HACCP TRAINING MANUAL

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1 INTRODUCTION

The provision of safe food to the customer is a governmental and industry responsibility. In order to ensure that food is safe it is good to establish a system to control food safety. In the past a positive approach was required using good manufacturing practices, hygienic production and product inspection. Today anyone exporting fish and fishery products, for most of the developed countries, will have not only to implement Hazard Analysis Critical Control Point (HACCP) but also to meet international requirements for construction and hygiene. The demand for food safety is not limited only to exports, local consumers and regulators are increasingly demanding it.

The fisheries industry in Mozambique, started in 1992 to implement quality management systems according to market demand. Considering that producers and workers have little knowledge of quality systems and there are no private consultancy firms in quality business, the government plays an important role in setting up and implementing quality management systems.

The purpose of this manual is to design guidelines which will be used to promote a common approach for the identification of hazards, critical control points (CCPs) and critical limits; to promote understanding and awareness of food safety practices through education and to identify of develop the skills necessary to allow both the governmental (public) and private sectors to appropriately use HACCP and GMP to promote food safety.

1.1 HACCP Background

Hazard Analysis Critical Control Point (HACCP) has become synonymous with food safety. It is recognized worldwide as a systematic and preventative approach that addresses biological, chemical and physical hazards through anticipation and prevention, rather than by finished production inspection.

The HACCP concept was pioneered in the 1960s by the Pillsbury Company, the US Army and NASA as a collaborative development of the production of safe foods for the space program. NASA wanted a “zero defects” program to guarantee safety in food that astronauts would be consuming in space. Pillsbury therefore introduced and adopted HACCP as a system that could provide the greatest safety while reducing dependence on finished product sampling and testing. Pillsbury presented the HACCP concept publicly at a conference for food protection in 1971.

Especially during the last decade HACCP has become widely used and it is now a legislative requirement in some countries, for instance USA, Canada and EU-countries.

There is no official HACCP standard but the system described by Joint FAO/WHO, Codex Alimentarius Commission (1993) and adopted in 1997 is internationally recognized.
1.2 Benefits of the HACCP approach

HACCP has a number of benefits for consumer, industry and government, that may be realized by applying the HACCP system as a management tool for food safety control of food processing and manufacturing. The HACCP system is scientifically based and systematically identifies conceivable hazards and measures for control to ensure food safety. It focuses on prevention rather than relying mainly on end product testing. It is cost-effective and leads to reduced product loss and wastage. It increases the effectiveness of the quality system by focusing on the critical parts of the process. In addition it can aid inspection by regulatory authorities and promote international trade by increasing confidence in food safety and promote the stability of the food business. It complements and strengthens other quality management systems.

1.3 Some problems associated with the implementation of HACCP

Some companies, especially small and medium size, may be faced with problems in applying HACCP. For example, there may be insufficient technical resources to perform the HACCP study or difficulties with assembling the HACCP team because one or two people have many responsibilities concentrated in their hands. The concentration of functions carries another problem. It is difficult for employees of this kind of company to include HACCP work in the daily routine and put aside the necessary time. The cost of implementation of the HACCP system relative to a company’s turnover is higher than in larger companies; their small purchasing power cannot often exert sufficient influence on their suppliers to start using the HACCP system and the power that they can exert over clients is limited. This makes it difficult to ensure that the control of hazards is maintained right up to the point of sale.
2 GOOD MANUFACTURING PRACTICES GUIDELINES

HACCP is only one part of a larger system of control procedures. It is based on Good Manufacturing Practices. Good Manufacturing Practices or pre-requisite programs are programs that comprise the basic universal steps and procedures that control entire operating conditions within establishments and ensure favourable conditions for producing safe food. GMPs include the following programs:

Premises - Outside Property, Building, Sanitary facilities, Water/Steam/Ice Quality Program

Transportation and Storage - Food Carriers, Temperature Control, Storage of Incoming Materials, Non-food Chemicals, Finished product

Equipment - Design, Installation, Maintenance and Calibration

Personnel – Training, Hygiene and Health Requirements

Sanitation and Pest Control - Sanitation and Pest Control Program

Recall Program
2.1 Premises

The premises include all elements in the building and building surroundings: the outside property, roadways, building design and construction, product flow, sanitary facilities, and water/steam/ice quality. They should be designed, constructed and maintained in a manner to prevent conditions that may result in the contamination of food.

**Outside property**
All outside areas of the plant should be free of debris and refuse that might be a source of insects and/or rodent infestation or cause objectionable odours, smoke, dust or other contaminants.

Roadways, yards and parking lots, should be properly graded, paved and maintained. They should provide and permit good drainage.

**Building**
Facilities should be designed, constructed and maintained in good repair to permit easy cleaning, prevent entrance and harbouring of pest and entrance of environmental contaminants.

Floors, walls and ceilings should be constructed of approved materials that are durable, smooth, and cleanable.

Walls should be light coloured, and floors sufficiently sloped for liquids to drain to properly trapped outlets.

Windows should be properly screened if opened and doors should have smooth, non-absorbent surfaces and be close fitting.

Stairs, elevators, overhead structures and other structures should be well designed and constructed so that there is no contamination of food and packaging materials.

Adequate lighting should be provided throughout the facility, so that proper operation can be carried out. Light bulbs and fixtures suspended over exposed food or packaging materials at any stage of production should be of a safety type or protected to prevent contamination of food or packing materials due to breakage.

Adequate ventilation should be provided to prevent steam, condensation, dust and heat build-up and to remove contaminated air.

Drainage and water disposal systems and facilities for waste storage should be designed and constructed so that the risk of contaminating food or potable water supply is avoided. They should be equipped with appropriate traps and vents.

The traffic patterns of employees and equipment, materials and product should be such that the possibility of cross contamination between raw and processed food is eliminated.
Sanitary facilities
Washrooms, lunchrooms and change rooms should be separate from and not lead directly into food processing areas and should be properly ventilated and maintained.

Washrooms should be equipped with handwashing facilities with a sufficient number of properly installed sinks and plumbing with hot and cold potable water. They must have soap, sanitazer, sanitary hand drying, and a cleanable waste receptacle.

Areas where employees are in direct contact with microbiologically sensitive foods should contain conveniently located handwashing facilities controlled by foot, knee or a timer. Notices should be posted in these areas requiring employees to wash their hands.

Water/Steam/Ice Quality program
Any water that contacts food or food-contact surfaces should be safe and of adequate sanitary quality. Microbiological, chemical and physical quality of source and in-plant water should be controlled regularly, from various points of usage in the facility. Records must be maintained on file.

