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Whitefish Processing Manual

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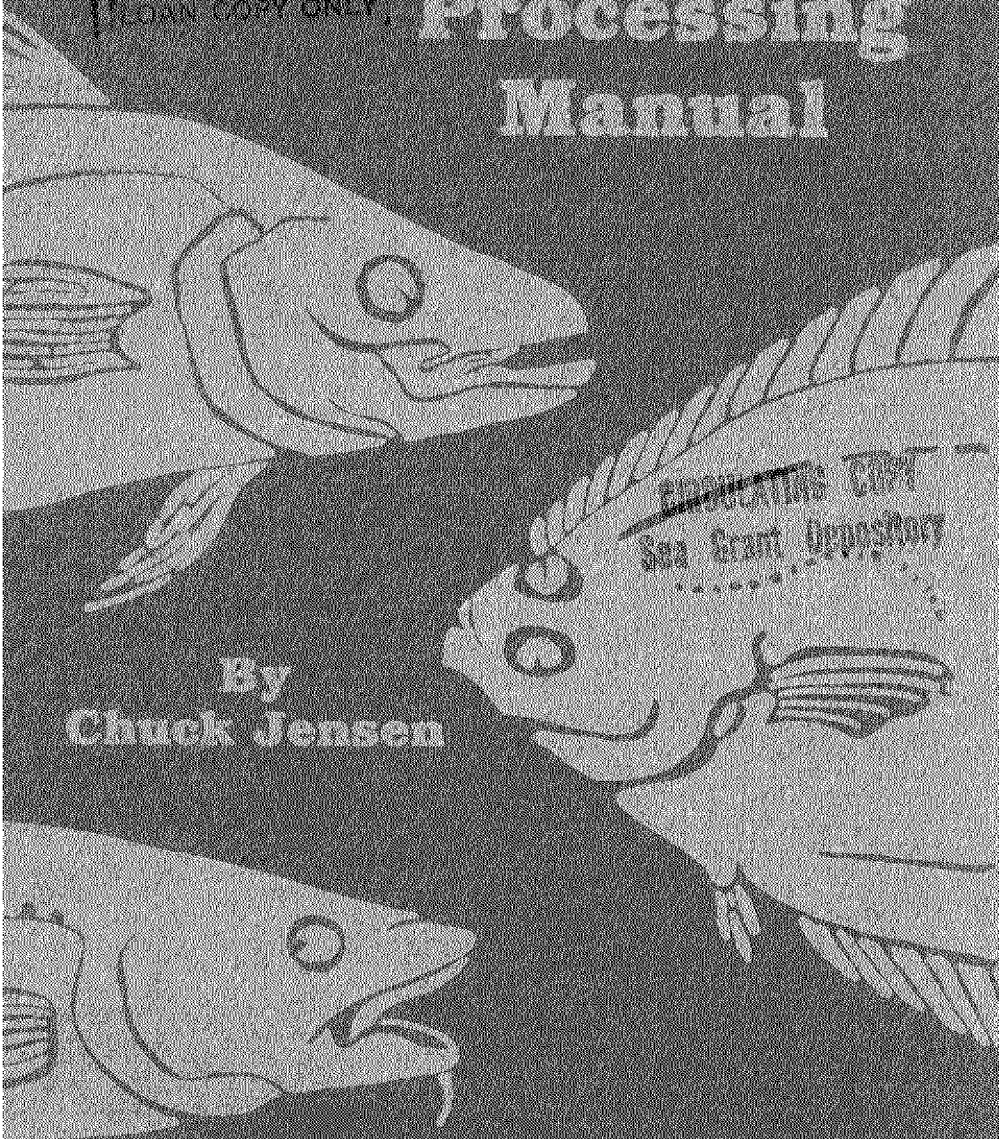

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WHITE FISH PROCESSING MANUAL

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INTRODUCTION

If Alaska is to compete in the world and domestic ocean white fish markets, its fishers and processors must implement strict quality control programs from the moment the fish comes over the rail. From that moment of landing, only time, temperature and human factors can downgrade the final product.

In terms of seafood products quality can be defined as "typical and essential feature or characteristics," or as "a fineness of grade or excellence." Seafood quality can be influenced by weather, primary handling, seasons, attitudes of fishermen, processors and management, buyers and ultimate consumers. Each of these influencing factors must be addressed if the end result is to be a product of consistent enough quality to satisfy consumers and generate repeat sales.

Quality begins with the fisherman and ends when the ultimate consumer utilizes the product. Unfortunately, the Alaskan processor can control quality only to the point at which the product is shipped to its primary distribution point.

The single most important factor influencing a final product's quality is the attitude of the primary producer and how he handles the product delivered to the processor. Remember, the quality of the product can be no better than the quality of the raw product received. The processor can influence the primary producer by establishing raw product standards and adhering to them without deviation. If those raw products that do not meet standards are not purchased, the primary producer must provide consistent quality or lose money.

Quality is not, as many assume, simply confirming a particular product as "best of lot." The best identification of a quality product, be it food, clothing or golf balls, is consistency and marketability. It usually isn't as important that the product is good, bad or mediocre as it is that the customers get what they want, get what they expect, and get it with no surprises. No one has yet manufactured the perfect golf ball, yet millions of golfers are satisfied with the consistent, reliable performance of certain brands of balls.

The following "memos" are a look to the future. If Alaskans are to be successful in white fish ventures, then I hope they look to the near future. I include them here because they take the term "quality" out of the realm of theory and place it in the practical world of white fish production. They illustrate the types of policies and procedures developed by the company expecting to be competitive in the world of domestic white fish markets.

MEMO

TO: All Skippers/Vessel Owners
FROM: Manager, U-Know-Who Fish Co.

Due to current and projected market conditions the following handling procedures for white fish must be observed. Rejection of the entire load is possible if not followed to the letter:

ROUND FISH:

1) Fish must be delivered within 48 hours of when first fish put down.
2) All fish must be bled and gutted.
3) All fish must exceed 21 inches.
4) All fish must be free of ulcers and other deformities.
5) All fish must be separated by species.
6) All fish must be boxed in containers not exceeding 100 pounds.
7) Ice must be used in a 1:2 ratio.
8) All fish must have an internal temperature of less than 32°F when delivered.

FLATFISH:

1) Fish must be delivered within 72 hours of when first fish put down.
2) All fish must exceed 13½ inches.
3) All fish must be free of ulcers and other deformities.
4) All fish must be graded by species.
5) All fish must be boxed with black side down.
6) Ice must be used in a ratio 1:2.
7) All fish must have an internal temperature of less than 32°F.
8) Roe fish must be separated from non-roe fish.

MEMO

TO: Unloaders and Dock Crew
FROM: Manager, U-Know-Who Fish Co.

Attached is a memo sent to all individuals fishing for this company. If any deviation from these rules is observed, the manager and quality control person must be notified and unloading stopped until they are on the scene.

In addition, the following procedure must be followed:

1) The oldest fish must come out first.
2) Fish temperature must be taken every tenth box and recorded.
3) Ice must cover fish in each box.
4) Every 20th box must be inspected for "FRESHNESS" and recorded.
5) No more than ten boxes per pallet.
6) Every pallet tagged with name, date, time, temperature, and species.
7) Every pallet of fish must be stored in cool area until needed.

