codex alimentarius commission

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

WORLD HEALTH ORGANIZATION

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CODEX ALIMENTARIUS COMMISSION

Sixteenth Session 1985

REPORT OF THE NINETEENTH SESSION OF THE CODEX COMMITTEE ON FOOD HYGIENE

Washington, D.C., 26-30 September 1983

INTRODUCTION

1. The Nineteenth Session of the Codex Committee on Food Hygiene was held in the Main Conference Room, Department of State, Washington, D.C., from 26 to 30 September 1983 by courtesy of the Government of the United States of America. The Session was attended by representatives and observers from 26 countries and two international organizations (see Appendix I for list of participants). The Chairman of the Session was Dr. R.B. Read, Director, Division of Microbiology, FDA.

2. The Session was opened by Dr. Sanford Miller, Director, Bureau of Foods, Food and Drug Administration who welcomed the participants on behalf of the Government of the USA. He underlined the importance of the aims of the Codex Alimentarius Commission one of which was to protect the consumer by assuring that foods moving in international trade were safe for human consumption. He referred to the recent meeting in Geneva of a Joint FAO/WHO Expert Consultation on Food Safety which had emphasized that food-borne diseases were still the largest source of illness in the world and that to alleviate the problem, international organizations must devote more resources to the special needs of developing countries when establishing food control systems.

Referring to items which the Committee would consider at its present Session, Dr. Miller underlined the prime importance of developing procedures for maintaining the integrity of containers for processed foods and of providing guidance for the preparation and cooking of foods consumed outside the home.

INFORMATION ON ACTIVITIES WITHIN WHO OF INTEREST TO THE COMMITTEE

3. The representative of WHO reviewed the activities of his organization relating to the work of the Committee.

He informed the Committee of the different programmes of WHO (Veterinary Public Health, Food Safety Programme, Diarrhoeal Diseases Programme, Nutrition International Programme on Chemical Safety) which were involved in food hygiene activities and of the report on these activities related to the work of the Codex which had been presented in detail at the latest meeting of the Codex Alimentarius Commission in July 1983 (see document ALINORM 83/6). He also drew attention to further WHO activities not mentioned in the above document.

4. The Veterinary Public Health Unit was the coordinator of four guidelines on Food Virology, Prevention and Control of Salmonellosis, Organization and Management of Surveillance of Food-borne Diseases,and Paralytic Shellfish Poisoning. These guidelines had already been prepared and would be issued in the near future.

5. In preparing comprehensive guidelines on salmonellosis which were intended for different professions involved in the prevention and control of this widespread zoonosis, several Codex documents were used. In particular, the Recommended International Codes of Hygienic Practice for Fresh Meat (CAC/RCP 11-1976), for Ante-mortem and Post-mortem Inspection of Slaughter Animals (CAC/RCP 12-1976) for Processed Meat Products (CAC/RCP 13-1976), for Poultry Processing (CAC/RCP 14-1976), as well as General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 1), served as background documents for elaboration of the main principles on prevention and control of salmonellosis during slaughtering and processing meat and poultry.

6. The report of the WHO Expert Consultation on Intersectorial Coordination of Food Hygiene Programmes (VPH/83.45) was now available from WHO. This document which gave the conclusions and recommendations of the majority of developing countries of the Mediterranean region underlined once again that "national and intercountry food hygiene programmes require the close collaboration of experts from a number of different disciplines."

7. The four reports of the FAO/WHO Expert Consulations and Working Groups on microbiological criteria for foods had been summarized by Dr. Christian (ICMSF) and were reviewed with him during his short visit to Geneva. The purpose of this work was to select for the reader the most important information with regard to microbiological criteria, including general principles for their establishment and application, as well as concrete recommendations on microbiological limits. After some editorial work the document would be issued by WHO.

8. Together with the International Union of Microbiological Societies' Committee on Food Microbiology and Hygiene, WHO convened a consultation on the present international problems in food hygiene (Budapest, 18-19 July 1983). Among the items proposed for future international activity on elaboration of microbiological criteria, the consultation suggested the following: dessicated coconuts, spices, smoked fish, fresh cheeses, pre-cooked chilled meals and chocolate.

9. The WHO European Surveillance Programme for the Control of Food-borne Infections and Intoxications in Europe was carried out by the FAO/WHO Collaborating Centre in Berlin (West). A second comprehensive report on the present situation with regard to food-borne diseases in Europe was under preparation and should soon be finalized.

10. WHO was continuing its training activities in the field of food hygiene. This year the Organization conducted an expert consultation on undergraduate and post-graduate teaching in veterinary public health (Brno, Czechoslovakia, 20-24 June 1983).

11. This consultation elaborated syllabi for different veterinary subjects, including food hygiene and technology, and surveillance, prevention and control of zoonoses and food-borne diseases and guiding principles for teaching these disciplines.

12. The Committee expressed the opinion that the scope of the WHO European Surveillance Programme for the Control of Food-bore Infections and Intoxications (see para. 9) was of great importance and should be extended world-wide.

ACTIVITIES OF ISO

13. Madame Gantois, as Representative of the ISO Secretariat, informed the Committee of the work of ISO in the field of microbiology.

14. Two sub-committees of ISO were specifically concerned with microbiology. Sub-committee 9 of Technical Committee 34 "Agricultural Food Products" was responsible for developing general guidance standards for food products and Sub-committee 4 of Technical Committee 147 "Water Quality" specialized in water microbiology. The work of these two Sub-committees concerned mostly the standardization of analytical methods.

15. ISO/TC 34/SC9: Food Microbiology

The last meeting of Sub-committee 9 was held, at the invitation of Hungary, in September 1983 at Balatonfured, under the chairmanship of Mr. Auclair (France) 15 countries

and five international organizations were represented, among them Thailand and Tanzania for the first time.

16. The following topics were discussed:

Enumeration of Enterobacteriaceae

Both a MPN Method and a Colony Count Method were used. The prescribed incubation temperature was 37°C. In the case of the MPN technique (medium: E E broth),it was agreed to prescribe a double concentration medium in order to lower the detection limit from 10 to 1 bacteria per gram. The Colony Count Method was performed using Violet Red Bile Agar (VRBA Medium).

Enumeration of Clostridium Perfringens

A Colony Count Method was used. The prescribed medium was Sulfite Cycloserine (SC Medium) and "Motility-nitrate and Gelatin-lactose Media were used for the confirmation tests. The incubation temperature was again discussed, but it was finally agreed to maintain a temperature of 37°C. Some countries had expressed the need for a method allowing enumeration of Clostridium perfringens in small numbers. A survey had been organized in response and the recently recorded results seemed to justify such a request.

General Guidelines for Microbiological Examination

An Ad hoc Working Group has been set up to accelerate the completion of this document. This Group met twice in Brussels and was soon expected to distribute a draft international standard (DIS). (See Appendix II).

Enumeration of Yeasts and Moulds

Agreement was reached on the main parameters.

- The Yeast-mould Group should be considered as a whole, and when counting no distinction was made between these two types of micro-organisms.
- The prescribed medium was a yeast extract-dextrose-chloramphenicol medium. This was a medium already recommended for milk products by the International Dairy Federation (IDF).

Enumeration of Bacillus cereus (Colony Count Method)

Incubation temperature was at 25°C for a period of five days. The prescribed medium was the Mossel Medium, and the confirmation tests were:

- glucose fermentation
- production of acetylmethylcarbinol
- nitrate reduction

The Need for Resuscitation in Microbiological Examaninations

The studies had not yet been completed and it seemed very difficult to present any proposal for general guidelines. It was difficult to find a solution to this problem in view of the diversity of products to be examined. It had nevertheless been considered useful to include a resuscitation step in the Enterobacteriaceae count.

Microbiological Analysis of Canned Products

A better definition had been achieved. The aims for the standardization of future documents had been better defined. It had been thought worthwhile to have available methods for evaluating the uniformity of a batch or assessing microbiological examinations. This programme of work should be pursued in close relationship with the Codex activities, so as to avoid duplication.

The next meeting of SC 9 had been scheduled for April 1984; in a country yet to be decided. There were some other microbiological studies in progress in other sub-committees of TC 34 concerning specific products.

SC 4 Cereals and Cereal Products

SC 5 Milk and Milk Products

SC 6 Meat and Meat Products

A summary of the State of Work of these Subcommittees is given in Appendix II.

17. ISO/TC 147/SC 4: Water Microbiology

The last meetings of ISO/TC 147/SC 4 and its working groups were held in Stockholm in June 1982. The status of the work was the following:

- General Guidance for Microbiological Analysis (SC 4/WG 1). A proposed DP (DP 8199) had been circulated to the working group. The results of the survey would be studied at the Working Group's next meeting (October 1984).

Coliforms (SC 4 WG 2)

The proposals for enumeration of coliforms and thermotolerant coliforms (also called presumptive faecal califorms) by enrichment in liquid medium and by membrane filtration had been completed for the detection of presumptive E. coli and the identification of E. coli. These projects will be reviewed at the next meeting of the working group (October 1984) before being registered as ISO draft proposals.

Pseudomona aeruginosa (SC 4/CT 3)

Two proposals for the enumeration of Pseudomonas aeruginosa (DP 8360/1) enrichment in liquid-medium and DP 8360/2 membrane filtration) were now being submitted for approval to the member committees.

Faecal Streptococci (SC 4/WG 4)

A draft proposal had been submitted to the ISO Central Secretariat for registration as a Draft International Standard (DIS 7899 Isolation and enumeration of presumptive Group D Streptococci - Part 1: enrichment in liquid medium; Part 2: membrane filtration. Voting on this draft project was now taking place.

Spores of Sulphite-reducing Anaerobes (SC 4/WG 5)

At the last meeting of the working group (June 1982), it had been agreed to present a new version of DP 6461: Isolation and enumeration of the spores of sulphite reducing anaerobes -(Part 1: enrichment in liquid medium; Part 2: membrane filtration).

Salmonella (SC 4/WG 7)

A revised proposal based on a method similar to ISO Method 6579 "Microbiology - General Guidance for Detection of Salmonellae" (TC 34/SC 9) had just been distributed.

Quality of the Membrane Filters used in Water Microbiology (SC 4/WG 9)

A proposed draft project had been submitted to the ISO Central Secretariat for registration as a draft international standard (DIS 7704 Water Quality - Evaluation of the membrane filters used for microbiological analysis). Voting on this draft project was now taking place.

All these working groups would meet in the Hague from October 17 to 21, 1984.

REVIEW OF MATTERS RELEVANT TO THE COMMITTEE AS DISCUSSED BY THE CODEX ALIMENTARIUS COMMISSION AND VARIOUS CODEX COMMITTEES

A. CODEX ALIMENTARIUS COMMISSION FIFTEENTH SESSION (4-15 July 1983)

18. The following Codes of Hygienic Practice were advanced to Step 8:

- Dried Milk and Annex I "Microbiological Criteria for Dried Milk Products"
- Processing of Froglegs.

The Commission had noted that two provisions in the Code of Hygienic Practice for Dried Milk required further examination - the definition for "pasteurization" (2.9) which would be considered by the International Dairy Federation and the definition for "lot" (7.5.5) which would be considered by this Committee at its present Session.

19. The Commission had also advanced the proposed Draft Code of Hygienic Practice for the Collecting, Processing and Marketing of Natural Mineral Waters to Step 6.

20. The Committee noted that two Codes of Hygienic Practice "General Principles of Food Hygiene" (first revision 1979) and "Low-acid and Acidified Low-acid Canned Food" which had been adopted by the Commission would be published soon respectively in Volumes A and G of the Codex Alimentarius.

B. OTHER BUSINESS

21. Codex Committee on Food Additives (CCFA)

Codex General Standard for Irradiated Foods (Step 8)

The CCFA re-examined Section 3 - Wholesomeness of Irradiated Foods and amended it to include an appropriate reference to the FAO/WHO/IAEA publication on wholesomeness of Irradiated Food. The CCFA also agreed to use the word "shall" rather than "should" in referring to the recommendations on food hygiene in Sub-section 3.1 (see ALINORM 83/12A, para 159). At its Fifteenth Session the Commission had noted that the use of "shall" would make it mandatory for all those member governments accepting the standard to apply the Codex General Principles of Food Hygiene and Codes of Hygienic Practice to foods that were irradiated. Since Codex Codes of Practice were advisory texts the Commission agreed to maintain the use of "should", bearing in mind that irradiation should not be used as a substitute for Good Manufacturing Practice.

The Committee endorsed the following text:

2.2 Absorbed Dose

The overall average dose absorbed by a food subject to radiation processing should not exceed 10 kGy (*). (**)

2.3 Facilities and Control of the Process

2.3.1 Radiation treatment of foods shall be carried out in facilities licensed and registered for this purpose by the competent national authority.

2.3.2 The facilities shall be designed to meet the requirements of safety, efficacy and good hygienic practices of food processing.

(*) For measurement and calculation of overall average dose absorbed see Annex A of the Recommended International Code of Practice for the Operation of Radiation Facilities used for Treatment of Foods.

(**) The wholesomeness of foods, irradiated so as to have absorbed an overall average dose of up to 10 kGy, is not impaired. In this context the term "wholesomeness" refers to safety for consumption of irradiated foods from the toxicological point of view. The irradiation of foods up to an overall average dose of 10 kGy introduces no special nutritional or microbiological problems (Wholesomeness of Irradiated Foods, Report of a Joint FAO/WHO/IAEA Expert Committee, Technical Report Series 659, WHO, Geneva, 1981).

3. HYGIENE OF IRRADIATED FOODS

3.1 The food should comply with the provisions of the Recommended International Code of Hygienic Practice of the Codex Alimentarius relative to a particular food.

3.2 Any relevant national public health requirement affecting microbiological safety and nutritional adequacy applicable in the country in which the food is sold should be observed.

B. CODEX STANDARD FOR FOOD GRADE SALT (STEP 8)

The Committee endorsed the following provisions:

6. HYGIENE

In order to ensure that proper standards of food hygiene are maintained until the product reaches the consumer, the method of production, packaging, storage and transportation of food grade salt should be such as to avoid any risk of contamination.

22. Codex Committee on Cocoa Products and Chocolate (CCCPC)

Codex Standard for Cocoa (Cacao) Nib, Cocoa (Cacao) Mass, Cocoa Press Cake and Cocoa Dust (Cocoa Fines) for use in the Manufacture of Cocoa Products and Chocolate

Codex Standard for Composite and Filled Chocolate

Codex Standard for White Chocolate/Cocoa Butter Confectionary

The following hygiene provisions were endorsed for the above standards:

"6. HYGIENE

6.1 It is recommended that the products covered by the provisons of this Standard be prepared in accordance with the appropriate sections of the Recommended International Code of Practice - General Principles of Food Hygiene (Ref. No. CAC/RCP 1-1969).

6.2 To the extent possible in good manufacturing practice, the products shall be free from objectionable matter.

6.3 When tested by appropriate methods of sampling and examination, the products:

(a) shall be free from micro-organisms capable of development under normal conditions of storage; and

(b) shall not contain any substances originating from micro-organisms in amounts which may represent a hazard to health.

23. Codex Committee on Fats and Oils

The following provisions were endorsed:

Draft Standard for Venaspati/Vegetable Fat Mixture

"6. HYGIENE

It is recommended that the product covered by the provisions of this Standard be prepared in accordance with the appropriate sections of the General Principles of Food Hygiene recommended by the Codex Alimentarius Commission (Ref. No. CAC/RCP 1-1969, Rev.1).

Draft Standard for Vanaspati/Substitute Ghee

"6. HYGIENE

It is recommended that the product covered by the provisions of this Standard be prepared in accordance with the appropriate sections of the General Principles of Food Hygiene recommended by the Codex Alimentarius Commission (Ref. No. CAC/RCP 1-1969, Rev.1) and the Recommended International Code of Hygienic Practice for Processed Meat Products (CAC/RCP 13-1976).

24. Codex Committee on Fish and Fishery Products (CCFFP)

Draft Standard for Quick Frozen Blocks of Fish Fillets, Minced Fish Flesh and Mixtures of Fillets and Minced Fish Flesh

Hygiene and Handling

The CCFFP had considered the written comments of France which proposed an additional point 5.2(d) requiring that the products "must not contain biotoxins". At the session the Delegation of France had also questioned the provisions of 5.2(b) which required that the product "shall be free from parasites which may represent a hazard to health", since the presence of all parasites was undesirable.

25. The CCFFP had noted that the presence of parasites carried major penalties in the defects table (Annex D. 6). It recognized that the two types of parasite defects were difficult to distinguish but decided to leave both Sub-section 5.2(b) and Annex D unchanged since the former allowed for control of harmful parasites when suitable methods of testing were available and the latter for the control of all visible parasites.

26. With regard to biotoxins the CCFFP decided that their presence was controlled in part by the necessity for adherence to good manufacturing practice expressed in the Hygiene and Handling Provisions and in part by Section 3, "Essential Composition and Quality Factors" which required that the raw material should consist of "sound fish which are of a quality fit to be sold fresh for human consumption".

27. The Committee agreed with the CCFFP that the present provisions adequately covered the nature and quality of the fish required and endorsed the following provisions:

5. HYGIENE AND HANDLING

5.1 When tested by appropriate methods of sampling and examination, the product:

(a) shall be free from micro-organisms in amounts which may represent a hazard to health;

(b) shall be free from parasites which may represent a hazard to health; and

(c) shall not contain any substances originating from micro-organisms in amounts which may represent a hazard to health.

5.2 To the extent possible in good manufacturing practice, the product shall be free from objectionable matter.

5.3 It is recommended that the product covered by the provisions of this Standard be prepared and handled in accordance with the following codes:

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

(ii) the Recommended International Code of Practice for Frozen Fish (CAC/RCP (CAC/RCP 1-1969, Rev. 1);

(iii) the Draft Code of Practice for Minced Fish (ALINOMR 81/18, Appendix VIII).

28. Code of Practice for Food Grade Fish Concentrate

The Committee noted that the CCFFP had deferred further consideration on the elaboration of the above Code until more comprehensive data on production, trade and consumption of the product were available.

29. Coordinating Committee for Europe

Draft Regional Standard for Vinegar

The Committee endorsed the following provisions:

6. HYGIENE

6.1 It is recommended that the products covered by the provisions of this Standard be prepared in accordance with the Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 1).

6.2 When tested by appropriate methods of sampling and examination the product:

(a) shall be free from micro-organisms capable of development under normal conditions of storage in amounts which represent a hazard to health;

(b) shall not contain vinegar eels or substantial quantities of other suspended matters and sediments; and shall be free from turbidity caused by micro-organisms (mother of vinegar); and

(c) shall not contain any substances originating from micro-organisms in amounts which may represent a hazard to health.

30. Codex Committee on Processed Meat and Poultry Products (CCPMPP)

Recommended International Code of Hygienic Practice for Processed Meat and Poultry Products

The Committee noted that the above Code had undergone a major revision both with regard to technical content and layout and that the hazard analysis critical control point (HACCP) system had been used when amending this text.

31. The Committee noted that the HACCP system was an attempt to exercise greater control over microbiological hazards in foods by pinpointing the steps in the processing, and, if necessary,in the distribution, wholesale and retail storage and ultimate use of foods where such hazards were most likely to occur.

