1979);

(ii) the Recommended International Code of Practice for Fresh Fish (CAC/RCP 9-1976);

(iv) the Recommended International Code of Practice for Frozen Fish (CAC/RCP 16-1978)

5.2 The products should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Micrtobiological Criteria to Foods (CAC/GL 21-1997)

5.3 Parasites

5.3.1 Fish flesh shall not be obviously infested with parasites

5.3..2 Fish flesh shall not contain living larvae of nematodes. Viability of nematodes shall be examined according to Annex I. If living nematodes are confirmed, products must not be placed on the market for human consumption before they are treated in conformity with the methods laid down in Annex II.

5.4 Histamine

No sample unit shall contain histamine that exceeds 20 mg per 100g fish muscle.

6. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985, Rev. 3-1999) the following specific provisions apply:

6.1 Name of the Food

6.1.1 The name of the product shall be ...-herring or ...- sprats in accordance with the law and custom of the country in which the product is sold, in a manner not to mislead the consumer.

6.1.2 In addition the label shall include other descriptive terms that will avoid misleading or confusing the consumer.

7. SAMPLING, EXAMINATION AND ANALYSIS

7.1 Sampling plan for containers (barrels)

(i) Sampling of lots for examination of the product for quality shall be in accordance with the sampling plan defined below. The sample unit is the entire container.

Lot Size (Number of containers)	Sample Size (Number of containers to be tested) (n)	Acceptance Number (c)
<15	2	0
16-50	3	0
51-150	5	1
151-500	8	1
501-3200	13	2
3201-35 000	20	3
>35 000	32	5

If the number of defective containers in the sample is less than or equal to c, accept the lot: otherwise, reject the lot.

(ii) Sampling of lots for examination of net weight shall be carried out in accordance with an appropriate sampling plan meeting the criteria established by the CAC.

(iii) For products in smaller containers the Codex Sampling Plan for Prepackaged Foods (CAC/RM 42-1969 AQL 6.5) should be applied.

7.2 Sensory and Physical Examination

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance with procedures elaborated in Section 7.3 through 7.8 and Annexes and in accordance with the Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories (CAC/GL 31-1999).

7.3 Determination of salt content: see Annex III

7.4 Determination of water content: see Annex IV

To be elaborated

7.5 Determination of the viability of nematodes: see Annex I

To be elaborated

7.6 Determination of histamine: AOAC 977.13

7.7 Determination of net weight

The net weight (excluding packaging material) of each sample unit in the sample lot shall be determined.

Specific method to be elaborated

7.8 Determination of drained weight

To be elaborated

8. DEFINITION OF DEFECTIVES

8.1 The sample unit shall be considered as defective when it exhibits any of the properties defined below.

8.1.1. Foreign matter

The presence in the sample unit of any matter which has not been derived from fish, does not pose a threat to human health, and is readily recognized without magnification or is present at a level determined by any method including magnification that indicates non-compliance with good manufacturing and sanitation practices.

8.1.2 Parasites

The presence of visible parasites in a sample unit detected by visual inspection.

8.1.3 Odour and flavour/taste

Fish affected by persistent and distinct objectionable odours or flavours indicative of decomposition (such as sour, putrid, fishy, rancid, etc.) or contamination by foreign substances (such as fuel oil, cleaning compounds, etc.).

9. LOT ACCEPTANCE

A lot shall be considered as meeting the requirements of this standard when:

(i) the total number of defectives as classified according to Section 8 does not exceed the acceptance number (c) of the appropriate sampling plan in Section 7; and

(ii) the average net weight of all sample units is not less than the declared weight, provided no individual container is less than 95% of the declared weight; and

(iii) does not exceed the acceptance number (c) of the appropriate sampling plan in Section 7;

(iv) the Food Additives, Hygiene and Handling and Labelling requirements of Sections 4, 5.1, 5.2 and 6 are met.

Annex I

Determination of the viability of nematodes: to be elaborated.