FRESH FISH EVALUATION:

1) Eyes should be clear and bright, not opaque.
2) Gill should be red, normal in appearance and practically odorless.
3) Skin should be bright, shiny and tight; not dried, dull and wrinkled.
4) There should be no "belly burn."
5) Flesh should be resilient.
6) There should be a "fresh fish" odor.

MEMO

TO: All Fillet Line Employees

FROM: Manager U-Know-Who Fish Co.

COD FILLETS FOR "SHATTER PACK" SHALL MEET FOLLOWING SPECIFICATIONS:

1) Color - Creamy white to white, no bruises, blood spots or other discoloration.
2) Texture - Firm, resilient.
3) Odor - Fresh, seaweedy.
4) Appearance - No cuts, no gaping, no feathers symmetrical, no holes.
5) Size/Weight - Minimum 6 inches; maximum 16 inches; minimum weight 3 ounces; maximum weight 20 ounces.

Defects Not Allowed:

Bones

Skin

STANDARDS FOR BLOCKS:

Bacteriological Standards:

	Maximum
TPC	100,000 colonies/gram
E. Coli	1.0/10 gram
Coag. Pos. Staph	.5 colonies/gram

Parasites:

Only one visible parasite per ten pounds of product will be allowed. No bone shall be tolerated. Skin over one-fourth square inch will be a major defect. Feathers shall constitute a minor defect. Discoloration or dehydration exceeding one-half square inch shall be a major defect.

Two majors or four minors in any sample shall be basis for rejection.

Color shall be uniform and natural. Weight shall be 16.5 pounds/block, one percent variation allowed. Size shall be 19" x 10" x 2.5". No PCBs, Hg or pesticide allowed.

I. QUALITY CONTROL PROGRAMS

The quality of any product sold to a consumer is dependent upon good quality control from the time the fish is caught until it leaves the processing plant as finished product. Many factors enter into the production process; and since final quality can be no better than that which is received, protection of quality begins aboard the vessel.

Delivery

Among procedures to be followed by fishermen, timely delivery is essential, with time determined from the moment the first fish is "put down" to time of delivery. Each species will have a different shelf-life, so optimum delivery times will vary. Pollock, for example, should be delivered within 36 hours in order to achieve maximum quality in the end product. Cod, if bled and gutted, will last 96 hours without a noticeable decrease in final quality. Starry flounder can be iced and held on a vessel for as long as seven days with no noticeable deterioration.

Bleeding

The round fish must be bled and gutted as an absolute minimum, with the possible exception of pollock. If it cannot be gutted, it should at least be bled. A decision on which type of bleeding cut to utilize is dependent upon the preference of the receiving station. Bleeding can best be accomplished by making a deep throat cut just in back of the gills, but if that is not possible, then other methods are available. One is to cut

across the tail severing the vein. Another method is to rip a gill raker to allow the blood to be pumped out. When the fish is gutted, the cuts should be made so that nothing other than the belly wall is cut and that no cuts, nicks or bruises are left in the belly lining or the marketable flesh of the fish. The fish should be handled gently to avoid bruising and should not be stacked to depths that would cause bruising or crushing. If ice is to be used as a cooling medium, then the maximum depth at which fish should be stored is 36 inches. Storage depth deeper than that will cause quality deterioration of the raw and finished product. No pughs or forks should be used. If it is necessary to use gaffs, then the gaffing should be done only in the head.

Onboard Storage

The type of refrigerant, or cooling medium, to be used is established by the processor. Several options are available including ice, champagne, slush, chilled sea water (CSW) and refrigerated sea water (RSW). All methods are acceptable in most circumstances, and each has its unique advantages and disadvantages. Ice is the traditional method of cooling white fish, particularly those that are gutted. Ungutted fish can be safely cooled in any of the other three mediums. If ice is the desired cooling method, then it is advantageous to the receiving station crew to have a diagram of the hatch and checkers showing the order in which they were loaded, providing such a diagram will facilitate off-loading and ensure that the oldest fish are off-loaded first.

It is an advantage to have shelving installed in the checkers to prevent fish stored on the bottom from being crushed and bruised. The advantage is that the shelving assures the receiving station of good, firm, easily worked fish. As a result, the fishermen also will receive more money for a higher quality raw product.

The basis for rejection of any raw product must be established and agreed to prior to the fishermen starting the trip. The fish cannot be old, because the flesh deteriorates, producing inferior fillets with a much shorter shelf-life. If the fish are warm, there will be substantial bacterial build-up, resulting in a shorter shelf-life and odors that may be offensive to the purchaser. If the product is contaminated in any way, it should be rejected. The physiological condition of the raw product must be considered. If the fish are in spawning and post-spawn condition, it will be difficult, if not impossible, to have an end product of good quality.

Flatfish should be stored lying straight and as level as possible to ensure ease of cutting and handling. If it is possible, they should be put into the checkers black side down to minimize the settling of blood into the white side. Ideally, flatfish also should be bled, and large flatfish bled and gutted. That may or may not be practical.

The minimum size of flatfish being delivered must be determined prior to the first trip. Small fish have low recovery potential and much higher labor costs. Fillets from small fish often are rejected on the basis of size alone.

No pughs or forks should be used, and fish must be handled gently, which is possible by using a slide for putting them down, or by lowering the fish in boxes.

When flatfish start showing signs of spawning, they must be watched closely so fishing can be stopped when the spawners become unacceptable for filleting.

The following "Receiving Quality Control Sheet" (Figure 1) illustrates how a processor might maintain quality control records on each delivery.

Figure 1: Receiving Quality Control Sheet

BOAT NAME DATE TIME TEMP O/S												
TIME TAKEN												
SPECIE												
RAW PRODUCT TEMP												
APPEARANCE												
BLED												
GUTTED												
AGE/HRS												
COOLING METHOD												
CLEANED												
STORED												
SIGNED:												

Clean-up and Sanitation

Of all the operations in a production facility, the most criticized and least praised is clean-up and sanitation. Some of the most valuable assets to any industry are: a clean plant; well-lighted candling tables and other work areas; and capable employees who know where their tasks fit into the total work picture, who realize each job must be done well, and who understand the probability of advancement in status, rate of pay and prestige. No rule or regulation can take the place of a job well done.

Since May 1969 when the Food and Drug Administration released the current "Good Manufacturing Practices" for manufacturers who process, hold, or pack human food, there has been an increased awareness of the need for better sanitation practices in fish plants and on fishing vessels.

Some semi-related incidents have stimulated public awareness of the need for a clean-up, and the consumer is demanding a higher quality product. A more serious threat has been the implication of *Salmonella*, a food poisoning bacteria, in a surprising array of food products. There is also a world-wide awareness in the fishing industry for the need for stringent quality control standards. A recent fish inspection and quality control conference sponsored by the Canadian government and the United Nations food and agriculture organizations attracted over 90 papers and was represented by more than 45 countries. At this time, it is not believed that anyone in this industry can reasonably question the need for better quality control for our fisheries products. One of the reasons fresh and frozen fishery products have not received strict attention in the past from regulatory agencies is that they have not been implicated in a disease-bearing capacity.