32. This approach was originally developed for use in food processing establishments in the USA and had the full support of WHO. A meeting of members of the International Commission on Microbiological Specifications for Foods (ICMSF) had been convened by WHO in Geneva 9-11 June 1980 to discuss the further development of the HACCP system, which included: assessment of the health and spoilage risks associated with processing and marketing a given food product; determination of Critical Control Points in the manufacturing process, and the establishment of programmes for monitoring Critical Points.

33. The Committee noted that the Code of Hygienic Practice for Low-acid and Acidified Low-acid Canned Foods had been elaborated along HACCP lines and agreed that in the elaboration of future Codes such as the proposed Draft Code for Pre-cooked Meals and for Caterin, and in the revision of existing Codes, the HACCP approach should be borne in mind.

34. Evaluation of Alternative Treatment of Spices to be used in Meat Products

The Committee noted that the CCPMPP had considered a document CX/PMPP 82/11 which contained information received from Governments on (i) Methods presently used for sterilizing spices; (ii) Methods permitted for sterilizing spices and changes to be foreseen in present legislation if any; and (iii) Methods of sterilizing spices which were considered to be preferable for future legislation, supplemented by similar information from current literature.

35. The CCPMPP noted that sterilization of spices was also of concern to other Codex Commodity Committees and agreed to recommend that methods for sterilizing spices be harmonized internationally. It was also agreed to ask the Commission to consider the elaboration of a code of practice for production, handling and treatment of spices, a task which could be entrusted to the Codex Committee on Food Hygiene.

36. At its Fifteenth Session the Commission had noted the concern of the CCPMPP regarding the sterilization of spices for use in processed meat and poultry products. The common method of treatment by ethylene oxide was under heavy criticism for toxicological reasons and was expected to be prohibited at least in some countries in the near future.

37. As there was a real need for spices of good bacteriological quality for use in processed meat and poultry products moving in international trade and also for products other than meat products, the CCPMPP agreed to seek the advice of the Commission regarding the desirability of elaborating a Code of Hygienic Practice for Production, Handling and Treatment of Spices, with a view to international harmonization. The Commission had recognized the need for such a Code and requested the Codex Committee on Food Hygiene to consider undertaking such a task at its next session.

38. In discussing the request of the Commission, the Committee noted that an alternative method, irradiation of spices at an average radiation dose of up to 10 kGy had received unconditional acceptance by the FAO/WHO IAEA Joint Expert Committee on Food Irradiation in 1981 and could be an efficient method for reducing the microbial load and the number of pathogenic micro-organisms in spices. Norway had already permitted irradiation of spices for food manufacturing purposes and provisional acceptance had also been given by certain countries.

39. At the present session, the Delegation of Norway was of the opinion that the preparation of spices which were free from microbiological hazard was not only a question of sterilizing treatment but also one of food harvesting and storage practices and suggested that the proposed Code should also take this into account.

40. Other delegations pointed out that several spices had been reported as the source of microbiological contamination and that the problem was not confined to the use of spices in processed meat and poultry products.

41. After further discussion in which the possibility of developing two separate Codes, one for the production, harvesting and handling of spices and another for subsequent treatment was considered, the Committee agreed that a background document should be prepared for consideration at its next session on the manufacturure and treatment of spices following which the Committee would decide how best to proceed with the elaboration of a Code or Codes of Practice to ensure good manufacturing practices and adequate treatment of spices. The Delegation of the Netherlands agreed to prepare such a document in cooperation with Canada, Denmark, France, UK and USA.

42. Codex Committee on Cereals, Pulses and Legumes (CCCPL)

Draft Standard for Maize (Corn)

Draft Standard for Wheat Flour

The CCCPL had, in line with the comments made by this Committee at its last session (see ALINORM 83/13, paras 44-48), amended the hygiene provision and for the above standard and now submitted them for endorsement. The texts read as follows:

For Maize

5.1 Unchanged

5.2 When tested by appropriate methods of sampling and examination the product:

5.2.1 shall, to the extent possible in Good Manufacturing Practice, be free from objectionable matter, having regard to the tolerance indicated in Sub-section 3.4 where applicable.

5.2.2 shall be free from micro-organisms, substances originating from micro-organisms, or other poisonous or deleterious substances in amounts which may resonably represent a hazard to health.

For Wheat Flour

6.1 Unchanged

6.2 When tested by appropriate methods of sampling and examination the flour shall be:

6.2.1 to the extent possible in Good Manufacturing Practice, free from objectionable matter.

6.2.2 free from micro-organisms, substances originating from micro-organisms or other poisonous deleterious substances in amounts which may reasonably represent a hazard to health.

43. Before endorsement the Committee considered whether specific references to freedom from mycotoxins should be made.

44. The Committee recognized that limits for mycotoxins varied considerably in national legislation and that it was not possible to provide a complete listing of all mycotoxins nor to give guideline figures for some of the more recently discovered mycotoxins. It was agreed for these reasons to maintain the present provision unchanged.

Amendments to the Codex Procedures for the Elaboration of World-wide and Regional Standards

45. A proposed revised procedure for the elaboration of Codex Standards had been discussed both by the Executive Committee and by the Codex Committee on General Principles. The Commission adopted the new procedure (ALINORM 81/13, paras 157-165) which was now published in the Fifth Edition of the Procedural Manual.

46. The revised procedure was aimed at shortening the time needed to develop standards while safeguarding the opportunity for member governments and the Commission to examine and approve standards and codes. In essence there were now 8 rather than 11 steps.

47. The new procedure allowed the adoption of a draft standard as a Codex Standard at Step 8 and this would be the procedure to be followed by Committees in elaborating their future standards.

Publication of Codex Standards

48. The Committee noted that several volumes of the Codex Standards had now been published in loose-leaf form and that work was also in progress on the preparation of Codex Codes of Practice and Codes of Hygiene Practice in similar form. It was hoped that this would facilitate the insertion of amendments to Standards and Codes in the future.

PROVISIONS FOR THE TEARDOWN EXAMINATION OF CANNED SEAMS

49. The Committee had available a document containing the report of a Working Group (see Appendix III) which had met in Ottawa from 11 to 14 November 1982 to provide further clarification and detail for certain provisions of the Codes of Hygienic Practice for Low-acid and Acidified Low-acid Canned Foods, and for the Salvaging of Damaged Canned Foods. The report dealt with classification of visual defects and a sampling plan including limits for acceptance. Some countries expressed doubts as to the statistical validity and possible misuse of the sampling plan. It was agreed that an appropriate explanatory preface should be drafted before the plan was inserted into a Codex document.

50. Before convening an ad hoc Working Group to discuss the report at the Session the Chairman of the Working Group, Mr. I.E. Erdman (Canada) informed the Committee informed the Committee that defects classification and lot evaluation provisions had been prepared to be used in conjunction with the Draft Codes but that proposals for microbiological examination and methods had not been included in the Report.

He sought guidance from the Committee on whether the defects classification and the microbiological examination methods, when prepared, should be annexes to the two Codes or whether they should be separate documents.

51. Before the Committee considered the matter Mr. Erdman showed slides illustrating the types of visual defects encountered in the production processing and distribution of canned goods as classified by the Working Group.

52. After some further discussion the Committee decided that the tests for examination of visual defects and for microbiological examination should be prepared as separate documents and should not be attached to the Codes.

53. The Committee also noted that a document compiled in France by CNRS and AFNOR dealing with defects and contamination not only in cans, but glass and metallo-plastic containers, should be taken into account when preparing the final text.

54. At a later stage there was further discussion on the contents of the two proposed documents.

(a) Visual Inspection and Teardown

It was pointed out that visual inspection and teardown examination were two separate steps, one to be carried out by an operative who might require a manual of visual defects and the other in the laboratory where a manual of instructions for teardown would be required.

55. The Committee recognized that adequate instruction manuals for teardown inspection already existed and decided the Working Group should prepare guidelines in colour, classifying visual defects only.

56. The Chairman of the Working Group agreed to prepare such guidelines and to send them to the Codex Secretariat which would look into the possibility of printing the guidelines in colour and distributing them for comments at Step 3 of the procedure.

57. It was pointed out that Government consultation on the guidelines was essential, because the defects classification itself required further work on, for instance, defect descriptions. The special problems of goods damaged in transport rather than in processing were also noted.

(b) Microbiological Examination and Methods

58. The Committee noted that microbiological examination of defects formed an essential link between the Guidelines on visual defects and the "Salvaging Code". The Group was of the opinion that the preparation of such criteria was of sufficiently high priority to warrant consideration by a Joint FAO/WHO Working Group or Consultation. It made a strong recommendation to the Joint FAO/WHO Food Standards Programme to find resources to organize such a body.

59. Updating of the Code of Hygienic Practice for Low-acid and Acidified Low-acid Canned Foods

The Committee noted that proposals made in the report of the Working Group would require revision of the above Code, in particular with regard to can integrity and post-thermal process hygiene. It was agreed that the Working Group would prepare specific amendments to the Code for consideration at the next session of the Committee.

AD HOC WORKING GROUP ON CANNED FOODS

60 This Working Group met under the chairmanship of I.E. Erdman, (Canada), to consider: (a) Sampling and Inspection Procedures for Microbiological Examination of Meat Products in Hermetically Sealed Containers (ALINORM 83/16, Appendix III); and (b) Code of Hygienic Practice forSalvaging of Damaged Canned Foods (ALINORM 83/13,

Appendix VII, CX/FH 83/4). Mr.B.E. Brown (Canada) was rapporteur. The Working Group noted that the above Code (b),which is presently at Step 4, was out for government comments and should remain at this step until sufficient time had elapsed to permit receipt of any comments. Thus these should be available for study at the next meeting of the Committee.

Comments on Document (a)

1. Preface

61. Opinion was expressed that the use of a preface as such in Codex Codes was unique. The material contained in the preface was important and should be re-located in appropriate places in the body of the document. For example,paras 1 and 5 should be used better define the Scope in Section I.

2. Scope

62. In addition to the inclusion of the pertinent parts of paras 1 and 5 from the preface, the scope should stress that the investigational guidelines and/or procedures were concerned only with microbiological analysis. The comments in paras 1 and 5 certainly detailed some of the important reasons why end-product analysis was futile in control of microbiological problems in such products. The scope should therefore be more specific as to when and how the procedures outlined should be used.

3. Definitions

63. (i) Lot While the definition given might be appropriate for the class of foods covered by this document, the Working Group advised that consideration be given to the results of the discussions on a definition which would be reviewed by the Committee at this meeting. (see paras 148-152).

64. (ii) Reject: This term was considered to the too harsh. The term "detain" was suggested as a replacement and would be in more keeping with the definition given in the footnote.

4. Procedure

PART A - HEAT-TREATED SHELF-STABLE PRODUCTS

65. Para 2 of the preface should, with some editorial amendments, be used as the lead paragraph. As a guide to sampling for investigation of microbiological problems, the Working Group felt that this section was adequate. It could be strengthened by a reference to the large number of sample units which would have to be analyzed to detect low incidences of defectives. Perhaps this could be done by an example, for instance, for an incidence of 1/10,000 (0.0001) there was only a probability of 0.39 (39%) of detecting one or more defectives in 5,000 sample units.

PART B - NON SHELF-STABLE PRODUCTS

66. The Working Group had considerable difficulty with this procedure. After much discussion it was assumed that this procedure was intended to be used in cases where there had been temperature abuse and warm zones within the lot could be determined. For such conditions, the sample of 5 cans represented a "worst possible situation", and therefore was a biased sample. The analysis of such samples should be as complete a microbiological profile, including pathogens, as was possible. Since the sample was biased, a three-class acceptance plan of the type given should not be used. Interpretation of the results was largely dependent upon other relevant information, e.g., microbiological flora of the product, etc.

67. For general investigation of microbiological problems in lots of such products the instructions and guidance given in PART A were pertinent.

68. Since these products were primarily dependent upon refrigeration for their preservation, the control and recording of temperatures during storage and transportation was most important. This fact should be dealt with in the body of the Code.

69. The Committee agreed with the recommendation of the Working Group to relocate sections of the preface in the body of the document.

70. With regard to the Working Group's suggestion to replace the word "reject" by "retain" it was noted that "reject" was used in Section 2 and in the footnote which was taken from the General Principles for the Establishment of Microbiological Criteria for Foods. In the opinion of the Working Group, however, the use of "detain" was more acceptable to many agencies and more in line with the intent of the footnote.

71. The Delegation of Denmark pointed out that in its opinion the observation of the Working Group regarding temperature controls and recording during storage and transportation was covered under provision 6.6.2.5 of the main code. The Committee agreed that the point should be brought to the particular attention of the Codex Committee on Processed Meat and Poultry Products for examination.

72. The Delegation of the Republic of Argentina, in line with the statement made at the last session of the Codex Committee on Processed Meat and Poultry Products agreed with the sampling procedures proposed for the microbiological examination of hermetically sealed containers since the Draft Code of Hygienic Practice for Processed Meat and Poultry Products (ALINORM 83/16, Appendix IV) has taken into account almost all the observations made by the Republic of Argentina on the subject.

Argentina considered that the Code should reflect a firm guarantee that bacterial proliferation does not result in the production of thermostable, toxins which could persist during the treatment of products undergoing re-processing.

73. In addition, the microbiological limits of micro-organisms which present a health hazard to the consumer should be quantified and indicated in the Code.

74. The Committee expressed its appreciation to the Working Group for its excellent work.

CONSIDERATION OF AMENDMENT TO CODEX EUROPEAN REGIONAL STANDARD FOR NATURAL MINERAL WATERS - SUB-SECTION 5.1 (MICROBIOLOGICAL SPECIFICATIONS)

75. The Committee had decided to establish an Ad hoc Working Group under the chairmanship of the Delegation of Switzerland to examine the proposed amendment as contained in para 34 of ALINORM 83/19. It had been agreed that the Working Group should make a recommendation to the Committee as regards endorsment of the amendment and inclusion of an identical provision into the section on end-product specifications of the Draft Code of Hygienic Practice for the Collecting, Processing and Marketing of Natural Mineral Waters (Section VIII).

76. The Delegation of Switzerland pointed out that while much work had been carried out on the 42°C method proposed at the previous session of this Committee, the results had not yet been published. Futhermore, certain aspects of the methods had to undergo more testing. The Delegation of Switzerland offered to prepare, in collaboration with the EEC, a working paper on the matter and expressed the view that governments would be in a position to comment on the revised proposal since the results of testing the method developed by Dr. Schmidt-Lorenz would also be available at that time.

77. The Committee decided that the Swiss paper should be first submitted to the next session of the Coordinating Committee for Europe (June 1984) and that this Committee would examine it in the light of comments from governments and the Coordinating Committee at its next session. It was noted that if necessary a proposal for new specifications to replace those in para 34 of ALINORM 83/19 would be included in the working paper.

CONSIDERATION OF DRAFT CODE OF HYGIENIC PRACTICE FOR THE COLLECTING, PROCESSING AND MARKETING OF NATURAL MINERAL WATERS AT STEP 6

78. The Committee had before it the above Code as contained in Appendix V to ALINORM 83/13. The Committee was informed that the Fifteenth Session of the Commission had advanced the Code to Step 6 of the Procedure. Due to the timing of sessions a Circular Letter requesting comments at Step 6 had been issued only recently and governments had, therefore, not had an opportunity to send in written documents.

79. The Committee decided to discuss briefly the Code and agreed that any pertinent comments be communicated to governments for information.

80. The Committee agreed that an editorial amendment should be made, replacing "food" by "natural mineral water" wherever it appeared in the Code and several typing errors be corrected.

81. On the proposal of the Delegation of the Netherlands, the Committee agreed to include in Sub-section 4.3.1 (Type of Construction) cross reference to the requirements laid down in Sub-section 3.7 (Protection of the Extraction Areas).

82. The Delegation of Denmark suggested to qualify the term "screens" in Sub-section 4.3.7 (windows) by adding "insects" to assure that those screens were suitable for their purpose. It was noted that the provision presently contained in the Code had been taken over from the General Principles of Food Hygiene and that the Codex Committee on Processed Meat and Poultry Products had amended the provision to include reference to "insect" screens.

83. In Sub-section 4.4.1.1 (Water supply) it was questioned whether the Code should allow for potable water in a factory for bottling natural mineral water. The Committee agreed that the provision for potable water should be retained.

84. One delegation expressed the view that Sub-section 5.5 (Exclusion of Animals) should be amended to prohibit the presence of all animals whether controlled or uncontrolled to avoid contamination of the soil. The Committee recalled that this provision had been established to permit e.g., guard dogs on the premises. The Committee agreed that comments were needed on this matter.

85. The Committee noted the view of the Delegation of the United Kingdom that Sub-section 7.3.4 (Treatment) should be deleted since natural mineral waters were not permitted to be preserved.

86. Concerning Sub-section 7.8 (Processing and Production Records) the Committee noted that many mineral waters had a shelf-life of more than two years. The Committee decided, therefore, that no time limit should be included in this provision and deleted the following "but unless a specific need exists they need not be kept for more than two years".

Status of the Code

87. The Committee decided to retain the Code as contained in Appendix IV to this Report at Step 6.

CONSIDERATION OF PROPOSED DRAFT CODE OF HYGIENIC PRACTICE FOR (PRE-) COOKED MEALS IN MASS CATERING AT STEP 2

88. The Committee had before it working paper CX/FH 83/5 containing the above Draft Code and some explanatory notes thereto. As agreed to earlier in the session an Ad hoc Working Group had examined the need for such a Code as well as the Draft itself section by section.

Members of the Delegations of Australia, Brazil, Canada, Denmark, France, Finland, Greece, Federal Republic of Germany, Netherlands, New Zealand, Norway, Sweden, Switzerland, United Kingdom and United States participated at the meeting of the Working Group which had been chaired by Mr. Van Havere of Belgium.

89. The Chairman of the Working Group presented the following report to the Committee:

"(1) The question was raised whether such a code was justified in the light of lack of international trade in catering. The Working Group believed that it is one of the responsibilities of Codex to assist countries in their domestic food hygiene, an introductory note added to the Draft Code could clarify the reasons why such a code was justified.

(2) Before discussing the scope of this code, the Working Group felt the need to describe in a firm definition what it meant by "mass-catering": "Mass-catering is the bulk preparation, portioning, storage, handling transportation, serving etc., of prepared meals for a group of persons".

(3) On the other hand, preparation did not only mean "cooking" in the sense of heat treatment but also preparing salads, filet americain, etc.

(4) After preparation the food might be handled in several different ways. Therefore, the Working Group agreed not to list the categories in the scope. However, it was clear that in the definitions the categories could be retained. As consequence of a wider scope due to the new mass-catering definition, the code was applicable to many aspects of airline catering (international or domestic) and to many fast foods and snack bars.

(5) Pre-packed quick frozen meals intended for retail sale were excluded (see Committee on Quick Frozen Products).

(6) Beside a mass-catering definition, the term "catering establishment" would be defined as a restaurant, canteen or other establishement where food is prepared and served for delivery to the ultimate consumer". Thus "serving rooms" were also included in the code.

Some delegations mentioned cases where food was prepared and served in the same room. Others stipulated that serving room could even include a hospital room or the open air (barbecues, wedding parties...).

