

Steps to

Effective Sanitation in

Smoked-Fish Plants

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

UNITED STATES DEPARTMENT OF THE INTERIOR

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By

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ABSTRACT

Effective sanitation procedures for use in smoked-fish plants are briefly described. Included are sections pertaining to plant design, construction, and maintenance; water and waste systems; cleaning and sanitizing methods and materials; personal hygiene; and problem areas to avoid in regard to bacterial contamination of finished product.

THE NEED FOR SANITATION IN SMOKED-FISH PLANTS

Raw fish and the processing areas where fish are handled may contain large numbers of microorganisms that hasten the spoilage of smoked fish, that destroy its wholesomeness, and that may contribute to an incidence of food poisoning. It is therefore important to process and handle smoked fish in as clean and fastidious a manner as the housewife would use in preparing food for her family at home. This end may be achieved by taking all necessary precautions to avoid a buildup of bacteria in the plant and to prevent the contamination of the cooked smoked-fish product. A product that is consumed without additional heating must be prepared and protected so that it can be eaten safely and enjoyed as a delicacy (fig. 1).

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Figure 1.--Smoked chub ready for delivery to the consumer. To protect this fishery product, it should be promptly packaged after being chilled. Extreme care should be taken to handle the product as little as possible and only in a sanitary manner. Packing materials should be clean and be kept covered. They should never be reused.

This has been designed to provide industry with effective sanitation procedures for use in smoked-fish plants.

MAINTAINING PLANT PREMISES, BUILDINGS, AND SERVICES

The first step towards accomplishing an effective in-plant sanitation program relates to the physical plant itself. A plant that is efficiently designed and constructed is more easily maintained in a clean and sanitary condition and will provide the proper environment in which food products can be handled.

CLEANLINESS AND CONSTRUCTION

Plant premises and work areas should be kept clean and orderly and buildings should be tightly constructed, maintained in good repair made with easily cleanable materials, and arranged in an orderly fashion (fig. 2). It is easy to clean an area if everything is arranged to provide for optimum sanitary conditions in the efficient flow of processed products.

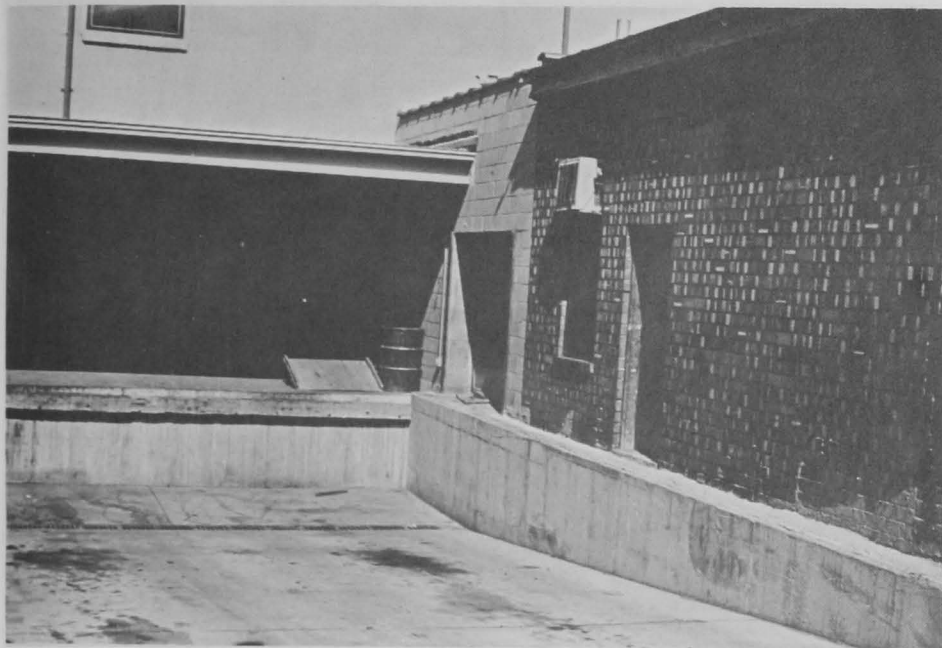


Figure 2.--As illustrated by this well-maintained plant, the premises should have no rubbish or other litter around that would encourage rats and flies. Driveways and outside doorways should be constructed and treated to minimize dust and dirt. The way a plant looks outside often indicates how it is inside.

