IMPROVED QUALITY CONTROL FOR THE HANDLING AND PROCESSING OF FRESH AND FROZEN TUNA AT SEA AND ON SHORE



ASEAN-CANADA FISHERIES POST HARVEST TECHNOLOGY PROJECT
PHASE II

ASEAN-CANADA FISHERIES POST-HARVEST TECHNOLOGY PROJECT - PHASE II

The ASEAN-Canada Fisheries Post-Harvest Technology Project - Phase II started in April 1992. The Project's objectives are to strengthen and upgrade fisheries product quality and fish inspection services within ASEAN countries; to assist in the development and implementation of improved methods and technologies in fish processing, preservation and packaging, on the basis of regional collaborative efforts, to enhance the transfer/adoption of appropriate technologies to the fish processing industries through training and extension services.

The Project activities are coordinated and administered by the ASEAN Executing Agency (AEA) which is incorporated in the Marine Fisheries Research Department (MFRD) of the Southeast Asian Fisheries Development Centre (SEAFDEC). In cooperation with the ASEAN governments, the Project established regional centres for fish processing technology (RC-FPT, Singapore), fish inspection and quality control (RC-FIQC, Indonesia), and information preparation and dissemination (RC-IPD, Malaysia) and developed work programs of national importance and regional interest for all ASEAN countries.

Each ASEAN country except Malaysia conducts two activities on either seafood processing or quality control in order to develop technical training manuals/materials and assist the RC-IPD in the production of extension materials based on these Project activities. The technologies developed are then transferred to the fish processing industries in the region through end-of-activity seminars/demonstrations and dissemination of information/training materials by government and private sector extension personnel.

The contribution of the Canadian International Development Agency (CIDA) for providing funds to assist the development of this work and its publication is gratefully acknowledged.

AUTHORS: Josephine Wiryanti, George F Glynn, and Leonard G Limpus.

LIAISON OFFICE: ASEAN Executing Agency,
ASEAN-Canada Fisheries Post-Harvest Technology Project - Phase II,
Changi Fisheries Complex, 300 Nicoll Drive, Singapore 498989.

[1] Marine Fisheries Research Department
Southeast Asian Fisheries Development Centre
Changi Fisheries Complex
300 Nicoll Drive, Singapore 498989

ISBN 981-00-9063-3

Foreword

Tuna is one of the leading commodities contributing to the socio-economic development in ASEAN countries. Fresh and frozen tuna intended for sashimi is destined mainly to Japan and USA, while other qualities are further processed into a variety of tuna products marketed throughout the world.

The Directorate General of Fisheries (DGF), Indonesia is very concerned with the quality, safety and economic integrity of tuna and tuna products. Since tuna is very delicate fish having a body temperature higher than the water where it is found, tuna must be handled as quickly and carefully as possible from the time of catching throughout the handling process.

During the ASEAN-Canada Fisheries Post-Harvest Technology Project - Phase II, the Regional Centre of Fish Inspection and Quality Control (RC-FIQC), Directorate General of Fisheries, Indonesia, carried out a pilot project on "Improved Quality Control of Fresh and Frozen Tuna" (WBS 232). The output of the pilot project is concerned with the improvement of Handling Practices and the development of a HACCP-based Integrated Quality Management Program (IQMP). The Manual comprises:

1. Good Handling Practices for the On-Board Handling of Fresh and Frozen Tuna.
2. An Integrated Quality Management Program for Tuna Operations On-Board Fishing Vessels.
3. Good Manufacturing Practices for the Processing of Tuna by Processing Plants.
4. An Integrated Quality Management Program for Fresh and Frozen Tuna by Processing Plants.
5. Inspection and Grading of Bigeye and Yellowfin Tuna.
6. Proper Procedures for the Unloading of Fresh Tuna.

The pilot projects also provided a transfer of technology on inspection, grading and quality control of fresh and frozen tuna to both government inspectors and private personnel in Indonesia and ASEAN member countries.

This Manual may be used as guideline for Tuna Handling Operators, Tuna Graders and Fish Inspectors in the application of Good Handling and Manufacturing Practices and for the HACCP-based Integrated Quality Management Program for Fresh and Frozen Tuna with particular attention to sashimi quality.

I would like to take the opportunity to express my sincere gratitude to the Canadian International Development Agency (CIDA), ASEAN Executing Agency (AEA) and the Canadian Supplies and Services Agency for the support of the ASEAN-Canada Fisheries Post-Harvest Technology Project - Phase II and this activity.

F.X. Murdjijo,
Director General of Fisheries,
Indonesia.

Acknowledgement

The Regional Centre for Fish Inspection and Quality Control (RC-FIQC), Directorate General of Fisheries, Indonesia, would like to acknowledge sincere gratitude to the Canadian International Development Agency (CIDA), the ASEAN Executing Agency (AEA) and the Canadian Supplies and Services Agency (CSSA) for the support provided throughout the implementation of ASEAN-Canada Fisheries Post-Harvest Technology Project - Phase II, and this activity.

Special appreciation goes to Mr. George F. Glynn, Canadian Specialist on Fresh and Frozen Tuna Handling and Mr. Haniff Madakia, Fish Technologist, for their generous supervision and technical assistance in the implementation of pilot project on "Improved Quality of Fresh and Frozen Tuna " (WBS 232). This Manual on Good Handling and Manufacturing Practices and the HACCP-based Integrated Quality Management Program (IQMP) for Fresh and Frozen Tuna intended for sashimi could not have been written without their help.

The RC-FIQC is also indebted to the Indonesian Tuna Processors, namely; P.T. Ratatotok, Bitung; P.T. Balinusa Windumas, Bali and P.T. Perikanan Samodra Besar, Bali for their favourable collaboration, without which this Manual would not have been accomplished.

Sincere thanks should also go to all staff from the Sub-Directorate of Fish Inspection and Quality Control, Directorate General of Fisheries, Indonesia for their technical contributions during the preparation of the Manual.

The RC-FIQC is also much obliged to the AEA for the editing, formatting and printing of the Manual.

Dr. Josephine Wiryanti,
Head, Sub-Directorate Fish Inspection and Quality Control, DFG
Indonesia Country Coordinator of the Project.
E-mail: j2103043@rad.net.id

Contents

Section 1 Good Manufacturing Practices for the On-Board Handling and Processing of Fresh and Frozen Tuna 1

1.1 Introduction, 2
1.2 Processing Steps, 4
1.3 Method of Catching, 4
1.4 Temperature of Tuna, 5
1.5 Handling, 5
1.6 Clubbing and Killing, 6
1.7 Bleeding, 6
1.8 Gutting and Gilling, 7
1.9 Lowering of Temperature, 8
1.10 Icing of Tuna, 8
1.11 Discharging of Tuna, 9
1.12 On-Board Freezing of Tuna, 9
1.13 Summary of Fish Handling Procedures, 10

Annex 1 Flowcharts for On-board Handling of Fresh and Frozen Tuna, 11
Annex 1.1 Flowchart for the On-board Handling of Fresh Tuna, 12
Annex 1.2 Flowchart for the On-board Handling of Frozen Tuna, 13
Annex 2 Tuna Missile, 14
Annex 3 Diagrams of Proper Handling Procedures and Descriptions, 15

Section 2 An Integrated Quality Management Program (IQMP) for On-Board Handling of Tuna 29

2.1 Introduction, 30
2.2 Establishment of Control Points or Inspection Points, 30
2.2.1 Process Flowchart for Inspection or Control Points, 32
2.2.2 Potential Critical Control Points, 33
2.2.3 Identification of Control Points, 34
2.3 Fish, 35
2.3.1 Requirements, 35
2.3.2 Defect Deficiency, 36
2.3.3 Monitoring Procedures, 36
2.3.4 Corrective Action, 37
2.3.5 Inspection of Tuna as it is Being Taken On-board, 37
2.3.6 Corrective Action Report, 38
2.3.7 Inspection of Tuna as it is Being Received On-board Vessel, 39
2.3.8 Information to be Supplied by Fishing Vessel, 40
2.4 Ice, 41
2.4.1 Requirements, 41
2.4.2 Ingredients, 41
2.4.3 Defect Definitions, 41

2.4.4 Monitoring, 41
2.5 Cleaning Agents, Sanitisers, Lubricants, 41
2.5.1 Requirements, 41
2.5.2 Specifications, 41
2.5.3 Monitoring Procedures, 42
2.5.4 Forms for Data Collection and Reporting, 42
2.5.5 Guidelines for Corrective Action, 42
2.5.6 Incoming Chemical Inspection Report, 43
2.5.7 Information to be Supplied by the Fishing Vessel Owner/Operator, 44
2.6 Vessel Design, Production Facilities, 45
2.6.1 Requirements for Vessel Design, 45
2.6.2 Production Facilities, 45
2.6.3 Corrective Action, 46
2.6.4 Guidelines for Corrective Action, 46
2.7 Operation & Sanitation, 46
2.7.1 Requirements, 46
2.7.2 Inspection of Vessel, 47
2.7.3 Forms for Inspection, 47
2.7.4 Guidelines for Corrective Action, 47
2.7.5 Action Reports, 48
2.8 Process Control, 51
2.8.1 Requirements, 51
2.8.2 Defects and Deficiencies, 51
2.8.3 Inspection Requirements, 51
2.8.4 Forms for Collection Data, 51
2.8.5 Corrective Action, 51
2.9 Fresh Storage Facilities, 51
2.9.1 Requirements, 51
2.9.2 Inspection Requirements, 52
2.9.3 Corrective Action, 52
2.9.4 Fresh Tuna Temperature Recovering Log, 53
2.10 Frozen Storage Facilities, 54
2.10.1 Requirements, 54
2.10.2 Inspection, 54
2.10.3 Corrective Action, 54
210.4 Frozen tuna Cold Storage Log, 55
2.11 Final Product, 56
2.11.1 Requirements, 56
2.11.2 Defect Tolerance, 56
2.11.3 Sampling Plan, 56
2.11.4 Corrective Action, 56
2.12 Recall Procedures, 56
2.12.1 Requirements, 56
2.12.2 Monitoring Procedures, 57

2.12.3 Guidelines for Corrective Action, 57
2.12.4 Shipping Record Report for Fresh/Frozen Tuna from Fishing Vessels, 58
2.13 Employee Qualifications on Fishing Vessels, 59
2.13.1 Requirements, 59
Annex 4 Definitions, 60
Annex 5 Potential Critical Control Points for the On-Board Handling of Fresh and Frozen Tuna, 61

Section 3 Good Manufacturing Practices for the On-Shore Handling and Processing of Tuna 63
3.1 Introduction, 64
3.1.1 Receiving, 64
3.1.2 Grading of Tuna, 65
3.1.3 Cooling, 66
3.1.4 Processing of Whole Fresh Tuna, 66
3.1.5 Processing and Packing of Fresh Tuna Loins, 67
3.1.6 Packing and Shipping of Whole Fresh Tuna for Exporting, 68
3.1.7 Processing of Frozen Tuna Loins and Sticks, 69
3.1.7.1 Tuna AKAMI and TORO, 71
3.1.7.2 Proportion of Akami and Toro, 71
3.1.7.3 Dressing of Eviscerated Tuna, 72
3.1.8 Processing of Tuna for Domestic Market, 73
3.1.9 Summary, 73
3.2 Employee Requirements, 74
3.2.1 Health, 74
3.2.2 Hand-Washing, 74
3.2.3 Hand Covering, Disinfection, 74
3.2.4 Outer Garments and Head Gear, 74
3.2.5 Smoking and Spitting, 75
3.3 Plant Facility Requirements, 75
3.3.1 Building, 75
3.3.2 Floors, 75
3.3.3 Drains, 76
3.3.4 Walls, 76
3.3.5 Ceilings and Overhead Protection, 77
3.3.6 Overhead Lighting, 77
3.3.7 Toilet Facilities, 77
3.3.8 Water Supply, 78
3.3.9 Floor Tanks for the Holding and Cooling of Tuna, 78
3.3.10 Overhead Pipes, 78
3.3.11 Processing, Grading and Packing Tables, 79
3.3.12 Conveyers Used in the Production of Loins, 79
3.3.13 Chutes, Containers Trolleys, 79

3.3.14 Animals, 79
3.3.15 Rodents and Insects, 80
3.3.16 Trays and Trolleys Used in the Frozen Production, 80
3.3.17 Freezing Facilities, 80
3.3.18 Freezing Facility Temperature Recorder, 80
3.3.19 Packing Material for Fresh Tuna Shipping and Material Used in Shipping, 81
3.3.20 Offal Removal, 81
3.3.21 Room Temperature in Processing Room, 81
3.3.22 Hot Water Supply, 82
3.3.23 Ice, 82
3.3.24 Plant Surroundings, 82
3.3.25 Sewage, 83
3.4 Proper Cleaning Procedures, 83
3.4.1 Clean-up Procedures, 83

Section 4 An Integrated Quality Management Program for the On-Shore Handling and Processing of Fresh and Frozen Tuna 85
4.1 Introduction, 86
4.1.1 Process Flowchart for Determining Inspection/Control Points, 88
4.1.2 Potential Inspection/Control Points, 89
4.1.3 Identification of Inspection/Control Points, 90
4.2 Fish, 91
4.2.1 Requirements, 91
4.2.2 Fish Defect Deficiency, 92
4.2.3 Monitoring Procedures, 92
4.2.4 Corrective Action, 92
4.2.4.1 Corrective Action Report, 94
4.2.4.2 Inspection of Tuna At Receiving Site, 95
4.2.4.3 Raw Product Inspection Report, 96
4.2.4.4 Information to be Supplied by Fish Processing Company, 97
4.3 Other Ingredients, 98
4.3.1 Requirements, 98
4.3.2 Ingredients, 98
4.3.3 Defect Definitions, 98
4.3.4 Defect Tolerances, 98
4.3.5 Monitoring Procedures, 98
4.3.6 Corrective Action, 99
4.3.7 Data Collection and Reporting Forms, 99
4.3.7.1 Incoming Ingredient Inspection Report, 100
4.3.7.2 Information to be Supplied by the Processing Company, - Monitoring Procedures, 101
4.4 Ice, 102
4.4.1 Ice Requirements, 102

4.4.2 Ingredients, 102
4.4.3 Defect Definitions, 102
4.4.4 Monitoring, 102
4.5 Cleaning Agents, Sanitisers, Lubricants, 102
4.5.1 Requirements, 102
4.5.2 Specifications, 103
4.5.3 Monitoring Procedures, 103
4.5.4 Corrective Action, 103
4.5.5 Forms for Data Collection and Reporting, 103
4.5.5.1 Incoming Chemical Report, 104
4.6 Plant Construction/Production Facilities/Plant Equipment, 105
4.6.1 Building, 105
4.6.2 Floors, 105
4.6.3 Drains, 105
4.6.4 Walls, 105
4.6.5 Ceilings, 105
4.6.6 Overhead Lighting, 105
4.6.7 Overhead Pipes, 106
4.6.8 Toilet Facilities, 106
4.6.9 Water Supply, 106
4.6.10 Floor Tanks, 106
4.6.11 Equipment, 106
4.6.12 Freezing Equipment, 106
4.6.13 Guidelines for Corrective Action, 107
4.6.14 Plant Rating Forms, 107
4.6.15 Guidelines for Corrective Action, 107
4.7 Operation and Sanitation, 108
4.7.1 Requirements, 108
4.7.2 Sanitation, 108
4.7.3 Plant Rating Forms, 109
4.7.4 Corrective Action, 109
4.8 Process Control, 109
4.8.1 Requirements, 109
4.8.2 Defects and Deficiencies, 110
4.8.3 Inspection Requirements, 110
4.8.4 Corrective Action, 110
4.9 Fresh/Frozen Storage Facilities, 110
4.9.1 Fresh Storage Facility, 110
4.9.1.1 Requirements, 110
4.9.1.2 Inspection Requirements, 111
4.9.1.3 Corrective Action, 111
4.9.1.4 Fresh Tuna Temperature Recording Log, 112
4.9.2 Frozen Storage Facility, 113
4.9.2.1 Requirements, 113

4.9.2.2 Inspection Requirements, 113
4.9.2.3 Corrective Action, 113
4.9.2.4 Frozen Tuna Cold Storage Log, 114
4.10 Packaging Material, 115
4.10.1 Requirements, 115
4.10.2 Specifications, 115
4.10.3 Defect Definitions, 115
4.10.4 Defect Tolerances, 115
4.10.5 Monitoring Procedures, 115
4.10.6 Corrective Action, 116
4.10.7 Packing Material Inspection Report, 117
4.11 Final Product, 118
4.11.1 Requirements, 118
4.11.2 Defect Tolerances, 118
4.11.3 Sampling Plan, 118
4.11.4 Corrective Action, 118
4.12 Recall Procedures, 119
4.12.1 General Requirements for Fresh and Frozen Tuna Products, 119
4.12.2 Specifications for the Documentation of Shipments, 119
4.12.3 Monitoring Procedures, 119
4.12.4 Corrective Action, 119
4.12.5 Shipment Record Form, 120
4.13 Employee Qualifications, 121
4.13.1 Requirements, 121
Annex 6 Potential Critical Control Points for Fresh/Frozen Tuna Products. 122
Annex 7 Detailed Plant Inspection and Rating Report, 124
Annex 8 Employee Hygienic Practices Checklist, 129
Annex 9 Detailed Plant Hygienic Inspection Report, 130
Annex 10 Action Report, 132

Section 5 Grading of Bigeye and Yellowfin Tuna 133
5.1 Introduction, 134
5.2 Nomenclature, 134
5.3 A Point Score System for Grading of Tuna, 134
5.3.1 Colour, 134
5.3.2 Condition, 135
5.3.3 Grading, 135
5.4 Colour Scores for Bigeye Tuna, 135
5.5 Colour Scores for Yellowfin Tuna, 136
5.6 Condition Scores for Bigeye and Yellowfin Tuna, 136
5.7 Quality Grading Form for the Inspection of Colour, 138
5.8 Quality Grading Form for Condition, 139
5.9 Flow Chart for Tuna Grading; At Sea, On-Shore, 140

Section 6 The Proper Unloading of Fresh Tuna from Fishing Vessels 141
6.1 Procedures in Place At Present in Indonesia, 142
6.1.1 Improvements, 142
6.1.2 Hatch Size and Vessel Design, 143
6.2 Proper Procedures in the Unloading of Fresh Tuna, 143
6.2.1 Temperature, 143
6.2.2 Fish Hole Chart, 144
6.2.3 Temperature Inspection, 144
6.2.4 Equipment, 144
6.2.5 Proper Fish Unloading System, 144
6.2.6 Unloading Requirements, 144
6.2.7 The Age of the Tuna, 145
6.2.8 Insulated Containers, 145
6.2.9 Transportation Procedures, 145
6.2.10 Cleaning of Fish Storage Area, 145
6.2.11 Icing of the Vessel, 145
6.2.12 Fish Hole Chart, 147
6.2.13 Temperature Recording Log Unloading Operation, 148
6.3 Inspection Points, 149
6.3.1 Discharging, 149
6.3.2 Temperature, 149
6.3.3 Unloading System, 149
6.3.4 Transportation, 150
6.3.5 Unloading Sites - Surroundings, 150
6.3.6 Ice, 150
Annex 11 Fish Unloading Systems and Description, 152

Section 7 Bibliography 157

SECTION 1

GOOD MANUFACTURING PRACTICES FOR THE ON-BOARD HANDLING AND PROCESSING OF TUNA

1.1 INTRODUCTION

Tuna is worth a lot of money. To obtain the highest price possible the method of catching tuna is very important. The demand for fresh tuna is increasing and with it is also the demand for a consistent quality product.

Good Manufacturing Practices (GMP) guidelines must be followed. GMP procedures are aimed at prevention of the problems by controlling the quality of the tuna as it is being caught.

Biology of Tuna

Tuna comes from the family of fishes called SCOMBROIDEA. This family of fishes possess large amounts of the unbound amino acid, HISTIDINE through the flesh. If the tuna is not handled properly at time of catching, this chemical can be converted, by bacterial action, to one of several toxic compounds, notably HISTAMINE. If sufficient amounts of histamine are produces in the muscles, scombroid poisoning may result, which in humans resembles a severe allergic action. Additional symptoms experienced include headaches, nausea, vomiting and swelling of the lips. To prevent the build up of this toxic-by-product, it is very important that the cooling process begin as soon as possible once the tuna is taking on board the fishing vessel. Histamine production is minimized at internal temperatures of lower than 7°C.

Tuna are unique among bony fish for their high metabolic rate (resulting in an extraordinary growth pattern) and in their vascular heat exchange system permitting them to maintain body temperatures several degrees higher than the ambient temperature, up to 38°C at time of catching. Most fish cool their muscles by transferring their metabolic heat to the blood where it cools at the gill surface where blood comes in close proximity to the water. In tuna however, a countercurrent heat exchange formed by arteries and veins supplying the red muscles (called retia mirable) acts in a way that the heated blood leaving the muscles warms the cooled blood entering the muscle. The retia, therefore, form a thermal barrier retaining metabolic heat in the tissue and preventing its loss in the gills.

The ability to thermoregulate varies. Large bluefin tuna appears to have a greater capacity to thermoregulate than smaller fish. Skipjack and yellowfin tuna can maintain an elevated muscle temperature, but it is only a fixed value above ambient over a wide rage of temperatures. Large bluefin tuna can maintain a red muscle temperature of between 26°C and 32°C, while the ambient temperatures varies between 6°C and 30°C respectively. This implies regulation of muscle temperature, which could be achieved by altering the functional size of the retia and/or by altering the blood flow through the retia.

It has been noted that when a tuna struggles, it will reduce the cooling of its muscles by the blood, as it uses all its energy to fight to escape capture. Therefore, it is very important to let the tuna return to its pre-exercise levels or stop struggling before it is removed from the hook.

Struggling will also have a dramatic effect on the amount of glycogen (stored carbohydrate) in the flesh which would be used up by the struggle.

This causes an effect on the amount of Adenosine Triphosphate (ATP) generated in the

flesh after death (from the glycogen). When the concentration of ATP falls to a certain level, the fish will enter into *rigor mortis*. Upon resolution of rigor (softening and relaxation of the muscle tissue), autolytic digestion spoilage will start, resulting in changes in the freshness of the flesh. The longer it takes the fish to go into and through rigor, the longer the fish will remain chemically fresh.

The utilisation of glycogen from struggling also effects the ultimate *post-mortem* condition of the flesh by the generation of lactic and pyruvic acids as it end-products. High concentrations of these acids can be built up in the flesh after two minutes of intense struggling. This acidic condition can lead to a visual deterioration of tuna causing a rainbow colour if the flesh which may further develop into a serious defect called "burnt fish". The flesh will turn pale and watery, giving a cooked appearance (called 'yake' in Japan) greatly reducing its value. Fish in this condition are not suitable for sashimi.

Struggling will take place upon taking the hook, and if allowed to struggle to death without immediate cooling, will result in "burnt flesh". The lactic acid will be metabolised by a live tuna on a hook, so that after two hours the flesh could return to pre-exercise levels. Care must be taken to stop a re-building of lactic acid as the tuna is being landed. Bleeding of fish also significantly reduces *post-mortem* production of lactic acid.

Other biological and non-biological factors will also contribute to tuna meat quality. These include feeding/food composition and flesh (fat) composition, parasites, age, sexual maturation, disease, killing methods, dressing procedures, chilling and storage procedures, and holding temperatures.

Tuna also contains polyunsaturated fats and oils which are warmed due to the blood in the system. If oxygen comes in contact with these oils, the fish will become rancid, producing odours and a poor taste. One cause of rancidity is the failure to properly bleed oxygen-rich blood from the meat. The GMP procedures will discuss the proper method for bleeding which must be followed.

Real fresh fish, when cut across will have the bone sticking up. This indicates that fish is still fresh and rigour mortis has not yet taken place.

For these reasons, fresh tuna especially for sashimi demands special handling and processing methods including:

- gentle catching and landing
- proper killing and bleeding
- careful dressing
- rapid cooling or freezing as appropriate

Rapid cooling and chilling at 0°C throughout the handling process is highly recommended for raw material intended for sashimi. If the product is to be frozen, it should be frozen to a core temperature of -60°C within 8 hours or less, followed by frozen storage at -50°C or lower.

The storage life of chilled tuna (yellowfin) is 10-12 days at 0°C. Frozen tuna will have the same initial quality as chilled tuna after thawing; however, its market life will only be three days, after which colour changes and textual changes become noticeable. Thawed

tuna also tends to exudate drip accompanied by rapid textural changes. Fresh tuna should be shipped within seven days of capture, if the product is to enter the fresh sashimi market.

Quality of tuna will start to decrease as soon as the tuna is caught. The loss of quality in tuna cannot be stopped, it can only slowed down. With Good Manufacturing Practices, the more care taken, the better the maintenance of the quality of the tuna for the end user. Final product grading is determined by the way the tuna is handled aboard the vessel.

1.2 PROCESSING STEPS

Processing Steps	Hazards
Method of Catching	Time of Stress
Landing of Tuna on Vessel	Area Clean and Safe
Method of Killing	System used
Bleeding	Proper Removal of Blood
Dressing	Removal of Intestines & Gills
Washing	Clean and Safe Salt Water
Lowering of Temperature	Proper Iced Chilled Sea Water
Storage of Fresh Tuna	Protect Skin and Cover with Good Clean Ice
Freezing of Whole Tuna On Board of Vessel	A Core Temperature of -60°C Must be Reached in 8 Hours or Less

1.3 METHODS OF CATCHING

To maintain a food quality product, tuna should be landed as soon as possible after catching. There are several methods which are used for the catching of tuna.

The longline system is the most commonly used method for the fishing of sashimi quality tuna. The proper method when using this system is to tend the lines at all times to ensure no dead tuna are being landed. Presently, tuna longlines use between 1600 to 3000 hooks. This is considered to many as it can take up to 15 hours to retrieve the lines. It is recommended that less then 800 hooks be used at any one time, or a number whereby no dead tuna are found when tending.

Decreasing the amount of hooked time that tuna is in the water will decrease the amount of dead tuna and increase the amount of higher quality tuna for the end user.

Other hooking methods such as handline, trolling, and the pole and line are also satisfactory as long as the tuna are landed quickly and killed immediately.

Purse seining may also be used to land sashimi grade tuna. However, with this method

much care must be taken to ensure that not too many tuna are caught at one given time. If there are large numbers of tuna caught, it will lead to physical damage and maximum stress (and acid levels). Tuna which are caught by sein must be allowed to return to pre-exercise levels before removal. Tuna should be removed from the sein by gaffing the fish in the head with a hook or by the use of a tuna missile.

Tuna is a very delicate fish and has to be treated as such. The quality of the tuna starts to decrease as soon as it is on the hook, so what ever can be done from there on will only slow down the decrease in quality.

Points of Concern

Tuna must be handled properly even when it is in the water.

Eliminate the amount of stress, by tending the hooks more often.

Decrease the amount of dead tuna by decreasing the amount of time that the tuna is on the hooks after catching.

1.4 TEMPERATURE OF TUNA

Tuna is a very large fish, and as such it takes time for its heat to be removed. The best way is to completely surround the fish in a heat removing substance - water/ice slurry. Ice alone can be used, but ice melting at the surface of the fish may cause "bridges" in the ice pack, and the ice in the gut may also melt causing little contact and heat transfer slowing the cooling rate and requiring labourious re-packing.

Also, depending on the species of the tuna, the temperature of the tuna meat could be 10 to 15°C higher than the water temperature. Additional heat may also be caused by struggling and, if the fish is not killed properly, the tuna will try to keep the body's temperature as high as possible after death.

Points of Concern

Tuna must be cooled as soon as possible after taking on board the vessel.