(7) The term "cooked ready-to-eat" should be replaced by "cooked for immediate consumption". The temperature of 75°C was considered as too high. A temperature of 60°-65°C was sufficient.

(8) Referring to the other sections (Section III up to VII) the General Principles of Hygiene (G.P.) were mostly applicable. The side-lined sentences were changes or additions to the G.P. Although members of the Working Group did not agree with all the draft proposals, it was recognized that certain activities in catering had to be considered as critical points. Therefore, the procedure of control of critical points should be applied (HACCP note by Dr. Bryan).

Some of these possible critical points were:

- 4.4 Water supply: the Danish Delegation referred to the re-draft text of the Code of Hygienic Practice for Processed Meat Products.

- 4.4.3 Refrigeration: Especially the problem of "undercapacity of equipment" could lead to critical situations. Chilling and freezing will be split into two separate items.

- 5.2 Cleaning and disinfection (see also the extensive re-drafted GP text on cleaning and disinfection).

- 7.1.5 Separate storage of raw and cooked materials (question of off-flavour and cross contamination).

- 7.4.1 Keeping the food at temperature of 60°C. The main point was that heated food should never be stored between 7°C and 60°C. End-product Specification could

- 7.4.1 (cont.)

be justified by a HACCP - note. As a matter of information, France had obligatory microbiological specifications for prepared meals. U.K. had some guidelines. They would be sent to the Committee for information.

(9) Finally, the Group agreed to re-draft the text before sending for government comments at Step 3."

90. The Committee congratulated Dr. Van Havere on the excellent paper and expressed its appreciation to the Working Group for having thoroughly examined the Draft Code. The Committee agreed with the conclusions arrived at by the Working Group.

91. Several delegations wished to be informed whether a code which dealt with products moving largely domestically only was within the remit of this Committee. The Committee noted that this Committee should, according to its terms of reference, deal with all matters related to hygiene and that one of the major aims of the Codex Alimentarius Commission was to protect the health of the consumer. The Committee agreed that it was well justified to continue with the work on the code and an introductory note was needed.

92. The Committee was informed that the European Regional Office of WHO had published a book on Mass-Catering (Author Dr. R.H.G. Charles) as a WHO Regional Publication, European Series No. 15, which might be of interest to delegates dealing with that matter, as it described areas where mass-catering could involve problems.

93. The Delegation of the Netherlands, inquired whether airline meals were also excluded from the Code. The question was also raised whether the Code was relevant to railroad meals. The Committee decided that airline as well as railroad meals were covered by the Code. The Committee noted the WHO publication on Aviation Catering.

94. The Committee agreed with the Delegation of New Zealnd that the definition of catering establishment in para 6 of the Working Group Report should be amended as follows: "... is prepared and/or served...". It was also agreed to substitute "area" for "room" in the same paragraph.

95. To clarify further the scope of the Code, the Committee discussed whether pre-cooked, frozen or chilled meals as such should be included. (See also para 89(5)). Attention was drawn to the large retail trade in such meals. It was noted that this type of meal was prepared in factories whereas food for mass-catering was more often prepared in large individual kitchens. Pre-cooked meals for retail sale required also different forms of packaging, labelling and storage instructions. The Committee agreed that they fell under the terms of reference of the Codex Alimentarius/UNECE Group of Experts on Quick Frozen Foods and were covered by the Code on Handling of Quick Frozen Foods.

96. The Committee also agreed that the period of time between preparation and consumption of meals for mass-catering was usually brief but this did not require the introduction of a time limit into the Code.

97. The Committee accepted the kind offer of the delegation of Belgium to re-draft the Code, having regard to the conclusions of the Working Group and the additional comments in paras 91-96 above.

Status of the Code

98. The Committee advanced the Code to Step 3 of the Procedure and noted that the revised text of the Code would be sent out for comments at Step 3.

REVISION OF THE AMENDED INTERNATIONAL CODE OF HYGIENIC PRACTICE FOR EGG PRODUCTS TO INCLUDE MELANGE

99. The Committee had before it the above Code (Ref. No. CAC/RCP 15-1976) and the proposed amendments in working paper CX/FH 83/6.

100. The paper was introduced by Dr. K. Buchli of the Netherlands who pointed out that this revision had been initiated in order to accommodate the requirements of the Expert Group on Egg Products of UN/ECE. Since the term "melange" for egg products was not much used in international trade and even by the ECE Group, the author proposed that the above Code be amended to include a definition and provisions for egg products. These proposed amendments dealt also with (a) handling of cracked eggs on the farm as well as at the packing station; and (b) the centrifuging of egg products.

Definition of Egg Products (Section 2)

101 The Committee agreed with the definition of "egg products" as contained in CX/FH 83/6.

Handling Cracked Eggs on the Farm (Section 3)

102. The Delegation of the United Kingdom proposed to clarify the meaning of the heading by including the term "in shell". This was agreed.

Sub-section 3.2.9

103. There was an extensive discussion on the type of containers to be used for the collection of the egg product. (Stainless steel, maximum 15 litres volume). The Delegation of Denmark indicated, that in their country, plastic bags in outer cartons were used as single-use containers. Other delegations stated that suitable plastic containers were used and it was not feasible to stipulate requirements for volume of those containers. The volume of containers would vary according to farm size. The Committee agreed to delete the following part of the sentence "of stainless steel with a volume of not more than ( ) litres". The Committee further agreed to prescribe that the containers be fitted with suitable closures.

104. The Delegation of Switzerland questioned the need for disinfection since the use of chemical disinfectants might lead to neglecting the cleaning operations. Furthermore, the product would be subject to microbiological contamination during the egg breaking and consequently Sub-section 4.4.4.5.1 required these products to be pasteurized. The Committee recalled that it was one of the principles of food hygiene to keep the microbial load as low as possible at all times. The Committee also noted that disinfection included chemical as well as physical methods. The Committee decided to retain the requirement for disinfection, if necessary. The Committee also agreed that the room for breaking eggs on the farm should be subject to the same requirements as at an egg processing plant and decided to add an appropriate reference to Sub-section 4.1.1. Several delegations indicated that in their countries no egg breaking operation was permitted to be carried out at farm level.

Sub-section 3.2.10

105. The Committee agreed that Sub-section 3.2.10 should preceed Sub-section 3.2.9.

Sub-section 3.2.12

106. The Delegation of France expressed concern that the provision as written could be interpreted in such a way that egg products had to be transported in frozen form, which was not acceptable. The Committee noted that egg products were not in a frozen state at a temperature of 0°C but agreed to clarify the provision by introducing a temperature of 0-7°C.

Section 4 Plant, Facilities and Operation Requirements

Sub-section 4.4.4.1

107. The Committee noted that an additional provision had been proposed for inclusion in this Sub-section to deal with centrifuging after breaking to remove the last part of the egg albumen from the egg shells. It was noted that this process should be permitted only for eggs washed before breaking, i.e., not for cracked egg which could not be washed. The Committee agreed that the text as contained in CX/FH 83/6 was suitable.

Sub-section 4.4.4.5.1

108. The Committee noted this provision required pasteurization in the plant of egg products received from farms or packing stations and agreed that such a provision would safeguard the hygienic quality of egg products which had not been prepared at the plant and should therefore be included in the revised code. The Delegation of the Federal Republic of Germany suggested to allow also for other methods to prevent multiplication of microbes in egg products such as fermentation or addition of salt or sugar.

109. The Committee agreed that the Secretariat be asked to review the numbering of the proposed additional sections. The Committee also decided that government comments should be requested only on the additional sections (amendments) to the Code of Hygienic Practice for Egg Products (CAC/RCP 15-1976) as contained in Appendix V to this Report.

Status of the Amendments

110. The Committee decided to advance the above amendments to Step 3 of the Procedure.

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF SECTION V - END-PRODUCT SPECIFICATIONS OF THE RECOMMENDED INTERNATIONAL CODE OF HYGIENIC PRACTICE FOR DESICCATED COCONUT (CAC/RCP 4-1969)

111. The WHO Representative introduced for consideration by the Committee the government comments on microbiological specifications for desiccated coconut (document CX/FH 83/7). He recalled that this product was reported as a source of food-borne diseases, particularly Salmonellosis and that elaboration of microbiological specifications for desiccated coconut could be of interest for many developing countries as well as for other countries which imported this product.

112. Written comments on the subject had been received from the USA, Thailand, Sweden, Poland, Netherlands and Uruguay. All of them except the Netherlands, included a test for Salmonellae. However, some countries also performed tests for coliforms (Poland, Uruguay), moulds and mesophilic aerobic bacteria (Hungary).

113. The Delegations from Netherlands, Canada, Belgium, FRG and UK expressed concern with regard to the problem of aflatoxin in desiccated coconuts. The Committee agreed to include a general statement on public health hazard of mycotoxins in desiccated coconut. No concrete limits were proposed to be included into the end-product specifications.

114. The Committee considered the recommendations of the ICMSF on microbiological specifications for tree and ground nuts and found them useful to some extent for desiccated coconut. In this connection, the Representative of the ICMSF made a proposal to include in the microbiological end-product specification for desiccated coconuts as such, only salmonellae which should not be isolated from 10 samples of the product (the size of the sample is 25 grams). This proposal was adopted by the Committee (n = 10, c = 0).

The Committee decided that the above Code should be amended as follows:

"SECTION V - END-PRODUCT SPECIFICATIONS

Substitute the following text for Section B:

(a) Salmonellae: Salmonellae organisms should not be recovered from any of the 25 grams samples examined when the test is carried out according to the method described (n = 10, c = 0, m = 0). Appropriate method: ISO 3565 - 1975.

(b) The product should not contain any substances originating from micro-organisms, particularly mycotoxins, in amounts which exceed the tolerances or criteria established by the official agency having jurisdiction."

Status of the Amendment

115. The Committee advanced the above amendment to Step 3 of the Procedure subject to approval by the Executive Committee acting on behalf of the Commission.

MICROBIOLOGICAL CRITERIA FOR PRE-COOKED FROZEN SHRIMPS AND PRAWNS

116. The Representative of WHO informed the Committee of the results of the Working Group on Microbiological Criteria for Pre-cooked Frozen Shrimps and Prawns (see documents CX/FH 83/8 and CX/FH 83/2) which had met during the Fifteenth Session of the Codex Committee on Fish and Fishery Products. In particular, he drew attention to the discussion on whether the microbiological criteria elaborated by the above Working Group were microbiological guidelines or end-product specifications.

117. The Delegation of the Netherlands stressed in this context that the majority of the Working Group had proposed the microbiological criteria as guidelines and not end-product specifications. After a three-year period of testing there would be sufficient information available to decide whether to introduce end-product specifications.

118. The Representative of WHO reminded the Committee that the question of the establishment of microbiological guidelines for the purposes of the FAO/WHO Food Standards Programme was thoroughly considered at the Eighteenth Session of the Codex Committee on Food Hygiene (ALINORM 83/13, para 114) which recommended that "the manufacturer should define his own sampling plan for microbiological purposes and establish limits that will ensure that limits in microbiological end-product specifications will be as a minimum adhered to and preferably bettered". In his opinion, it would therfore be a logical sequence to elaborate, first of all, end-product specifications which would help the manufacturer define his own sampling plan, thus producing the food in accordance with existing codes of hygienic practice.

119. The Delegations of the UK, USA, France, Canada and Australia expressed a preference for the proposed microbiological criteria as end-product specifications to be attached to the appropriate Code of Hygienic Practice. The Committee agreed with this point of view.

120. The attention of the Committee was drawn to the fact that the Delegation of Thailand which participated in the above Working Group noted that if the microbiological criteria were considered by the Food Hygiene Committee as an end-product specification the figure for Staphylococcus aureus would be 2 instead of 1. The Committee accepted this proposal. The Delegation of Denmark proposed to include enterococci for control of production hygiene.

The Delegation of France informed the Committee that existing provisions in national regulations distinguished between whole pre-cooked frozen shrimps and peeled pre-cooked frozen shrimps. Tests for the determination of Staphylococcus were only made on peeled shrimps because the extra handling increased the risk of contamination. The Delegation of France would also prefer to include a criterion for E. coli as a good indicator of faecal contamination rather than make reference to Enterococci.

121. The Secretariat referred to the discussion on this subject by the Working Group as well as to the recommendations of the Second Joint FAO/WHO Expert Committee which had concluded that "the inclusion of a microbiological criterion for E. coli offered no added benefit in deciding compliance with the Code of Practice". The Committee decided to not include E. coli or enterococci in the proposed end-product specifications and recommended the following microbial limits:

Mesophilic aerobic bacteria*
$n = 5$, $c = 2$, $m = 10^5$, $M = 10^6$

* Method to be added later.

Staphylococcus aureus*
n = 5, c = 2, m = 500, M = 5000
Salmonella*
n = 5, c = 9, m = 0.

122. The Committee agreed that these criteria should be circulated to governments at Step 3 of the Procedure with a view to their incorporation as end-product specification into the Code of Hygienic Practice for Shrimps and Prawns.

Microbiological Safety of Irradiated Foods

123. The Committee had before it a report of the Board of the International Committee on Food Microbiology and Hygiene (ICFMH) of the International Union of Microbiological Societies (IUMS). (see Appendix VI).

124. The Board had met in Copenhagen in 1982 at the request of FAO and WHO to consider the above subject. These organizations hoped that irradiation of food, by reducing contamination with pathogenic micro-organisms and food loss from spoilage, would contribute to achieving health for all by the year 2000 by improving both food safety and nutrition, but wished to be assured that irradiation of food did not create a health hazard.

125. The Committee recalled that the Codex Committee on Food Additives had, in co-operation with the Federal Research Centre for Nutrition in Karlsruhe and the Joint FAO/WHO/IAEA Expert Committee on the Wholesomeness of Irradiated Food (JECFI) elaborated a Codex Standard for Irradiated Foods. This Standard had come before this Committee at its 16th Session, at which time some concerns were expressed on the possible effects of sub-lethal doses of irradiation on the microbial flora of treated foods and on food-borne pathogens and the possible consequences to public health.

The Board had considered these views of the Committee and had concluded that:

"after analyzing the scientific knowledge to date, it was satisfied that there was no cause for concern. Irradiation induced genetic mutation of pathogens in food did not create an increased hazard to health and in the Board's opinion there would be no qualitative difference between the kind of mutation indiced by ionizing irradiation and that induced by any other pasteurization/partial preservation methods such as heat treatment or vacuum drying.

Modern food handling technology was adequate to control problems created by suppression of spoilage micro-organisms. Food irradiation was an important addition to the methods of control of food-borne pathogens and did not present any additional hazards to health provided it is not used as a substitute for food manufacturing practice in Codes of Practice".

126. The Committee expressed its satisfaction with the above conclusions and its appreciation to those who had participated in the Meeting of the Board and the preparation of its report.

127. The Delegation of Norway referred to the Committee's earlier endorsement of the hygiene provision of the revised Codex General Standard for Irradiated Foods (see para 21) and in the light of the Board's conclusions questioned whether Sub-section 3.2 which read:

"Any relevant national public health requirement affecting microbiological safety and nutritional adequacy applicable in the country in which the food is sold should be observed".

should be retained.

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* Method to be added later.

128. The Delegation pointed out that this provision did not appear in any other Codex Standard and could be interpreted as applying specifically to irradiated foods.

129. The Committee did not think that the provision implied that there was any specific hazard associated with irradiation and made no change to the text.

CONSIDERATION OF PRIORITY FOODS FOR FUTURE WORK ON MICROBIOLOGICAL CRITERIA

130. The Representative of WHO presented the Committee with some proposals for work on microbiological criteria listed by the Second FAO/WHO Expert Consultation on microbiological specifications for foods (working document CX/FH 83/10) as well as by the International Union of Microbiological Societies/Committee on Food Microbiology and Hygiene. Among food items mentioned were: spices, smoked fish, fresh cheese, pre-cooked chilled meat, chocolate and canned foods.

131. The Delegation of Australia stressed that further microbiological criteria should be elaborated for those foods, the production of which had been already covered by Codes of Hygienic Practice. Moreover, some work could be done on the revision of existing microbiological criteria which had been already incorporated in the Codes. The Committee referred to the earlier discussion on the necessity of microbiological criteria for canned food, and decided that this should be given priority. (see para 58).

132. The Delegation of the USA made a suggestion for elaboration of microbiological criteria for waters other than mineral waters, dried fishery and meat products, and soy products and agreed to prepare a background paper on these subjects for consideration by the Committee at its next session.

HISTAMINE (SCOMBRIDAE) POISONING

133. The WHO Representative informed the Committee that he had made a request for information on histamine poisoning at the Fifteenth Session of the Codex Committee on Fish and Fishery Products (CCFFP). (ALINORM 83/18, paras 284-286). Many countries replied to the Circular Letter issued by the Secretariat and supplied data on the incidence of histamine poisoning, on control measures, and on existing regulatory limits for histamine in foods. These data were collated in the comprehensive document "Monograph on histamine poisoning" (CX/FH 83/11) prepared by Dr. S.L. Taylor.

134. Dr. Taylor presented this document to the Committee which noted that the monograph contained valuable information on the epidemiology of histamine poisoning in foods identified as sources of food-borne disease, on methodology for detection of histamine, regulatory limits for histamine in foods, as well as a comprehensive list of references. Delegations from Canada, Denmark, Netherlands, USA, UK, FRG, Norway, New Zealand and Japan commented on the document. In particular it was recognized that it was difficult to assess the full extent of histamine poisoning in the world since good statistics on its incidence did not exist. For a variety of reasons, incidents of histamine poisoning often go unreported.

135. Knowledge with regard to the formation of histamine in such foods as cheese and wine which had been reported as causing histamine poisoning was very limited. There were also difficulties because methodology for the detection of histamine varied greatly in different countries and required standardization.

136. Most countries did not have firm regulatory limits on the permissible levels of histamine in foods, which reflected an understandable degree of uncertainty with regard to the threshold toxic dose for histamine.

137. The Committee noted that in the fishing industry, bacterial histamine production could often be effectively controlled in some cases and for some species by the use of low storage temperature; the Delegation of Japan informed the Committee that the introduction of a temperature of 5°C in its fishing industry had significantly decreased the cases of histamine poisoning. However, in Norway it had been found that the use of low storage temperatures did not always seem to effectively prevent the accumulation of histamine in fish products especially fermented fish products. When good manufacturing practices were followed, histamine could still sometimes develop in fermented herring

products of good quality, even at temperatures as low as 10°C. The use of lower temperatures might prevent the development of the desired flavour characteristics. It was pointed out that such fermented products, judged to be of high organoleptic quality have been a long-standing traditional food without apparently causing histamine poisoning, even though present knowledge suggested that they might have contained histamine.

138. The Delegation of the USA pointed out that for many species, particularly in the tropical and sub-tropical regions the conditions required for bacterial histamine formation was not known. Thus advice, such as the routine application of the Codes of Practice for temperature control of fish and fishery products as a preventive measure might be incorrect and possibly misleading.

139. Taking into account the increasing incidence of histamine poisoning and the lack of knowledge in this field in many countries the Committee requested WHO to issue the monograph on histamine poisoning as a FAO/WHO document for world-wide distribution.