WATER SUPPLY AND WATER DRAINAGE

An ample supply of hot and cold water from an approved source should be provided, and plant premises and floors should be constructed so that they can be kept as dry and as free from the accumulation of water as possible. Drainage may be accomplished by sloping the grounds surrounding the plant and by installing adequate floor drains to carry off waste water (fig. 3).

PREVENTION OF INSECT INFESTATION

Windows and doors should be screened or kept closed to prevent insects and rodents from entering (fig. 4), for these pests may carry germs that spread disease. The services of professional exterminators may be needed periodically to maintain a vermin-free plant.

WASTE DISPOSAL

Fish scraps, scales, slime, blood, and entrails must not be allowed to accumulate. They must be placed in easily cleanable refuse containers provided with lids (fig. 5) and stored away from areas where

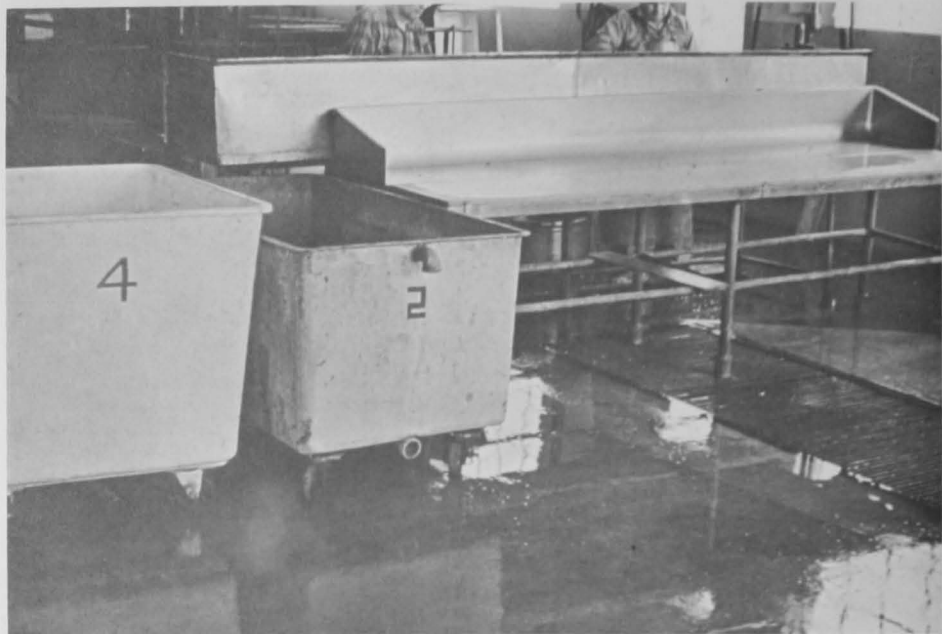


Figure 3,--Floor drains, when properly installed, carry off waste water and thereby help to prevent the buildup of bacteria.

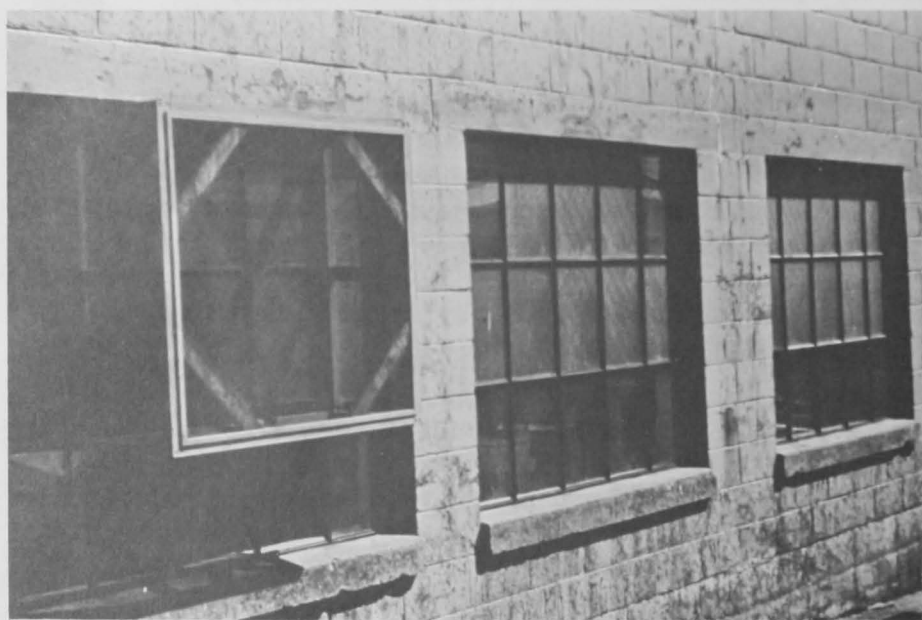


Figure 4,--All doors and windows that open should be screened to prevent the entry of insects and rodents.