Why be concerned with sanitary operations? Fish are food; a fact that many plant personnel and fishermen tend to forget.

Employee Attitudes

The attitude of the employee toward plant clean-up and sanitation is one of the biggest problems facing the fish plant manager. Sometimes this poor attitude is perpetrated by plant management by turning over the clean-up job to the poorest workers, and turning it into a job of the lowest order, or by assigning an already exhausted crew to do what to them is pure drudgery. I believe a study of plant sanitation conditions would point to employee attitudes as one of the most important contributors to an unclean, unsanitary plant. The person charged with the responsibility of clean-up should be the plant foreman. The head of the clean-up crew should be paid on a level with the fish boss. The raise in the status of the clean-up crew will be reflected in a better job of cleaning. Remember, a poor attitude can negate the best sanitation technology.

The ideal procedure is to have continual cleaning throughout the production day. By doing this, clean-up at the end of the day will be easier and may be less expensive.

When cleaning up, initiate the procedure by cleaning machines and table tops from top to bottom. Final clean-up should start within minutes of the end of the production day. This will allow all loose material to be removed easily rather than drying and sticking to the contact surfaces of the machinery and tables. The water temperature used must be warm enough to allow the cleanser to do its job, but cool enough to prevent "cooking" residue onto the surfaces.

Dry cleaning should be utilized as much as possible in clean-up. This

means that floors are swept and tables are squeegeed rather than hosed, and debris is collected and deposited in appropriate containers. Good detergents must be used. If foaming agents are used, they should be of the type that adheres to a vertical surface. All rinses should be with cold water and appropriate chlorination. All contact surfaces without product in the vicinity, as well as all machinery, should be rinsed during all breaks as a matter of routine. After the clean-up procedure is completed the entire plant with all machinery and tables must be rinsed and sanitized for the lay-up period of several hours or days.

At the start of the next production day, the entire plant should be sanitized again to ensure that the product being run will not become contaminated.

The outside of the plant is as important as the inside. Most state and federal inspectors along with major buyers form first impressions from external appearance and those impressions can be lasting. Therefore, the dock area must be cleaned, hosed down, and sanitized. It should be neat; all equipment should be in its proper place with no clutter in the work area. The unloading equipment must be cleaned after every use to prevent build-up of material that might contaminate the raw product. All storage areas should be cleaned and kept neat and tidy. Both wet and dry garbage must be kept in vermin and insect-proof areas to inhibit any build-up of that type of nuisance. Processing wastes must be either discharged into receiving waters or stored in such a matter that their removal can be easily achieved. When these procedures are followed, the entire processing area, docks, and grounds should have no odor, should be clean, and should be attractive to all concerned employees, visitors, and regulatory agents.

The plant should be warm enough to keep employees comfortable, but no warmer than necessary since the product must be kept cool. Air temperature within the plant can cause a rise in temperature of both raw and finished product. Each degree rise in product temperature encourages bacterial growth in both raw and finished product.

What is meant by a clean plant? The plant is physically clean when all dirt, slime, blood, gurry, oil, and grease are removed. It may still have a large number of bacteria on working surfaces, walls, and floor. When these have been killed it is biologically clean. If a residue of detergent is left or sanitizing agent remains on working surfaces, it may get into the fish product, leaving an odor and bad taste. This, then would be chemically unclean. The plant sanitarian's tools are: water, cleansers or detergents, the scrub brush, sanitizers, and more water, in just about that order. Detergents help to remove the dirt. Sanitizers kill bacteria. The functions of the two should not be confused.

Detergents

There are several types of detergents available. The best detergent for all-around use is inexpensive, approximately neutral and is biologically degradable. Purchase it in bulk. There are a number of proprietary cleaners on the market. These run the gamut from acid to alkaline. An acid cleaner will have a pH less than 7 and most generally in the neighborhood of 3, while an alkaline detergent will have a pH of over 7, generally in the neighborhood of 10.5 to 12. Look on the package for the pH of your cleansing product. A neutral product in the pH range of 6 to 8 will be less corrosive to machinery. Some detergents are chlorinated, some have corrosion inhibitors included, and some jellies and foams are used to hold the detergents to the surface to be cleaned. They have their special uses as explained below.

Each of the basic types of detergents will handle some cleaning jobs better than others. Standard neutral detergents will hold the dirt and oil particles in suspension, permitting them to be washed away. Acids attack mineral deposits, and alkalis will attack fats and proteins. Chlorinated alkaline detergents are best for removing proteins (gurry which is built up on fish carts and tables). They are not sanitizers, as the alkalinity is too high to allow the chlorine to go into solution.

Basic cleaning agents containing sodium triphosphate or sodium metasilicate are mildly alkaline and good for removing oils and protein. They are not so alkaline as to be highly corrosive. Selection of a good cleaning action of any cleaning agent is a function of the concentration, contact time, and temperature. Water is a universal solvent and no cleaner should be used without diluting it to manufacturer's recommendations. Within reason then, the higher the concentration and temperature, the shorter the contact time needed to clean a surface. If the contact time can be long, lower the concentration; if contact time must be short, increase the concentration.

In rare cases it may be necessary to use harsher cleaning agents to remove caked-on gurry or heavy build-up of oils and protein on some surfaces. Sodium hydroxide (caustic soda) or potassium hydroxide are useful for these hard-to-clean jobs. They are very harsh cleaners of very high pH. They are very dangerous and will burn skin on contact. They are highly corrosive. They must be handled with a great deal of care, never deviating from manufacturer's recommendations. Special instruction must be given to workers handling these materials.

Sanitizing or Sterilizing Agents

The three most common sanitizing agents are chlorine, iodine, and phenols. Chlorine is used more than the other two in food processing

plants. It is the least expensive and is readily available in several forms. Iodine is more expensive and not as available, but has some advantages. Phenolic compounds such as "Lysol," or creosol should not be used in any fish processing plant, because very small quantities of phenols leave a long lasting odor and bad taste in most food-stuffs. Fish is no exception. When combined with even very small quantities of chlorine, phenolic compounds produce a very strong flavor and odor.

Chlorine Compounds

There are two basic forms of chlorine available for plant sanitation. Gaseous chlorine is available in quantities ranging from 100-pound cylinders to 30-ton tank cars. It is readily available in 150-pound cylinders, and equipment is available for feeding this directly into the plant water systems. The hypochlorite compounds are calcium hypochlorite and sodium hypochlorite. These are widely used in fish processing plants. Sodium hypochlorite is sold in liquid forms such as "Purex" or "Clorox." They are low in free chlorine, averaging about 5 percent to 6 percent. Calcium hypochlorite is available under such brand names as "HTH," "B-K," "Percloron" and others. The amount of available chlorine varies from 50 percent to 70 percent, depending on the sodium carbonate content. The higher the concentration of sodium carbonate, the lower the available chlorine.

It is very important to dilute the calcium hypochlorite to a maximum of 50 parts per million in order to obtain a low pH. This is one place where the old adage of "if a little is good a lot is better" is all wrong.