140. The Committee recognized that at the present time it would be too premature to elaborate any internationally acceptable regulatory limits within the framework of the FAO/WHO Food Standards Programme on histamine in foods as well as to make recommendations on how to prevent and control such intoxications.

141. Additional research in this field with regard to the mechanism of histamine formation in different foods as well as further work on epidemiology of this disease, development of safe and accurate methodology for detection of histamine on foods, elaboration of preventive and control measures and regulatory limits for histamine in foods were needed.

142. The Committee agreed that before the monograph was published Dr. Taylor should incorporate further information supplied by countries and suggest research lines for future action.

143. The Committee was of the opinion that fish technologists should have an opportunity to discuss the incidence of histamine in fish and fishery products and agreed to bring this discussion and Dr. Taylor's background paper to the attention of the Codex Committee on Fish and Fishery Products.

DEFINITION OF "LOT" IN CODEX TEXTS

144. The Committee has before it a working document entitled "Consideration of the Definitions of the term "lot" used in Codex Standards and Codes of Practice" (CX/FH 83/12) and the Report of an Ad hoc Working Group that had been established to examine the above document where appropriate.

145. The Chairman of the Working Group, Dr. W.A. Royal of New Zealand recalled that the Fifteenth Session of the Commission had adopted a Code of Hygienic Practice for Dried Milk and Annex I thereto concerning microbiological criteria for dried milk products. Both documents contained definitions of "lot" which, however, were not identical. It had recommended to determine whether one definition only of lot could be elaborated for use in Codex documents where appropriate.

146. The Chairman of the Working Group pointed out that the working paper mentioned above contained an outline of Codex provisions for lot and lot identification as well as several proposed definitions and recommendations concerning action by this and other Codex Committees.

147. The Chairman of the Working Group presented the following report by the Working Group which had consisted of Delegates from Norway (Rapporteur), Australia, Canada, Netherlands, Switzerland, UK and USA:

> "The approach adopted by the Working Group was to review and comment on the summary of recommendations contained in the working document CX/FH 83/12, page 6, para 38".

148. Taking each recommendation in turn, the conclusions of the Working Group were as follows:

(a) Paragraph 14: "Consideration be given to the inclusion of a statement in the Code of General Principles of Food Hygiene to the effect that the Code is the primary point of reference for definitions and general principles, and that all special codes contain elaboration on the general principles". This principle was accepted by the Working Group.

(b) Paragraph 18: "A standard text for "lot identification" is required". The recommendation was accepted and the text inthe revised draft of the general labelling standard was adopted for recommendation to the Committee. This text reads: "Each container shall be embossed or otherwise permanently marked in code or in clear to identify the producing factory and the lot".

(c) Paragraph 21: "A common definition for "lot" is appropriate to the Code of General Principles of Food Hygiene and the General Standard for Food Labelling".

The Working Group agreed that a common definition was possible and proposed the following text: "A lot means a definite quantity of a commodity produced under essentially the same conditions". The Working Group recognized that this broad definition may need to be expanded and clarified in relation to particular products.

(d) Paragraph 26: "Consideration be given to establishing a uniform style and approach to citation of sampling plans and lot acceptance provisions". This principle was endorsed and it was recommended that the proposal be taken up by Codex Committee on Methods of Analysis and Sampling and the Codex Commodity Committees.

(e) Paragraph 36: "Amplification of general definitions to cover the requirements of individual commodities or interest groups should be accomodated in the "lot inspection" and "lot acceptance" criteria where they are specially needed". In the light of the recognition by the Working Group that the definition of lot may need to be expanded for particular products (Ref. (c) above), it was also recognized that such specification/clarification may have to be included as part of the lot inspection and lot acceptance criteria in the specific standards".

149. The Committee joined the Working Group in expressing its thanks for the excellent paper and congratulated the Working Group on its work.

The Committee agreed with the conclusions and recommendations of the Working Group as set forth in para 148 (a) to (e) above.

150. The Committee agreed that the definitions for lot in the Code of Hygienic Practice for Dried Milk and Annex I thereto needed to be re-examined in the light of the decisions made by the Committee under para 148 (c) and (g) above. It was agreed that expertise for such a task was available in the Joint FAO/WHO Committee of Government Experts on the Code of Principle concerning Milk and Milk Products which would meet once more. The Committee decided to refer the matter to the "Milk Committee".

151. The Committee agreed that the Secretariat should be required to initiate the amendment of the General Principles of Food Hygiene in order to (i) include into the Code the statement required under para 148 (a); and (ii) to amend the definition of lot under para 148 (c), and the provision for lot identification. Sub-section 7.5.4).

152. The Committee further agreed that the definition of lot and the provision for lot identification should also be amended in other Codes as appropriate and that the Secretariat should take the necessary action.

OTHER BUSINESS

Sub-section 3.4.9 of Revision of the Recommended International Code of Hygienic Practice for Processed Meat and Poultry Products (para 115 of ALINORM 83/16)

153. The Delegation of Denmark drew attention to a discussion on the requirements for walls and floors (Sub-section 3.4.9) of the above Code at the 12th Session of the Committee on Processed Meat and Poultry Products (para 115 of ALINORM 83/16). The requirement that walls and floors should be of non-toxic material was questioned, since they did not usually come into contact with the food. If there was a danger of contamination the same requirements should also apply to the other parts of the building such as ceiling and windows. The Committee had made no change since the text had been taken from the General Principles of Food Hygiene, but requested advice from this Committee.

154. The Committee agreed that indeed there could be undesirable contamination from toxic vapours given off by certain construction materials. The Committee also agreed that the matter of avoiding toxic materials was not limited to walls and floors and decided, therefore, to propose amending sub-section 4.3.1 of the General Principles of Food Hygiene, adding the following sentence: "All construction materials should be such, that when construction is completed, they do not emit toxic vapours". The Secretariat was requested to take appropriate action.

155. The Committee expressed its appreciation to the Codex Committee on Processed Meat and Poultry Products for having brought up the matter and recommended also that the Committee adopt the text outlined in para 154 above.

Hygienic Requirements for Water in Airplanes

156. The Delegation of the Netherlands informed the Committee of problems which arose in connection with obtaining and maintaining potable water of good quality in airplanes. Complaints had been noted that in some airports the available potable water supply for planes was not in conformity with microbiological specifications for potable water. Difficulties had been experienced in cleaning up the pipe-system in airplanes after such unsuitable water had been used.

157. The Delegation of the Netherlands also stated that substances might have to be added to drinking water for airplanes which were normally not allowed in drinking water. The Delegation therefore sought the views of the Committee on whether it should deal with this matter.

158. The Committee noted that WHO had developed guidelines for Drinking Water (previously International Standards for Drinking Water) and had also published a Guide to Hygiene in Aviation. The Committee concluded that it would therefore be appropriate for WHO to provide guidance on this particular problem.

Statement by the Delegation of Argentina

159. The Delegation of Argentina stated that due to the late arrival of several documents it had not been able to obtain advice from the authorities concerned on a number of agenda items and had, therefore, not been in a position to participate in the discussion of those items. The Delegation of Argentina wished to record its reservation.

160. Several other delegations stated that they had not been able to obtain the necessary comments within their countries since some of the documents had not been available in time.

161. The Committee noted that every effort was made to distribute the documents in good time before the meeting. To achieve this purpose governments were invited to submit their comments within the deadline indicated in the Circular Letters.

Date and Place of Next Session

162. The Committee noted that its 20th Session would take place in October 1984. The proposed date was October 1-5, 1984 fixed by agreement between the Codex Secretariat and the United States Government.

163. The Delegation of New Zealand noted with regret that the next sessions of the Codex Committees on Food Hygiene and Food Labelling were not to be held in consecutive weeks as in previous years. This separation of meetings caused difficulties for those countries having to travel long distances to attend separated meetings with separate delegates.

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APPENDIX II

REPORT ON THE STATE OF WORK OF THE INTERNATIONAL ORGANIZATION FOR STANDARDIZATION IN THE FIELD OF MICROBIOLOGY

FOOD PRODUCTS

1. GENERAL MICROBIOLOGY - SUB-COMMITTEE ISO/TC 34/SC 9

Six International Standards are now published:

ISO 4831-78 - Microbiology - General guidance for the enumeration of coliforms - Most probable number technique at 30 °C

ISO 4832-78 - Microbiology - General guidance for the enumeration of coliforms - Colony count technique at 30 °C

ISO 4833-78 - Microbiology - General guidance for the enumeration of micro-organisms - Colony count technique at 30 °C

ISO 6579-81 - Microbiology - General guidance on methods for the detection of Salmonella

ISO 6887-83 - Microbiology - General guidance for the preparation of dilutions for microbiological examination

ISO 6888-83 - Microbiology - General guidance for enumeration of Staphylococcus aureus - Colony count technique

Five draft standards are at the state of ballot:

DIS 7251 - General guidance for the enumeration of presumptive Escherichia coli - Most probable number - Technique after incubation at 35° C or 37 °C then 45 °C

DIS 7402 - General guidance for enumeration of Enterobacteriaceae without resuscitation - Most probable number technique at 35 °C or 37 °C and colony count technique at 35 °C or 37 °C

DIS 7667 - Agricultural food products - Standard layout for methods of microbiological examination

DIS 7937 - General guidance for enumeration of presumptive Clostridium perfringens - Colony count technique at 35° to 37 °C

DIS 7218 - General guidance for microbiological analysis

Two draft proposals are still being considered by the Sub-Committee:

DP 7932 - General guidance for enumeration of presumptive Bacillus cereus - Colony count technique

DP 7954 - General guidance for detection and enumeration of yeasts and moulds

Detection and enumeration of yeasts and moulds, enumeration of Bacillus cereus, general guidance for the microbiological analysis are considered with a first priority.

The future programme of work contains also:

- General guidance for microbiological analysis of preserves (convenor : Canada)
- Enumeration of Vibrio parahaemolyticus (convenor : France)
- Revision of ISO 6579 on Salmonella with reconstitution of dehydrated products (convenor : M. READ)
- Preparation of sample for the microbiological analysis (convenor : M. KITCHELL)
- Enumeration of Enterobacteriaceae with resuscitation (convenor : M. VAN SCHOTHORST)
- Campylobacter
- Yersinia enterocolitica
- Enumeration of low numbers of Clostridium perfringens (the enquiry shows its necessity)

The next meeting of ISO/TC 34/SC 9 should be held near March 1984.

2. SPECIFIC MICROBIOLOGY

2.1 Cereals and cereal products - Sub-Committee ISO/TC 34/SC 4

One draft proposal is considered:

DP 7698 - Enumeration of micro-organisms after incubation at 30 °C - Colony count technique

2.2 Milk and milk products - Sub-Committee ISO/TC 34/SC 5

Five draft proposals are considered in liaison with IDF and AOAC:

DP 5541/1 - Enumeration of coliforms - Part 1 : Most probable number technique

DP 5541/2 - Enumeration of coliforms - Part 2 : Colony count technique

DP 7889 - Yogurt - Enumberation of characteristic micro-organisms - Colony count technique at 37 °C

DP 8198 - Casein and caseinates - Enumeration of micro-organisms - Colony count technique at 30 °C

DP 8261 - General guidance for preparation of samples, primary dilutions, initial suspensions and further dilutions for microbiological examination

2.3 Meat and meat products - Sub-Committee ISO/TC 34/SC 6

Three standards are published:

ISO 3565-75 - Detection of Salmonellae (Reference method)

ISO 3811-79 - Detection and enumeration of presumptive coliform bacteria and presumptive Escherichia coli (Reference method)

ISO 5552-79 - Detection and enumeration of Enterobacteriaceae (Reference methods)

One draft standard is at the state of ballot:

DIS 6649 - Detection and enumeration of Clostridium perfringens (Reference method)

One draft proposal is considered:

DP 6563 - Treatment of a primary sample for microbiological analysis

REPORT OF THE WORKING GROUP ON THE VISUAL AND TEARDOWN INSPECTION OF CANS FOR DEFECTS

1. The Formation of the Working Group and Its Mandate

The need for more definitive information concerning defects commonly found in cans (the two and three piece sanitary can) and instructions for the tear-down evaluation of double seams arose from different sources. First there is the need for further clarification and detail for the following sections of the Code of Hygienic Practice for Low-Acid and Acidified Low-Acid Canned foods:

7.4.2	Inspection of empty product containers,
7.4.7	Closing operations,
7.4.8	Inspection of closures,
7.4.8.1	Inspection for gross defects,
7.4.8.1.2	Inspection of can seams,
7.4.8.1.4	Closure defects,
8.2.2	Container closure records,
11	End Product Specifications

In addition to guidance with respect to the visual and tear-down examination guidance is also required as to appropriate sampling plans and acceptable incidences of defects with respect to the present state of the art. The Working Group responsible for the preparation of the Draft Code of Hygienic Practice for the Salvaging of Damaged Canned Products also expressed a need for the same information for sections 7.1.3 and 7.2.5 of that Code. Finally, in reply to an expressed need in the report of the Working Group formed to examine the Annex C to the International Code of Hygienic Practice for Processed Meat Products, Sampling and Inspection Procedures for Microbiological Examination of Meat Products in Hermetically Sealed Containers (Alinorm 81/16, Appendix II) the Food Hygiene Committee accepted the offer of the U.S.A. delegation to prepare a working document on the tear-down inspection of double seams for presentation at the next session.

During the past year there has been a serious problem involving defects found in canned salmon produced in both Canada and the United States which has had international involvement. During the investigation of this problem certain things became apparent, such as, differences in nomenclature used to identify specific defects, differences in the classification as to the seriousness of the defects, a variety of methods used to test and analyze canned foods, differences in the interpretation of results of tests and analyses, and what level of these defects could be reasonably expected given the present state of the art. The differences and disagreements not only existed between countries but also within countries. There was definitely a need for at least a common agreement. Therefore, the three countries involved in this problem, Canada, the United Kingdom and the United States, each with a long history in canning technology, decided to try to resolve these disagreements and differences. Early in the discussion between the three countries it became apparent that this problem was shared by other countries and that the best forum would be the Codex Alimentarius through the Food Hygiene Committee.

ALINORM 85/13
APPENDIX III

In view of the foregoing the Chairman of the Food Hygiene Committee requested an ad hoc Working Group composed of the following countries; Canada, the Netherlands, Norway, the Republic of West Germany, the United States of America and the United Kingdom. The group is to be chaired by Canada. The working Group met in Ottawa, Canada from 11 Nov to 14 Nov. 1982, inclusive. The following delegates were present:

1. Canada - Mr. I.E. Erdman, (chairman), Health & Welfare Canada
Dr. B.E. Brown, (rapporteur), Health & Welfare Canada
Dr. D. Clark, Health & Welfare Canada
Mr. R. Burke, Health & Welfare Canada
Dr. K. Devlin, Health & Welfare Canada
Mr. J. Mercer, Health & Welfare Canada
Ms. Hélène Couture, Health & Welfare Canada
Dr. F. Tittiger, Agriculture Canada
Mr. J. Donald, Agriculture Canada
Mr. B. Lingeman, Fisheries and Oceans Canada
Dr. G. Jarvis, Health & Welfare Canada
Mr. D. Laitin, Continental Can of Canada
Mr. J.A. Roser, American Can Canada Inc.
Mr. M. Teeter, Canadian Food Processors Association
Mr. D. Gardner, T.J. Lipton Inc.

2. Norway - Mr. Olav C. Sundsvold, The Official Norwegian Quality Control Institute for Canned Fish Products

3. U.S.A. - Dr. G.J. Jackson, U.S. Food and Drug Administration
Dr. T.R. Mulvaney, U.S. Food and Drug Administration
Mr. S.H. Spinak, U.S. Dept. of Agriculture
Mr. C.B. Denny, the National Food Processors Association

4. United Kingdom - Dr. R.H.G. Charles, Dept. of Health and Social Services
Dr. A. Tolan, Ministry of Agriculture, Fisheries and Food

The following topics were discussed by the Working Group:

1. Definitions for Defect Classification

    1. Class I (critical) Defect
    2. Class II (major) Defect
    3. Class III (minor) Defect

2. Visual Defects

    1. Nomenclature
    2. Classification

3. Laboratory Examination
    1. Methods and Interpretation
    2. Incidence of Infection by Defect Type
    3. Health Hazard Considerations

4. Evaluation of Container Integrity

   1. Vacuum/Pressure Leak Test
   2. Tear-Down Evaluation

5. Lot Evaluation

   1. Sampling Plans and Acceptance Criteria
   2. Standards and/or Guidelines

6. Investigations

7. Salvage

1. Definitions for Defect Classification

Class I (critical) Defects are defects which provide evidence that (a) the container has lost its hermetic seal (e.g., holes, fractures, punctures, product leakage, etc.,) or (b) evidence that there is, or has been, microbial growth in the can contents.

Class II (major) Defects are defects which result in cans which do not show signs of having leaked, but are of such magnitude that they may leak.

Class III (minor) Defects are defects which result in cans which do not show signs of having leaked, and are not likely to result in leakage.

2. Visual Defects

The defects were grouped according to either the origin of the defect or the part of the can affected. No attempt was made to list all alternative names for each defect. Instead a pictoral record of each defect was compiled into a manual with the appropriate classification given to each defect.

The following defects are shown in the manual:

1. Tin plate or coating defects,
2. Dirty, stained or smeared defects,
3. Rusted can defects,
4. Dented cans
   - body
   - side seam
   - double seam
5. Panelling Defects
6. Buckling defects
7. Punctured/fractured/cut cans
8. Cable cuts
9. Defects involving the double seam

For some of the defects the classification depends upon the extent to which it is present and in such cases this is shown in the pictures. Not all the defects which can be encountered are shown in the manual but it is believed that most of those commonly occurring are represented. The manual is being prepared to assist the inspector in identifying and classifying defects found on the visual examination of canned foods.

The proper visual examination of a can for defects requires the removal of the label. This, of course, would not be necessary for lithographed cans. The Working Group recognized that label removal may impose economic penalties and restrictions to inspections, however for proper inspection it should be done. It will have to be left to the discretion of the agency having jurisdiction whether the labels should be removed in the inspection of any particular lot.

Each defect found during the inspection shall be identified and classified as to its seriousness as given in the manual. The results of the examination shall be recorded. In some instances a defect may be classified as a II or even a III upon visual examination but after destructive examination be found to be classed higher as a I or II.

The question as to whether only the most serious defect on any can should be scored (recorded) or if all unrelated defects be scored was discussed. First there is the question of related and unrelated defects. For example a can may be swollen and have a cut-over with some evidence of leakage through the cut-over. It is reasonable to assume that the swelling resulted from microbial contamination via the cut-over and that only the most serious defect need be recorded, that is either the swelling or the leakage. However there is merit in also recording the presence of the cut-over since is the primary cause and would indicate corrective action. There is also the question of the unrelated or independent defects, should only the most serious defect be scored or all defects. The Working Group would like guidance from the Food Hygiene Committee in these matters.

A manual has been presented to the Working Group and it agreed on the title and on the scope of that manual.

Title: "Manual for Ex-Cannery Visual Screening Examination of Low-Acid Canned Foods for Container Integrity."