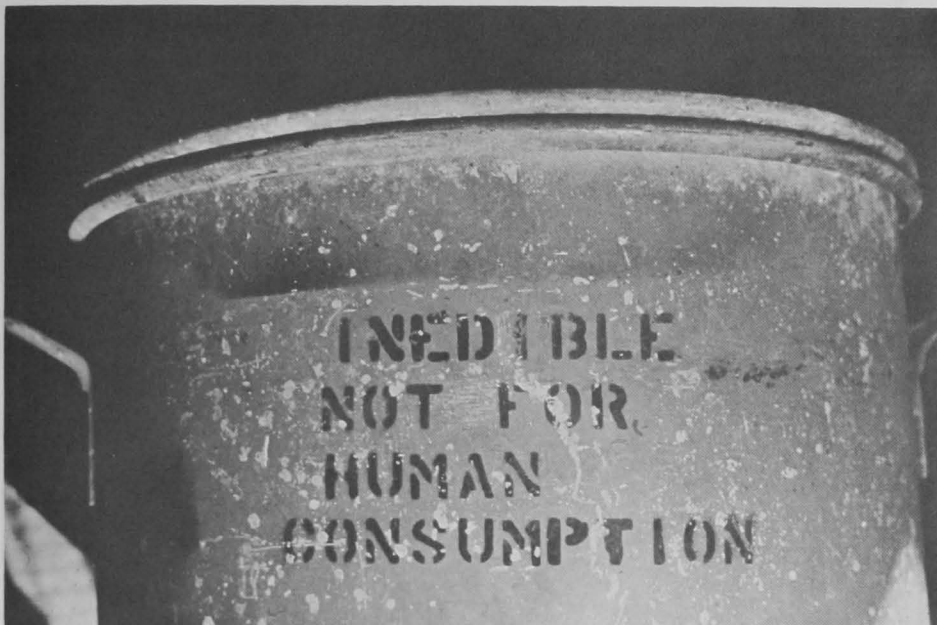


Figure 5.--All fish and remains that are not fit for human consumption should be put in containers that are plainly marked. These containers should be tightly covered. The containers should be emptied and cleaned daily.

smoked fish are processed or handled. This waste material must be removed from the plant and premises daily, for it serves as food for bacteria and encourages the growth and buildup of these microorganisms within the plant. For example, molds, which are a common cause of spoilage in smoked fish, can pervade a plant, making it difficult to produce a product that will remain free from spoilage for any period of time.

Cleaning of Plant and Equipment and Storage of Supplies

An effective sanitation program depends particularly upon the design of an efficient plant cleanup schedule--complimented by the proper cleaning supplies and equipment--effective personnel supervision and constant attention to detail.

CLEANING EQUIPMENT

Equipment for cleaning, if kept readily accessible, will undoubtedly be used more frequently (fig. 6). In the cleaning operation, it is important to remove all waste material no matter how small the amount. This material includes fish wastes, fish oil, and other organic matter, which may adhere to the equipment, utensils, or floors and walls of

