

**RECOMMENDED INTERNATIONAL CODE OF  
HYGIENIC PRACTICE FOR GROUNDNUTS (PEANUTS)**

**CAC/RCP 22-1979**

**1. SCOPE**

1.1 This Code of Hygienic Practice applies to groundnuts, also known as peanuts, monkey nuts or earth nuts (*Arachis hypogaea* L).

It contains the minimum requirements of hygiene for farm handling, transportation, storage, in-shell operations and commercial shelling. It covers all types and forms of raw, dried groundnuts (peanuts) in-shell and shelled.

**2. DESCRIPTION**

**2.1 Definitions**

**Blows** (pops) means in-shell nuts which are unusually light-weight due to extensive damage from physiological, mould, insect, or other causes and which can be removed, for example, by an air-separation process.

2.2 **Curing** means drying of in-shell groundnuts (peanuts) to a safe moisture level.

2.3 **Farmer's stock groundnuts (peanuts)** means in-shell groundnuts (peanuts) as they come from the farm, after separation from the vines by hand and/or mechanical means.

2.4 **Safe water activity** means a water activity of in-shell and shelled groundnuts (peanuts) that will prevent growth of micro-organisms normal to the nut harvesting, processing and storage environment. Water activity ( $a_w$ ) is a measure of free moisture in a product and is the water vapour pressure of the substance divided by the vapour pressure of pure water at the same temperature. An  $a_w$  exceeding 0.70 at 25°C (77°F) is unsafe.

**3. HYGIENE REQUIREMENTS IN PRODUCTION/HARVESTING AREAS**

**3.1 Environmental Hygiene in Areas from which Raw Materials are derived**

**3.1.1 Unsuitable growing or harvesting areas**

Food should not be grown or harvested where the presence of potentially harmful substances would lead to an unacceptable level of such substances in the food.

**3.1.2 Protection from contamination by wastes**

Adequate precautions should be taken to ensure that human and animal wastes are disposed of in such a manner as not to constitute a public health or hygiene hazard, and extreme care should be taken to protect the products from contamination with these wastes. Vine and groundnuts waste should not be permitted to accumulate in such a manner as to promote mould growth or to attract rodents or insects.

### 3.1.3 **Irrigation control**

Food should not be grown or produced in areas where the water used for irrigation might constitute a health hazard to the consumer through the food.

### 3.1.4 **Pest and disease control**

Control measures involving treatment with chemical, physical or biological agents should only be undertaken by or under direct supervision of personnel who have a thorough understanding of the potential hazards to health, particularly those which may arise from residues in the food. Such measures should only be carried out in accordance with the recommendations of the official agency having jurisdiction.

## 3.2 **Harvesting and Production**

### 3.2.1 **Curing**

After being dug, pods should be exposed for maximum rate of drying. This may be accomplished by turning the vines to leave the pods uppermost where they are away from the ground and exposed to sun and wind. Curing should be completed as rapidly as possible to a safe water activity so as to prevent growth of microorganisms, particularly moulds that produce aflatoxins. When curing by supplemental heat, excessive heat should be avoided since this impairs the general quality of the nuts, e.g. splitting of kernels after shelling. Close checks of moisture content or water activity of lots of farmer's stock groundnuts should be maintained. (see sub-section 7.8.2.1 for relationship between safe water activity and moisture level measurements).

### 3.2.2 **Techniques**

Methods and procedures associated with harvesting and production should be hygienic and such as not to constitute a potential health hazard or result in contamination of the product.

### 3.2.3 **Equipment and containers**

Equipment and containers used for harvesting and production should be so constructed and maintained as not to constitute a hazard to health. Containers which are re-used should be of such material and construction as will permit easy and thorough cleaning. They should be cleaned and maintained clean and, where necessary, disinfected. Containers previously used for toxic materials should not subsequently be used for holding foods or food ingredients.

### 3.2.4 **Removal of obviously unfit materials**

Damaged or imperfect groundnuts and lots that contain any obvious contamination with human or animal wastes, insect infestation, decomposition, broken shells, embedded dirt, blows, or other defects to an extent which would render them unfit for human consumption, should be segregated during harvesting and

production to the fullest extent practicable. Such segregated unfit groundnuts should be disposed of in such a place and in such a manner as to avoid contamination of sound nuts, water supplies, or other crops.