Scope: "This manual is for the use in the ex-cannery visual examination of low-acid foods in hermetically sealed rigid metal containers. The examination is to determine whether or not further examination of a lot should be carried out. Lots failing may be eligible for salvage, but consideration for salvage falls outside the scope of this manual."

3. Laboratory Examination

Methods adopted should be within the capability of a relatively unsophisticated microbiological laboratory with the ability to open containers and transfer inoculum aseptically. In keeping with the definition for commercial sterility of food, both the presence of viable organisms and growth must be established. In

some instances this may be accomplished by establishing that the viable organisms are present in sufficient numbers to be incompatible with the product and its processing. In many instances growth may have progressed to the point of autosterilization and no viable organisms can be found using conventional methods therefore other observations are required. Another problem is the ability to differentiate between incipient and post-processing spoilage.

3.1 Methods and Interpretation

The laboratory examination of the contents should include at least the following:

1. Test for the presence of viable organisms using at least two different media capable of supporting aerobic and anaerobic growth, for example PE2 media and cooked meat media. It is also recommended that either streak or pour plates be prepared using suitable media and incubated aerobically and anaerobically. The latter procedure may permit a more rapid method for showing the presence of viable organisms, specially when densities are relatively large. There is the added benefit of the possibility of obtaining an estimate of the density as well as some leads to identification.

2. Direct microscopic examination of the contents of either a dried, stained smear or wet mount by phase contrast can be informative when the contents have relatively large cellular densities. There is the limitation that this procedure does not differentiate between viable and dead cells.

3. Appearance and odour of the product should be assessed. Microscopic growth often produces changes in the appearance and/or odour of a food. The presence of off-odours, physical changes in the food such as liquefaction, curdling, precipitation, etc. as well as the presence of gas should be noted and may be indicative of microbial growth.

4. Changes in pH of the food should be noted. Often microbial growth induces changes in the pH of its media, therefore any significant change in the pH of a particular food should be noted.

5. Laboratory examination should not be limited to the contents but should include the container (can). The container should be tested for leaks and the seams torn down and examined.

While many methods for the detection of viable organisms have been published and are in use, they all depend upon the aseptic inoculation of specific media which permits the resuscitation, germination, and outgrowth of vegetative cells and spores in general and obligate anaerobes in particular. The quantity of inoculum used (about 1 to 3 g) is small in comparison with the can contents. While such a technique may be adequate to detect the presence of viable organisms in the can contents suspected of being contaminated, it cannot be used as a test of sterility, that is the absence of viable organisms.

There remains much to be accomplished in the interpretation of the results. What constitutes evidence of the presence of viable organisms in a food? If 2 or 3 tubes of each media are inoculated, must all tubes for both media be positive or

can less be accepted? What evidence is required to verify that there has been microbial growth or that the organisms found are capable of growing in the food. These problems have yet to be addressed.

3.2 Incidence of Contamination (Infection) by Defect Type

A measure of the seriousness of a can defect is whether it will result in contamination (infection) of the contents. This principle has been applied in the Campden procedure developed for the sorting and assessment of lots of canned salmon suspected of having unacceptable levels of defects. A resumé of some of the analyses of defect cans found in the investigation of the canned salmon problem in Canada and the U.K. was presented by the Canadian delegation. The entire report is attached as appendix 2.

3.3 Health Hazard Considerations

This topic was not discussed during this meeting and will be a subject for discussion at the next meeting.

4. Evaluation of Container Integrity

In both the U.K. and North America a mechanical sorting system involving double dud detectors and check weighers have been used to salvage lots of canned salmon believed to have unsatisfactory levels of can defects. A dud detector can reject cans having centre depths of the ends below a prescribed minimum. In double dud detection this is applied to both can ends. The check weigher is also set to reject cans having a gross weight below a prescribed minimum. The basis for this is that a can which has a defect which results in the loss of the integrity would leak and loose some if not all of the vacuum applied at the time of seaming and/or would loose some of the product resulting in a loss of weight. A decrease in or loss of internal vacuum usually results in a decrease in the can end centre depth. The working group agreed that while such a system may be very useful in certain cases it can not be said to be a reliable general method for checking container integrity. During the testing of canned salmon cans having a hole in the body (index fault) were seen in which there had been little or no loss of weight nor had there been sufficient decrease in the end plate centre depths to result in rejection by the sorting system.

Four reliable methods presently employed in the industry to detect leaks in metal containers were discussed:

1) Helium leak test;
2. Dye leak test;
3) Vacuum leak test;
4) Pressure leak test.

1. Helium Leak Test

Although this method is quite sensitive, capable of detecting microleaks, it is expensive and requires special handling.

2. Dye Leak Test

This method involves the application of a detectable dye (by colour of fluorescence, etc.) around the outside of a seam then pulling a vacuum on the can and observing whether and where there is dye penetration into the interior. This has been used to plot routes of entry of microorganisms into cans.

3. Vacuum Leak Test

This is the most popular method for testing integrity of cans after filling, seaming and processing. Details of the method, including construction of the required apparatus have been published by the National Food Processors Association in 1972. For testing the can is opened at one end, the contents removed and the can thoroughly cleaned and dried. A small amount of water is placed in the can and a vacuum drawn on the interior by means of a gasketed Plexiglas cover which permits observation of the can interior. As the amount of vacuum is increased so is the pressure differential between the interior and exterior of the can. The can is rotated so that the water placed inside passes over the interior of the seams at each vacuum level applied. Leaks are observed by the formation of air bubbles. The value of the Plexiglas is that it allows the interior of the can surface to be observed.

4. Pressure Leak Test

In modern can manufacturing facilities all cans are pressure tested for leaks at the time of manufacture. The process involves the application and maintenance of a pressure of air to the interior of a can resulting in a pressure differential between the can interior and exterior. Leaks are detected either by the failure to maintain an applied pressure or by immersion of the can in water and watching for the appearance of air bubbles. The procedure is used in testing the integrity of cans after filling, seaming and processing and like in the vacuum leak test, the can is opened at one end, emptied, cleaned and dried. The opening in one end must be carefully done so as to permit sealing in a bung through which the air is introduced to create the pressure. Pressures of up to 20 psig are used for most cans, although some of the larger cans tend to bulge at pressures in excess of 15 psig.

There was no agreement reached by the Working group as to which method was or is preferred. It was agreed that the helium leak test apparatus is most precise but not suited for routine investigations. The pressure and vacuum methods are reported to be of equal reliability.

For some defects occurring to the double seams, tear-down examinations should be carried out to determine whether the defect is class I or II. The extent to which tear-down examinations are applied will depend upon the nature of the defects. More frequent tear-down examinations may have to be made on aluminium cans and containers having soldered end seams. The Working Group did not deal with a specific method for tearing down seams. The delegation from the U.S.A. will present a report on this subject at the next meeting of the Food Hygiene Committee.

5. Lot Evaluation

1. Sampling Plans and Acceptance Criteria

In order to evaluate the condition of quality of a lot, a sampling plan is required. The type of plan used should be in keeping with why the lot is being evaluated. That for assessing a potential public health hazard may be more severe than that for organoleptic quality. Different sampling plans may have to be used for the following:

1. Product quality not involving a public health hazard;
2. Examination for compliance to net weight regulations;
3. Health hazards including non-compliance with public health regulations, and this would include examination for container integrity.

The economic aspects of sampling plans must also be taken into consideration. There is the cost of the product in the sample which can be considerable specially in those situations in which the sample size is large, the product is expensive and that destructive analyses are involved. There is also the additional storage and handling costs which may result from any delay in reaching a decision as to whether the product can be distributed. Such additional costs can be very important where the trading profit is a small percentage of the selling price.

Sampling plans have to be applicable to many situations, but at least cover the following:

1. Monitoring

This activity, commonly used by regulatory agencies, is also employed by buyers in assessing the incoming quality of their purchases. In this type of examination no particular problem is anticipated. Rather it is a periodic check to see that regulatory requirements or specifications are being met. After considerable discussion the following plan given in Table 3 was devised and is recommended as a screening or first stage examination of lots of unknown quality.

Table 1
Monitoring Sampling Plan
Routine Minimum Sampling and Limits

Defect	Sample Size (n)	Accept (Ac)	Retain[1] (Re)	AQL[2] Pa = 0.95	RQL[3] Pa = 0.05
Class I	240	0	1	0.2/1000	12/1000
Class II	240	5	6	11/1000	44/1000
Class III	240	NO LIMITS PROPOSED AT THIS TIME			

(Notes:

Table 2 - Analysis of Defect Containing Canadian Canned Salmon

		I	II		III		IV		V		VI		II	III	IV			V	
		Number[7] Observed	Viable Organisms		Leaked at < 25" of Hg		Product Dry		Direct (DME) Microscopic		Appearance		Viable Organisms	Leaked at 25" of Hg	Product Dry	Total		DME	Total
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	No.	No.	No.	%	No.	No. %
A.	1. Droops	22	1	4.5	10	45.4	1	4.5	5	22.7	3	13.6	1	10	0	11	50.0	1	12 54.5
	2. Spurs	95	1	1.1	12	12.5	1	1.1	10	10.5	16	16.8	1	12	0	13	13.7	5	18 18.9
	3. K.D.E.[1]	54	0	0	4	7.4	0	0	6	11.1	12	22.2	0	4	0	4	7.4	5	9 16.7
	Total	171	2	1.1	26	15.2	2	1.1	21	12.3	29	17.0	2	26	0	28	16.4	11	39 22.8
B.	1. K.D.F.[2]	22	1	4.5	7	31.8	0	0	1	4.5	5	22.7	1	6	0	7	31.8	0	7 31.8
	2. Cut-Over	34	4	11.8	23	67.6	10	29.4	23	67.6	1	2.9	4	20	0	24	70.6	2	26 76.5
	3. I.F.[3]	4	3	75.0	4	100.0	2	50.0	3	75.0	1	25.0	3	1	0	4	100.0	0	4 100.0
	Total	60	8	13.3	34	56.7	12	20.0	27	45.0	7	11.7	8	27	0	35	58.3	2	37 61.7
C.	S.S.F.[4]	4	2	50.0	1	25.0	2	50.0	3	75.0	1	25.0	2	0	1	3	75.0	0	3 75.0
D.	Holed[5]	24	8	33.3	18	75.0	11	45.8	14	58.3	1	4.2	8	10	0	18	75.0	2	20 83.3
E.	Blown[6]	25	13	52.0	12	48.0	8	32.0	21	84.0	6	24.0	13	4	4	21	84.0	3	24 96.0
	Total	284	33	11.6	91	32.0	35	12.3	85	29.9	43	15.1	13	67	6	106	37.3	18	124 43.7

(1) K.D.C. - Knocked Down Curl (End), in U.K. called Torn Droop

(2) K.D.F. - Knocked Down Flange

(3) I.F. - Index Fault, in U.K. called Cut Down Flange

(4) S.S.F. - Side Seam Fault

(5) Holed include Fractures, Punctures, etc.

(6) Blown, includes Swollen & Leakers

(7) Judged most serious defect present.

(8) For the 4 S.S.F.; when analysed in laboratory 3 were shown to be blown and have been counted in that category, the fourth one leaked and should have been counted in E.

(9) Evidence of contamination - presence of viable organisms.

(10) Evidence can leaked - leaked at <25" of Hg
- product dry

(11) Presumptive evidence of contamination - presence of microbial cells, direct microscopic examination

1. The term "retain" is used rather than the conventional "reject" because lots which are retained because the number of defects found exceeds the acceptable limit may be salvageable. This will depend upon the nature and incidence of defects.

2. The term "AQL" means acceptable quality level and lots having that level would by the sampling plan be accepted 95% of the time.

3. The term "RQL" means retention quality level and lots having that level would by the sampling plan be accepted 5% or retained 95% of the time.)

The choice of a 240 can sample size represents a compromise between the economic and the hazard aspects. While it only assures retention of lots having for example 1.2 Class I defects per 100 cans 95% of the time, a relatively high defect level, it is capable of detecting and hence retaining lots having 3 Class I defects per thousand cans, (see the OC curves in figure 1), at least 50% of the time. The smaller the sample size the more lots which may be inspected for the same cost.

Lots retained as a result of examination by this sampling plan may have to be examined in greater depth employing a more rigorous sampling plan. Retained lots may be salvaged subject to the provisions contained in the Codex Alimentarius Principles for Salvage of Low-Acid Canned Foods presently at step 3.

2. Investigational

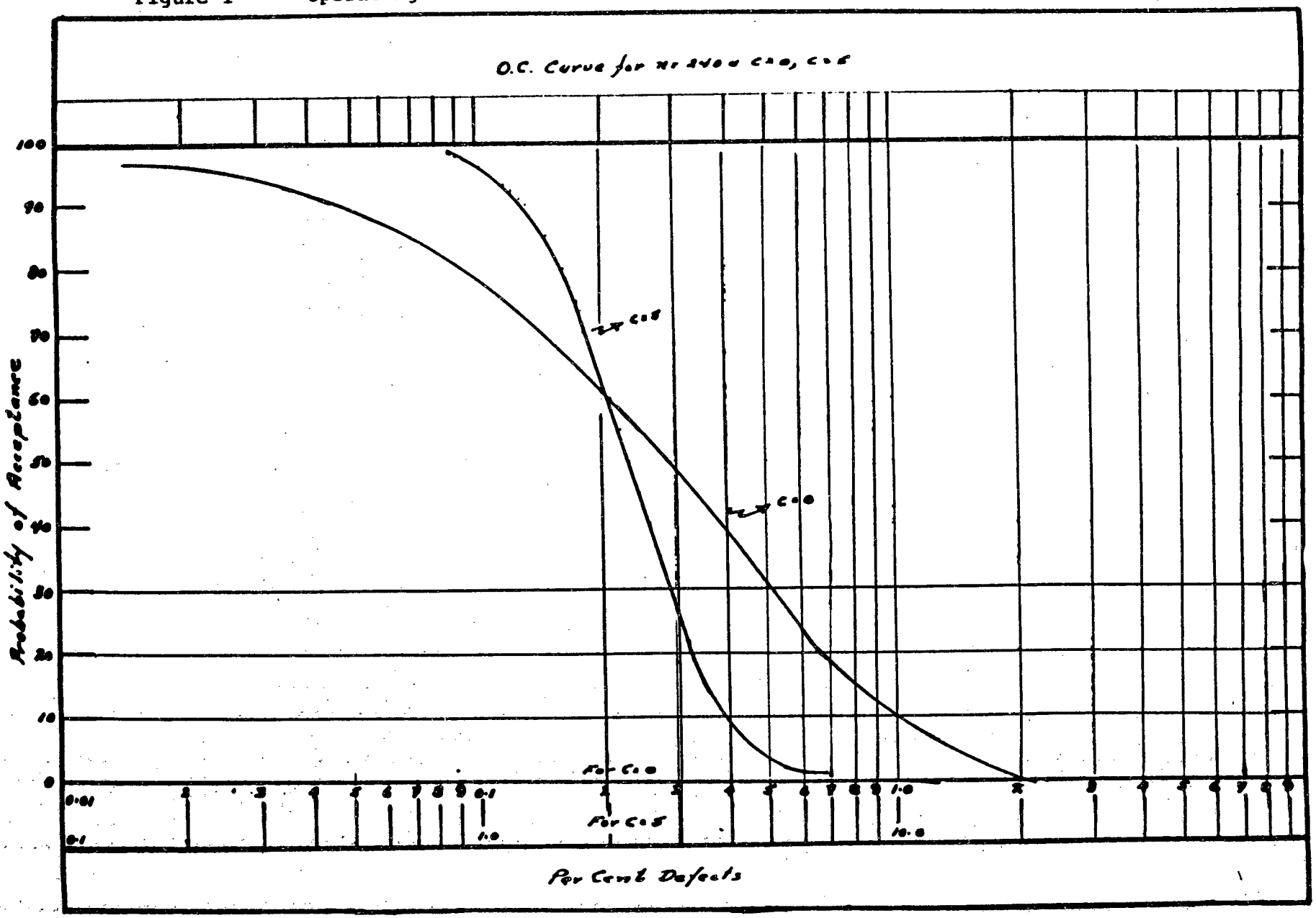
This applies to lots in which a problem is known or suspected. Usually the problem is confined to specific defects or attributes and more information is required as to the extent of the problem. Generally sampling plans for investigation require larger sample sizes than for monitoring plans, specially in cases where attribute sampling plans as opposed to variables sampling plans are required. The acceptance criteria should be adjusted to be in keeping with the specific problem and the degree of concern. No single plan was recommended by the Working Group since the plan will depend upon the needs of the investigation.

3. Post-Salvage

Sampling plans under this heading would be applied to lots which have been salvaged and the object is to obtain assurance that the salvage procedures have been effective. Since the reasons for the salvage and the concerns will vary, it is not possible to derive a single sampling plan to meet all contingencies. Because the recovered product should be relatively defect free and depending upon the degree of concern the sampling plans will have to be more rigorous (higher sample numbers) in order to detect low defect levels.

Theoretically the cans for a sample should be drawn at random from the lot. This is seldom, if ever, feasible under operating conditions. Therefore, it is recommended that the sample be selected in a manner to be representative of the lot.

Figure 1 Operating Characteristic (O.C.)Curves for Monitoring Sampling Plan



Small lots present a problem. Generally the sample size should not exceed 10% of the lot size, hence the monitoring plans should not be used for lots having fewer than 2400 cans. For small lots specific plans should be devised.

Complete visual examination of labelled canned foods requires the removal of the label. Lithographed cans are, of course, exempt, for obvious reasons. In some circumstances visual inspection of canned foods may be effectively carried out without label removal, but this will be dictated by the situation at the time and the degree of concern. Some products are completely overwrapped, e.g., cans of sardines, and these must be removed to permit inspection. There is an economic aspect to the removal of the label. If the examination is non-destructive, i.e., visual, then many if not all of the cans in the sample will be judged to be sound and hence could be returned and put into distribution if and when the lot is cleared. While re-labelling may only involve the extra cost of the label and the labour for the canner, it does present a problem when lots are inspected away from the primary producer, e.g., imported canned foods. While it is recommended that all labels should be removed to permit visual examination of the complete can surface for the presence of defects, the decision should remain with the agency having jurisdiction.

The question as to what constitutes a lot was discussed. The Codex Alimentarius Code of Practice for Low-Acid and Acidified Low-Acid Canned Foods, Section 7.4.10, recommends that each container should be permanently marked with a code identifying at least the establishment, the product contained, the year and day of the year the product was packed. Preferably sampling should be applied to single code lots, that is lots which have the same code. When product is in distribution, specially imported product, segregation of the product into code lots is not always economically feasible. Therefore a lot may have to be designated by the persons responsible for carrying out the inspection or by the owner of the product. Such lots may well contain more than one code lot, however, they should be limited to the same product, same container size and preferably from the same cannery.

In all cases where lots have been examined and evaluated complete records should be made and kept. This is particularly important where lots have been retained so that interested parties may be informed as to why the lot was retained.

Separate discussions on items 6, Investigations and 7, Salvage were not held. Where applicable these were discussed in conjunction with other topics.

4. Holed cans include those that are fractured, punctured or leaking. (Leaking cans are also included in categories 1, 2 and 3.)