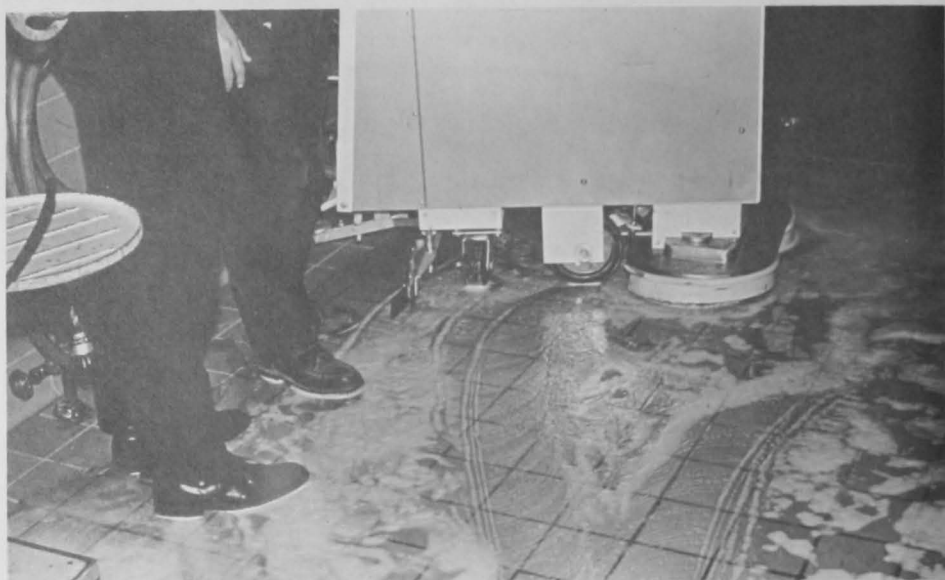


Figure 6.--Cleaning equipment will be used more frequently if it is kept accessible and in good repair. Each plant employee should have specific cleaning duties, schedules, and procedures. One man should be assigned to see that all cleaning routines are carried out exactly as ordered.

the plant. Portable steam-cleaning units are often quite effective for cleaning relatively inaccessible areas of such waste material. The small size of bacteria, about $1/25,000$ th of an inch long, permits millions of them to grow in a tiny bit of refuse or fish waste. Care must therefore be taken to remove every bit of waste matter during the cleanup operation after the day's production is completed.

CLEANING OF HAND EQUIPMENT AND UTENSILS

Hand equipment and utensils, such as dip nets, should be cleaned and sanitized frequently, particularly at the end of the day.

Separate hand equipment should be maintained for handling only smoked fish. Hand equipment used for raw fish must never be used for smoked fish, because bacteria or molds from the raw fish may contaminate the smoked fish. Color coding the equipment helps to prevent it from being used improperly.

USE OF DETERGENTS

A suitable industrial detergent and plenty of hot water should be used on floors and equipment. A hard-bristled brush should be used with the detergent to remove materials that are difficult to get off, such as oil or dried pieces of fish waste (fig. 7). High-pressure hot-water hose attachments and equipment, used in conjunction with vigorous brushing, will help remove waste materials.

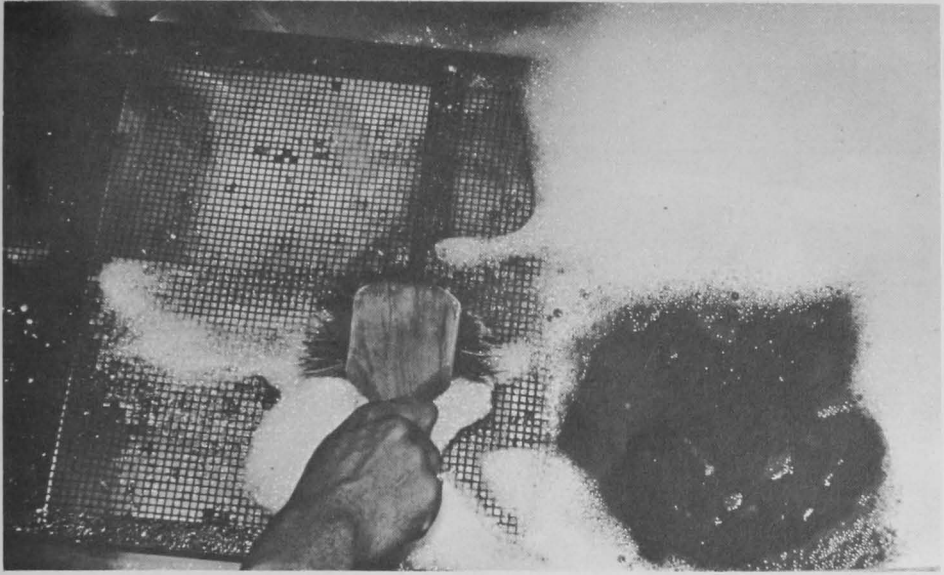


Figure 7.--Equipment and utensils (disassembled where possible) should be soaked in hot water with detergent, and all flesh, scales, and blood removed with a stiff brush.