### 3.2.5 **Protection of groundnuts from contamination**

Suitable precautions should be taken to protect the nuts from contamination by domestic animals, rodents, birds, insects, mites and other arthropods, or other biological agents, or with chemical or other objectionable substances during handling and storage. The nuts should be moved to suitable storage, or to the processing area for immediate processing, as soon as possible after harvesting or drying. Where nuts are likely to become infested with insects, mites (and other arthropods) during or after harvesting, suitable treatment such as fumigation or application of a pesticide spray should be carried out as a preventive measure. Nuts should be stored in covered containers, buildings, or under covering (e.g. pyramid stacking). Fumigation or spray methods and chemicals used should be approved by the official agency having jurisdiction. High humidities which are conducive to proliferation of mould and elaboration of aflatoxins should be avoided in storage areas in order to maintain groundnuts at a safe moisture level (see sub-section 7.8.2).

## 3.3 **Transportation**

### 3.3.1 **Conveyances**

Conveyances for transporting the harvested crop from the place of harvest or storage should be adequate for the purpose intended and should be of such material and construction as will permit thorough cleaning and treatment with pesticides and should be so cleaned and maintained as not to constitute a source of contamination to the product. In addition, bulk transport such as ship or rail car should be well ventilated with dry air to remove moisture resulting from respiration of the groundnuts and to prevent moisture condensation as the vehicle moves from warm to cool regions or from day to night.

### 3.3.2 **Handling procedures**

All handling procedures should be such as will prevent the product from becoming contaminated. Extreme care should be taken in transporting groundnuts with an unsafe moisture level to prevent spoilage or deterioration. (See also applicable parts of sub-section 7.8.2.1).

## 3.4 **Shelling Plant**

### 3.4.1 **Purchasing of farmer's stock**

Most of the damage may have already been done to the groundnuts during growing, harvesting, curing, handling and storage. A buyer for a shelling plant, whether located at the plant or at an outlying commission buying point, should monitor the quality of ground nut lots offered to him, and with the Government advisory agencies assist suppliers in eliminating improper practices. Buyers should encourage suppliers of farmer's stock groundnuts to follow good production practices as described herein.

### 3.4.2 **Receiving and inspection**

Farmer's stock groundnuts received at the shelling plant should be inspected on arrival. It is advisable to know the origin and history of each lot of groundnuts. The transport vehicle should be examined for cleanliness, insect infestation, dampness or unusual odours. If the vehicle is not fully enclosed, it should have available a covering such as a tarpaulin to keep out the rain or other forms of water. The general

appearance of the groundnuts should be observed during the process of unloading. If the groundnuts are wet to the touch, insect infested, insect damaged, or contain an unusual amount of dirt, debris or other foreign material, they should not be co-mingled with known good groundnuts in a bulk warehouse. The vehicle which contains groundnuts should be set aside until a decision is made for their disposal. If possible, remove a sample from each lot, separate the "loose shelled" kernels and shell the remainder for groundnuts grade observation before an acceptance decision is made. Examine all loose shelled, damaged and under-sized kernels for possible presence of mould. If no external mould is seen, split the kernels to disclose possible hidden mould growth. Excessive mould or presence of mould resembling *A. flavus* warrants a chemical test for aflatoxin or rejection of the lot.

If the groundnuts are to be stored in a bulk warehouse or storage bin, the warehouse or bin should be thoroughly cleaned of all debris and extraneous material and fumigated or otherwise treated with a pesticide before use, if necessary. Groundnuts should not be stored in a warehouse containing any openings which may permit entrance of rodents or birds or which may have leaks in the roof or walls that can allow the rain to enter. The warehouse should be checked frequently for leaks or infestation, both before and after filling. To prevent condensation drippage, warehouses should be ventilated as, for example, by screening around tops or eaves. (see also sub-section 7.1.2).

#### 3.4.3 Unloading equipment and area

Unloading equipment such as an unloading hopper, conveyor belt, bucket elevator, and dirt removing equipment should be so designed as to prevent accumulation of debris. Only areas which can be easily inspected and cleaned should be used for processing groundnuts. A programme of periodic cleaning together with preventive pest control measures should be carried out. Groundnuts should be handled so as to avoid cracking or tearing of hulls which may permit damage to the kernels.