5. Blown cans include swollen cans.)

In the Canadian study 230,000 cans representing 94 lots (day codes) from 17 canneries were visually examined for the presence of defects. Of a total of 344 cans found to have abnormalities, 284 were judged to have major defects and these were subject to the following analyses:

1) Presence of viable organisms in the contents;
2) Direct microscopic examination of the contents;
3) pH of contents (unfortunately this was carried out on only a small portion of the contents of the 284 cans);
4) Observation of physical appearance and smell of the contents;
5) Vacuum leak test;
6) Centre depth of both ends prior to opening for examination of contents;
7) Gross weight;
8) Double seam heights and thicknesses;
9) Tear down examination of both double seams for overlap, tightness and juncture ratings - particular attention was paid to double seam defects and any points where leaks were detected during the vacuum leak test.

The results of the analyses 1, 2, 3, 4 and 5 are summarized in Table 2. To facilitate comparison, the defects have been grouped as for Table 1.

Incidence of contamination (infection) by defect type

The infection rates derived by the U.K. were based upon the microbiological analyses of the contents of 178 cans of salmon which were judged to have "serious" visual defects. The results are summarized in Table 1.

*** Table 1 Infection Rates by Defect Type**

Defect	Total	Infected	Per Cent Infected
1. Severe Double Seam Faults	80	4	5
2. Side Seam Faults	27	4	15
3. K.D.F., K.D.E., C.D.F.	50	30	60
4. Holed	16	5	31
5. Blown	5	4	80
6. Total	178	47	26

(Notes on the above defects

1. Included in the severe double seam faults are the following:

   a) Droops exceeding 50% of the double seam height;
   b) Leaking droops;
   c) Spurs (Vees) exceeding 50% of double seam height;
   d) Leaking Spurs (Vees);
   e) Torn Droops (this defect is called a knocked down end or curl in North America);
   f) Leaking Torn Droops.

2. Side Seam Faults include those that were leaking.

3. The defects included in this category are:

   a) K.D.F. - knocked down flange including those that were leaking;
   b) K.D.E. - knocked down end including those that were leaking, (this is different from what is called a K.D.E. in North America and which in the U.K. is called a torn droop);
   c) C.D.F. - cut down flange including those that were leaking, (this is called an index fault in North America).

* Data Obtained from the summary report of assesment of efficiency of automatic sorting procedure for U.S. Canned Salmon By The Campden Food Preservation Research Association, Chipping Campden, England.

Viable Organisms

The Canadian results show a lower incidence of infection (recovery of viable organisms) than do the U.K. results, with only 11.6% (33) of the 284 defect cans being positive for the presence of viable organisms as compared to 26% (47) of the 178 defect cans in the U.K. study. A comparison by defect groups is varied with group A (severe double seam faults) having only 1.1% infected compared to 5% in the U.K. study (Table 1) and group B with only 13.3% compared to 60%. Similarly the blown/swollen cans, group E were 52% infected compared to 80%. The incidence of infection for holed cans appears to be about the same with 33% compared to 31%. The Canadian study revealed a considerably higher incidence of infection with cans having side seam faults, that is 50% compared to 15%.

Loss of Container Integrity

The presence of viable organisms in the contents cannot always be used as evidence of either underprocessing or post-processing contamination. Interpretation is dependent upon the type of organisms found, the type of product and the extent of heat processing it has received. Because canned salmon receives extensive heat treatment to ensure that the bones are sufficiently softened it is reasonable to assume that the product should be free of viable mesophiles. Any underprocessing of canned salmon which could lead to the possible survival of botulinum spores would be evidence in the condition of the bones in that they would not be soft. Thus if viable microorganisms are found in the product and the bones are soft it is reasonable to assume that post processing contamination has taken place. There is an additional stipulation that in order to comply with the international definition of the term "commercial sterility" that growth or the potential for growth in the product should be established for any viable organisms found.

Frequently no viable organisms are found in product in which there is other evidence of microbial growth or that the container has leaked. Conventional methods used to establish the presence of viable organsims use relatively small amounts of inoculum (1 to 5 g) and are incapable of detecting low numbers of viable organisms. Low densities of organisms can result due to lack of growth at the time the product is tested or by autosterilization. Therefore other evidence should be sought to help establish contamination and growth by microorganisms or leakage of the can. This was done in the Canadian study. In addition to the presence of viable organisms, cans containing dry product were judged as having leaked and thus capable of becoming infected and those which leaked at vacuums below 25" of Hg were judged as capable of leaking and depending upon the hygienic conditions capable of being infected. The physical state or smell of the product can often be indicative that microbial growth had taken place, for example rotten, putrid or sour odours, product liquified or otherwise physically altered indicative of proteolysis, etc.

Normally the direct microscopic examination (D.M.E.) of the fluid portion in sound canned salmon shows no or very few microbial cells and then usually a few micrococci. The presence of significant numbers of microbial cells, specially rods, in the fluid portion can be taken as evidence of contamination and growth. Further

confirmation is a co-incident change in pH from the normal range although microbial growth is not always accompanied by detectable changes in pH. Since both viable and dead cells will be seen in the direct microscopic examination, their presence could be due to incipient and/or post processing contamination. In the Canadian study, results of the D.M.E. were taken into consideration.

In Table 2 the number of cans having each defect are listed. For each defect the number of cans having: viable organisms, leaked during the vacuum leak test, dry product, microbial cells in direct microscopic examination and non-normal organoleptic appearance are listed followed by the percentage based on the total number of that defect. Again there is considerable variation in the results for each defect. For each category the defects can be ranked from the lowest to the highest incidence and the rankings for all 5 categories totalled. With this aggregate rank score, group A has the lowest with a total score of 7 followed by group B with 12, then group D with 16 and finally groups C and E both with 20.

While the aggregate scores gives a means of evaluating the seriousness of the defects, it was observed that many cans were positive for more than one test. This can produce a bias, giving more emphasis to some defects. To circumvent this the data was re-evaluated with the view to determine how many of the defect cans were in fact defective. For this purpose a defective is defined as a can having an abnormality (defect) which provides evidence that there has been loss of the hermetic seal or that there has been microbial contamination or spoilage of the contents. Thus in order to be called a defective, a can must have shown the presence of viable organisms in the contents or leaked at under 25" of Hg during the vacuum leak test or contained dry product or the contents showed a positive count upon D.M.E. The results of the re-evaluation are given in the right hand side of Table 2. In the re-evaluation only the most serious positive test was counted, for example if the product was dry and viable organisms were found it was only scored under viable organisms. The order for the tests is, first viable organisms, then leaking at under 25" of Hg, followed by dry product and finally having a positive D.M.E. As can be seen in Table 2 the cans were scored by defect for the first three tests which were then totalled giving a total number of defectives for each. The percentage was calculated and is given. Finally the cans were scored for D.M.E. which were added to the previous totals and again percentages calculated. The reason for separating the D.M.E. results from the others is that these cans showed only a positive D.M.E. It is interesting that no cans were found whose contents showed organoleptic changes indicative of microbial growth that were not positive for at least one of the other tests.

The incidence of defectives overall is 37.3% when only the first three tests were considered and 43.7% if a positive direct microbial count is included. The significance of a defective can is that it had become contaminated as indicated by a presence of viable mesophilic organisms or that it leaked as evidenced by dry product or that it could have leaked as evident by leaking during the vacuum leak test. It is believed that the incidence of defectives is more meaningful than the incidence of infection since the chance that a can which leaks during the critical post-processing handling due to some physical defect will become infected is largely dependent upon the extent of the leakage and the hygienic conditions existing at the time.

The incidence of defectives gives a measure of the seriousness of the defects more in keeping with the physical nature of the defect than does the incidence of infection. Group A defects have the lowest, as was the case with that of infection, however the spread of values within the group is greater. Group B is still second lowest with 58.3% defectives compared to 13.3% for infected. From the results it is obvious that both the cut-over and the index fault produce considerably higher proportion of defectives and if being grouped should be put with group D, holed. Since knocked down flanges are similar to knocked down curls (torn droops) and since their incidences of defectives are in the lower range it would appear logical to put these in group A, that is if grouping is beneficial. It was surprising that the defects such as holed/fractured/punctured should show such a low infection rate in both studies. When the incidence of defectives is considered, the 75% level is more consistent with what would be expected from such defects.

ALINORM 85/13
APPENDIX IV

DRAFT CODE OF HYGIENIC FRACTICE FOR THE COLLECTING, PROCESSING AND MARKETING OF NATURAL MINERAL WATER

(Retained at Step 6)

SECTION I - FIELD OF APPLICATION

This code recommends appropriate general techniques for collecting natural mineral water, its treatment, bottling, packaging, storage, transport, distribution and sale for direct consumption, so as to guarantee a safe, healthy and wholesome product.

SECTION II - DEFINITIONS

2.1 For the purposes of this code the following expressions have the meaning stated:

2.1.1 Natural mineral waters - all waters meeting the requirements of the European standard for Natural Mineral Waters (CAC/RS 108-1979).

2.1.2 Adequate - sufficient to accomplish the intended purpose of this code.

2.1.3 Cleaning - the removal of soil, food residues, dirt, grease or other objectionable matter.

2.1.4 Contamination - the occurrence of any objectionable matter in the product.

2.1.5 Disinfection - the reduction, without adversely affecting the natural mineral water, by means of hygienically satisfactory chemical agents and/or physical methods, of the number of micro-organisms to a level that will not lead to harmful contamination of natural mineral water.

2.1.6 Establishment - any building(s) or area(s) in which natural mineral water is handled after collection and the surroundings under the control of the same management.

2.1.7 Handling of natural mineral water - any manipulation with regard to collecting, treating, bottling, packaging, storing, the transport, distribution and sale of natural mineral water.

2.1.8 Food Hygiene - all measures necessary to ensure the safety, soundness and wholesomeness of natural mineral water at all stages from its production or manufacture until its final consumption.

2.1.9 Packaging Material - any containers such as cans, bottles, cartons, boxes, cases, or wrapping and covering material such as foil, film, metal paper and wax-paper.

2.1.10 Pests - any animals capable of directly or indirectly contaminating natural mineral water.

2.1.11 Containers - any bottle, carton, can or other container to be filled with natural mineral water, properly labelled and intended for sale.

2.1.12 Aquifers - any solid permeable mass of rocks (layer) containing natural mineral water.

2.1.13 Spring - any natural mineral water discharging genuinely from the ground.

SECTION III - PRESCRIPTIONS OF THE RESOURCES OF NATURAL MINERAL WATERS

A. Protection of alimentary reservoirs and aquifers

3.1 Authorization

Any spring, well or drilling intended for the collection of natural mineral water should be approved by the official authority having jurisdiction for this region.

3.2 Determination of the genesis of natural mineral water

As far as it is methodologically possible in each case, a precise analysis should be carried out on the origin of natural mineral waters, the period of their residence in the ground before being collected and their chemical and physical qualities.

3.3 Perimeter of protection

If possible areas wherein natural mineral water might be polluted or its chemical and physical qualities otherwise deteriorated should be determined by a hydrologist. Where indicated by hydrogeological conditions and considering the risks of pollution and physical, chemical and biochemical reactions, several perimeters with separate dimensions may be provided for.

3.4 Protective measures

All possible precautions should be taken within the protected perimeters to avoid any pollution of, or external influence on, the chemical and physical qualities of natural mineral water.

It is recommended that regulations be established for the disposal of liquid, solid or gaseous waste, the use of substances that might deteriorate natural mineral water (by agriculture e.g.) as well as for any possibility of accidental deterioration of natural mineral water by natural occurrences such as a change in the hydrogeological conditions. Particular consideration should be given to the following potential pollutants: bacteria, viruses, fertilizers, hydrocarbons, detergents, pesticides, phenolic compounds, toxic metals, radioactive substances and other soluble organic or inorganic substances. Even where nature provides apparently sufficient protection against surface pollution, potential hazards should be taken into consideration, such as mining, hydraulic and engineering facilities etc.

B. Hygiene prescriptions for the collection of natural mineral water

3.5 Extraction

The withdrawal of natural mineral water (from springs, galleries, genuine or drilled wells) must be performed in conformity with the hydrogeological conditions in such a manner as to prevent any other than the natural mineral water from entering, or, should there be pumping facilities, prevent any extraneous water from entering by reducing the supply. The natural mineral water thus collected or pumped should be protected in such a way that it will be safe from pollution whether caused by natural occurrence or actions of neglect or ill will.

3.6 Materials

The pipes, pumps or other possible devices coming into contact with natural mineral water and used for its collection should be made of such material as to guarantee that the original qualities of natural mineral water will not be changed.

3.7 Protection of the extraction area

In the immediate surroundings of springs and wells, precautionary measures should be taken to guarantee that no pollutant whatsoever can enter the extraction area, that is, an area surrounding the source within a radius of about 60 m. The extraction areas to be established therefore should at least be identical with the areas allocated at the time of construction. These extraction areas should be inaccessible to non-authorized people by providing adequate devices (e.g. enclosure). Any use not aiming at the collection of natural mineral water should be forbidden in these areas.

3.8 The exploitation of natural mineral water

The condition of the extraction facilities, areas of extraction and perimeters of protection as well as the quality of the natural mineral water should periodically be checked. To control the stability of the chemical and physical particulars of the natural mineral water derived - besides the natural variations - automatic measurements of the typical characteristics of water should be carried out and notified (e.g, electrical conductance, temperature, content of carbon dioxide) or frequent partial analyses should be done.

C. Maintenance of extraction facilities

3.9 Technical aspects

Methods and procedures for maintaining the extraction facilities should be hygienic and not be a potential health hazard to humans or a source of contamination to natural mineral water. From the hygiene standpoint, servicing of the extraction installations should meet the same standards as those required for the bottling or treatment.

3.10 Equipment and reservoirs

Equipment and reservoirs used for extraction of natural mineral water should be constructed and maintained in order to minimize all hazards to human health and to avoid contamination.

3.11 Storage at the point of extraction

The quantity of natural mineral water stored at the point of extraction should be as low as possible. The storing should furthermore guarantee protection against contamination or deterioration.

D. Transport of natural mineral water

3.12 Means of transport, piping and reservoirs

Any vehicle, piping or reservoir used in the processing of natural mineral water from its source to the bottling facilities, the latter included, should comply with the necessary requirements and be made of inert material such as ceramic and stainless steel which prevents any deterioration, be it by water, handling, servicing or disinfection; it should allow easy cleaning.

3.13 Maintenance of vehicles and reservoirs

Any vehicle or reservoir should be properly cleaned and if necessary disinfected

and kept in good repair so as not to present any danger of contamination to natural mineral water and of deterioration of the essential qualities of natural mineral water.

SECTION IV - ESTABLISHMENT FOR /TREATMENT/ AND BOTTLING OF NATURAL MINERAL WATER - DESIGN AND FACILITIES

4.1 Location

Establishments should be located in areas which are free from objectionable odours, smoke, dust or other contaminants and are not subject to flooding.

4.2 Roadways and areas used by wheeled traffic

Such roadways and areas serving the establishment which are within its boundaries or in its immediate vicinity should have a hard paved surface suitable for wheeled traffic. There should be adequate drainage and provision should be made for protection of the extraction area in accordance with sub-section 3.7 where appropriate and to allow for cleaning. Adequate road signals may be provided to call the attention of road users to the existence of a natural mineral water extraction area.

4.3 Buildings and Facilities

4.3.1 Type of construction

Buildings and facilities should be of sound construction in accordance with the provisions of Sub-section 3.7 and maintained in good repair.

4.3.2 Disposition of holding facilities

Rooms for recreation, for storing or packaging of raw material and areas for the cleaning of containers to be re-used should be apart from the bottling areas to prevent the end-product from being contaminated. Raw and packaging materials and any other additions which come into contact with natural mineral water should be stored apart from other material.

4.3.3 Adequate working space should be provided to allow for satisfactory performance of all operations.

4.3.4 The design should be such as to permit easy and adequate cleaning and to facilitate proper supervision of natural mineral water hygiene.

4.3.5 The buildings and facilities should be designed to provide separation by partition, location or other effective means between those operations which may cause cross-contamination.

4.3.6 Buildings and facilities should be designed to facilitate hygienic operations by means of a regulated flow in the process from the arrival of the natural mineral water at the premises to the finished product, and should provide for appropriate temperature conditions for the process and the product.

4.3.7 Natural mineral water handling, storing and bottling areas

- Floors, where appropriate, should be of water-proof, non-absorbent, washable, non-slip and non-toxic materials, without crevices, and should be easy to clean and disinfect. Where appropriate, floors should slope sufficiently for liquids to drain to trapped outlets.

- Walls, where appropriate, should be of water-proof, non-absorbent, washable and non-toxic materials and should be light coloured. Up to a height appropriate for the operation they should be smooth and without crevices, and should be easy to clean and disinfect. Where appropriate, angles between walls, between walls and floors, and between walls and and ceilings should be sealed and coved to facilitate cleaning.

- Ceilings should be so designed, constructed and finished as to prevent the accumulation of dirt and minimize condensation, mould development and flaking, and should be easy to clean.

- Windows and other openings should be so constructed as to avoid accumulation of dirt and those which open should be fitted with screens Screens should be easily movable for cleaning and kept in good repair. Internal window sills, if present, should be sloped to prevent use as shelves.

- Doors should have smooth, non-absorbent surfaces and, where appropriate, be self-closing and close fitting.

- Stairs, lift cages and auxiliary structures such as platforms, ladders, chutes, should be so situated and constructed as not to cause contamination to food. Chutes should be constructed with inspection and cleaning hatches.

- Piping for natural mineral water lines should be independent of potable and non-potable waters.

4.3.8 In natural mineral water handling areas all overhead structures and fittings should be installed in such a manner as to avoid contamination directly or indirectly of natural mineral water and raw materials by condensation and drip, and should not hamper cleaning operations. They should be insulated where appropriate and be so designed and finished as to prevent the accumulation of dirt and to minimize condensation, mould development and flaking. They should be easy to clean.

4.3.9 Living quarters, toilets and areas where animals are kept should be completely separated from and should not open directly on to natural mineral water handling areas.

4.3.10 Where appropriate, establishments should be so designed that access can be controlled.

4.3.11 The use of material which cannot be adequately cleaned and disinfected, such as wood, should be avoided unless its use would clearly not be a source of contamination.

4.3.12 Canalisation, drainage lines

Canalisation and drainage and used water lines as well as any possible waste storage area within the protected perimeter should be built and maintained in such a manner as not to present any risk whatsoever of polluting aquifers and springs.

4.3.13 Fuel storage area

Any storage area or tank for the storing of fuels such as coal or hydrocarbons should be designed, protected, controlled and maintained in such a manner as not to present a risk of aquifers and springs being polluted during the storage and manipulation of these fuels.

4.4 Hygiene Facilities

4.4.1 Water supply

4.4.1.1 An ample supply of potable water in compliance with Section 7.3 of the Codex Code of Practice - General Principles of Food Hygience (CAC/RCP1 1969 Rev. 1) under adequate pressure and of suitable temperature should be available with adequate facilities for its storage, where necessary, and distribution, and with adequate protection against contamination. The standards of potability should not be less than those contained in the latest edition of "International Standards of Drinking Water" (WHO).