USE OF SANITIZING AGENTS

The cleaning operation is followed by a chlorine sanitizing rinse containing a minimum concentration of 50 p.p.m. (parts per million) of available chlorine (fig. 8). Just before being used, a 50-p.p.m. solution may be made by following the directions on the label of the commercial sanitizer product. Service representatives are available from the sanitizer manufacturer to assist you in performing this operation satisfactorily without introducing corrosion problems in your particular plant. Equipment, utensils, and containers used for handling and processing fish should, wherever possible, be constructed of non-corrosive materials that permit effective cleaning and sanitizing. Examples are stainless steel (as illustrated and Fiberglas¹ or polyethylene-type containers (fig. 9).

ESTABLISH A ROUTINE FOR CLEANING

All tanks, utensils, or equipment used for containing or handling raw fish products should be cleaned and sanitized at the end of the day's operation or immediately before the tanks, utensils, or equipment are to be used for handling or processing smoked fish.

¹ Trade names referred to in this publication do not imply endorsement of the commercial products.

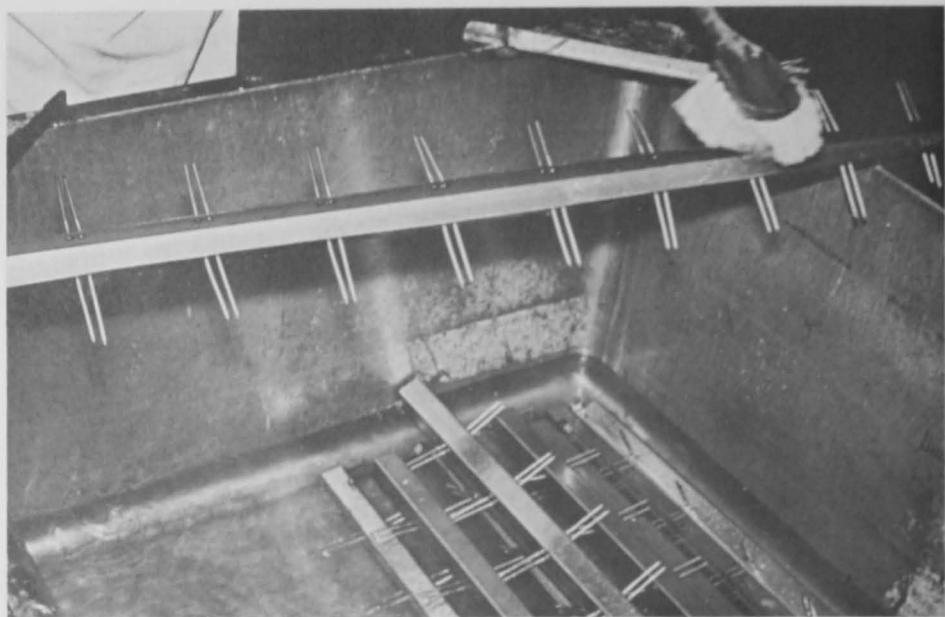


Figure 8.--Equipment and utensils, after being cleaned with hot detergent, should be well rinsed in hot water and soaked in an approved sanitizing solution, such as hypochlorite, that is constantly maintained at a minimum concentration of 50 p.p.m. available chlorine.



Figure 9.--All containers and utensils used for handling and processing fish should be constructed of noncorrosive materials that make cleaning easy and effective.

STORAGE OF FOOD INGREDIENTS AND PACKING MATERIALS

Dry ingredients, such as salt, must be of food grade and must be stored in a clean, dry place where they are protected from insects, rodents, and adulteration by other materials. Wood chips and sawdust should be covered to prevent their being contaminated with dust. Packing containers and cartons must be kept covered and must be separated from areas where raw fish are processed or stored. They must be used only once.