Running water at suitable temperature, and under pressure as needed, should be provided in all areas where required for food processing, for cleaning of equipment, utensils, and food-packaging materials, or for employees sanitary facilities.

There should not be cross-contamination between potable water and non-potable water systems. All hoses, taps, cross connections or other areas of possible contamination must be equipped with anti-backflow devices. Non-potable water should never be used in food processing, handling, packaging or storage areas.

All water treatment chemicals should be approved for such use and stored properly.

Ice used in food processing facilities must be made from potable water and protected from any source of contamination. It should be tested regularly and records maintained on file.

Steam that comes into direct contact with food or food contact surfaces should be from a potable water source. Boiler treatment compounds must be approved for such use.
2.2 Transportation and Storage

All ingredients, raw material, packaging material or other incoming material and finished product should be handled, stored and transported in a sanitary manner and at appropriate temperatures to avoid contamination, rapid proliferation of microorganisms, spoilage or damage. Sensitive ingredients and packaging materials should be stored under appropriate conditions.

The facility should maintain stock rotation of raw material, ingredients, packaging material and finished product, “first in, first out”.

Food carriers should be suitable for transport of food and made from material suitable for food contact. They should be loaded, arranged and unloaded in a manner that prevents damage and contamination of the food, ingredients and packaging materials.

Chemicals should be received and stored in a dry, well ventilated area, separate from all food handling areas. All chemicals must be properly labelled and stored, handled only by authorized and properly trained plant employees.

2.3 Equipment performance and maintenance

All plant equipment and utensils for food handling or production should be designed and installed in such a way as to facilitate its cleaning and sanitizing including the adjacent areas and also its maintenance and inspection. Equipment and utensils should be constructed of corrosion resistant material.

Equipment that is used in the processing or food handling areas and does not come into contact with food should be so constructed that it can be kept in a clean condition.

All food contact surfaces should be non-absorbent, non-toxic, smooth, free of pitting and able to withstand repeated cleaning and sanitising.

Any chemicals, coating or lubricants used in or on the equipment/utensils must be approved and used as labelled.

Routine maintenance should be performed to ensure that equipment/utensils are operating as intended. A preventive maintenance program should be in place that lists all equipment/utensils and preventive measures and procedures. The program should specify the necessary servicing for the equipment and frequency including replacement of parts, responsible person, methods of monitoring, verification activities and records to be kept.

Control instruments used for measuring, regulating, or recording temperature, pH, acidity, water activity, or other conditions should be accurate and adequately maintained, and adequate in number for their designated uses.
2.4 Personnel

The plant should have an adequate written program in place to monitor and control all elements in this section, and maintain the appropriate records.

Personnel responsible for identifying sanitation failures or food contamination should have the necessary background education or experience, or a combination of both, to provide a level of competency necessary for production of clean and safe food.

Food handlers and supervisors should receive appropriate training in proper food handling techniques and food-protection principles and should be informed of the danger of poor both personal hygiene and sanitary practices. All training activities should be documented including who received the training, the date and the type of training delivered.

Any person who, by medical examination or supervisory observation, is shown to have, or appears to have, an illness, open lesion, including boils, sores, or infected wounds, or any other abnormal source of microbial contamination by which there is a reasonable possibility of food, food contact surfaces, or food packaging material becoming contaminated, should be excluded from any operations which may be expected to result in such contamination until the condition is corrected.

Personnel should be instructed to report any abnormal health condition to their supervisors.

All persons working in food handling areas should conform to hygiene practices while on duty. They should:

- Wear outer garments, protecting clothes, hair covering and footwear, suitable for the operation.
- Wash hands thoroughly and sanitize before starting work, after each absence from work station, after using toilet facilities, and at any time after handling contaminated materials.
- Remove all unsecured jewellery and other objects, which may fall into or otherwise contaminate food. If any hand jewellery can not be removed it should be covered by material which can be maintained in an intact, clean and sanitary condition.
- Not smoke, eat or drink in food handling areas.
- Maintain gloves in an intact, clean, and sanitary condition, if they are necessary in food handling.
- Store clothing and other personal belongings in areas other than where food is exposed or equipment/utensils are washed.
- Maintain adequate personal hygiene.
2.5 Sanitation and Pest Control

All plants should have a written, effective and safe sanitation and pest control program.

The sanitation program should include written cleaning and sanitizing procedures for all equipment, utensils, overhead structure, floors, walls, ceilings, drains, lighting devices, refrigeration units, and anything else impacting on the safety of the food. The name of the person responsible must be specified, the chemical used (detergent/sanitizer), the procedures used and the frequency of cleaning and sanitizing.

Cleaning and sanitizing equipment should be designed for its intended use and be properly maintained and stored.

The facility should use only approved chemicals and they should be used according to the instructions (e.g. concentration, water temperature, dilution factor).

The effectiveness of sanitation programs should be monitored and verified (using different tests and methods) and records kept.

The pest control program should contain written procedures to prevent insects, rodents, birds and other animals from entering the plant.

The program should specify:
- the name of a contact person at the plant responsible for pest control;
- the name and address of any extermination company used;
- a list of all chemicals and methods used for their application;
- a map of bait locations;
- procedures and frequency of inspection;
- a pest survey; and
- control report form.

Pest control chemicals should be used according to instructions to prevent contamination.

Measures should also be in place for verification of the effectiveness of the pest control program. All records must be kept on file.
2.6 Recall Program

The plants should have a written recall program where written recall procedures are developed to ensure that identified food is removed from the market as efficiently, rapidly and completely as possible and which can be put into operation at any time.

A recall program should contain at a minimum, the following elements:
- Documentation identifying the product coding system and product designation;
- Records of finished product distribution, kept for a period of time that exceeds the shelf life of the product;
- The step by step procedures, to follow in the event of a recall, including the extent and depth of the recall;
- A current list and addresses of people that will take part in any recall activities;
- Means of notifying the affected customers, retailers, wholesalers;
- Control measures for the returned recall product;
- Means of assessing the progress and efficacy of the recall;
- Means of coordinating recall with regulatory agencies.

Recall procedures should be tested with sufficient frequency to ensure that they function properly.

When a producer initiates a recall of food he must notify the regulatory authorities and submit the following information:
- reason for recall,
- amount of product involved (total distributed, total remaining in the company, total recalled),
- product codes,
- areas of distribution,
- contact person within the company
- copies of any news release.