Annex II

Treatment procedures sufficient to kill living nematodes

- e.g. freezing to - 20° C for not less than 24 h in all parts of the product
- the adequate combination of salt content and storage time (To be elaborated)
- or by other processes with the equivalent effect (To be elaborated)

Annex III

Determination of the salt content in Salted Atlantic Herring and Salted Sprats (method from salted cod standard).

Annex IV

Determination of water: to be elaborated.

PROPOSED DRAFT CODEX STANDARD FOR LIVE, QUICK FROZEN AND CANNED BIVALVE MOLLUSCS

(At Step 3 of the Procedure)

1. SCOPE

This standard applies to live bivalve molluscs intended for direct consumption and quick frozen and canned bivalve molluscs. This standard does not apply to fresh or frozen scallop adductor muscle meat (i.e. without viscera and roe).
Traceablity is an important feature for bivalve molluscs and must be secured.

2. DESCRIPTION

2.1 Product Definition

Live bivalve molluscs are a product which is alive immediately prior to consumption. The product is presented including the shell. The product is not prepared, however packing medium, salt, water and/or edible oils and other ingredients may have been added.

Quick frozen bivalve molluscs are a product prepared from live bivalve molluscs which are quick frozen after a suitable preparation.

Canned bivalve molluscs are a product prepared from fresh, frozen, cooked, smoked or not smoked edible portions of bivalve molluscs to which salt, water and/or edible oils, other ingredients and packing medium may have been added.

2.2 Process Definition

Live bivalve molluscs shall be organisms which are harvested alive from an approved growing area and/or from an approved relaying area after a suitable relaying process or from an approved purification centre, raft, float or tank after suitable purification. The approval mentioned in this subsection must be given by the official agency having jurisdiction.

Frozen bivalve molluscs shall be derived from organisms which meet the requirements for live bivalve molluscs and the product shall, after any suitable preparation [deshelling], be subjected to a freezing process and shall comply with the conditions laid down hereafter. The freezing process shall be carried out in appropriate equipment in such a way that the range of temperature of maximum crystallization is passed quickly. The quick freezing process shall not be regarded as complete unless and until the product temperature has reached -18ºC or colder at the thermal centre after thermal stabilization. The product shall be kept deep frozen so as to maintain the quality during transportation, storage and distribution. Frozen bivalve molluscs shall be processed and packaged so as to minimize dehydration and oxidation.

Canned bivalve molluscs shall be derived from organisms which meet the requirements for live bivalve molluscs. Canned bivalve molluscs are packed in hermetically sealed containers and shall have received a processing treatment sufficient to ensure commercial sterility.

The water used for steaming, cooking, deshelling and cooling shall be of potable quality or clean seawater.

2.3 PRESENTATION

Any presentation of the product shall be permitted provided that it:
meets all requirements of this standard; and
is adequately described on the label to avoid confusing or misleading the consumer.

The bivalve molluscs may be packed in count per unit of weight or per package.

3. ESSENTIAL COMPOSITION AND QUALITY FACTORS

3.1 Live Bivalve Molluscs

Bivalve molluscs intended for direct consumption or intended to be processed shall be alive imemediately prior to consumption or prior to the commencement of processing and of a quality fit for human consumption. Bivalve molluscs must respond adequatly to percussion and must contain a normal quantity of bodily fluids.

3.2 Glazing (for frozen bivalve molluscs)

If glazed, the water used for glazing or preparing glazing solutions shall be of potable quality or shall be clean sea-water. Potable water is fresh-water fit for human consumption. Standards of potability shall not be less than those contained in the latest edition of the WHO "International Guidelines for Drinking Water Quality". Clean sea-water is sea-water which meets the same microbiological standards as potable water and is free from objectionable substances.

3.3 Other Ingredients

The packing medium and all other ingredients used shall be of food grade quality and conform to all applicable Codex standards.

3.4 Final Product

Products shall meet the requirements of this standard when lots examined in accordance with Section 9 comply with the provisions set out in Section 8. Products shall be examined by the methods given in Section 7.

4. FOOD ADDITIVES

Only the use of the following additives is permitted.

