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Facilities Inspection Manual for assessing conditions and operational requirements in a typical Uganda fish Processing Establishment with particular reference to legal requirements for general conditions relating to premises and equipment (*Draft Manual)*

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ABSTRACT

This report attempts to review evidence from literature bearing in mind two questions: Are instructional techniques, procedures and methods for assessing premises and equipment conditions and operations available and effective in reducing food processing related hazards? Does the available evidence show certain assessment factors or practices to be more important than others in positive effects on these outcome measures? The report proceeds to offer an agenda for inspecting outstanding legal requirements in premises and equipment needs. Strengthening ways for identification of non-conformities through interpretation of requirements based on good practices; identification of method of inspection; description of procedure for inspection; setting limits of tolerance; explanation of how to arrive at the correct rating for a non-conformity and rating for each item identified in the regulation. In this regard, the EU regulatory requirements have been described along with illustrations from the suggestions of experts to show how the steps contained within them can be met in realistic ways and put forward in an effective inspection program. A critical analysis of the above findings found certain requirements in viewing checklist inspection impacts and success with regard to the current establishment inspection system in Uganda. Despite some reservations and uncertainties, inspection systems as a necessary element in developing and maintaining effective risk control activities remain firmly supported by the available literature. What emerged from this review and analysis was the appreciation of meaningful inspection procedures and recognition of the factors both within and beyond the inspection process that could greatly affect its impact.

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1. INTRODUCTION

Uganda has the second biggest share in Lake Victoria (43%). Between 1992 and 1998 the fish industry sector greatly developed and revenues from fish exports increased from 12 to more than 60 million US dollars per year (MTTI 2000). At the beginning of 1999, 11 industrial factories were processing fish for export, more than 300 thousand people were earning their living directly from the fisheries sector and thousands of people were working in related industries like packaging, fishnet, transport industry or benefiting from the fish industry.

In 1999, after suspected fish poisoning in Lake Victoria, Uganda set a self-imposed ban on fish exports to the EU and started implementing appropriate corrective measures. The first EU field inspection mission identified the unreliability of Uganda's fish safety system and confirmed the ban.

1.1 Crisis in the fish industry

The ban resulted in heavy losses in terms of jobs and foreign income. Out of about 100,000 people involved in various activities about 32,000 lost their jobs, the others earned less than one third of their normal income. Families and other dependants of directly employed people were also affected (around 300,000 people).

According to government reports Uganda suffered a tremendous loss in terms of reduced returns for the whole duration of the ban from April to August 1999 MAAIF (2000). Until July 1999 losses were estimated at US$ 36.9 million. Losses to the fishing communities due to reduced prices and less fishing activity amounted to US$ 4.25 million per month.

Three out of 11 fish factories had to be closed and the remaining ones were working at 20% capacity. Therefore, most of the factories had to lay off 60% to 70% of their labour force. About 2,000 directly employed people had already been laid off (MAAIF 2000).

Other related industries like the packaging, fishnet and transport in general were directly affected and all the people involved also suffered consequences of the EU ban on the exports.

1.2 Main cause of the crisis

Unreliable Fish Safety Assurance System was identified as the main cause due to:

- **Deficient organisational fish inspection framework**. There was a problem with the structure of the competent authority and the lack of a clear line of command and accountability due to the involvement of two bodies. Uganda National Bureau of Standards (UNBS) designated as the "Competent Authority" and the Department of Fisheries Resources (DFR) responsible for implementing the fish inspection. The District Fisheries Offices were not reporting to the DFR and hence not following the instructions regarding hygiene and handling of fish as required by the EU regulations.

- **Weak regulations.** Regulations lacked updating/upgrading to meet the fish industry's and international market's requirements and were not fully enforced.

- **Weak capacity of the fish inspectors.** Inspectors could not perform their duties appropriately due to lack of training in Good Hygiene Practices (GHP) and Hazard Analysis Critical Control Points (HACCP), clear guidelines and appropriate operating practices in the fish inspection, in particular with regard to inspection of fish batches being landed, GHPs at landing sites, sampling procedures, etc. as well as auditing of GHPs and HACCP food safety assurance systems in the fish factories

- **Lack of laboratories with adequate capacity**. No laboratory was accredited and none was applying Good Laboratory Practices (GLPs).

- **Deficient fishing and transportation boats as well as landing sites**. Design/operations/maintenance did not permit appropriate fish handling in accordance with GHP requirements.

- **Fish handling** throughout the chain was not in accordance with GHPs. The ice used to preserve fish was a source of contamination and its production and preservation was not in accordance with GHP requirements.

1.3 Integrated remedial approach and strategy

The strategy adopted had two objectives: to lift the ban as soon as possible and to establish the necessary foundations for a reliable fish safety assurance system. Thus the approach and strategy adopted was of an integrated nature requiring participation at all levels of the fish production chain. Activities aiming at improving the organisational and regulatory frameworks were carried out parallel to strengthening the capacity of the fish inspection services, the technical support institutions and the private sector from the fishing to the factory level. A particular focus was put on the establishment of working tools, guidelines and methodologies (fish inspection manual, code of practice, inspection guides, etc.).

1.4 Concerted measures

The following were considered priority areas for immediate action:
Review of the organisational aspects. The responsibility of "Competent Authority" was shifted from UNBS to the DFR, which has the real regulatory authority for fish. The role of the central authority and its direct linkages with the Districts Fish Inspectors (DFI) were streamlined and strengthened.
Review of the regulation. Regulations were updated and made to conform to the international requirements. Recommendations were made and actions taken to facilitate its enforcement.
Strengthening the Institutional Framework Capacity:

- The capacity of the DFR (Regulatory and Inspection Authority) was reinforced. Fish inspection services were streamlined and the capacity of the DFR- the Competent Authority for the EU-was strengthened through:
  - training of fish inspectors in fish inspection, HACCP auditing and documentation and provision of fish inspection equipment;

- preparation of inspection tools such as a fish inspection manual, inspection guides and records;
- establishment of a documentation system at the central, district and landing site levels for better traceability; and
- introduction of an **IT** software for fish inspection benchmarking and monitoring;

- Technical support institutions were strengthened, through training of GHP and HACCP.
- Laboratories were upgraded by providing equipment and technical support aiming for accreditation.
- The private sector including the fishing, landing and factory levels was strengthened through training.

1.5 The current fish inspection program objectives

In order to strengthen the fish inspection system now and in the future, a special program was designed. The objectives of the program are:

To have appropriate standards for fish products in place that reflect the needs and concerns of both consumers and industry with regard to safety, quality, identity;

To have appropriate standards and codes of practices, and systems for assessing those requirements that contribute to the achievement of the products mentioned above;

To have in place a fair, visible and effective system, that provides reasonable legal requirements for assurance of compliance with product and process standards and includes the requisites, trained personnel, equipment, laboratories, protocol and procedures; and

To increase the understanding of the relevance, appropriateness and integrity of the inspection system and related procedures for the domestic and foreign markets.

1.6 Current Shortcomings in the fish and fish product control system in Uganda

Although Uganda fish regulation (MAAIF 1998) is harmonised with the EU requirements and its implementation has undergone major steps towards becoming reliable, further upgrading is still going on in the fish safety and quality assurance system.

The fish regulation provides many important legal requirements to be complied within the fish industry. These requirements cover fish Quality and Safety concerns in the following areas:

i. Fish landing sites
ii. Fish transport vehicles and vessels
iii. Placement of fish and fishery products on the market
iv. Fish processing establishments
v. Collection, transportation and delivery of samples
vi. Traceability and quality labelling

vi. Fish Health Certificate and other areas as provided under the Quality Assurance Rules or as the competent authority regulates on the basis of requirements provided by importing countries and international bodies.

The requirements for fish safety and quality assurance and the protocols for inspection provided in the current inspection manuals are of a general nature, hence are difficult to apply uniformly during inspection and audit.

1.7 Rationale for the project

1.7.1 Crisis in the fish inspection and control system

There are four different plant inspection types conducted by the competent authority on a regular basis using checklists. These include:

- Plant Certification (Evaluation of conformity to general requirements for Fish Handling and Processing Establishment),
- Operational Compliance Verification (Evaluation of conformity to requirements for general hygiene and handling practices in fish and processing Establishments),
- HACCP Review (Assessment of HACCP manual) and
- HACCP Verification (On-site verification of HACCP implementation).

The self-assessment and third party audits conducted at various levels of the inspection and control system revealed that the inspection guidelines in the current manual give varying interpretations in terms of what to look for and look at, procedures and methods of inspection to be applied and tolerance limits. Thus, this is presumed to have led to significant differences among inspectors in ensuring consistent and harmonious implementation of regulatory requirements defined in the manual. Lately, there have also been complaints from the industry regarding inconsistent non-conformity ratings by inspectors. The main cause is assumed to be due to the unreliability of the guidelines provided in the Manual for Standard Operating Procedures for Fish Inspection and Quality Assurance (DFR 2000b).

Although accepting the significance of other factors, it was thought that there is a need for explicit inspection system and protocol that ensures consistency and harmony in terms of the legal requirements, interpretations, methods and procedures for inspection and limits, explanations and ratings, for each sub-rule in the regulation. It is from this viewpoint that the objectives for this project were defined.

1.8 Objectives of the project

In relation to the facts on inconsistent non-conformity rating by inspectors (section 1.7.1) it was envisaged that an improved checklist on general requirements in fish handling and processing establishment be developed. In order to accomplish that the following objectives were developed for this project:

1. To review evidence from literature bearing in mind two questions:
   - Are instructional techniques, procedures and methods for assessing premises and equipment requirements as cited in the EU Council Directive 91/493/EEC (EU

1991) governing fish processing establishment conditions of operation available and effective in reducing food processing related hazards?
- Does the available evidence show certain assessment factors or practices to be more important than others in positive effects on these outcome measures?

2. To study the existing plant inspection system (Plant facilities certification checklist) in the Uganda Manual of Standard Operating Procedures for Fish Inspection and Quality Assurance. Develop standard, consistent and harmonised interpretation of requirements of the EU Council Directive 91/493/EEU. Identify methods and procedures of inspection of the items and set limits against which the items shall be rated and explanations on how to arrive at the correct rating for the items being assessed.
3. To develop a compliance verification checklist for evaluation of conformity to general requirements in fish handling and processing establishment for inspecting a typical Uganda fish processing establishment as laid down in the inspection manual.
4. To make recommendations for the Department of Fisheries Resources.

1.8.1 Scope of the project

The study is limited to cover a system for evaluation of conformity to general requirements for Fish Handling and Processing Establishments (facilities inspection system) in a typical Uganda fish chilling and freezing establishment. These covered requirements (Council Directive 91/493/EEC of 22 July 1991 Chapter III, Sections 1 to 11 (Appendix 1) on general conditions for establishments on land relating to premises and equipment as outlined below:

1. Working areas,
2. Areas where products are handled prepared and processed,
3. Cold rooms and where fishery products are stored,
4. Facilities for protection against pest such as insects, rodents, bird's etc.,
5. Instruments and working equipment such as cutting tables, containers, conveyor belts and knives,
6. Containers for fishery products not intended for human consumption and premises for storage of such containers
7. Facilities to provide adequate supplies of drinking water within the meaning of Council Directive 80/778/EEC,
8. Hygienic waste water disposal system,
9. Changing rooms, wash basins and flush lavatories etc.,
10. Facility for inspection services.
11. Facilities for cleaning and disinfecting means of transport,

The following areas of the EU Directive 91/493/EEC have not been considered as part of this project work:

I. General conditions of hygiene applicable to premises, equipment and staff.
II. Special conditions for handling fishery products on shore for fresh, frozen, thawed and processed products including condition concerning parasites.
III. Health controls and monitoring of product conditions, packaging identification/traceability and storage and transport.

2. LITERATURE REVIEW

Food hazard control and prevention strategies to assure every food processed is safe and processed in hygienic conditions regard inspection systems/manuals as an axiomatic part of all such efforts. To reinforce this point, requirements for food safety and hygienic processing are found in many food regulations or manuals promulgated by individual countries and food authorities (FAO 1993 and EU 1991).

Indeed, instances where inspection systems have been shown to be ineffective in reducing processing related food borne illnesses have been reported (Troller 1993), and at least one review has raised concerns about the 'worth' of food establishment safety and hygiene inspection programs (FVO 2000). In its defence, inspection system shortcomings can reflect the use of inadequate instructional techniques or situational factors that confound the assessment process or its objectives. Most importantly, the notion that inspection is somehow exempt from the accountability demands of business operations is no longer tenable. Moreover, in appreciating that adherence to inspection rules imposes added costs on responsible employers and extra burdens on employees too. Knowledge of factors that can influence success in inspection efforts would be especially important. Indeed one could argue that faulty or bad inspection systems/manuals may have worse consequences than no inspection system at all.

It was these issues that prompted this literature review. The originally conceived purpose was to address two questions:

Q- 1: Can the available instructional techniques, methods and procedures for assessing requirements cited in the EU Council Directive 91/493/EEC of 22 July 1991, governing fish processing establishment conditions and operations be shown to be truly effective in improving fish processing related safety and hygiene hazards?

Q- 2: Does the evidence single out certain elements/attributes or characteristics of assessment programs as having the most positive effects on achieving effective inspection system or manual?

Approaches to these questions would seem straightforward. Among the more obvious include:

(1). Search the literature for instructional techniques, procedures and methods on how the competent authorities in the EU countries and other countries have implemented applicable EU legislation on general conditions and operations relating to premises and equipment requirements and the associated changes in their fish processing safety and hygiene experience.

(2). Locate literature sources comparing the extent and nature of compliance to requirements expected of an inspection system/manual from countries approved to export to the EU countries with those not approved but operating in similar processing situations but exporting to non-EU countries.

(3). Analyse the instructional techniques in inspection systems/manuals and practices of competent authorities having exemplary safety/hygiene control programs and contrast them with others having worse performance but comparable operations, workforce size/makeup, and other inspection factors.

2.1 Effectiveness of Fish Processing Safety and Hygiene Inspection systems

Cases that show the effectiveness of assessment systems of fish processing establishment in reducing processing related food borne illnesses have been reported (Chesworth 1997). Published data (FVO 2000) and unpublished evidence shows that many countries have implemented the EU requirements relating to the general conditions for establishments. It was not possible to establish with the limited data and time available whether this compliance was achieved as a result of implementation of a comprehensive checklist inspection system, separate assessment-specific effects or other factors, and if so, what instructional techniques or situational factors were included,.

The FVO (2000) acknowledges that the performance of the competent authorities is often weakened due to operational deficiencies, e.g. a lack of well-defined procedures, insufficient documentation of supervision and ineffective enforcement of corrective systems, but does not give guidelines of instructional techniques, procedural requirements or methods to achieve successful inspection.

The Canadian Food Inspection Agency (CFIA 1999) points out the need for legislative framework that provides the necessary authority for the Fish Inspection Program to enforce standards concerning safety, management and reporting structures, mandates, resources and program policies. No details of how the inspection system/manual can be developed are mentioned, but the principle of interpretation of requirements is acknowledged.

The competent authority in Iceland has produced a comprehensive inspection manual that outlines the aspects of the operation of the inspection services. It lays down the structure of the shared jurisdiction, fish inspection program roles and responsibilities, program networks, policies and procedures, standard setting mechanisms and establishment assessment mechanism. The manual interprets the local legislation, identifies procedures and methods for inspecting the attributes and rating system for non-conformities.

The Icelandic Inspection Manual (Fiskistofa 1999) is based on similar principles of interpretation, methods and procedures of inspection and rating as CFIA. The system looks for the intent of the requirement in the legislation and identifies the compliance needed for that requirement. It identifies the methods and procedures of inspection and includes a rating system.

The increasing availability of predictive models to anticipate the biostatic or biocidal effects of various combinations of methods for controlling biological and chemical hazards is facilitating the choice of optimum formulation, processing and storage procedures to assure that the product will be of good quality. Hazard Analysis and Critical Control Points (HACCP) procedures have been developed to choose the relevant monitoring procedures relative to the appropriate hazard(s) and the correct functioning of plant. Such predictive models can be used to develop methods and procedures of assessing processing conditions and operations (Harrigan and Park 1991).

2.2 Aspects of Quality Assurance Management

Inspection and auditing has grown over the last few years, spurred by the interpretation of the legislation by retailers, producing establishments, and enforcement authorities. At a basic level, it has an important role in establishing a satisfactory "*Due Diligence*" defence, should the product cause a problem.

Inspection objectives require assessing that the facility is suitable and capable to produce a safe product and that legal constraints on the product are being met. It also requires that an effective control measure is in place to ensure consistent performance. The management commitment to quality and safety is important. A focus on a particular problem or quality issue, is expected to contribute to the goal of reducing the risk of bad flavour, foreign matter and micro-organisms in food thus, increasing food safety, quality and consumer confidence (Crossland 1997).

According to Brown (1997), there is a need to ensure that correct standards of performance are in place, that these standards are being adhered to and there is therefore a system of controls available to measure these standards. It is also important that these controls are manageable, realistic, understood and promoted by everyone from senior management downwards and their implementation must be fair, equitable, comprehensive, and supported by well-established systems of corrective action.

Assessment must be emphasised as a basis for good inspection (Brown 1997). Planning an assessment and acknowledged competence of inspectors has been raised as significant in achieving the objectives of inspection. According to Harrigan and Park (1991), HACCP provides a good framework for bringing hazard expertise to bear on the manufacture, distribution and storage of food products. It requires a thorough knowledge of food hazards and training of all staff in aspects of hygiene.

Clearly, then, in designing control mechanisms, an organisation/individual has to look at the most important goals facing the operation and identify which areas are most vulnerable to failures, which could in turn adversely affect the outcome. Standards of achievement must be driven by external demands (Brown 1997).

In the food production industry, the demands of legislation, customers and ultimately the expectation of the consumer of the product set the desired standards. In simple terms, once external requirements have been established and defined in terms of expected performance the organisation/individual has to analyse every process, which goes into achieving the output requirements. This analysis should define the process in detail and the inputs into the process such as people, systems, equipment and machinery etc. (Brown 1997). From this the measures or control which will indicate if the process is meeting performance requirements can also be established. The frequency of attention each control receives in inspection terms will usually depend on its impact upon food safety and outcome of the process.