The Germicidal Effect of Chlorine

When chlorine in a water solution comes in contact with microorganisms the cells will be killed if the concentration is high enough and the contact times are sufficiently long. According to the most generally accepted theories, the germicidal action of the chlorine compound is due to the hypochlorous acid produced when the compound is added to water. The speed at which bacteria are killed is directly proportional to the concentration of hypochlorous acid.

The Advantages of Chlorine Gas

Chlorine gas is considered the best source of chlorination where large volumes of water are used. This certainly applies to most Alaskan white fish processing operations. The specific advantages are:

1. It is a pure substance and contains no other minerals.
2. It lowers the pH slightly, producing more hypochlorous acid.
3. It is easy to control and apply.
4. It is the least expensive source on the basis of pounds of available chlorine.

The main objection is the cost of the chlorination equipment. This cost, however, is balanced by the lower price of the product over a sufficient period of time.

Hypochlorites

Hypochlorites are the second choice because:

1. When they are added to processing water, the other chemicals such as calcium chloride and sodium chloride are produced which may have an adverse effect on the quality of the product.
2. The amount added is difficult to control.
3. They raise the alkalinity of the water and add to mineral deposits on equipment.
4. They are more sensitive to organic matter in the water and lose their germicidal powers faster.
5. They are more difficult to store, and they deteriorate on long standing.
6. They are more costly. Sodium hypochlorite is too expensive for general plant use because of the relatively low amount of free chlorine. It is, however, ideal for boat use, as fishermen tend to use a too-high concentration of the other types of hypochlorites. There is a general tendency in the plants to use "HTH" or "Percloron." These products are highly alkaline; in other words, they have a high pH. At a concentration of 25 parts per million calcium hypochlorite, the pH is 9.35. At 100 ppm, the solution has a pH of 9.75, and at 1,000 ppm yields a pH of 11.10. At these high levels, the amount of free chlorine produced is greatly reduced, and very little hypochlorous acid is available to attack the organisms. Figure 2 shows the relative efficiency of the three chlorine compounds.

Figure 2: Relative Killing Power of Hypochlorites and Gaseous Chlorine

Chlorine Compound	Total Free Chlorine	pH*	Time Required to Kill 99.9% of Cells
Chlorine gas	5 ppm	7.0	1 minute
Calcium hypochlorite	5 ppm	7.4	2 minutes
Sodium hypochlorite	5 ppm	7.6	2.5 minutes

*pH of untreated water was 7.2

Concentrations of 5 ppm available free chlorine should be present in processing waters. This concentration will not produce an off-flavor in fish products. For sanitizing equipment and surfaces after cleansing, the

concentration should be increased to 25 to 50 ppm with a residual of free chlorine content not under 25 ppm at the washing end of the water line. This concentration is high enough to kill exposed bacteria in a very short time. Do not use a sanitizing agent in place of detergents. Remember, exposed bacteria would be killed. If deposits of slime and gurry are left on machinery or working surfaces, the chlorine will react with the protein producing chloramines, which have a very slow germicidal activity. As a result, very little chlorine will be available to kill spoilage bacteria.

Instructions to Clean-up Crews

A word is necessary about water use. It is a good idea to conserve water. Shovel up the gurry, blood, etc., before wash down. Cleansers are more effective when used with warm water — 120° to 140° F is ideal. The one drawback to using warm water is that it will raise the temperature of the surface on which the bacteria live, increasing their growth rate astronomically. Use steam sparingly, if at all. It may be necessary in limited areas to use steam to remove fats and oils. Steam is necessary to remove the thick oil and fat deposits left by egg processing.

Rinsing and sanitizing should be done with cold water to cool the contact surface heated by the warm water wash. Thus, remaining bacteria will have less chance to grow and multiply.

Suggested Periodic Cleaning Schedule

I. Before the season starts:
- A. Require thorough cleaning of all machinery, tanks, tables, floors, walls, and ceilings to remove dirt and bacteria-bearing dust.
- B. Sanitize all working surfaces with 25 ppm chlorine solution.

II. Continuous cleaning:
- A. Tables, floors and other working surfaces should be sloped to effect continuous draining to prevent standing water which builds up bacteria populations.
- B. Rinse each cart or tub each time it is emptied.

III. Morning clean-up:
- A. Before operations start for the day, rinse all working surfaces with cold water containing approximately 5 to 10 ppm residual free chlorine, as a precaution to remove any cleanser and sanitizing agent left from the previous clean-up.

IV. Each coffee or rest break:
- A. As practical, run all fish that have come on to the line through processing steps.
- B. Remove all static material from working surfaces; in other words, bits of fish, gurry, etc.

C. To remove all slime and blood, flush and rinse all working surfaces with water containing 5 ppm residual free chlorine.
D. Shovel all waste from the floor.

V. Lunch break:

A. Clear line of all fish.
B. Remove all gurry from the working surfaces.
C. Shovel all waste from floor.
D. Drain all washing tanks.
E Rinse all working surfaces, wash tanks, tubs, carts, and floor with high-pressure hose, using 25 ppm free chlorine solution to cut slime and lower bacterial count.
F. At end of lunch break, flush all surfaces with 5 ppm free chlorine solution to clean away all excess chlorine.

VI. End of day clean-up:

Repeat items A through D above.

E. Rinse all working surfaces with cold water containing 25 ppm chlorine.
F. Remove cowlings to expose all machinery that comes in contact with the fish.
G. Scrub all working areas with cleanser and scrub brush, or a high pressure detergent dispenser.
H. Scrub all cutting boards and place in a tank containing 100 ppm chlorine solution.
I. Rinse all areas with stronger chlorine solution of 30 to 50 ppm. Allow 10 minutes contact time.
J. Scrub down floors and walls. A large floor broom with stiff bristles is effective for this.
K. Rinse all surfaces with clean water or 5 ppm chlorine solution. This low level of chlorine will prevent corrosion of metal surfaces.

VII. End of Week:

In certain areas and on equipment, fish carts and chutes, a hard dried deposit tends to build up. This is the place where jelly or foam additives in harsh detergents may be useful. This is difficult to remove by using ordinary detergents and a scrub brush. By using the techniques outlined above, this dried-on material should be held to a minimum. If the problem does arise, strong detergents mixed with a jelly or foam will help considerably. As mentioned before, the jelly or foam will hold the detergent to the surface. Remember, alkali detergents attack oil and proteins.

Procedures on use:

A. Rinse away all loose material, mix chemicals in the tank following manufacturer's recommendations.

B. Spray all hard-to-clean areas and other surfaces which have a heavy deposit of static material.

C. Let stand 30 minutes to an hour, then rinse thoroughly. Strong alkali detergents will corrode metal surfaces.

D. It may be necessary to use an acid detergent once a month or several times during a season. Acid detergents will remove the mineral deposits. Do not use acid detergents on concrete floors, as acid will pit the concrete.