Tuna must be placed in a cooling tank so as to decrease the core temperature as quickly as possible.

1.5 HANDLING

One method of taking the tuna on board is by the use of a gaff which is placed very carefully through the lower jaw. Another method is the use of a Tuna Missile. This is a multi-jawed griping device which is slid down the line to grip the tuna by the head. It is said to both clam the tuna and ensure it cannot escape (Annex 2).

When the crew are handling the tuna, they should wear gloves to protect the skin and the scales of the tuna.

The outer appearance of the tuna will tell the buyers how the tuna has been handled at time of catching.

During handling, if the skin is damaged then the meat will also be damaged. This will cause the tuna to have a lower grade which in turn can reduce the price. All care must be taken to ensure proper handling of tuna.

The deck surface must be kept clean and have a proper covering on the surface so as to protect the tuna from being damaged.

There should also be a proper overhead canopy in place to protect the tuna from the sun.

NOTE: One very important point to remember especially for the longline fishing vessel is that there should be enough crew available at all times to handle each tuna as it is taken on board the vessel. Tuna cannot be left on the deck without being properly handled; for example, a boat cannot take in all the tuna that are on the long line and then start the killing and handling operation.

Section 5.9 gives a flowchart for tuna grading at sea.

Points of Concern

Prevent tuna from being damaged.

Care must be taken to ensure that the skin, scales and outer meat is protected.

1.6 CLUBBING AND KILLING

Tuna is killed by either a sharp blow to the head or a spike inserted into the brain. The soft spot is found between the two eyes. The brain should be destroyed by placing a sharp object into the brain and pushing down so as to destroy the nervous system. The spinal core should also be destroyed by the use of a short metal rod and a tube. Force the rod through the tube into the brain and down the spinal canal to destroy the spinal core.

The primary reason for immediate killing is to prevent the tuna from suffering additional stress and struggling during the bleeding process. The reason for the destruction of brain and spinal core is to ensure the tuna's central nervous system which regulates body temperature will not function after death so that the tuna's body temperature will fall more rapidly in cold storage.

Points of Concern

Ensure that the tuna is killed properly.

Decrease the chances of struggling.

Decrease the chances of damage.

1.7 BLEEDING

Tuna must be bled as soon as possible after being taken on board. Removal of the hot blood will allow the tuna to cool much faster, and also reduce acidity. Listed are three steps that should be taken to properly bleed the tuna.

STEP #1: Locate the lateral median line behind the pectoral fin and with a clean knife roughly 2 inches long by ½ inch wide, make a cut no more than 2 inches long behind the pectoral fin. To cut the blood vessel make a cut 1 to 2 inches deep into the blood vessel. This cut must be completed on both sides of the fish.

STEP #2: The next step is to cut the blood vessels in the gills. Pull open one side of the gill cover, and with a clean sharp knife cut through the membrane behind the gill. Cut upward toward the spine to sever the blood vessel, being careful not to damage the heart. The heart, even though the tuna is dead, will continue to pump the blood as long as it is not damaged. This cut must be completed on both sides of the head.

STEP #3: The final step is to cut vertically on both sides of the tail between the third and fourth dorsal finlet from the tail. Do not remove the tail. During these three steps clean salt water must be kept running over the tuna to prevent the blood from clotting.

Points of Concern

Ensure that the proper bleeding is completed with each fish.

Ensure that when cutting the blood vessel in the gill area that the heart is not damaged.

1.8 GUTTING & GILLING (REMOVAL OF EXTERNAL ORGANS & GILLS)

It is very important that all the internal organs are removed from the tuna as quickly as possible after bleeding. Fish possess chemically active proteins known as enzymes which are responsible for the digestion of their food. At death, these enzymes, which include the digestive enzymes of the stomach and intestines, remains active. If they are not removed, they will actually breakdown the tissues of the digestive tract and begin destroying the belly meat, which is very important. The thickest part of the tuna is around the belly area and this is where the highest yield recovery takes place. It must be protected.

To remove the internal organs, first make a straight cut 4 inches long in the belly, cutting towards the anus. You must not cut through the anus. Reach into the cut and pull out the intestine which is attached to the body wall of the fish. Cut the intestine as close to the anus as possible.

Next, you must remove the gills from the head, making sure not to damage the head. Pull open the gill cover and then grab the lower end of gills. Cut gills away from the head, then pull and remove the gills and gut material.

When this process has been completed, the belly area must be properly cleaned with proper clean safe sea water. Making sure that all gut remnants and blood is removed. The area around where the gills have been removed must also be properly washed and all blood removed. This area is usually scrubbed with a soft nylon brush to ensure that the blood in the bone area is properly removed. After this process is completed the outer area of the skin must be washed properly so as to ensure that there are no slime or foreign material present. The above-mentioned process should be done as quickly and carefully as possible to ensure that the quality of the tuna is maintained at all times.

Where seawater temperatures are warm, it is recommended that the water be cooled before it comes in contact with the tuna. One method to do this is to pass the wash

water through a 2.5 cm coil of copper pipe approximately 4 m long which has been placed in an incubated box filled with ice and water. This will help in the initial cooling of the tuna.

Points of Concern

Gutting must be done properly.

No fish to be placed in fish hole which is not gutted.

Protect the belly wall by proper washing after gut removal.

1.9 LOWERING THE TEMPERATURE

Tuna should be placed in a container of salt water and ice for a period of up to 12 hours or until the core temperature of the tuna is at 0°C. If it is kept for longer than 12 hours, there may be a bleaching effect. The mixture of ice and water should be at least two parts ice to one part water. This procedure should be used on vessels wherever possible. Remember that the quicker the body temperature is lowered the better results you will have in maintaining the quality of the tuna. For vessels that are unable to use this process due to size, then the tuna must be placed in ice as quickly as possible. If the tuna is chilled in ice, it may have to be re-packed several times as it chills.

1.10 ICING OF TUNA (STORAGE ON BOARD)

When the proper core temperature has being acquired, the tuna must be removed from the slush tanks and very quickly and carefully placed in the fish hole. We must ensure that the skin or the meat are not being damaged when being placed down through the fish hatch.

The first part of icing a tuna is to properly pack the belly completely with ice. This will help maintain the proper temperature in the belly wall.

The outer area of the tuna must be covered with a green tuna paper so as to protect the skin of the tuna from coming in direct contact with the ice. This procedure will help maintain a good skin surface. Before the paper is placed around the tuna it must be soaked in clean salt water, not fresh water. Fresh water causes bleaching of the skin. Salt water help maintain the natural colour of the skin.

Green tuna paper is a special parchment type paper that can be ordered from Japan. An alternative is to use cheese on muslin cloth.

The main type of ice used in Indonesia is block ice. Due to the very hot climate this is the only type of ice that is suitable. It will last for a longer period of time. However, block ice must be properly crushed before it is placed around the tuna. It is very important that there are no large pieces of ice or sharp edges of ice used in the icing of tuna. The tuna must be properly covered at all time with a good layer of ice.

There should be a layer of ice 30 centimetres deep under the tuna. The tuna are placed head to tail ensuring that there is enough room between each fish to properly ice. Each tuna must be laid flat so as to ensure that the tuna does not bend. If tuna is allowed to be bent, then this will cause tearing off the meat which in turn will cause

downgrading of the quality. There can be two layers of tuna placed in a fish hole compartment one on top of the other; if more layers, shelving must be used. Between each layer of tuna, the fish must be covered with at least 30 centimetres of ice. The ice must be spread evenly over the fish, ensuring that there are no air pockets present. As the ice melts the water must be able to run clear of the fish. Proper pumping of the fish hole must be maintained.

Large and small tuna should not be iced together, large tuna should not be placed on top of small tuna. The more pressure that is placed on the fish the more chances there is of damage occurring while the fish is in the ice.

The fish hole must be properly insulated to maintain a proper cold temperature. The fish hatch opening must be well insulated to protect the hole from the outside air temperature.

Another method of holding tuna is the use of Refrigerated Sea Water. This system can only be used with vessels that have water tight fish holes and the proper refrigeration system on board. They must have the proper controls and holding facilities so as to maintain this system.

When fish are being placed in this system, the tuna must be placed into plastic bags so as to protect each tuna. The temperature must be maintained at 0°C at all times. The water must be kept clean and systems must be place to change the water as it becomes stale.

Once the tuna is properly iced and stored, it must be continuously checked to see that it is covered by ice at all times. Temperature of the meat should not drop below -2.5°C in the fresh state as rapid browning of the meat in the outer layers can occur.

Points of Concern

All tuna must be properly iced.

Regular inspection to ensure that the tuna is completely covered with ice.

Prevent tuna from touching when being iced in the fish hole.

1.11 DISCHARGING OF TUNA

When the time comes to discharge the tuna from the fish hole, all care must be taken to ensure that the tuna is handled very carefully and quickly.

Before the tuna is removed from the fish hole there should be a proper protected covering around the fish hole so as to ensure that the skin and flesh cannot be damaged.

There must be an overhead covering in place aboard the vessel if the tuna are going to be exposed to the sun for any period of time.

1.12 ON BOARD FREEZING OF TUNA (FOR SASHIMI AND OTHER MARKETS)

To obtain high quality frozen product, the previously mentioned landing and handling

on-board procedures apply. Temperature of tuna must be reduced as quickly as possible.

Air-blast freezing is recommended because low temperature can be obtained relatively quickly. Tuna in air-blast freezers should be suspended from the head, or aligned head-first into the air-blast. Tuna laid flat must be protected so that it does not bend. If tuna is bent during freezing, when it is thawed the meat will become torn causing a decrease in the quality.

The required core temperature that tuna is to be frozen on board is -60°C. The refrigeration capacity should be such as to do this within 8 hours or less.

The freezer storage area on board must maintain a constant temperature. The temperature should be held at -50°C or below. If the temperature is allowed to fluctuate or rise excessively, the freezer store's atmosphere will hold enough water vapour to cause a drying effect on the skin of the tuna and create a condition called freezer burn.

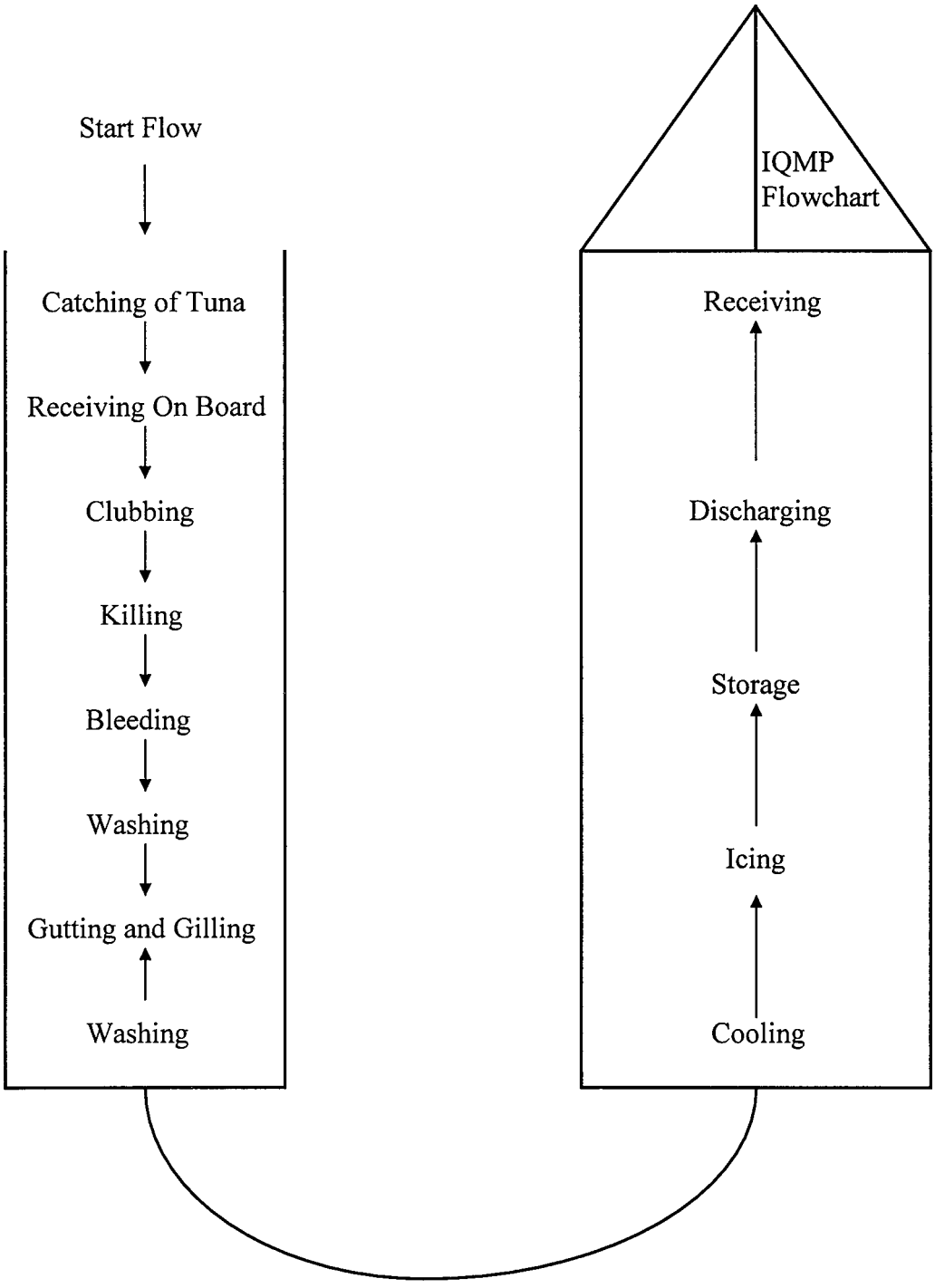
On-board blast freezers and cold storage rooms are required to be equipped with a monitoring gauge to record the temperature on an hourly basis. This will give information to show if there is a problem with the temperature in the rooms.

1.13 SUMMARY OF FISH HANDLING PROCEDURES:

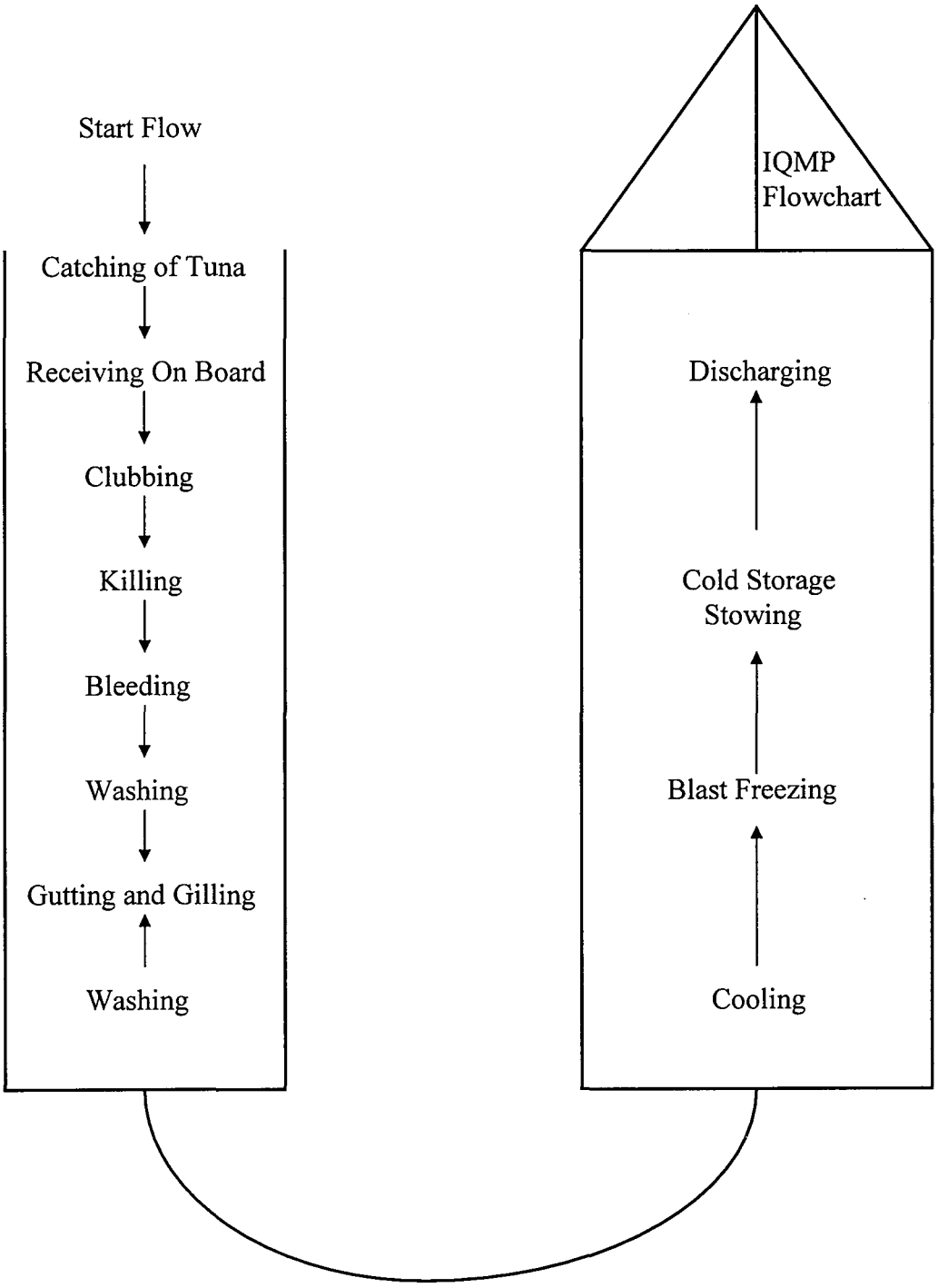
1. Remove fish from hook as soon as possible after hooking.
2. Gaff tuna carefully through the lower jaw, or the use of a Tuna Missile is also recommended.
3. Eliminate struggling by clubbing the fish properly.
4. Handle the fish quickly and carefully at all times.
5. Kill the fish with a spike inserted in the brain as soon as it is on board.
6. Bleed the fish immediately after killing.
7. Wash the fish after bleeding.
8. Gut and gill the fish following bleeding.
9. Wash the fish properly after gutting and gilling.
10. Start chilling as soon as possible.
11. Properly ice the fish in fish hole.
12. Core temperature of fresh tuna must be kept at 0°C.
13. For tuna that is frozen on-board, the core temperature should be at least -60°C.
14. The cold storage area for the tuna frozen on-board should be maintained at -50°C or below.

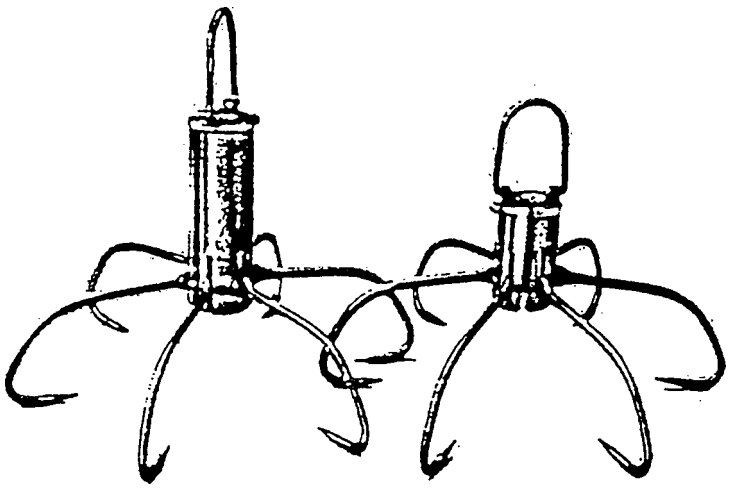
FLOWCHARTS FOR THE ON-BOARD HANDLING OF FRESH AND FROZEN TUNA

Annex 1.1 Flowchart for On Board Handling of Fresh Tuna



Annex 1.2 Flowchart for On-Board Handling of Frozen Tuna





Tuna Missile

Diagrams of
Proper Handling Procedures and Descriptions

Taken from: Nakamuna, Robert M, et. al.
The Management of Yellowfin Tuna
in the Handline Fishing Industry of Hawaii:
A Fish-Handling Handbook.
University of Hawaii Sea Grant College Program (1987)
UNIHI-SEAGRANT-AR-88-01

Note: To handle tuna head-on, follow steps 1 through 14
as shown in figures 1 to 18.

Note: To head tuna, follow steps 1 through 5
as shown in figures 22 to 24.

LANDING THE FISH

Run-Fight Time

More runs after hookup mean longer fight time and an increased chance of BTS occurrence. To reduce this possibility, the number of runs should be minimized and tuna should be landed as rapidly as possible -- ideally within 6 minutes of hookup.

Gaffing

The best place to gaff a fish is through the lower jaw (Figure 1) because it is strong enough to support the fish when lifted. Also, a gaff through the jaw makes it easy to position the fish for stunning. Gaffs should not be made through the body or heart. A gaff through the body reduces the value of the fish, and an accidental gaff through the heart ruins the chances for proper bleeding.

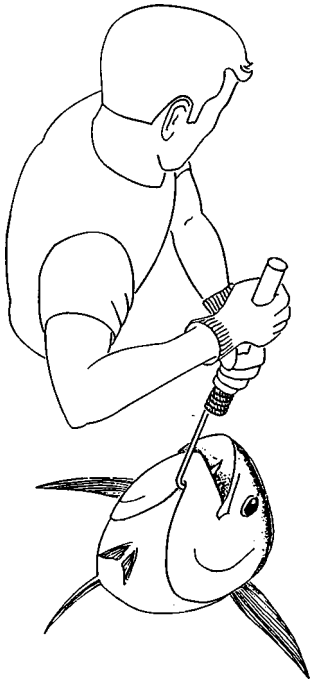


Figure 1. Gaff the fish through the lower jaw.

Stunning and Killing

Longer struggling time results in increased body temperature, bruising, scale loss, and muscular contractions. Fish should be stunned and killed as quickly as possible. The best place to club a fish is on the soft spot. The soft spot, which is whitish in colour, is located on the mid-dorsal line just above the eyes (Taniguchi, 1977). The brain is located slighted behind the soft spot.

- Stunning

Fish should be stunned by clubbing immediately after gaffing or as soon as they are brought on board. Clubbing can be accomplished with a bat, mallet, or lead-filled steel pipe (Figure 2).

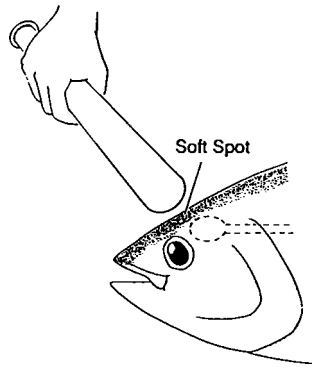


Figure 2. Stun the fish by clubbing the soft spot between the eyes.

- Killing

Sometimes stunning only temporary renders the fish unconscious. Fish that appear to be dead can recover and start to thrash in the fish box. To prevent this, the fish should be killed immediately after stunning by destroying the brain. Three techniques are described below. When properly executed, the fish will shudder once, become limp, and die.

The first technique involves the use of a sharp probe such as an ice pick or a screwdriver. These are simple tools which can be used to quickly and easily kill the fish (Figure 3).

Step 1 Place a sharp probe on either side of the soft spot.
Step 2 Pierce the skin, and then push the probe down until the skull is reached.
Step 3 Apply downward pressure on the probe, and then slide it backward in the direction of the tail until you reach a thin cartilaginous plate at the base of the ridge. The plate will collapse, and the probe will sink about 1 inch deeper into the brain.
Step 4 Move the probe back and forth to destroy the brain.

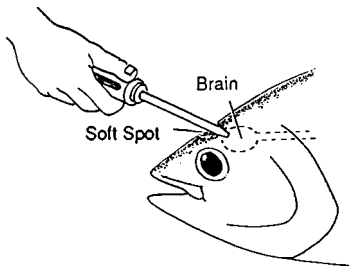


Figure 3. Destroy the brain on either side of the soft spot using an ice pick of screwdriver.

Another killing techniques involves the use of the Taniguchi tool (Figure 4). Developed in Japan by Dr. H. Taniguchi (1997) and used mainly on longline fishing vessels, this tool consists of a short metal tube and a rod. A welding rod or flexible plastic rod may also be used.

Step 1 Bore a hole into the fish's brain at the soft spot.
Step 2 Force the rod through the tube, into the brain, and down the hollow core of the spinal canal to destroy the spinal cord.

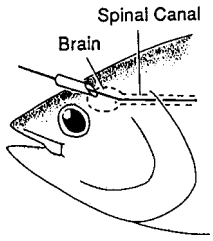


Figure 4. Insert the metal tube through the brain, followed by the rod into the spinal canal to destroy the spinal cord.

A third technique used to kill fish involves the use of a hacksaw and rod (Figure 5). A sharp knife may be used in place of a hacksaw.

Step 1 Using a hacksaw, cut a wedge from the area over the soft spot to the base of the eyes.
Step 2 Remove the wedge to expose the brain.
Step 3 Insert the rod through the brain and into the spinal canal to destroy the spinal cord.

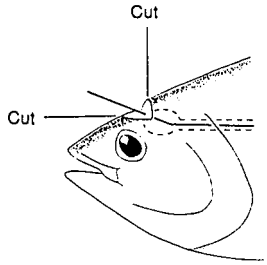


Figure 5. Cut a wedge over the soft spot to expose the brain, and then pass a rod through the brain into the spinal canal.

CLEANING THE FISH

Bleeding

Fish should be bled for 5 minutes immediately after killing. Removal of the "hot" blood allows the fish to cool more rapidly. When heart, which continues to function even after the brain is destroyed, must be kept intact in order for it to pump the blood out of the fish. Three methods for proper bleeding are given below.

- Pectoral Cut

  To make the pectoral cut, a short, narrow knife roughly 2 inches long by 1/2 inch wide should be used since the blood vessels (subcutaneous artery) lies no more than 1 inch below the skin surface of the fish. A sharpened oyster shucker or any other similar-sized knife is ideal. The knife should be kept extra clean to prevent bacteria - which may contribute to accelerated spoilage - from being introduced into the fish.

  Step 1 Locate a spot the width of three fingers behind the base of the pectoral fin and about 1/4 inch below the lateral median line which extends along the side of the fish (Figure 6).
  Step 2 To sever the blood vessel, make a 1 to 2 inch cut, 1 inch deep, from the spot towards the base of the pectoral fin.
  Step 3 Make this cut on both sides of the fish.
  Step 4 To drain the blood from the fish, position it's head down, on an incline. Shoot water on the fish to prevent blood clot.

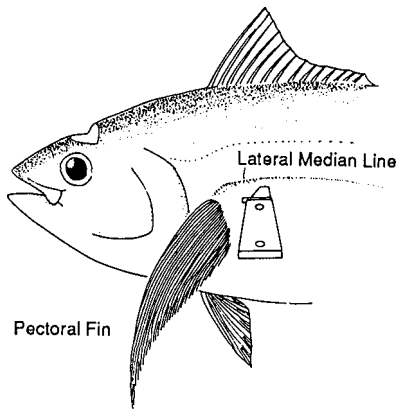


Figure 6. Bleed fish by cutting behind the pectoral fin.

- Gill Cut

  Step 1 Position the fish so that it is lying on its side.
  Step 2 Pull open one side of the gill cover, and then insert a knife behind the gills through the membrane (Figure 7).
  Step 3 Cut upwards towards the spine to sever the blood vessels, being careful not to stab the heart.
  Step 4 Make a cut on both sides of the fish.
  Step 5 To drain the blood from the fish, position its head down, on an incline. Shoot water on the fish to prevent blood clotting.