Distribution records should contain sufficient information to permit traceability to a particular code or lot number. The following minimum information is required:
- product identification and size;
- lot number or code; quantity;
- customers names, address,
- phone number to the initial level of product distribution.

2.7 Consumer Complaint Procedure

The plants should develop a consumer complaint files and standard operation procedures for handling, addressing consumer complaints.
3 HACCP GUIDELINES

3.1 Glossary of HACCP terms

Control:
- To manage an operation, process or procedure so that a desirable target performance is achieved.

Control Measure or Preventive Measure:
- Any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level.

Control Point:
- Any step or point in a process or procedure whereby biological, chemical, or physical factors may be controlled.

Corrective actions:
- The action or procedures to be taken when monitoring a CCP if the monitored value is above the critical limit that indicates a potential or actual loss of control.

Criterion:
- A requirement on which a judgement or decision can be based.

Critical Control Point:
- Any point or step at which control can be applied and a food safety hazard prevented, eliminated or reduced to an acceptable level. If not properly controlled, may also result in unacceptable safety, wholesomeness, or economic fraud risk.

Critical Limit:
- An established criterion which separates acceptability from unacceptability, which must be met for each preventive measure at a critical control point.

Decision Tree (CCP):
- A sequence of questions to determine whether a control point is critical or not.

Deviation:
- Failure to meet required critical limits for a critical control point.

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

HACCP:
- Hazard Analysis Critical Control Point, a systematic approach to food safety via hazard identification, assessment and control. A system, which identifies, evaluates, and controls hazards, which are significant for food safety.

**HACCP plan:**

- A document prepared in accordance with the principles of HACCP to ensure control of hazards, which are significant for food safety in the segment of the food chain under consideration.

**Hazard:**

- The potential to cause harm. This may be a specific object e.g. bacteria, toxin, virus, parasite, chemical or physical hazard. Operational malpractices or other operations can also constitute a hazard if they lead to unacceptable contamination or growth and survival of organisms or microorganisms.

**Monitoring/ monitoring procedure:**

- A planned series of observations or measurements of a named parameter, at an identified critical control point. The values obtained should be recorded and compared to the target level and permitted critical limits. The results of monitoring ideally should be obtained rapidly and in time to allow remedial action to be taken if the value were outside the critical limits.

**Process:**

- One or more actions or operations to harvest, produce, store, handle, distribute, or sell a product or group of similar products.

**Risk:**

- An estimate of probability or likely occurrence of a hazard.

**Step:**

- Any location or stage in a food handling process including raw material and/or finished products including e.g. stages in production, harvesting, transport formulation, processing, storage, as identified in the flow diagram.

**Validation:**

- Obtaining evidence that the elements of HACCP plan are effective

**Verification:**

- Methods, procedures or tests additional to those used in monitoring to determine if the HACCP system is in compliance with the HACCP plan and/or the HACCP plan needs modification or review. Microbiological testing can be useful in verification.
3.2 HACCP Principles and application

3.2.1 Assembly of HACCP team

The type of HACCP plan to be developed will influence the composition of the HACCP team. The team should be multi-disciplinary and could include representatives from production, sanitation, quality assurance, food microbiology, engineering and inspection staff. Outside expert advice should be obtained as necessary and also personnel who are directly involved in daily processing activities should be included.

Key-members of the team must have an intimate knowledge of the HACCP-system. Selected personnel should have a basic understanding of the technology/equipment used on the processing lines, the practical aspects of food practices, the flow and technology of process, applied aspects of food microbiology and HACCP principles and techniques.

3.2.2 Organization Chart and Narrative

An organization chart whereby the facilities demonstrate the managerial responsibility of the firm with a chain of command within the management should be drawn. The relationship between the positions responsible for the HACCP-based system and the production manager has to be indicated.

The narrative should explain how a position relates to the HACCP-based system, its day-to-day operation, and the relation to the other positions on the chart.

3.2.3 Description of the product

The product should be defined in terms of name (market name or Latin name), composition, structure (important product characteristics), shelf life, packaging system, storage and distribution condition. Mention should be made of how it is to be used, where it will be sold and labelling instructions.

3.2.4 Identification of intended use

The intended use of the product should be based upon its normal use by end consumers or users. They can be the general public or a particular segment of the population or another processor, who will further process the product. If the product is unsuitable for some sensitive groups, for instance the elderly, very young, sick or immunocompromised, or an allergic, this should be labelled.
3.2.5 Construction of flow diagram and facility layout

A flow diagram should provide a simple description of all steps involved in the processing from raw material reception to storage, processing, packaging, finished product holding and shipping and its associated ingredients and other incoming material.

A diagram of the layout of the facility, indicating equipment placements and movements of product and personnel through the process, including changing rooms, washrooms and lunchrooms, routes of potential cross-contamination, high and low risk area segregation, should also be prepared.

On-site confirmation of flow diagram and facility layout:
The flow diagram should be verified on-site for accuracy during all stages and hours of operation and amended if necessary. This can vary from simple inspection to the completion of a comprehensive checklist depending on how complex the processing of the product is. All records must be kept. This check involves all members of HACCP team and at different times with different shifts.

3.2.6 Identify hazards and preventive measures (Principle 1)

This stage of the HACCP study is the Hazard Analyses. This is one of the key stages in any HACCP study.

The HACCP team should identify all actual and potential hazards associated with raw material, ingredients or other incoming material, the process, manner by which the product is marketed and its final use. They should also identify the potential contamination points, determine the likelihood of occurrence of various hazards and assess the risk severity.

They must ask question like:
- What hazards are likely to be present in each raw material, ingredients and other incoming materials;
- Is there any risk of cross-contamination during the process;
- Is the equipment appropriate for intended use with regards to the production of safe food;
- Can the equipment be effectively cleaned and sanitized,
- Are there any hazards associated with the facility layout or internal environment;
- Is segregation between high risk and low risk areas effective;
- Can employee practices affect the safety of the product.

How to conduct a hazard analysis?
There are two techniques Brainstorming and Cause and Effect, which can be useful to identify hazards and contamination points.

Brainstorming is a technique in which participants, in turn, state one possible cause of a problem. Observing a few simple rules (see appendix 1) will help to obtain originality and integration of thinking as well as enthusiasm.

Cause and effect analysis is a technique often used by quality circles and provides an additional structure to brainstorming ideas together. A vertical or horizontal arrow or spine represents the effect or problem, potential principal causes are identified as arrows entering the spine (see appendix 1). In turn each principal arrow can have secondary arrows representing subcauses. The end result is a diagram that lists all causes of a problem appearance of a fish bone). The principal causes are often considered under heading of 4M:
The hazard analysis must consider factors which may be beyond the immediate control of the processor. For instance, product distribution may be one of the factors, but information on how the food will be distributed could influence, for example, how the food will be processed.