Cooper (1994) states that signs or indicators of a potential criminal violations include:

- Serious wrongful conduct;
- Historical non-compliance;
- Incriminating documents;

- A culture that does not take regulations seriously, that prevents knowledge of a serious problem from reaching higher management, and/or simply allows known problems to persist.

According to Chesworth, (1997), reporting audits is very important, both to the relationship between the two parties and to any due diligence defence. The reporting must reflect areas where performance is good, as well as those where problems exit. Reporting style vary from the purely documentary, through checklists, to elaborate scoring systems which try to weigh the various attributes.

Checklists need very careful design to reflect the different critical parameters in different food industry sectors. According to Crossland (1997), a good option is to cover the common general hygiene and GMPs requirements in one section, followed by industry specific lists, driven by HACCP identification of the hazards appropriate to the process. As Crossland (1997) has noted, a checklist has the benefit of being easy to complete during an audit, with the potential for leaving a copy with the supplier at the conclusion. They are easily computerised and reflect both the negative and positive. However, if they are poorly designed and lengthy, they can become too prescriptive and distract the auditor from objective observation.

According to Harrigan and Park (1991), the essential components of a quality assessment system include; legislation, relevance and appropriateness of methods and procedures used, and adequate instructional techniques. Eliminating situational factors that can confound the assessment process such as adoption of a fixed personal style and inspection frequency which may give rise to the inspector becoming familiar, and then less responsive to future inspections.

Radford (1997) cites specialist training needs for auditors/inspectors on techniques such as specific instruction regarding working procedures, definitions of relevant aspects of good workmanship, body language and open questioning enable greater levels of communication with the auditee and increased confidence when auditing.

To facilitate trade between companies and between countries it is necessary to establish procedures for ensuring each product line. Therefore, companies and inspection bodies have to establish a suitable quality assurance system (the organisational structure, responsibilities, procedures, processes and resources for implementing quality management) and make available adequate equipment, personnel and other resources to make the quality system effective.

The enforcement of general food hygiene regulations is a matter for local authorities. The regulations place a direct duty on the proprietor of a food business to make sure that the operation carried out in respect to any activity involving food is carried in hygienic way (Crossland 1997).

2.3 Attribute of assessment programs requirements

The *Due Diligence* defence requires establishing reasonable precautions and evidence that all due diligence has been exercised in premises- design and fabrication, raw material, process, equipment and machinery, personnel hygiene, preventive pest control, and cleaning and disinfecting systems. There must be a system operating fully

by the organisation. The system must be one, which considers all possible risks and certain measures to monitor and eradicate risks. The system must be set out in writing (Crossland 1997). The staff must be trained fully and a good recording system maintained. Where any complaint is received it must be fully investigated to determine if there are any faults in the system. All members of staff must appreciate their own responsibilities. The system must be continually checked and evaluated and modifications made where appropriate.

2.4 Summary of establishment requirements for sea food processing

A great variability exists in the size and extent of handling in fish processing establishments. Accordingly the hygienic requirements and the design in fish handling areas may vary considerably but the principles of inspection are basically the same. According to Troller (1993), all the requirements commonly listed in the legislation and codes of practices are not equally important. The most important factors include facilities for water supply, waste disposal and cooling and cold storage facilities and their capacity. Of less importance are buildings, ventilation, factory location, clothes changing facilities, lighting and roadways. This contravenes Juran's philosophy of quality as "fitness for use or purpose" as distinguished from "conformance to specification" (Harrigan and Park 1991).

FDA (2001) has promulgated general Good Manufacturing Practices (GMP) regarding facets of manufacturing process including requirements regarding cleanliness, education, training, supervision and freedom from communicable disease. The building, facilities and equipment design and appropriate application of quality control procedures in food plants is necessary (Middlekauff 1989). Similar requirements for production and placement of fishery product to the market.are embraced by FAO (1993) and the EU (1991).

2.4.1 Buildings, Construction and Layout

According to Sea Fish Industry Authority (1992) and Thomas (1997), a processing plant shall provide:
- Adequate space for equipment installations and storage of materials
- Separation of operation that might contaminate food
- Adequate lighting and ventilation
- Protection against pest.

2.4.2 Premises design and fabrication

According to Thomas (1997), the basic principles of plant design emphasise; *versatility*-internal hygiene cladding which can be easily dismantled and re-erected to give maximum flexibility, *elimination of bad practices*-at time of design the system should be made to build out bad habits and practices. Due regard should be given to making the system as user friendly as possible; logical, simple, easy to keep, with in-built disciplines and technical restraints to minimise policing duties. *Continuous flow*-the flow should be continuous and progress should be in a single logical flow to avoid cross-contamination. *Physical separations*- in terms of product and personnel with separate changing facilities and microbiologically filtered air at positive pressure. *Temperature control*- must be adequately planned to ensure that raw materials, work

in progress and finished product are all maintained at the correct safe temperature through out the chain. *Cleaning provision*- premises must be designed for adequate cleaning and disinfecting both throughout and at the end of production. *Location of cleaning facilities*- individual facilities for hand hygiene equipment/utensil washing areas must be provided but separate from production areas. Staff amenities such as changing areas, toilets, showers, canteen and first aid should be carefully sited. *Pest control*- all pests must be denied access by effective proofing and other disciplines. *Building exterior*-surfaces around the building must have suitably impervious surfaces with adequate drainage and appropriate space for vehicle loading and unloading. *Waste* - sufficient provision must be made for all categories of waste, preferably into poly-lined washable plastic bins. Thomas (1997) emphasised that these general principles must be applied to each area in turn to ensure that the construction in conducive to effective hygiene and the elimination of micro-organisms.

2.4.3 The construction

Food premises must be resistant to thorough cleaning on a regular basis and constructed so that there is minimal opportunity for microbial build-up. Depending on the type of food material involved, some of the chemicals required to effect cleaning may be abrasive or aggressive. According to Thomas (1997), it is vital to understand precisely the type of food ingredients involved, chemical, physical and temperature abuse, which each area of the premises must withstand.

According to Timperley (1993 and 1994), and CFIA (1999*)*, the requirements of *external walls, floor, inclusive roofs, doors and windows* are that they should be water-, insect- and rodent proof. *Internal walls*, on the other hand, should be smooth, flat resistant to wear and corrosion, impervious, easily cleanable and white or light coloured. *Wall* should be free from crevices. Recommended finishes include a smoothly finished steel-floated cement rendering coated with a hard two-pack epoxy paint, fibre-glass and resin laminates laid up directly on to the wall structure, high grade wall cladding sheets, and high grade prefabricated plastic coated metal/foam sandwich insulated panels (Sea Fish Industry Authority 1992). Conventional wood and corrugated metal walls are undesirable in food plants because the wall-floor junction is difficult to clean.

Windows should be avoided in production areas where possible. However, where they are present they must be clear, complete and they and their frames must be completely sealed to prevent insect ingress. Any open window must be totally screened with mesh sufficiently fine to exclude all flying insects. Broken or cracked panes must be replaced. The ledges of inside windows should possess a slope of at least 20° (Sea Fish Industry Authority 1992).

The floor should ideally be impervious to spillage of product, water and resistant, non-toxic, non-tainting and of good appearance and easy repairable. According to Troller (1993), concrete is probably the most satisfactory floor for food application in wet areas. All food polymeric materials have some disadvantages of poor resistance to wear and cracking. In wet areas, floors must be laid with a gradient of 1 to 60 to drains to prevent formation of puddles (Thomas 1997). Special attention must be paid to freeze floors that require a heater mat in the layer below. Junctions between walls should be coved to facilitate effective cleaning and prevent pest harbourage. Floor-

wall junctions should be coved (about 10-cm. radius) and sealed. Damaged floor must be repaired as soon as possible, regard must be observed for any odour or taint produced during the laying or repair. Any mezzanine surface must be completely sealed with self-contained drainage. Measure must be taken to ensure that there is no risk of contamination to the area below.

Troller (1993) and CFIA (1999) emphasise that *exterior doors* of all types must fit tightly with maximum allowable gaps of 3 mm or adequately proofed with brush strips against pervading pests. Within the premises, doors should be self-closing preferably with vision panels. According to Thomas (1997), rubber swing doors and heavy-duty plastics curtaining are ideal for production areas.

Ceilings type for product zones is not clear. Many sanitarians feel that suspended ceilings are not satisfactory for these areas. CFIA (1999) agrees that the advantages of suspended ceilings outweigh the disadvantages only when there is a serious problem of dust flaking paint from above. Overall, Thomas (1997) emphasises that where open food is stored or processed; ceilings should be smooth, easily cleaned and light coloured. There must be nothing which poses foreign body hazard to the area below. Other area ceilings may be suspended but access must be provided to the void above for services and to enable adequate cleaning, pest inspection and maintenance. Painted surfaces must be sound and free from flaking and must be with paint approved for use in food preparation areas. The average height of ceiling is generally agreed to be 2.7 to 3.5 m to allow for easy accessibility. All junctions should be coved for easier cleaning and completely sealed. Particular care must be taken to provide adequate ventilation and extraction in areas of extreme heat and steam. All services should drop vertically from the ceiling whenever possible and be fully accessible for cleaning and inspection.

All light must be protected by plastic diffusers or shatterproof covers to prevent any contamination by broken glass. Design, location, intensity (Table 1) and maintenance of light must be appropriate. Skylight must not be positioned above exposed product and should be completely protected from access by pests.

Table 1: A list of minimum light requirements for food process (Troller 1993).

Location	***Foot-candlepower***
Office	50
Cold Storage	20 (30-40 at perimeter)
Rest rooms	20-30
Food Process	50-60
Laboratory	50-60
Inspection tables	50-70
Packing areas	20-30

NB: 1 foot-candle = 1.075 Lux

Ventilation: Clear air is a requirement for food plants. According to Troller (1993), worker comfort is optimal at 40-65% relative humidity, temperature of 20-21°C, and air exchange rate of 0.028m^3 min^{-1}, although this may vary widely depending on the number of airborne particles, gases, etc., present. Adequate temperature and dust control must be provided in all areas, relevant to individual processes to provide a congenial work place, and to prevent an environment which is not conducive to the rapid multiplication of micro-organisms. Ventilation must always ensure that air

flows from clean to dirty areas. In high care situations the air should be at positive pressure to ensure there is no chance of contamination. Air intake should always be filtered. In low risk environments, filters are to prevent the ingress of the smallest insects and dust. According to Thomas (1997), in high care areas the filters should be 0.5 micron to prevent access by micro-organisms. Areas requiring steam extraction must have sufficient ventilation to minimise condensation, which encourages mould growth and corrosion. Dust extraction units must be plumbed to pump or gravity feed into the drains. All ventilation and extraction systems must be designed to allow for scrupulous cleaning. All compressed air supplies must be filtered and passed cross water and oil traps and should be regularly drained to prevent condensation.

Drainage: most importantly, the capacity of the drains must be sufficient to cope with the maximum load at one time without flooding. The Sea Fish Industry Authority (1992) recommends drainage slope of 1 in 70-80 as opposed to 1 in 60 cited by Thomas (1997). In wet areas, including normally dry rooms that are washed down, the gradient of the floor must be laid to ensure that liquids flow towards and into the drains without a need for more than a quick squeeze to remove the last dampness. Standing pool of liquid promotes micro-organism growth and should never occur. Drainage channels should be smooth; half round in section with drains and gullies covered by easily accessible, easily cleaned, removable grids and not obscured or impeded by machinery. Where quantities of solids or fat are liable to enter the drains, easily removable and cleanable traps should be provided. In high-risk premises the flow of the drains must be from high risk to low risk to avoid any possibility of contamination of the environment. Sufficient access points must be provided to enable rod clearing of any blockages. Manhole must be greased and sealed. All drainage exit point must be pest-proofed and any external pipes fitted with circumference guards to prevent rodents using them to climb up the building.

2.4.4 Layout

The general layout and arrangements of rooms within a processing establishment is important in order to minimise the risk of contamination of the final product. To avoid cross contamination, it is essential that raw material is received in a separate area and stored in a separate chill room. The sequence of processing operations should be as direct as possible. This layout minimises the risk of re-contamination of semi-processed product. Facilities for the production, storage and handling of ice must be designed and constructed to similar standards of hygiene as those for fish. Containers and other equipment must be stored under cover in a protected environment when not in use to avoid their contamination (Thomas 1997, Radford 1997). These ancillary storage facilities also need to be easily cleaned, and to have suitable washing facilities and drainage to maintain them in a hygienic condition.

Clear physical segregation (e.g. a wall) between "clean" and "unclean" is of prime importance. A "clean" area is defined by ICMF (1998) as an area where any contaminant added to the product will carry over to the final product, i.e. there is no subsequent processing step that will reduce or destroy contaminating microbes. Dry rooms must be separate from wet rooms and ventilation must be sufficient to remove excess humidity.

According to CFIA (1999), the separation between the clean and unclean areas must be complete. There should be no human traffic between these areas, and equipment and utensils used in the unclean areas should never be used in the clean area. This means that there must be separate wash and hygiene facilities for equipment and personnel in these areas.

Layout and design of food factories should ensure that there are no interruptions and "dead ends" in the product flow, where semi-processed material can accumulate and remain for a long time at ambient temperature. Time-temperature conditions for products during processing are extremely important critical control points in order to prevent bacterial growth. This means that a steady and uninterrupted flow of all products is necessary in order to have full control of this critical factor.

According to CFIA (1999), in addition to facilitate product flow, factory layout and practices should ensure that:

- All functions should proceed with no criss-crossing and backtracking.
- Visitors should move from clean to unclean areas.
- Ingredients should move from "dirty" to "clean" areas as they become incorporated into food products.
- Conditioned (e.g. chilled) air and drainage should flow from clean to dirty areas.
- The flow of discarded outer packing material should not cross the flow of either unwrapped ingredients or finished products.
- There is sufficient space for plant operations including processing, cleaning and maintenance. Space is also required for movement of materials and pedestrians.
- Operations are separated as necessary. There are clear advantages in minimising the number of interior walls since this simplifies the movement of materials and employees, makes supervision easier, and reduces the area of the wall that needs cleaning and maintenance.

2.4.5 Refrigeration facilities

A number of books and regulations emphasise temperature control and facilities for storage of fish as the backbone for maintaining quality of fish products. The EU regulation and other experts, agree that fish cold storage facilities must be designed to maintain the temperature of fish at -18°C or below. While, coolers shall maintain fish at a temperature from 4°C to -1°C. According to CFIA (1999), freezer facility shall freeze a 25 mm-thick block of unpacked fillets to -18°C in two hours or less or air blast freeze fish at a rate that prevents deterioration of the fish, until the thickest section of the fish is at a temperature of -18°C. A maximum air velocity of 0.3 $m.s^{-1}$ over fish is recommended for chillers to prevent drying out of fish. According to the Sea Fish Industry Authority (1992), the installed capacity of a chilling plant depends upon detailed design but a general rule of thumb used by refrigeration engineers is 20-25 Kcal $hr^{-1}m^{-3}$.

Refrigeration should be selected and installed by professionals and there must be adequate chilled and frozen storage available for raw materials, work in progress and finished product. Where temperature control is critical to the process, temperature should be monitored and logged automatically at least every 2 hours. An alarm should ideally be fitted to alert personnel to any temperature outside the designed parameters.

Automatic defrost cycles should be set to ensure the coils are kept free of ice. Evaporators should be designed to regularly allow easy cleaning. Condensation must be plumbed by gravity or pumped to a drain. Doors should be kept closed whenever possible. Those, which are regularly open, should be protected with heavy plastic strip curtaining to prevent fluctuations in temperature. When chilled or frozen products are handled, refrigeration must also extend to the loading areas. Both at goods in and dispatch, loading docks should be available which are sealed, proofed against pest and temperature controlled. High care areas and blast chillers should be fogged with biocide daily after production and cleaning are complete.

2.4.6 Process equipment and utensils

During auditing or quality management and control, emphasis must be put on people, procedures, design of plant and equipment, pests, physical contaminants and chemicals, water and environmental conditions, and micro-organisms (Radford 1997).

Many regulations concerning requirements for equipment, including EEC Council Directive 91/493/EEC (EU 1991), agree that the food equipment should be non-contaminating and easy to clean.

According to Troller (1993), the degree of stringency in hygiene requirements must be related to the product being processed. For example, raw fish does not require the same standard of hygiene as cooked and peeled shrimp.

There are seven basic principles for hygiene design agreed upon by a working party appointed by Food Manufactures Federation (FMF) and Food Machinery Association (FMA) (Thomas 1997):

1. All surfaces in contact with food must be inert to the food under the conditions of use and must not migrate to or be absorbed by the food.
2. All surfaces in contact with food must be smooth and non-porous so that tiny particles of food, bacteria, or insect eggs are not caught in microscopic surface crevices and become difficult to dislodge, thus become a potential source of contamination.
3. All surfaces in contact with food must be visible for inspection or the equipment must be readily disassembled for inspection, or it must be demonstrated that routine cleaning procedures eliminate possibility of contamination from bacteria or insects.
4. All surfaces in contact with food must be readily accessible for manual cleaning, or if not readily accessible, then made readily accessible for manual cleaning. Or if clean-in-place techniques are used, it must be demonstrated that the results achieved without disassembly are the equivalent of those obtained with disassembly and manual cleaning.
5. All interior surfaces in contact with food must be so arranged that the equipment is self-emptying or self draining.
6. Equipment must be so designed as to protect the contents from external contamination.
7. The exterior or non-product contact surfaces should be arranged to prevent harbourage of soils, bacteria, or pests in and on the equipment itself as well as in its contact with other equipment, floors, walls or hanging supports

In the design and construction of equipment it is important to avoid dead areas where food can be trapped and bacteria growth take place. Also dead ends must be avoided, and any piece of equipment must be designed so the product flow is always following the "first in first out" principle.