Additive	Maximum level in the final product
Antioxidants	
Ascorbic acid	} limited by GMP
Ascorbate, sodium, calcium or potassium salts	} "
Citric acid	} "
sodium, calcium or potassium salts	} "
Sequestrant	
For canned bivalve molluscs:	
Calcium disodium EDTA	}75 mg/kg

5. HYGIENE AND HANDLING

5.1 The final product shall be free from any foreign material that poses a threat to human health.

5.2 Live bivalve molluscs intended for direct consumption should possess visual characteristics associated with freshness and viability, including shells free of dirt, an adequate response to percussion, and normal amounts of intravalvular liquid.

5.3 When tested by appropriate methods of sampling and examination prescribed by the Codex Alimentarius Commission (CAC), the following requirements shall be met:

[Live bivalve molluscs must not contain more than 300 faecal coliforms or more than 230 E.coli per 100 g of mollusc flesh and intravulvar liquid. Determination by the 5 tube, 3 dilution MPN testing method or any other method equivalent.]

[Live bivalve molluscs and products thereof must not contain Salmonella in 25 g flesh.]

Live bivalve mollusc shall be free from micro-organisms or substances originating from micro-organisms or virus in amounts which may present a hazard to health in accordance with standards established by the CAC.

(iv) [In the edible parts of bivalve molluscs (the whole part or any part edible seperately) the total Paralytic Shellfish Poison (PSP) content must not exceed 80 microgrammes per 100 g of mollusc flesh in accordance with the biological testing method in association if necessary with a chemical method for detection of Saxitoxin.]

(v) [Using the customary biological testing methods (on rats or mice) there must not be a positive result to the presence of Diarrhetic Shellfish Poison (DSP) in the edible parts (the whole part or any part edible seperately) of bivalve molluscs.]

(vi) [the content of Amnesic Shellfish Poisoning (ASP) in the edible parts of bivalve molluscs (the whole part or any part edible seperately must not exceed 20 microgrammes domoic acid per 100 g of mollusc flesh in accordance with the HPLC testing method.]

(vii) in the absence of routine virus testing procedures and the establishment of virological standards, health checks must be based on faecal bacteria counts.

(viii) The product must not contain any other substance in amounts which may present a hazard to health in accordance with standards established by the CAC.

5.4 It is recommended that the product covered by the provisions of this standard be prepared and handled in accordance with the following Codes:

the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 3 (1997));

[the [draft] recommended International Code of Practice for Fish and Fishery Products];

the [draft revised] Recommended International Code of Practice for Canned Fish;

(iv) the Recommended International Code of Practice for the Processing and Handling of Quick Frozen Foods (CAC/RCP 8-1976);

the Draft International Code of Hygienic Practice for the Products of Aquaculture (under elaboration, 1994);

the Recommended International Code of Hygienic Practice for Low Acid and Acidified Low Acid Canned Foods (CAC/RCP 23-1979).

6. LABELLING

In addition to the provisions of the Codex General Standard for the Labelling of Prepackaged Foods (CODEX STAN 1-1985) the following specific provisions apply:

6.1 The Name of the Food

The name of the product as declared on the label shall be the name of the species of bivalve molluscs according to the law, custom or practice in the country in which the product is to be distributed.

6.1.1 There shall appear on the label, reference to the presentation provided for in Section 2.3-Presentation in close proximity to the name of the product in such descriptive terms that will adequately and fully describe the nature of the presentation of the product to avoid misleading or confusing the consumer.

6.1.2 In addition to the specified labelling designations above, the usual or common trade names of the variety may be added so long as it is not misleading to the consumer in the country in which the product will be distributed.

6.1.3 Products shall be designated as steamed,cooked, deshelled [heat shocked], frozen, canned as appropriate.

6.1.4. For live bivalve molluscs this product shall declare the date of minimum durability or a statement to this effect.

6.1.5 If the (frozen) product has been glazed with sea-water, a statement to this effect shall be made.

6.1.6 If appropriate : the term "quick frozen", shall also appear on the label, except that the term "frozen" may be applied in countries where this term is customarily used for describing the product processed in accordance with subsection 2.2 of this standard.

The label shall state that the product should be maintained under conditions that will maintain the quality during transportation, storage and distribution.