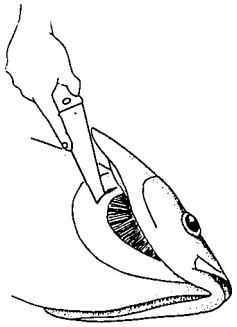


Figure 7. Bleed fish by cutting blood vessel at top of gills.

- Tail Cut

Step 1 Cut the blood vessel vertically between the third and fourth dorsal finlet (see appendix) from the tail (Figure 8).
Step 2 Make cuts on both sides of the fish, or remove the tail completely.
Step 3 Drain the blood from the fish. Shoot water on the fish to prevent blood clotting.

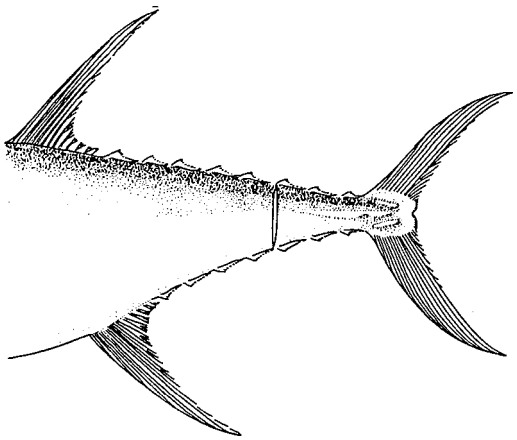


Figure 8. Bleed fish by cutting tail.

Gutting and Gilling

Removing the internal organs and gills is another way to cool the fish faster to prevent spoilage and bacterial growth which can cause BTS. Also, a gutted, gilled fish can be processed faster and handled less at the market. Female and very large fish should be handled more quickly - but carefully - since they are prone to a greater incidence of BTS. Although tuna smaller than 80 pounds rarely develop BTS, those weighing as little as 5 pounds have been observed with this condition.

The sex of the fish can be determined by the presence of testicles of ovaries. During the spawning season - from May to October - the male testicles are smooth, elongated, and noticeably white in appearance; the female ovaries are elongated, rough in texture, and yellow to orange in colour, and their surface is lined by prominent veins.

Fish can be gutted and gilled with the head on or off. Both approaches are given below.

- Head-on Approach

Step 1 Make a straight, 4 inch slit in the belly, cutting towards the anus (Figure 9).

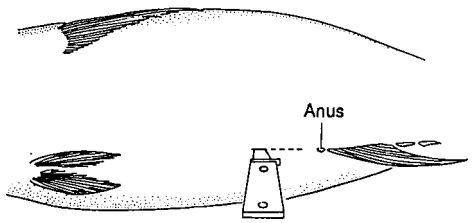


Figure 9. Insert knife 4 inches in front of the anus, and then cut towards it.

Step 2 Reach into the cavity and pull out the intestines attached to the body wall. Cut the intestine near the anus (Figure 10).

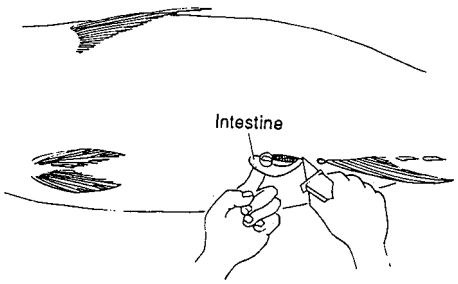


Figure 10. Cut the intestine near the anus

Step 3 Pull one gill away from the body. Then insert a knife at the top of the gill and slide towards the eye. Make this cut on both sides of the fish (Figure 11).

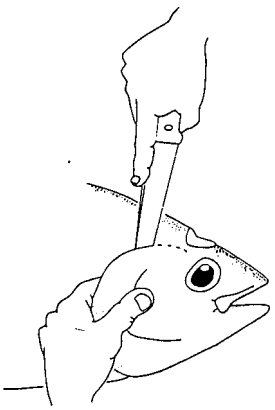


Figure 11. Insert knife at the top of the gill cover and slide it toward the eye.

Step 4 Pull the gill cover back, reach inside the cavity with a knife, and then cut the main muscle attaching the gill cover to the head. Make this cut on both sides of the fish to allow easier access to the gills, which needs to be removed (Figure 12).

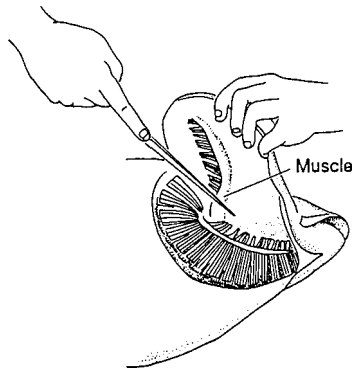


Figure 12. Cut the main muscle attaching the gill cover to the head.

Step 5 Cut the lower end of the gill-to-head attachment and not the entire connection of the lower body to the underside of the mouth (Figure 13). If you cut the entire connection, unequal pressure exerted by muscle stiffening will lower the quality of the fish in two ways. First, it will cause the head to lift up and bend backwards, distorting the shape and appearance of the fish. Second, this unequal pressure will cause tearing and gaping of fillets.

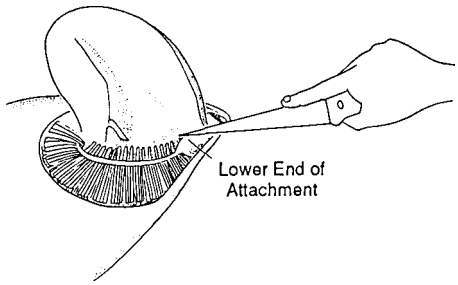


Figure 13. Cut lower end of gill-to-head attachment.

Step 6 Pull one gill cover from the body, and then cut through the membrane behind the gills. Extend the cut through the kidneys as far back and as close to the backbone as possible. Bring the cut down each side of the gill openings. Make this cut on both sides of the fish (Figure 14).

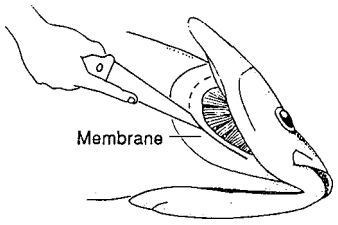


Figure 14. Cut through the membrane behind the gills.

Step 7 Pull one gill cover away from the body. Insert a knife under the gills, close to the spinal column, and cut the upper end of the gill-to-head attachment. Cut on both sides of the fish, and then free gills from the head.

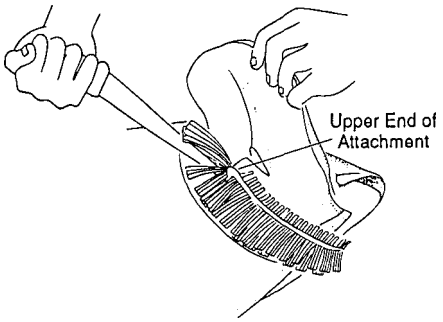


Figure 15. Cut upper end of gill-to-head attachment.

Step 8 Pull open gill cover, and then grab the lower end of the gills. Pull and remove the gills and guts. Remove any remaining attachments (Figure 16).

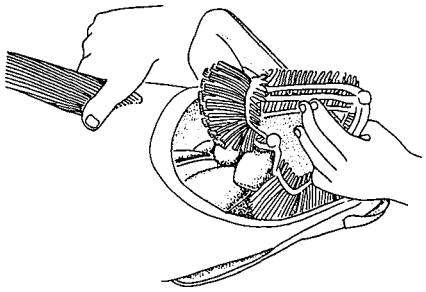


Figure 16. Remove gills and guts and any remaining attachments.

Step 9 Remove the gonads from the cavity by sliding your hand under them and tearing the membranes anchoring them to the stomach.

Step 10 Pop the air bladder.

Step 11 Remove as much of the kidney and coagulated blood as possible from the backbone. Scrub the area with a stiff wire or nylon brush until spine becomes white (Figure 17).

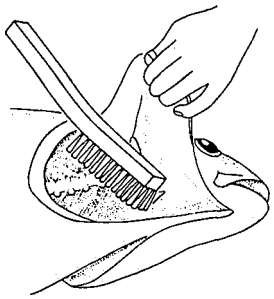


Figure 17. Scrub spine through gill openings to remove the kidney and coagulated blood.

Step 12 Remove as much loose skin and hanging attachments as possible from the bone within the gill openings.

Step 13 Remove the membranes from inside gill cover (Figure 18).

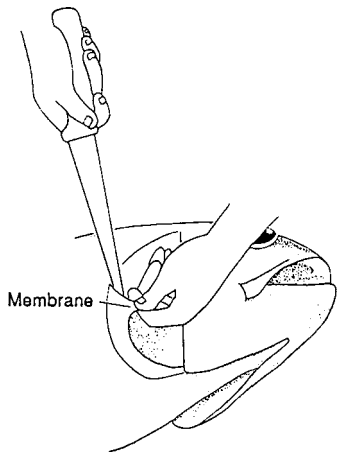


Figure 18. Trim the membranes lining the gill collar.

Step 14 Rinse fish with chilled water and wash away slime from the outside of the skin.

Step 15 Remove all fins, and even the tail, if desired (Figures 19 and 20).

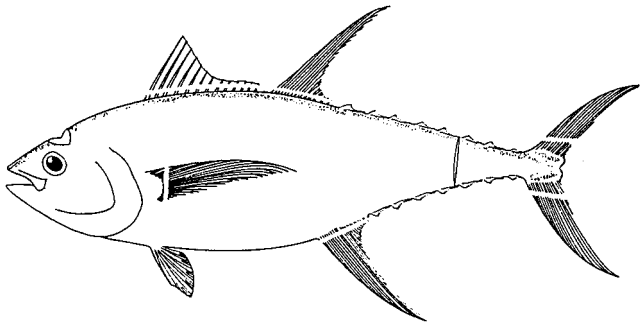


Figure 19. Remove all fins.

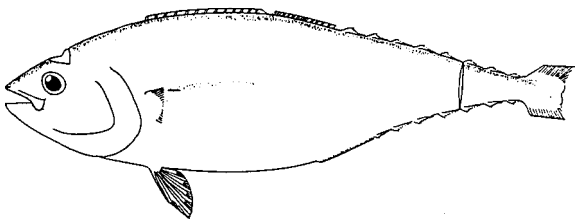


Figure 20. Gilled, gutted fish with head on and fins removed.

Step 16 Optional. For easier processing, cut off a portion of the gill cover for better access to the gills and guts. Either use a saw or bend the gill plate back until it snaps in half, and then cut along the crease with a knife (Figure 21).

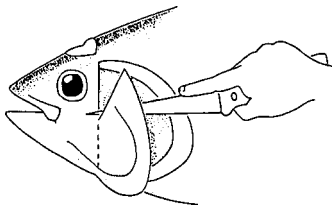


Figure 21. Saw off the gill cover or fold it back and cut along crease.

- Head-off Approach

With the head-off approach, a part or all of the head is sawed off and the gills and guts are removed with the head. The procedure is as follows.

Step 1 Remove the head by sawing straight down behind the eyes (Figure 22).
Step 2 Alternatively, insert the saw behind the gill cover and saw at an angle towards the snout. Make this tapered cut on both sides of the fish (Figure 23).

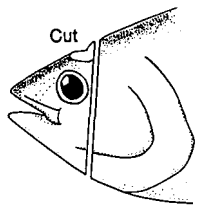


Figure 22. Saw straight down behind the eyes to remove the head.

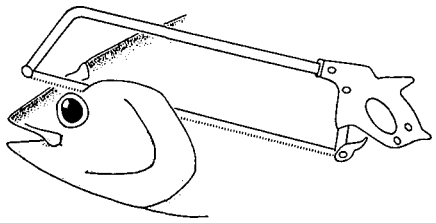


Figure 23. Saw towards snout from behind the gill cover on both sides of fish to achieve a tapered cut.

Step 3 For gutting and gilling instructions, follow steps 1, 2 and 6 through 13 in the head-on approach section.

Step 4 Rinse fish with chilled water and wash away slime from the outside of the skin.

Step 5 Remove all fins, and even the tail, if desired (Figure 24).

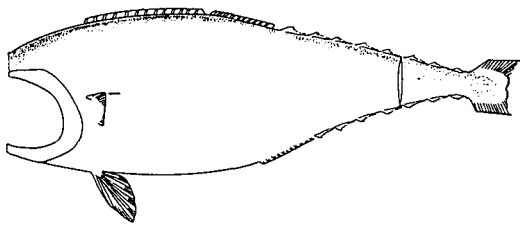
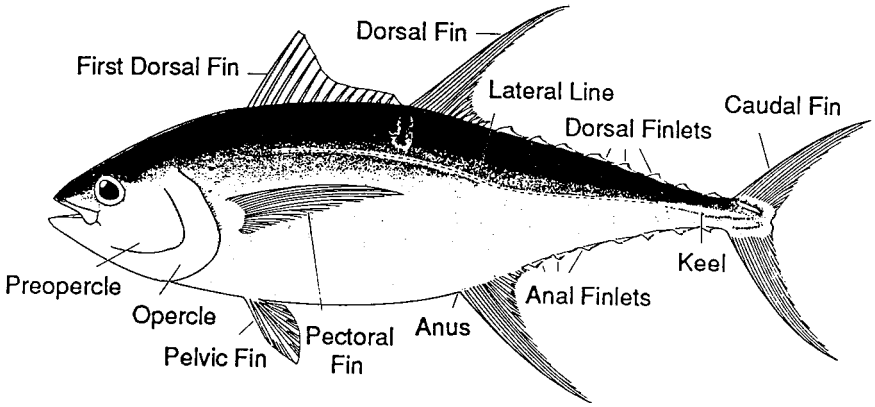
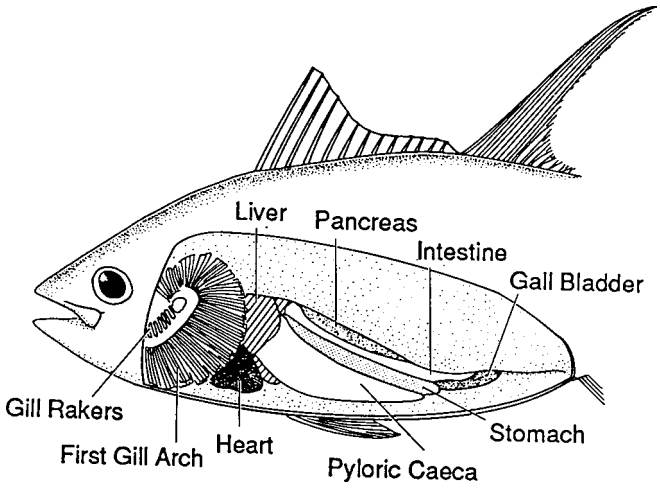


Figure 24. Gilled, gutted fish with head and fins removed.



External Anatomy of Yellowfin Tuna



Internal Organs of Yellowfin Tuna

SECTION 2

AN INTEGRATED QUALITY MANAGEMENT PROGRAM (IQMP) FOR THE ON-BOARD HANDLING AND PROCESSING OF TUNA

2.1 INTRODUCTION

Due to the rising concerns by the different countries of the world, there will have to be in the very near future requirements to have in place an adequate safety assurance program for the on-board handling of fresh/frozen tuna. Vessel owners/operators will have to show in writing the procedures that they are using to identify hazards associated at each point in the processing operation of the catching, handling, storage of tuna; which points are critical control points; and the preventive measures they are taking to assure that the safety of their product is guaranteed.

A number of quality control systems exist to ensure the above, the best known is the Hazard Analysis and Critical Control Point (HACCP) system. This system, while an international standard, is a narrowly defined food safety system that requires a number of pre-requisite requirements and does not deal with quality or economic fraud. A more comprehensive program, which incorporates HACCP, its pre-requisite requirements, regulatory requirements, and market requirements, is the Integrated Quality Management program (IQMP).

The IQMP specifies a number of generic areas or control points where hazards may occur. Each of these areas must be examined to see if there is a control point or critical control point in the process in that area. Annex 4 gives the definitions used in this manual to describe "control points" and "critical control points", etc.

Vessel owners/operators should conduct a study of their operation using the IQMP as a guide, incorporate the IQMP into their quality control programme and submit this programme to the competent authorities for approval.

2.2 ESTABLISHMENT OF CONTROL POINTS OR INSPECTION POINTS

As part of GMP procedures, fishing vessel owners/operators should implement planned procedures for the monitoring of their operations at Control Points or Inspection Points where problems are noted. Detection of problems at the earliest opportunity allows the problems to be related to the factors that caused them and permits the most effective approach to correct them.

Control or Inspection Points represent the last opportunity before any other processing takes place with the tuna to evaluate compliance with requirements and take corrective action where necessary.

For each Control or Inspection Point the following information must be specified:

1) The requirements that are being complied with.
2) The standard that is being employed during inspection.
3) Evaluation of the monitoring procedures.
4) The system for collection data and record keeping.
5) Description of the corrective action that will be implemented when problems are discovered.

There are 11 areas in the on board handling operation of tuna that are required to be examined at control or inspection points to ensure compliance with GMP requirements. They are discussed as the following sections:

Fish	2.3
Ice	2.4
Cleaning Agents, Sanitisers, Lubricants	2.5
Vessel Design, Production Facilities	2.6
Operation & Sanitation	2.7
Process Control	2.8
Fresh Storage Facilities	2.9
Frozen Storage Facilities	2.10
Final Product	2.11
Recall Procedures	2.12
Employee Qualifications	2.13

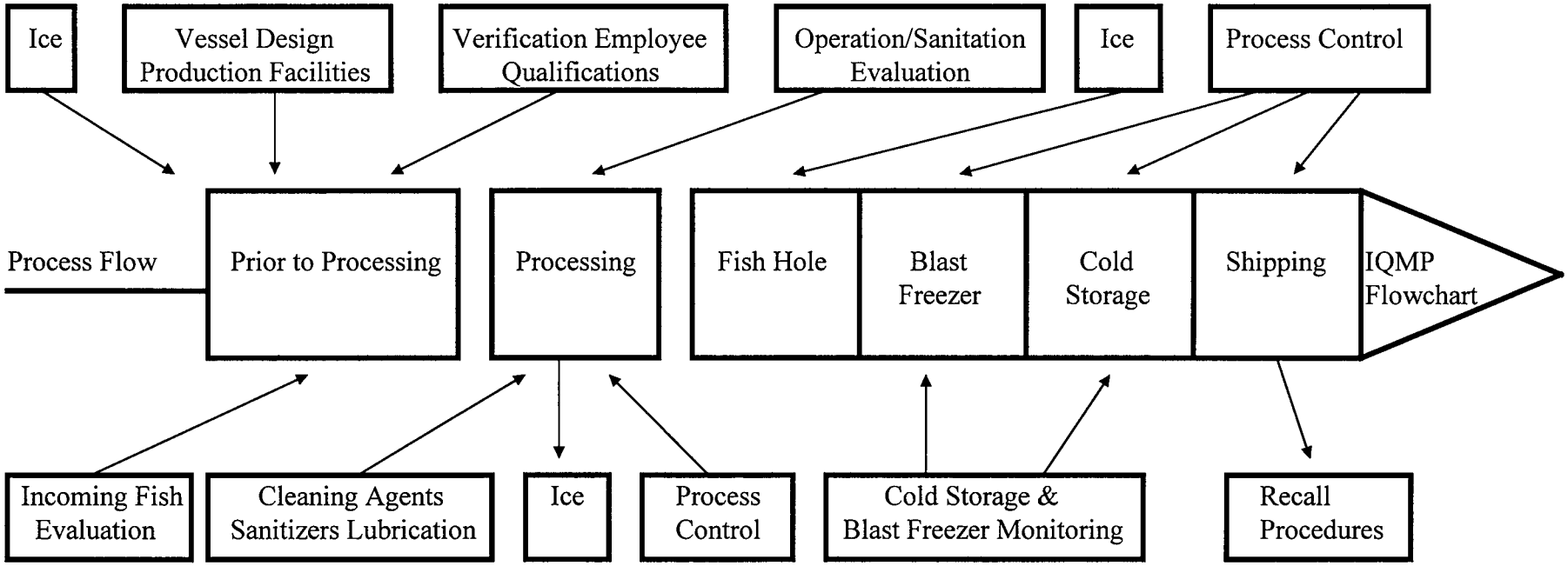
In establishing the Control or Inspection Points for the on-board operation of tuna, each owner must understand what hazards they are attempting to prevent and the location whereby an inspection or control procedure will provide the best opportunity to control the hazard.

A flow chart and table are found in sections 2.2.1 and 2.2.2. They provide an overview of where inspection or control points for each item may be established.

Section 2.2.3 is a form for setting up an individual IQMP program.

Annex 5 provides specific information regarding the potential critical control points for the on-board handling of fresh/frozen tuna.

2.2.1 Process Flowchart for Inspection or Control Points



2.2.2 Potential Inspection/Control Points

ITEM	HAZARDS	CONTROL POINTS
Fish	Health & safety risks tainted, decomposed, unwholesome tuna dead, non-compliance	Prior to processing, before catching
Ice	Contamination of tuna unsafe, unclean	Prior to use when received, during use
Cleaning Agents Sanitisers	Contamination of tuna with unapproved unsafe chemicals	Prior to use, when received, during application
Vessel Design Production Facilities	Contamination to tuna due to poor design of vessel	Prior to fishing, during fishing
Operation & Sanitation	Contamination to tuna due to poor operation & sanitation practice	Prior to catching, during operation, daily inspection
Process Control	Production of tuna that don't comply with safety quality, wholesomeness &/or fair trade requirements	During operation -washing, cleaning, cooling, icing, &/or freezing
Fresh Storage Facilities	Decomposition or contamination of tuna due to poor storage	During operation of fish hole
Frozen Storage Facilities	Decomposition or contamination of tuna due to poor storage	During operation of blast freezer/cold storage
Final Product	Production of tuna that does not comply with safety, quality & wholesomeness & fair trade requirements	Prior to unloading of fresh/frozen tuna
Recall Procedure	Unable to trace tuna to processor	During unloading, shipping
Employee Qualifications	Production of tuna posing health & safety risk	Prior to start up skilled fishery Personnel

2.2.3

IDENTIFICATION OF CONTROL POINTS

Type of Operation: _____

Check off those items which will be mentioned at a control point and identify where/when the point of time the inspection will occur.

ITEMS	POINT OF TIME OF INSPECTION
Fish	_____
Ice	_____
Cleaning Agents, Sanitisers Lubricants	_____
Vessel Design, Production Facilities	_____
Operation & Sanitation Process Control	_____
Fresh Storage Facilities	_____
Final Product	_____
Employee Qualifications	_____

Refer to the section indicated for completion of those control points that have been checked off.

2.3 FISH

2.3.1 Requirements

Under GOOD MANUFACTURING PRACTICES the following requirements are to be followed by the fishing vessel owner/operator, and crew.

1) No person shall take on board the fishing vessel any tuna that is decomposed, tainted or unwholesome.
2) When tuna is taken aboard the vessel it is required to be bleed properly.
3) After bleeding, the gut material must be removed. No tuna is to be kept on board of fishing vessel without being properly gutted and washed.
4) The gills from all tuna are to be removed properly.
5) Tuna should be placed in an insulated container containing two parts clean safe ice and one part clean safe salt water. The tuna should remain in this tank until the core temperature reaches 0°C.
6) After chilling, tuna intended for the fresh market must be placed into the fish hole. The belly of the tuna must be packed completely with good clean ice. The exterior skin must be completely covered with tuna paper to protect the outer surface.
7) After chilling, tuna destined for freezing must be placed in blast freezer either suspended by the head or placed flat with head first into blast air flow.
8) Every vessel is required to keep a record of each day's catch. The information that is required is as follows:

    A) The areas that were fished during the trip.
    B) The number of fishing hooks used or lines used each day.
    C) The number of live tuna landed each day.
    D) The number of dead tuna landed each day.
    E) The number of discard tuna for each day.
    F) The number and kinds of other fish caught while fishing tuna, for each day.
    G) There must be a fish hole chart showing the list of each day's catch, where they are stowed in the hole so as to ensure that the oldest tuna can be kept separate from the fresh tuna.
    H) There must be a log showing the monitoring of the temperature of the tuna as it is being placed in the fish hole. Also there must be a log to show the temperatures of the frozen tuna being removed from the blast for storage in cold storage.

Any equipment that is used in the processing of tuna that is damaged or can cause any damage or contamination to the tuna, cannot be used.

All fish handling equipment such as knives, chutes, fish conveyors, fish washers, tables and utensils, shall be of smooth, non-absorbent, non-corrodible materials. If wood is to come in contact with the tuna, it must be free from cracks and crevices and constructed in such a manner that it can be properly cleaned.

The contact surface of the fish hatch must be properly constructed so as it is of proper size. The contact surface in the fish hole must be properly insulated.

Both the fish hole surface and the fish hole hatch must be properly constructed of a smooth surface, free from cracks and crevices and made of non-corrodible material.

Only clean safe salt water is to be used in the washing and cleaning of tuna. Fresh water is not to be used due to the fact that if used, it will cause bleaching of the skin.

After the removal of the gut material from the fish, it is to be discarded immediately. It is not to be left around the tuna due to the fact that it can cause contamination to the fish.

Any area aboard the fishing vessel that can come in contact with the tuna must be of a smooth surface and kept in a clean and sanitary condition.

Fishing vessels must have a proper overhead canopy in place so as to protect the tuna from direct contact with the sun.

2.3.2 Defect Deficiency

A tuna which is taken on board in whole state is considered defective if there is any trace of fuel oil or other critical contamination of the flesh odour which is indicative of decomposition or taint.

Critical contamination is the presence of any material or distinct and persistent odour or flavour of any material which has not being derived from fish and which poses a threat to human health.

Tuna which is not bled, cleaned or chilled properly can also become a defect fish.

2.3.3 Monitoring Procedures

The following procedures shall be used in determining the condition of the tuna:

- Each tuna is examined for contamination by fuel oil or other critical contamination source likely to be a threat to human health at time of taking the tuna on-board.

- In regards to dead tuna that are taken on board at time of catching, these fishes must be inspected to see that there are no contamination arising from the fish being dead. When these fish have being dressed the belly section must be inspected to ensure that the fish is still fit for human consumption.

- Dead tuna after being processed aboard the vessel must be marked and separated so as when product is landed, it can be reinspected by the receiving plant.

2.3.4 Corrective Action

When there is a problem with the tuna there should be a corrective action report filled out describing the problem and what action has been taken. An example of a Corrective Action reporting form is found in 2.3.6.

The fishing vessel will identify the position responsible for taking corrective action and the position responsible for ensuring that the corrective action was carried out. If the vessel owner wants to use its own forms it must provide an example of the forms that will be used to record the corrective action.

For each instance of non-compliance the fishing vessel must have a record of the corrective action that took place and that the records must provide the following information:

- A description of the non-compliance item
- The date the non-compliance item happened
- The date the corrective action took place
- What corrective action was taken
- The outcome
- The signature of the person responsible

2.3.5 Inspection of Tuna As it is Being Taken On board

During the catching and taking on board of tuna an inspection of the overall appearance should be done. Section 2.3.7 contains an example of an inspection of landing report and Section 2.3.8 is the information to be supplied by the fishing vessel.

2.3.6

CORRECTIVE ACTION REPORT

Date: _____ Area Affected: _____

Description of the Problem with the Tuna:

_____

_____

_____

_____

Show Action Which Has Being Taken to Correct the Problem:

_____

_____

_____

Date Problem Solved: _____

Current Status: _____

Vessel Owner: _____

Inspector: _____

This report must be filled out when there is a problem that is affecting the quality of the tuna.

This report must be kept to show whether there was a problem and what was done to correct the problem.