Cleanablility of equipment involves a number of factors such as construction materials, accessibility and design. According to Campden Food Preservation Research Association (1986) and Troller (1993), the most common design faults, which cause poor cleanability, are:

1. Poor accessibility (equipment should be placed at least 1 m from wall, ceiling or nearest equipment).
2. Inadequately rounded corners (minimum radius should be 1 cm, but the American 3-A Sanitary Standard Committee regards 2 cm as optimum).
3. Sharp angles.
4. Dead angles (including poorly designed seals).

Food processing involves extremes of temperature, abundant use of water, condensation and contamination of food overhead pipes and surfaces. Equipment design must consider this and include proper protection.

1. Machinery containing materials intended to come in contact with food must be designed and constructed (of stainless steel and food grade plastics) so these materials can be cleaned before each use. Radford agrees with the CFIA (1999), that wooden equipment is to be discouraged, particularly in open food areas since it is absorbent to water and difficult to cleanse. Galvanised steel is not recommended for these surfaces because its surface coating can be rougher and can wear a way and become unacceptable. There are numerous grades of stainless steel, which vary in quality, corrosion resistance and ease of fabrication. Care must also be taken to ensure that plastics are food grade and do not contain unsuitable plasticizing additives. High-density polyethylene is a suitable and commonly used material. Specialised food equipment manufactures are familiar with these technicalities.
2. All surfaces and their joining must be smooth, with no ridges or crevices that could harbour organic materials,
3. Assemblies must be designed to minimise projections, edges and recesses. They should be constructed by welding or continuous bonding, with screws, screw-heads and rivets used only where technically unavoidable.
4. Contact surfaces must able to be readily cleaned and disinfected and built with easily dismantled parts. Inside surfaces must be curved in a way to allow thorough cleaning.
5. Liquid derived from foods cleaning disinfecting and rinsing fluids should be able to readily discharge from machinery.
6. Machinery must be designed and constructed to prevent liquids or living creatures - primarily insects - from entering and accumulating in areas that cannot be cleaned.
7. Machinery must be designed and constructed so that ancillary substances, such as lubricants, do not come in contact with food.

Belt conveyors are preferred for conveying fish products. Teflon surfaced belts have been found to be durable and resistant (Troller 1993).

2.4.7 Personnel hygiene facilities

The EU Directive 91/493/EEC of 22 July 1991 (EU 1991) requires adequate facilities for personnel hygiene to be available for use in the establishment. According to CFIA (1999), the toilets must be provided in sufficient numbers for both sexes. Table 2 shows the scale that has been used by the agency to give the minimum number of toilets for a given number of employees:

Table 2: Number of toilets compared to number of employees.

1 toilet for 1 to 9 employees
2 toilets for up to 24 employees
3 toilets for up to 49 employees
5 toilets for up to 99 employees
1 toilet for every 30 employees over 100

The number of toilets for men can be reduced by one for each urinal installed, as long as it is not reduced below 2/3 of the appropriate number specified above.
The toilet facilities must be close enough to processing areas that they can be conveniently used by employees. The design should be such that toilets do not lead direct to the food processing areas. Provided with drains or other design to eliminate overflow of water or sewage and vented to the outside. No chemical and portable toilets are acceptable. One hand wash point should be provided for each toilet or three urinals. They must have non-hand-operated taps.

According to Thomas (1997) and Gaston (1997), all operatives must enter and leave the premises by a specific entrance and proceed to a dedicated changing area and leave outer garments and put on protection clothing. Washrooms must be properly equipped with bactericidal liquid or powdered soap and single use towels. Provisions must be made for the disposal of used sanitary ware in the ladies' lavatories.

Changing rooms must have adequate space, pegs and lockers. for the number of staff employed at peak times. There must be a clearly designated separate area for dirty laundry. The canteen must be the only place where the consumption of food and drink is permitted. According to Thomas (1997), separate facilities should be provided for workers in high care areas.

2.4.8 Preventive Pest control

General pest control methods that have to been applied should aim at excluding, reducing and/or destroying the pests. According to the Chesworth (1997), birds, rodents, and insects must be denied access by effective proofing and other disciplines. Design of doors, windows, drains, must be so as to exclude their entry. It is important that QMP should be put in place to exclude, reduce and/or destroy any pests within the establishment.

According to Mathew (1997), any gap of greater than 8 mm can allow a mouse to gain entry to the factory or building. CFIA (1999) permits a maximum gap of 3 mm on doors. Electric fly control units must be used. CFIA (1999) recommends that flytraps be positioned 2.5 to 3 m from the floor. They must not be located directly

above food handling areas. Each unit should be fitted with a suitable catch tray. It must be ensured that they are constantly on.

2.4.9 Cleaning and disinfecting systems

Emphasis here should be on cleaning schedules, cleaning products and methods employed, disinfecting, monitoring procedures, maintenance contracts for cleaning equipment, back up facilities provided by supplier company, training programmes, responsibility and ownership of supervisor/management, cost/price, safety and supply of chemicals and water hygiene.

Both CFIA (1991) and EU regulation (1991), require washbasins to be equipped with non-hand-operated taps. There must be adequate washbasins, and other facilities or materials necessary for employee hygiene and convenient location from processing areas. Facilities should have hot water present at 45 to 50°C. There should be equipment and materials such as hand-dips and foot-dips conveniently located in the processing areas. According to Thomas (1997), it must be compulsory to use hand-washing facilities at the entrance to all processing areas. Further hand-washing facilities should be available throughout the factory. Boot wash facilities should be provided at high and low risk entrance/exits. Bactericide rinse or spray should be provided for boots used in high care areas. Sea Fish Industry Authority (1992) has cited minimum provision of hand-washing facilities below (Table 3).

Table 3: Minimum number of hand-washing stations per personnel (Sea Fish Industry Authority 1992).

No. of persons	Minimum no. of wash stations
1 to 15	1
16 to 30	2
31 to 50	3
51 to 75	4
76 to 100	5

Ṡtainless steel constructed wash basins and troughs are preferred (Thomas 1997). According to Hall (1997), facilities involving ceramic sinks and hand operated taps should be downgraded and considered unacceptable. However, EU regulation and CFIA regard only hand-operated taps as unacceptable. All hand and boot wash facilities must be suitably trapped and plumbed directly to the drain. There should also be changing facilities for personnel and visitors.

Like many other sanitarians, Gaston (1997) recommends that separate operation of clean and dirty utensils must be maintained. Utensil washing facilities should be identified as such and must not be used by staff for hand washing. Clean utensils must be stored in a clean and well-ventilated storage area, which allows good drainage and drying.

According to Gaston (1997), it is the dual responsibility of the supplier and user of substances hazardous to health to ensure that the chemicals are stored in lockable containers and are only released on request from the hygiene supervisor.

2.4.10 Utilities - Water

Thomas (1997), states that all water used in food factories must be adequately pressurised potable quality and free from discoloration or taint. Its microbiological and chemical quality should be regularly checked and recorded. The water source must be controlled to protect against contamination from chemicals and micro-organisms. Water storage tanks must be covered and frequently inspected to ensure the absence of contamination. Where water is chlorinated on site, a routine checking regime should be implemented and recorded. Pipe-work lagging must be kept and complete, and any redundant plumbing removed. The local supply pipes for food contact water should be constructed of appropriate material. Lead pipes are not considered acceptable in modern food processing plants. Process systems containing water should be regularly checked for leakage, as this presents a potential contamination source. Water must come from a public main supply or suitably treated to be of similar quality. Plumbing from public main supplies must conform to company bylaws. Any supplies of non-potable water must be clearly identified.

2.4.11 Waste storage and disposal

Adequate provisions must be made throughout the premises for the intermediate collection of waste. According to Thomas (1997), poly-lined washable plastic bins are preferred. These bins of waste should be collected at least once a day and to bulk waste containers outside the building. Bulk waste containers should be clear of the ground, lidded to prevent pest access. Refuse areas must have well-drained impervious surfaces and be regularly cleaned. Receptacles for effective disposal of fish offal should be provided and identified. Their design should include tight-fitting covers and they should be constructed of non-absorbent and non-corrodible materials.

2.5 Fisheries legislative frame work in Uganda

The law that regulates the fisheries industry in Uganda is the Fisheries Act, 1964 and subsidiary legislation, the Fish Quality Assurance Rules 1998 and statutory instruments no. 23 (MAAIF 1998). It gives effect to the Act for statutory quality management and fish inspection functions. It makes provisions for compliance in the hygiene and sanitation concerns of fish handling, processing, transportation and marketing. Requirements for product traceability labelling and laboratory sampling/analysis as well as other areas of concern are addressed.

2.5.1 Uganda Policy on Fish Utilisation

Policy to ensure safety, quality and wholesomeness of fish and fishery products before placement on the market has been drafted (DFR 2000a).

Policy objectives

- To improve on utilisation of fish catch and reduce waste or post harvest losses;
- To safeguard fish quality to meet the growing expectations regarding safety of fish and fisheries products.

Policy strategies

- Streamline and strengthen existing institutional systems for inspection and quality of fish and fisheries products;
- Improve and maintain in-plant quality control and hygienic conditions in processing establishments by encouraging the adoption of voluntary codes of Good Manufacturing Practices, which include hygiene practices, cleaning, and disinfection regimes.
- Adaptation of Quality Assurance Systems based on Hazard Analysis of Critical Control Points (HACCPs) and Total Quality Management (TQM).
- Ensure proper fish handling, transportation, distribution and marketing systems in Uganda;
- Improve and develop fisheries infrastructure (with emphasis on fish landing sites) technology and price incentives for quality fish;
- Encourage suitable designs of boats for fishing and transportation of fish (with emphasis on hygiene and use of ice on board);
- Avoid contamination of fish and fishery products before and after harvest.

2.6 Institutional Quality Assurance and Management Framework in Uganda*

2.6.1 The Department of Fisheries Resources

The legislative authority of the Department of Fisheries Resources (DFR) is derived from the Fish Act of 1964. It is supported by the subsidiary legislation (MAAIF 1998) that was gazetted in accordance with the provision in section 43 of the Fish Act.

Role of Department of Fisheries Resources

The Department of Fisheries Resources in the Ministry of Agriculture Animal Industry and Fisheries (MAAIF) is legally responsible for activities in the fish industry. It is the inspection body responsible for statutory inspection, certification and control of fish and fish products. It is the competent authority responsible for certification of fish and fishery products intended for export and local consumption. It is also responsible for inspection of health conditions for the production and distribution of fishery products for human consumption, including the inspection of hygiene, premises, equipment, and own checks in fish processing establishments that are licensed by Commissioner for Fisheries.

2.6.2 Collaborating institutions

Uganda National Bureau of Standards (UNBS) to obtain services and expertise on horizontal issues such as Mandatory National Standards on:

- Codes of practice for the handling, processing, storage, and placing on the market of fishery products US129:1999/EAS 62.
- General requirements for establishing a Hazard Analysis of Critical Control Points (HACCPs) Program for Food Processing Industry US130:1999.
- Fish and Fishery products- Determination of the concentration of Volatile Nitrogenous Basis (TVB-N) US131:1999.
- Specification for factory and employees requirements for food factories US28:1993.
- Specification for drinking water US201:1994

* Extract from the current Inspection Manual (DFR 2000b)

Food Science and Technology Research Institute (FOSRI) to obtain data on post-harvest technologies and other support services to the fish industry.

National Environment Management Authority (NEMA) to share information and reduce duplication of services. Impose stiff penalties to people suspected of catching fish using chemicals.

Ministry of Health (MOH) to obtain services and expertise on provision for the supply of safe food and prevention of adulteration of food and drugs as far as composition and labelling storage and handling are concerned. Also, to regulate the Public Health Act of 1964 that consolidates the law regarding the protection of public health and to provide the safeguarding and promotion of sanitation and housing including storage of foodstuffs.

Department of Plant Protection (DPP)- MAAIF to obtain services and expertise on registration, control and usage of agricultural chemicals.

Water Resources Management Department (WRMD) to obtain information and services on the protection and management of water resources.

2.7 Domestic fish processing control system in Uganda

2.7.1 Approval of processing Establishments

In order to export or trade, the legislation mandates a fish processor to be registered and must renew this registration annually. To qualify for registration, the establishment must meet certain requirements for construction, equipment and operation. In addition the processor must document and implement a Quality Management Program plan, which considers all HACCP principles as well as other regulatory requirements. To maintain their certificate of registration, the establishment must maintain compliance with these requirements.

Quality Management Program

The legislation requires that a Quality Management Program (QMP) must include procedures, inspections, and records, for the purpose of verifying and documenting the processing of fish and the safety and quality of fish processed in Uganda. All registered fish processing establishments in Uganda are legally required under the Fish Quality Assurance Rules, to adhere to the GMP. Each registered fish processor must prepare a QMP plan, that outlines the controls implemented to ensure that fish products are processed under sanitary conditions and that the resulting product is safe and of acceptable quality and complies with all regulations. The QMP plan must include a written description of the plant sanitation and pest control programs and recall system in place, as well as, controls in place to meet construction and equipment requirements, and labelling requirements. The QMP must include a formal hazard analysis of product and process and, if hazards exist, prepare a plan in accordance with the seven principles of HACCP to ensure that all health and safety hazards are controlled during the processing of fish. Records of all monitoring, inspection, measuring and corrective actions must be kept for the HACCP component of QMP.

2.7.2 Establishment Assessment

The legislation provides for inspectors to conduct regulatory verifications, to verify that registered fish processing establishments QMP meets the requirements set out in fish regulation. These include System and Compliance Verifications.

System Verification

The legislation cites that establishments are to be evaluated against the QMP Reference Standards upon the discretion of the Commissioner for Fisheries, to verify that they contain all necessary components and the necessary controls to ensure compliance with the regulation. The emphasis is on verifying documentation.

Compliance Verification

The legislation provides that, upon the discretion of Commissioner for Fisheries, an establishment is to be evaluated to verify the implementation of a QMP plan as designed and that it is effective in meeting the requirement set out in the regulation and the QMP Reference Standards. Compliance Verification involves a combination of audit and inspection activities including; verifying the operation of the QMP; inspecting plant conditions, operations and products; taking samples; investigating corrective actions; and performing analysis. The emphasis is on verifying implementation. All verifications involve an exit interview, observation of practices, visual establishment inspection, record review of monitoring procedures and corrective actions, and sampling of products, as required, for applicable analysis. A fully documented inspection report to be provided to the company and a copy is filed internally.

2.7.3 Frequency of conducting system and Compliance Verification

The frequency of system/compliance verification is risk based taking into consideration the establishments overall compliance profile and product risk profile. Compliance verification target frequencies vary from once a month to once every two months.

2.7.4 Compliance and Enforcement Action

The legislation (MAAIF 1998) provides that the processor is responsible for correcting non-conformities identified during an audit/inspection. The inspector may take compliance and enforcement actions against processors who will be found to be in non-compliance, with the regulation. The registration of the establishment may be suspended or revoked, depending on the nature of the non-compliance.
A product, which is found non-compliant will be detained and may be seized until it is brought into compliance or destroyed. If required, a recall order of products already on the market may be issued.

3. METHODOLOGY

The Facilities Inspection Manual and checklist are developed based on legal requirements in the Council Directive 91/493/EEC (Appendix 1). Detailed interpretations of the legal requirements were extracted from reviewed literature and analysed for possible hazards. Steps taken during analysis are as shown below.

3.1 Consideration of risk

Special consideration was given to the detailed legal requirements/controls in each group or section, emphasised in the literature reviewed as "*must*" and their potential to cause contamination/cross-contamination or spoilage to the fish product.

3.2 Deficiency Rating System

The rating indices were derived from hazard analysis based on type, severity and risk of the hazard (Appendix 2). Hazards associated with each item[1] were weighed so that the score accurately reflected its overall significance. The final scores in each section of the inspection items were used as a guide to performance levels and an overall score gives a measure of acceptability of the plant.
If an establishment gets a non-conformity, the following category of ratings have been used; minor **m**, Major **M**, Serious **S**, Critical **C**. Professional judgement shall be used to make decisions, depending on the type, severity and the risk.

3.3 Definitions of rating

Critical deficiency (**C**): Any condition or practice that can lead to the fish becoming unsafe or unwholesome.

Serious deficiency (**S**): Any condition or practice that can preclude proper implementation of hygiene practices or obtain appropriate level of hygiene and thus lead to the production of contaminated or spoiled fish product but with no safety implications.

Major deficiency (**M**): Any condition or practice, which precludes general hygiene and can/will lead to the spoilage of the product.

Minor deficiency (**m**): Any condition or malpractice that does not conform to the requirements, but which is not major, serious or critical.

3.4 Rating of fish handling and processing plants[2]

For the overall rating of the plant, a four-scale index (**A, B, C,** and **D**) has been used. The inspector will take into consideration only the total of the worst non-conformities e.g., if the plant has **2C, 5S, 3M** and **4m**, the inspector will consider **2C** and rate the plant **D** (Table 3). Likewise a plant with **0C, 2S, 6M** and **5m** will be by **2S,** as **C** type.

[1] Item refers to interpretation derived from literature regarding a particular legal requirement
[2] Recommended in the current plant rating system (DFR 2000b)

Table 4: Plants Rating (DFR 2000b).

Plant Rating	No. of Minor Deficiencies	No. of Major deficiencies	No. of Serious deficiencies	No. of Critical deficiencies
A	0 to 6	0 to 5	0	0
B	7 or more	6 to 10	1 to 2	0
C	NA	11 or more	3 to 4	0
D	NA	NA	5 or more	1 or more

NA: Not applicable.

3.5 Structure of the Inspection Manual

The legal requirements of the EU legislation (Appendix. 1) were grouped into eleven groups. One of these groups, as an example:
2.0 Areas where products are handled prepared and processed.
This group then has sub-groups:
2.1. Floor and **2.2 Walls.**
Under each legal requirement such as 2.0 Areas where products are handled prepared and processed, sub-group 2.1 Floors**,** there can be several items/attributes to inspect. These are numbered as, for example:
2.1.1. These contain **Interpretations**,
where the legal requirement has been interpreted based on information obtained from literature reviewed.