Identification of the establishment approved for the production of the product.

6.1.9 Identification of the growing area must be kept at the establishment.

6.2 Net Contents (Frozen Glazed Products)

Where the food has been glazed the declaration of net contents of the food shall be exclusive of the glaze.

6.3 Storage Instructions

For live bivalve molluscs, the label shall include terminology to indicate that the product shall be stored at temperatures which will not advesely affect their quality and viability.

For deshelled [heat shocked] bivalve molluscs: the label shall include terms to indicate that the product shall be stored at a temperature of 2-7 ºC.

For frozen bivalve molluscs: the label shall include terms to indicate that the product shall be stored at a temperature of -18 ºC or colder.

6.4 Labelling of Non-Retail Containers (for bulk transport of live bivalve molluscs)

In the case of live and raw shucked molluscs, information specified above shall be given either on the container or in accompanying documents, except that the name of the food, lot identification, harvesting location, date of harvest and/or date of processing and the name and address and autorisation or registration number of packer or manufacturer as well as storage instructions shall always appear on the container.

However, lot identification, and the name and address may be replaced by an identification mark, provided that such a mark is clearly identifiable with the accompanying documents in which this information is given.

7. SAMPLING, EXAMINATION AND ANALYSES

7.1 Sampling

(i) Sampling of lots for examination of the product shall be in accordance with the FAO/WHO Codex Alimentarius Sampling Plans for Prepackaged Foods (AQL - 6.5) CAC/RM 42-1969.

(ii) Sampling of lots for examination of net weight shall be carried out in accordance with an appropriate sampling plan meeting the criteria established by the CAC.

7.2 Sensory and Physical Examination

Samples taken for sensory and physical examination shall be assessed by persons trained in such examination and in accordance with procedures elaborated in Sections 7.3 through 7.6, [*and maybe in future: Guidelines for the Sensory Evaluation of Fish and Shellfish in Laboratories" (CAC/GL 31-1999)*]

7.3 Determination of Net Weight and Drained Weight

The net weight and drained weight of all sample units shall be determined by the procedures described or mentioned in sections 7.3.1., 7.3.2, 7.3.3 and 7.3.4..

7.3.1 Determination of Net Weight

Weigh the unopened container;
Open the container and remove the contents;
Weigh the empty container, (including the end) after removing excess liquid and adhering meat;
(iv) Subtract the weight of the empty container for the weight of the unopened container.
The resultant figure will be the total net content.

7.3.2 Determination of Net Weight of Frozen Products not Covered by Glaze

The net weight (exclusive of packaging material) of each sample unit representing a lot shall be determined in the frozen state.

7.3.3 Determination of Net Weight of Products Covered by Glaze

AOAC official method 963.18, Net Contents of Frozen Seafoods

Determination of Drained Weight

In the case of canned bivalve molluscs, maintain the container at a temperature between 20 ºC anbd 30 ºC for a minimum period of 12 hours prior to examination;

Open and tilt the container to distribute the contents on a pre-weighed circular sieve which consists of wire mesh with square openings of 2.8 mm x 2.8 mm;

Inlcine the sieve at an angle of approximately 17-20 ºC and allow the bivalve molluscs to drain for two minutes, measured from the time the product is poured into the sieve;

Weigh the sieve containing the drained bivalve molluscs;

The weight of drained bivalve molluscs is obtained by subtracting the weight of the sieve and drained product.

7.4 Determination of Count

When declared on the label, the count of bivalve molluscs shall be determined by counting the numbers of bivalve molluscs in the container or a representative sample thereof and dividing the count of bivalve molluscs by the actual de-glazed weight to determine the count per unit weight.

7.5 Procedures for Thawing

The sample unit is thawed by enclosing it in a film type bag and immersing in water at room temperature (not greater than 35 ºC). The complete thawing of the product is determined by gently squeezing the bag occasionally so as not to damage the texture of the bivalve molluscs, until no hard core or ice crystals are left.