4.4.1.2 Natural mineral water, potable water, non potable water for steam production or for refrigeration or any other use should be carried in completely separate lines with no cross connection between them and without back siphonage. It would be desirable that these lines be identified by different colours. Steam used in direct contact with natural mineral water and natural mineral water contact surfaces should contain no substances which may be hazardous to health or may contaminate the food.

4.4.2 Effluent and waste disposal

Establishments should have an efficient effluent and waste disposal system which should at all times be maintained in good order and repair. All effluent lines (including sewer systems) should be large enough to carry peak loads and should be so constructed as to avoid contamination of potable water supplies.

4.4.3 Changing facilities and toilets

Adequate, suitable and conveniently located changing facilities and toilets should be provided in all establishments. Toilets should be so designed as to ensure hygienic removal of waste matter. These areas should be well lit, ventilated and where appropriate heated, and should not open directly on to natural mineral water handling areas. Hand washing facilities with warm or hot and cold water, a suitable hand-cleaning preparation, and with suitable hygienic means of drying hands, should be provided adjacent to toilets and in such a position that the employee must pass them when returning to the processing area. Where hot and cold water are available mixing taps should be provided. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided near to each washing facility. Care should be taken that these receptacles for used paper towels are regularly emptied. Taps of a non-hand operable type are desirable. Notices should be posted directing personnel to wash their hands after using the toilet.

4.4.4 Hand washing facilities in natural mineral water processing areas

Adequate and conveniently located facilities for hand washing and drying should be provided wherever the process demands. Where appropriate, facilities for hand disinfection should also be provided. Warm or hot and cold water and a suitable hand-cleaning preparation should be provided. Where hot and cold water are available mixing taps should be provided. There should be suitable hygienic means of drying hands. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided adjacent to each washing facility. Taps of a non-hand operable type are desirable. The facilities should be furnished with properly trapped waste pipes leading to drains.

4.4.5 Disinfection facilities

Where appropriate, adequate facilities for cleaning and disinfection of working implements and equipment should be provided. These facilities should be constructed of corrosion resistant materials, capable of being easily cleaned, and should be fitted with suitable means of supplying hot and cold water in sufficient quantities.

4.4.6 Lighting

Adequate natural or artificial lighting should be provided throughout the establishment. Where appropriate, the lighting should not alter colours and the intensity should not be less than:

540 lux (50 foot candles) at all inspection points
220 lux (20 foot candles) in work rooms
110 lux (10 foot candles) in other areas.

Light bulbs and fixtures suspended over natural mineral water in any stage of production should be of a safety type and protected to prevent contamination of natural mineral water in case of breakage.

4.4.7 Ventilation

Adequate ventilation should be provided to prevent excessive heat, steam condensation and dust and to remove contaminated air. The direction of the air flow should never be from a dirty area to a clean area. Ventilation openings should be provided with a screen or other protecting enclosure of non-corrodible material. Screens should be easily removable for cleaning.

4.4.8 Facilities for storage of waste and inedible material

Facilities should be provided for the storage of waste and inedible material prior to removal from the establishment. These facilities should be designed to prevent access to waste or inedible material by pests and to avoid contamination of natural mineral water, potable water, equipment, buildings or roadways on the premises.

4.5 Equipment and Utensils

4.5.1 Materials

All equipment and utensils used in natural mineral water handling areas and which may contact the natural mineral water should be made of material which does not transmit toxic substances, odour or taste, is non-absorbent, is resistant to corrosion and is capable of withstanding repeated cleaning and disinfection. Surface should be smooth and free from pits and crevices. The use of wood and other materials which cannot be adequately cleaned and disinfected should be avoided except when their use would clearly not be a source of contamination. The use of different materials in such a way that contact corrosion can occur should be avoided.

4.5.2 Hygienic design, construction and installation

4.5.2.1 All equipment and utensils should be so designed and constructed as to prevent hygienic hazards and permit easy and thorough cleaning and disinfection.

SECTION V - ESTABLISHMENT: HYGIENE REQUIREMENTS

5.1 Maintenance

The buildings, equipment, utensils and all other physical facilities of the establishment, including drains, should be maintained in good repair and in an orderly condition. As far as practicable, rooms should be kept free from steam, vapour and surplus water.

5.2 Cleaning and Disinfection

5.2.1 Cleaning and disinfection should meet the requirements of this code. For further information on cleaning and disinfection procedures see Annex I, Revised Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 1 (1979)).

5.2.2 To prevent contamination of natural mineral water, all equipment and utensils should be cleaned as frequently as necessary and disinfected whenever circumstances demand.

5.2.3 Adequate precautions should be taken to prevent natural mineral water from being contaminated during cleaning or disinfection of rooms, equipment or utensils, by water and detergents or by disinfectants and their solutions. Detergents and disinfectants should be suitable for the purpose intended and should be acceptable to the official agency having jurisdiction. Any residues of these agents on a surface which may come in contact with natural mineral water should be removed by thorough rinsing with water in compliance with 7.3 of the Recommended International Code of Hygienic Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 1 (1979)) before the area or equipment is again used for handling natural mineral water.

5.2.4 Either immediately after cessation of work for the day or at such other times as may be appropriate, floors, including drains, auxiliary structures and walls of natural mineral water handling areas should be thoroughly cleaned.

5.2.5 Changing facilities and toilets should be kept clean at all times.

5.2.6 Roadways and yards in the immediate vicinity of and serving the premises should be kept clean.

5.3 Hygiene Control Programme

A permanent cleaning and disinfection schedule should be drawn up for each establishment to ensure that all areas are appropriately cleaned and that critical areas, equipment and material are designated for special attention. A single individual, who should preferably be a permanent member of the staff of the establishment and whose duties should be independent of production, should be appointed to be responsible for the cleanliness of the establishment. He should have a thorough understanding of the significance of contamination and the hazards involved. All cleaning personnel should be well-trained in cleaning techniques.

5.4 Storage and Disposal of Waste

Waste material should be handled in such a manner as to avoid contamination of natural mineral water or potable water. Care should be taken to prevent access to waste by pests. Waste should be removed from the natural mineral water handling and other working areas as often as necessary and at least daily. Immediately after disposal of the waste, receptacles used for storage and any equipment which has come into

contact with the waste should be cleaned and disinfected. The waste storage area should also be cleaned and disinfected.

5.5 Exclusion of Animals

Animals that are uncontrolled or that could be a hazard to health should be excluded from establishments.

5.6 Pest Control

5.6.1 There should be an effective and continuous programme for the control of pests. Establishments and surrounding areas should be regularly examined for evidence of infestation.

5.6.2 Should pests gain entrance to the establishment, eradication measures should be instituted. Control measures involving treatment with chemical, physical or biological agents should only be undertaken by or under direct supervision of personnel who have a thorough understanding of the potential hazards to health resulting from the use of these agents, including those hazards which may arise from residues retained in the natural mineral water. Such measures should only be carried out in accordance with the recommendations of the official agency having jurisdiction.

5.6.3 Pesticides should only be used if other precautionary measures cannot be used effectively. Before pesticides are applied, care should be taken to safeguard natural mineral water, equipment and utensils from contamination. After application, contaminated equipment and utensils should be thoroughly cleaned to remove residues prior to being used again.

5.7 Storage of Hazardous Substances

5.7.1 Pesticides or other substances which may represent a hazard to health should be suitably labelled with a warning about their toxicity and use. They should be stored in locked rooms or cabinets used only for that purpose and dispensed and handled only by authorized and properly trained personnel or by persons under strict supervision of trained personnel. Extreme care should be taken to avoid contaminating natural mineral water.

5.7.2 Except when necessary for hygienic or processing purposes, no substance which could contaminate natural mineral water should be used or stored in natural mineral water handling areas.

5.8 Personal Effects and Clothing

Personal effects and clothing should not be deposited in natural mineral water handling areas.

SECTION VI - PERSONNEL HYGIENE AND HEALTH REQUIREMENTS

6.1 Hygiene Training

Managers of establishments should arrange for adequate and continuing training of all natural mineral water handlers in hygienic handling of natural water and in person hygiene so that they understand the precautions necessary to prevent to prevent contamination of natural mineral water. Instruction should include relevant parts of this Code.

6.2 Medical Examination

Persons who come in contact with natural mineral water in the course of their work should have a medical examination prior to employment if the official agency having jurisdiction, acting on medical advice, considers that this is

necessary, whether because of epidemiological considerations or the medical history of the prospective natural mineral water handler. Medical examination of natural mineral water handler should be carried out at other times when clinically or epidemiologically indicated.

6.3 Communicable Diseases

The management should take care to ensure that no person, while known or suspected to be suffering from, or to be a carrier of a disease likely to be transmitted through food or while afflicted with infected wounds, skin infections, sores or with diarrhoea, is permitted to work in any natural mineral water handling area in any capacity in which there is any likelihood of such a person directly or indirectly contaminating natural mineral water with pathogenic micro-organisms. Any person so affected should immediately report to the management that he is ill.

6.4 Injuries

Any person who has a cut or wound should not continue to handle natural mineral water or natural mineral water contact surfaces until the injury is completely protected by a waterproof covering which is firmly secured, and which is conspicuous in colour. Adequate first-aid facilities should be provided for this purpose.

6.5 Washing of Hands

Every person, while on duty in a natural mineral water handling area, should wash his hands frequently and thoroughly with a suitable hand cleaning preparation under running warm water in compliance with Section 7.3 of the Codex Code of Practice - General Principle of Food Hygiene (CAC/RCP 1-1969 Rev. 1 (1979)). Hands should always be washed before commencing work, immediately after using the toilet, after handling contaminated material and whenever else necessary. After handling any material which might be capable of transmitting disease, hands should be washed and disinfected immediately. Notices requiring hand-washing should be displayed. There should be adequate supervision to ensure compliance with this requirement.

6.6 Personal Cleanliness

Every person engaged in a natural mineral water handling area should maintain a high degree of personal cleanliness while on duty, and should at all times while so engaged wear suitable protective clothing including head covering and footwear, all of which articles should be cleanable unless designed to be disposed of and should be maintained in a clean condition consistent with the nature of the work in which the person is engaged. Aprons and similar items should not be washed on the floor. During periods where natural mineral water is manipulated by hand, any jewellery that cannot be adequately disinfected should be removed from the hands. Personnel should not wear any insecure jewellery when engaged in natural mineral water handling.

6.7 Personal Behaviour

Any behaviour which could result in contamination of natural mineral water, such as eating, use of tobacco, chewing (e.g. gum, sticks, betel nuts, etc.) or unhygienic practices such as spitting, should be prohibited in natural mineral water handling areas.

6.8 Visitors

Precautions should be taken to prevent visitors to natural mineral water handling areas from contaminating the product. These may include the use of protective clothing. Visitors should observe the provisions recommended in paragraphs 5.8, 6.3, 6.4 and 6.7 of this code.

6.9 Supervision

Responsibility for ensuring compliance by all personnel with all requirements of Sections 6.1 - 6.8, inclusive should be specifically allocated to competent supervisory personnel.

SECTION VII - ESTABLISHMENT: HYGIENIC PROCESSING REQUIREMENTS

7.1 Raw Material Requirements

To guarantee a good and stable quality of natural mineral water, certain criteria should be monitored regularly, e.g.

7.1.1 Spring discharge, temperature of the natural mineral water;

7.1.2 Appearance of the natural mineral water;

7.1.3 Odour and taste of the natural mineral water;

7.1.4 The conductance of natural mineral water or any other adequate parameter;

7.1.5 The microbiological flora.

7.2 Should there be a perceptible lack in meeting the standards, the necessary corrective measures are immediately to be taken.

7.3 Treatment

The treatment may include decantation, filtration, airing and where necessary application or offtake of carbon dioxide (CO_2).

7.3.1 Processing should be supervised by technically competent personnel.

7.3.2 All steps in the production process, including packaging, should be performed without unnecessary delay and under conditions which will prevent the possibility of contamination, deterioration, or the development of pathogenic and spoilage micro-organisms.

7.3.3 Rough treatment of containers should be avoided to prevent the possibility of contamination of the processed product.

7.3.4 Methods of preservation and necessary controls should be such as to protect against contamination or development of a public health hazard and against deterioration within the limits of good commercial practice.

7.3.5 All contaminated equipment which has been in contact with raw materials should be thoroughly cleaned and disinfected prior to being used in contact with the end-products.

7.4 Packaging material and containers

7.4.1 All packaging material should be stored in a clean and sanitary manner. The material should be appropriate for the product to be packed and for the expected conditions of storage and should not transmit to the product objectionable substances beyond the limits acceptable to the official agency having jurisdiction. The packaging material should be sound and should provide appropriate protection from contamination. Only packaging material required for immediate use should be kept in the packing or filling area.

7.4.2 Product containers should not have been used for any purpose that may lead to contamination of the product. Used containers, also new containers if there is a possibility that they have been contaminated, should be cleaned and disinfected. When chemical disinfectant is used, the container should be rinsed as prescribed under 5.2.3. Containers should be well drained after rinsing. Used and, when necessary, unused containers should be inspected immediately before filling.

7.5 Filling and Sealing of Containers

7.5.1 Packaging should be done under conditions that preclude the introduction of contaminants into the product.

7.5.2 The methods, equipment and material used for sealing should guarantee a tight and impervious sealing and not damage the containers nor deteriorate the chemical, bacteriological and organoleptic qualities of natural mineral water.

7.6 Packaging of Containers

The packaging of containers should protect the latter from contamination and damage and allow appropriate handling and storing.

7.7 Lot Identification

Each container shall be permanently marked in code or in clear to identify the producing factory and the lot. A lot is a quantity of food produced under identical conditions, all packages of which should bear a lot number that identifies the production during a particular time interval, and usually from a particular "line" or other critical processing unit.

7.8 Processing and Production Records

Permanent, legible and dated records of pertinent processing and production details should be kept concerning each lot. These records should be retained for a period that exceeds the shelf life of the product, but unless a specific need exists they need not be kept for more than two years. Records should also be kept of the initial distribution by lot.

7.9 Storage and Transport of the End-Product

The end-product should be stored and transported under such conditions as will preclude contamination with and/or proliferation of micro-organisms and protect against deterioration of the product or damage to the container. During storage, periodic inspection of the end-product should take place to ensure that only natural mineral water which is fit for human consumption is despatched and that end-product specifications should be complied with when they exist.

7.10 Sampling and Laboratory Control Procedure

The following are intended as guidelines for testing the water at the source and at critical control points:

Natural mineral water should contain no parasites and should be free from:

	Incubation Temperature	n	c	m	Method
1. Coliforms	37°C	5 (x250 ml)	0	0	ISO method if they exist; otherwise to be elaborated.
2. Faecal streptococci	37°C	5 (x250 ml)	0	0	
3. Spore-forming sulphite-reducing anaerobic bacteria	42°C	5 (x250 ml)	0	0	
4. *Pseudomonas aeruginosa*	42°C	5 (x250 ml)	0	0	
5. Aerobic microbial counts; the maximum permissible total aerobic counts per millilitre at 20-22°C and 37°C depend on the unique characteristics of the source and should be fixed by the authority having jurisdiction.					

SECTION VIII - END-PRODUCT SPECIFICATIONS

After bottling natural mineral water should be free from:

	Incubation Temperature	n	c	m	Method
1. Coliforms	37°C	5 (x250 ml)	0	0	As for European Regional Standard (See Annex I)
2. Aerobic microbes capable of multiplying on x 10 diluted plate count agar	42°C	5 (x250 ml)	0	0	

PROPOSED DRAFT AMENDMENT TO THE RECOMMENDED INTERNATIONAL CODE OF PRACTICE FOR EGG PRODUCTS (CAC/RCP 15-1976) (AT STEP 3)

SECTION 2 - DEFINITIONS

Add:

Egg Products The content of eggs, as whole egg or only the yolk or only egg albumen or a mixture of yolk and albumen in liquid, frozen or dried form, single or in combination with other foods or drinks to a minimum content of 50% egg product.

SECTION 3 - RAW MATERIAL REQUIREMENTS

Add new Sub-sections 3.3 and 3.4 as follows:

3.3 Handling In-shell Cracked Eggs on the Farm

3.3.1 Thin-shelled or hair cracked eggs or cracked eggs with shell membranes intact should be carefully handled and packed in a separate container to prevent breakage before delivery to the breaking plant.

3.3.2 If there is a danger that this type of egg will break during the transport to the egg-breaking plants the following procedure should be followed.

3.3.3 Only clean hair cracked eggs (not washed) or clean cracked eggs (not washed) with shell membranes intact may be broken on the farm.

3.3.4 This procedure should be in accordance with Section 4, Sub-section 4.4.4.1.

3.3.5 Egg products collected on the farm may not be strained nor be separated into egg-yolk and egg-albumen.

3.3.6 This egg product should be collected in clean and, if necessary, disinfected containers with suitable closures and should be chilled in accordance with Sub-section 4.4.4.4, Section 4. This procedure should preferably be performed in a separate room. The room used for the operation should be in accordance with the requirement set forth in Sub-section 4.1.1.

3.3.7 All measures should be taken to protect the product from contamination.

3.3.8 The egg products should be collected and transported from the farm where they are produced as soon as possible only to the egg product plant and transported at a temperature between 0-5°C.

3.4 Handling In-shell Cracked Eggs at the Packing Station

3.4.1 The same procedures should be followed as prescribed in Sub-sections 3.3.2, 3.3.3, 3.3.4, 3.3.5, 3.3.6, 3.3.7 and 3.3.8.

Change present Sub-section 3.3 - Transportation to Sub-section 3.5 - Transportation.

SECTION 4 - PLANT, FACILITIES AND OPERATING REQUIREMENTS

Sub-section 4.4.4.1

Add the following (new indent):

After breaking, a centrifuge may be used to remove the last part of the egg albumen out of the egg shells, but only eggs that have been washed with the method described in Sub-section 4.4.4.2 may be centrifuged.

Sub-section 4.4.4.5.1 Add the following (new indent):

Egg product received from the farms or packing stations should be pasteurized in the plant.

ALINORM 85/13
APPENDIX VI

THE MICROBIOLOGICAL SAFETY OF IRRADIATED FOOD

Report of a meeting of the Board of the International Committee on Food Microbiology and Hygiene (ICFMH) of the International Union of Microbiological Societies (IUMS)* with participation of WHO, FAO and IAEA, held in Copenhagen on 16 December 1982.

* The IUMS is a Non-Governmental Organization in official relationships with WHO.

I - INTRODUCTION

At the request of FAO and WHO, this subject was considered at a meeting of the Board of the International Committee on Food Microbiology and Hygiene (ICFMH) of the International Union of Microbiological Societies (IUMS) on 16 December 1982. The Board met at the Royal Veterinary and Agricultural University in Copenhagen. A list of those present is given in Annex A.

The Chair was taken by Professor Mossel and Dr. Charles was asked to write the Report.

Professor Mossel opened the meeting and welcomed and thanked the participants, He described the role of ICFMH and its relationship to IUMS.