Procedure, where the procedure for inspecting the item /attribute is laid down,
Method of Inspection; where the method to be used is set down,
Limits; which state what the tolerance limits are for this item and
Explanation; which show the limit resulting in
Rating of non-conformities if limits are exceeded.

3.5.1 Legal Requirement

This is the requirement as derived from the EU legislation, concerning a given aspect of the operation of the establishment.

3.5.2 Interpretation

Where the original requirement is not explicit or in general terms an interpretation was necessary. This includes information cited from various literature sources relating a particular group/section of the legal requirement and is made to facilitate the inspection for conformance to the specific requirements based on good practice and not merely the baseline of legal requirement. The items were chosen based on the emphasis put on them by experts as "must"….

3.5.3 Method of Inspection

The name of the methods of inspection that are to be applied is given here. The methods are described below. The inspector makes use of one or more of these categories of methods: observation, measurement and design checks. The choice of the inspection method is based on its *relevance* to monitoring procedure relative to the

appropriate hazards and the *correct* functioning of plant at the correct stages of the manufacturing and distribution process.

- ***Observation***

The observation is a careful or critical objective viewing or interview in a formal way e.g. examination, professional judgement of any state or occurrence, such as a crack in the floor.

- ***Measurement***

This is the act or process of ascertaining the extent, dimensions, quality etc. of the object of observation by comparison with a standard.

- ***Design checks***

The premises and equipment should take into account; construction or layout and material, which both relate to prevention of contamination and ease of cleaning and disinfecting. When checking design look for indicators of possible contamination of fishery product due to poor design. This could be due to spots that are difficult to clean and disinfect or cross contamination due to layout of processing lines or premises. Materials used for equipment or premises could be a source of contamination or not possible to maintain in a state that is suitable to keep clean and to disinfect.

3.5.4 Procedure

This describes what is to be inspected specifically and how it is to be inspected. It was derived from hazard analysis (Appendix 2).

3.5.5 Limit

Gives the criteria against which the item/attribute to be inspected shall be rated. The tolerance limits were derived from the regulation and hazard analysis (Appendix 2) based on the severity and risk of hazard on the product.

3.5.6 Explanation

This gives guidance on how to arrive at the correct rating for the items being inspected. The decision of the explanation was based on the severity and risk of the associated hazard on the item under consideration.

3.5.7 Rating

The rating can be; **m, M, S, or C.** All items for inspection were evaluated by hazard analysis (Appendix 2). The type, risk and severity of the hazard(s) associated with each item under review were analysed and appropriate scores were assigned.

3.6 Procedure for Inspection

3.6.1 Pre-conditions

Pre-inspection

Prior to inspection, the inspector shall familiarise themselves with the establishment to be visited. Therefore, the inspector shall review the previous inspection reports, layout of the plant, range of processing activities and any available other information. Where no previous inspections have been conducted a pre-inspection visit shall be arranged to obtain relevant information. Inspectors shall note in particular any deficiencies from previous inspections.

Starting conference

The aim of the starting conference is:

- for the inspector to introduce him/herself to management
- inform the management the purpose of the inspection
- to identify the factory areas, documents and personnel likely to be involved in the inspection;
- Request for information relating to the production system and conditions.

The details (including practical and administration) of the inspection shall be discussed with management of the establishment at the start of the visit.
Before the inspection, the inspector shall establish contact with the Quality Assurance Department. As a general rule when inspecting an establishment, the Quality Assurance Manager should accompany inspectors.

Documentation

The inspection will be completed using the checklist provided (Appendix 3b). Verbal feedback of the plant performance will be provided to the factory as the inspection proceeds. Non-conformances will be highlighted and, agreed where possible, the cause will be identified and corrective actions suggested. The inspection reports will be produced in a standard format giving the results of the inspection. Note that in Appendix 3b, there are several items for Inspection in each section of the legal requirements. Two parenthesis/ratings have been assigned to each group/section of the requirement. The Inspector shall use his/her professional judgement to decide on the correct rating for any nonconformity identified, based on its risk and its severity.

3.6.2 Declaration of conformity

As the inspector goes through the plant, he/she will put a mark between the appropriate parentheses when he/she notices a deficiency. He/she will not put any mark between the parentheses if the evaluated element conforms to the requirements. The results of inspections will be presented using the checklist in the appendix 3b. Verbal feedback of the plant performance will be provided to the management of the establishment as the inspection proceeds, where non-conformities will be highlighted.

The following information is contained in the inspection report:

- Name of the establishment
- Establishment approval number
- Date of inspection
- Name of inspector
- Person responsible for establishment
- Address of the establishment.

3.6.3 Withdrawal of inspection services

A plant rated **D**[3] may be closed down if the critical deficiencies are deemed to compromise public health and until the critical deficiencies are fixed at the discretion of the Commissioner for Fisheries. **C** and **B** plants are authorised to operate but are given time to fix the deficiencies and move to **B**, then to **A** level.

4. CONCLUSION

With regard to answering the first question in the objectives of this study, the literature accessed and reviewed in this report offered little idea about instructional techniques, procedure and methods for inspection but offered predictive modelling and risk assessment as a possible guide to the tolerance limits and rating of non-conformities. The Canadian Fish Inspection Agency and The Icelandic competent authority gave guidelines pertaining to developing inspection manual.

A second approach considered factors covered in the EU regulation (Appendix 1) more specific to conditions of premises and equipment operation itself or the attainment of safe and hygienic processing environment. The review and analysis provided the facts that were necessary for designing a manual and checklist including definitions to clarify meanings of some words and interpretations (Appendix 3a). Only the most important attributes/items that have influence in contaminating and cross-contaminating the fishery products or are likely to cause spoilage of the product in premises and equipment were cited from literature for each condition highlighted in the EU regulation relating to premises and equipment. Of particular interest were areas most vulnerable to failures, such as the availability, provision, design, layout, suitability, efficiency, construction materials and finish of premises and equipment, which could in turn affect the product quality, safety and other outcomes.

The available information from CFIA (1999), Directorate of Fisheries (Iceland) and the concept of predictive modelling and risk assessment (Appendix 2) facilitated the hazard analysis. Methods and procedures of inspection were identified. Limits of tolerance of non-conformity, explanation for the rating and the rating for each non-conforming item were identified. Two ratings have been assigned to each group of legal requirements because the type, risk and severity of the hazards associated with each item identified were different when evaluated by hazard analysis. Its impact on product safety and hygiene was evaluated and a score was assigned to the item. A set of information tying together evaluative information from the different standards emerged from this exercise. Some were more supportable than others owing to

[3] In the current Inspection Manual (DFR 2000b)

limitations in the data contained in the standards under review. The known inspection methods (Observation, Design checks, and Measurement, Document check) were recommended and assigned to each item as shown in the manual (Appendix. 3a).

The Inspection Manual has been designed in the form of a checklist (Appendix 3a) with scores being assigned to each item, which, according to Crossland (1997), has the benefit of being easy to complete during the inspection with a potential for leaving a copy with the management of establishment at the conclusion.

The Reporting Form/Checklist (Appendix 3b) covers items in the Inspection Manual regarding premises and equipment. The inspector shall make reference to the manual for details of items to be inspected in each group or sub-group of the requirements.

5. DISCUSSION

As noted in the course of this review, the existing literature only partially satisfies these approaches. For example, published inspection systems/manuals to comply with prescribed EU legal requirements are relatively few. More common in the literature reviewed were assessment standards targeting cite-specific problems that were not covered in details by EU regulation thus, needed interpretation. These included detailed requirements for buildings, construction, layout, premises, design and fabrication, refrigeration facilities, process equipment and utensils, personnel hygiene facilities, preventive pest control, cleaning and disinfecting systems, water, and waste storage and disposal used to measure implementation impact.

Although affirming the effectiveness of a checklist inspection approach to meet hazard control objectives, this review also draws attention to some shortcomings in the supportive data. Some literature noted increased positive outcomes from inspection systems, but there were cautions about drawing cause-effect conclusions. Results of assessment reports based on fitness for use or purpose in fish processing establishment might suggest assessment shortcomings as contributing factors but baseline data or other evidence is needed to support such claims. Assessments of interpretations of EU requirements or the merits of certain inspection methods and procedures may not always be able to separate assessment-specific effects from other intervention factors. Also, in many instances, data collection for establishment evaluation purposes may not always follow sound assessment design principles. For example, where an item was reported as "adequate, suitable or appropriate" for the purpose or "food grade material" of food contact surfaces, analysis is lacking to show how improvements, consistencies and harmonious inspection are accounted for by positive results from such inspection systems. Also in some instances, it was possible that the inspection can be coupled to other forms of intervention (Voluntary ISO 9000 series implementation or Due diligence mitigation effort or influence of market forces which are considered to be complementing inspection) so this makes attribution even more difficult.

On the other hand, the approach can be quite complex in implementation, due to the balancing between the practicalities of the inspection system; this being the cost of running the process versus the demand of the external customer/consumer per se. (Which in themselves may be open to variable interpretation in case of a legal

requirement; negotiation in the case of an external customer; and research options in the case of consumer). Not withstanding the fact that variance occurred even among authorities on some standards and in some instances use of terminology to describe the requirement.

Some reports that suggested training deficits as factors contributing to ineffective assessment problems lacked confirming information. However, it was evident that for effectiveness of any inspection system, the professional judgement of the inspector matters. It demands neutrality, impartiality and acknowledged competence in all aspects of food hygiene and quality techniques. Planning an assessment, making an observation within remit is paramount.

Clearly then, the current literature cannot supply complete answers to the questions posed. Definitive questions require more research and some suggestions for work are described at the conclusion of this report. Even with the above reservations, the benefits of a literature review at this time are believed to be twofold. First, to offer a preliminary appraisal of the merits of inspection system directed to fish processing safety and hygiene concerns. Second, to offer a conceptual framework for treating the EU requirements, clarify the issues that should be addressed in the inspection system/manual and follow-up effects.

Even with the above reservations and uncertainties, the role of an inspection system as a necessary element in developing and maintaining effective safety and quality control activities in fish processing conditions appeared firm. Indeed, the issue was not so much whether facilities checklist inspection could make a difference in ensuring fitness for use or purpose in fish processing conditions, but rather ascertaining the conditions for maximising this inspection effects. This was the second question posed in this review and two approaches were used. One effort focused on the EU regulation where examples were extracted from the set of interpreted requirements in literature reviewed to highlight the different steps that had to be taken. Various exhibits showed how the steps could be met in realistic ways and could have merit in framing and implementing an effective inspection system.

Although the literature has much theory on items for assessment having relevance to inspection system/manual, this review is not theory driven, i.e., intended to serve as test of specific hypotheses derived from specific theoretical formulations. As was noted, the treatment in various places does take account of suggested assessment models or guidelines for the purpose of organising and analysing the inspection manual for requirements under review.

The approach to achieving food safety and quality on the basis of specification, however, is much debated. This approach seems to fit in well with the idea of having end-product specifications, which include appropriate acceptance sampling plans. However, the fact that a food could conform to an end-product specification and yet provide a substantial public-health risk should not be overlooked. In this context, Jurans view of quality as *'fitness for that use or purpose'* is an important one; Jurans distinguished this from *'conformance to specification'* where a product could meet all the specifications applied to it and yet be dangerous to use.

By this approach it is clear that an explicit inspection system that interprets, identifies methods and procedures for inspection, and logically rates the non-conformities is likely to reduce the possibilities of inconsistencies and non-harmonious rating of non-conformities thus improve effective implementation of the regulation. This is not to say it was the only cause of the non-conformity rating. As already mentioned literature reviewed indicates several causes including training inadequacy and acknowledged competence of an inspector.

Comparing the results of this approach to the current inspection manual, there is no doubt that this manual addresses the presumed main cause of the inconsistencies cited in the rationale for this project.

6. RECOMMENDATIONS

The following suggestions are made for follow-up work in answering the two questions originally posed and for monitoring the implementation of Council Directive 91/493/EEC.

1. Since this research covered just part of the EU legal requirements similar studies should be done to establish a comprehensive inspection manual for assessing general conditions of hygiene applicable to premises, equipment and staff, special conditions for handling fishery products on shore for fresh, frozen, thawed and processed products, and health controls and monitoring of product conditions, packaging, identification, storage and transport including HACCP monitoring programs.

2. Studies should be done to ascertain how other competent authorities have responded to EU rules on inspection systems and the quality of such efforts. The major data sets used in this literature review and development of the inspection manual were theory/hypothetical directed efforts and, for that case was not the norm. Focusing the efforts on the most prevalent inconsistent rated non-conformities and selecting establishments or operations where they are most recurrent would be ideal. Differences in how the mandated inspections are met at the various selected competent authorities and links between the inspection systems and specific safety and hygiene risk factor would be analysed. The extent to which the operation practices follows EU inspection requirements and the resulting experience could offer an important reference in gauging an effective inspection system or manual.

3. Case-control or cohort/team studies should be used to compare differences in the level of professional judgement or training of inspectors involved in inconsistent inspection results against those not so affected. The intent here is to get a better assessment of how training deficits of inspectors can lead to such problems. Such an analysis will require measures to separate out many non-training factors that could also be responsible for apparent differences in these cases.

4. Workshops should be arranged to discuss issues concerned with effectiveness of competent authority inspection system both now and in the future. Invitees should include experts and practitioners familiar with competent authority inspection

systems, job skill training, food establishment auditing/inspection, and evaluation subject areas. The workshop should seek to pool ideas bearing on the questions posed in this report and added concerns such as the adequacy of the current Inspection Manual in meeting the EU requirements, future inspection challenges due to changing processing technologies and measurement outcomes for assessing the effectiveness of inspection.

5. In-depth studies of inspection systems and practices and their interrelationship with other elements in establishment quality control programmes should be conducted. This effort should be directed at competent authorities showing exemplary instructional techniques, procedures and methods in their inspection systems that could offer program models for effective inspection systems that can best complement or enhance other processing measures aimed at maximising risk management.

6. It is necessary to clarify on what food grade materials are acceptable by the Uganda National Bureau of Standards for construction of food contact surfaces. (UNBS is the institution responsible for services and expertise on issues such as mandatory national standards in Uganda).

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APPENDIX 1: Excerpts from Council Directive: 91/493/EEC of 22 July 1991.

Council Directive: 91/493/EEC of 22 July1991.
Laying down the health conditions for the production and the placing on the market of fishery products (Chapter 111).

General conditions for Establishments on land.
I. General conditions relating to premises and equipment. Establishment shall afford at least the following facilities*:*

1. Work areas of sufficient size for work to be carried out under adequate hygienic conditions. Their design and layout shall be such as to preclude contamination of the product and keep quite separate the clean and contaminated parts of the building;

2. In areas where products are handled, prepared and processed:

   (a). Waterproof flooring which is easy to clean and disinfect and laid down in such a way as to facilitate the drainage of the water or provided with equipment to remove water;
   (b). walls which have smooth surfaces and are easy to clean, durable and impermeable;
   (c). ceilings or roof linings which are easy to clean;
   (d). doors in durable materials which are easy to clean;
   (e). adequate ventilation and, where necessary, good steam and water-vapour extraction facilities;
   (f). adequate natural or artificial lighting;
   (g). an adequate number of facilities for cleaning and disinfecting hands. In workrooms and lavatories taps must not be hand-operable. These facilities must provided with single use hand towels;
   (h). facilities for cleaning plant, equipment and utensils;

3. In cold rooms where fishery products are stored: the provision set out under point 2 (a), (b), (c), (d), and (f). Where necessary, a sufficiently powerful refrigeration plant to keep products at temperatures prescribed in this Directive.
4. Appropriate facilities for protection against pests such as insects, rodents birds, etc.;
5. Instruments and working equipment such as cutting tables, containers, conveyor belts and knives made of corrosion-resistant materials, easy to clean;

6. Special watertight, corrosion-resistant containers for fishery products not intended for human consumption and premises for the storage of such containers if they are not emptied at least at the end of each working day;

7. Facilities to provide adequate supplies of drinking water within the meaning of Directive 80/778/EEC, or alternatively of clean seawater or seawater treated by an appropriate system, under pressure and in sufficient quantity. However, by way of exception, a supply of non-drinking water is permissible for the production of steam, fire fighting and cooling of refrigeration equipment, provided that the pipes installed for the purpose preclude the use of such water

for other purposes and present no risk of contamination of the products. Non-drinking water pipes must be clearly distinguished from those used for drinking water or clean seawater;

8. Hygienic waste water disposal system;

9. An adequate number of changing rooms with smooth, waterproof, washable walls and floors, wash basins and flush lavatories. The latter may not open directly onto the workrooms. The wash basins must have materials for cleaning the hands and disposable towels; the wash basins must not be hand-operable;

10. If the volume of the products being treated requires the regular or permanent presence of the an adequately equipped lockable room for the exclusive use of the inspection service;

11. Adequate facilities for cleaning and disinfecting means of transport. However, such facilities are not compulsory if there is a requirement for the means of transport to be cleaned and disinfected at facilities officially authorised by the competent authority;

12. Establishment keeping live animals such as crustaceans and fish must have appropriate fittings ensuring the survival conditions provided with water of a quality such as that no harmful organisms or substances are transferred to the animals.

APPENDIX 2: Modelling and Risk Assessment

Predictive modelling and risk assessment in relation to condition relating to fish processing premises and equipment.

The system involves the following essential stages:

1. Hazard analysis, which consists of identifying and evaluating the hazards arising from, design of plant and equipment, pest, physical contamination risk, water and environmental conditions and micro-organisms, other various relevant human factors including the probability of using the food product.
2. A determination of the Critical Control Points (CCPs), which are defined as the point in the production process at which the identified. Hazards can be effectively controlled. An alternative definition of Critical Control Points emphasises the need for the continuous integrity of the CCPs: this definition is that CCPs are processing determinants whose loss of control permits the realisation of the potential hazard as an unacceptable food safety or food spoilage risk.
3. Establishment of appropriate systems for monitoring these CCPs.