2.3.7

INSPECTION OF TUNA AS IT IS BEING RECEIVED ON-BOARD VESSEL

Date: _____ Name of Vessel: _____

Area Fished: _____ Type of Fishing Gear: _____

Species: _____

Outer Appearance of Fish: _____

Any Odours: _____

Fish Live: _____

Fish Dead: _____

Condition of Belly of Fish: _____

Temperature of the Fish: _____

Any Noticeable Contamination: _____

Fish Pass: _____

Fish Fail: _____

Any Comments to the Condition Which is Not Listed on this Sheet:

_____

_____

_____

_____

_____

Inspected By: _____

2.3.8

INFORMATION TO BE SUPPLIED BY FISHING VESSEL

Type of Fishing Operation: _____

Requirements

We will meet good manufacturing practices for the on board handling of tuna as outlined in this manual. _____

Or

We will provide our own company requirements that will meet or exceed those supplied in the GMP. _____

Defect Definitions and Defect Tolerances

We will utilise the defect definitions and defect tolerances as described by fisheries for the handling of whole dressed tuna which is being presented in this document.

_____

Or

We will provide our own company defect definitions and tolerances that meet or exceed those supplied by the GMP. _____

Monitoring Procedures

We will implement the level of monitoring as specified in this document. _____

Or

We will provide our own company monitoring procedures that meet or exceed those supplied by in the GMP. _____

Forms for data collection and inspection reporting

We will utilize corrective action sheet and the raw inspection form supplied in this manual. _____

Or

We will provide our own company reports for corrective action and the raw inspection reports that meet or exceed those supplied by in this document. _____

If the fishing vessel is going to supply its own report forms for any of the above mentioned reporting forms it must present a copy of the forms that it will be using to the appropriate authorities.

Name of vessel owner/operator: _____

Date: _____

2.4 ICE

2.4.1 Requirements

Only ice that is made from clean safe water can be used for the chilling and icing of tuna aboard a fishing vessel.

Only properly crushed ice should be used when icing the tuna. Wherever possible block ice should be crushed in a proper crushing machine before placing aboard the vessel.

2.4.2 Ingredients

The only additive permitted in water for making ice is chlorine. The amount of chlorine when tested in water should not exceed 10 parts per million (ppm).

2.4.3 Defect Definitions

Ice which is not clean or safe is not permitted to be used in the chilling of or the icing of tuna.

Ice which has come in contact with contamination can not be used in the production of tuna.

Ice which has a sharp edges or large pieces of ice should not be used in the icing of tuna.

It is not permitted to reuse ice that has already being used for previous production. Ice which has being transported to the fishing vessel in an unsanitary truck or in unclean containers is not acceptable.

2.4.4 Monitoring

The fishing vessel will describe how it ensures that the ice which they use will be only ice that is approved and uncontaminated. The fishing vessel will describe how it ensures that the ice is stored in a proper protected insulated fish hole free from any safety risks whereby the ice can cause damage to the tuna.

2.5 CLEANING AGENTS, SANITISERS, LUBRICANTS

2.5.1 Requirements

Only cleaning agents, sanitisers, lubricants which have been approved for food grade can be used in the cleaning of the equipment, fish hole and any area that the tuna will come in contact, during the operation of fishing.

It is the responsibility of the owner/operator of the fishing vessel to ensure that the compounds meet the requirements.

2.5.2 Specifications

The fishing vessel must maintain a list of all cleaning agents, sanitisers,

lubricants, and any other chemicals that are to be used in the on-board operation. The list must include the specifications for each chemical used and what and where they are used.

2.5.3 Monitoring Procedures

The fishing vessel owner/operator is required to provide the proper procedures for ensuring that only approved chemicals are used in the cleaning of the vessel.

2.5.4 Forms for Data Collection & Reporting

The fishing vessel must complete forms showing that incoming chemicals are approved. Examples of the forms to be used are found in Sections 2.5.6 and 2.5.7.

2.5.5 Guidelines for Corrective Action

The fishing vessel must show what action is taken to remove unapproved chemicals from the vessel.

2.5.6

INCOMING CHEMICAL INSPECTION REPORT

Date: _____

Type of Chemical: _____ Supplier: _____

What it is to Be Used For: _____

Brand Name: _____

Manufacturer: _____

	Yes	No
Has the chemical being approved?	_____	_____
Are the containers safe?	_____	_____
Are the chemicals protected from contamination?	_____	_____
Do the chemicals meet the company specifications and requirements?	_____	_____

If there is a problem, then list the action that will be taken to eliminate any problems:

_____

_____

_____

This inspection report is to be completed for each chemical which is to be used in the onboard handling for tuna.
This form when completed is to be signed and kept on file for future reference.

Inspected by:_____

2.5.7

INFORMATION TO BE SUPPLIED BY THE FISHING VESSEL OWNER/OPERATOR

Type of Fishing Vessel: _____

The Owner/Operator of the fishing vessel agrees that the requirements as specified in this document regarding the use of cleaning agents, sanitisers & lubricants will be met.

Items Used:

The fishing vessel will keep a list of all chemicals used on-board the vessel for the maintenance of equipment and fish facilities. This list will show all the information which has being identified in this report and will have available for inspection on request.

Monitoring Procedures:

The fishing vessel will show what procedures it will implement to ensure that only approved chemicals are used in the process for the on-board handling equipment which is used for the tuna operation.

_____
_____
_____
_____
_____
_____

Name of Company Official: _____

Date : _____

2.6 VESSEL DESIGN, PRODUCTION FACILITIES

2.6.1 Requirements for Vessel Design

The requirements that a fishing vessel must meet to be able to fish for fresh/frozen tuna.

The deck area used for the handling of tuna must be constructed of a smooth surface, free from cracks and crevices and made of non-corrodible material. The deck area must not have any areas that can cause contamination to the tuna.

Materials which are used when tuna is being placed on the deck area must be kept clean and safe. Any materials which can cause damage or contamination to the tuna are not permitted to be used.

The fish hole hatch must be constructed in the proper manner. The hatch should have a proper opening which is properly constructed of a smooth surface free from cracks and crevices and non-corrodible material. A hatch which is made of wood must be protected with a smooth covering so as to protect the skin and flesh of the tuna when either being placed in the hole, or being removed from the hole.

The fish hole itself, must be constructed of a smooth surface, free from cracks and crevices, and made of non-corrodible material. The fish hole must also be well insulated to protect the tuna from the heat. If the insulation is to come in direct contact with the fish, then it is to be made of only proper approved insulation. This insulation cannot have any chemicals which can cause contamination or harm to human beings.

Fishing vessels which have a REFRIGERATED SEA WATER SYSTEM on board: are required to have fish holes that are completely watertight. They are required to have the proper system to control the temperature of the water and the fish. The temperature of the fish must be maintained at 0°C at all times.

Fishing vessel which have a FREEZING ON-BOARD SYSTEM: are required to have a proper freezing system aboard to ensure that the core temperature of the tuna is lowered to a temperature of -60°C within 8 hours or less, and that the cold storage room air temperature can be maintained at -50°C or below.

Fishing vessels which store the tuna in ice in the fish hole are required to have proper insulation and a pumping system in a place, so as to ensure that the fish hole is being properly pumped at all times.

The fish hole must be constructed in a manner whereby there is no risk that any BILGE WATER can come into the fish hole. If this were to happen, it can cause the tuna to become contaminated.

There must be in place a canopy to protect the tuna from direct contact with the sun.

2.6.2 Production Facilities

All vessels for fishing of tuna are required to have on board a properly insulated container for the cooling process. This container is to be constructed of a smooth surface, free from cracks and crevices and made of non-corrodible materials.

All fish handling equipment such as chutes, fish conveyors, fish washers, tables and utensils for processing, shall be of smooth, non-absorbent, non-corrodible materials. No equipment can be constructed whereby it can cause contamination to the tuna.

2.6.3 Corrective Action

Any vessel must identify what action is to be taken if there is a problem whereby it can cause the following results:

A) If there is a deficiency which can result in the production being not of acceptable quality.
B) If there is a threat to the health and safety of the consumer.
C) If there is a problem which prevents proper sanitation aboard the vessel.
D) If the problem can cause the tuna to become tainted, decomposed or unwholesome.
E) If the problem inhibits the general sanitation of the vessel.

The fishing vessel's owners/operators must identify if any of the above-mentioned problems exist, and identify who will take the corrective action. What system is to be used, and who is responsible for taking this action. The vessel must ensure that if there is a problem, which can cause any deficiencies of a critical nature to the tuna must be willing to provide the proper action to protect the tuna.

2.6.4 Guidelines for Corrective Action

The fishing vessel's owner/operator must identify the person responsible for taking the corrective action and ensure that the corrective action has been carried out.

The vessel must show a record that has been taken showing what has happened. The record should show for each instance of non-compliance, the following information is recorded:

- A description of the non-compliance item.
- The date the non-compliance item occurred.
- The date the corrective action was taken.
- What action was taken and what was the outcome.
- The signature of the person responsible.

2.7 OPERATION & SANITATION

2.7.1 Requirements

The owner of the fishing vessel for the catching, processing and holding of tuna is required to ensure that there is no contamination present on board the

vessel.

The owner must ensure that the fishing vessel meets the regulations that are required by the authorities having jurisdiction.

The fishing vessel's owners/operators must provide assurance that the fishermen who come in contact with the tuna do not directly or indirectly contaminate the fish. The vessel owners must have a training program in place for the fishermen to show what can and will happen when they do not follow the requirements for the proper handling of the tuna.

The fishermen should report any medical conditions which may present a health and safety risk to the production of the tuna. This would also include being a carrier of a disease which can likely be transmitted through food or while having infected wounds.

2.7.2 Inspection of Vessel

The owner is required before each trip commences to ensure that the proper cleaning and sanitation is completely aboard his vessel. They are required to complete a form showing at the commencing of each trip that their vessel meets the requirements. They must show the critical control points in the operations and what action will be taken for any deficiencies that can occur.

2.7.3 Forms for Inspection

It is recommended that the owners either accept the forms listed in this manual or show to the authorities what type of forms they intend to use. A copy of the forms should be given to the authorities.

The Action Reports 2.7.5 A, vessel fault inspection report is used to record the information and results of the sanitation inspection and to indicate where there is corrective action needed; and the Inspection Report 2.7.5B is used to cover the overall operation for the processing equipment for tuna and also the storage areas.

2.7.4 Guidelines for Corrective Action

The vessel must identify what action is to be implemented for, deficiencies of a critical nature, serious nature, major & minor nature. If deficiencies are of a critical nature, the vessel will not be able to operate till the critical deficiencies are corrected.

2.7.5 Action Reports

A : VESSEL FAULT INSPECTION REPORT

Vessel Name: _____ Date of Inspection: _____

LIST DEFICIENCY	CATEGORY OF DEFICIENCY				ACTION BY
	CRI	SER	MAJ	MIN	

CRI: means that it is critical and action must be taken immediately.
SER: means that it is serious and action must be taken as soon as possible.
MAJ: means that it is major nature and can be corrected within the day.
MIN: means that it is minor nature and can be corrected within several days.

NOTE:
No vessel should operate where there are one or more critical deficiencies or five or more serious deficiencies which have been identified.

DEFICIENCY: means any imperfections or inadequacy in physical facilities, equipment which can cause damage to the tuna.

B: DETAILED VESSEL INSPECTION REPORT

Vessel Name: _____ Date: _____

Type of Fishing Gear: _____

Fresh Tuna Operation: _____

Frozen Tuna Operation: _____

ITEM	OPERATION REQUIREMENTS DEFICIENCY SCORE				DATE FOR CORRECTIONS
	CRI	SER	MAJ	MIN	
Employee Health A. No known carrier					
B. No communicable of sores					
C. No open wounds or sores					
Hand Wash Facilities					
A. Proper washing of hands					
B. Proper disinfection gloves					
Washing of Equipment A. Properly washed and cleaned before and after using B. Properly sanitized					
Ice A. Made of water from approved source free from foreign matter, no contamination B. Properly stored in clean fish hole					

ITEM	OPERATION REQUIREMENTS DEFICIENCY SCORE				DATE FOR CORRECTION
	CRI	SER	MAJ	MIN	
Offal Removal A. Removed immediately					
B. Equipment kept clean					
C. Proper method of disposal					
Utensil Cleaning A. Cleaning and sanitized during processing					
B. Cleaned and disinfected after work					
C. Dried and stored in sanitary manner					
General cleaning and maintenance A. Facilities and equipment in good repair					
B. Facilities and equipped kept clean					
Fish Hole Storage A. Properly cleaned and sanitized					
B. Proper temperature of ice					
C. Proper protection of rise in room temperature					
Cold Storage Area Proper temperature device to record the temperature on a continuous basis					
Frozen Tuna Properly protected from rise in temperature					

If during inspection it is found that there are no defects for an item, then you are to record that it is OK in the are marked Date for Corrections.

2.8 PROCESS CONTROL

2.8.1 Requirements

Tuna is to be properly washed during and after being processed. It is very important that all measures are taken to remove all blood, gut remnants and any foreign material from the tuna.

During washing only fresh safe sea water is to be used in the washing of the tuna. Tuna is to be handled as quickly and as carefully as possible after being taken on-board the vessel.

Tuna is to be properly cooled in slush ice, which is made up of two parts ice and one part water. After properly cooling of tuna, the fish are to be placed properly in the fish hole in ice, or in the blast freezer for freezing.

During the process there must be regular temperature checks done to ensure that the core temperature of the fresh tuna is maintained at 0°C.

In the process of freezing tuna, the core temperature is to be lowered to -60°C within 8 hours or less.

2.8.2 Defects & Deficiencies

The improper or inadequate washing of tuna will be considered a process control deficiency.

The improper cooling of tuna is considered a process control deficiency. The improper icing of the tuna is considered a process control deficiency and the improper freezing of the tuna is also considered a process deficiency.

2.8.3 Inspection Requirements

On a regular or continuous basis, the vessel's designated inspector is required to inspect the tuna during the handling operation to ensure that the washing, cooling, icing and/or freezing is carried out in a proper and safe manner.

2.8.4 Forms for Collection Data

The vessel owner is required to provide examples of the inspection forms they intend to use in recording activities directed towards process control.

2.8.5 Corrective Action

The vessel must identify what action is to be taken when they identified defects, deviations, or deficiencies in the process control.

2.9 FRESH STORAGE FACILITIES

2.9.1 Requirements

The following are the requirements for the proper storing of fresh tuna in fish

storage area:

A) The fish hole must be free from any contamination.
B) The fish hole must be properly insulated.
C) The ice for icing the tuna must be clean and safe.
D) The ice must contain a good low cooling temperature.
E) Only fish and fish products are to be stored in the fish hole.
F) In regard to tuna stored in Refrigerated Sea Water only clean safe sea water with the proper temperature and controls to be used.
G) The core temperature of the tuna must be maintained at 0°C.

2.9.2 Inspection Requirements

The fishing vessel must keep a record of the temperatures of the tuna as they are being placed either in the ice or the refrigerated sea water after cooling.

The fishing vessel must also ensure that the tuna in ice is always covered at all times to ensure that the temperature does not rise.

2.9.3 Corrective Action

The fishing vessel must have in place a corrective action plan so as to prevent the temperature from rising in tuna. If this occurs, it must show what action will be taken and by whom.

A corrective action report should contain the following information:

A) A description of the problem with the temperature.
B) The date that the problem was first noticed.
C) The date the corrective action was taken and what was done to correct the problem.
D) The signature of the person responsible.

2.9.4

FRESH TUNA TEMPERATURE RECOVERING LOG

DATE	TIME	STORED IN ICE	TEMPERATURE

Vessel Name : _____

Start Date of Trip : _____

Finish Date of Trip : _____

Company Official : _____

2.10 FROZEN STORAGE FACILITIES

2.10.1 Requirements

Blast freezers for the on-board freezing of tuna are required to have the proper equipment to freeze the core temperature of the tuna to -60°C within 8 hours or less.

Rooms used for the storage of the frozen tuna are required to maintain an air temperature of -50°C or below.

Rooms for the freezing & storage of the frozen tuna are required to have a proper temperature recorder showing the movement in the temperature.

When tuna is being removed from either the blast freezer or the cold storage the frozen fish shall be protected to minimise the rise in the temperature.

2.10.2 Inspection

The vessel is required to keep a log which shows the temperatures of the frozen tuna.

The temperature recorder must be checked on a continuous basis to ensure that the proper temperatures are being maintained.

2.10.3 Corrective Action

The vessel owner must show what action will be taken when there is a rise in the temperature of the cold storage.

The vessel owner must also show what action will be taken when there is too much delay in freezing the tuna to its proper core.

The fishing vessel will be required to identify the person responsible for taking corrective action and must show what procedure was used. The information should show the following items:

A) A description of the problem with the temperature.
B) The date the problem happened on.
C) The date the corrective action was taken and what was done to solve the problem.
D) The signature of the person responsible.

FROZEN TUNA
COLD STORAGE LOG

DATE	TIME	BLAST FREEZER		COLD STORAGE	TEMPERATURE
		No of Fish	Temp		

Vessel Name : _____

Start Date of Trip: _____

Finish Date of Trip : _____

Company Official : _____

2.11 FINAL PRODUCT

2.11.1 Requirements

No vessel shall attempt to unload any tuna that is tainted, decomposed, or unwholesome or otherwise fails to meet the requirements laid down by the authorities having jurisdiction.

No vessel shall attempt to unload any frozen tuna that was before freezing tainted, decomposed, unwholesome. Frozen tuna whose core temperature is not at -60°C, should be specially marked.

Fresh tuna being discharged from the fishing hole must show the age of the tuna so as to distinguished what market the product is destined for.

Fresh tuna with a core temperature above 0°C must remain in ice as to such time as the temperature of 0°C is attained.

2.11.2 Defect Tolerance

Same as in Section 2.11.1.

2.11.3 Sampling Plan

The sampling will be done by the receiving processing plant.

2.11.4 Corrective Action

The fishing vessel must show what action is to be taken to remove any unacceptable tuna, who will take the action, what system will be used to record the action and what is being done with the unacceptable tuna. The information on the form which is required to be completed by the vessel owner should have the following items listed:

A) A description showing why the tuna was rejected.
B) The number of fish which were unacceptable.
C) The date of unloading.
D) What action was taken to remove the unacceptable product.
E) Where did the unacceptable product be disposed.

2.12 RECALL PROCEDURES

2.12.1 Requirements

All tuna whether they be fresh/frozen being removed from the fishing vessel must have the following information to accompany the fish to the processing plant.

- The date the fish were landed
- The name of the vessel
- The product form the whether fresh/frozen
- The number of fish

- The name of the fish
- The age of the fish whether it is old or new
- The name of the carrier if it is to be transported via truck to the processing plant
- The name of the buyer
- The address of the buyer

An example of this form appears in Section 2.12.4

2.12.2 Monitoring Procedures

The fishing vessel must have in place a procedure so as to identify the tuna which it is shipping to their first destination. It must show that the fish came from their vessel.

2.12.3 Guidelines for Corrective Action

The fishing vessel must show what action it will take if there is required a recall of their product. They must have in writing a system whereby if there is action needed after the tuna has been removed from the vessel and shipped they can properly execute this action. They must have on the form the following information:

- Description of the problem
- The number of fish
- The date noticed
- The date it is corrected
- The outcome when the corrective action was taken and signature of the person responsible for taking the action

SHIPPING RECORD REPORT FOR FRESH/FROZEN TUNA FROM FISHING VESSELS

Date: _____

Name of Vessel: _____

Type of Fishing Gear Used: _____

Product Description: _____

Fresh: _____

Frozen: _____

Name of Fish : _____

Total Number of Fish : _____

The Age of the Old Fish: _____

The Number of the Old Fish: _____

The Name of the Carrier: _____

The Name of the Buyer: _____

Address of the Buyer: _____

Vessel Officials Signature: _____

2.13 EMPLOYEE QUALIFICATIONS ON FISHING VESSELS

2.13.1 Requirements

There should be in place a program where by the fishery people on-board each vessel should be trained in the proper handling of fresh/frozen tuna.

In the on-board handling of tuna it is very important that both the owner/operator plus the fishermen understand the proper methods which are required to be used.

They must understand that what ever they do in the catching, handling, processing, icing and/or freezing of the tuna will determine what the quality is and this inturn will determine the price.

The GOOD MANUFACTURING PRACTICES guidelines shows the proper procedures for the on-board handling of tuna.

Annex 3 shows the step-by-step methods with diagrams as to the proper handling of tuna.

Definitions

Control or Inspection Point:	A point in time at which there is an opportunity to evaluate compliance with specific requirements and, if necessary, to correct defects, deviations or deficiencies that may be found relating to quality, and/or fair trade practices, and/or regulations in force.
Critical Control Point:	A point at which if preventive measures are not taken, will expose a customer to unacceptable risks related to safety or unwholesomeness.
Decomposed:	With respect to tuna, means that the tuna has an offensive or objectionable odour, colour, flavour, texture or substance associated with spoilage.
Defect :	An imperfection or inadequacy in tuna, or products.
Deficiency :	An imperfection or inadequacy in facilities, equipment or environment.
Deviation :	An imperfection or inadequacy in a process, or procedure.
Hazard :	Anything in the handling of tuna that might contaminate food and make it unsafe for consumers, or that mislead consumers, making one liable to economic fraud.
Poisonous or Harmful Substances:	Includes bacteria of public health significance, natural toxins, all regulated pesticides, non-permitted additives and other contaminants.
Tainted :	Tuna that is rancid or has an abnormal odour or flavour.
Unwholesome :	Tuna which, either in the meat or on the surface, contains bacteria of public health significance, or toxins harmful or offensive to man.

POTENTIAL CRITICAL CONTROL POINTS FOR THE ON-BOARD HANDLING OF FRESH/FROZEN TUNA

NO	ITEM	HAZARD	POTENTIAL CRITICAL CONTROL POINTS
1	INPUT MATERIALS		
	Fish (Tuna)	Taint Decomposition, unwholesomeness Dead, non-compliance with regulations	Prior to processing
	Ice	Not of food grade Unsuitable, unclean Non-compliance with regulations	Prior to use Application area
	Cleaning Agents Sanitisers, Lubricants	Not approved for use in food operations or on food contact surfaces	Prior to use
		Misapplication	Application area
2	Production Conditions Vessel Design Production Facilities	Non-compliance with regulations for the proper handling	Prior to fishing
	Operation & Sanitation	Non-compliance with regulations	Prior to, during processing
	Process Control	Non-compliance with regulations	During processing
	Fresh & Frozen Storage Facilities	Non-compliance with regulations	During time tuna is either in ice or in cold storage
3	PRODUCTS		
	Final Product Required Characteristics	Taint Decomposition, unwholesomeness Defects &/or non-compliance	During processing after last process prior to unloading & after freezing
	Recall Procedures	Unable to trace product to the customer to whom tuna was sold	During unloading & shipping

4	PERSONNEL		
	Health & Hygiene	Fishermen suffering from or carrying a communicable disease Fishermen with an infected or open cut	Prior to fishing
	Quality Management	Not properly trained in the proper procedures for the handling of tuna	Prior to processing

SECTION 3

GOOD MANUFACTURING PRACTICES FOR THE ON-SHORE HANDLING AND PROCESSING OF TUNA

3.1 INTRODUCTION

Tuna is a very delicate fish, which demands that the quality of the product be protected at all times. We must view the workmanship methods of handling tuna and ensure that every method of handling is to protect the tuna at all times.

In this section, Good Manufacturing Practices (GMP) will be outlined to show the proper methods which should be adapted to maintain a good quality product for the end user. GMP procedures are aimed at the prevention of problems by controlling and maintaining the quality of the tuna at all times. When we receive the product at the unloading site we cannot improve the quality of the product, we can only try to maintain the existing quality.

The biology and GMP for handling tuna on board is given in Section 1.

To prevent deterioration in the quality of tuna, the temperature of the tuna must be maintained at 0°C at all times during catching, storage on vessel, unloading, processing and shipping. Histamine production is controlled by minimizing the internal temperature of the tuna to below 7°C at all times.

The GMP procedures in this section will attempt to establish a set of guidelines to help the processor in the production of tuna products.

This chapter is set up into a series of guidelines. They are listed as follows:

a)	Processing Procedures for the Proper Receiving, Grading, Processing Holding, Packing of Fresh Whole Tuna; Frozen Tuna Loins; Frozen Tuna Sticks; and Proper Packing Procedures.	3.1
b)	Employee Requirements	3.2
c)	Plant Facility Requirements	3.3
d)	Proper Cleaning Procedures	3.4

In examining processing procedures (a), we will take a step-by-step approach used in the processing of tuna.

Receiving	3.1.1
Grading	3.1.2
Cooling	3.1.3
Processing of Whole Fresh Tuna	3.1.4
Processing and Packing of Fresh Tuna Loins	3.1.5
Packing and Shipping of Whole Fresh Tuna	3.1.6
Processing of Frozen Tuna Loins	3.1.7
Processing of Tuna for Domestic Market	3.1.8
Summary	3.1.9

The processing procedures list the factors which can affect the processing operation, and the methods of correcting these problems.

3.1.1 Receiving

During receiving it is very important to have the tuna delivered to the receiving

area in a proper insulated container, which is made up of slush ice and salt water. Tuna is to be properly handled in a safe and proper manner. The temperature of the tuna is very important and there should be a form that shows the recorded temperature that has been inspected at time of discharge.

Section 4.2.3 shows the type of forms which is required to be completed at point of discharge. These forms will also show if there is a problem with the temperature of the tuna. If there is any problems at time of discharge, then when the product arrives to the receiving area it can be corrected.

Points of Concern

No tuna is to be taken into the receiving area that has become decomposed, unwholesome and/or contaminated.

No tuna which has not been properly gutted is permitted.

No tuna is to be accepted at the receiving area which has been transported by the means of an open truck.

No tuna is to be placed on the floor of the receiving area. Tuna which is placed on the floor will become contaminated very easily. It is unacceptable to have a product that is being processed for human consumption handled in this manner. There are too many ways for the floor to be contaminated, and in turn cause contamination to the product.

3.1.2 Grading of Tuna

The grading of tuna is done at this stage for colour, condition and size. Tuna must be placed on a proper grading table when being inspected for these procedures.

Section 5 details the system that is used for the grading of Bigeye and Yellow Fin Tuna for colour and condition and the forms which should be completed when inspection of tuna is being carried out.

During quality inspection for colour and condition, the tuna should be marked as to what market it is intended for by placing a tag with the proper markings on them.

Points of Concern

Tuna are not to be placed on floor, for fear of contamination and damage to the outer area of the fish.

Tuna are not to be dragged on floor area for fear of damage.

Tables for the inspection and processing of tuna are to be constructed of a smooth surface which is free from cracks and crevices. The table should be constructed of approved materials.

During inspection all attempts must be taken to prevent the contamination of the tuna from foreign material.

All utensils used during the inspection procedure must be clean and safe.

3.1.3 Cooling

Tuna must be kept cool at all times to ensure that there is no rise in the core temperature of the tuna.

Tuna is not to be left exposed for a long period of time.

Tuna should only be removed from the slush tanks as they are going to be processed.

The core temperature of the tuna should be at 0°C at all times.

Tuna for domestic markets must be maintained at a proper core temperature.

The air temperature in the processing area should be maintained at 18°C or less.

Points of Concern

Tuna which has a high temperature is not permitted to be exported.

Tuna is not to be removed from slush tanks until time of packing for shipping. Temperature before being removed from the tanks must be at 0°C.

If temperature of tuna rises above 7°C than the meat is being exposed to the process of increasing chances of histamine. The only way that this compound can be controlled is by eliminating the chances of a rise in the temperature.