II - GENERAL DISCUSSION

Dr. Käferstein presented the views of FAO and WHO. These organizations hope that irradiation of food, by reducing contamination with pathogenic micro-organisms and food loss from spoilage, would contribute to achieving Health for All by the Year 2000 by improving both food safety and nutrition. This could only be done if irradiation of food did not of itself create a health hazard. The Joint FAO/IAEA/WHO Expert Committee on the Wholesomeness of Irradiated Food (JECFI) (3) concluded in 1980 that the irradiation of any food commodity up to an overall average dose of 10 kGy (1Mrad) presents no toxicological hazard and does not introduce special nutritional or microbiological problems. However, concerns about the effects of irradiation on micro-organisms in food had been raised by Dr. Charles and others at the Food Hygiene Committee of the Codex Alimentarius Commission in 1979 (ALINORM 79/13A and ANNEX B to this Report). Was the Board able to say if these microbiological concerns were justified or if sufficient scientific research had given results which could alleviate these concerns? It was important that a definitive answer should be given, since the International Organizations did not want to promote irradiation of food and then have to change their minds after its widespread use for several years.

Mr. Hutchinson briefly described the Codex Alimentarius procedure, including the roles of the Food Additives Committee and the Food Hygiene Committee. In 1979 this last had noted that the upper limit of 10kGy (1Mrad) established by the Codex Recommended International General Standard for Irradiated Foods (4) represented sub-lethal low dose irradiation,which raised certain concerns related to microbiological aspects and public health considerations. Among these concerns were increased radiation resistance and increased pathogenicity associated with genetic changes of surviving micro-organisms, and destruction of vegetative cells only preventing competitive growth of spoilage micro-organisms prior to the outgrowth of resistant organisms, e.g., *Clostridium botulinum* spores. The Food Hygiene Committee had appointed an *ad hoc* Working Group, but this had only looked at the problem caused by the suppression of spoilage flora, which if felt,necessitated special care in handling irradiated food to ensure refrigerated conditions of storage and transport in order to preclude the growth of pathogens. The FAO and WHO now wanted an opinion from geneticists about the possibility of a public health hazard from radiation induced mutation in surviving organisms.

In reply, Professor Mossel presented a paper for discussion by the Board (see ANNEX C to this Report). He stated that the problem of genetic mutation had already been reviewed in 1975 by Ingram and Farkas and that they had not been able to identify a hazard. He himself subsequently reviewed the evidence and substantiated their concludions. He agreed that there could be a problem due to suppression of spoilage organisms, but this was no greater than arose with other methods of partial preservation, e.g., pasteurisation, salting, vacuum packing. Following all these procedures, safety depended on proper temperature control of the treated food.

Professor Elias stated that he had provided the Board with copies of all current relevant literature, including 65 reprints of papers published since 1980. All this work had still not identified any hazard, but FAO and WHO needed positive evidence and assurance that hazardous mutations had not occurred, Professor Mossel stated that these doubts had at first been expressed in Karlsruhe in 1960; this had led to the following action: there was initially the literature search by Ingram and

Farkas confirmed by Professor Mossel himself in 1977. Direct research on genetics of irradiated micro-organisms has been performed by Professor Idziak in Canada. Further direct research was being carried out in Professor Mossel's laboratory. The conclusion was that shifts in the surviving flora were similar to those which occur after other sub-lethal treatment and if changes in attributes of micro-organisms occured, these were all towards reduction in the hazards to health. These changes did not make the micro-organisms unidentifiable or even significantly more difficult to identify.

On behalf of the Joint FAO/IAEA Division, of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development, Dr. Farkas expressed the IAEA's view that the conclusions of the 1974 FAO/IAEA Consultant's Meeting on the Microbiological Aspects of Food Irradiation, and the statements of the 1976 and 1980 reports of the Joint FAO/IAEA/WHO Expert Committee on the Wholesomeness of Irradiated Food (JECFI) regarding the microbiological safety of irradiated foods are still valid (2) (3) and no evidence has been found which shows the contrary. Furthermore, the Codex Recommended International General Standard for Irradiated Foods and the Recommended Code of Hygienic Practice for the Operation of Radiation Facilities used for the Treatment of Foods (4) properly cover the food hygiene aspects of the process. Nevertheless, as recommended by the 1980 JECFI, codes of technological practice will be prepared for various food groups and the Food Preservation Section of the IAEA has already contracted out technical papers to this end. These codes will be further developed following consultation with the Codex Officers in charge of the General Standard of Irradiated Foods (now under revision) and the codes will contain guidelines for the handling, irradiation and storage of foods treated with sub-sterilising doses.

He pointed out that other adverse influences on micro-organisms, i.e., heating, drying and ultra violet irradiation would also induce mutation. There was no evidence of undesirable effects arising from the irradiation of medical products or as a result of food irradiation which was already taking place in some countries, e.g., Japan, though this was relatively limited in amount. Professor Elias pointed out that this provided an answer to a problem indicated by Mr. Hutchinson (see ANNEX B to this Report) that the problems were difficult to investigate because nobody, as far as he knew, had studied all the surviving flora or irradiated foods. Dr. Farkas, however, agreed with Mr. Hutchinson's point that it was not possible for food microbiologists to study the full range of mutation of the heterogeneous micro-flora in food.

Mr. Hutchinson pointed out that the more widespread use of irradiation which would allow the general clearance of the technique for use in food processing would lead to a more extensive knowledge of the effects of irradiation on surviving microbial flora than had been obtained from the present relatively limited experience of food irradiation.

Professor Mossel said that his group has used the most modern means of analytical microbiology to study as fully as possible all changes in the composition and determinative traits of the micro-flora surviving after irradiation of food and that no adverse effects had been found.

Dr. Corry informed the Board that she had herself studied irradiation of micro-organisms and had in addition received the views of Dr. T.A. Roberts of the Meat Research Institute at Bristol, which she summarised. These all support the views of Dr. Farkas and Professor Mossel that changes in the properties of microbes tend to result in less rather than more virulent strains and that there is no more difficulty in identifying the surviving micro-flora by standard microbiological techniques than in an unirradiated population. It also needed to be remembered that there is no selective pressure to encourage the continual survival in foods of strains of increased virulence. Repeated expossure of survivors to sub-lethal radiation has often been shown to select populations with enhanced resistance to radiation, but there is no evidence that this can occur in the practical situation. Indeed, similar increased resistance to other factors, such as heat, has been induced by comparable methods in the laboratory (Corry and Roberts 1970 J. appl. Bact. 33 733-737). Exposure to sunlight, ultra violet irradiation etc. must also cause mutation in microbes, yet there is no evidence that mutants thus produced pose any particular hazard. Professor Skovgaard pointed out that thousands of tons of feed for experimental animals are

irradiated every year, some sterilised and some pasteurised, and no problems have been identified. Professor Elias asked if there was a risk of increased mycotoxin production as there was some published experimental evidence of this. Professor Mossel stated that the increase in mycotoxin production is more than balanced by the decrease in the number of mycotoxin-producing organisms. Dr. Farkas added that this increase in mycotoxin production is due to the reduction in concentration of these organisms and not to genetic mutation; the same result can be obtained by reducing the innoculum size.

Dr. Charles pointed out that food of animal origin was normally cooked before consumption and that this heat treatment was sufficient to destroy pathogens derived from the food animals, such as *Salmonella*, *Campylobacter* and *Yersinia*. Irradiation of the raw food would not affect spore bearing organisms present in the food, nor would it prevent recontamination from a food handler, e.g., with *Staphylococcus aureus* or *hepatitis* virus. Infection from these sources could only be prevented by adequate heat treatment and the observance of other established hygienic precautions in the preparation and storage of food. The consumer might well ask why it was then necessary to irradiate the food, since irradiation did not provide any safeguard that could not be provided by thorough cooking and irradiated food still had to be cooked and to be subject to normal hygienic precautions. Furthermore, if there was any health risk due to the induction of genetic mutations in micro-organisms, the mutagenic effects of irradiation would be added to those of other unavoidable processes such as cooking.

The Board gave a firm and definitive reply that total reliance could never be placed on kitchen hygiene, recontamination could occur after cooking, refrigeration might be inadequate and in some cases, e.g., on a resting stomach, illness could occur following the ingestion of very small numbers of micro-organisms. The use of ionising radiation to reduce the numbers of vegetative forms of pathogens on raw food would reduce the load of pathogens entering the food chain and complement the other hygienic measures in reducing yet further the hazards of microbial foodborne disease. Not only does irradiation of food create another barrier to the transmission of pathogenic organisms through food, especially Gram negative organisms, but the survivors of irradiation are usually more sensitive to heat, drying etc.

Dr. Corry and Dr. Bartl pointed out that modern methods of farming tend to increase the load of Gram negative organisms in food animals, emphasising the need for a process such as irradiation to reduce this load early in the food chain. Dr. Corry also pointed out that *Clostridium perfringens*, although a spore former, was usually present almost entirely as vegetative cells in meat, and that radiation would therefore have a significant effect on their numbers. It was also observed by Dr.Farkas that,while low dose irradiation did not eliminate either spores or viruses,it would reduce their numbers.

III - CONCLUSIONS

The Board agreed with the views expressed in Professor Mossel's paper (see ANNEX C to this Report). It had noted the concern of the Codex Committee on Food Hygiene but, after analysing the scientific knowledge to date, it was satisfied that there was no cause for concern. Irradiation induced genetic mutation of pathogens in food did not create an increased hazard to health and in the Board's opinion there would be no qualitative difference between the kind of mutation induced by ionizing irradiation and that induced by any other pasteurization/partial preservation methods such as heat treatment or vaccum drying.

Modern food handling technology was adequate to control problems created by suppression of spoilage micro-organisms. Food irradiation was an important addition to the methods of control of foodborne pathogens and did not present any additional hazards to health.

IV - REFERENCES

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2. *WHO Technical Report Series No. 604 1977.*

3. *WHO Technical Report Series No. 659 1981*

4. - *General Standard for Irradiated Foods*

   - *Code of Hygienic Practice for the Operation of Radiation Facilities used for the Treatment of Foods.* (CAC/RCP 19-1979).

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CONCERNS REGARDING THE MICROBIOLOGICAL SAFETY OF FOOD

(Summarized by the FAO/WHO Secretariat of the Codex Alimentarius Commission)

The following is the substance of an FAO/WHO Inter-Secretariat letter written by the Secretariat of the Codex Committee on Food Hygiene:

"The use of short wave irradiation to produce mutation in micro-organisms is a well-known technique and has been used in a variety of the lower fungi and in bacteria to produce, for instance biochemical "markers" so that genetic segregation and recombination can be followed both through mitotic and meiotic cycles. Pontecorvo and his co-workers made an extensive study of the genetics of *Aspergillus nidulans* using mutants which were for the most part obtained by U.V. and X-irradiation (1). Macdonald and Hutchinson used the same techniques to study recombination in *Aspergillus niger* and penicillin producing strains of *P. chrysogenum* (2), (3) and (4).

Irradiation produced a wide number of mutations for requirements for amino-acids, nucleotides and vitamins in otherwise prototroph species and also some strains which were resistant to inhibitors such as acriflavin.

To obtain the highest number of mutants, irradiation doses were adjusted to ensure near total kill of the cells (in the above cases fungal conidia) - in the small percentage surviving the rate of mutation was very high. These techniques were designed to select specific mutants but the irradiation must have induced many others which fell outside the scope of the screening techniques used.

The use of irradiation to produce microbial strains for industrial purposes is of course also well-known; mutation by U.V. and X-irradiation has given strains which produce enormously increased yields of penicillin by comparison with the parent strains and there are many other examples of the same kind: many vitamins and amino-acids are produced micro-biologically by mutated strains. In some cases the normal metabolic path ways are blocked and there is an accumulation of the desired end-products. In all cases, screening of mutations has been designed to select only the strains required. Many other mutations both morphological and biochemical are produced in an irradiation programme which obviously go unnoticed and the way in which they have mutated cannot be recorded.

The connection between this kind of directed irradiation and the ultra-short wave irradiation used in the sterilizing of foods hinges on the following factors, in the opinion of the Secretariat:

1. Maximum permissible doses of 10 MeV given in the Revised General Standard for Irradiated Foods obviously cannot guarantee total kill of micro-organisms present in a food.

2. Among the survivors of irradiation there is likely to be a high mutation rate.

3. Among mutations, there is a possibility of inducing genetic changes which may be deleterious to haman health.

When the General Standard for Irradiated Foods was examined by the Codex Committee on Food Hygiene, there was considerable concern expressed on a number of issues. A resumé of these concerns expressed by delegations in full Committee appears in paragraph 20 of the Report which reads as follows:

> "It was noted that the upper limits of irradiation set by the Joint Expert Committee on Food Irradiation (JECFI) which encompassed the eight specified foods in the Draft General Standard for Irradiated Foods at Step 8, as referred to the Food Hygiene Committee, was established to represent toxicological safety. The Food Hygiene Committee noted that this upper limit also represented sub-lethal, low-dose irradiation, which raised certain concerns related to microbiological aspects and public considerations. Among these concerns involving

sub-lethal doses of irradiation were increased radiation resistance and increased pathogenicity associated with genetic changes of surviving micro-organisms, and destruction of vegetative cells only, preventing competitive growth of spoilage micro-organisms prior to outgrowth of *C. botulinum* spores".

The *ad hoc* Working Group of the Committee which examined the Standard in detail made the following more general comments:

"The Working Group noted with some concern that the irradiation processes could lead to microbiological health hazards that are not of much significance with current food technology. The concern is that the irradiation, particularly when it is used to extend shelf life or to reduce or eliminate certain pathogens will alter the current microbial ecology of foods and may therefore result in the growth of pathogens to hazard levels without the concomitant development of normal spoilage flora. While the foods currently proposed for irradiation have codes of practice specifying that such foods should be held under sufficiently refrigerated conditions as to preclude growth of pathogens, extra care will have to be used with these irradiated foods to assure freedom from such hazards when irradiated. Foods which do not have specific codes of practice may well be proposed for such irradiation processes, and even where such codes do exist, there is not automatic assurance that such codes will always be followed. Therefore, irradiation proposals should be specifically associated with codes of hygienic practice for each commodity. This could most easily be done by close collaboration with the Food Hygiene Committee and specific commodity committees".

The Codex Committee on Food Hygiene has raised problems which are very difficult to investigate because no body as far as is known, has studied the surviving flora of irradiated foods and to identify the full range of mutants produced by irradiation of foods or even to select those with increased pathogenicity or toxin production would be impossible.

The concern of the Codex Committee on Food Hygiene is a subject on which experts should give an opinion. If necessary a Code of Practice could perhaps be elaborated which would give advice on how irradiated foods could be handled in the household, in restaurants and catering establishments to ensure that the greatest precautions possible are taken against possible outgrowth on foods of micro-organisms which survive irradiation.

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ALINORM 85/13
APPENDIX VI
ANNEX C

HEALTH HAZARDS OF MICROBIOLOGICAL NATURE INHERENT TO FOODS IRRADIATED AT A LEVEL OF BELOW 10 KGY

Respected colleagues on the staff of FAO and WHO have requested the Committee's Expert advice with respect to some facets of the microbiological wholesomeness of foods, irradiated at the ≤ 10 kGy level for either radicidation or radurization purposes. Clearly it is beyond the Committee's competence to deal at large with the discussions which have unfortunately been raging for almost three decennia now: one group advocating food irradiation as a marvel, the other depicting it as a monster, the latter as a result of post-Hiroshima public paranoia of irrational fear for nuclear energy. I suggest that we limit our advice to one specific aspect: are there conclusive or at least persuasive data to support the verdict that irradiated foods present no particular problems of a microbiological nature that can interfere with their acceptance from the point of view of protection of the consumer against health risks.

In essence, I am generally opposed to applying the risk vs. benefit analysis approach to problems of public health. Nonetheless, in the case of food irradiation, and more specifically when considering radicidation of foods, there is a spectacular benefit that we cannot and should not ignore. Unwarranted complacency has for too long allowed raw foods of animal origin, such as pork, chicken and veal to be marketed in a microbiological condition that can best be described as: perennial occurence of at least one infective unit of *Salmonella*, *Campylobacter* or *Yersinia* per 100 cm^2 of every commodity sold to the public. If this status of human food is compared to that of petfoods which are required to be 'specific pathogen free' the divergence is at least surprising. Fortunately, irradiation of prepacked portions of such meats with about 5 kGy is a promising approach to alleviating the problem. It should therefore, definitely be considered for approval, together with other suitable decontamination procedures (1) by health administrators. In addition a recent outbreak in Norway in which over 120 patients were recorded who had contracted salmonellosis due to the consumption of foods spiced with Brazilian pepper, containing *Salmonella oranienburg* indicates another area of consumer protection that merits the attention of Health Administrators (2). In summary, radicidation is a very effective tool for intervention in some areas of microbiological safety of foods - a measure of prevention which is long overdue (3).

As stressed before, the benefits of radicidation should not include such a state of euphoria that caution with respect to perilous side effects is neglected. What then are the real microbiological hazards menacing food radicidation and, by the same token radurisation. The main concern has been the emergence of mutants that (i) are of unprecedented pathogenicity or virulence; (ii) cannot be identified because of loss of their determinative traits. This subject was most carefully reviewed, about 1975 by the late Professor M. Ingram and Dr. J. Farkas (4). These authors could not substantiate claims of this nature. I was invited to review their evidence - in fact a superfluous assignment, which I nonetheless accepted because the discipline of Science should be truth and not authority. As expected, I found no fault with Ingram and Farkas's dissertation. On the contrary, I substantitated their conclusions by paying particular attention to the methodological aspects of the problem (5). It is a well established practice to monitor foods processed for safety by the use of "marker" (index and indicator) organisms. The use of marker organisms for this purpose has been defended in an academic and eloquent and hence convincing way by Sir Graham Wilson (6). Since then many public health bacteriologists have recognized the merits of, and adopted this invaluable diagnostic tool. If marker organisms are properly used for the assessment of adequate processing for safety all identified and supposed risks of microbiological nature can be eliminated (7). My conclusion of 1977 therefore was that consumers and public health authorities alike can be reassured that no microbiological hazards endanger the process of food irradiation at the ≤ 10 kGy level, used for radicidation or radurisation. Since 1977 I have not become aware of any new experimental evidence to the contrary. While carefully monitoring the literature in this area, as a part of our research on the ecological aspects of food processing for safety in general (1).

Another consideration is that radicidation and radurisation might change the microbial community structure of fresh foods so that pathogens are able to multiply to dangerous levels before the normal association flora develop and metabolise sufficiently to spoil the food. I know of no evidence to show that this risk is any greater than that posed by foods treated by e.g., heat where the same flora shift occurs.

In spite of all this, it would be utterly unwise not to listen attentively to colleagues who apparently are concerned about this matter - despite the reassurance expressed in the literature quoted before. It would be equally wrong not to be prepared to carry out additional research when really required. However, in the latter case both the nature of the problem, the experimental approach to be followed and the Public Health impact of such data - reassuring or alarming - should be most accurately defined. If we fail to do precisely the latter in this *Forum*, we risk adding a perennial fruitless discussion to our deplorable failure so far to protect the consumer against food transmitted disease. I am convinced that if this situation were continued this would greatly detract from the prestige of Food Microbiology, a branch of Science this Committee is supposed to foster instead of frustrating.

D.A.A. Mossel

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