In the implementation of the system, however, there is likely to be an additional initial stage in which a flowchart of the manufacturing process for a product is drawn up, on which the hazards and CCPs can then be indicated. The four phases are thus:

I. Construction of schematic flow chart of the entire process (this includes the plant layout, installation of equipment, personnel movement, and process flow, including finished products and by-products flow). The important data to obtain would be:
   - ❖ Method of transport of raw material, transit time and temperatures.
   - ❖ The time and temperature of storage of the raw materials.
   - ❖ The make and model of equipment being used in the processing and manufacture, together with the relevant technical data of its operation. For example, if there is more than one make or model of a piece of equipment available for a given operation, this could have an important influence on the safety and quality of the product- for example the ease of cleaning the equipment and so on. One important aid to minimising quality variations is to have specific items of equipment specified for each product line.
   - ❖ Any holding times and identified '*bottlenecks*' in the production line. These may occur when, for example, the freezing machine has much less throughput than the preceding process. *If there is as a result a build up of fresh fillets. What then happens to them? If they are kept in holding room awaiting their turn, how long may they remain there, and what is their eventual temperature before freezing? If the build up of product continues towards the end of the day, may they then be placed in a cold store? Such questions give degree of seriousness of the problems.*

II. Hazard Analysis - Identification of Hazards (physical, chemical and biological) and the location of these recorded at the appropriate points on the flowchart.
   There are three different types of microbiological hazards:
   - ❖ Raw materials which can be regarded as potential source of pathogens, food

poisoning organisms, food spoilage organisms, or toxic substances (pre-formed toxins).

- ❖ Source of contamination during production, processing or distribution.
- ❖ Manufacturing processes, which lack a controlled processing, steps that effectively destroy micro-organisms.
- ❖ Steps during production, processing, distribution, storage, etc., which provide an opportunity for micro-organisms to survive or even grow and multiply.

The Hazard Analysis (Table 3) requires these various elements to be evaluated. Analysis requires a food microbiologist to examine all aspects of the premises and equipment as illustrated on the flowchart, using an evaluation based on an informed awareness of the determinants listed below (section b).

Table 5**:** Hazard Analysis

Item	***Hazards***	***Is the hazard significant***		***Justification***	***preventive measure***	***Is it a CCP***	
		YES	NO			YES	NO
Capacity of freezer	Microbial growth, pathogens	Yes		eg.,Bacillus coagulans (thermoduric thermophilic spore former are significant as spoilage organisms in there own right in the tropics (room T°) Food born pathogens (Campylobacter, viruses) whether or not food is refrigerated is not of direct relevance.	Fast freezing to reduce regeneration phase & retard chemical changes. Matching freezer capacity with preceding process.	Yes	

The analysis requires determination of *risk*, which is the probability of the potential hazard being realised, and its *severity***.** This is important in establishing a ranking of points requiring consideration. The difference in the risk and severity aspects can then be determined from the priority Table 6.

Table 5: Hazards ranking

Severity \ **Risk**	**Low(L)**	**Medium(M)**	**High(H)**
Low(L)	L/L	L/M	L/H
Medium(M)	L/M	M/M	M/H
High(H)	L/H	M/H	H/H

H/H- (Rating index C): A condition or practice that can lead to the fish becoming unsafe or unwholesome.

H/M or M/H- (Rating Index S): A condition or practice that can preclude proper implementation of hygiene or obtain appropriate level of hygiene and thus lead to the production of contaminated or spoiled fish products but with no safety implications.

M/L or L/M- (Rating Index M): Any condition or practice, which precludes general hygiene and lead to the spoilage of the product.

L/L- (Rating Index m): Any condition or malpractice that does not conform to the sanitary requirements, but which is not major, serious or critical.

III. Identification of Critical Control Points, and location of these on the flowchart, followed by a re-valuation of the interaction between Hazards and CCPs. A decision tree can be used here.

A CCP may provide a total elimination of one or more microbiological hazards. This is designated as a CCP-1. In other cases, a CCP may reduce a microbiological hazard without entirely eliminating it, and this has been designated as CCP-2.

IV. Listing and evaluation of the monitoring and QA Procedures (Table 5) used to ensure continuing efficacy of control at the CCPs, together with a consideration of the nature of the documentation on monitoring and QA procedures and the storage of this documentation.

In the example above, its important that bonus payment are not determined by amount of output, as a critical deviation in a CCP parameters will sometimes cause loss of output, reprocessing or a temporary stoppage.
Sometimes a CCP can be monitored. Further more, microbial testing is normally of little value for monitoring CCPs during production, because of the delay before results are known. In designing third inspection checklist for the capacity of the freezer the monitoring procedure will be to check the design and output capacity of the freezer. The limits will be matching in the capacity of the freezing and preceding step.

Table 6: HACCP Plan Form for condition of premises and equipment

Process step		Freezer capacity
Significant hazards		Pathogens
Preventive measures		Matching capacity to preceding step
Critical limits		must match
Monitoring	**What** **When** **How** **Frequency**	Freezer capacity Inspector Checking design Monthly
Corrective action		Check if freezer capacity matches preceding step
Responsibility for inspection		Inspector
Records		Checklist
Verification		On-site inspection

Specific example of the microbiological principles involved

In order to develop relevant monitoring procedure relative to the appropriate (hazard) organisms and the correct functioning of the plant, at correct stages of the manufacturing and distribution processes, the inspector needs a good understanding of the factors determining the occurrence, growth, survival or death of micro-organisms in foods. A summary list can be made as follows:

1. The food and the process

- The innate infection of the raw material
- Contamination during handling and from equipment
- The chemical and physical properties of the raw material
  - Chemical composition- nutrients and antimicrobial substances
  - Micro-heterogenity of the material
  - pH and buffering power
  - Gaseous balance
  - Oxidative-reduction potential (Eh)
  - Water activity (a_w)
  - Mechanical barriers

- *Transport and pre-processing storage conditions*
  - Temperature
  - Gaseous environment
  - Humidity
  - Time

- *Processing and preservation procedures*
  - Direct: temperature
  - Indirect: chemical and physical changes produced in food

- *Packaging and post-processing storage conditions*
  - Temperature
  - Gaseous environment
  - Humidity Time

2. The micro-organisms concerned

- Characteristics of species/strains
  - Tolerance of inhibitory factors
  - Optimum requirements for growth
  - Growth rates

- *Synergistic effects between micro-organisms*
  - Changes in structures and physical properties of the food
  - Supply of additional nutrients and growth factors
  - Changes in pH and gaseous environment

- *Antagonistic effects between micro-organisms*
  - Competition for nutrients
  - Changes in pH and gaseous environment
  - Production of antibiotics, etc.

APPENDIX 3a: Facilities Inspection Manual

Definitions

Adequate: Sufficient relative to situation.

Approved materials: Means materials that have been approved for a specific use by the Approving Authority including those products listed in the *Reference List of Acceptable Construction Materials, Packaging Materials and Non-food Chemical products by the Uganda National Bureau of Standards.*

Cleaning: Means the removal of soil, fish residues, blood, waste water or any other dirt or debris from a processing area and processing equipment.

Critical Control Point: A step or point or item which control can be applied to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Critical limit: A criterion, which separates acceptable from unacceptable.

Control: Means a process of regulation, of checking and verifying that outcomes have been achieved, or are being achieved, against set plans and objectives.

Durable: in respect of construction material, means resistant to decay, breakdown or other physical damage.

Flow diagram: Is a representation of the sequence of steps or operations used in the production or manufacture of a particular food item.

Hazard: Physical, biological, chemical agent in or condition on food with the potential to cause adverse health effect or harm.

High care environment: an area within a factory where open foods are handled or assembled prior to final packaging or dispatch.

Impervious: in respect of any material, means an inert material such as concrete through which water or any other substance will not pass.

Non-absorbent: in respect of any material, means a material that is highly resistant to the passage, absorption or incorporation of water or any other substance.

Non-toxic: Means not injurious to health.

Processing areas: Means an area of a registered establishment that is used for the processing or storage of fish and any other area designated as a processing area in a quality management program.

Refrigeration facilities: means freezers, cold storage coolers, cool rooms and any other room inside an establishment where the ambient air temperature is reduced by mechanical means in order to preserve the quality and safety of fish.

Risk: is the probability of a hazard occurring.

Severity: The seriousness of the consequences when the hazard occurs.

Smooth: means a fairly regular or even surface without projections, indentations or roughness and that can be easily cleaned and disinfected.

Sound: means being in good repair or maintenance.

Source of contamination: Any material that is not part of the product specification and not an approved material for product contact surfaces.

Suitable: means appropriate, proper or correct, according to the standard.

Support area: means an area of registered establishment that is not a processing area. Any other area designated as a support area in a quality management program, or an area that is used for employee sanitation, personnel hygiene or a change room or the storage of materials and ingredients used for processing.

Washable: means capable of being cleaned and disinfected with water, cleansers, disinfectants, or liquids.

A checklist for assessing requirements for general conditions relating to premises and equipment

❖ ***LEGAL REQUIREMENT***

1. Working area of sufficient size for work to be carried out under adequate hygienic conditions. Their design and layout shall be such as to preclude contamination of the product and keep quite separate the clean and contaminated parts of the building:

❖ ***INTERPRETATION***

A fish-processing establishment shall be designed, laid-out and constructed in such a way that it will not become a potential source of contamination for the products. In addition, the establishment's surrounding shall not become a potential source of contamination or provide shelter for insects or animal pests. Loading and handling areas shall be designed so that they can be kept clean and not attract pests.

1.1 Layout: Design and layout

1.1.1. Shall be of sufficient size of work areas to:

- permit adequate cleaning and disinfecting of all areas;
- prevent the accumulation of dirt, fish being in contact with toxic materials and floor surfaces, the shedding of foreign particles into fish and the formation of condensation or mould on surfaces;
- permit good production practices, including protection against contamination and cross-contamination by fish, equipment, water, air or personnel and any other sources of contamination, including insect and animal pests;
- provide, if necessary, suitable temperature conditions that permit sanitary processing and storage of fish; and

- Provide for the orderly and rapid movement of raw material and finished product into and out of the establishment.

1.1.2. The ground, under the control of an operator of an establishment in proximity to the establishment, shall be kept clean, free from debris and unnecessary material and be maintained to minimise harbourages for insect and animal pests.

1.1.3. Areas where fish is loaded, unloaded or handled and other high traffic areas shall be paved with asphalt covered with concrete or other impervious material and equipped with appropriate drainage.

❖ ***METHOD OF INSPECTION***

Observation, Design check

❖ ***PROCEDURE***

- Observe if the fish processing establishment is designed and laid out to provide suitable environmental conditions, permit adequate cleaning and sanitation, minimise contamination, prevent access by pests, provide adequate space for the performance of all operations, and prevent unnecessary delays during processing activities due to design.
- Check if the grounds around the establishment are suitably free of debris and refuse and are not in close proximity to potential sources of contamination of fish products.
- Check if the flow of products being processed is such that processing pathways for different products do not cross and the risk of cross-contamination is controlled.
- Check if a complete physical separation of time or space between high risk and low risk areas, dry and wet areas (the handling of raw products and the handling of finished products), to prevent possible contamination from one to the other is provided.
- Check if working spaces and aisles in the processing area are unobstructed and wide enough to allow for the fast movement of people and materials so as to have full control of temperature / time conditions.
- Check if loading and unloading areas and other high traffic areas are surfaced with concrete or other suitable surface, properly sloped and drained adequately so that water and other liquids do not pool.
- Check if separate wash and hygiene facilities for equipment and personnel in clean and unclean areas are provided.
- Check if layout of process operation is as direct as possible to minimise risk of re-contamination of semi-processed products.
- Check if equipment is placed at least 1 m from wall, ceiling or nearest equipment for ease of cleaning and disinfecting and inspection.
- Check if establishment containing retail outlets on the premises is designed so that retail areas are separate and unauthorised persons are prevented from entering processing areas.
- Check if holding area and anterooms are provided through which persons can pass to enter the processing areas.

❖ ***LIMITS***

All items must be fulfilled

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in 1.1 result in	S or C

❖ ***LEGAL REQUIREMENTS***

2. In areas where products are handled, prepared and processed

2.1. An adequate number of facilities for cleaning and disinfecting hand. In workrooms and lavatories taps must not be waterproof flooring which is easy to clean and disinfect and laid down in such a way as to facilitate the drainage of water or provided with equipment to remove water;
2.2. Walls, which have smooth surfaces and are easy to clean, durable and impermeable;
2.3. Ceilings or roof linings which are easy to clean;
2.4. Doors of durable materials, which are easy to clean;
2.5. Adequate ventilation and, where necessary, good steam and water-vapour extraction facilities;
2.6. Adequate natural or artificial lighting;
2.7. An adequate number of facilities for cleaning and disinfecting hand. In workrooms and lavatories taps must not be hand operated. These facilities must be provided with single use hand towels;
2.8. Facilities for cleaning and disinfecting plant facilities, equipment and utensils must be available.

❖ ***INTERPRETATION***

Floors shall not be allowed to become a potential source of contamination for fish products.

2.1. Floor in wet areas: (processing receiving and holding areas)

2.1.1. Shall be constructed of smooth, impervious, non-absorbent and non-toxic materials, be sloped for drainage and be maintained in a sound condition for ease of cleaning and disinfecting.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check if the floor is waterproof, non-absorbent, washable and of non-toxic material. It is recommended that they be non-slip.
- Check/observe if floor in wet working area is sloped sufficiently for liquid to drain (a slope of 1cm/60cm has been found adequate). Check, if floors are ribbed or grooved to facilitate traction, that any grooving of this nature always runs to the drainage channel.
- Observe if, where floors in wet areas are not adequately sloped, it can be demonstrated that they are maintained in a clean and sanitary condition.
- Check if there are grates on top of drainage adequately opened so solid waste does not block the flow of wastewater.
- Check/observe if floors are kept in good repair.

❖ ***LIMITS***

All items must be fulfilled

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in 2.1 results in	M or S

❖ ***INTERPRETATION***

Walls must be constructed and maintained in such a way that they will not become potential sources of contamination for food products or allow moisture to enter. Light colours, such as white, off-white or light pastels allows cleanliness to be evaluated and increase the overall lighting levels in the facility.

2.2. Walls in wet working areas (processing, receiving and holding areas)

2.2.1. Wall surfaces shall be constructed of smooth, non-absorbent, durable and non-toxic materials that are Light-coloured and thoroughly washable, in such a manner that all joints are sealed and floor and wall junctions are coved or rounded, and shall be maintained in a sound condition for ease of cleaning and disinfecting.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check/observe if walls in wet working areas are non-absorbent. Constructed of approved materials. (In addition to the approved materials for wet working areas, walls of dry working areas may be constructed of wallboards or chipboards).
- Check if where panelling material is used in the construction of walls/partition, all seams and joints are made watertight and smooth. Coving is not required for walls that are supported on concrete curbs rising from the floor provided that the junction between the curb and the wall does not allow water to enter, light coloured and with ease of cleaning and disinfecting.

❖ ***LIMITS***

All items must be fulfilled.

❖ *EXPLANATION:*	❖ *RATING*
Any item not fulfilled in 2.2 results in	M or S

❖ ***INTERPRETATION***

Ceilings and overhead fittings must not be allowed to become sources of falling debris, dust, and condensation or moulds that could contaminate work surfaces or fish products. Light-coloured ceilings allow cleanliness to be evaluated and increase the overall lighting levels in the factory.

2.3. Ceilings and overhead fixtures in processing, receiving and holding areas

2.3.1. Shall be constructed of smooth, non-absorbent, durable and non-toxic materials that are light-coloured, washable, of a height acceptable to the competent authority and maintained in a sound condition for ease of cleaning and disinfecting.

2.3.2. Water feed lines, piping, lighting, and other overhead fixtures shall be designed, constructed, installed and finished to; prevent the accumulation of dirt, reduce condensation and the growth of moulds, and the shedding of foreign particles into fish being processed beneath and, if the purpose of each is not readily evident, shall be labelled in such a manner that this purpose is readily discernable by an inspector.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check if ceilings in the production areas are constructed of durable, smooth, waterproof and light coloured materials and are well maintained.
- Check if all surfaces are constructed so as to facilitate cleaning and disinfecting and joints sealed to prevent entrance of moisture.
- Check if the ceilings are of sufficient height to allow the sanitary operation of the equipment for the particular area (at least 2.7m is appropriate).
- Observe if overhead fixtures are designed, constructed, installed and finished such that they are:
  - not located directly over fish processing operations (with the exception of lighting, or other fixtures specially required by the nature of the processing operation);
  - flush mounted to upper surfaces or ceilings;
  - Boxed in, where practical. Otherwise, they shall be easily accessible and finished in such a way that they can be properly cleaned;
  - Labelled, if necessary, so that the inspector can easily identify their purpose.
- Observe /check if supply lines to processing equipment (e.g., water, electricity are feeding to the equipment by the shortest route possible).
- Observe if, where monorails are used, precaution is taken to ensure that hydraulic fluid or lubricants do not drip onto production surfaces or fish products.
- Observe if ceiling and overhead fixtures are maintained in sound condition for ease of cleaning and disinfecting as required by operating conditions.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 2.3 results in	M or S

❖ ***INTERPRETATION***

Doors and windows must not be allowed to become potential source of contamination or avenue for the entrance of pests.

2.4. Doors/windows

2.4.1. Doors into and out of processing and support areas shall be constructed of smooth, non-absorbent and non-toxic materials that are washable, be properly fitted and hung and be maintained in a sound condition for ease of keeping clean and disinfected.

2.4.2. Doors shall be located so that persons may not enter directly into a processing area, with the exception of holding rooms, from outside the establishment; and

2.4.3. If the doors are emergency exits from a processing area, shall be clearly marked "*Emergency Use Only*" or with other similar wording and be equipped with emergency door opening devices, panic bars or similar devices that prevent entry from the exterior of the establishment.

2.4.4. Windows that are capable of being opened, and any other openings to the outside shall be constructed so as to prevent the accumulation of dirt and be fitted with non-corrosive insect-proof and animal-proof screens or other similar devices.