3.1.4 Processing of Whole Fresh Tuna

Tuna is to be placed on tables whereby the process of removing the fins is carried out. All fins should be removed properly at this stage in production.

The belly cavity is inspected for workmanship to ensure that there are no gut remnants left in the belly wall of the tuna.

The area around the head where the gills have been removed must be inspected to ensure that it is properly cleaned. If there are any dead blood present it must be removed immediately. The section of visible bone around the head section must, if not already during catching being cleaned properly, be completed at this time.

The inner belly lining must be properly trimmed. Any pieces of the membrane which are hanging or loose must be removed properly. When the tuna has been inspected for workmanship, if the tuna are to be held for any period of time before being packed and shipped, they must be placed in properly constructed slush tanks, which have clean and safe slush ice and salt water.

If the temperature of the wash water is high, it is recommended that the water be cooled before coming in contact with the tuna. One method is to pass the wash water through a coil of copper pipe which has been placed in a ice/water slurry.

Points of Concern

No tuna which is decomposed, tainted or unwholesome shall be processed.

No tuna is to be inspected or processed on the floor surface of the processing area. The reason for this is to prevent contamination.

No tuna is to be dragged across the floor. Tuna is a very delicate fish. It is very easy to damage the skin surface of the tuna. If the scales are damaged and the skin is torn, the condition of the tuna will be affected by this method of handling tuna. The outer meat when the tuna is being dragged will also be damaged causing a decrease in the usable meat. Remember that the buyer is only paying for the amount of product that he can use.

No tuna is to be exposed to the heat for a long period of time. If the temperature of the meat of the tuna is permitted to rise it will create a quality problem.

No tuna should be placed in improperly designed slush tanks.

No blood is permitted to remain in the tuna. This will cause rancidity to form in the meat of the tuna, causing health and quality problems.

If these measures are followed, tuna will be protected from contamination and damage to the scales, skin, and outer meat.

3.1.5 Processing and Packing of Fresh Tuna Loins

Tuna which is being directed for processing as fresh tuna loins must be processed immediately prior to shipping.

Tuna loins must be processed and inspected for any defects as quickly and as carefully as possible. All defects must be removed at time of processing.

Tuna loins must be covered immediately in a proper approved poly sheet immediately after being inspected.

Tuna loins are to be packed in a proper shipping box which must contain either frozen gel-packs or dry ice.

Tuna loins should only be produced in a specially designed temperature controlled room. The air temperature should not exceed 18°C.

Points of Concern

No tuna loins that is unsafe, decomposed, or unwholesome is permitted to be packed or shipped.

Tuna loins must maintain a temperature of 0°C.

No fresh tuna loins destined for sashimi are permitted to be processed from tuna that does not meet the colour and condition score of 40 and higher.

No tuna loins are to be transported in an unrefrigerated truck.

3.1.6 Packing and Shipping of Whole Fresh Tuna for Exporting

Tuna must have a core temperature of 0°C before it is placed into carton for shipping.

Tuna is to be removed from the slush tanks just prior to packing.

The outer surface must be wiped clean with a sponge and clean safe salt water.

The belly section must be wiped clean from any water or foreign material.

The belly wall must be packed with frozen gel packs to help in maintaining the core temperature of the tuna.

The outer skin surface must be covered with green tuna paper which has been previously soaked in salt water. This will prevent the skin of the tuna from losing its moisture; and also, where there are more than one tuna in a carton, it will protect each tuna from the other.

The tuna after being properly covered is to be placed gently into the carton. The carton must contain two sheets of 10 mil poly which is large enough to completely cover the tuna.

Before closing the plastic you must place frozen gel packs around the tuna to help maintain the proper temperature. If dry ice is used, it must be placed in the container so as not to cause freezer burn to the skin surface and the outer meat.

The carton must be constructed of water tight material and have strength to withstand packages stacked on top of each other without being crushed.

The carton must also be constructed of material that prevents the transfer of temperature. It must be designed for cold retention and be insulated from external temperatures.

Transporting of fresh tuna packed for air shipment. The truck must contain a chill unit so as to maintain the air temperature at 0°C during transportation to the airport.

Points of Concern

Tuna which is decomposed or unwholesome is not permitted to be packed for export.

Tuna, at no time is to be removed from the slush tanks and placed on the floor prior to or during the processing operation.

Tuna that is improperly chilled shall not be packed for shipping.

No tuna is to be shipped unless each container contains either frozen gel packs and/or dry ice.

No tuna is to be placed into carton without proper protection of the skin.

No tuna is to be packed without the belly section containing a proper amount of frozen gel packs.

No carton to be used which does not reach the requirements mentioned above.

No tuna to be transported to the airport in non-coolant trucks.

3.1.7 Processing of Frozen Tuna Loins and Sticks

Tuna which is destined for frozen production must be processed as quickly and as carefully as possible as soon as it is received. Sections 3.1.7.1 and 3.1.7.2 show parts of tuna loins and section 3.1.7.3, the dressing of eviscerated tuna.

Fresh Tuna which is destined for frozen loin production must be properly handled. The tuna must be transferred to the loin production area in a proper manner. The fish must be moved into the production area by means of containers or trolley.

All care must be taken to ensure that during the production process that no tuna comes in contact with any contamination.

Frozen loins and sticks must be processed in a proper clean and safe environment. The production facilities must be properly constructed so as to produce the best quality product with the utmost of care. The workmanship of the product must be controlled at all times.

Temperature must be reduced as quickly as possible after the production has been completed.

Air-blast freezing is recommended because low temperatures can be obtained very quickly. The blast freezer should be able to reduce the product's core temperature to -60°C within 6 hours. After the product is properly frozen it must be stored in the cold storage. The temperature of the cold storage must be maintained at -50°C or lower.

Both the blast freezer and the cold storage should have a recorder to continuously record the temperatures .

During the processing of tuna there are to be no chemicals added to enrich the colour of the loins or sticks, unless they have been previously approved for human consumption by the competent authority having jurisdiction. A

description of the chemicals should accompany the frozen production which contains the additives.

After freezing and during the removal of outer skin, only the amount of production which can be properly handled is to be removed from the cold storage.

During the removal of the skin and defects, all care must be taken to ensure that the product does not come in contact with any contamination.

Before the product is placed into the carton, it is required to be placed through a metal detector to ensure that there is no metals present in the meat.

Each tuna loin is to be placed into a sleeve and the sleeve properly sealed to ensure that the frozen loin or sticks are protected from contamination.

During the time that the frozen product is out of the cold storage for final processing, all care must be taken to minimize the chance of rise in temperature.

Points of Concern

No tuna which is tainted, decomposed, and unwholesome shall be processed.

No tuna is to be placed on the floor before processing commences.

No tuna is to be removed from the slush tanks until ready for processing.

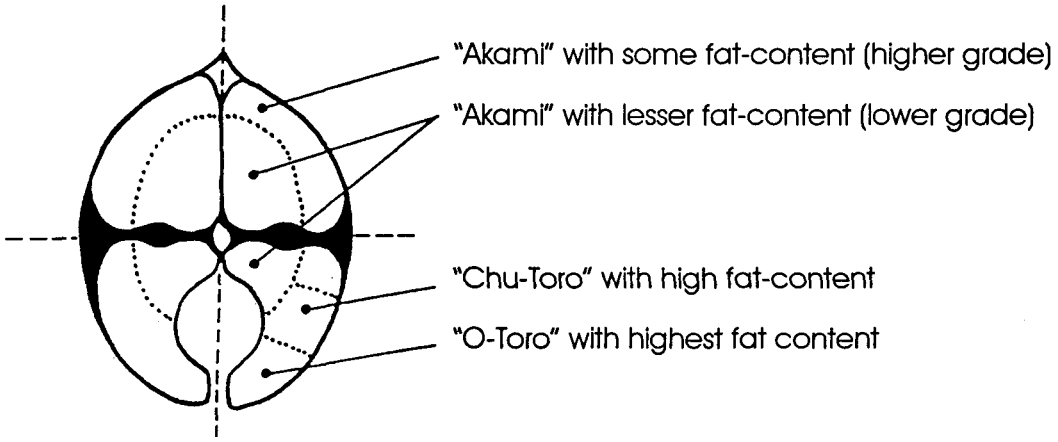
No tuna is to be dragged across the production floor.

No product is to be removed from the blast freezer until proper core temperature has been reached.

All products are to be properly covered with plastic sleeves and placed into a proper shipping carton.

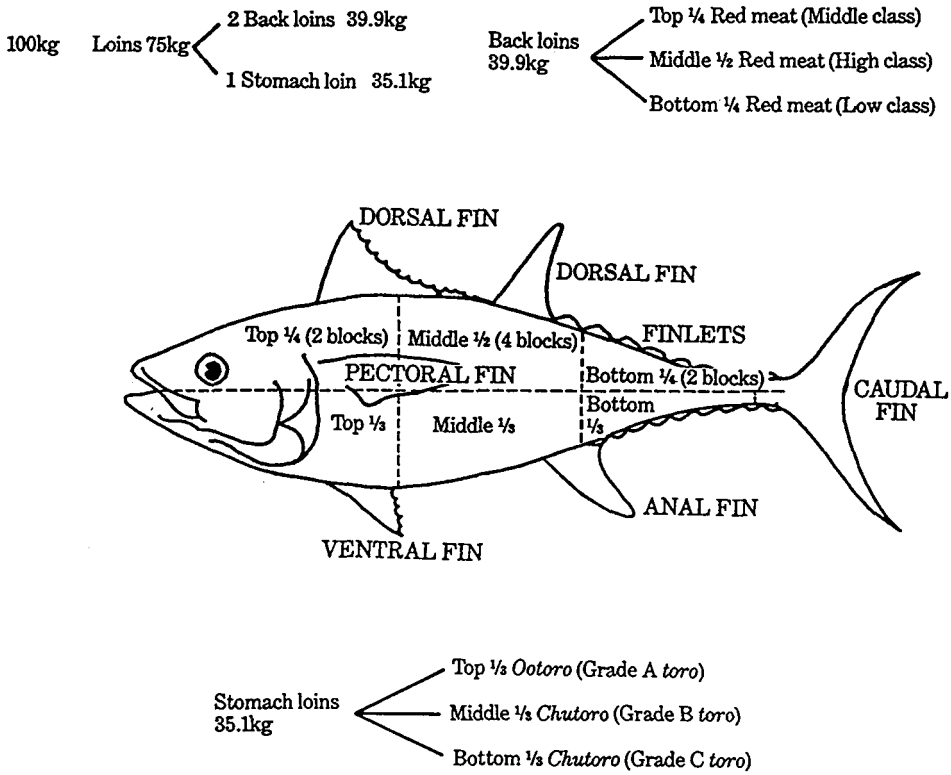
No frozen product is to be transported from the processing plant by open truck.

3.1.7.1: Tuna *AKAMI* and *TORO*



Source: Narasaki

3.1.7.2: Proportion of *Akami* and *Toro*



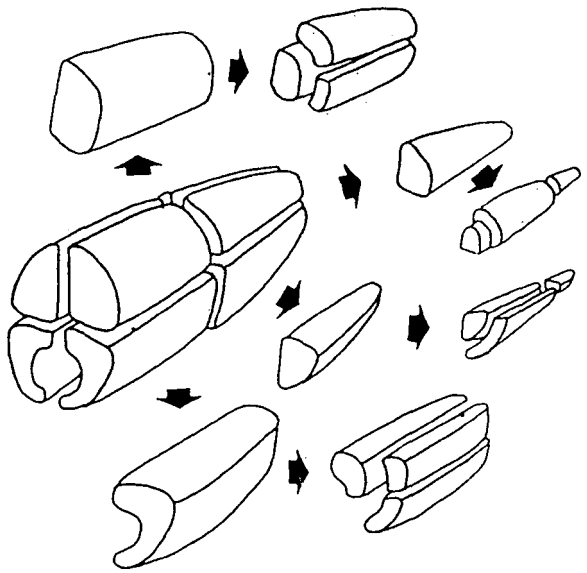
Source: Williams; Queensland Fishing Industry Training Council

From INFOFISH Technical Handbook 1, Handling and Processing of Tuna for Sashimi.

3.1.7.3 Dressing of Eviscerated Tuna

Place the fish on a clean cutting-board on one side with the head to your left.

- Hold the pectoral fin and raise it slightly. Insert knife neat the base of pectoral fin and cut down towards the dorsal line, and move the knife gently following the line of the operculum.
- Cut just behind the isthmus to the base of the pectoral fin also following the line of the operculum to complete the cut. Sometimes , the pelvic fins are removed at this stage by cutting from the isthmus.
- Turn the fish onto the other side, and repeat the above steps, followed by chopping the backbone by holding the head and using a heavy knife or hacksaw until the head is cut.
- The fully dressed tuna is then quarter filleted by inserting a sharp knife through the back until reaches the backbone, and cutting along the dorsal line as shown in the following diagrams.
- The four quarter-fillets are then carefully sliced into thinner fillets, or directly cut into blocks of 300-400 mm in length for the wholesale market. Upon proper chilling condition, these blocks can be stored up to one week.



Filleting of Dressed Tuna for Sashimi

Source: Narasaki, 1986

From INFOFISH Technical Handbook 1, Handling and Processing of Tuna for Sashimi.

3.1.8 Processing of Tuna for Domestic Market

No tuna which is tainted, decomposed or unwholesome shall be processed for the domestic market.

Tuna must be properly chilled before being shipped.

Tuna is to be properly stored in slush ice and salt water prior to shipping.

Tuna is to be properly transported to the market.

Points of Concern

No tuna for the domestic market is to be left on the processing floor.

Tuna which is improperly gutted or is not gutted is not permitted to be shipped to the market.

No tuna for the domestic market is to be left in the open air with no covering.

No tuna is to be shipped to the market in open trucks.

No tuna is to be shipped without being properly iced.

3.1.9 Summary

The main point to remember is the way in which tuna is to be handled at all time.

Tuna is graded by both the colour and condition of the whole fish.

The freshness and colour are the main factors that are considered in determining the price which is to be paid for tuna. The next factor is determined by the Yield Recovery of the meat. This is determined by the condition of the outer surface. By looking at the scales and skin they determine how much of the outer meat will be used.

When we sell a whole tuna, we sell the whole fish which includes the scales, and skin as well as the meat. The end user will only pay for what usable meat he will recover from the tuna. For every time that a tuna is dragged, pulled, or slides across a floor there is not only damage to the loss of scales or torn skin, but also damage to the outer meat area, both in contamination and in loss of unable product.

Tuna must be handled very carefully at all times, it is not to be dragged across a processing floor. The floor is not to be used as part of the processing operation.

We must improve the workmanship of the tuna wherever and whenever possible. If we show the buyers that we are improving our work methods and

decreasing any damage to the tuna then we can be in a position to demand more return on the end product.

3.2 EMPLOYEE REQUIREMENTS

3.2.1 Health

No employee who is known to be suffering from any communicable disease is permitted to work with tuna.

No employee who is a known carrier of any disease is permitted to work with tuna.

No employee who has infected wound or open cuts on their body shall be employed in the direct handling of tuna.

REASON: A person who is suffering from a communicable disease or who is a carrier can infect the tuna product with bacteria capable of causing food poisoning. A person who has open cuts or infected wounds must not be employed in the working area due to the fact that there is danger of infecting the tuna product with food poisoning organisms.

3.2.2 Hand-Washing

Each employee who is involved in the processing of tuna products must wash their hands with warm water and liquid or powered soap immediately after each absence from their work area.

REASON: In order to maintain satisfactory sanitary conditions in the processing area each person is required to wash their hands. Unless the employees wash their hands properly after each time they return to the work station then the contamination of the product, work station, and utensils that they are using will become infected.

3.2.3 Hand Covering, Disinfecting

All hand coverings used by the employees in the handling of tuna, must be kept clean and disinfected on a continuous basis.

REASON: Large numbers of bacteria accumulate on protective hand coverings. Unless they are frequently cleaned and disinfected, they become a serious source of contamination to the product.

3.2.4 Outer Garments and Head Gear

3.2.4.1 All employees engaged in the production of tuna are required to wear coveralls, smocks, or coats, and headgear which is approved by the competent authority having jurisdiction.

REASON: Unless the clothing of the employees handling the product is clean, there is danger that contamination will occur on the product. Headgear is also necessary to protect the product from

contamination.

3.2.4.2 Protective outer garments worn by employees in the tuna processing operations is to be kept clean at all times.

REASON: Unless the protective clothing worn by the employees is kept clean at all times there is the danger of contamination to the products.

3.2.5 Smoking and Spitting

No person is permitted to smoke or spit in any working area which is designated for processing.

REASON: Smoking is objectionable because of the danger of contamination to the tuna products with ash, cigarette buts and matches. Spitting is objectionable to public health.

3.3 PLANT FACILITY REQUIREMENTS

3.3.1 Building

The building must be properly constructed in accordance with the requirements of the competent authorities having jurisdiction.

The building should be properly enclosed with the proper construction of the facility meeting all requirements for the processing of fresh/frozen tuna products. Listed are the requirements which should be followed in the processing facility.

REASON: The area of a processing building for the production operation of tuna products must be properly enclosed so as to prevent contamination from occurring to the product.

The tuna must be protected at all times from contamination. As we have discussed previously in this report, tuna if not handled properly at all times can become contaminated very easily.

The area when properly enclosed with the proper air temperature will ensure that the tuna will not be exposed to excessive heat and also will be protected from the contamination of the outer air itself.

3.3.2 Floors

Floors are to be constructed of a durable material which is properly sloped so as to ensure that the drainage occurs.

The floors must be maintained in good repair at all times. It is impossible to prevent hair line cracks on the floor. Action is to be taken when such cracks are large enough to cause difficulty in cleaning.

Floors must be properly sloped so as to ensure the rapid disposal of waste and

are easy to clean.

Floors in processing area are to be kept clean at all times, and at the end of production they must be properly sanitized.

REASON: If floors are not constructed of proper approved material and is not sloped properly, then there can be problems with the sanitation of this area. If there are cracks or crevices in the floor area it can cause a build up of bacteria. If there is an inadequate sloping of the floor it will prevent the proper removal of liquid and solid waste from the processing area.

3.3.3 Drains

All drains are to be properly constructed. They are to be smooth and properly sloped to ensure the removal of waste from the processing area.

All drains which are connected to a sewer line must have a check backwater valve installed to prevent a backflow.

All drains must be constructed deep enough so as to prevent overflowing onto the processing floor. If this occurs it can create an unsanitary condition.

All drains which exit the processing and production areas are to be equipped with a metal flap or covering to prevent entrance to rodents and or animals.

Drains are to be cleaned at all times to prevent a build up of stale water. There should be a good flow of water running throughout the drains.

REASONS: If the drains are not placed properly in the floors, there will be a problem with the sanitary condition of the plant.

3.3.4 Walls

The surface of the walls in all processing areas must be constructed of a smooth surface. If the surface is not smooth it is very hard to keep clean.

Walls must be constructed of a waterproof material to prevent a build up of bacteria and debris.

Walls should be of a light colour so as to be able to detect dirt. The light colour also gives the establishment a bright and sanitary appearance.

Where walls are constructed of sheeting materials, all joints must be made water tight by the use of a suitable jointing compound.

Walls where they are joined to the floor must be equipped with a proper water tight curb. This curb is installed to prevent any build up of bacteria which can cause contamination to the tuna products.

REASON: If walls are not properly constructed and kept clean and waterproofed then there will be a problem with the building up of bacteria and debris.

3.3.5 Ceilings and Overhead Protection

Processing area which have ceilings and or overhead protection must be constructed of materials which are free from cracks, crevices and open joints.

There should be no exposed area where by dust or debris may collect and subsequently fall or be flown on the product.

REASON: The work area and product must be protected from falling debris which could be a source of contamination to the tuna products.

3.3.6 Overhead Lighting

All overhead lighting must be placed into the ceiling whereby there cannot be any build up of dust and debris.

All lighting bulbs and lighting tubes must be constructed of non-shattered material.

REASON: The production area and product must be protected from falling debris, dust and broken lighting. If this happens, it would be a source of contamination to the tuna products.

3.3.7 Toilet Facilities

There should be the proper types and number of toilet facilities to accommodate the number of employees.

The following numbers are suggested .as a guide for the number of toilet facilities:

1 to 9 Employees	1 Toilet
10 to 24 Employees	2 Toilets
25 to 49 Employees	3 Toilets
50 to 100 Employees	5 Toilets

for every 30 employees over 100 an extra toilet is required.

Toilet areas should be ventilated to the outside.

All toilet rooms must be constructed of a smooth surface, washable, light-coloured and the floors must be constructed of approved materials. There must be wherever possible a floor drain in the facilities.

There should be a foot dip which covers the area larger than the door opening as you leave the wash room facilities.

The door to the washroom area must be self closing.

There is required an automatic wash basin equipped with a foot paddle with the proper liquid or powered soap attached. There is also needed an automatic air hand dryer to be in place rather than the use of paper towels.

REASONS: The presence in food products of organisms associated with sewage or human disease or infection is highly objectionable. Poor sanitary practices may contribute to outbreaks of gastro-intestinal disease and other infections among workers.

3.3.8 Water Supply

An adequate supply of safe, sanitary water that has a coliform bacteria count of less than two per hundred millilitre.

OR

A water supply which has been approved by the competent authorities having jurisdiction.

Water used in the operation of fresh tuna must be either pure and safe salt water of fresh water approved with salt added to match the equivalent of salt water.

REASON: We must ensure that the water supply will not be a source of contamination to the tuna products.

There must be no cross-connection with the water which is used in the processing and the water which is used for the cooling of freezing equipment. Only approved water is to be used throughout the whole process, even in the wash down system or the drain system.

3.3.9 Floor Tanks for the Holding and Cooling of Tuna

All the floor tanks for the holding and cooling of tuna must be constructed of a non-corrodible material.

The construction of these tanks shall be so constructed that the surfaces are smooth, free from the cracks and crevices and can be properly drained and cleaned.

These tanks must have installed into them a proper non-corrodible ramp which is constructed of a smooth surface, free from cracks and crevices and can be properly cleaned.

All floors tanks must be between 30 to 50 cm above the surface of the floor to protect any contaminated water from training from the floor surface into the tanks.

REASON: All floor tanks if not constructed with the proper materials, with the surface area being smooth and free from cracks and crevices will cause damage to the outer surface of the tuna, causing areas for contamination to set into the meat.

3.3.10 Overhead Pipes

There are to be no overhead pipes in any areas of the processing facility.

Pipes even if they are covered to prevent rust or condensation from falling are not permitted in the processing areas.

REASON: The work area and product must be protected from any falling debris and dust which could be a source of contamination to the products.

3.3.11 Processing, Grading and Packing Tables

All table surfaces used in the operation for the processing, grading and packing of fresh tuna must be made of non-corrodible material such as stainless steel, salt water resistant aluminium alloys, fibreglass reinforced, and plastic sheets which is made of approved material.

Any of these materials which are used in the process must be made of a smooth surface free from cracks and crevices. Wood is not to come in contact with the product.

REASONS: If there are materials which are not corrosion resistant, non-smooth and not free from cracks and crevices used in the production of tuna then there is a good chance that contamination of the product will occur.

3.3.12 Conveyors Used in the Production of Loins

Conveyor belts that come in contact with tuna loin production must be equipped with a spray washer and where practical a scraper.

REASON: Because tuna comes in contact with conveyor belts during production, it leaves large numbers of bacteria on the surface of the belt. Unless the belt is equipped with a good water spray, bacteria will accumulate and the tuna meat will come in contact, becoming heavily contaminated.

3.3.13 Chutes, Containers, Trolleys

All chutes, containers and trolleys are to be made of a non-corrodible material, other than wood, and shall be free from cracks, crevices and made of a smooth surface.

Wood or galvanized metal is not permitted to be used.

REASON: Wood and galvanized metal are not acceptable due to the fact that there is too great a risk of contamination. If the chutes, containers, and trolleys are not made of proper materials such as stainless steel, saltwater-resistant aluminium, or reinforced fibreglass, and are smooth and free from cracks and crevices then there is a high risk of contamination to the products.

3.3.14 Animals

Dogs, cats, and other animals are not allowed in or around processing establishment.

REASON: Dogs, cats, and other animals are potential carriers of diseases and, when present in a food establishment, are contamination hazards to the

establishment and to the tuna products.

3.3.15 Rodents and Insects

A proper rodent and insect control program must be in place with all areas of the processing facility. Where pesticides are being used only trained people with the proper equipment should be used in this manner that prevents the contamination of the products.

All openings where these rodents and insects can gain access to the plant must be protected by the proper methods.

Only pesticides which have been approved for use around food are permitted to be used. These pesticides are only to be used after approval by the competent authorities having jurisdiction.

REASONS: Rodents and insects are potential public health hazards. Rodents carry diseases which can be transmitted to man by contamination of food with rodent excreta and urine. The common house fly has long been known as a carrier of diseases caused by micro-organisms. Any type of insect is objectionable. There is also a danger of contamination to the tuna products with rodent hairs or droppings and insect fragments.

3.3.16 Trays and Trolleys Used in the Frozen Production

All trays and trolleys used in the production of tuna loins or sticks destined for freezing must be made of non-corrodible materials, other than wood, and shall be free from cracks and crevices.

Trays and trolley which come in contact with the tuna meat must be made of either stainless steel, or saltwater-resistant aluminium alloys. The frame must be made of a smooth surface, free from cracks and crevices, and be easily cleaned.

REASONS: Only corrosion-resistant material is permitted in the handling of tuna product destined for freezing. The use of any other material can cause contamination to the product.

3.3.17 Freezing Facilities

Freezing facilities for processed tuna loins and sticks shall be capable of reducing the temperature at the centre of the fish to -60°C within 6 hours.

REASON: It is very important to have the product frozen as quickly as possible. If the tuna meat is exposed to a slow freezing it will create quality problems to the meat.

The slow removal of the warm temperature from the meat will cause the centre of the meat to be soft and cruddy. This in turn will cause a decrease in the quality of the product.

3.3.18 Freezing Facility Temperature Recorder

All freezing facilities are required to have a recorder in place to continuously monitor the room temperature.

REASON: There must be a system to record the temperature of the room so as to determine if there is a problem with the freezing of the product. If there are changes in the temperature whereby it rises and falls it can create moisture loss and freezer burn to the product. This will cause a decrease in quality and a loss in yield.

3.3.19 Packing Material for Fresh Tuna Shipping and Material Used in Shipping

All cartons used in the shipping of fresh tuna must be constructed from a strong cardboard material.

The carton must be waterproof to prevent water damage and weaken the carton.

The carton must be made watertight. This is done by ensuring that the tuna are wiped clean and that there are two sheets of 10 mil (very heavy) plastic covering the tuna.

The carton must have cold retention capability and insulation from external temperature factors. This is very important in the quality control factor for the shipping of tuna.

Frozen gel packs or dry ice must be available for the packing of fresh tuna.

Tuna paper must be available for covering the skin to protect it from damage in shipping.

REASON: Tuna carton must be constructed in such a manner that during shipping the cartons are able to be stacked on top of each other without being crushed. Improper cartons will create problems to the quality of the tuna.

3.3.20 Offal Removal

Bins or containers in which offal is stored shall be watertight, constructed of either metal or other material approved by the authorities and, were necessary to prevent contamination of the processing plant or any fish therein, be equipped with well-fitted covers.

REASON: If offal to other refuse while being on site at the processing facility is not properly stored it will create a safety problem. It will attract insects, birds and rodents. Therefore it is very important to have the proper container or bin which is properly covered at all times.

3.3.21 Temperature in Processing Tuna

The room temperature in the processing areas should be controlled at 18°C or less.

REASON: The lower that the air temperature can be kept during the processing of fresh tuna the better it will be in helping maintain the meat temperature of the tuna. Remember that if the meat temperature rises above 7°C, it will create quality problems.