#### 3.4.4 Precleaning

The maximum possible amount of dust and dirt should be removed from the farmer's stock groundnuts before they enter the shelling plant. Sand screens and aspirators will take out much of the dust and dirt and improve the overall sanitation of the shelling plant. The maximum possible amount of foreign material, loose shell, loose kernels and blows should be removed. Foreign material not removed by the cleaner can cause mechanical problems by clogging the sheller, as well as by requiring more picking and sorting of the shelled groundnuts. Removal of loose kernels and blows before shelling will improve the quality of the groundnuts as well as the sheller and plant performance.

#### 3.4.5 Shelling and sizing

All foreign material should be removed from the shelled groundnuts (using stoners, magnets, sorters, etc.). The shelled groundnuts should be continuously inspected to determine whether the plant equipment is performing properly and the groundnuts are free of foreign material, damage and contamination. Any equipment adjustments indicated by the inspection should be made promptly.

Once the shelled groundnuts are size graded, additional stoning should be done in order to remove small light stones, dirt balls and other foreign material which could not be removed in the farm stock stoners. Special care should be taken to avoid overloading size grading equipment.

#### 3.4.6 Sorting

Sorting is the final step for removing debris and defective kernels. It can be done by hand picking or

photo-electric sorting machines or a combination of both. Sorting belts should be well lighted, loaded no more than one layer deep, and operated at a speed and with the number of sorters to assure removal of foreign material and defective kernels. Photo-electric sorting machines should be adjusted as often as practicable against standards selected to assure removal of foreign material and defective kernels. Adjustment should be checked frequently and regularly. One contaminated kernel may contain sufficient aflatoxin to endanger as many as 10.000 co-mingled kernels. Foreign material and defective kernels (mouldy, discoloured, rancid, decayed, shrivelled, insect or otherwise damaged) should be bagged separately - and tagged as unsuitable for human or animal consumption. Containers of defective groundnuts should be removed as soon as practicable from the processing room. Materials which carry the danger of contamination by aflatoxin, or which are contaminated, should be detoxified or destroyed.

#### 3.4.7 **Cleaning of special areas**

3.4.7.1 Boots or wells of elevators accumulate groundnuts and ground nut material. Accumulated material should be removed and the boots/wells cleaned and sprayed and/ or fumigated as necessary to prevent insect and rodent infestation. Fumigation or spray methods and chemicals used should be approved by the official agency having jurisdiction.

3.4.7.2 Canvas conveyor belts will accumulate product between belt and conveyor pan. Pulleys can accumulate crushed material. Underside of moulding on conveyors can accumulate particles of groundnuts. These areas should be cleaned and sprayed and/or fumigated on a regular basis to prevent insect and rodent infestation.

3.4.7.3 Storage and surge hoppers should be cleaned and sprayed between runs.

3.4.7.4 Every piece of machinery whether open or enclosed should be cleaned of lodged material on a regular schedule.

3.4.7.5 The area immediately surrounding the plant should be kept clean of all debris that might attract insects, rodents or birds and subjected to an adequate pest control programme.

3.4.7.6 Dry clean-up procedures should be utilized to avoid wet spots in which micro-organisms can propagate and contaminate contacted groundnuts kernels. Even though water may not be used directly on equipment, spray and elevated humidity from continuous use can increase moisture in organic matter trapped in crevices in equipment, such as conveyors, to the point where micro-organisms can proliferate.

### 4. **ESTABLISHMENT: DESIGN AND FACILITIES**

#### 4.1 **Location**

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

#### 4.2 **Roadways and Areas used by Wheeled Traffic**

Such roadways and areas serving the establishment which are within its boundaries or in its immediate vicinity should have a hard paved surface suitable for wheeled traffic. There should be adequate drainage and provision should be made to allow for cleaning.