❖ ***METHOD OF INSPECTION***

Observation, design check,

❖ ***PROCEDURE***

- Check if all window frames and doors in processing, receiving and holding areas are constructed of, durable, smooth, waterproof and light-coloured material, that is easy to keep clean. (Doors and window frames may be constructed of wood provided they are coated with an acceptable material that will prevent moisture from entering the wood).
- Observe/check if window and doorframes are sealed to adjacent walls, and that doors, when closed, have a close-fitting seal to exterior frames.
- Observe if doors and windows are kept in good condition for ease of cleaning and disinfecting.
- Check if windows that open are screened and interior windowsills are sloped downward or bevelled for ease of cleaning and to prevent accumulation of extraneous material.
- Check if doors are not allowing direct entry into processing areas from outside (except holding rooms), with exception of emergency exits.

❖ ***LIMITS***

All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 2.4 results in	m or M

❖ ***INTERPRETATION***

Adequate ventilation is essential to prevent the accumulation of odours, humidity and condensation in the establishment. Condensation must be controlled to prevent contamination of walls, equipment and products from ceilings and overhead fixtures.

2.5. Ventilation

2.5.1. Natural and mechanical ventilation systems shall provide clean air, inhibit condensation and maintain conditions that are free from foul odours smoke or steam and any opening for the ventilation of the processing or support areas shall be fitted with non-corrosive insect-proof and animal-proof screens or other similar devices.

❖ ***METHOD OF INSPECTION***

Observation, Design checks

❖ ***PROCEDURE***

- Check/observe if ventilation systems provide, when the exterior doors are closed, sufficient air exchange and treatment to prevent the build up of smoke, undesirable odours or excessive heat and humidity, and inhibit condensation.
- Check if air intake is located and operated in such a manner as to prevent the intake of contaminated air and the contamination of fish products by airborne dust, bacteria or other contaminants.

❖ ***LIMITS***

All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Item not fulfilled in 2.5. results in;	M or S

❖ ***INTERPRETATION***

Adequate lighting increases efficiency in determining defects allows easier monitoring of sanitation and reduces safety hazards. Lighting fixtures shall have covers to prevent breakage and designed to be easily cleaned and disinfected to prevent contamination of work surfaces and products.

2.6. Lighting

2.6.1. Either natural or artificial light shall be provided at intensities adequate to ensure the effective delivery to the processing operation being conducted.
2.6.2. The light fixtures shall have appropriate covers and be installed for ease of cleaning and disinfecting.
2.6.3. Light that gives highly distorted colour rendition is not recommended.

❖ ***METHOD OF INSPECTION***

Observation, Measurement, Design check

❖ ***PROCEDURE***

- Observe/check/measure if at minimum, a light intensity of 215-lux (20 foot-candles) or more, as measured by a standard light meter, is in all processing and support areas to facilitate cleaning.
- Observe if surfaces where processing and packaging is conducted have stronger lighting; (an intensity of 538 lux or more is recommended, more intensity lighting, equal to or greater than 1,075 lux, is recommended for location such as inspection stations).
- Observe/check if light bulbs and fixtures in all processing and support areas where there is exposed fish, ingredients or packaging materials are adequately covered or coated with a shatterproof material or similarly designed to prevent contamination in case of breakage.
- Check if the light fixtures are designed to allow cleaning and disinfecting.

❖ ***LIMITS***

All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 2.6. results in	M or S

❖ ***INTERPRETATION***

2.7. Hand/footwear cleaning and disinfecting facilities

Good personnel hygiene practices are essential for preventing contamination of fish products with micro-organisms associated with sewage or human diseases or infection. Hands, gloves and footwear shall not be allowed to become potential sources of contamination.

2.7.1. Facilities

2.7.1.1. Wash basins shall be available and equipped with non-hand-operated taps.

2.7.1.2. Wash basins and other facilities or materials necessary for employee hygiene shall be;
- provided in adequate quantities, and
- Conveniently located in or visible from processing areas.

2.7.1.3. Equipment and material provided to clean and disinfect protective clothing and footwear such as hand-dips and foot-dips shall be provided in adequate quantities and be conveniently located in the processing areas.

2.7.1.4. Hand wash and toilet facilities shall be maintained in good operating order and be properly equipped with single-service towels and toilets tissue, and all effluent and sewage shall be disposed of in accordance with ordinances or, if none exist, in a manner satisfactory to an inspector.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Observe if processing areas åre suitably supplied with washbasins in adequate numbers for employee hygiene, either in the processing areas or in a visible location nearby (At least one washbasin is available for every ten employees).
- Observe/check if hand-washing facilities are available and equipped with non-hand-operated taps, hot and cold (or tempered) running water, a bacteriological liquid or powdered soap dispenser, and single service towels and facilities for disinfecting hands. No air dryers allowed.
- Observe if wash basin is properly plumbed to drain.
- Observe if hand-washing facilities are maintained and function correctly.
- Check/observe if facilities for washing and disinfecting are provided in a convenient location in processing areas to allow for the disinfecting of hands or hand coverings.
- Check/observe if foot-dips are provided to allow for footwear to be disinfected, in areas such as sanitary zones and restricted access areas (except where it can be shown that this is not required due to the nature of the processing operation).
- Check/observe if product flow is considered when determining the location of washbasins (some operations require at least one hand washing facility in the packing room for use by packing room workers only).

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 2.7 results in	M or S

❖ ***LEGAL REQUIREMENT***

2.8 Facilities for cleaning and disinfecting plant facilities, equipment and utensils

❖ ***INTERPRETATION***

Cleaning and disinfecting equipment and supplies shall be available to ensure that the sanitation program can be carried out as written. The layout and design of equipment used for holding chemical products for cleaning and disinfecting shall not allow contamination of fish products.

2.8.1. Equipment and material used to clean and disinfect an establishment and processing equipment shall be suitably provided in adequate quantities and be conveniently located in the establishment.
2.8.2. Any product used for the lubrication of fish processing equipment or machinery and any product used for cleaning and disinfecting shall be clearly labelled as to its use, stored in an appropriate location and only used by a person trained to use or apply it in a manner that prevents contamination of fish or contact surfaces.
2.8.3. Unnecessary material or equipment shall not be stored in a processing area.

❖ ***INTERPRETATION***

2.8.1. Adequacy and suitability of facilities

Equipment and material used to clean and disinfect an establishment and processing equipment shall be provided in adequate quantities and be conveniently located in the establishment.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Observe if available in adequate facilities for sanitary storage of cleaning equipment and materials, when not in use, are provided and available.
- Observe if brushes, brooms, hoses and equipment and materials needed for proper cleaning and disinfecting, in accordance with the establishment's sanitary program, are available in adequate quantities at all times.
- Check if operational and segregated wash areas for utensils and equipment from high risk and low risk areas are provided and available.
- Observe if separate areas for tray and rack washing are provided, which is well ventilated and has good extraction and adequately drained.
- Check if cleaned utensils are stored in clean and a well-ventilated storage area, which allows for good drainage and drying, to avoid recontamination.
- Observe if supplies of clean water adequately pressurised for washing is ample.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 2.8.1. results in	M or S

❖ ***INTERPRETATION***

Chemical used for lubrication or for cleaning and disinfecting must not be allowed to become a potential source of contamination for food products. Chemical products must not be allowed to be improperly or unnecessarily stored in processing areas, as this could hinder cleaning and disinfecting.

2.8.2. Chemical product storage.

2.8.2.1. Any product used for the lubrication of fish processing equipment or machinery and any product used for cleaning and disinfecting shall be clearly labelled as to its use, stored in an appropriate location.

2.8.2.2. Unnecessary material or equipment shall not be stored in a processing area.

2.8.2.3. No odiferous or toxic substances shall be stored in a processing area.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check/observe if chemical products used for lubrication or for cleaning and disinfecting are properly labelled and stored in a lockable a weatherproof location that is maintained in good repair.
- Check/observe if substances that are toxic or have a strong odour are not stored in a processing area or in close proximity to supplies or materials, or in such a way as to possibly contaminate the product.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 2.8.2. results in	C or S

❖ ***LEGAL REQUIREMENT***

3. In cold rooms and where fishery products are stored;

3.1 The provisions set out under point 2 (a), (b), (c), (d) and (f) above.

3.2 Where necessary, a sufficiently powerful refrigeration plant to keep products at temperatures prescribed in the Directive (< chilled products - 4°c or frozen products <-18°c).

❖ ***INTERPRETATION***

Refrigeration facilities shall be built in accordance with good engineering practices and with respect to freezing equipment.

Floor must not be allowed to become a source of potential contamination or an avenue for fish products

3.1.1. Floors of coolers and cold storage

3.1.1.1. Shall be constructed of smooth, impervious, non-absorbent and non-toxic materials, be sloped to drainage and be maintained in a sound condition for ease of cleaning and disinfecting. Heater mat must be provided for freeze floors

❖ ***METHOD OF INSPECTION***
Observation, design check

❖ ***PROCEDURE***
- Check if the floor is hard wearing, waterproof, non-absorbent, easily washable and of non-toxic material (shall be non-slip).
- Check if the floor is maintained in sound condition for ease of cleaning and disinfecting as often as required by operating conditions.
- Check/observe if floor in wet working area is sloped sufficiently for liquid to drain (a slope of 1cm / 60cm has been found adequate).
- Check, if floors are ribbed or grooved to facilitate traction that any grooving of this nature always runs to the drainage channel.
- Observe if, where floors in wet areas are not adequately sloped, it can be demonstrated that they are maintained in a clean and sanitary condition.
- Check if there are grates on top of drainage adequately opened so solid waste does not block the flow of wastewater.
- Check/observe if floors are kept in good repair.

❖ ***LIMITS***
All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 3.1.1. results in	M or S

❖ ***INTERPRETATION***

3.1.2. Walls of coolers and cold storage.

Internal walls must be constructed and maintained in such a way that they will not become potential source of contamination for fish products or allow moisture to enter. Light colours such as white that allows cleanliness to be evaluated and increase the overall lighting levels in the facility.

3.1.2.1. Walls shall be constructed of smooth, non-absorbent, durable and non-toxic materials that are light coloured and thoroughly washable, in such a manner that all joints are sealed and floors and wall junctions are coved or rounded.

3.1.2.2. Wall shall be maintained in a sound condition with pipes or conduits chased into the wall, boxed in or bracketed sufficiently clear of the wall for ease of cleaning and disinfecting.

❖ ***METHOD OF INSPECTION***
Design check

❖ ***PROCEDURE***
- Check if walls are durable, impervious, non-absorbent with smooth surface.
- Check if where panelling material is used in the construction of walls of coolers and cold storage, all seams and joints are made watertight and smooth (Coving not required for wall supported by curbs and rising from floor), light coloured with ease of cleaning and disinfecting.

❖ ***LIMITS***
All items must be fulfilled

❖ *EXPLANATION*	❖ *RATING*
Item not fulfilled in 3.1.2. results in	M or S

❖ ***INTERPRETATION***

Ceilings and overhead fittings shall not be allowed to become sources of falling debris, dust, condensation or mould that contaminate work surfaces or fish products.

Light-coloured ceiling allow cleanliness to be evaluated and increase the overall lighting levels in the facility.

3.1.3. Ceilings of coolers and cold storage

3.1.3.1. Ceilings shall be constructed of smooth, non-absorbent durable and non-toxic materials that are light-coloured, washable, of height acceptable to the competent authority and maintained in a sound condition for ease of cleaning and disinfecting.

3.1.3.2. Cooling units, water feed lines, piping, lighting or other overhead fixtures shall be designed, constructed, installed and finished to prevent the accumulation of dirt and to reduce condensation, the growth of moulds and the shedding of foreign particles into fish product.

❖ ***METHOD OF INSPECTION***

Design check, observation

❖ ***PROCEDURE***

- Check if all surfaces are constructed so as to facilitate cleaning and disinfecting, and joints sealed to prevent entry of moisture.
- Check/observe if ceilings and roof linings are constructed of durable, smooth, waterproof and light-coloured and are well maintained. (Suspended ceilings are permitted, provided that they can be maintained in a clean and sanitary condition).
- Check if ceilings are of sufficient height to allow the sanitary operation of the equipment for the cooling unit (a minimum of 2.7 m is appropriate).
- Check if overhead fixtures are designed, constructed, installed and finished such that they are;
  - not located directly over fish processing operations (with exception of lighting, or other fixtures specifically required by the nature of coolers);
  - flush mounted to upper surfaces or ceilings;
  - boxed in, where practical. Otherwise, they must be readily accessible and finished in such a way that they can be properly cleaned.
  - labelled, if necessary, so that their purpose can be easily identified by the inspector.
- Observe/check if supply lines to cooler equipment (e.g., water, electricity) are fed to equipment by the shortest route possible.
- Observe/check if, when overhead monorails are used, precautions are taken to ensure that hydraulic fluids or lubricants do not leak or drip onto packaging or fish products.

❖ ***LIMITS***

All items must be fulfilled

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in 3.1.3. results in	m or M

❖ ***INTERPRETATION***

Doors shall not be allowed to become potential source of contamination or avenue for the entry of pests.

3.1.4. **Doors /windows/ventilation of coolers and cold storage**

3.1.4.1. Door into and out of holding areas shall be constructed of durable, smooth, non-absorbent, insulated, light coloured material and non-toxic materials that are washable, be properly close-fitted and hung and be maintained in sound condition for ease of cleaning and disinfecting.

3.1.4.2. Shall be located so that person may not enter directly, with the exception of holding rooms, from outside the establishment.

3.1.4.3. Shall be protected by secondary plastic swing doors or strip curtains with doors that are close fitting to exclude vermin and other pests.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check if doors in product areas are made of durable, smooth, waterproof and light- coloured material with smooth surfaces that can ensure cleanliness.
- Check if the doors in product areas are sealed to the adjacent walls and doors, and have a close-fitting seal to doorframes when closed and protected by secondary plastic strip curtains.
- Check if holding areas or ant-rooms through which persons pass to enter the storage area are provided.
- Observe if doors are kept in good condition.

❖ ***LIMITS***

All items must be fulfilled.

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in3.1.4. results in	S or M

❖ ***INTERPRETATION***

3.1.5. Lighting

Adequate lighting increases efficiency in determining defects allows easy monitoring of sanitation and reduces safety hazards. Lighting fixtures shall have covers to prevent breakage and designed to be easily cleaned and disinfected to prevent contamination of work surfaces and products.

3.1.5.1. Lighting shall be covered with a protective shield to prevent glass from falling into the product or packaging material should a light burst or break in work areas where open products is handled

3.1.5.2. In storage, lighting shall be 240 lux.

❖ ***METHOD OF INSPECTION***
Observation, design check

❖ ***PROCEDURE***
- Check/observe if at minimum, a light intensity of 240 lux as measured by a standard light meter is installed or light provided is adequate.
- Check if the light fixtures are designed to allow cleaning and disinfecting.
- Observe/check if light bulbs and fixtures are adequately covered or coated with a shatterproof material or similarly designed to prevent contamination in case of breakage.

❖ ***LIMITS***
All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 3.1.5 results in	m or M

❖ ***INTERPRETATION***

3.2.1. Cooling and Freezer equipment capacity

Facilities for temperature control during cooling shall be capable of maintaining adequate temperatures. Temperature recording shall be required for all refrigeration facilities to ensure that minimum temperatures are being met.

3.2.1.1. Cooling storage

3.2.1.1.1. Coolers shall maintain fish at a temperature from 4°C to-1°C.

3.2.1.1.2. Refrigeration plant shall be designed to give a rapid pull-down in air temperature but without creating large air movement, which dry out the fish.

3.2.1.1.3. Each refrigerated area shall be provided with a clear visible air temperature indicator or recorder.

❖ ***METHOD OF INSPECTION***
Measurement, Design check

❖ ***PROCEDURE***
- Check if coolers and other facilities and equipment used for the refrigeration of fresh or unfrozen fish products are designed to maintain a temperature between -1°C and 4°C (with allowance for the fact that the temperature may vary slightly above this range due to operating conditions).
- Check if a maximum air velocity over the fish is 0.3m/sec.
- Check if coolers have temperature recorded daily. (This includes days the establishment is not operating). This can either be done with automatic temperature recording devices, or the temperature can be recorded manually using an accurate thermometer.
- Check if refrigeration facilities are maintained in good repair.

❖ ***LIMITS***
All items must be fulfilled.

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in 3.2.1 results in	M or S

❖ ***INTERPRETATION***

Facilities for temperature control during freezing, storage and refrigeration shall be capable of maintaining adequate temperatures. Temperature recording is required for all refrigeration facilities to ensure that temperatures are being met.

3.2.2. Freezer store

3.2.2.1. Refrigeration facilities shall be built in accordance with good engineering practices and with respect to freezing equipment shall;
- Contact freeze a 25mm-thick block of un-packaged fish to -18°C in two hours or less, or
- Air blast freeze fish at a rate that prevents deterioration of the fish, until the thickest section of the fish is at a core temperature of -18°C.

3.2.2.2. Refrigeration facilities shall be operated in a manner that minimises frost build-up.

3.2.2.3. Cold storage shall be equipped with automatic temperature recording devices, accurate thermometers must be installed and the temperature read and recorded at least once every 2 hours.

3.2.2.4. Cold storage shall maintain the temperature of fish at -18°C or colder.

3.2.2.5. The temperature sensor must be located furthest a way from the cold source.

❖ ***METHOD OF INSPECTION***

Observation- Measurement, design check

❖ ***PROCEDURE***

- Check if freezers and cold storage facilities used for fish and fish products have the capability to provide and maintain adequate temperatures.
- Check if freezers are able to rapidly reduce the temperature of fish products to -18°C or lower, to minimise adverse effects on the product being frozen
- Check if air blast freezers have sufficient capacity, air velocity and correct air circulation through the product being frozen to minimise adverse effects on the product (at least evaporator temp. of ≤ -30°C and air velocity ≥ 2m/sec).
- Observe/measure if cold storage maintains a temperature of ≤ -18°C.
- Check if cold storage has temperature-recording device that automatically records the temperature at least every two hours and the temperature recording devices must be sufficiently accurate to confirm that required temperature is being met.
- Check temperature chart to see if prescribed temperature has been reached within time limits
- Check if equipment for monitoring is periodically standardised or calibrated.