3.3.22 Hot Water Supply

Hot water shall be provided and maintained at a minimum temperature of 43°C in sufficient quantity for the fresh and frozen tuna processing facilities.

REASON: Hot water is necessary for efficient hand washing. It also greatly assists in the washing of equipment after processing is completed. The action of detergents used in the cleaning of the equipment is chemical in nature and the speed of reaction increases with the rise in the water temperature. Without the use of hot water there will be a serious chance that the product will become contaminated, due to poor washing of hands and poor cleaning of equipment.

3.3.23 Ice

Only clean ice which is made from a source of water which has been approved by the competent authorities having jurisdiction may be used in a fresh tuna and/or a frozen tuna operation.

Where block ice is being used, all sawdust and other debris must be removed by washing with approved water under pressure. Ice, at time of use, must not have a coliform bacteria MPN count of more than 2 per 100 millilitres.

Containers used for the handling and storage of ice shall be constructed of non-corrodible material and all such containers must be well maintained and kept clean at all times.

Processing facilities which receive their ice from an outside source must ensure that the ice which they are receiving meets the requirements that are discussed in these regulations.

When receiving ice from outside sources, only ice which is transported in either clean and safe closed trucks equipped with a cooling unit or insulated containers are to be used.

No ice which is contaminated is permitted to be used in the processing of tuna.

No ice which is transported in unsafe or unclean trucks or containers are to be accepted by the processing plants. Ice being transported in this manner will become contaminated and cause contamination to the products.

3.3.24 Plant Surroundings

The area and beach surroundings which are in direct contact with the processing facility shall be kept clean and safe at all times.

REASON: The accumulation of refuse in the area and beach surroundings

around the processing facility may give rise to objectionable odours, which will attract insects and rodents and thus become a sanitation problem.

3.3.25 Sewage

Sewage, including liquid waste from fish processing operations, shall be disposed of in such a manner that the waste is inaccessible to flies and the water supply for the establishment will not become contaminated. Any disposal system which can contaminate the waste supply, then that water supply will not be approved.

REASON: Sewage is characterized by the presence of vast numbers of bacteria of public health significance. Unless sewage is effectively removed, working surfaces will become contaminated. Any disposal system which can contaminate the water supply, then that water supply will not be approved.

3.4 PROPER CLEANING PROCEDURES

3.4.1 Clean-up Procedures

EVERY QUALITY ASSURANCE PROGRAM SHOULD INCLUDE A COMPREHENSIVE WRITTEN CLEANING AND DISINFECTION PROGRAM FOR ITS OPERATION. THIS PROGRAM SHOULD ENSURE THAT ALL FISH HANDLING AREAS ARE ADEQUATELY CLEANED AND DISINFECTED.

The specifics of the cleaning program will vary according to individual circumstances and the program should be designed to meet the needs of each operation. Each cleaning step may be customised to provide the best possible results. Where appropriate, programs should be drawn up in consultation with relevant specialist.

Once the cleaning and disinfection program has been designed it is important that it be recorded. The written program will serve as a reference document for the training and daily function of personnel engaged in cleaning and disinfection. Where written cleaning programs are used, they should specify:

- areas, items of equipment and utensils to be cleaned;
- responsibility for particular task;
- method and frequency of cleaning; and
- monitoring arrangements.

It will also serve as a reference for management and the agency having jurisdiction against which the daily clean-up can be measured. The written program should specify the cleaning and disinfection to be performed in every food-handling area. A separate program may be created for different processing areas or lines, as required. Cleaning schedules should be prepared to cover every item of equipment and all areas of the factory including toilets, cloakrooms, and dining and rest areas.

Cleaning can be carried out by the separate or combined use of physical methods, such as scrubbing or turbulent flow, and chemical methods using detergents, alkalis or acids. A typical cleaning and disinfection process may

involve as many as six separate steps:

1 PRE-CLEANING

Preparation of area and equipment for cleaning. Involve steps such as removal of all product from area, protection of sensitive components and packaging materials from water, removal by hand or squeegee of fish scraps, etc.

2 PRE-RINSE

A rinsing with water to remove remaining large pieces of loose soil or gross debris from surfaces.

3 CLEANING

Treatment of surfaces with an appropriate detergent to remove soil or to loose soil and bacteria film and hold them in solution or suspension.

4 RINSE

A rinsing with water to remove loosened soil and residues of detergent.

5 DISINFECTION

Where necessary, application of chemicals and/or heat to destroy most microorganisms on surface.

6 POST-RINSE

A final rinse with water to remove disinfectant. This step is not applicable or recommended in all situations.

SECTION 4

AN INTEGRATED QUALITY MANAGEMENT PROGRAM (IQMP) FOR THE ON-SHORE HANDLING AND PROCESSING OF FRESH AND FROZEN TUNA

4.1 INTRODUCTION

Due to the rising concerns by the countries of the world to eat safe food, requirements are being established in food processing industries to show that they have in place an adequate food safety program for the control of their products intended for human consumption. Plant operators will have to show in writing the procedures that they are using to identify hazards associated with the handling, processing and distribution of tuna and those preventive measures being taken to ensure the safety of the products is guaranteed, such as monitoring at critical control points and applying a preventive action plan if any of the critical points are out of control.

A number of quality control systems exist to ensure the above, the best known is the Hazard Analysis and Critical Control Point (HACCP) system. This system, while an international standard, is a narrowly defined food safety system that requires a number of pre-requisite requirements and does not deal with quality or economic fraud. A more comprehensive program, which incorporates HACCP, its pre-requisite requirements, regulatory requirements and market requirements is the Integrated Quality Management Program (IQMP).

The IQMP specifies a number of generic areas/control points or points of inspection. Each of these areas must be examined to see if there is a control point or critical control point in the process in that area. Annex 4 gives definitions used in this manual to describe "control points" and "critical control points", etc.

Plant owners/operators should conduct a study of their operation using the IQMP as a guide, incorporate the IQMP into their quality control programme and submit this programme to the competent authorities for approval.

As part of GMP Procedures, each Fish Plant Owner/Operator will be required to implement planned procedures for the monitoring of their operations at Control Points or Inspection Points where problems are noted. Detection of problems at the earliest opportunity allows the problems to be related to the factors that caused them and permits the most effective approach to correct them.

Each Control Point or Inspection Point represent an opportunity, before any other processing takes place with the tuna, to evaluate compliance with requirements and take corrective action where necessary.

For each control or inspection point the following information must be specified:

1. The requirements that are being complied with.
2. The standard that is being employed during inspection.
3. Evaluation of the monitoring procedures.
4. The system for collecting data and record keeping.
5. Description of the corrective action that will be implemented when problems are discovered.

There are 12 areas in the processing operation for the handling of tuna on-shore that need to be examined at control or inspection points to ensure compliance with GMP requirements.

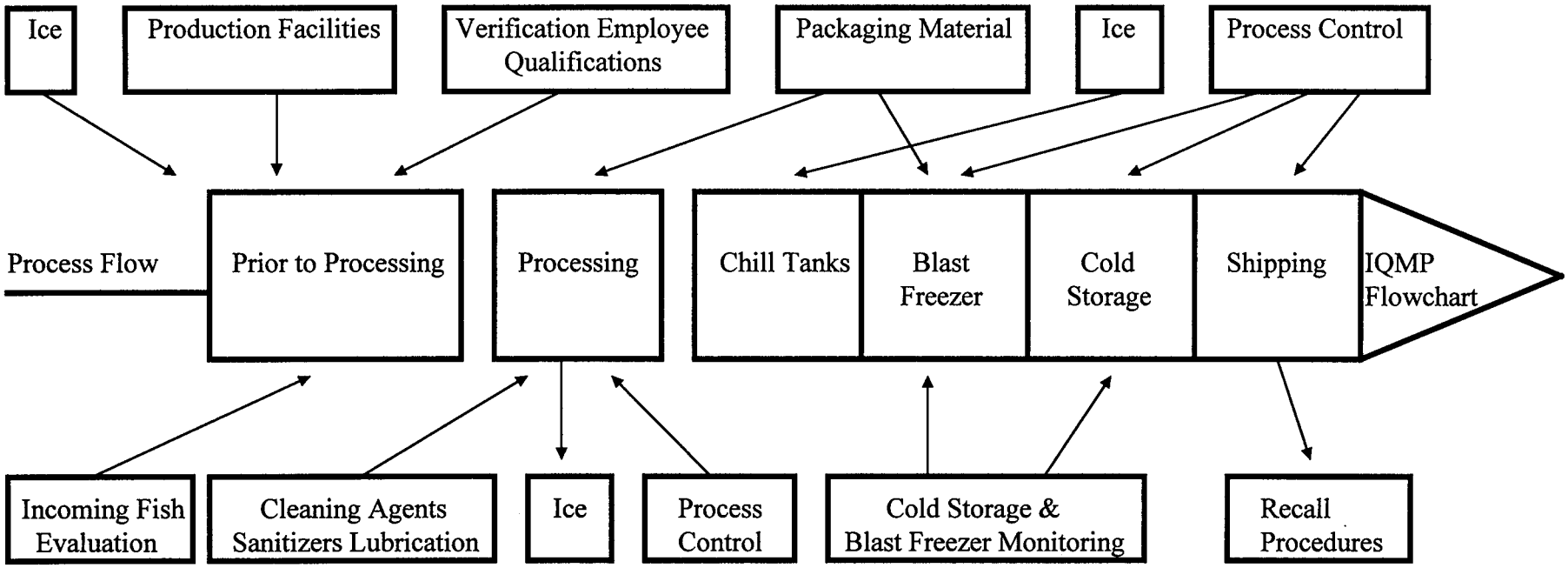
Fish	4.2
Other Ingredients	4.3
Ice	4.4
Cleaning Agents, Sanitisers, Lubricants	4.5
Plant Design, Production Facilities	4.6
Operation And Sanitation	4.7
Process Control	4.8
Fresh/frozen Storage Facilities	4.9
Packaging Material	4.10
Final Product	4.11
Recall Procedures	4.12
Employee Qualifications	4.13

In establishing the Control or Inspection Points for the processing of tuna, each processor must understand what hazards they are attempting to prevent and the location for inspection which will provide the best opportunity to control the hazard.

A flow chart and table are found in sections 4.1.1 and 4.1.2. They provide an overview of where inspection or control points for each item.

Annex 6 provides the specific information regarding potential Critical Control Points for the processing of fresh/frozen tuna.

4.1.1 Process Flowchart for Determining Inspection/Control Points



4.1.2 Potential Inspection/Control Points

Items	Hazards	Control Points
Fish	Health and Safety Risks Tainted, Decomposed Unwholesome Tuna Dead, Non-compliance	Prior to Process Before Receiving
Other Ingredients	Contamination of Tuna With Unapproved, Unsafe Compounds/not Meeting Specifications	Prior to Use When Received
Ice	Contamination of Tuna Unsafe, Unclean	Prior to Use When Received During Use
Cleaning Agents, Sanitisers	Contamination to Tuna With Unapproved/unsafe Chemicals	Prior to Use When Received During Application
Plant Design/ Production Equipment	Contamination to Tuna Due to Poor Design of Equipment/building	Prior to Start Up/ During Operation
Operation and Sanitation	Contamination to Tuna Due to Poor Operation And Sanitation Practice	Prior to Use During Inspection Operation/daily
Process Control	Production of Tuna That Don't Comply with Safety, Quality Wholesomeness and/or Fair Trade Requirements	During Operation Washing Cleaning Cooling/icing Packing
Fresh and Frozen Storage Facilities	Decomposition Or Contamination of Tuna Due to Poor Storage	During Operation of Cooling/freezing
Packaging Material	Use of Unapproved Damaged, Unclean Cartons	Prior to Use Immediately Before Use
Final Product	Production of Tuna That Does Not Comply With Safety, Quality And Wholesomeness And Fair Trade Requirements	Prior to Packing of Fresh/frozen Tuna
Recall Procedures	Unable to Trace Tuna to Buyer/customer	During Packing Prior to Shipping
Employee Qualification	Production of Tuna Posing Health And Safety Risks	Prior to Start Up Skilled Trained Personnel

IDENTIFICATION OF INSPECTION/CONTROL POINTS

Type of Operation: _____

Check off those items which will be mentioned at a control point and identify where/when the point of time of inspection will occur.

Items	Point of Time of Inspection
Fish:	_____
Other Ingredients:	_____
Ice:	_____
Cleaning Agents, Sanitiser, Lubricants:	_____
Plant Design/ Production Facilities:	_____
Operation and Sanitation:	_____
Process Control:	_____
Fresh/frozen Storage Facilities:	_____
Packaging Material:	_____
Final Product:	_____
Employee Qualifications:	_____

Refer to the section indicated for completion of those control points that have been checked off.

4.2 FISH

4.2.1 Requirements:

Under GOOD MANUFACTURING PRACTICES the following requirements are to be followed by the processing plant:

1. No tuna which is decomposed, tainted or unwholesome is permitted to be received or processed for export, or processed for domestic market.

2. Tuna is to be bled properly at time of receiving for further production.

3. No tuna which is improperly gutted is acceptable.

4. No ungutted tuna is permitted to be received at processing plant.

5. Tuna must have all gills removed before delivery.

6. Tuna is to have a temperature of 0°C at time of receiving.

7. Tuna is only to be delivered to processing plant in proper insulated containers, which has been properly cleaned and is free from cracks and crevices and is not contaminated.

8. No tuna is permitted to be placed on the processing floor, this will cause contamination to the product.

9. Tuna is not permitted to be exposed to the air for a long period of time. Tuna if not being packaged immediately after receiving must be placed into slush ice in a proper approved holding tank.

10. Tuna for processing for fresh/frozen loins must be processed immediately after removal from tanks.

11. Tuna is not to be dragged or pulled across the processing floor at any time.

During the receiving of tuna at the processing plant the following information is required to be completed by the processor:

A. The name of the vessel which the fish came from.
B. The quantity of tuna received.
C. The quality of the tuna as inspected when received. Each fish to be graded and the information recorded.
D. Ensure that there is a discharge chart showing the age of the tuna.
E. A temperature log showing the temperature of the tuna at time of discharge.

Any equipment which is used in the process for the holding of tuna that is damaged or can cause damage or contamination of the tuna cannot be used.

All fish handling equipment such as tables, chutes, containers and utensils, shall be of a smooth surface, non-absorbent, non-corrodible materials.

All fish holding tanks must be of a smooth surface, free from cracks and crevices so as to prevent contamination to the tuna.

All areas which in the processing plant are used for the production of tuna are to be clean and safe. No areas are to be used which can cause contamination to occur in the tuna.

4.2.2 Fish Defect Deficiency:

A tuna which is received at the processing plant is considered defective if there is any trace of fuel oil or other critical contamination of the flesh odour which is indicative of decomposition or taint.

Tuna which is not bled, cleaned or chilled properly can also become a defect fish.

There are three areas whereby a tuna should be inspected to see if the proper bleeding process has been completed. The three areas are as follows:

(A) The arteries behind the pectoral fin.
(B) The arteries which supply the gills with blood.
(C) The tail section between the third and fourth dorsal finlet from the tail.

Critical contamination is the presence of any material or distinct and persistent odour or flavour of any material which has not been derived from fish and which poses a threat to human health.

4.2.3 Monitoring Procedures:

The following procedures shall be used in determining the condition of the tuna.

Each fish is examined for contamination by fuel oil or other critical contamination source likely to be a threat to human health.

At time of receiving the tuna at the processing plant it must be inspected for flesh colour, freshness, and condition. This process is completed by removing a piece of meat from the tail section between the fifth and sixth caudel finlet.

All lots of raw fish which is landed at a fish processing plant must be inspected at the identified critical points of inspection to ensure that they are derived from raw material which means the minimum regulatory requirements.

4.2.4 Corrective Actions:

The processor will identify the position responsible for taking corrective action and the position responsible for ensuring that the corrective action was carried out. If the processor wants to use their own forms they must supply an example of the type of form they intend to use to record corrective action.

For each instance of non-compliance the processor must have a record of the corrective action that took place and that the records must provide the following information:

- A description of the non-compliance item
- The date the non-compliance item happened
- The date the corrective action took place
- What corrective action was taken
- The outcome
- The signature of the person responsible

The following forms are to be completed by the company:

CORRECTIVE ACTION REPORT

Date: _____ Area Affected: _____

Description of The Problem With The Tuna:

_____

_____

_____

_____

_____

_____

Show What Action Has Been Taken to Correct Problem:

_____

_____

_____

_____

_____

_____

Date Problem Solved: _____

Current Status: _____

Company Name: _____

Inspector: _____

This report must be filled out when there is a problem that is affecting the quality of the tuna.

This report is to be kept on file as a record to show that the corrective action was taken.

INSPECTION OF TUNA AT RECEIVING SITE

Date: _____

Name of Shipper: _____

Name of Processing Company: _____

Species: _____

Outer Appearance of Fish: _____

Colour of Meat: _____

Freshness of Meat: _____

Temperature of Fish: _____

Condition of Inner Belly Wall: _____

Any Noticeable Contamination: _____

Any Other Comments to The Condition Or Handling of The Fish: _____

_____

_____

_____

_____

_____

Inspected by: _____

RAW PRODUCT INSPECTION REPORT

Date: _____ Vessel/Area: _____

Species: _____ Temperature of fish: _____°C

	SAMPLES									
DEFECTS	1	2	3	4	5	6	7	8	9	10
Raw Fish Decomposed odours (ammonia, sour, vegetable, faecal, putrid)										
Taint odours (rancid oil, abnormal odour associated with feed)										
Broken/perforated belly walls										
Critical Contamination										
Pass or Fail										

Lot Passes ☐ Lot Fails ☐

INFORMATION TO BE SUPPLIED BY FISH PROCESSING COMPANY

Type of Fish Processing Operation: _____

Requirements:
We will meet the requirements as specified by the GMP for the processing and handling of tuna. _____

OR

We will provide our own company requirements that will meet or exceed those supplied in the GMP. _____

DEFECT DEFINITIONS and DEFECT TOLERANCES:
We will utilize the defect definitions and defect tolerances as described for the handling of tuna which is being presented in this document. _____

OR

We will provide our own company defect definitions and tolerance that meet or exceed those supplied in this document. _____

MONITORING PROCEDURES:
We will implement the level of monitoring as specified in this document._____

OR

We will provide our own company monitoring procedures that meet or exceed those supplied by the document _____

FORMS FOR DATA COLLECTION, INSPECTION and RAW PRODUCT:
We will utilize the forms supplied in this report for Corrective Action, Inspection Reporting and Raw Product. _____

OR

We will provide our own company reports for Corrective Action, Inspection Reporting and Raw Product that meets or exceeds those supplied by this document. _____

If the processor is going to supply their own forms, they must produce a copy of the type of forms they will use in this report to the authorities having jurisdiction.

NAME OF COMPANY: _____
DATE: _____

4.3 OTHER INGREDIENTS

4.3.1 Requirements:

No company shall attempt to use any ingredients added to tuna products unless they meet the requirements of the competent authorities having jurisdiction and be acceptable for the manufacturing of food.

4.3.2 Ingredients:

The tuna processing company must keep a list of the ingredients which is added to the tuna products during the processing procedure. The list must contain the following information:

- The amount of Ingredients to be used
- When in the process the ingredients is added
- The concentration of ingredients
- Any special application procedures
- The manufacturer's description of the ingredients

The list must be available to the competent authorities upon request.

4.3.3 Defect Definitions:

The fish processor is only to use those ingredients that meet the requirements of the authorities having jurisdiction. They must ensure that these ingredients are approved for use in tuna products. This information must be acquired from the manufacturer. This information is to be made available to the authorities.

4.3.4 Defect Tolerances:

There is zero (0) tolerance for ingredients or additives which does not reach the requirements.

NOTE: A request made by any tuna processor for the use of ingredients which is not permitted by the local authorities but permitted by the importing country must be accompanied with the following documentation:

- The processor must obtain the proper documentation from the competent authorities of the importing country, stating that the ingredients or additives is of food grade and acceptable for use in that country.

- All products containing ingredients not permitted for use in the country of origin must carry the statement "FOR EXPORT ONLY". This must be clearly printed on the cartons for proper viewing. The first shipment for the year containing non-approved ingredients must be accompanied by a CERTIFICATE from the competent authority.

4.3.5 Monitoring Procedures:

The tuna processing company must provide a monitoring system that ensures

that all tuna products containing ingredients not permitted in the country of origin are not sold in that country.

That the permitted ingredients are only used solely for their intended use and the ingredients added conform to the requirements of the competent authority and manufacturer's specifications.

All ingredients must be properly stored and inspected for contamination and placed in a secured area whereby the ingredients cannot be mixed with another product.

4.3.6 Corrective Actions

The company will identify the person who is responsible for taking the corrective action and ensure that the corrective action is being carried out.

The company must supply forms to an inspector upon request the record of the corrective action taken. The form must contain the following information:

- A description of the non-compliance ingredient
- The identification of information
- The date the non-compliance ingredient was identified
- The date the corrective action was taken
- What corrective action was taken
- What was the outcome
- The signature of the person responsible

4.3.7 Data Collection And Reporting Forms:

The company may use the attached data reporting forms or must provide examples of the type of forms it intends to use in recording incoming ingredients inspection to ensure that the material is approved and is not contaminated. The company must supply a copy of the intended forms that are to be used.

INCOMING INGREDIENT INSPECTION REPORT

Date: _____

Type of Ingredient: _____

Supplier: _____

Brand Name: _____

Manufacturer: _____

Lot #: _____ Code#: _____

	Yes	No
Has The Ingredients Been Approved?	_____	_____
Ingredient Containers Sound?	_____	_____
Are The Ingredients Uncontaminated?	_____	_____

What Action Needs to Be Taken:

_____

_____

_____

_____

_____

Inspected By: _____

INFORMATION TO BE SUPPLIED BY THE PROCESSING COMPANY

Monitoring Procedures

Type of Operation: _____

We will implement the following monitoring procedures to ensure that only approved and uncontaminated ingredients are used in the processing of tuna products.

List The Procedures That Will Be Used:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Company Name : _____
Company Official: _____
Date: _____

4.4 ICE

4.4.1 Requirements:

Only ice which is made from clean and safe water is permitted to be used in the processing of tuna.

Only properly crushed ice is to be used in the slushing and icing of tuna. Ice is to be properly stored in clean and safe containers.

4.4.2 Ingredients:

Where there is block ice being used, all sawdust and other debris must be removed by washing with approved water under pressure. Ice, at time of use, must have a coliform bacteria MPN count of no more than 2 per 100 millilitres and be approved by the competent authorities having jurisdiction.

4.4.3 Defect Definitions:

No ice which is contaminated is to be used in the production of tuna.

No ice which is transported in unclean trucks or containers is permitted to be used.

Dirty or used ice is not permitted to be used in the processing of tuna.

No ice is permitted to be transported in open trucks. This can cause contamination to the ice and in turn will cause contamination to the tuna products.

4.4.4 Monitoring

The processing company will describe how it ensures that the ice they use will be only ice that has been approved and uncontaminated. The processor will describe how it ensures that the ice is stored in proper insulated containers or in a proper clean and safe ice house. Where ice is being trucked to the plant from outside source, the processor must describe how it ensures that the ice they are receiving is free and safe from any contamination. This information in regards to ice must be recorded and presented to the competent authorities on request.

4.5 CLEANING AGENTS, SANITISERS, LUBRICANTS

4.5.1 Requirements

Only cleaning agents, sanitisers, lubricants, pesticides that have been approved by the competent authorities are permitted to be used in the tuna processing operations.

The processing company is responsible to ensure that the compounds used meet all requirements.

4.5.2 Specifications

The processing company must maintain a list of all cleaning agents, sanitisers, lubricants, pesticides and any other chemicals that are used in the maintenance of equipment and plant facilities, and produce proof of the approval of those chemicals. The list must show where each chemical is to be used in the plant, when it is to be used, and any special manufacturing instructions regarding of how it to be used.

4.5.3 Monitoring Procedures

The processor will show what procedures they will implement to ensure that only approved chemicals are used in the process for the production equipment which is used in the tuna operation.

4.5.4 Corrective Action

The company will identify who is responsible for taking the corrective action and list what action has been taken. The form must show the following information:

- A description of the non-compliance item
- The lot # or identification of information
- The date the non-compliance item was identified
- The date the corrective action was taken
- What method of corrective action was taken
- The outcome
- The signature of the person responsible

4.5.5 Forms for Data Collection and Reporting

The processor is required to provide samples of the type of forms it intended to use in recording the results of the incoming chemicals. A copy of the type of form which should be used is given in 4.5.5.1.

INCOMING CHEMICAL REPORT

Date: _____

Type of Chemical: _____

Supplier: _____

What is The Chemical Used For in The Processing Area:

_____

_____

Brand Name: _____

Manufacturer: _____

	Yes	No
Has The Chemical Being Approved?	_____	_____
Are The Containers Safe?	_____	_____
Are The Chemicals Protected From Contamination?	_____	_____
Do The Chemicals Meet The Company Specifications And Requirements?	_____	_____

If There is A Problem Then List The Problem And The Action That Will Be Taken to Eliminate The Problem:

_____

_____

_____

This inspection report is to be completed for each chemical which is to be used in the processing plant. This form when completed is to be signed and kept on file for future reference.

Inspected by: _____

4.6 PLANT CONSTRUCTION/PRODUCTION FACILITIES/PLANT EQUIPMENT

The requirements that a processing plant must meet to be able to process fresh/frozen tuna products are as listed below:

4.6.1 Building

The building must be properly constructed in accordance with the requirements laid down in the GMP for processing plants.

4.6.2 Floors

Floors are to be properly constructed of a durable surface material which is properly sloped so as to ensure that the proper drainage occurs.

There are to be no cracks or crevices whereby they become large enough to have improper cleaning which will cause the build up of bacteria.

4.6.3 Drains

All drains are to be properly constructed. They are to be smooth and properly sloped to ensure proper removal of waste from the processing area.

All drains which are connected to a sewer line are to have a proper check backwater valve installed to prevent a backflow.

Drains which are exposed to the outside must be equipped with a metal flap or covering to prevent entrance to rodents and or animals.

Drains are to be constructed deep enough so as to prevent an overflow onto the production floor which can cause bacterial problems.

4.6.4 Walls

The surface of walls in all production areas must be constructed of a smooth surface, with waterproof material to prevent a build up of bacteria.

Walls should be of a light colour so as to be able to detect dirt. Light colour also gives the establishment a bright and sanitary appearance.

Walls which are constructed of sheeting material, where it meets the floor there must be a proper water tight curb installed to prevent any build up of bacteria. Also walls constructed with sheeting, must have the joints made water tight by the use of suitable jointing material to protect the build of bacteria.

4.6.5 Ceilings

All ceilings are to be constructed of materials free from cracks, crevices and open joints.

4.6.6 Overhead Lighting

All overhead lighting must be placed up into the ceiling to prevent any build-up of dust and debris. All bulbs and lighting must be constructed of shatterproof material to prevent contamination of foreign material into the tuna.

4.6.7 Overhead Pipes

There are to be no overhead pipes in any area of the production for the processing of fish.

4.6.8 Toilet Facilities

As to the regulations for the number of toilet facilities to accommodate the number of employees, this is in the GMP Requirements for the processing plant regulations.

All toilet rooms should be constructed of a smooth surface, washable, light-coloured and the floors must be constructed of approved materials. There should be wherever possible a floor drain in the facilities.

All doors to the washrooms should be self-closing.

All toilet facilities must be properly vented to the outside air.

4.6.9 Water Supply

An adequate supply of safe, sanitary water that has a coliform bacteria count of less than two per hundred millilitre.