#### 4.3 **Buildings and Facilities**

- 4.3.1 Buildings and facilities should be of sound construction and maintained in good repair.
- 4.3.2 Adequate working space should be provided to allow for satisfactory performance of all operations.
- 4.3.3 The design should be such as to permit easy and adequate cleaning and to facilitate proper supervision of food hygiene.
- 4.3.4 The buildings and facilities should be designed to prevent the entrance and harbouring of pests and the entry of environmental contaminants such as smoke, dust, etc.
- 4.3.5 Buildings and facilities should be designed to provide separation, by partition, location or other effective means, between those operations which may cause cross-contamination.
- 4.3.6 Buildings and facilities should be designed to facilitate hygienic operations by means of a regulated flow in the process from the arrival of the raw material at the premises to the finished product, and should provide for appropriate temperature conditions for the process and the product.

4.3.7 In food handling areas:

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

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

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

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

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

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

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

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

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

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

#### 4.4 **Sanitary Facilities**

##### 4.4.1 **Water supply**

An ample supply of water, in compliance with sub-section 7.3 of the *General Principles of Food Hygiene* (CAC/RCP 1-1969), under adequate pressure and of suitable temperature should be available with adequate facilities for its storage, where necessary, and distribution, and with adequate protection against contamination.

4.4.1.2 **Non-potable water** used for steam production, refrigeration, fire control and other similar purposes not connected with food should be carried in completely separate lines, identifiable preferably by colour, and with no cross-connection with or backsiphonage into the system carrying potable water.

##### 4.4.2 **Effluent and waste disposal**

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

##### 4.4.3 **Changing facilities and toilets**

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

##### 4.4.4 **Hand washing facilities in processing areas**

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

#### 4.4.5 **Disinfection facilities**

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

#### 4.4.6 **Lighting**

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

540 lux (50 foot candles) at all inspection points

220 lux (20 foot candles) in work rooms

110 lux (10 foot candles) in other areas.

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

#### 4.4.7 **Ventilation**

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

#### 4.4.8 **Facilities for storage of waste and inedible material**

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

### 4.5 **Equipment and Utensils**

#### 4.5.1 **Materials**

All equipment and utensils used in food handling areas and which may contact food should be made of material which does not transmit toxic substances, odour or taste, is non-absorbent, is resistant to corrosion and is capable of withstanding repeated cleaning and disinfection. Surfaces should be smooth and free from pits and crevices. The use of wood and other materials which cannot be adequately cleaned and disinfected should



be avoided except when their use would clearly not be a source of contamination. The use of different materials in such a way that contact corrosion can occur should be avoided.

#### 4.5.2 **Sanitary design, construction and installation**

4.5.2.1 **All equipment and utensils** should be so designed and constructed as to prevent hygienic hazards and permit easy and thorough cleaning and disinfection and, where practicable, be visible for inspection. Stationary equipment should be installed in such a manner as to permit easy access and thorough cleaning.

4.5.2.2 **Containers for inedible material and waste** should be leak-proof, constructed of metal or other suitable impervious material which should be easy to clean or disposable and able to be closed securely.

4.5.2.3 **All refrigerated spaces** should be equipped with temperature measurement or recording devices.

#### 4.5.3 **Equipment identification**

Equipment and utensils used for inedible materials or waste should be so identified and should not be used for edible products.

### 5. **ESTABLISHMENT: HYGIENE REQUIREMENTS**

#### 5.1 **Maintenance**

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

#### 5.2 **Cleaning and Disinfection**

5.2.1 Cleaning and disinfection should meet the requirements of this Code. For further information on cleaning and disinfection procedures see Appendix I of the *General Principles of Food Hygiene* (CAC/RCP 1-1969) referred to in sub-section 4.4.1.1 of this Code.

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

5.2.3 Adequate precautions should be taken to prevent food from being contaminated during cleaning or disinfection of rooms, equipment or utensils by water and detergents or by disinfectants and their solutions. Detergents and disinfectants should be suitable for the purpose intended and should be acceptable to the official agency having jurisdiction. Any residues of these agents on a surface which may come in contact with food should be removed by thorough rinsing with water, in compliance with sub-section 7.3 of the *General Principles of Food Hygiene* (CAC/RCP 1-1969) referred to in sub-section 4.4.1.1, before the area or equipment is again used for handling food.

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

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

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

### 5.3 **Hygiene Control Programme**

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

### 5.4 **By-Products**

By-products should be stored in such a manner as to avoid contamination of food. They should be removed from the working areas as often as necessary and at least daily .