❖ ***LIMITS***

All must be fulfilled

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in 3.2.2 results in	S or C

❖ ***INTERPRETATION***

Equipment used for product preservation processes must not, through improper functioning, allow an unsafe or unacceptable product to be produced. Devices used to monitor process equipment must be capable of ensuring its proper functioning.

3.2.3. product preservation process equipment and monitoring devices

3.2.3.1. Equipment that is used to perform product preservation process shall meet the applicable requirements set out in the establishment's quality management program.

3.2.3.2. Devices that are used to monitor the effectiveness of product preservation processes or the performance of equipment used in product preservation processes shall be calibrated and function in accordance with the applicable requirements set out in the establishment's quality management program.

❖ ***METHOD OF INSPECTION***

Design check, measurement, document check

❖ ***PROCEDURE***

- Check if equipment used for product preservation processing is consistently capable of meeting critical limits applied to the process (a critical limit represents the value that must be met and is used to separate acceptable product from unacceptable product).
- Measure if equipment used for monitoring product preservation processes is accurate and precise enough to correctly measure the critical limit (check if periodic standardisation or calibration is also necessary, and is addressed in the verification section of the establishment HACCP plan).

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 3.2.3 results in	S or C

❖ ***LEGAL REQUIREMENT***

4. Appropriate facilities for protection against pests such as insects, rodents, birds, etc.

❖ ***INTERPRETATION***

Pests and other animals shall not be allowed to become a potential source of microbial contamination or foreign matter for fish products. Pest control products must not be allowed to become a potential source of chemical contamination for fish products.

4.1. Animals are not permitted inside an establishment.

4.2. Pesticides and any other animal control products shall be applied in a manner that prevents the contamination of fish, packaging, labelling materials and ingredients.

4.1.1. Protection/Exclusion

Protective devices such as rodent-proof drain outlets and tight-fitting doors must be provided.

4.1.1.1. Door

4.1.1.1.1. When doors are closed they shall fit tightly so that no gap between door and frame is larger than 3 mm across.

4.1.1.1.2. Doors into and outside of an establishment shall be kept closed. May be opened only when necessary to allow personnel, fish and other materials to enter or leave the establishment unless air curtains or other devices as specified in the establishment quality management program that prevents the entry of insects and animal pests are in operation.

4.1.1.1.3. The minimum size and number of doors consistent with efficient working practice is recommended.

❖ ***METHOD OF INSPECTION***

Observation, measurement, design check

❖ ***PROCEDURE***

- Check/measure/observe if, when doors are closed, they fit tightly so that no gap between door and frame is larger than 3mm across.
- Check if exterior doors are kept closed when not in use. (Unless air curtains or other devices to prevent the entry of pests are installed). Should have automatic opening and controlling devices.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 4.1.1.1. results in	m or M

❖ ***INTERPRETATION***

Windows must not be allowed to become potential sources of contamination or avenue for the entry of pests.

4.1.1.2. Windows

4.1.1.2.1. Windows that can be opened and any other openings to the outside shall be constructed so as to prevent the accumulation of dirt and be fitted with non-corrosive insect-proof and animal-proof screens or similar devices.

❖ ***METHOD OF INSPECTION***

Observation, measurement, design check

❖ ***PROCEDURE***

- Check if window frames are sealed to adjacent walls,
- Check if there is a fly screen that seems to have an opening that is more than 1 mm. Gauge if in doubt.

- Observe/check if windows that open are screened and interior windowsills are sloped downwards or bevelled for ease of cleaning and accumulation of extraneous material.

❖ ***LIMITS***
All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 4.1.1.2.results in	m or M

❖ ***INTERPRETATION***
Adequate ventilation is essential to prevent the accumulation of odour humidity and condensation in a processing establishment. Condensation must be controlled to prevent contamination of walls, equipment and products from ceilings and overhead fixtures.

4.1.1.3. Ventilation

4.1.1.3.1. Natural and mechanical ventilation systems shall provide clean air, inhibit condensation and maintain conditions that are free from foul odours and any openings for the ventilation of the processing or support areas shall be fitted with non-corrosive insect-proof and animal-proof screens or other similar devices.

4.1.1.3.2. At some point from where the ventilation duct opens to out side to where it opens on the inside there must be fly screening with a screen with a mesh size no larger than 1 mm.

❖ ***METHOD OF INSPECTION***
Observation, measurement, design check

❖ ***PROCEDURE***
- Observe if there is fly screening that does not seem to be tight fitting, gauge to determine if there is non-compliance. If the situation is such that observation or gauging is not possible, interview the person responsible to determine if there is correct fly screening.

❖ ***LIMITS***
All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 4.1.1.3 result in	M or S

❖ ***INTERPRETATION***
Drains must not be allowed to become a source of potential contamination or an avenue for the entry of pests into the establishment. The location, type and size of drainage systems is critical in the prevention of pooling and back-ups of processing water which may cause unsanitary conditions.

4.1.1.4. Drains (rodent-proof drain outlets)

4.1.4.1. Drains shall be of a type and size sufficient to carry off any process effluent and water from processing and cleaning operations.

4.1.4.2. Drains shall be equipped with non-corrosive covers or grates and be constructed in a manner that prevents the entry of insects and animal pests, sewer gases or any other deleterious substances. Their openings must not be more than 10mm across.

4.1.4.3. Water locks shall be in the drainpipes between the opening in the floors and the collecting well.

❖ ***METHOD OF INSPECTION***

Observation, design check, measurement

❖ ***PROCEDURE***

- Check/observe if protective devices such as rodent-proof drain outlets and tight-fitting doors are provided.
- Check/measure if all drains opening inside the premises are large enough (not more than 10mm across) to carry off process effluent and water from processing and cleaning operations without danger of overflowing or becoming obstructed.
- Check if drains that are connected to sewer lines are provided with a check (backwater) valve, and are provided with traps.
- Check if floor drains have covers that are removable and are constructed of metal or other acceptable material (covers are not required where drains are located under processing equipment).
- Check if open drains that pass through exterior walls or floors are designed so that insects and animal pests cannot enter the processing areas.
- Observe if drains in processing and support areas are designed and installed so that they carry effluent away from the processing area.
- Observe if drains are kept in good repair.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 4.1.1.4 results in	M or S

❖ ***INTERPRETATION***

4.2. Fly traps

4.2.1. There shall be at least one electric flytrap at every entrance to rooms where processing takes place and where packaging material is stored.

4.2.2. Flytraps shall not be placed over processing lines or in front of fans.

4.2.3. Distance of electric traps from floor shall be 2.5 to 3m.

4.2.4. The flytraps must be on 24 hours a day.

4.2.5. Lamps must be replaced at least every year or according to manufacturer's specifications.

❖ ***METHOD OF INSPECTION***

Observation, document check, design check

❖ ***PROCEDURE***

- Observe/check if there is at least one electric flytrap in each processing room and where packaging material is stored and its placement. (If necessary, the distance from the floor should all be 2.5 to 3m).
- Observe if the lamps are turned on.
- Check if lamps have been changed once per year or according to manufacturer's specifications.
- Observe/check if the electrical devices to control flies and other insects are equipped with catch basins and are properly located and maintained in order to eliminate the risk of contaminating fish products.

❖ ***LIMITS***

All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 4.2. results in	M or S

❖ ***INTERPRETATION***

4.3. Toxic substances: Handling of toxic substances

4.3.1. Fly stickers, insecticide wall paint, insecticide strips, automatic dispensers of aerosol insecticides and continuous vaporisers of insecticides must not be used in processing areas.

4.3.2. When not being used toxic substances shall be kept in premises or cupboards that can be locked.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check/observe if fly stickers, insecticide wall paints, insecticide strips, and automatic dispensers of aerosol insecticides and continuous vaporisers of insecticides are not used in processing areas.
- Observe if there is storage and handling of toxic substances such as pesticides in particular in rooms where products or packaging materials are handled.
- Observe/check if toxic substances are kept in premises or cupboards, which can be locked.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled 4.3. results in	S or C

❖ ***LEGAL REQUIREMENT***

5. Instruments and working equipment such as cutting tables, containers conveyor belts and knives made of corrosion-resistant containers easy to clean and disinfect:

❖ ***INTERPRETATION***

Equipment and instrument in contact with fishery products:
Equipment and utensils must be constructed and maintained in such a way that it does not become a potential source of contamination for fish products.
Equipment and utensils must be made of materials that are non-corrodible, non-absorbent, smooth and non-toxic that is washable, and can be maintained in a sound condition for ease of cleaning and disinfecting. Wood, since it can harbour micro-organisms, must not be used and allowed to come in contact with fish products (with specified exceptions).

5.1 Equipment material

5.1.1. Fish processing equipment and ice handling or conveying equipment, including all surfaces, legs and frames shall be constructed of smooth, non-corrodible, non-absorbent and non-toxic materials that are washable, and shall be maintained in sound condition for ease of cleaning and disinfecting.

5.1.2. Exceptions may be; frames and legs of dryer flakes, ice screws that are in contact with ice may be constructed of galvanised metal. Cooler or cold storage racking system on which pallets of fish are stored shall be constructed of metal or other material acceptable to the competent authority and shall be maintained in a sound condition for ease of cleaning and disinfecting.

5.1.3. The equipment such as tables, utensils and totes, bins, and baskets used for holding fish being processed or final products shall be made of corrosion-resistant metal or other approved food standard materials (e.g. stainless steel, saltwater- resistant aluminium, high-density plastics and fibreglass-reinforced plastics) and well maintained.

5.1.4. No wooden materials shall be allowed.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check/observe if equipment on which fish is processed or which comes in contact with ice or fish products is constructed of corrosion-resistant, non-absorbent, impervious and washable material that is maintained in a sound condition for easy of cleaning and disinfecting or other approved material. This includes such equipment as tables, utensils and totes, bins, knives and baskets used to hold fish being processed or final products. Examples of approved materials are stainless steel, saltwater-resistant aluminium, high-density plastics and fibreglass reinforced plastics. Check if materials in equipment retain properties of food standard materials.
- Check that wood, glass and enamelled material is not used in cutting boards, or the handles of utensils (forks, shovels, brooms, squeegees, knives, rakes, etc).
- If a wire mesh is used, check that it is of non-corrodible material designed to allow the mesh to be properly cleaned and disinfected (mesh with bare galvanised wire or mesh with twisted joints is not acceptable). Such as, welded square mesh

of stainless steel wire or welded square mesh employing mild steel wire that has been covered with an approved plastic coating.

❖ ***LIMITS***
All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 5.1 results in	S or C

❖ ***INTERPRETATION***
All equipment/utensils must not be allowed to become a potential source of contamination for fish products.

5.2 Equipment/utensil design

5.2.1. Equipment for conveying fishery products from the reception area to the work area must be designed in such a way that it allows cleaning and disinfecting with the facilities available at the establishment.

5.2.2. All utensil and cutting surfaces, used in processing or holding areas, that come in contact with fish or other fish products must not have gaps, crevices or inaccessible points that may be omitted during cleaning, and must be properly sloped to drain.

5.2.3. All welded equipment, including tables, bins and support brackets must have continuous, smooth and uniformly welded joins.

❖ ***METHOD OF INSPECTION***
Observation, design check

❖ ***PROCEDURE***
- Check if surfaces in contact with food are smooth and non-porous.
- Check if surfaces that come in contact with fish products have no gaps, crevices or inaccessible points that may be omitted during cleaning.
- Check if surfaces are properly sloped to drain.
- Check if all welded equipment, including tables, bins and support brackets, has continuous, smooth and uniformly welded joints.
- Check that pans and bowls do not have closed rolled rims, as these are difficult to clean.
- Observe if all flumes are free flowing and all joints and bends in the flume are smooth to the extent that debris can be easily removed by flowing water.
- Observe/check if all drive motors and transmissions are located such that incidental lubricant drops are not allowed to reach surfaces that come in contact with fish.
- Check if the equipment is so designed to protect the content from external contamination.
- Check if, where necessary, equipment is capable of being disassembled to allow for maintenance, cleaning disinfecting monitoring or inspection.

❖ ***LIMITS***
All items must be fulfilled

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in 5.2. results in	M or S

❖ ***INTERPRETATION***

5.3 Equipment: Containers

5.3.1. All re-useable containers for holding fish shall be suitably made of approved food standard material (stainless steel, high-density, polyethylene is preferred).

5.3.2. Sufficient containers must be provided for all the fish, ice, and waste.

❖ **METHOD OF INSPECTION**

Observation, design check

❖ ***PROCEDURE***

- Check/observe if containers are suitably made of approved food standard materials.
- Observe if sufficient containers for all the fish, ice, and waste are provided.

❖ ***LIMITS***

All items must be fulfilled.

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in 5.3.2 results in	S or C

❖ ***INTERPRETATION***

Conveyors must not be allowed to become a potential source of contamination for fish products. Conveyors in contact with fish must be constructed of and maintained in a sound condition for ease of cleaning and disinfecting.

5.4 Conveyors

5.4.1. Conveyors in contact with fish shall be maintained in a sound condition for ease of cleaning and disinfecting,

5.4.2. Conveyers shall be constructed of non-corrosive, non-absorbent, smooth, impervious, light-coloured and non-toxic materials or non-corrodible, non-absorbent, impervious and non-toxic wire mesh or chain link and, if necessary, be equipped with effective spraying washers and scrapers.

5.4.3. Conveyors that are used for loading finished and packed products into conveyances may be made of mild steel or other similar material and shall be maintained in a sound condition for ease of cleaning and disinfecting.

❖ ***METHOD OF INSPECTION***

Design check, observe.

❖ ***PROCEDURE***

- Check if conveyor is made of acceptable materials and maintained in a sound condition so that they can be easily cleaned and disinfected.
- Observe if conveyor is designed to clean regularly by sprayers, air sprayers, scrapers, manual spraying or dips (exception to this can be made only when it can be shown that sanitary conditions can be maintained through some other means.

❖ ***LIMITS***

All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 5.4 results in	S or C

❖ ***LEGAL REQUIREMENT***

6. Special water tight corrosion-resistant containers for fishery products not intended for human consumption and premises for the storage of such containers if they are not emptied at least at the end of each working day

❖ ***INTERPRETATION***

Fish offal and other by-products must not be allowed to become a potential source of contamination for food products. Offal must be collected, handled and disposed of in a manner that does not attract pests.

6.1 Waste containers:

6.2.1. Receptacles for the effective disposal of fish offal shall be provided, be clearly marked "*For By-products only"* or with other similar wording or be colour coded and be

- equipped with tight-fitting covers, as applicable;
- constructed of non-absorbent and non-corrodible materials and kept in a sound condition for ease of cleaning and disinfecting.
- If stored out side the establishment, shall be placed on a concrete pad sloped to a drain.

6.2.2 Continuous offal handling systems that carry offal on conveyers or flumes to be equipped with tight fitting covers. Offal bins shall be constructed so that they pose no threat of contamination to the processing areas or to fish being processed and must;

- if located inside the processing areas, be constructed of non-absorbent and non-corrosive material and kept in a sound condition for ease of cleaning and disinfecting.
- if located outside the processing areas, be constructed of mild steel or other suitable non-absorbent material for ease of cleaning and disinfecting.
- if delivering offal to the interior of the offal bin, be located over or surrounded by a concrete pad of suitable size sloped to drain.

6.2.3. Fish offal shall be

- collected in a handling system, receptacle that or conveyances that are not used for holding or transport of fish intended for processing.
- disposed of or stored, before disposal, in a manner that will not attract insect and animal pests, allow the build-up of offensive odours or contaminate the area surrounding the establishment.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Observe if bins and receptacles in which fish by-products are physically designed or clearly marked *By-products only* and are watertight or with other similar wording or colours coded.
- Check if they are designed with tight-fitting covers to prevent contamination of the establishment or any fish products (container used along processing lines do not require covers).
- Check if bins or receptacles in which fish offal is stored are constructed of metal or approved standard materials.
- Check if continuous systems for conveying offal to final removal points are constructed of acceptable materials, maintained in sound condition.
- Check if they are designed and constructed so that offal or liquid waste will not contaminate fish products or processing area, and that they can be effectively and thoroughly cleaned.
- Check/observe if design of draining of waste containers is possible after cleaning and disinfecting.
- Check if continuous systems for conveying offal to other final removal point is designed and constructed so that offal or liquid waste shall not contaminate fish products or processing area.
- Observe/check if containers, bins receptacles and conveyances used for offal are not used for holding or transporting fish intended for processing, or for any material or utensils used in fish processing operation.

❖ ***LIMITS***

All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in6.0 results in	M or S

❖ ***LEGAL REQUIREMENT***

7. Facilities to provide adequate supplies of drinking water within the meaning of Directive 80/778/EEC, or alternatively of clean seawater or seawater treated by an appropriate system, under pressure and in sufficient quantity. However, a supply of non-drinking water is permissible for the production of steam, fire fighting and the cooling of refrigeration equipment provided that, the pipes installed for the purpose preclude the use of such water for other purposes and presents no risk of contamination of the products. Non-drinking water pipes must be clearly distinguished from those used for drinking water or clean seawater.

❖ ***INTERPRETATION***

Water shall not be allowed to become a potential source of contamination for fish products. Clean, uncontaminated water is essential for use in cleaning and processing.

7.1 Piping

71.1 Design

7.1.1.1. Each operator of an establishment shall keep and make available to an inspector blueprints or other suitable drawings or sketches that shows all water supply and waste disposal systems. This must include source of supply, intake location, piping runs, treatment systems employed, location of water-sampling valves for the taking of water samples before and after its treatment and the out fall or sewage hook-up locations.

7.1.1.2. Intake shall be situated in a position where it is not possible for the water in taken to be affected by discharges into the lake water, waste or engine coolant outlets.