OR

A water supply which has been approved by the competent authorities having jurisdiction.

4.6.10 Floor Tanks

All floors tanks for the cooling and holding of tuna must be properly constructed of a non-corrodible material. The construction of these tanks shall be so constructed that the surfaces are smooth, free from cracks and crevices, and can be properly drained. All floor tank top section must be at least 30 cm up from the floor surface.

4.6.11 Equipment

The equipment used for the processing of tuna must be made of non-corrodible material such as stainless steel, salt water resistant aluminium alloys, fibreglass reinforced, and or plastic which is of approved materials. Any of these materials must be made of a smooth surface, free from cracks and crevices.

4.6.12 Freezing Equipment

All freezing equipment must be able to freeze the tuna to a core temperature of -60°C as quickly as possible. Cold storage facilities must be able to

maintain an air temperature of -50°C or below. Both the blast freezer and the cold storage must have a continuous temperature recorder to monitor the change in the temperatures.

4.6.13 Guidelines For Corrective Action:

The company must identify what action will be implemented for deficiencies of a critical nature -- a condition or practice which:

(A) results in the production of a product that is unwholesome,
(B) presents a threat to the health and safety of the consumer, or
(C) is not in accordance with regulations.

CRITICAL DEFICIENCIES MUST BE CORRECTED IMMEDIATELY

Deficiencies of a serious nature -- a condition or practice which:

(A) prevents proper sanitation, and/or
(B) may result in the production of a tainted, decomposed or unwholesome product, but which is not considered to be a critical deficiency.

Deficiencies of a major/minor nature: conditions or practices which:

(A) may inhibit general sanitation, and/or
(B) may result in the deterioration of product quality, but which is not considered to be a serious or critical deficiency.

The company must also identify who will take the action, what system will be used to record the action and who will verify that the action was taken.

No plant is permitted to operate where there are one or more critical deficiencies or five or more serious deficiencies are identified.

4.6.14 Plant Rating Forms

The company must identify the forms they intend to use to record their inspection of construction/equipment. It is recommended that the plants use the detailed plant rating report form which is provided in Annex 7 in this section.

The Action Report: This report form (Annex 10) is used to summarize the results of a full scale construction/equipment inspection and to indicate a date for the corrective action. This form is also used in the weekly construction/equipment inspection directed at critical control points.

The Detailed Plant Inspection and Rating Report: This report is used in all fish processing operations to record the individual construction and equipment items. This form is used in the inspection and rating the seriousness of the deficiencies.

4.6.15 Guidelines For Corrective Action:

The company must identify each instance of non-compliance and have a record of the corrective action that took place. The record must show the following information:

- A description of the non-compliance item
- The identification of the information
- The date the non-compliance item was identified
- The date the corrective action was taken
- What type of corrective action was taken
- The final outcome
- The signature of the person responsible

4.7 OPERATION AND SANITATION

4.7.1 Requirements:

No person who is a carrier of any disease or has an infected wound or open cut is permitted to be in contact with the processing of tuna products.

NOTE: The processor of tuna is required to ensure that there is no contamination present in their plant.

The owner must ensure that the plant meets the requirements of the official agencies having jurisdiction.

The company must provide assurance that the employees who come in contact with the tuna products do not directly or indirectly contaminate the food with pathogenic microorganisms.

The company must take steps to train their employees in the precautions necessary to prevent contamination to the tuna products.

All companies which are processing tuna products must have a policy in place whereby the employees are required to report any medical conditions which may present a health and safety risk in the production process. This would also include being a carrier of a disease likely to be transmitted through food while being afflicted with infected wounds, skin infections or diarrhea.

All companies should have on a regular basis at least once a week a Employee Hygienic Practice report showing the work habits of the employees. Annex 8 in this section has a form for the Employee Hygienic Practices Checklist.

4.7.2 Sanitation:

The company must ensure that the proper sanitation of the plant is being carried out during clean-up and also during the regular production. The absolute cleanliness of personnel, equipment and premises is very important at all stages of the production of tuna.

Tuna must be protected from contamination by pathogenic micro-organisms which can cause disease in people.

Tuna must be protected from spoilage organisms which can cause

deterioration in the quality of the tuna.

Good standards of cleanliness both with the employees and the method of cleaning and proper sanitation will minimize the risk of rodent and insect infestation.

The most important objective of cleaning is to minimize the risk of CROSS-CONTAMINATION between tuna. Waste tuna material left on equipment, gloves and surfaces can act as a primary source of contamination since it serves to harbour large populations of contaminating micro-organisms.

4.7.3 Plant Rating Forms:

We recommend the Detailed Plant Hygiene Inspection Report form and the Action Report form for operation and sanitation record forms which are attached in this Manual as Annex 9 and 10 respectively, as a guide to determine critical points in operation and sanitation.

4.7.4 Corrective Action:

The company for each corrective action that takes place for each non-compliance must record the following information:

- A description of the non-compliance item
- The area of the non-compliance
- The date the non-compliance was identified
- The date the corrective action was taken
- What method of corrective action was taken
- What was the final outcome
- The signature of the person responsible

4.8 PROCESS CONTROL

4.8.1 Requirements:

Tuna is to be properly washed during and after processing. It is very important that all old blood around the gills are removed and washed properly and the belly wall is properly washed during the processing process before packing. Also before packing the outer skin must also be properly washed.

During the production process the temperature of the fish must be properly controlled.

During the production of loins the area for processing must be properly controlled so as to ensure no contamination will occur with the tuna loins. The area must be kept clean at all times to prevent cross-contamination by improper cleaning during production.

During the production of frozen tuna products the proper controls are to be in place to ensure that the tuna is frozen as quickly as possible.

During the removal of the skin and the trimming of the tuna loins after freezing,

the amount of time that the frozen product in out of the cold storage must be controlled to ensure the minimum rise in temperature.

4.8.2 Defects and Deficiencies:

The improper handling or dragging of tuna is considered a defect control deficiency.

The damage to the outer surface of the skin and outer meat by poor processing and handling procedures is considered a defect control deficiency.

4.8.3 Inspection Requirements:

On a continuous basic there is required during the packing of the fresh tuna to monitor the temperatures of the fish. This is done very easily by placing the temperature probe in the cut which has been already made for bleeding behind the pectoral finlet.

4.8.4 Corrective Action:

The company will identify the person who is responsible for taking the corrective action, ensuring that the corrective action was carried out. The company must provide a copy of the forms they intend to use which must contain the following information.

- A description of the non-compliance items
- The section of non-compliance
- The date that the non-compliance item was identified
- What type of corrective action was needed
- What was the final outcome
- The signature of the person responsible for carrying out the corrective action.

4.9 FRESH/FROZEN STORAGE FACILITIES

4.9.1 Fresh Storage Facility

4.9.1.1 Requirements:

The following are the requirements for the proper storage of fresh tuna:

(A) All tuna are to be stored when in the processing plant awaiting processing in either insulated containers or in slush bins.

(B) Either the containers or the tanks are to be properly constructed of non-corrodible material. The surface is to be smooth and free from cracks and crevices.

(C) The ice for icing the tuna must be made from clean and safe water.

(D) The water used in the cooling process must be either clean and safe salt water or clean and safe fresh water which is converted to the same strength as salt water.

(E) The core temperature of the fresh tuna must be maintained at 0°C.

4.9.1.2 Inspection Requirements:

The plant is required to inspect the tuna before packing for shipping to ensure that the temperature is maintained at 0°C.

4.9.1.3 Corrective Action:

The processing company must have in place a corrective action so as to prevent any increase in the fresh tuna during processing before shipping. The corrective action form should contain the following information:

- A description of the problem with temperature
- The date that the problem was detected
- The date that the corrective action was taken and what was done to correct the problem.
- The signature of the person responsible for the corrective action being taken.

FRESH TUNA TEMPERATURE RECORDING LOG

DATE	TIME	STORED IN ICE	TEMPERATURE

Company Name : _____

Date : _____

Company Official : _____

4.9.2 Frozen Storage Facility

4.9.2.1 Requirements:

The following are the requirements for the handling of frozen tuna:

(A) The core temperature of the tuna must be lowered to -60°C as quickly as possible.
(B) The cold storage temperature is to be maintained at -50°C or lower at all times.
(C) When the frozen tuna is being removed from either the blast or the cold storage it must be protected to minimize a rise in the temperature.

4.9.2.2 Inspection Requirements:

The processor is required to have a continuous temperature recording device installed in all freezer rooms so as to ensure that if there is a problem with the temperatures it is recorded and corrective action can be taken.

4.9.2.3 Corrective Action:

The company must show what corrective action is to be taken. They must have a person who is responsible for ensuring that the corrective action is carried out and they are required to have a form completed with the following information:

- A description of the problem with the cold storage.
- The date the problem happened.
- The date the corrective action was taken and a description of what was done to correct the problem.
- The signature of the person responsible.

FROZEN TUNA
COLD STORAGE LOG

DATE	TIME	BLAST FREEZER		COLD STORAGE	TEMPERATURE
		No of Fish	Temp.		

Company Name : _____

Date : _____

COMPANY OFFICIAL : _____

4.10 PACKAGING MATERIAL

4.10.1 Requirements

No person shall export any product unless it is packed properly in a clean safe carton which is free from any contamination.

All cartons for the shipping of either fresh/frozen tuna must be new, clean, and sound. When packing frozen tuna loins each loin must be placed into a proper plastic sleeve. This sleeve is then sealed so as to prevent contamination and dehydration to the product.

All cartons for the shipping of fresh whole tuna must be constructed as follows:

- Carton must be constructed from a strong material. This material must be constructed in such a manner that during transportation they will not crush when stacked on top of each other.

- Cartons must be waterproof to prevent leakage.

- Cartons must be constructed of a material that will minimise temperature fluctuations to its contents.

4.10.2 Specifications

The company is only permitted to use packaging material that has been approved by the competent authorities having jurisdiction. The packaging materials must be of food grade. This means that there is no chance for contamination to the tuna products from the materials used in the construction of the packaging material. The company is responsible for proving that the packaging material used meets those requirements. The company must have from the manufacturer a document stating that the packaging material meets the requirements and is acceptable for the packaging of tuna products.

4.10.3 Defect Definitions

All packaging material that is not approved for food contact, not new, not clean or sound, or otherwise fails to meet the specified requirements of this section shall be considered defective.

4.10.4 Defect Tolerances

The defect tolerance for packaging material is nil.

4.10.5 Monitoring Procedures

The company will describe the monitoring procedures used to ensure that only approved, clean, sound and undamaged packaging material are used for tuna products.

4.10.6 Corrective Action

The company will identify a person responsible for taking the corrective action and ensure that the corrective action is carried out. The company must also supply a form that will be used to record the corrective action that took place, it must show the following information:

- A description of the non-compliance material
- The amount of material involved
- The date that the non-compliance item was identified
- The date the corrective action was taken
- The information showing what was done with the non-compliance material.
- The final outcome
- The signature of the person responsible for ensuring that the corrective action was taken. This information is to be made available to an inspector upon request.

PACKAGING MATERIAL INSPECTION REPORT

Date: _____

Packaging Material Type: _____

Supplier: _____

	YES	NO
Are the containers or packaging material clean?		
Are the containers or packaging material new?		
Are the containers or packaging material undamaged?		
Do the containers or packaging meet the specifications?		

Action:

_____

_____

_____

_____

_____

_____
Company Inspector

4.11 FINAL PRODUCT

4.11.1 Requirements

No company shall import, export or process for export or attempt to import, or export or process any tuna which is tainted, decomposed, or unwholesome or otherwise fails to meet the requirements or regulations which are laid down by the competent authorities having jurisdiction.

All tuna products produced by the processing company must be free from any contamination and must be processed in accordance with the GMP or REGULATIONS issued by the competent authorities having jurisdiction.

4.11.2 Defect Tolerance

Same as mentioned above.

4.11.3 Sampling Plan

Before the shipping of the product, the processor must ensure that all requirements for the processing of fresh and frozen tuna products have been met. No product which does not meet the following standards are permitted to be shipped.

Tuna must be acceptable for human consumption.

The proper core temperatures of fresh/frozen tuna must be according to what is required in the GMP Requirements and regulations issued by the competent authorities.

Fresh tuna, the fish must be properly iced, covered and properly packaged according to the requirements in this report, the regulations in force and GMP procedures.

4.11.4 Corrective Action

The company must identify what action is to be taken to remove unacceptable final product. They must show who is responsible for taking the action and what system will be used to record the action.

The company must supply an example of the type of form which it will use in recording the corrective action. This form must contain the following information:

- A description of the unacceptable final product
- The quantity of the Product
- The date that the non-compliance was identified
- The date it was corrected
- What action was taken to correct the unacceptable product
- Where is the product now
- The signature of the person responsible for taking the corrective action.

4.12 RECALL PROCEDURES

4.12.1 General Requirements for Fresh and Frozen Tuna Products

Every carton and case in which tuna is packed at a processing plant shall be legibly marked on one end in such a manner that the following information is seen properly:

- The name of the fish processor
- The day, month, and year
- The type of product, example: Fresh Tuna

This information must be visible so as it can be read by the authorities.

4.12.2 Specifications for the Documentation of Shipments

All fish processing companies must have in place a recall procedure, that if there is a problem detected after the product has been shipped to the distribution site, it can be removed from the market in a quick and effective manner. This requires the fish processing plant to have the proper up-to-date procedures for all shipments. The following information must be kept in the shipping record document:

- The date of the shipment
- The description of the product
- The lot number
- The lot size
- The code markings
- The shipper
- The carrier
- The consignee
- The destination

4.12.3 Monitoring Procedures

The company will describe the procedures it uses to ensure that all shipments are recorded and may be traced to their first shipping destination:

4.12.4 Corrective Action

The company will identify the person responsible for taking the corrective action and will ensure that the corrective action is carried out. The company will provide a form that will show the following information:

- A description of the non-compliance product
- The lot number
- The date that the non-compliance was detected
- The date that the corrective action was implemented
- What corrective action was taken to recall the product
- What was the final outcome
- The signature of the person responsible for taking the corrective action.

SHIPMENT RECORD FORM

Date: _____

Product Description: _____

_____

_____

Lot Size: _____

Lot#: _____

Codes: _____

Shipper: _____

Carrier: _____

Consignee: _____

Destination: _____

If Shipped by Air The Way Bill Number: _____

Expected Time of Arrival: _____

Company Official: _____

This information should be completed with each shipment and kept on file.

4.13 EMPLOYEE QUALIFICATIONS

4.13.1 Requirements:

The plant employees are to be properly trained in the proper personal hygienic practices which affect the quality of tuna. These hygienic practices are as follows:

Employee health, employee appearance, smoking, spitting, hand washing, hand disinfection, proper use of foot dips, headgear, outer garments, and the proper procedure when returning to work station after coming from toilet area.

The company agrees to meet the requirements of the GOOD MANUFACTURING PRACTICES for the processing plant and assure that the personnel which work in tuna processing will be trained in the personal hygienic practices.

POTENTIAL CRITICAL CONTROL POINTS
FOR FRESH/FROZEN TUNA PRODUCTS

ITEM	HAZARD	POTENTIAL CRITICAL CONTROL POINTS
1) INPUT MATERIALS		
Fish	Taint Decomposition Unwholesomeness Non-compliance with Regulations	Prior to Processing
Other Ingredients	Not food grade Unsuitable Non-compliance with Regulations	Prior to use
	Unclean Misapplication	Application Area
Packing Material	Not approved for food contact	Prior to Use
	Used, Unclean, Unsound	Packing Area
Ice	Not approved for food	Prior to Use
Cleaning Agents, Sanitisers, Lubricants	Not approved for use in food plants or on food contact surfaces	Prior to Use
	Misapplication	Application Area
2) PRODUCTION CONDITIONS		
Constructing Maintenance of Production Facilities and Processing Equipment	Non-compliance with Regulations	Prior to Processing
Operation and Sanitation	Non-compliance with Regulations	Prior to, during Processing
Process Controls	Non-Compliance with Regulations	During Processing
Storage	Non-compliance with Regulations	During time products are in storage
3) PRODUCTS		
Required Characteristics	Taint Decomposition Unwholesomeness Defects and/or non-compliance with grade designations	During processing a) At/after last process step prior to packing b) After freezing

Required Characteristics	Mislabeling Underweight	During processing, a) At/after packing b) After freezing
Recall Procedures	Inability to trace products to the customers to whom they were sold	Packing area for product coding
4) PERSONNEL		
Hygiene and Health	Employee(s) suffering from/carrying communicable disease. Employee(s) with infected wounds open lesions	Prior to Processing
Quality Management	Responsibility for quality management not clearly identified	Prior to Processing

DETAILED PLANT INSPECTION AND RATING REPORT

(page 1)

PLANT NAME	OPER. TYPE(S)	DATE OF INSP.	TYPE OF INSP.

CONSTRUCTION AND EQUIPMENT REQUIREMENTS							
	Item/Sub-Item	DEFICIENCY SCORE			NA	SCORE	DEFICIENCY DESCRIPTION/ COMMENTS DATES FOR CORRECTION
		MAJ	Se	CR			
1	FLOORS - WET WORKING AREA						
	a) impervious finish						
	b) good repair						
	c) proper slope (1:480)						
	d) proper floor/wall joint						
2	FLOORS - DRY WORKING AREA						
	a) properly constructed						
	b) in good repair						
3	DRAINS						
	a) sufficient capacity						
	b) smooth and impervious						
	c) properly trapped and covered						
	d) rodent proof						
	e) equipped with check valve where necessary						
4	WALLS - WET OR DRY AREAS						
	a) smooth, crack-free surface						
	b) light-coloured						
	c) waterproof						
	d) washable with no obstruction below 1.5 m						
	e) window sills sloped inward						

DETAILED PLANT INSPECTION AND RATING REPORT

(page 2)

PLANT NAME	OPER. TYPE(S)	DATE OF INSP.	TYPE OF INSP.

CONSTRUCTION AND EQUIPMENT REQUIREMENTS							
	Item/Sub-Item	DEFICIENCY SCORE			NA	SCORE	DEFICIENCY DESCRIPTION/ COMMENTS DATES FOR CORRECTION
		MAJ	Se	CR			
5	CEILINGS						
	a) smooth, crack-free surface						
	b) light coloured						
	c) washable						
	d) acceptable height						
	e) free of ledges, pipes, etc. over work surface						
6	LIGHTING						
	a) acceptable light levels (min. 20 ft candles)						
	b) protective covers provided if necessary						
	c) designed to facilitate cleaning						
7	VENTILATION						
	a) provides for odour, smoke, steam removal						
	b) prevent condensation						
8	WATER SUPPLY						
	a) safe sanitary water from approved source						
	b) adequate volume and pressure						
9	HOT WATER SUPPLY						
	a) available in sufficient quantity						
	b) minimum of 43°C						

DETAILED PLANT INSPECTION
AND RATING REPORT
(page 3)

PLANT NAME	OPER. TYPE(S)	DATE OF INSP.	TYPE OF INSP.

CONSTRUCTION AND EQUIPMENT REQUIREMENTS							
	Item/Sub-Item	DEFICIENCY SCORE			NA	SCORE	DEFICIENCY DESCRIPTION/ COMMENTS DATES FOR CORRECTION
		MA/I	Se	CR			
10	HAND WASHING FACILITIES						
	a) adequate no. of fixtures						
	b) equipped with hot and cold running water						
	c) soap, towels, waste receptacles provided						
	d) facilities visible from work areas						
11	HAND COVERING DIPS						
	a) facilities provided						
	b) conveniently located						
12	TOILET FACILITIES						
	a) adequate no. of fixtures						
	b) adequately ventilated						
	c) properly constructed (floors, walls, ceiling anteroom)						
	d) drain provided						
	e) toilet room doors of approved type						
13	OFFAL CONTAINERS						
	a) approved construction of container and facilities						
	b) provided with fitted lids						

DETAILED PLANT INSPECTION
AND RATING REPORT
(page 4)

PLANT NAME	OPER. TYPE(S)	DATE OF INSP.	TYPE OF INSP.

CONSTRUCTION AND EQUIPMENT REQUIREMENTS							
	Item/Sub-Item	DEFICIENCY SCORE			NA	SCORE	DEFICIENCY DESCRIPTION/ COMMENTS DATES FOR CORRECTION
		MAJ	Se	CR			
14	BOXES, CARTS, BINS FOR HOLDING FISH PRIOR TO PROCESSING						
	a) if wood, treated to prevent moisture from entering wood						
	b) in good repair						
	c) provided for drainage						
15	a) product contact surfaces of approved material						
	b) joints smooth and watertight						
16	TABLE CONSTRUCTION/DESIGN						
	a) constructed to facilitate cleaning of table and area beneath						
	b) stands for workers of approved material						
17	FRAMES AND LEGS						
	a) of approved material						
	b) properly maintained						
18	PRODUCT CONVEYORS						
	a) equipped with water spray, scraper, etc.						
19	FISH FLUMES						
	a) of approved material						
	b) properly constructed						

DETAILED PLANT INSPECTION
AND RATING REPORT
(page 5)

PLANT NAME	OPER. TYPE(S)	DATE OF INSP.	TYPE OF INSP.

CONSTRUCTION AND EQUIPMENT REQUIREMENTS							
	Item/Sub-Item	DEFICIENCY SCORE			NA	SCORE	DEFICIENCY DESCRIPTION/ COMMENTS DATES FOR CORRECTION
		MAJ	Se	CR			
20	CUTTING BOARD, CRACKING BLOCKS AND MALLETS, ROLLER DEVICES						
	a) of approved material						
	b) In good repair, crack-free						
	c) roller devices equipped with Spray washers						
21	RECEPTACLES, TRAYS, TANKS VATS AND UTENSILS						
	a) of approved material						
	b) surfaces smooth, crack-free, in good repair						
	c) provided for drainage, where required						
22	WIRE MESH UTENSILS						
	a) not permitted						
23	ENAMELS UTENSILS						
	a) not permitted						
24	FREEZING FACILITIES - CONTACT FREEZERS						
	a) adequate						
25	FREEZING FACILITIES - BLAST FREEZERS						
	a) adequate						
26	FROZEN STORAGE						
	a) rooms maintained at proper temperature						
	b) rooms equipped with approved thermometer						

EMPLOYEE HYGIENIC PRACTICES CHECKLIST

Plant : _____ Date: _____
Inspector : _____

REQUIRED PRACTICE	S	N	U	COMMENTS
Employee Health				
Employee Appearance				
Smoking				
Spitting				
Hand washing/Dipping				
Using Foot Dips				
Headgear				
Outer Garments				
Hand Covering				
Toilet Areas				

S = Satisfactory
N = Needs Improvement
U = Unsatisfactory

Comments/Action Taken

_____
_____
_____
_____
_____
_____

DETAILED PLANT HYGIENIC INSPECTION REPORT

Company Name : _____

Date : _____

ITEM	OPERATION REQUIREMENTS DEFICIENCY SCORE				DATE OF CORRECTION
	CRI	SER	MAJ	MIN	
Employee Health A. No known carrier					
B. No communicable disease or sore					
C. No open wounds or sores					
Hand Wash Facilities A. Proper washing of hands					
B. Proper disinfection of gloves					
Washing of Equipment A. Properly washed and clean before and after using					
B. Properly sanitized					
Ice A. Made of water from approved source free from foreign matter, no contamination					
B. Properly stored in cooling tanks					
Offal Removal A. Removed immediately					
B. Equipment kept clean					
C. Proper method of disposal					
Utensil Cleaning A. Cleaned and sanitized during processing					

ITEM	OPERATION REQUIREMENTS DEFICIENCY SCORE				DATE OF CORRECTION
	CRI	SER	MAJ	MIN	
B. Cleaned and disinfected after work					
C. Dried and stored in sanitary manner					
General cleaning and maintenance A. Facilities and equipment in good repair					
B. Facilities and equipment kept clean					
Chill Tanks A. Properly cleaned and sanitized					
B. Proper temperature of ice					
C. Proper protection against a rise in room temperature					
Cold Storage Area A. Proper temperature device to record the temperature on a continuous basis					
B. Frozen Tuna properly protected from rise in temperature					
Toilet Facilities Properly cleaned and sanitized					
Outer Plant Surroundings Clean and Tidy					

If during inspection it is found that there are no defects for an item, then you are to record that it is OK in the area marked Date for Corrections.

ACTION REPORT

Plant Name : _____

Type of Operation : _____

ITEM NO.	DEFICIENCY	ACTION BY

Signature

_____

Date

SECTION 5

GRADING OF
BIGEYE AND YELLOWFIN TUNA

5.1 INTRODUCTION

There is a need of establish the proper standards for the grading of tuna.

Tuna must be graded before it is shipped to the end user. By using the system which has been adapted by the countries which process tuna, we will attempt to set up a set of guidelines for the proper quality grading standards for bigeye and yellow fin tuna.

There are separate standards for the colour of bigeye and yellowfin tuna. In regards to the condition of both types of fish there is only one set of standards.

5.2 NOMENCLATURE

ABRASIONS	Scratching of the skin
BLEACHING	Whitening of the skin surface
DISTORTION	Improper shape
GLOSSY	The meat is shining
INGRESO	Entering
OPAQUE	Cannot see through
STAINING	Skin or flesh is discoloured
TRANSLUCENT	Shining throughout
TRANSPARENT	Very clear

5.3 A POINT SCORE SYSTEM FOR GRADING TUNA

5.3.1 Colour

The natural colour of tuna is affected by many factors. The most important one being the freshness, fat content, and time of exposure to the air. Freshly cut surface of tuna meat are dark, and become bright red as the tissues take up oxygen. It is important to remember this factor when grading, you must wait 30 minutes after the notches are cut.

To inspect colour, remove the tuna from the ice and cut off from the fifth and sixth caudal finlet. Cut a notch about 3 to 4 cm in from this cut.

Remove the piece of meat, and wait 30 minutes before comparing with the descriptions in Sections 5.4 and 5.5.

Inspection is done for colour to determine whether it is for sashimi, loins, canning, and or other markets, depending on the buyer.

5.3.2 Condition

Condition has two aspects: carcass and flesh condition. Carcass condition is assessed in terms of damage of the exterior damage to the skin; for example rips, cuts and tears. Flesh condition is done by assessing the meat at the tail cut to see if there is gaping, parasites and disease, and also along the exterior surface of the carcass damage which can be felt with the fingers. Bruising is one example.

The table presented in Section 5.6 is for assessing and scoring carcass condition. It is also important that the characteristics described in the table can occur in various combinations, and therefore a judgement must be made. For example, you can have a tuna which has a good fat content but is not very fresh. This tuna may be considered the same as a tuna that is very fresh but has a very little or no fat.

5.3.3 Grading

A flowchart for sizing and tuna grading at sea and on shore is given in Section 5.9.

5.4 COLOUR SCORES FOR BIGEYE TUNA

5.4.1 Very Good (Score 50)

i) Meat is transparent, glossy.
ii) Colours are bright.
iii) Large amounts of fat present, penetrating into the inner muscles layers.

5.4.2 Good (Score 40)

i) Meat is a little translucent, and less glossy.
ii) Colours are less bright.
iii) Large amounts of fat present, penetrating into the inner muscle layers, note some carcasses are too fat.

5.4.3 Medium (Score 30)

i) Meat is translucent, and has lost its gloss.
ii) Colours are a little dull.
iii) Fat is present, but with little or no penetration to the inner muscles.
iv) Meat colour may appear a little brownish.

5.4.4 Poor (Score 20)

i) The meat is almost opaque.
ii) The colour of the meat is distinctively brownish, and dull.
iii) There is no visible fat in the outer layers, the meat is the same colour throughout.

5.4.5 Very Poor (Score 10)

i) The meat is opaque.
ii) The colour of the meat is brown, whitish or grey.
iii) Little or no fat visible in the outer layers.