### 5.5 **Storage and Disposal of Waste**

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

### 5.6 **Exclusion of Domestic Animals**

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

### 5.7 **Pest Control**

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

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

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

## 5.8 **Storage of Hazardous Substances**

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

5.8.2 Except when necessary for hygienic or processing purposes, no substance which could contaminate food should be used or stored in food handling areas.

## 5.9 **Personal Effects and Clothing**

Personal effects and clothing should not be deposited in food handling areas.

# 6. **PERSONNEL HYGIENE AND HEALTH REQUIREMENTS**

## 6.1 **Hygiene Training**

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

## 6.2 **Medical Examination**

Persons who come into contact with food in the course of their work should have a medical examination prior to their employment if the official agency having jurisdiction, acting on medical advice, considers that this is necessary, either because of epidemiological considerations, the nature of the food prepared in a particular establishment or the medical history of the prospective food handler. Medical examination of a food handler should be carried out at other times when clinically or epidemiologically indicated.

## 6.3 **Communicable Diseases**

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

#### 6.4 Injuries

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

#### 6.5 Washing of Hands

Every person, while on duty in a food handling area should wash his hands frequently and thoroughly with a suitable hand-cleaning preparation under running warm water which should be in accord with the Sub-Section 7.3 of the *General Principles of Food Hygiene* (CAC/RCP 1-1969) referred to in Sub-Section 4.4.1.1 of this Code. Hands should always be washed before commencing work, immediately after using the toilet, after handling contaminated material and whenever else necessary. After handling any material which might be capable of transmitting disease, hands should be washed and disinfected immediately. Notices requiring hand-washing should be displayed. There should be adequate supervision to ensure compliance with this requirement.

#### 6.6 Personal Cleanliness

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

#### 6.7 Personal Behaviour

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

#### 6.8 Gloves

Gloves, if used in the handling of food products, should be maintained in a sound, clean and sanitary condition. The wearing of gloves does not exempt the operator from having thoroughly washed hands.

#### 6.9 Visitors

Precautions should be taken to prevent visitors to food handling areas from contaminating food. These may include the use of protective clothing. Visitors should observe the provisions recommended in Sub-Sections 5.9, 6.3, 6.4 and 6.7.

## 6.10 Supervision

Responsibility for ensuring compliance by all personnel with all requirements of Sub-Sections 6.1 - 6.9 inclusive should be specifically allocated to competent supervisory personnel.

## 7. ESTABLISHMENT: HYGIENIC PROCESSING REQUIREMENTS

### 7.1 Raw Material Requirements

#### 7.1.1 Acceptance criteria

Groundnuts should not be accepted by the plant if known to contain decomposed, toxic, or extraneous substances which will not be reduced to acceptable levels by normal plant procedures, sorting or preparation. Particular care should be taken to avoid contaminating in-shell groundnuts or shelled nut meats with animal or human faecal material; nuts suspected of being contaminated should be rejected for human consumption. Special precautions must be taken to reject nuts showing signs of insect damage or mould growth because of the danger of their containing mycotoxins such as aflatoxins. Aflatoxin test results should be known before allowing lots of raw groundnuts to be processed. Any lot of raw groundnuts with an unacceptable level of aflatoxins, which cannot be reduced to permitted levels by the available sorting equipment, should not be accepted.

Progressively more accurate decisions on accepting or rejecting may be made according to the following chart (see page 94).

#### 7.1.2 Storage

Raw materials stored on the plant premises should be maintained under conditions that will protect against contamination and infestation and minimize deterioration. Groundnuts not scheduled for immediate use should be stored under conditions that prevent infestation and mould growth (see Sub-Section 3.4.2).

The warehouse should be of sound construction, in good repair and built and equipped so that it will provide suitable storage and adequate protection for groundnuts. All break, or openings in the walls, floors, or roof shall have been repaired. Any breaks or openings around doors, windows and eaves shall have been repaired or screened. Screens should be used only in those areas of the building where moisture entry from precipitation cannot occur. The building should have sufficient ventilation to prevent accumulation of moisture where it can condense and wet the groundnuts. Provision should be made in existing storages or at the design stage in new storages for gas tightness to permit *in situ* fumigation of peanuts.