7.1.1.3. Water pipes should be free from leaks.

7.1.1.4. A sufficient number of taps shall be available, reducing the need for excessively long hoses. Further more, there should be drums or hooks to keep hoses on.

7.1.1.5. Prevention devices shall be fitted to water outlets where there is a risk of back flow or back-siphonage if pressure drops.

7.1.1.6. There shall be drawings that show clearly piping for potable water and non-potable water (Water reticulation map).

❖ ***METHOD OF INSPECTION***

Observations, Document check.

❖ ***PROCEDURE***

- Check/observe if an adequate clean water is supplied for processing and sanitation purposes at sufficient pressure and volume.
- Check if water from public main supplies or suitably treated water of similar quality is provided.
- Check/observe if drawings (water reticulation map) in the establishment for location of potable and non-potable water tallies with all ground feed lines of pipes and are clearly labelled or coloured so that the purpose of each is readily discernible by inspector.
- Observe if all source intakes are located in a manner that prevents contamination of the water, and check if storage tanks are designed to prevent contamination.
- Check if piping and tanks do not leak.
- Check if prevention of back flow or siphonage is provided.
- Check if, when water source is not protected from human or environment contamination or may be exposed to contamination from time to time, chlorination or some equivalent treatment, such as UV light or filtration, is provided.

❖ ***LIMITS***

All items not fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 7. results in	S or C

❖ ***INTERPRETATION***

Adequate supplies of water that meet one of the following requirement shall be provided in every establishment under a minimum operating pressure of 140kPa for fish processing, establishment cleaning, ice making, employee sanitation and personal hygiene and operation of toilets:

7.1.1. PRESSURE

7.1.2.1. Water piping shall be designed for a minimum outflow of 2 kg/cm^2.

7.1.2.2. During cleaning, the water outflow pressure should be at least 10 kg/cm^2.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check/observe if adequate pressure of water is provided.

❖ ***LIMITS***

2 kg/cm^2

10 kg /cm^2

❖ ***EXPLANATION***	❖ ***RATING***
Water pressure not reaching limits results in	S or C

❖ ***INTERPRETATION***

7.1.3. IDENTIFICATION OF TAPS

7.1.3.1. Piping for non-potable water shall be clearly distinguished from piping for potable water.

7.1.3.2. Outlets shall in particular be identified.

❖ ***METHOD OF INSPECTION***

Observation, design check,

❖ ***PROCEDURE***

- Observe if distinction between potable and non-potable is provided.
- Check if out lets are identified by marks.

❖ ***LIMITS***

All items must fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Item not fulfilled in 7.1.3 results in	S or C

❖ ***INTERPRETATION***

Ice comes into direct contact with equipment and fish products and therefore, shall not be allowed to become source of contamination.

7.4. Ice storage/supply

7.4.1. Ice handling or conveying equipment shall be constructed of smooth, non-corrosive, non-absorbent and non-toxic materials that are washable.

7.4.2. Ice screws or augers that come are in contact with ice may be constructed of galvanised metal

7.4.3. Ice making or storage facilities shall

- be operated in a manner that minimises frost build-up;
- be built in accordance with section: 2 subsection 2.1 to 2.6 of the EU requirements.

7.4.4. No ice making facility or ice storage facility shall use wood on any surface that makes contact with ice.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check if ice machine has capacity to supply adequate ice for the operation.
- Check if ice making and storing facilities complies with the requirement described previously for floors, wall, ceilings, overhead fixtures, and windows (section. 2, subsections 2.1 to 2.6) and located within the segregated area for fish handling.
- Observe if wood is not used as construction material for any surface that comes in contact with ice.
- Check if ice handling and conveying equipment constructed of smooth non-corrosive, non-absorbent and non-toxic materials that are washable are provided (use of galvanised metal for screws or augers that are in contact with ice is permitted provided that it does not result in contamination of ice).

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled 7.4 results in	S or C

❖ ***LEGAL REQUIREMENT***

8. Hygienic waste water disposal system

Wastewater shall be discharged to local waters or to a public sewer, provided that permission is granted local water company or equivalent body.

❖ ***INTEPRETATION***

8.1.0. Drains/piping

8.1.1. Drains shall be of a type and size sufficient to carry off any process effluent and water from processing and cleaning operation.

8.1.2. These pipes shall not be connected to the sewage system until the wastewater has undergone sedimentation/screening. It will be connected well outside the premises.

8.1.3. Shall have waterproof floor, which are easy to clean and disinfect and laid in such way as to facilitate the drainage of water to a closed sewage system.
8.1.4. All drainage from establishment shall be disposed of in a manner acceptable to the NEMA or in accordance to the local ordinances.
8.1.5. Piping shall be equipped with non-corrodible covers or grates and be constructed in a manner that prevents the entry of insect and animal pest, sewer gases or any other deleterious substance.

❖ ***METHOD OF INSPECTION***
Observation, design check

❖ ***PROCEDURE***
- Observe/check if drains large enough to carry off process effluent and water from processing and cleaning operations without danger of overflowing or becoming obstructed are provided.
- Check if drains that are connected to a sewer line is provided with a check (backwater) valve, and drains that are directly connected to a sewer are provided with traps.
- Check if floor drains have covers that are removable and constructed of metal or other acceptable material (covers are not required where drains are located under processing equipment).
- Check if open drains, which pass through exterior walls or floors, are designed so that insect cannot enter the processing area.
- Check if drains in processing and support areas are designed and installed so that they carry effluent away from the processing area.
- Check if required as a direct part of the processing operation (e.g., systems designed to carry away waste products during processing), all catch basins, interceptors and other means of separating organic matter from plant effluent are located outside the processing area.
- Observe if sewage is disposed of in an acceptable manner (Approved municipal system or remote areas from public facilities).

❖ ***LIMITS***
All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 8.0. results in	M or S

❖ ***LEGAL REQUIREMENT***
9. An adequate number of changing rooms with smooth, waterproof, washable walls and floors, wash basins and flush lavatories. The latter may not open directly on to the workrooms. The wash basins must have material for cleaning the hands and disposable towels; the wash basin taps must not be hand operable;

❖ ***INTERPRETATION***

9.1. Layout: changing rooms

Street clothing and personal effects are a potential source of contamination and must be kept from coming into contact with fish products.

9.1.1 There shall be changing-rooms for workers with closets or other means of storing clothes for each worker. The emphasis is not to mix outdoors clothing with working clothes.

9.1.2 Each worker shall have facilities to store clothes and change into protective clothing before entering processing areas.

9.1.3 Showers shall be available for staff to use before and at the end of the shift.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check if adequate closets or similar facilities where each employee and visitors can store street clothing, footwear, coats, personal effects, lunches, etc. and change into protective clothing before entering processing areas are provided. Changing facilities can be combined with lunchrooms where necessary.
- Observe if the location of apron and glove racks is such that aprons and gloves are cleaned and stored under sanitary conditions.
- Check if laundry facilities are available and functional.
- Check if showers are available with flowing water.
- Check if canteen facilities are available and designed to serve substantial range of meal types.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled 9.1 results in	M or S

❖ ***INTERPRETATION***

9.2. Layout: Materials /surfaces

9.2.1. The walls and floors of sanitary facilities shall be constructed of made from approved standard materials that are smooth, impervious, non-absorbent and non-toxic.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check if floors and walls in changing rooms are constructed of waterproof, non-absorbent, washable and non-toxic the materials.
- Check if, where floors are not adequately sloped, it is demonstrated that the can be well maintained.
- Check if drains are designed and installed so that they carry effluent a way from wash rooms

❖ ***LIMITS***
All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 9.2 results in	M or S

❖ ***INTERPRETATION***
Adequate, properly equipped and maintained toilets are essential to ensure that potential contamination from sewage is prevented.

9.3. Layout: Lavatories

9.3.1. Flush toilets shall be present in adequate numbers for both sexes.
9.3.2. Flush toilets shall be conveniently located adjacent to processing areas. It is acceptable that toilets are connected to changing rooms by corridors.
9.3.3. Flush toilets shall be designed so that toilet areas do not lead directly into processing areas; and all effluent and sewage shall be disposed of in accordance with local ordinances or, if none exist, in a manner satisfactory to an inspector.

❖ ***METHOD OF INSPECTION***
Observation, design check

❖ ***PROCEDURE***
- Check if toilets are provided in sufficient numbers for both sexes.
- Check if the number of toilet bowls fulfils the requirement. Only flush toilets are permissible.
- Observe if the minimum number of toilet bowls is as follows:
  1 toilet for 1-5 employees
  2 toilets for 6-24 employees
  3 toilets for 25-49 employees
  5 toilets for 50-100 employees
  One toilet bowl shall be provided for each 30 additional employees.
- Observe if toilet facilities are close enough to processing areas that employees can conveniently use them.
- Check if the toilets can not let directly into processing areas (entrance to toilet rooms from the processing areas is acceptable provided that the toilets are equipped with an anteroom, which separates them from the processing area).
- Observe if toilet rooms are equipped with drains or other means to eliminate overflows of water or sewage.
- Check if toilets are adequately vented to the outside.
- Observe if waste receptacles are available in washroom.

❖ ***LIMITS***
All items must be fulfilled.

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 9.3 results in	M or S

❖ ***LEGAL REQUIREMENT***

10. If the volume of the products treated requires regular or permanent presence an adequately equipped lockable room for exclusive use of inspection services.

❖ ***INTERPRETATION***

10.1. Layout: Premises for Inspectors

10.1.1 If the competent authority does not have its own premises on the spot or in the immediate vicinity on the basis of quantities displayed for sale, inspector shall have access to a lockable room with equipment and necessary tools so that they can carry out their inspections.

10.1.2 The Department of Fisheries Resources decides when the permanent presence of an inspector is required and what facilities and equipment should be put at the inspector's disposal.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Check/observe if there is adequately equipped lockable room with equipment and necessary tools for exclusive use of the inspection services.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled in 10.1 results in	m or M

❖ ***LEGAL REQUIREMENT***

11. Adequate facilities for cleaning and disinfecting means of transport

❖ ***INTERPRETATION***

11.1. Equipment used for product preservation process or transport must not, through improper functioning allow an unsafe or unacceptable product to be produced.

11.2. Means of transport for fish and fish products must be constructed of food standard materials that are smooth, non-absorbent, non-corrosive and washable.

11.3. Devices used to monitor process equipment must be capable of ensuring its proper functioning.

11.4. Equipment: Vehicles design

11.5. Equipment that is used to perform product preservation process shall meet applicable requirements set out in the establishment's Quality Management Processing.

11.1.1. Construction and equipment of vehicles shall be such that prescribed temperatures can be kept during transport. Vehicles shall be closable.

❖ ***METHOD OF INSPECTION***
Observation, check

❖ ***PROCEDURE***
- Check/observe if the vehicle is well refrigerated or insulated and adequately designed to preserve fish. Check if vehicle can be closed.

❖ ***LIMITS***
All items must be fulfilled

❖ *EXPLANATION*	❖ *RATING*
Any item not fulfilled in11.1 results in	m or M

❖ ***INTERPRETATION***

11.2. Equipment: Vehicle Materials / Surfaces

11.2.1. Inside surface of transport vehicle shall be made of approved food standard materials.

❖ ***METHOD OF INSPECTION***
Design check

❖ ***PROCEDURE***
- Check if walls, floors, ceilings, and doors in transport vehicles are made of approved food standard materials.

❖ ***LIMITS***
Approved food standard materials

❖ *EXPLANATION*	❖ *RATING*
Non-food standard material in 11.2 results in	m or M

❖ ***INTERPRETATION***

Cleaning and disinfecting equipment and supplies must be available to ensure that the sanitation program can be carried out as written.

11.3. Equipment and material for cleaning

11.3.1. Equipment and material used to clean and disinfect mean of transport shall be provided in adequate quantities and be conveniently located in the premises.

11.3.2. Any product used for cleaning and disinfecting shall be clearly labelled as to its use, stored in an appropriate location and only used by a person trained to use or apply it in a manner that prevents contamination of fish or contact surfaces.

❖ ***METHOD OF INSPECTION***

Observation, design check

❖ ***PROCEDURE***

- Observe if suitable brushes, brooms, hoses and other equipment and materials needed for proper cleaning and disinfecting of means of transport are available in adequate quantities at all times.
- Check if there are adequate facilities for the sanitary storage of hoses and other cleaning equipment. Observe if they are labelled as to its use.
- Check if there is a designated and segregated area for vehicle cleaning and disinfection.

❖ ***LIMITS***

All items must be fulfilled

❖ ***EXPLANATION***	❖ ***RATING***
Any item not fulfilled 11.3 results in	M or S

APPENDIX 3b: Inspection Reporting Form/Checklist

Establishment:	E.A. Number:
Inspector:	Date:

	Items to inspect	m	M	S	C
1.0	**Layout**				
1.1	-Is the area sufficient to carry out the work under sanitary and hygienic condition?		( )	( )	
1.2	-Does the layout preclude contamination?			( )	( )
1.3	-Are the clean and dirty areas separated?			( )	( )
2.0	**Fish handling and processing area**				
2.1	**Floors**				
	- Is the floor waterproof?		( )	( )	
	- Is the floor made of materials easy to clean and disinfect?		( )	( )	
	- Is the floor laid down in a way to allow for easy drainage of water or Is it provided with equipment to remove water?		( )	( )	
2.2	**Walls**				
	-Are the surfaces smooth and easy to clean and disinfect?		( )	( )	
2.3	**Ceilings**				
	- Is the ceiling of a smooth washable surface that will ensure cleanliness?		( )	( )	
2.4	**Doors**				
	-Are the doors made of durable material?	( )	( )		
	-Are they easy to clean?	( )	( )		
2.5	**Ventilation**				
	-Is the ventilation adequate?		( )	( )	
	-Does it allow a good extraction of water vapour?		( )	( )	
2.6	**Lighting (natural or artificial)**				
	-Is lighting adequate?		( )	( )	
2.7	**Hand cleaning & disinfecting facilities**				
	- Are the facilities in sufficient number?		( )	( )	
	- Are the taps hand operated?		( )	( )	
	- Are detergents & disinfecting agents available?		( )	( )	
	- Are facilities provided with disposable hand towels?		( )	( )	
2.8	**Facilities for cleaning and disinfecting plant facilities, utensil & equipment**.				
	- Are they available?			( )	( )
3.0	**Chill rooms, ice rooms & cold stores**				
3.1	**Floors**				
	-Is the floor waterproof?		( )	( )	
	-Is the floor made of materials easy to clean & disinfect?		( )	( )	
	-Is the floor laid down in away to allow for easy drainage of water or is it provided with equipment to remove water?		( )	( )	
3.2.	**Walls**				
	- Are the surfaces smooth, easy to clean & disinfect?	( )	( )		
	-Are surfaces durable & impermeable?		( )	( )	
3.3.	**Ceilings**				
	- Is the ceiling of a smooth washable surface that will ensure cleanliness? washable	( )	( )		
3.4.	**Doors**				
	-Are the doors made of durable material?	( )	( )		
	-Are the doors easy to clean?	( )	( )		
3.5	**Lighting**				
	-Is the lighting adequate?		( )	( )	
3.6	**Refrigeration capacity**				
	-Is the refrigeration capacity adequate to ensure proper product temperature?			( )	( )
4.0	**Protection against vermin and undesirable animals (rats, cats, dogs, birds etc)**				
	- Are there adequate vermin proofing and appropriate protection facilities?			( )	( )
5.0	**Instruments and working equipment (cutting boards, knives conveyor belts, containers)**				
	- Are they made of resistant material?			( )	( )
	-Are they easy to clean and disinfect?			( )	( )
6.0	**Elimination of by-products not destined for human consumption**				
	- Are the special watertight by-products non-corrosive bins equipped with lids?		( )	( )	
	- Is there an adequate room for storage of by-products, if not evacuated at the end of the day?		( )	( )	
7.0	**Water supply (potable water within the meaning of Directive 80/778/EEC)**				
	-Is potable water available?		( )	( )	
	-Is it available in sufficient pressure and volume?			( )	( )
	-Is there a clear distinction between potable and non-potable water pipes?			( )	( )
8.0	**Waste water and waste management**				
	- Is there an adequate and hygienic wastewater disposal system?			( )	( )
9.0	**Changing rooms, showers and toilets facilities**				
	-Is there an adequate number of changing rooms?		( )	( )	
	-Are the walls and floors in the changing rooms smooth, water proof, and easy to clean?		( )	( )	
	-Is there an adequate number of wash basins?		( )	( )	
	-Is there adequate number of toilets?		( )	( )	
	-Do the toilets open directly to the fish handling and processing area?		( )	( )	
	-Are they equipped with working water flushing system?		( )	( )	
	-Are hand washing and disinfecting system available?			( )	( )
	-Are disposable hand towels available?			( )	( )
	-Are the wash basin taps hand operated?			( )	( )
10.	**Cleaning and disinfecting of transport vehicles**				
	-Is appropriate equipment available for cleaning and disinfecting vehicles?		( )	( )	
	-Is cleaning and disinfecting carried out in a separate and approved area (structure).		( )	( )	
	-Do vehicles transporting fish have adequate drainage facilities?		( )	( )	
	-Are the internal surfaces of the trucks smooth, easy to clean and disinfect?		( )	( )	
11.	**Freezing and cold storage facilities**				
	-Is the freezing capacity sufficient?		( )	( )	
	-Is the cold storage refrigeration capacity sufficient to keep fish temperature at below -18°c		( )	( )	
	-Are the cold stores equipped with temperature recording device easy to consult?		( )	( )	
	-Is the thermal sensitive part of the thermometer placed in the warmest part of the cold store?		( )	( )	
	Overall Score	( )	( )	( )	( )

Conclusion:

Based on the inspection results above, the establishment is rated	

The non-compliances identified shall be addressed before the next inspection and the competent authority shall be informed in writing about the compliance.

Inspector: ----------

Person responsible for the establishment: ----------

Name of Establishment:	**EA Number:**
Name of Inspector:	**Date:**
	Page ___ of pages___

Inspection item number:	**Description of non-conformity:**

Signatures:

Inspector: -_____ Person responsible for the establishment: - ——————————