7.6 Cooking Methods

The following procedures are based on heating the product to an internal temperature of 65-70 ºC. The product must not be overcooked. Cooking times vary according to the size of the product and the temperature used. The exact times and conditions of cooking for the product should be determined by prior experimentation.

Baking Procedure: Wrap the product in aluminum foil and place it evenly on a flat cookie sheet or shallow flat pan.

Steaming Procedure: Wrap the product in aluminum foil and place it on a wire rack suspended over boiling water in a covered container.

Boil-in-Bag Procedure: Place the product into a boilable film-type pouch and seal. Immerse the pouch into boiling water and cook.

Microwave Procedure: Enclose the product in a container suitable for microwave cooking. If plastic bags are used, check to ensure that no odour is imparted from the plastic bags. Cook according to equipment instructions.

MPN Method For Analyses of E.Coli/Faecal Coliforms

(to be elaborated)

7.8 Determination of Biotoxins

(to be elaborated)

8. DEFINITION OF DEFECTIVES

The sample unit shall be considered as defective when it exhibits any of the properties defined below.

8.1 Deep Dehydration (Frozen Products)

Greater than 10% of the weight of the bivalve molluscs in the sample unit or greater than 10% of the surface area of the block exhibits excessive loss of moisture clearly shown as white or yellow abnormality on the surface which masks the colour of the flesh and penetrates below the surface, and cannot be easily removed by scraping with a knife or other sharp instrument without unduly affecting the appearance of the bivalve molluscs.

8.2 Foreign Matter

The presence in the sample unit of any matter which has not been derived from bivalve molluscs, does not pose a threat to human health and is readily recognized without magnification or is present at a level determined by any method including magnification, that indicates non-compliance with good manufacturing and sanitation practices.

8.3 Odour/Flavour

Bivalve molluscs affected by persistent and distinct objectionable odours or flavours indicative of decomposition or rancidity.

8.4 Texture

Textural breakdown of the flesh, indicative of decomposition, characterized by muscle structure which is mushy or paste-like.

Objectionable Matter (Canned Products)

A sample unit affected by struvite crystals - any struvite crystal greater than 5 mm in length.

9. LOT ACCEPTANCE

A lot shall be considered as meeting the requirements of this standard when:

(i) the total number of defectives as classified according to section 8 does not exceed the acceptance number (c) of the appropriate sampling plan in the Sampling Plans for Prepackaged Foods (AQL-6.5) (CAC/RM 42-1977);

(ii) the total number of sample units not meeting the count designation as defined in section 2.3 does not exceed the acceptance number (c) of the appropriate sampling plan in the Sampling Plans for Prepackaged Foods (AQL - 6.5) (CAC/RM 42-1969);

(iii) the average net weight of all sample units is not less than the declared weight, provided there is no unreasonable shortage in any individual container;

(iv) the Food Additives, Hygiene and Labelling requirements of Sections 4, 5.1, 5.2, 5.3 and 6 are met.

PROPOSED DRAFT CERTIFICATE FOR FISH AND FISHERY PRODUCTS
(At Step 3 of the Procedure)

PROPOSED DRAFT MODEL SANITARY CERTIFICATE
covering Fish and Fishery Products

Reference number:_____

Country of dispatch:	Tel:
Competent authority:	Fax:
Inspection body:	E-mail: (optional)

I. Details identifying the fishery products

Description – Species (scientific name):	Approval no. of Establishment:	State or type of processing:	Type of packaging:	Lot identifier/ date coding	Number of packages:	Net weigh
				Sum:		

Temperature required during storage and transport:_____°C

II. Provenance of the fishery products

Name and address of consignor: _____

III. Destination of the fishery products

The fishery products are to be dispatched from: _____
(Place of dispatch)

to: _____
(Place and country of destination)

by the following means of transport:_____

Name of consignee and address at place of destination: _____
_____

IV. Attestation

The undersigned official inspector hereby certifies that:

1) The products described above originate from (an) approved establishment(s) and
2) have been handled, prepared or processed, identified, stored and transported under a competent HACCP- and sanitary programme consistently implemented and in accordance with the requirements laid down in Codex Alimentarius' Recommended International Code of Practice for Fish and Fishery Products, CAC/RCP xx-xxxx.