In the HACCP as from FAO, FDA or the EU only safety issues are considered as hazards. There are quality systems such as the ISO 9000 quality standards that are perfectly good for all aspects of quality including aspects of quality such as net weight or species substitution that do not pose a risk to the safety of the consumer and should not be considered as hazards. The NMFS (National Marine Fisheries Service) HACCP has included quality aspects. In the opinion of HACCP experts that creates a confusion as HACCP is a system for addressing hazards to the safety of the consumer and "quality hazard" is really a misnomer.

Considering only the safety hazards we can group them in three categories: biological, chemical, physical hazards.

**Biological hazards**

Biological or microbiological hazards can be divided into three types: bacterial, viral and parasitic. They can cause foodborne infections or intoxication, by their presence, growth or toxin production. When the HACCP plan is developed for biological hazards the aim should be to destroy, eliminate or reduce that hazard, prevent recontamination, inhibit the growth of microorganisms and toxin production.

**Chemical hazards**

There are two types of chemical hazards in foods, those, that are naturally occurring toxicants and added chemicals such as agricultural chemicals, toxic elements and food additives. Many naturally occurring toxicants are biological in origin and frequently they are included in the biological hazard category.

**Physical hazards**

There can be described as extraneous matter or foreign objects and including any physical matter not normally found in food that may cause illness or injury to the consumer. The most common foreign object found is glass but wood, stone, metal, insects, plastic and bones can also be found.

**Assess risk severity**

In order to make the right priorities it is also beneficial to establish the severity of a hazard. We can classify the hazards as:

- Life-threatening
- Severe or chronic
- Moderate or mild

**Likelihood of occurrence**

The probability of occurrence of a hazard can be considered in following degrees: high, moderate, low and negligible.
Preventive measures

The HACCP team must then describe and consider what control or preventive measures, if any exist, can be applied for each CCP. More than one measure may be required to control a specific hazard and more than one hazard may be controlled by a specific measure. Preventive measure can be:

- Purchasing specifications
- Maintenance of proper temperature
- Proper time and temperature control
- Training programs for employees
- Equipment sanitation and maintenance
- Scale calibration
- Pest control programs
- Certificate of water potability
- Adherence to Good Manufacturing Practices
- Control system enabling traceability of materials and products
- Production scheduling

If a hazard has been identified for which no control measure exists, the product or process should be modified so that the hazard is eliminated or reduced to acceptable or minimal levels.

3.2.7 Identify Critical Control Points (CCP) (Principle 2)

A decision tree may be used to determine whether a step or operation is a CCP for the identified hazard. All hazards, which reasonably could be expected to occur, should be considered. More than one CCP can be established at a given operation. The team should indicate on the flow diagram the steps that have been deemed critical control points.

Thus CCPs should be carefully chosen on the basis of the risk, severity and likely occurrence of a hazard to be controlled and the control points should be truly critical. Examples of CCPs are a specific heat process, chilling, specific sanitation procedures, prevention of cross-contamination, adjustment of food to a given pH or NaCl content.

This is an opportunity to evaluate compliance with regulatory requirements, and if necessary, to correct any defects, deviation, or deficiencies that may be found.

3.2.8 Establish Critical Limits (Principle 3)

At each critical control point, critical limits must be established. In some cases, more than one critical limit will be specified at a particular CCP. They must be specific and reasonable for each control measure and for instance can be limits on temperature, time, humidity, moisture level, water activity, pH, titratable acidity, salt concentration, preservatives, aroma and visual appearance. They can be a maximum, minimum, or range value.

Critical limits may be derived from sources such as regulatory standards and guidelines, literature surveys, experimental studies, practical experience and expert advice. Critical limits may exceed a regulatory requirement.

In some cases, processing variations may require the use of target levels to ensure that critical limits are met.
3.2.9 Establish Critical Control Points monitoring procedures (Principle 4)

Monitoring is the periodic measurement or observation at a CCP to determine whether a critical limit or target level has been met. It involves systematic observation and/or the recording of significant factors for prevention or control of hazard. The monitoring procedures can be on-line systems, where the critical factors are measured during the process or off-line systems, where samples are taken for measurement of the critical factors elsewhere. Monitoring also can be done by analytic tests, which require more time although physical and chemical measurements may be done rapidly. Monitoring must be conducted by a designated person with full knowledge and authority to carry out corrective actions when indicated. The designated person must understand the purpose and importance of monitoring, have ready access to the monitoring activity, be unbiased and accurately report the monitoring activity. Monitoring results must be documented for use in verification of the HACCP plan.

3.2.10 Establish corrective actions (Principle 5)

The system must allow for corrective actions to be taken immediately when the monitoring results indicate that a particular CCP is not under control. Action must be taken before deviation leads to a safety hazard. Corrective actions must be prescribed and formalized so that employees responsible for critical control point monitoring understand and are able to perform the appropriate corrective action in the event of a deviation. The action plan should contain written details of immediate action to be taken, who is to be informed and type of report to be produced; what to do with the product that has been produced; investigation of how a recurrence is to be prevented and who is to assume responsibility for decision making. Action plans must be recorded and filed.

3.2.11 Establish record-keeping procedures (Principle 6)

The developing of a strict record keeping system that demonstrates control over critical control points will:
- advise facility management and government officials of the performance of a plant’s HACCP plan on a day-to-day basis;
- provide evidence of a proper and safe operation;
- serve as a mechanism for indicating serious problems and assisting the responsible individual(s) in the determination of a proper corrective action;
- permit traceability of the product.