Avoiding Cross-Contamination

PROPER CARE IN HANDLING PRODUCT

In the smoked fish plant, it is essential to prevent bacteria from being carried from the raw fish to the final smoked-fish product. If the fish are smoked at a high temperature, the number of microorganisms originally contained in the raw fish will be reduced considerably (fig. 10). It is important, therefore, that the number of bacteria in the final smoked product not be increased artificially by transferring these organisms to the final product from raw fish,

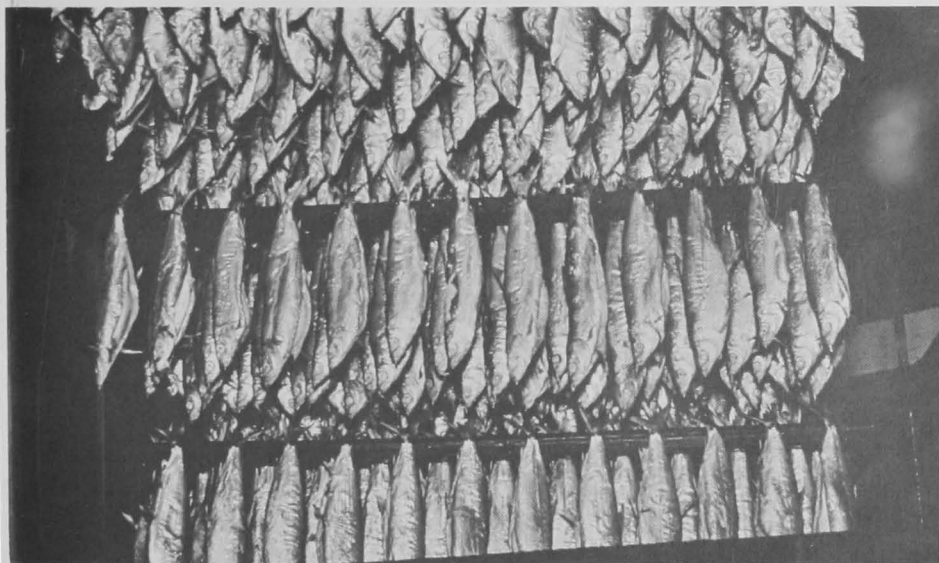


Figure 10.--Smoked chub after being processed in a high-temperature, controlled oven. Most consumers today want a lightly smoked, bland product. High processing temperatures are therefore important in reducing the total microbial load originally present on the raw fish. It is essential, however, that the final product not be recontaminated by poor handling practices.

processing equipment, utensils, packing materials, dirty hands, or other sources of contamination.

POSSIBLE SOURCES OF CONTAMINATION

The final product may be contaminated by contact with dust particles, drip water, unclean tables, utensils, gloves, and other objects used in the cooling, packing, and storing smoked fish.

PROPER SEPARATION OF PRODUCT AND OPERATIONS

Because of the possible transfer of bacteria, it is essential to have complete separation between the raw-fish operations and the smoked-fish operations (fig. 11). To prevent this cross-contamination, the plant manager should see that physical separators are constructed. Separations may be made by installing floor-to-ceiling partitions between raw-fish areas and smoked-fish areas (fig. 12). The use of clean equipment and utensils for handling the raw product and final product must be enforced. Equipment and utensils used for handling raw fish must not be used for handling smoked fish.

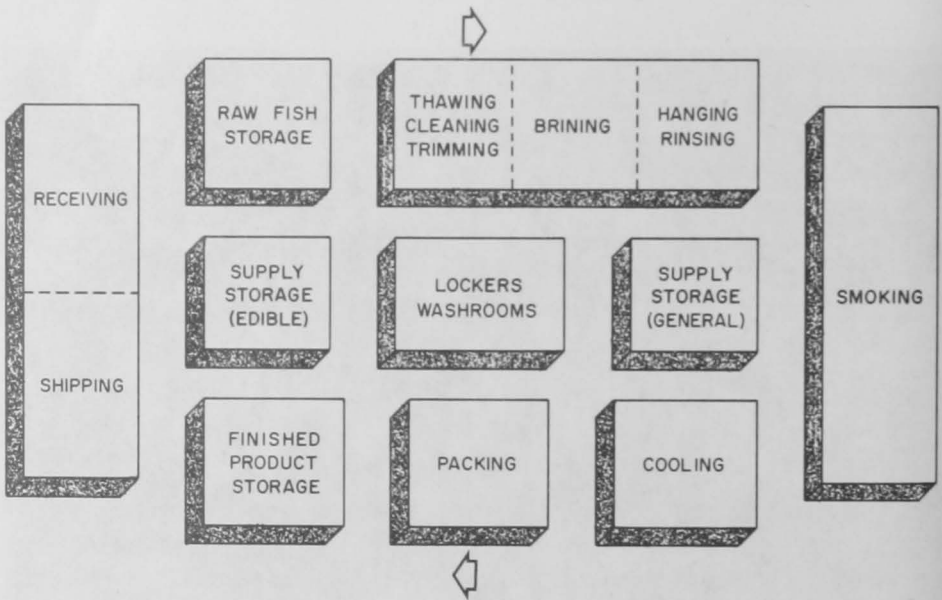


Figure 11.--Wherever possible, separate rooms should be provided to ensure separation of operations, to prevent possible transfer of bacteria between raw-fish operations and final-product operations. Product flow and protection, as indicated in this stylized plant layout, is facilitated by proper separation of operations.