Area with new concrete floors or walls should not be used for storage until it is absolutely certain that the new concrete is well-cured and free of excess water. For the first year it is safest to use an approved plastic cover spread over the entire new concrete floor as a moisture barrier prior to use for groundnuts. However, other means of protecting the groundnuts against moisture from "sweating" of concrete can be used, such as stacking of containers on pallets. The plastic can be removed when the warehouse is emptied. This system will protect against moulding of the groundnuts due to sweating of new concrete.

Products which affect the storage life, quality or flavour of groundnuts should not be stored in the same room or compartment as groundnuts. For example, such items as fertilizer, gasoline or lubricating oils should not be stored with groundnuts, and some fruits or vegetables contribute objectionable odours or flavours.

## 7.2 Inspection and Sorting

Prior to introduction into the processing line, or at a convenient point within it, raw materials should be inspected, sorted or culled as required to remove unfit materials (see Sub-Sections 3.4.2 and 3.4.6).

Experience has shown that aflatoxin is most frequently associated with mouldy, discoloured, shrivelled, insect damaged or otherwise damaged groundnuts. Mould contaminated groundnuts may exhibit some of the following characteristics:

- (a) Darker skin colouring before and/or after roasting.
- (b) Darker flesh (after blanching) before and/or after roasting.
- (c) Resistance to splitting and/or blanching.

To remove mould-contaminated nuts effectively, sorting should be performed before and after blanching and roasting. Where splitting is part of the processing operation, nuts that resist splitting should be removed. The effectiveness of sorting techniques should be checked by regular aflatoxin analyses of the sorted groundnuts stream or of the finished product, or both. This should be done frequently enough to give assurance that the product is completely acceptable.

Rejected groundnuts from the sorting procedure (pickouts) should be destroyed or segregated from edible products. If they are to be used for crushing, they should be separately bagged and tagged as unsuitable for direct human or animal consumption in their present state.

## 7.3 Prevention of Cross-Contamination

7.3.1 Effective measures should be taken to prevent contamination of food material by direct or indirect contact with material at an earlier stage of the process.

7.3.2 Persons handling raw materials or semi-processed products capable of contaminating the end-product should not come into contact with any end-product unless and until they discard all protective clothing worn by them during the handling of raw materials or semi-processed products which have come into contact with or have been soiled by raw material or semi-processed products and they have changed into clean protective clothing.

7.3.3 If there is a likelihood of contamination, hands should be washed thoroughly between handling products at different stages of processing.

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

## 7.4 Use of Water

7.4.1 As a general principle only potable water as defined in the latest edition of "International Standards of Drinking Water" (WHO) should be used in food handling.

7.4.2 Non-potable water may be used with the acceptance of the official agency having jurisdiction for steam production, refrigeration, fire control and other similar purposes not connected with food. However, non-potable water may, with specific acceptance by the official agency having jurisdiction, be used in certain food handling areas provided this does not constitute a hazard to health.

7.4.3 Water re-circulated for re-use within an establishment should be treated and maintained in a condition so that no health hazard can result from its use. The treatment process should be kept under constant surveillance. Alternatively, re-circulated water which has received no further treatment may be used in conditions where its use would not constitute a health hazard and will not contaminate either the raw material or the end-product. Re-circulated water should have a separate distribution system which can be readily identified. The acceptance of the official agency having jurisdiction should be required for any treatment process and for the use of re-circulated water in any food process.

## 7.5 Processing

7.5.1 Processing should be supervised by technically competent personnel.

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

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

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

## 7.6 Packaging

7.6.1 All packaging material should be stored in a clean and sanitary manner. The material should be appropriate for the product to be packed and for the expected conditions of storage and should not transmit to the product objectionable substances beyond the limits acceptable to the official agency having jurisdiction. The packaging material should be sound and should provide appropriate protection from contamination.

7.6.2 Product containers should not have been used for any purpose which may lead to contamination of the product. Where practicable containers should be inspected immediately before use to ensure that they are in a satisfactory condition and where necessary cleaned and/or disinfected; when washed they should be well drained before filling. Only packaging material required for immediate use should be kept in the packing or filling area.