Figure 3: Sanitation Check Sheet

Date _____ Time _____

Clean-up ☐ Time started _____

M/HS Total _____

Time finished _____

Start-up ☐

Floor/Deck	Clean	☐ ☐	Sanitized	☐ ☐
Walls/B head	Clean	☐ ☐	Sanitized	☐ ☐
Knives Soaking		☐ ☐	Bacteriocide	☐ ☐

Machinery

Header	Clean	☐ ☐	Sanitized	☐ ☐
Gutter	Clean	☐ ☐	Sanitized	☐ ☐
Filleter	Clean	☐ ☐	Sanitized	☐ ☐
Skinner	Clean	☐ ☐	Sanitized	☐ ☐
Butcher Tables	Clean	☐ ☐	Sanitized	☐ ☐
Candle Table	Clean	☐ ☐	Sanitized	☐ ☐
Packing Tables	Clean	☐ ☐	Sanitized	☐ ☐

Work clothing (rain gear, gloves)

Cleaned, sanitized, dry, hung up, stored.

Hand-dips/foot baths

Lighting adequate

Processing area rinsed down prior to production start-up.

Signed _____

Personal Hygiene

This is perhaps the area of the greatest contamination. Some of the basic steps which you might post on the bulletin board in your plant are:

1. All long hair shall be confined by hair nets.
2. Beards shall be confined by snoods or hair nets.
3. Wash hands before going to place on fish line. Use a bactericidal soap in the washroom.
4. Have a dip pan with a sanitized agent outside washroom door. All personnel should dip their hands in the solution after each trip to the washroom or after each break. In this case, an iodine solution is best, as it will change color on becoming inactive.
5. Have pans with iodine solution available for all workers wearing gloves. Gloves should be washed in clean water at the beginning of each break, and placed in the sanitizing solution during break. This solution will need to be changed after each break. The use of knit polypropylene gloves is recommended, as polypropylene is easy to clean and will not support bacteria growth.

It would be well for the foreman to come in and do the initial morning spraydown. This should assure a good job and give him a chance to pick up any trouble spots in the clean-up. Crews should be staggered so that one or two people clean up during the break rather than an inefficient job done by the whole crew.

The above outlined procedures will cost in equipment and labor, but can result in an overall economy of operation. Manpower is the most expensive element involved. A small crew trained to do the job will be economically more efficient than what may be your present system of everyone "pitching in" and giving a hand. You will also have a cleaner plant, improved product and better working climate for all concerned.

Fillet Quality

The standards for white fish fillets formulated by federal and state governments, industry, and foreign buyers are included as part of this manual (See Appendices A and B). They indicate what levels of quality can be marketed successfully. These standards should be studied, and equivalent or higher shelf-levels of quality strived for. The items of most importance for general quality standards should be odor, color, and texture. These three characteristics are of major importance; and the marketing of a product that reflects concern for those characteristics will result in repeat sales.

Secondary quality concerns are the size of individual fillets and the neatness of the cut. Fillet products should be uniform with no ragged

or sloppy appearing fillets allowed in a pack. In-plant guidelines should be established to guarantee that standards of color, texture, odor, drip, weight, and neatness of cuts are adhered to. These guidelines must be within the range of current market standards, but should not be so stringent that the majority of the product is rejected.

Possibly the most important standards are those required or requested by buyers. Buyers should be consulted prior to establishment of in-plant product standards.

Figure 4 is an example of a finished product quality control sheet.

Figure 4: Finished Product Examination

DATE:	BOAT:			SPECIE:					
Time Taken									
Color Normal									
Other									
Fresh									
Odor Good									
Off									
Texture Good									
Off									
Trim Good									
Sloppy									
Parasites None									
#									
Defects									
Bone									
Skin									
Spots									
Scales									
Count/10#									
Ave WT/ Fillet									
Comments									
Acceptable/No									

Defects

Major defects within frozen fillets are bones, blood spots and parasites, all of which can be removed easily.

Bones, whether pin bones or others, are dangerous defects. Every effort should be exercised to ensure they are not in product being sold as boneless.

Parasites are not dangerous, but are esthetically undesirable. Parasites that may be considered dangerous to man are eradicated by freezing the fillet or fish and holding for a period of 24 hours at 0°F.

Flavor of the cooked product cannot be controlled by the processor beyond the point of assuring that the raw product was fresh and that no contaminants were introduced during the processing.

Freshness of the finished product is controllable and must be consistent in order to develop firm markets with repeat sales. Any additives utilized during processing must be identified, and in some, if not all cases, must be listed as an additive on the product label.

Packaging

Packing is the last opportunity for a processor to see his product. It is the last opportunity for inspection of quality. All product packed in shatter pack, block packs, individually quick frozen (IQF), or packed fresh should be given more than a passing look to ensure that the product is up to standard. Packing must be neat, and in the case of blocks, efforts must be made to eliminate voids, to pack corners correctly, and to ensure that the weight of the block is correct. In shatter packs, the fillets must be laid straight, not touching, and each layer covered with a liner. Liners must be folded properly across the top of the block to ensure that dehydration is kept to an absolute minimum. Each liner should be clean and sealed properly. The master carton should be clean and sealed, and it should be coded with all necessary information (See Figure 5: Check Sheet For Packing Quality Control).

Quality control for packaging is simple though time consuming. The packaging material liners, individual boxes and masters must be inspected and their conditions noted at the time of receiving.

Package supplies must be stored in a location that will protect the material from vermin infestation. It must be kept dry so that it will not absorb moisture. It should be protected from excess heat and contaminants, and stored in a manner that will guarantee that the oldest material is used first. Such precautions are essential to ensure that supplies are clean, in good condition, and used in a timely fashion.

All packaging must meet buyers or industry standards. There must

be enough tops for bottoms, and complete boxes must match masters. Industry invariably includes criteria regarding the weight of packaging material, wax or polycoat, printing, and the information that should be on the master carton.

Finished product must be stored in an area held at the proper temperature. In the case of frozen product, 0°F or below is recommended. The actual temperature of the storage room at minimum is not as critical as avoiding fluctuating temperatures. The storage room must have adequate circulation to ensure that it is cold in all areas. The product must be kept away from walls to prevent possible warm spots developing. It should be clean and lighting must be adequate. A palletized tag system should be set up and a running inventory kept of all product in storage to assure "first in, first out."

All shipping and receiving must be controlled. Everything that comes into the plant should be checked off against purchase orders, prices and packing slips. All product being shipped should be counted as it leaves the storage room and again as it goes into the van or other shipping container. Inventories within the storage room must match the production minus anything that has been shipped or sold. As a primary producer, the principle of first in, first out, must be adhered to, with the cold storage and warehousing set up accordingly.

Figure 5: Packing Quality Control Sheet

DATE:	BOAT:			SPECIE:					
Time									
Appearance Good									
Bad									
Odor Good									
Bad									
Packing To Spec									
Off									
Liner Folded									
Box Clean									
Box Sealed									
Master Clean									
Master Sealed									
Net WT									
Fillet WT RT									
Comments:									

Figures 6 through 11 are examples of inspection form checklists used throughout the industry to monitor quality control.