The records used and kept in the total HACCP system should be for instance:

**Ingredients and packaging materials records:**
- supplier certification documentation showing compliance with processor’s specifications;
- processor audit records verifying supplier compliance,
- storage temperature records for temperature sensitive ingredients and for packaging materials;
- storage time records of limited shelf life ingredients;
- records indicating compliance with labelling or sealing specifications of packaging materials;

**Records related to product safety:**
- sufficient data and records to establish the efficacy of barriers in maintaining product safety;
- sufficient data and records establishing the safe shelf life of the product; when the age of the product can affect safety;
- documentation of the adequacy of the processing procedures from a knowledgeable process authority;

**Processing records:**
- records from all monitored CCP’s,
- records verifying the continued adequacy of the processes;

**Product storage and distribution records:**
- temperature records;
- records showing no product shipped after shelf life date on temperature sensitive products;

**Deviation and corrective actions records;**

**Monitoring records;**

**Verification records;**

**Validation records and modification to the HACCP plan, approved revisions and changes in ingredients, formulations, processing, packaging and distribution control, as needed;**

**Employee training records; and**

**Good manufacturing practices records.**

The plant should also keep the HACCP plan records:
- list of the HACCP team and assigned responsibilities;
- description of the product and its intended use;
- flow diagram for the entire manufacturing process indicating CCPs;
- hazards associated with each CCP and preventive measure;
- critical limits;
- monitoring system;
- corrective action plans for deviations from critical limits;
- record-keeping procedures;
- procedures for verification and validation of HACCP system and verification data.

3.2.12 Establish verification procedures (Principle 7)

Procedures for verification must be established to ensure that the HACCP system is working correctly. Verification procedures differ from monitoring activities. Results from verification are not intended to make decisions on the acceptability of lots of product. Verification procedures involve for instance, chemical, microbiological and other analytical tests, auditing of monitoring procedures and records, product sampling, plant inspection audit, review of the HACCP system and its records.

3.2.13 Validation or review of the HACCP plan

In addition to the verification procedures outlined above, it is necessary to have a system in place that will automatically initiate a review of the HACCP plan prior to any changes which may affect the safety of the product, including the following:
- change in raw material or product formulation;
- change in processing system;
- change in factory layout or in the environment;
- change in or modifications to processing equipment;
- change in cleaning and disinfecting programme;
- change in staff and/or responsibilities;
- anticipated change in consumer use; receipt of information indicating a health risk associated with the product.

Data arising from HACCP review must be documented and form part of the HACCP record-keeping system.

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LIST OF REFERENCES


APPENDIX 1:

Rules of Brainstorming.

1. Topic  Everyone talks about the same idea.
2. Volume  The more ideas and information the better.
3. Record  Write everything down.
4. Take Turns  Let everyone have a say.
5. One go per person  People should not be allowed to dominate the meetings.
6. Pass  Say “Pass” if you cannot think of anything when it’s your turn.
7. No criticism  Attack problems, not people.
8. No comments  Avoid being sidetracked. Concentrate on the job in hand.
9. Wild ideas  A wild idea may make someone else think of a sensible one.
10. 5W’s + 1H  Who, What, Where, Why, When and How.

Cause and Effect Analysis.

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APPENDIX 2:

Critical Control Point decision tree

Q1 Do preventive control measures exist?

Yes ➔ Modify steps in the Process or product

No ➔

Is control at this step necessary for safety

Yes ➔

No ➔ Not a CCP ➔ Stop*

Q2 Is the step specifically designed to eliminate or reduce the likely occurrence of a hazard to an acceptable level?**

Yes ➔

No ➔

Q3 Could contamination with identified hazard(s) occur in excess of acceptable level(s) or could these increase to unacceptable level?***

Yes ➔

No ➔ Not a CCP ➔

Stop*

Q4 Will a subsequent step eliminate identified hazard(s) or reduce likely occurrence to acceptable level(s)?**

Yes ➔

No ➔ Critical control Point (CCP)

Not a CCP ➔ Stop*

*Proceed to the next identified hazard in the described process.

**Acceptable and unacceptable levels need to be determined within the overall objectives in identifying the CCPs of the HACCP plans.
APPENDIX 3:

EXAMPLE OF HACCP PLAN OF WHOLE FROZEN SHRIMP

1. Organization Chart and Chart Narrative.

General/Sales Manager

Quality Assurance & Production Manager

Sales Representatives

Maintenance Supervisor

Production Supervisor

Sanitation Supervisor

General/Sales Manager – Can be owner of the company or someone else. He reviews the overall HACCP plan with other managers and supervisors. He is also responsible for setting up and maintaining customer accounts. Oversees all sales representatives and handling of customer or consumer complaints.

Quality Assurance and Production Manager – Responsible for the HACCP plan and any changes and paperwork that are related to the plan. Responsible for handling customer complaints and initiating recalls. Oversees the Quality assurance staff, production, maintenance and sanitation personnel. Is responsible for directing production and any new process or procedures in the plant. Is responsible for purchasing all of the raw material, ingredients, packaging and labelling materials.

Maintenance Supervisor – Oversees all maintenance activities in the plant. Reports to the Production Manager.

Production Supervisor – Oversee the daily production in the plant. Is responsible for overseeing all personnel in the production and other food handling areas, including storage. Works directing raw material into finished product. Reports the production to the Production Manager.

Sanitation Supervisor - Oversees the daily cleanup and sanitation of the plant and reports to the production manager. Responsible for pest control program.
2. Product description.

<table>
<thead>
<tr>
<th>Process/product type Name: Whole frozen shrimp in-shell</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Product name (s)</td>
</tr>
<tr>
<td>2. Composition</td>
</tr>
<tr>
<td>(a&lt;sub&gt;w&lt;/sub&gt;, pH, Preservatives, …)</td>
</tr>
<tr>
<td>3. Intended use</td>
</tr>
<tr>
<td>4. Packaging</td>
</tr>
<tr>
<td>5. Shelf life</td>
</tr>
<tr>
<td>6. Where it will be sold</td>
</tr>
<tr>
<td>7. Storage and distribution condition</td>
</tr>
<tr>
<td>8. Labelling instructions</td>
</tr>
<tr>
<td>9. Intended consumer</td>
</tr>
</tbody>
</table>

Product Name: Whole frozen shrimp in-shell.

- Receiving packaging
- Receiving ingredients
- Receiving fresh shrimp

- Storage of packaging materials
- Storage of ingredients
- De-icing/washing

- Preparation of dipping solution
- Dipping
- De-icing/washing

- Grading/size
- Grading/species
- Packing and weighing

- Freezing
- Packing (master carton)
- Labelling

- Cold store
- Shipping/distribution

UNU-Fisheries Training Programme
4. Whole frozen shrimp in-shell floor plan.
## 5. Good Manufacturing Practices

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Quality management manual.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>General rules on hygiene, health requirement and good handling/processing practices.</td>
<td>Basic and specific training.</td>
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<tr>
<td></td>
<td>5. Keep the finished product distribution records for 3 years.</td>
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</tbody>
</table>

Record all non-conformities identified on corrective action report, Quality manager will sign and verify that appropriate corrective action was taken.