Done
at_____(Place) on_____(Date) 200____

Seal[1] _____

[1]The signature and the stamp must be in a colour different to that of the printing.

_____ _____
(Signature of official inspector) (Name and official position in capitals)

PROPOSED DRAFT MODEL INSPECTION CERTIFICATE
covering Salted Atlantic Herring

Reference number:_____

Country of dispatch:	Tel:
Competent authority:	Fax:
Inspection body:	E-mail: (optional)

I. Details identifying the products

Description – Species (scientific name):	Approval no. of Establishment:	State or type of processing:	Type of packaging:	Lot identifier/ date coding	Number of packages:	Net weight:
				Sum:		

Temperature required during storage and transport:_____°C

II. Provenance of the products

Name and address of consignor:
_____

III. Destination of the products

The products are to be dispatched from:
_____
(Place of dispatch)
to:
_____
_____
(Place and country of destination)
by the following means of transport:_____

Name of consignee and address at place of destination:
_____

IV. Attestation

The undersigned official inspector hereby certifies that::

1) The products described above originate from (an) approved stablishment(s) and

2) have been handled, prepared or processed, identified, stored and transported under a competent HACCP- and sanitary programme consistently implemented and in accordance with the requirements laid down in Codex Alimentarius' Recommended International Code of Practice for Fish and Fishery Products, CAC/RCP xx-xxxx, and

3) comply with Codex Alimentarius' Standard for Salted Atlantic Herring, CODEX STAN xx-xxxx.

Done at_____on_____200___
(Place) (Date)

Seal[ii] _____ _____
(Signature[1] of official inspector) (Name and official position in capitals)

The signature and the stamp must be in a colour different to that of the printing.

(LOGO)

(COUNTRY)

(NAME OF COMPETENT AUTHORITY)

STATEMENT CONCERNING RADIOACTIVITY LEVEL IN FISH

ISSUED BY THE "NATIONAL QUALITY CONTROL SERVICE FOR FISH AND FISHERY PRODUCTS"

As Addendum to Sanitary Certificate no.:

One of the main tasks of the National Fish Inspection and Quality Control Service" is to guarantee the wholesomeness and good quality of fish and fish products exported from (country).

The level of radioactive caesium 134 and caesium 137 in fish of commercial value is monitored by the "Competent Authority". The monitoring programme started in (year) and in no instances the level of radioactivity has been found to exceed the natural background level.

The detection limit for this analysis is 20 Bq/kg for caesium 134 and caesium 137 combined.

Measurements performed by the National Radiation Protection Authority revealed that radioactive Iodine 131 could not be detected.

(Name of Inspection Body)

(Sign.)	(Sign.)
NN	XX
Director General of "Inspection Body"	Laboratory manager

Issued:..... , ...199....
Place Date

Seal .....
Signature of Official Inspector

(LOGO)

(COUNTRY)

(NAME OF COMPETENT AUTHORITY)

STATEMENT CONCERNING TRACE METALS IN SAITHE
(*Pollachius virens*)

ISSUED BY THE "NATIONAL QUALITY CONTROL SERVICE FOR FISH AND FISHERY PRODUCTS"

As addendum to Sanitary Certificate no.: _____

One of the main tasks of the "National Quality Control Service" is to guarantee the wholesomeness and good quality of fish and fishery products exported from (country).

To this end, chemical, physical, microbiological and sensory analyses are performed.

Chemical analyses of the following trace metals have been performed for saithe, all values are in milligrams per kg wet weight:

Hg, mercury	0.02 - 0.12	Cd, cadmium	< 0.001
Pb, lead	< 0.04		

These concentrations represent normal values for fish caught in national waters. It will be seen that all values are low, and well below permissible concentrations for those trace metals where limiting values have been given by international regulating bodies.

(Name of Inspection Body)

(Sign.) (Sign.)

NN XX
Director General of "Inspection Body" Laboratory Manager

Issued:..... , ...199....
Place Date

Seal .....
Signature of Official Inspector

[ii] The signature and the stamp must be in a colour different to that of the printing.