Figure 6: Checklist 1 - Fresh Fish Quality Inspection

Vessel/Truck _____ Date _____ Time _____ Plant _____

Species _____ Temperature _____ Inspector _____

Score	AA (Top of catch)	A (Good)	B (Fair)	C (Poor)	Enter Score
ODOR	Fresh, strong, seaweedy shellfishy	No odor; neutral odor	Definite musty, mousy, bready malty odor Process Immediately!	Acetic, fruity sulphic faecal REJECT	
GUT CAVITY	Glossy, brilliant, difficult to tear from flesh	Slightly dull, difficult to tear from flesh	Somewhat gritty, somewhat easy to tear from flesh	Gritty, easily torn from flesh	
GILLS	Bright red mucus, translucent	Pink mucus slightly opaque	Grey, bleached, mucus opaque and thick	Brown, bleached mucus yellowish grey, clotted	
EYES	Convex, black pupil translucent cornea	Flat, slightly opaque pupil	Slightly concave, grey pupil; opaque cornea	Completely sunken grey pupil; opaque, discolored cornea	
OUTER SLIME	Transparent or water white	Milky	Yellowish grey, some clotting	Yellowish brown, grey clotted and thick	
SKIN	Bright, shining, iridescent, no bleaching	Wavy, slight dullness, slight loss of brightness	Dull, some bleaching	Dull, gritty, marked bleaching and shrinkage	

OTHER FACTORS/COMMENTS: _____

_____

_____

Figure 7: Checklist 2 - Fillet Quality Inspection Scoresheet

Product: _____ Date: _____

Plant: _____

Inspector: _____

Sample number					
Appearance					
Odor					
Flavor when cooked					
Texture					
Total Score					

Comments: _____

_____

_____

_____

_____

Score as follows:

Outstanding	10
Excellent	9
Very good	8
Good	7
Fair	6
Just acceptable	5
Rather poor	4
Poor	3
Very poor	2
Inedible	1

Figure 8: Checklist 3 - Filleting Line Inspection Form

Cutter # _____ Date: _____

or Plant: _____

Machine # _____ Inspector: _____

Sample Data:

Sample Number						
Time of Day						
Species						
Type of cut						
Number of fillets in sample						
Defects: Number of Occurrences:						
Black membrane						
Napes						
Bones						
Fin rays						
Frills						
Other objectionable matter from fish						
Foreign materials						
Total Defects						
Yields:						
In weight						
Out weight						
%Yield						

Comments: _____

_____

Action _____

_____

Average Number of Defects _____ Average Yield _____ Score _____

Quality control signature _____

Production manager signature _____

The form adapted from "Quality Control in Fish and Seafood Plants," Fisheries Council of Canada.

Figure 9: Checklist 4 - Trimming Inspection Form

Trimmer # _____ Date: _____

Plant: _____

Inspector: _____

Sample Data:

Sample Number										
Time of Day										
Species										
Defects: Number of occurrences										
Workmanship defect										
Scales										
Skin										
Black membrane										
Parasites										
Foreign matter										
Bones - minor										
Bones - major										
Fin cluster										
Blood clots/bruises										
Total Defects										
Yields:										
In weight										
Out weight										
% yield										

Comments: _____ Average number of defects: _____

_____ Average yield: _____

Action _____ Score: _____

_____

Quality control signature _____

Production manager signature _____

This form adapted from "Quality Control in Fish and Seafood Plants," Fisheries Council of Canada.

Figure 10: Checklist 5 - Product Inspection Form

Product/Pack: _____ Date: _____

Size grade: _____ Plant: _____

Lot size: _____ Inspector: _____

Packing	Packer #								
	Shape								
	Cleanliness								
	Wrapping								
	Code/Print								
	Fillet orientation								
	Weight of net contents								
	Product same as label								
	Package mats. as specns.								
	Count per wrap								
	Count per carton								
Thawed State	Odor								
	Texture								
	Color								
	Fin bones								
	Minor bones								
	Major bones								
	Parasites								
	Blood spots								
	Bruises/melanin spots								
	Black membrane								
	Scales								
	Skin spots								
	Raggedness								
	Frills								
	Viscera								
	Chalk/jelly								
	Drip loss (%)								
	Foreign material								

Comments: _____

Action _____

Quality control signature _____

Production manager signature _____

This form adapted from "Quality Control in Fish and Seafood Plants", Fisheries Council of Canada.

Figure 11: Checklist 6 - Cleaning Schedule

Morning cleanup
Before operations start for the day, rinse all working surfaces with cold water containing approximately 5 to 10 ppm residual free chlorine*. Ensure removal of all cleanser and sanitizing agent left from the previous clean-up.
Inspect plant's sanitary condition.

Continuous cleaning
Tables, floors and other working surfaces should be sloped for continuous draining to avoid standing water in which bacteria multiplies.
Rinse or rub each cart each time it is emptied.

Each coffee or rest break
As practical, complete processing of all fish that have come onto the line.
Remove all traces of fish, gurry, etc. from working surfaces.
Remove all fish slime and blood by flushing and rinsing all working surfaces with water containinng 5 ppm residual free chlorine*.
Shovel all waste from the floor.
Clean-up crews of one or two people should have staggered breaks, ensuring efficient cleaning operations and reduced overtime. This applies to all breaks.

Lunch break:
Clear the processing line of all fish and re-ice the fish.
Shovel all waste from the floor.
Drain all wash tanks
Rinse all the working surfaces, wash tanks, tubs, carts and floors with a high-pressure hose, using 25 ppm chlorine* solution to cut the slime and lower the bacteria count.
At the end of the break, flush all surfaces with 5 ppm chlorine solution to clean away any excess chlorine.

End of day clean-up
Repeat all items specified above. rinse all working surfaces with cold water containing 25 ppm chlorine*.
Remove cowlings to expose all machinery that comes in contact with the fish.
Scrub all working areas with cleanser and scrub brush, or a high pressure detergent dispenser.
Scrub all the cutting boards and put them in a tank containing 100 ppm chlorine solution.*
Re-rinse all areas with a stronger chlorine solution of 30 to 50 ppm. Allow ten minutes contact time.
Scrub down floors and walls. A large floor broom with stiff bristles is effective for this.
Rinse all surfaces with clean water of 5 ppm chlorine* solution. This low level of chlorine will help prevent corrosion of metal surfaces.

Inspector _____ Date _____

Production Manager _____

Figure 12: Checklist 7 - Sanitation Inspection

Date _____ Plant _____ Inspector _____

Area		S*	U*	Comments
Culling Room:	Tables			
	Walls			
	Floor			
Holding Room:	Receiving area			
	Walls			
	Floor			
	Stowage boxes			
	Hopper			
	Conveyor; mesh/flume			
Processing Room:	Roundfish hopper			
A. Cutting Area	Conveyor mesh			
	Cutting table frame			
	Cutting boards			
	Roundfish and fillet pan			
	Weight scales			
	Rollers, belts, flumes			
B. Candling and Trimming Area	Table frame			
	Candling board			
	Cutting board			
	Rollers, belts, flumes			
	Weight scales			
	Fillet pans			
	All offal chutes/drains			
C. Packing Table	Table frame			
	Rollers, belts, flumes			
	Weight scales			
	Fillet pans/pack trays			
	Package holding area			
	Walls and floors			
D. Machines	Filleting machines			
	Mincing machine			
	Skinning machines			
Washrooms:	Men's			
	Women's			
Freezing Department:	Freezers			
	Walls and floors			
	Freezer pan storage			
Cold storage:	Temperature			
	Ice conditions			
	Storage of Product			
Dry storage:				
Pan washing area:				
Shipping/Receiving:				
Water Supply:	Bacteria			
	Chlorine residual			
Plant grounds/wharfs:				

*S = Satisfactory U = Unsatisfactory

From "Quality Control in Fish and Seafood Plants," Fisheries Council of Canada

Figure 13: Checklist 8 - Bacteriological Results Sheet

Date: _____ Plant: _____ Inspector: _____

Equipment Tests

Time: _____

Sample No.	Standard plate count per gm.
Cutting board	
Knife tray	
Fillet tray	
Preskin table	
Postskin table belt	
Brine tank	
Packing table (fresh)	
Packing table (frozen)	
Packing table trays (frozen)	
Control sample	

Operational Tests

Time: _____

Sample No.