All records will be kept on file.
6. Regulatory Action and Quality Points

<table>
<thead>
<tr>
<th>Regulatory Action Point (RPA) and Quality Points</th>
<th>Compliance/References</th>
<th>Control Measure</th>
<th>Monitoring procedure</th>
<th>Corrective Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Receiving of packaging materials.</td>
<td>Use only approved products that are acceptable for food processing.</td>
<td>Use only packaging materials approved for use in food processing plants. Obtain documents from supplier to indicate their acceptability. Apply Sanitation Operation procedures for receiving of packaging materials. Training of Quality Control staff.</td>
<td>Packaging materials upon receipt. Inspection of packaging materials to determine their condition and ensure that they are clean, new and solid. Upon receipt.</td>
<td>Unacceptable packaging materials will be rejected and rejection will be recorded in the corrective action file. Identification of the nature of and time frames of corrective action by the Quality control supervisor. Corrective action entered in a report with signature and date of implementation. Audit of corrective action by Quality assurance Manager. Identifying the sources of the problem and taking steps to avoid any recurrence. Providing new training to employees if necessary.</td>
</tr>
</tbody>
</table>
## 2. Receiving of ingredients.

**Compliance/References.**
- Use only approved ingredients that are acceptable for food processing.
- Obtain documents from supplier to indicate their acceptability.
- Apply Sanitation Operation procedures for receiving of ingredients.
- Training of Quality Control staff.

**Control Measure.**
- Use only ingredients approved for use in food processing plants.
- Ingredients upon receipt.
- Inspection of ingredients to determine their condition.
- Ensure that the ingredients received from the supplier are those that were ordered.

**Monitoring procedure.**
- Upon receipt.
- Quality Control staff.

**Corrective Action.**
- Unacceptable ingredients will be rejected and rejection will be recorded in the corrective action file.
- Identification of the nature of and time frames of corrective action by the Quality control supervisor.
- Corrective action entered in a report with signature and date of implementation.
- Audit of corrective action by Quality assurance Manager.
- Identifying the sources of the problem and taking steps to avoid any recurrence.
- Providing new training to employees if necessary.
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</thead>
<tbody>
<tr>
<td>3. Receiving of raw material (fresh shrimp) and production of final product.</td>
<td>The production of shrimp has blackspots, or is decomposed or unwholesome and meets all other regulatory requirements. Product specifications.</td>
<td>Do not accept shrimp, which has blackspots, or is decomposed or unwholesome final product. Train production personnel to immediately recognise shrimp that has blackspots, or is decomposed or unwholesome. Buy raw material from reputable suppliers. Apply Sanitation Operation procedures, time and temperature for on-line production. Training of Quality Control staff. Calibrate thermometers used for taking temperatures.</td>
<td>Raw material (fresh shrimp) upon receipt. Final product. Thermometers.</td>
<td>Conduct inspection of incoming raw material (sensorial proprieties and general visual inspection). Temperature records and use of ice or iced water. Conduct product on-line inspection. Use other receiving records to reflect inspection and necessary action. Conduct inspection of final product. Apply good manufacturing practice. Thermometers used to check product temperature will be calibrated against a mercury thermometer.</td>
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</tbody>
</table>

Unacceptable packaging materials and ingredients will be rejected and rejection will be recorded in the corrective action file.

Identification of the nature of and time frames of corrective action by the Quality control supervisor.

Corrective action entered in a report with signature and date of implementation.

Audit of corrective action by Quality assurance Manager.

Identifying the sources of the problem and taking steps to avoid any recurrence.

Providing new training to employees if necessary.
<table>
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<th></th>
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</thead>
<tbody>
<tr>
<td>5. Storage of fresh shrimp.</td>
<td>Use good manufacturing practices for storage fresh raw material.</td>
<td>All product is tagged with date of catch. Apply Sanitation Operation procedures, for storage raw material. Raw material very well iced. Temperature in the chiller according to the regulation for fresh product.</td>
<td>Fresh shrimp in chiller. Monitoring temperature of chiller and continuous monitoring of temperature of the raw material and checking the amount of ice. Every four hour.</td>
<td>Decomposed raw material will be rejected and rejection will be recorded in the corrective action file. Identification of the nature of and time frames of corrective action by the Quality control supervisor. Corrective action entered in a report with signature and date of implementation. Audit of corrective action by Quality assurance Manager. Identifying the sources of the problem and taking steps to avoid any recurrence. Providing new training to employees if necessary.</td>
</tr>
<tr>
<td>Regulatory Action Point (RPA) and Quality Points</td>
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<tr>
<td>6. Preparation of dipping solution.</td>
<td>Use of approved ingredients and approved concentration levels. Ingredient specifications.</td>
<td>Use only ingredients approved for use in food processing plants. Use of ingredient according to the specification. Apply good manufacturing practices. Train one of the production personnel on preparation of dipping solution.</td>
<td>Sodium Metabisulfite solution. Conduct inspection of prepared solution. Control time/temperature of prepared solution.</td>
<td>If the solution inspected does not meet company and regulatory specifications then reject it. Record the corrective action and keep it in file. Identification of the nature of and time frames of corrective action by the Quality control supervisor. Corrective action entered in a report with signature and date of implementation. Audit of corrective action by Quality assurance Manager. Identifying the sources of the problem and taking steps to avoid any recurrence. Providing new training to employees if necessary.</td>
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**UNU-Fisheries Training Programme**
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<tbody>
<tr>
<td></td>
<td></td>
<td>Train the personnel in packing line for proper weight.</td>
<td>Calibrate all scales.</td>
<td>The scale used to weigh the product will be checked with standard weight.</td>
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<td></td>
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<td></td>
<td>Contracted Company will perform maintenance and calibrate the scales.</td>
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<td></td>
<td>Conduct inspection of one unit for each size of shrimp product.</td>
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<td></td>
<td>Conduct inspection of one unit for each size of shrimp product.</td>
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<tr>
<td>7. Freezing.</td>
<td>Product description (-18°C in the core).</td>
<td>Temperature of product from freezer below -18°C and packaging into Master as quickly as possible and put into cold store.</td>
<td>Final product. Temperature measure and monitoring. Every 4 hours. Quality control staff.</td>
<td>If the final product does not meet the temperature specifications then put the product on hold since last monitoring and do new check by sampling. Check the freezer. If necessary repair the freezer. Identification of the nature of and time frames of corrective action by the Quality control supervisor. Corrective action entered in a report with signature and date of implementation. Audit of corrective action by Quality assurance Manager. Identifying the sources of the problem and taking steps to avoid any recurrence.</td>
</tr>
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</tr>
<tr>
<td>9. Labelling.</td>
<td>Product description and according to Regulations.</td>
<td>Label all finished product according to regulatory requirements and company specifications.</td>
<td>Final product. Conduct inspection of final product.</td>
<td>Every 4 hours. Quality control staff.</td>
</tr>
<tr>
<td></td>
<td>Train the personnel in packing and labelling.</td>
<td>Check the labelling at the beginning of shift.</td>
<td></td>
<td>If the final product was not labelled according to the specifications then reject and re-label.</td>
</tr>
<tr>
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<td></td>
<td>If necessary re-train the personnel.</td>
</tr>
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<td></td>
<td>Identification of the nature of and time frames of corrective action by the Quality control supervisor.</td>
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<td></td>
<td>Corrective action entered in a report with signature and date of implementation.</td>
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<td></td>
<td>Audit of corrective action by Quality assurance Manager.</td>
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<td></td>
<td>Identifying the sources of the problem and taking steps to avoid any recurrence.</td>
</tr>
</tbody>
</table>
### 7. Hazard Analysis