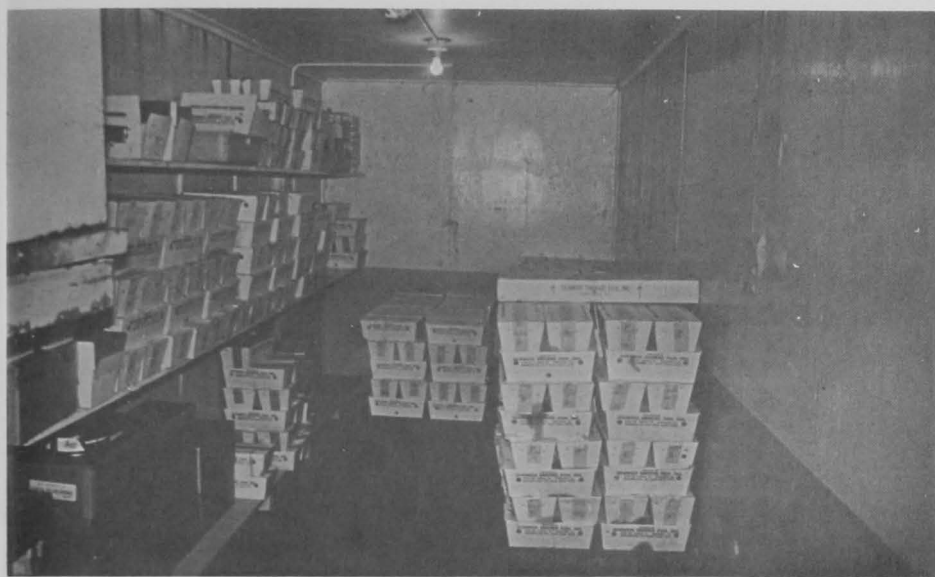


Figure 12.--After being packaged, the product should be stored in a clean refrigerated room separate from other processing areas. Storage time and temperature should be kept to a minimum.

CAREFULNESS OF PERSONNEL

If possible, workers engaged in cleaning, scaling, or any operation involving raw fish should remain out of the areas where smoked fish is being processed, stored, or packed. If a worker must go from raw-fish operations to smoked-fish operations, he should change his outer garments, including his footwear, and wash his hands thoroughly. He should also wash his hands before beginning work in the morning, after lunch, and after each visit to the toilet. After washing his hands and before returning to work, each worker should sanitize his hands by immersing them in an approved sanitizing solution.

CARE IN BRINING PREPARATION

In the preparation of raw fish for brining, the worker should thoroughly clean each fish, removing all entrails and waste material, and then carefully rinse each fish--including the belly cavity, head, and sides--with a spray of clean water (fig. 13). (A wash tank for cleaning fish should not be used, as dirty wash water contaminates all the fish in the tank as well as the tank itself.) The cleaned fish are then placed within a clean container to await brining. The brine tank is cleaned and sanitized at the end of each day's operation. Brine solution must never be reused.



Figure 13.--In the preparation of raw fish for brining, each fish should be thoroughly cleaned and all intestinal contents removed, followed by a spray rinse with clean, cold water.

POINTS TO REMEMBER

1. Bacteria and other microorganisms are carried by soil, by dust particles in the air, by water, by hands, by clothing, and by other physical objects.
2. For the avoidance of cross-contamination of the smoked fish, physical separations or partitions must be maintained between raw fish, raw-fish products, and raw-fish handling equipment and the final cooked, smoked product.
3. Raw fish must be cleaned by the removal of all viscera, blood, and other materials, then must be rinsed individually with a spray of clean water before being placed in a clean container for holding until being brined.
4. Plants and premises must be kept clean, and the work areas must be kept as clean and dry as possible to prevent the buildup of bacteria and to lessen the chance of cross-contamination.

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