	Standard Plate Count		Total Coliform		Temp.
	per ml	per gm	100 ml	gm	°F
Whole fish surfaces					
Fish fillet (fish and skin)					
Knife tray brine					
Fillet trays					
Preskin table					
Postskin table					
Brine tank					
Packing table, fillet, fresh					
Packing table, fresh fillet trim, premince					
Postskin table					
Packing trays (frozen & fresh)					
Post mince machine tray					
Control sample					

II. STATE, FEDERAL AND INDUSTRY REGULATIONS

Various regulatory agencies must be contacted and accommodated during renovation or construction of a facility. There are reports to be filed and requirements that must be met.

The Alaska Department of Environmental Conservation (DEC) requires that you file for a permit to operate. Plans must be submitted, both for renovation or new construction, and approved *prior* to the start of construction. Details of the DEC requirements can be obtained from any of several local offices or the agency's main office in Anchorage.

The Alaska Department of Fish & Game (ADF&G) requires an intent to operate, fish tickets, and an annual Alaska Commercial Operator's Report. In addition, ADF&G also requires catcher/processor to have vessel licenses and possible fisheries limited entry or interim use permits.

The Alaska Department of Labor requires posting of a surety bond or waiver for fisheries. Either can be obtained, along with application instructions from the Department of Labor's main office in Juneau.

The Alaska Department of Revenue requires an Alaska business license, a fisheries business license, a fisheries tax liability bond, an affidavit for non-resident bond security if you meet that requirement and a labor bond. The information on these requirements may be obtained from the Department of Revenue in Juneau.

The Alaska Department of Commerce requires certification of any measuring or weighing devices for purchases or sales. They are also located in Juneau.

The Alaska Department of Natural Resources may or may not require that you obtain water rights if you are using anything but a municipal water system. They are also located in Juneau. In addition to meeting state regulations, federal people must be satisfied. From them you must obtain a permit to discharge effluent from the operation into receiving waters.

FDA only requires that you operate under the Good Manufacturing Practices Act, copies of which may be obtained from the Food and Drug Administration in Seattle. OSHA, or Occupational Safety and Health Act, will require that the plant be safe to work in.

For floating operations the Coast Guard, may or may not require vessel inspection, vessel documentation and registration. Industry regulations are entered into under a gentleman's agreement. Regulations imposed by trade associations may or may not be valid and it is up to the individual to adhere to those self-imposed regulations.

Forms, Permits & Licenses Required

Direct Marketer

Vessel License
Fisheries Entry or Interim Use Permit
Intent to Operate
Fish Ticket
Annual Alaska Commercial Operator's Report
Fisheries Business License
Fisheries Tax Liability Bond or Advance Payment
$50,000 Bond for Exporting Salmon in the Round
Affidavit for Non-Resident Bond Security
Labor Bond
Fisheries Surety Bond or Waiver
Certification of Measuring/Weighing Device
Water Rights
Vessel Inspection
Vessel Documentation
Alaska Registration
Permit to Operate

Buying Station

Vessel License
Intent to Operate
Fish Ticket
Annual Alaska Commercial Operator's Report

Fisheries Business License
Fisheries Tax Liability Bond or Advance Payment
$50,000 Bond for Exporting Salmon in the Round
Affidavit for Non-Resident Bond Security
Labor Bond
Fisheries Surety Bond or Waiver
Certification of Measuring/Weighing Device
Water Rights
Vessel Inspection
Vessel Documentation
Alaska Registration
Permit to Operate

Fish Expediter

Alaska Business License
Labor Bond
Certification of Measuring/Weighing Device
Permit to Operate

Small Cooperative

Vessel License
Fisheries Entry or Interim Use Permit
Intent to Operate
Fish Ticket
Annual Alaska Commercial Operator's Report
Fisheries Business License
Fisheries Tax Liability Bond or Advance Payment
$50,000 Bond for Exporting Salmon in the Round
Affidavit for Non-Resident Bond Security
Labor Bond
Fisheries Surety Bond or Waiver
Certification of Measuring/Weighing Device
Water Rights
Vessel Inspection
Vessel Documentation
Alaska Registration
Permit to Operate

Small Scale Processors

Vessel License
Fisheries Entry or Interim Use Permit
Intent to Operate
Fish Ticket
Annual Alaska Commercial Operator's Report
Fisheries Business License
Fisheries Tax Liability Bond or Advance Payment
$50,000 Bond for Exporting Salmon in the Round

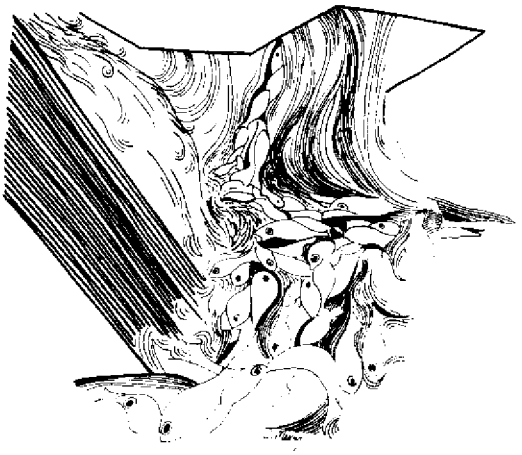
Affidavit for Non-Resident Bond Security
Labor Bond
Fisheries Surety Bond or Waiver
Certification of Measuring/Weighing Device
Water Rights
Vessel Inspection
Vessel Documentation
Alaska Registration
NPDES Permit
Registration for Canners
Permit to Operate

Nested Operation

Vessel License
Fisheries Entry or Interim Use Permit
Intent to Operate
Fish Ticket
Annual Alaska Commerical Operator's Report
Fisheries Business License
Fisheries Tax Liability Bond or Advance Payment
Affidavit for Non-Resident Bond Security
Labor Bond
Fisheries Surety Bond or Waiver
Certification of Measuring/Weighing Device
Water Rights
Vessel Inspection
Vessel Documentation
Alaska Registration

Street Vendor

Vessel License
Fisheries Entry or Interim Use Permit
Intent to Operate
Fish Ticket
Annual Alaska Commercial Operator's Report
Fisheries Business License
Fisheries Tax Liability Bond or Advance Payment
Labor Bond
Fisheries Surety Bond or Waiver
Certification of Measuring/Weighing Device
Water Rights
Vessel Inspection
Vessel Documentation
Alaska Registration
Permit to Operate



III. SURVEY OF RAW MATERIAL

Type of White Fish

True Cod

The first criteria for production is to determine a season for processing. It is imperative that fish delivered to the plant be prime quality, as only prime fish can produce prime fillets. The cod spawning season (See Figure 12) should be noted carefully and allowances made to curtail production sharply at that time. Spawning fish produce poor fillets.