<table>
<thead>
<tr>
<th>Ingredient/Processing step.</th>
<th>Potential hazard introduced or Controlled.</th>
<th>Is the Potential Hazard Significant?</th>
<th>Justification for Inclusion or Exclusion as a Significant Hazard.</th>
<th>Preventive measure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Receipt of Packaging Materials and ingredients.</td>
<td><strong>Biological</strong>&lt;br&gt;Potential for incoming materials to be contaminated during manufacturing or transportation.</td>
<td>No</td>
<td>Not likely to occur; Only use approved suppliers. Controlled by Regulatory Actions Point and Good Manufacturing Practice for receipt of packaging materials and ingredients.</td>
<td></td>
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<tr>
<td></td>
<td><strong>Chemical</strong>&lt;br&gt;Potential for incoming materials to be contaminated during manufacturing or transportation.</td>
<td>No</td>
<td>“”</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Physical</strong>&lt;br&gt;Potential for incoming materials to be contaminated during manufacturing or transportation.</td>
<td>No</td>
<td>“”</td>
<td></td>
</tr>
<tr>
<td>2. Storage of packaging material and ingredients</td>
<td><strong>Biological</strong>&lt;br&gt;Potential for incoming materials to be contaminated during storage.</td>
<td>No</td>
<td>Not likely to occur; Controlled by Regulatory Actions Point and Good Manufacturing Practice for storage of packaging materials and ingredients.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Chemical</strong>&lt;br&gt;Potential for incoming materials to be contaminated during storage.</td>
<td>No</td>
<td>“”</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Physical</strong>&lt;br&gt;Potential for incoming materials to be contaminated during storage.</td>
<td>No</td>
<td>“”</td>
<td></td>
</tr>
<tr>
<td>Ingredient/Processing step.</td>
<td>Potential hazard introduced or Controlled.</td>
<td>Is the Potential Hazard Significant?</td>
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<td>Preventive measure.</td>
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</tr>
</tbody>
</table>
| 3. Receiving raw material (fresh shrimp). | Biological  
May be contaminated with pathogens. | No | The presence and growth of pathogens or parasites on the raw product can not be considered a significant hazard because the product must be fully cooked before consumption. |  |
| | Chemical  
May be contaminated with industrial oil. | No | Not likely to occur and if it occur can be controlled by RPAs and good manufacturing practices. |  |
| | Physical  
Foreign matter. | No | The presence of foreign matter like pieces of plastic, wood, bycatch can not be considered a significant hazard. It can be controlled by good manufacturing practices. |  |
| 4. De-icing and washing | Biological  
Contaminated wash water. | No | Controlled by GMPs, Regulation on water, monitoring of processing water. |  |
| | Chemical  
Contaminated wash water with industrial chemical. | No | Controlled by GMPs. |  |
| | Physical  
None identified. | | |  |
| 5. Ice | Biological  
Contaminated ice. | No | Controlled by GMPs. |  |
| | Chemical  
Contaminated ice industrial chemical. | No | Controlled by GMPs. |  |
| | Physical  
None identified. | | |  |
<table>
<thead>
<tr>
<th>Ingredient/Processing step.</th>
<th>Potential hazard introduced or Controlled.</th>
<th>Is the Potential Hazard Significant?</th>
<th>Justification for Inclusion or Exclusion as a Significant Hazard.</th>
<th>Preventive measure.</th>
</tr>
</thead>
</table>
| 6. Storage of the fresh shrimp on ice. | **Biological**  
Growth of pathogens. | No | Potential for pathogens growth if temperature abused. Controlled by good manufacturing practices, time and temperature monitoring. | |
|                             | **Chemical**  
None identified. | | | |
|                             | **Physical**  
None identified. | | | |
| 7. Preparation of shrimp for further processing (de-icing and washing). | **Biological**  
Contaminated wash water. | No | Controlled by GMPs, Regulation on water, monitoring of processing water. | |
|                             | **Chemical**  
Contaminated wash water with industrial chemical. | No | Controlled by GMPs. | |
|                             | **Physical**  
None identified. | | | |
<table>
<thead>
<tr>
<th>Ingredient/Processing step.</th>
<th>Potential hazard introduced or Controlled.</th>
<th>Is the Potential Hazard Significant?</th>
<th>Justification for Inclusion or Exclusion as a Significant Hazard.</th>
<th>Preventive measure.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. Preparation of dipping solution (Sodium Metabisulfite 1.25%).</td>
<td>Biological Water may be contaminated with pathogens.</td>
<td>No</td>
<td>Controlled by Regulatory action point, GMPs, Regulation on water, monitoring of processing water.</td>
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<tr>
<td></td>
<td>Chemical Strong/weak solution than specified.</td>
<td>No</td>
<td>Controlled by good manufacturing practice.</td>
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<td></td>
<td>Physical None identified.</td>
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<tr>
<td></td>
<td>Chemical Excess of ingredient on the edible part of the shrimp.</td>
<td>No</td>
<td>Potential for allergic reactions by consumers. Not likely to exceed 100 PPM. Controlled by Good Manufacturing Practice.</td>
<td>Reject all product containing excess of sulfites.</td>
</tr>
<tr>
<td></td>
<td>Physical None identified.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>10. Grading/size.</td>
<td>Biological None identified.</td>
<td></td>
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<tr>
<td></td>
<td>Chemical Physical None identified</td>
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</tr>
<tr>
<td></td>
<td>Physical None identified.</td>
<td></td>
<td></td>
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<tr>
<td>11. Grading/specie</td>
<td>Biological None identified.</td>
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<tr>
<td></td>
<td>Chemical Physical None identified.</td>
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</tr>
<tr>
<td></td>
<td>Physical None identified.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingredient/Processing step.</td>
<td>Potential hazard introduced or Controlled.</td>
<td>Is the Potential Hazard Significant?</td>
<td>Justification for Inclusion or Exclusion as a Significant Hazard.</td>
<td>Preventive measure.</td>
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</tr>
<tr>
<td>12. Packing.</td>
<td><strong>Biological</strong> Cross-contamination from packaging materials.</td>
<td>No</td>
<td>Contamination from packaging materials not likely to occur and can be controlled by Regulatory action point and good manufacturing practices.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Chemical Physical</strong> Cross-contamination from packaging materials with industrial chemicals.</td>
<td>No</td>
<td>Contamination from packaging materials not likely to occur and can be controlled by Regulatory action point and good manufacturing practices.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Physical</strong> Foreign matter included.</td>
<td>No</td>
<td>Not likely to occur.</td>
<td></td>
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<tr>
<td>13. Weighing.</td>
<td><strong>Biological</strong> None identified.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Chemical</strong> None identified.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Physical</strong> None identified.</td>
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</tr>
<tr>
<td>14. Freezing.</td>
<td><strong>Biological</strong> Not identified.</td>
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<tr>
<td></td>
<td><strong>Chemical</strong> Not identified.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Physical</strong> Not identified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Packaging (Master carton).</td>
<td><strong>Biological</strong> Pathogens contamination.</td>
<td>No</td>
<td>Not likely to occur, controlled by Regulatory action point on receiving packaging materials.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Chemical</strong> Not identified.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td><strong>Physical</strong> Not identified</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>16. Frozen storage (final product)</td>
<td><strong>Biological</strong> Pathogens growth.</td>
<td>No</td>
<td>Pathogens growth is not likely to occur at low water activity.</td>
<td></td>
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<tr>
<td></td>
<td><strong>Chemical</strong> Not identified.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td><strong>Physical</strong> Not identified</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ingredient/Processing step.</td>
<td>Potential hazard introduced or Controlled.</td>
<td>Is the Potential Hazard Significant?</td>
<td>Justification for Inclusion or Exclusion as a Significant Hazard.</td>
<td>Preventive measure.</td>
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</tr>
</tbody>
</table>
| 17. Shipping and distribution. | **Biological**  
Pathogen growth. | No | Potential pathogen growth if temperature is abused. Not likely to occur, all products are shipped and distributed frozen. | |
|                           | **Chemical**  
Not identified. | | | |
|                           | **Physical**  
Not identified. | | | |
8. Determination of Critical Control Points