7.6.3 Packing should be done under conditions that preclude the introduction of contamination into the product.

#### 7.6.4 **Lot identification**

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

#### 7.6.5 **Processing and production records**

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

#### 7.7 **Preservation of Product**

In-shell nuts or shelled nuts (nut meats) should be stored at a moisture level low enough so that the product can be held under normal storage conditions without development of mould or significant deterioration by oxidative or enzymatic changes. Finished products may be treated with antioxidants at levels approved by the Codex Alimentarius Commission and packed in gas tight containers under nitrogen or vacuum to protect quality and retard possible mould growth.

#### 7.8 **Storage and Transport of End-Product**

Groundnuts should be stored and transported under such conditions as will maintain the integrity of the container and the product within it. Carriers should be clean, dry, weatherproof, free from infestation and sealed to prevent water, rodents or insects from reaching the peanuts. Groundnuts should be loaded, held and unloaded in a manner that protects from damage or water. Well insulated carriers or refrigerated vehicles are recommended for transport when climatic conditions indicate such a need. Extreme care should be taken to prevent condensation when unloading groundnuts from cold storage or from a refrigerated vehicle. In warm, humid weather, the groundnuts should be allowed to reach ambient temperature before exposure to external conditions. This tempering may require 1-3 days. Groundnuts that have been spilled are vulnerable to contamination and should not be used for edible products.

7.8.1 All products should be stored in clean, dry buildings, protected from insects, mites and other arthropods, rodents, birds, or other vermin, chemical or microbiological contaminants, debris and dust.

#### 7.8.2 **Controlled storage conditions**

##### 7.8.2.1 **Control of mould growth**

An environment with a relative humidity between 55% and 65% should be maintained to protect quality and prevent mould growth. A single water activity value may correspond to different moisture levels in different varieties of groundnuts. Producing countries should therefore determine for each of their own varieties of groundnuts, the moisture level that corresponds to the safe water activity value given in the Code. These moisture levels can then be used as local standards for field control. No groundnuts should be stored closer than 0.5 metres (1½ feet) from any outside wall. An active programme should be maintained to detect and control hazards from damp pallets, damp floors and walls, overhead moisture during storage, condensation, wet



unloading and loading out conditions - all conducive to moisture pick-up and mould. Growth of toxigenic moulds may be prevented by packing nut products that have been dried to a "safe water activity" or by storing at a temperature sufficiently low to prevent mould growth. Exposed nut products in storage may be maintained at or dried to a "safe water activity" by control of the relative humidity of the circulating air. Those who use refrigerated storage should be aware that the water activity of nuts increases with increased temperature; this fact should be taken into account when changing storage temperatures. If the storage temperature of groundnuts is changed, e.g., cold groundnuts transferred to an area of high humidity or vice versa, care should be taken to see that moisture does not condense on the groundnuts.

#### 7.8.2.2 Control of infestation by insects, mites and other arthropods.

Groundnuts should be stored in such a manner that infestation can be controlled by such methods as anaerobic or refrigerated storage or fumigation prior to storage.

Stored groundnuts should be inspected regularly and, if infested, fumigated by appropriate methods. If necessary they can be removed for fumigation. In this case the storage areas should be separately cleaned and disinfected.

### 7.9 Sampling and Laboratory Control Procedures

7.9.1 In addition to any control by the official agency having jurisdiction, it is desirable that each plant should have its own or contracted laboratory control of the hygienic quality of the nut products processed and of the pest control procedures. The amount and type of such control will vary with the different nut products as well as the needs of management. Such control should provide for rejection of all nuts that are unfit for human consumption and monitoring of the quality of the finished products.

7.9.2 Where appropriate, representative samples of the production should be taken to assess the safety and quality on the product.

7.9.3 Laboratory procedures used should preferably follow recognized or standard methods in order that the results may be readily interpreted.

## 8. END-PRODUCT SPECIFICATIONS

Standard methods should be used for sampling, analysis and other determinations to meet the following specifications:

8.1 To the extent possible in good manufacturing practice the products should be free from objectionable matter and should not contain any substance in amounts which may represent a hazard to health.

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

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

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

8.3 The products should comply with the provisions for food additives and contaminants laid down in Codex Commodity Standards and with maximum levels for pesticide residues recommended by the Codex Alimentarius Commission.