5.5 COLOUR SCORES FOR THE YELLOWFIN TUNA

5.5.1 Very Good (Score 50)

i) Meat is transparent, glossy.
ii) Colours are bright.
iii) Fat is clearly visible.

5.5.2 Good (Score 40)

i) Meat is a little translucent, and less glossy.
Ii) Colours are less bright.
iii) Fat just visible in outer layers.

5.5.3 Medium (Score 30)

i) Meat is translucent, and has lost its gloss.
ii) Colours are a little dull, a little brownish.
iii) No fat visible in outer layers.

5.5.4 Poor (Score 40)

i) The meat is almost opaque, no gloss.
ii) Colours distinctively brownish and dull.
iii) No fat visible in outer layers.

5.5.5 Very Poor (Score 10)

i) The meat is opaque.
ii) The colour is brown, whitish, or grey.
iii) No fat visible in outer layers.

5.6 CONDITION SCORES FOR YELLOWFIN AND BIGEYE TUNA

5.6.1 Very Good (Score 50)

i) No apparent defects/damage (no rips, tears, cuts and abrasions).
ii) Scales intact.
iii) Fish looks as though it has just been lifted from the water, natural body colours bright.
iv) Flesh at notch very firm, springs back quickly on pressing lightly with fingertips. No soft spots present on carcass surface.

5.6.2 Good (Score 40)

i) Slight defects/damage, there are a few minor rips, tears, cuts,

abrasions.

ii) Some scales loss.

iii) Body colours are a little dull.

iv) Flesh at notch, springs back slowly on pressing lightly with fingertips. One or two very small soft spots present on carcass surface.

5.6.3 Medium (Score 30)

i) Noticeable defects/damage, a maximum of two rips, tears, cuts, abrasions which could affect the meat yield.

ii) Small patches of scales lost.

iii) Body colours dull/dark.

iv) Flesh at notch less firm, does not spring back fully on pressing lightly with the finger tips several small spots present on carcass surface.

5.6.4 Poor (Score 20)

i) More than two rips, tears, cuts or abrasions which could affect meat yield.

ii) Large patches of scales lost.

iii) Body colours dark.

iv) Bleaching, red staining very apparent.

v) Flesh at notch soft, does not spring back at all on pressing lightly with fingertips. Large soft areas on carcass surface .

5.6.5 Very Poor (Score 10)

i) Severe body damage, distortion.

ii) Severe scale loss.

iii) Body colours dark.

iv) Severe bleaching, staining.

v) Flesh at notch very soft, falling apart. Carcass surface breaking up.

vi) Meat has evidence of parasites or disease.

QUALITY GRADING FORM FOR THE INSPECTION OF COLOUR

Name of Vessel: _____

Date Landed: _____

Description	Very Good	Good	Medium	Poor	Very Poor
Flesh Colour					
Transparency Flesh					
Fat Content					
Freshness					

COMMENTS

SIGNATURE

POSITION

QUALITY GRADING FORM FOR THE INSPECTION OF CONDITION

Name of Vessel: _____

Date Landed: _____

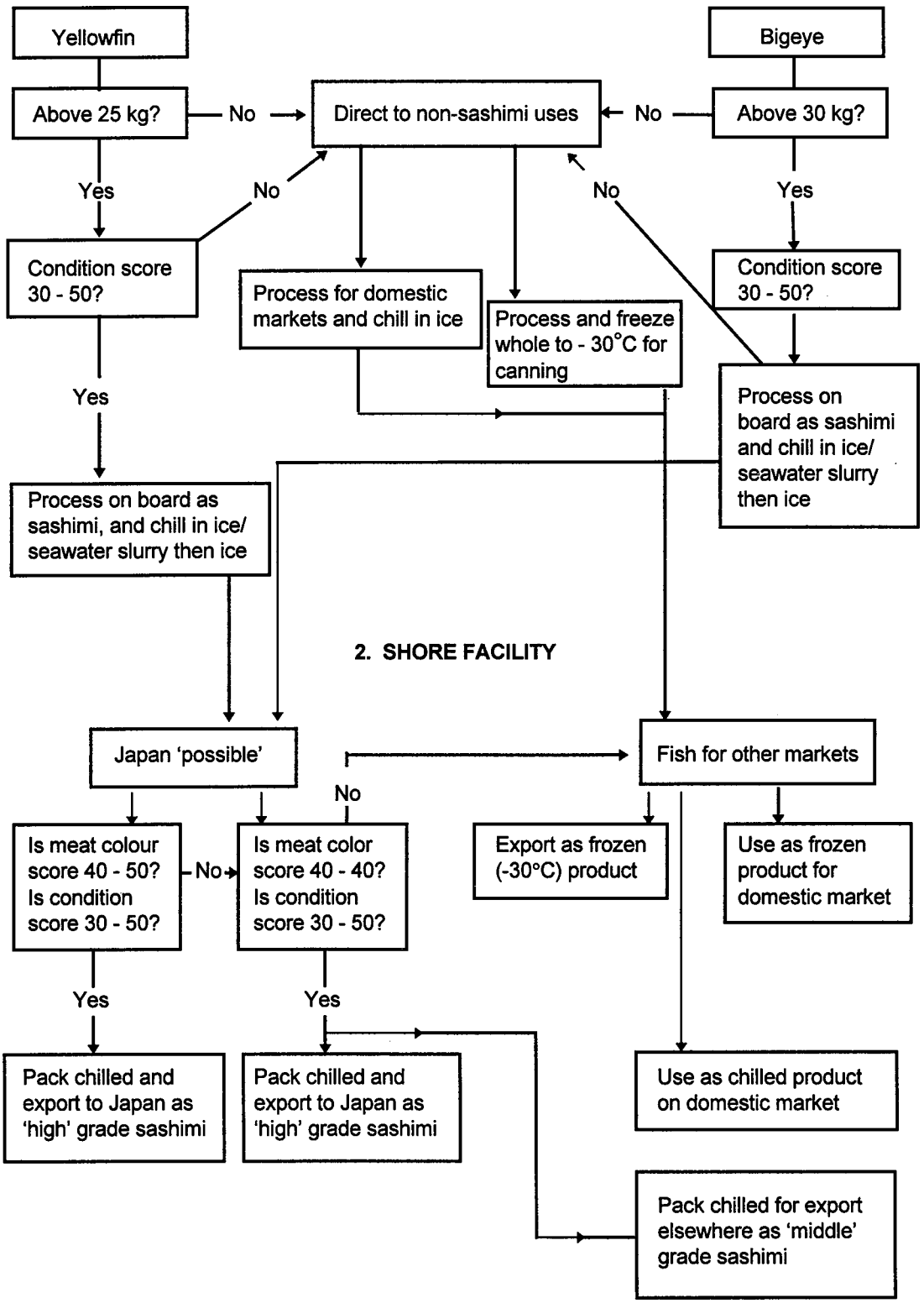
Description	Very Good	Good	Medium	Poor	Very Poor
Scales					
Skin Surface					
Body Colour					
Texture					
Bleaching					
Staining					

COMMENTS

SIGNATURE

POSITION

5.9 Flowchart for Tuna Grading



SECTION 6

THE PROPER UNLOADING OF FRESH TUNA FROM FISHING VESSELS

6.1 PROCEDURE IN PLACE AT PRESENT IN INDONESIA

6.1.1 Improvements

There is at present a need to improve the method of handling for the unloading process.

The systems which are presently in use in different areas are as follows:

SYSTEM 1

The tuna in this type of operation is unloaded by the procedure of using people to unload the fishing vessel.

All tuna is handled by the use of human labour. Every tuna is man-handled. From the time it is removed from the ice till the time it is placed into the processing plant it must be handled by the use of human intervention. This, in actual fact means, that this process requires that a tuna must be handled at a minimum of SIX times before it is placed into the processing plant. If this method of handling is to be continued it will create many problems with the QUALITY of tuna. We must remember that for every time that we handle a tuna, we are decreasing the value of the fish. It is estimated that for every time a tuna is handled, the percentage of Grade A tuna is decreased by 3 to 5 percentage points.

SYSTEM 2

In this method of unloading, there is in place aboard the fishing vessel, a fish hoist that will remove the tuna from the fish hole and place on the deck of the vessel. The tuna is then removed from the deck by the means of human intervention up a chute and onto either a trolley or into the back of a truck. Also with this type of system, there are some facilities, whereby the tuna is transported to the processing plant by the means of fibreglass chutes. Even though there is a decrease in handling by the method of the use of chutes, considerable handling and a decrease in the overall quality of the tuna is still present.

In System 2 there is a method of handling of tuna at unloading which must be addressed: the method of placing tuna in the back of an open truck, and transporting the tuna to a processing plant. There must be a more effective means to handle tuna. This system of handling must discontinue, if we are going to maintain the quality of the tuna.

SYSTEM 3

In this method of unloading, there is a boom truck available to decrease the amount of handling. With this system in place, it eliminates the amount of handling which is placed on the tuna. When the product is removed from the ice, there is a rope or sling placed around the tail, which inturn is placed onto the hook of the cable from the boom truck. The tuna is removed from the vessel and placed into the slush container. This system is very effective because it eliminates excessive handling.

6.1.2 Hatch Size And Vessel Design

FISH HOLE SIZE: There is a concern in regards to the size of the hatch for the removal of the tuna from the fish hole.

During our travels to the unloading and processing facilities, it was noticed that the fish hole opening was very small. This, when the unloading process was in operation, raised concerns to the quality of the tuna.

Many vessels have at present, a very small opening for the loading and unloading of tuna. Due to the size of the fish hole opening, there is a problem with the amount of damage that occurs with the outer surface of the tuna. There is not sufficient area so as to protect the tuna. When the overall inspection of the whole tuna is completed, the outer surface is also taken into consideration.

In the inspection procedure, if the skin and outer surface is damaged, then it will and do affect the overall quality grading of the tuna. Tuna is graded by colour and appearance. The outer surface will tell the buyer what way we are handling our tuna. If there is damage to the skin and outer meat it affects the yield that the end user will recover. If the skin is damaged, then the outer meat is also damaged, which in turn causes a decrease in the recovery of usable meat. When this happens, it is a determining factor in what price is to be paid to both the processor and the fishing vessel.

We must all remember that the price of tuna is always determined by the quality of the meat and the method in which the tuna is handled. When the buyer is viewing the whole tuna, he is looking at what the appearance of the outer surface is like. He determines his price only on what usable product he can deliver to the end user. Usable product is determined by the colour and texture of the meat.

6.2 PROPER PROCEDURES FOR THE UNLOADING OF FRESH TUNA

In order to demand a higher price for our tuna, we must ensure the end user that we are doing everything possible to maintain the highest quality and excellent workmanship of our product. In the proper unloading system we will attempt to show the end user that we are controlling the way in which we will handle our tuna at time of discharging. The system which is required to be established is listed in the following text of this report.

6.2.1 Temperature

The first requirement is to have an inspection carried out on the temperature of the tuna before it is removed from the fishing vessel. The first fish to be inspected for the proper temperature is the last fish which has been processed at sea.

The proper equipment which is required to inspect the core temperature of the tuna is by using an Electronic Temperature Gauge which has a probe attached that can reach the core of the tuna.

To check the temperature, place the probe into the cut which has been previously made behind the pectoral fin for bleeding. If the core temperature of the tuna is not at 0°C, the fish should remain aboard the vessel or if needed to be removed, it must be placed into slush ice and water until the proper temperature is reached.

6.2.2 Fish Hole Chart

Before the discharge is to commence, the unloading personnel must have from the fishing vessel a fish hole chart which should show where each day's fishing is properly stored. It is very important to know where the oldest fish is on board the vessel. The buyer will want to know the age of the tuna so as to determine what market to ship the fish to. The type of chart which should be used by the vessel owner is attached in Section 6.2.12.

6.2.3 Temperature Inspection

During discharging of the tuna, there must be random checks recorded to ensure that all the tuna have a core temperature of 0°C. The amount of tuna to be inspected is 20%. So for every 10 tuna, we must check TWO tuna for temperature. Attached in Section 6.2.13 is a form showing the type of Temperature Log which should be used.

6.2.4 Equipment

Before the unloading begins, there should be in place a required number of insulated containers to handle the unloading of the tuna. These containers must be properly cleaned and free from contamination. There must be a proper mixture of two parts ice and one part clean and safe salt water.

6.2.5 Proper Fish Unloading System

The system which is needed, is to have a permanent fish unloading system in place at the unloading sites. With the proper system there would be a considerable decrease in the handling of tuna. The handling would decrease by 80%. This would help to maintain the quality of the tuna by improving the workmanship procedure. With this system it would be required that the tuna would be handled when it is removed from the ice in the fish hole, control the fish as it is being hoisted up through the fish hatch, and when it is being placed into the slush container. The diagrams attached as Annex 11 shows the proper design of equipment for the unloading of tuna.

6.2.6 Unloading Requirements

Some requirements that are needed when the discharge is to begin. The fish hatch must be properly covered around each side so as to ensure that no damage can happen to tuna as it is being removed from the fish hole. There should be clean salt water to clean off the old ice from the surface of the tuna as it is being removed from the fish hole. All old ice in the belly section must also be removed from the tuna as it is being discharged.

6.2.7 The Age of the Tuna

During the unloading process, the oldest tuna must be kept separate from the other tuna. When the old tuna is being discharged, the containers which they are placed in should be marked and kept separately.

6.2.8 Insulated Containers

With the use of insulated containers which have the proper slush ice and water, the tuna can be properly stored and moved to the processing plant for further processing. The use of containers at unloading sites, helps with the handling and maintains the temperature of the fish. The containers should not be over filled. The least amount of pressure that can be put on the tuna, the better it is for the fish in the bottom of the container. After the container is filled it should be properly covered and removed to the processing plant if it is close by.

6.2.9 Transportation Procedures

For tuna which has to be transported by truck to a processing plant, the required system that must be used is in a proper clean insulated truck which is equipped with a cooling unit so as to control the temperature during transportation. Tuna must not be transported loose in any type of truck, the quality of the tuna must be cared for at all times.

Open trucks are not permitted to be used in the transportation of tuna from the fishing vessel to the processing plant. With the use of this method the quality of the tuna and workmanship would be decreased.

6.2.10 Cleaning of Fish Storage Area

Immediately after the tuna has been removed from the fish hole, all ice must be removed.

The fish hole must be properly cleaned and sanitized. All care must be taken to ensure that the fish hole is free from any contamination and any discarded materials.

Only clean safe water is to be used in the cleaning process of the fish hole.

After the fish hole has been properly cleaned and sanitized and before new ice is placed in the hole, the fish hole must be properly rinsed so as to ensure that the sanitized solution is properly removed.

6.2.11 Icing of the Vessel

Only ice which is made from properly approved water is permitted to be used aboard the vessel.

Ice should be properly crushed so as to ensure that there are no sharp edges or large pieces of ice which could create a problem in the icing of tuna.

The proper method of transportation of ice to the fishing vessel is as follows:

A) Truck which is used for the purpose of transporting of ice to the vessel must be properly cleaned and sanitized and rinsed before any ice is placed in it.

B) Ice, while being transported to the vessel must be covered properly to protect from contamination.

6.2.12

FISH HOLE CHART

Name of Vessel: _____

Date Started Fishing: _____

Date Stopped Fishing: _____

Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

Each day there must be a record showing how many tuna were placed in the fish hole and where they are located. The fishing vessel must present the location of each day's fishing where the tuna is placed in the fish hole.

Signature of Vessel Owner: _____

TEMPERATURE RECORDING LOG
UNLOADING OPERATION

Name of Vessel: _____ Date Landed: _____

Time Start Discharging: _____ Time Finished Discharging: _____

Time	Temperature	No. Of Days In Ice	Comments

Signature of Inspector: _____

This document should accompany the shipment to the processing plant. If there are any problems with any part of the shipment of tuna in regards to the temperature, the problem tuna should be marked & held in insulated container at processing plant for further inspection.

6.3 CONTROL POINTS

6.3.1 Discharging

In the method of discharging there are areas which can become critical if effective planning is not carried out.

1) Tuna must be handled quickly and carefully at all times.

2) Protect the tuna during discharge that it will not be damaged.

3) Tuna is not to be dragged or hauled either across the deck or up a chute.

4) Tuna must be protected from the heat of the sun.

Decrease the number of times tuna is handled from the time it is removed from the fish hole till the time it gets to the processing plant.

All tuna whether it is for the sashimi, fresh loins, canning, freezing, or for local markets, must be treated as a food item and must be handled in accordance with Good Handling and Manufacturing Practices.

6.3.2 Temperature

There must be regular checks carried out during the unloading process to ensure that the fish are properly chilled. If there are fish that have high temperatures, these fish will have quality problems if not corrected.

1) Know where the problem can occur and have a plan in place to prevent it from happening.

2) Have proper canopy in place to protect the tuna from direct contact with the sun.

3) Proper slush tanks be prepared before start of discharging.

4) Decrease the amount of time that the tuna is out of the ice.

5) Tuna must be kept in proper containers that contain slush ice and salt water.

6.3.3 Unloading System

There must be a proper unloading system in place so as to maintain the quality of the tuna when it is being removed from the vessel. It is very important to decrease the amount of handling that occurs during discharge.

Tuna cannot be man-handled.

Proper protection must be in place around fish hole opening to protect the outer surface of the Tuna. The workmanship of the tuna will affect the quality of the fish.

Tuna should be lifted out of the vessel by the head.

All tuna must be treated in the same manner.

When removing tuna from the ice in the fish hole you cannot walk on the fish.

6.3.4 Transportation

The proper system for the transporting of tuna must be followed. Tuna can be damaged very easily if it is not handled properly.

No tuna is to be transported in an open truck.

No tuna is to be transported without proper protection.

All tuna is to be iced properly before transporting to the processing plant.

Properly cleaned and safe insulated containers must be used to transport tuna.

Trolleys should not be used, unless there is protection in place so as the tuna cannot be damaged.

Only trucks that have a proper cooling system in place should be used for the transporting of tuna to the processing plant. The truck box must be constructed of a clean and safe material whereby there is no means of contamination happening to the product.

6.3.5 Unloading Sites - Surroundings

The area around and the unloading site shall be kept clean at all times. If there is an accumulation of refuse in the area it will create objectionable odours, which in turn will attract insect and rodents which in turn will cause a sanitation problem.

No damaged or discarded containers are permitted around or on the unloading site.

Proper washing facilities must be in place. No dogs, cats and other animals are permitted around the site.

No containers which are used for offal shall be used for the handling of tuna.

A rodent and insect control program must be in place so as to ensure that the site does not become a public health hazard.

6.3.6 Ice

Ice must be handled in such a manner that it cannot come in contact with items which can cause contamination to the tuna. Ice must be made from approved water supply so as to ensure that the ice will not be a source of product contamination.

Only clean safe ice is to be used in the slush containers.

Used ice is not permitted.

Ice for use in the unloading system must be protected from contamination.

Ice which has come in contact with dirty containers is not permitted.

FISH UNLOADING SYSTEMS & DESCRIPTION

The Fish Handling System shown in Diagram A1 shows the method for unloading from small fishing vessels. It shows the method of grading, culling and boxing.

Diagram A2 shows the same system with a tuna suspended from the hook.

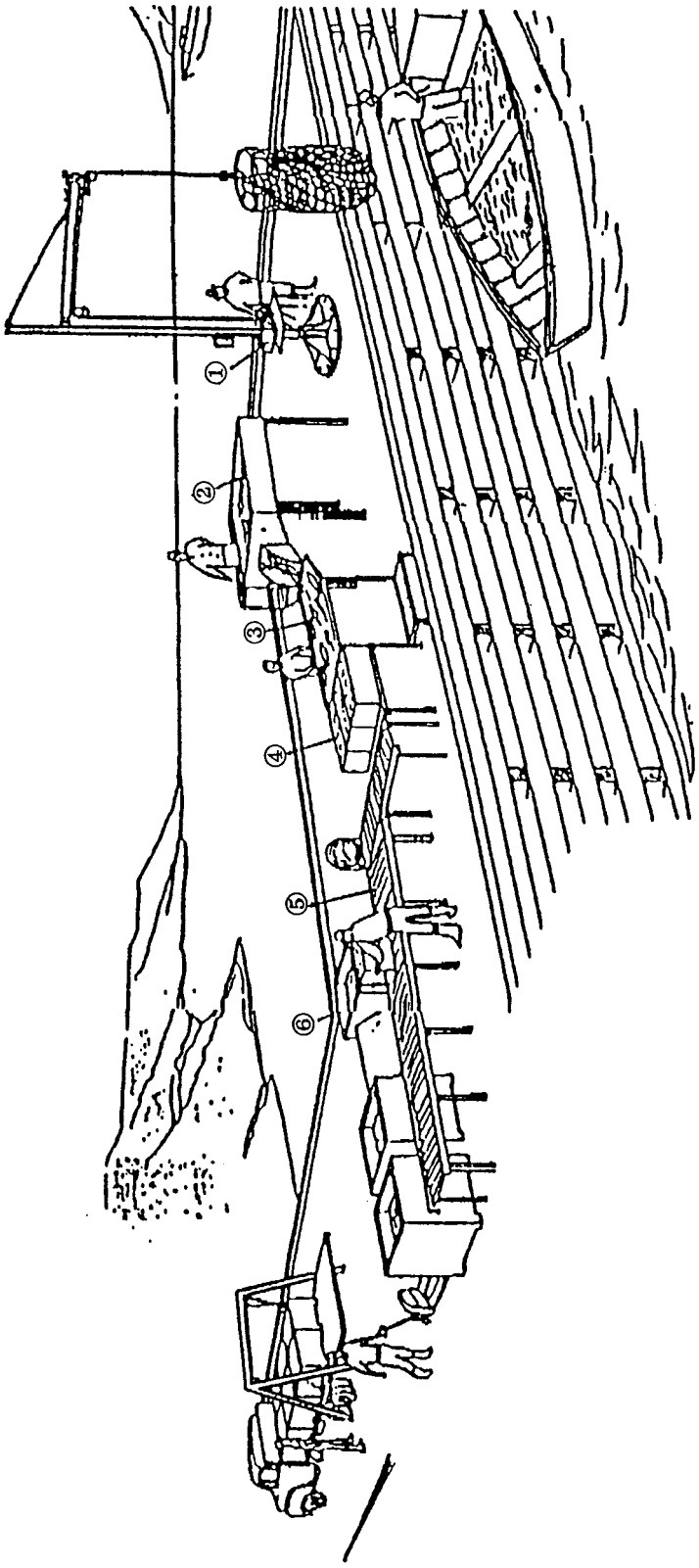


Diagram A1 Fishing Handling System

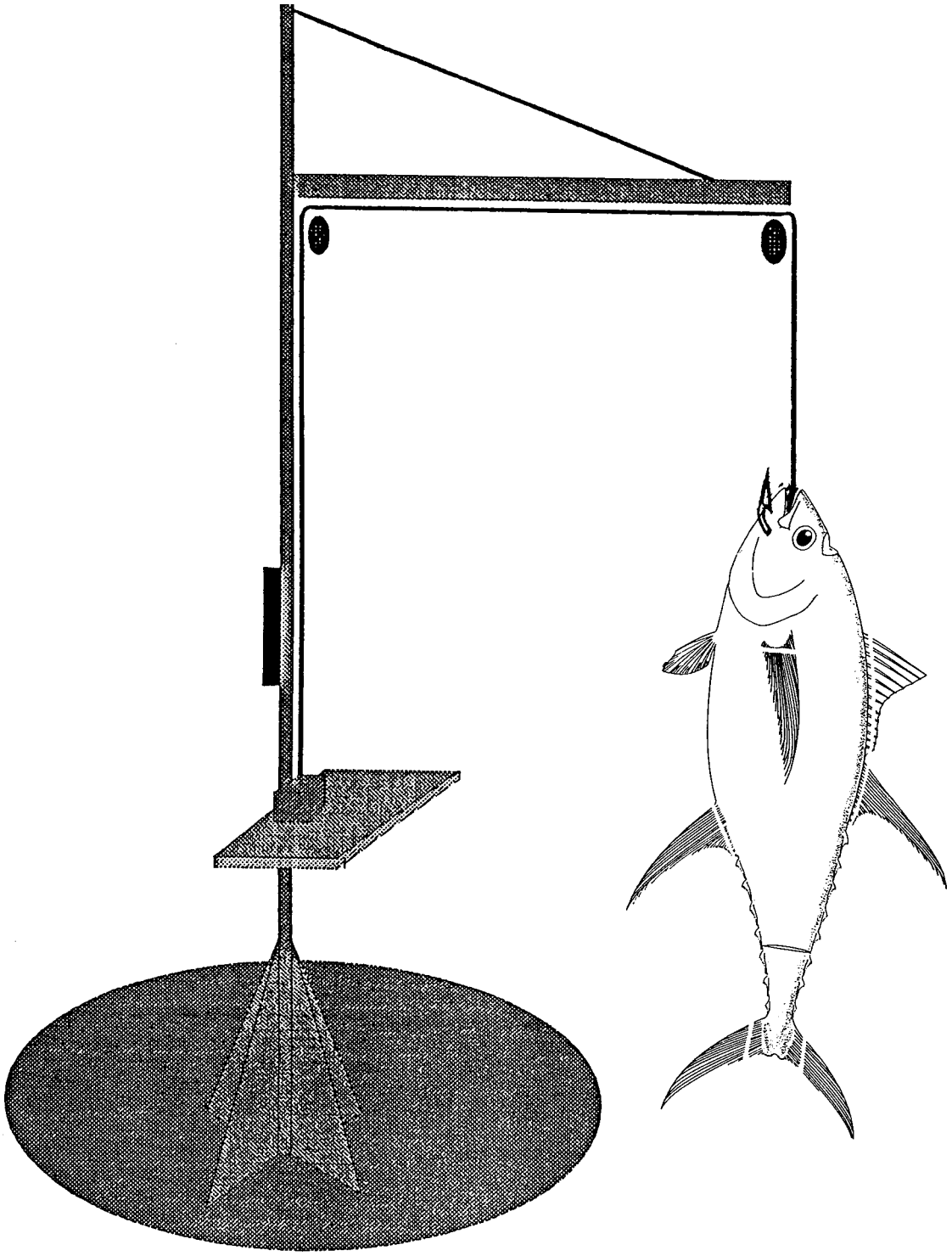


Diagram A2

SECTION 7

BIBLIOGRAPHY

7.0 BIBLIOGRAPHY

Handbook of Compliance
Department of Fisheries and Oceans
Ottawa, Canada

Quality Management Program Submission Guide (1990)
Department of Fisheries and Oceans
Ottawa, Canada

Sanitation & Hygiene Employee Handbook
Institute of Fisheries and Marine Technology
St. John's, Newfoundland, Canada

Nakamura, Robert M. *et. al.*
The Management of Yellowfin Tuna In the Handline Fishing Industry of Hawaii:
A Fish-handling Handbook
University of Hawaii Sea Grant College Program (1987)
UNIHI-SEAGRANT-AR-88-01

Putro, Sumpenlo
Handling and Processing of Tuna for Sashimi
INFOFISH Technical Handbook 1:
INFOFISH, Malaysia 1990

Williams, S. E.
Marketing Tuna in Japan.
Queensland Fishing Industry Training Committee, Australia, 1986

Guide to Good Manufacturing Practices (GMP)
Department of Fisheries and Oceans
Ottawa, Canada

Proper Unloading Procedures Guide
Institute of Fisheries and Marine Technology
St. John's Newfoundland, Canada

Hoar, W. S. and Randall D. J. Ed
Fish Physiology Vol IV: The Nervous System, Circulation and Respiration.
Academic Press 1970