There are not any Critical Control Points in whole frozen shrimp processing.

9. Records Keeping Procedures

All required records will be maintained in the plant accessible to responsible officials at reasonable time. Those records stored in automated data processing systems will be backed up. All records will be retained for 3 years from the date the product were processed. All records will include:

1. The name and location of the plant
2. The date and time of the activity that the record reflects
3. The signature of the person performing the operation
4. If and when necessary, identification of the product and product code.

10. Verification Procedures

All records that are generated in the plant will be reviewed and initialled daily by Quality Assurance Manager. The Q.A. Manager also reviews all records received from outside contractors.

The HACCP team will meet once per year to evaluate the effectiveness of the HACCP plan. Report of the meeting will be kept.

Appropriate analytical analysis will be performed on selected product every three months to help in the determination of control of Critical Control Points.

Finished product assessment will be performed by QA personnel to verify product compliance with regulatory requirements and company specifications.

11. Conclusion

In the above HACCP plan carried out due to the nature of the product, whole frozen shrimp, and its intended use, to be fully cooked before eaten, we did not find any significant hazards. Therefore biological, chemical or physical hazards found can be controlled by Good Manufacturing Practices.
### APPENDIX 4:

**HACCP WORKSHEET**

**Form 1: Product description**

<table>
<thead>
<tr>
<th>Process/product type name:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Product name</td>
</tr>
<tr>
<td>2. Composition (aw, pH, preservatives, etc)</td>
</tr>
<tr>
<td>3. Intended use</td>
</tr>
<tr>
<td>4. Packaging</td>
</tr>
<tr>
<td>5. Shelf life</td>
</tr>
<tr>
<td>6. Where it will be sold</td>
</tr>
<tr>
<td>7. Storage and distribution condition</td>
</tr>
<tr>
<td>8. Labelling instructions</td>
</tr>
<tr>
<td>9. Intended consumer</td>
</tr>
</tbody>
</table>

**Form 2: Regulatory Actions and Quality Points**

<table>
<thead>
<tr>
<th>Regulatory Actions and Quality Points</th>
<th>Compliance/Reference</th>
<th>Control Measure</th>
<th>Monitoring Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>What</td>
</tr>
</tbody>
</table>

**Form 3: Hazard Analysis**

<table>
<thead>
<tr>
<th>Ingredient/Processing step</th>
<th>Potential hazard introduced or controlled</th>
<th>Is the potential hazard significant?</th>
<th>Justification for inclusion or exclusion as significant hazard</th>
<th>Pre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biological</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Form 4: Determination of Critical Control Points

<table>
<thead>
<tr>
<th>Process step</th>
<th>Hazard</th>
<th>Q. #1</th>
<th>Q. #2</th>
<th>Q. #3</th>
<th>Q. #4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Do control preventive measure exist?</td>
<td>Is the step specifically designed to eliminate or reduce the likely occurrence of the hazard to an acceptable level?</td>
<td>Could contamination with identified hazards occur in excess of acceptable levels or could these increase to unacceptable levels?</td>
<td>Will a subsequent step eliminate identified hazards or reduce the likely occurrence to an acceptable level?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No-not a CCP-</td>
<td>Yes - CCP</td>
<td>No – to Q. #3</td>
<td>No – CCP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>However, if control/preventive measures are required to ensure safety then modify step, product, or process.</td>
<td></td>
<td>Yes - to Q. #4</td>
<td>Yes – Not a CCP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes- to Q. #2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Form 5: HACCP Plan

<table>
<thead>
<tr>
<th>Critical Control Point (CCP)</th>
<th>Significant hazard</th>
<th>Control/preventive measure</th>
<th>Critical limits</th>
<th>Monitoring procedures</th>
<th>Corrective Action and records</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CCP 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CCP 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>