The distance from fishing grounds to plant is of extreme importance. Maximum fishing time on the grounds must be allowed for the benefit of the fishermen and for your production, yet you must also assure that only prime fish will be delivered. Ideally, for small boat operations, the distance to the grounds should allow day fishing. Those fish delivered daily should be of prime quality whether they are drag, pot or longline fish, assuming that they are cared for properly aboard ship.

Pollock

A processing season should be established, with production geared to that period. Spawning time is of critical importance due to the opportunity to reduce the overall cost of fillet production by taking roe for the oriental market. Because pollock is softer and more delicate than cod, handling of pollock aboard the vessel should be more gentle. Fishing grounds should be close to the plant to assure short trips and delivery of prime fish.

Flatfish (Excluding halibut)

Seasons for flatfish must be checked more closely than those for round

fish. Domestic fresh markets for flatfish out of Alaska will be from September through April to avoid the competition existing on the coasts of Washington, Oregon and California during the summer months when production is heavy. Spawning periods generally are in February and March, though spawning conditions have been observed in the Kodiak area over a longer period. Oriental markets exist for flatfish with roe, and plans should be made to process roe fish for those markets.

Methods of Catch

Methods of commercial fishing white fish include longline, trawl, pots, jigging and bottom gillnets. Each of these methods has strong and weak points.

Trawl

The ability to catch large quantities of product in relatively short periods of time is both an advantage and disadvantage. Trawl-caught fish can be, depending on the length of the tow, in as good condition as any. Conversely, obtaining large quantities of product in a brief period frequently prohibits the fishermen from caring for the fish properly. In order to deliver a top-grade raw product, fishermen must time tows so that excessive bruising and crushing does not occur, and must make tows small enough to handle promptly and properly. Also of major importance is the distance from the fishing grounds to the receiving station.

White Fish Spawning Seasons

Based on the best information currently available, the spawning seasons for ocean white fish species are as follows:

Sablefish	February - Early March
Pacific Cod	March - Early April
Pollock	March
Flathead Sole	February - March
Rock Sole	February - March
Starry Flounder	Late March - April - Early May
Yellowfin Sole	June - July

These periods are approximate, and vary among stocks and areas.

Longline

Longlining has been used on white fish — excluding pollock, flounder and sole — for many years. It is the "traditional" method of catching white fish. The quality of longlined white fish can be either very good or very bad depending upon weather conditions and care in onboard handling. Bad weather can prohibit timely hauling of gear. Fish which die on the hook produce an inferior product. Longlining usually produces

landings of high quality fish, however; and features the added bonus of being able to operate year-round. With proper onboard bleeding and gutting, a prime product is received by the purchaser. As in other fisheries, timely delivery and proper handling at the receiving station is essential.

Pots

Pot fishing is not extensively used in the white fish fishery, although it does have potential. The advantages of live fish being brought to the surface, discharged on the deck of the fishing vessel and immediately processed by the fishermen are readily apparent. Proper bleeding, gutting and cooling guarantees a good product for the processor. Limited effort in this type of fishery for anything but black cod has not provided sufficient information on how spawning and schooling affect catches.

Jigging

Jigging is a method that may or may not be commercially feasible in all parts of Alaska. The quality of the fish should be excellent except during spawning. It appears that this method would be suitable and cost effective for a small boat operation.

Bottom gillnets

Bottom gillnets are used infrequently, but have an advantage over other methods of white fish fishing in that it is size selective. The gillnetters have the same disadvantages that affect longliners in that gear may be difficult to retrieve during foul weather. In such cases, poor fish may be delivered to the receiving station.

Preferred method of catch

The preferred method of catch is whichever method works best on the basis of sound economic analysis. The volume of the species caught must be considered along with the quality of raw product delivered to dockside. These fish should be healthy, relatively free of parasites, and free of ulcers or other physical defects normally found in some fresh fish.

Sources of Help and Information

The following pages list state and federal agencies which can assist in gathering information necessary for a successful operation. In some cases these agencies may not be active in regulating the industry. The most important people to contact are those who have local knowledge of the area in which the proposed processing operation is to be located. Fishermen obviously are a great source of information, especially fishermen's associations. Processors, if any, in the area may or may not be receptive to talking to potential competition, although many processors have formed organizations that may be of great value and have access to pertinent information.

Alaska Department of Fish and Game
Permit Supervisor
Commercial Fisheries Entry Commission
Pouch KB
Juneau, Ak 99811
Phone: 586-3456
for: Vessel License
Interim Use or Permanent Entry Permit

Alaska Department of Fish and Game
Division of Commercial Fisheries
Computer Service Section
P.O. Box 3-2000
Juneau, AK 99802
Phone: 465-4150
for: Intent to Operate
Fish Tickets
Alaska Commercial Operators Annual Report

Alaska Department of Revenue
Division of Public Service
Pouch SA
Juneau, AK 99811
Phone: 465-2306

Alaska Department of Labor
Divsion of Labor Standards and Safety
P.O. Box 630
Juneau, AK 99802
Phone: 465-4839

Alaska Department of Commerce and Economic Development
Division of Measurement Standards
P.O. Box 11-1686
Anchorage, AK 99511
Phone: 345-7750, or
Pouch D,
Juneau, AK 99811,
Phone: 789-9763

Alaska Department of Natural Resources
Division of Land and Water Managment
230 S. Franklin Room 407
Juneau, AK 99801
Phone: 465-3400

United States Coast Guard
701 C Street, Box 17
Anchorage, AK 99513
Phone: 271-5137 or
612 Willoughby Avenue
Juneau, AK 99802
Phone: 586-7280 or 586-7288 (inspectors) or
c/o USCG Base Ketchikan
Ketchikan, AK 99901
Phone: 225-4496

U.S. Environmental Protection Agency

701 C Street, Box 19
Anchorage, AK 99513
Phone: 271-5083 or
3200 Hospital Drive
Juneau, AK 99801
Phone: 586-7619

Alaska Department of Environmental Conservation

Anchorage
Seafood and Animal Industries
333 W. 4th Avenue, Post office Mall
P.O. Box 10-4240
Anchorage, AK 99510-4240
Phone: 272-1561 or

Dillingham
Seafood and Animal Industries
Sifsof Building
Pouch A
Dillingham, AK 99576
Phone: 842-2307 or

Dutch Harbor
Seafood and Animal Industries
Unisea Mall
P.O. Box 462
Dutch Harbor, AK 99692
Phone: 581-1681 or

Juneau
Southeast Regional Office
9000 Old Glacier Highway
P.O. Box 2420
Juneau, AK 99803
Phone: 789-3151 or

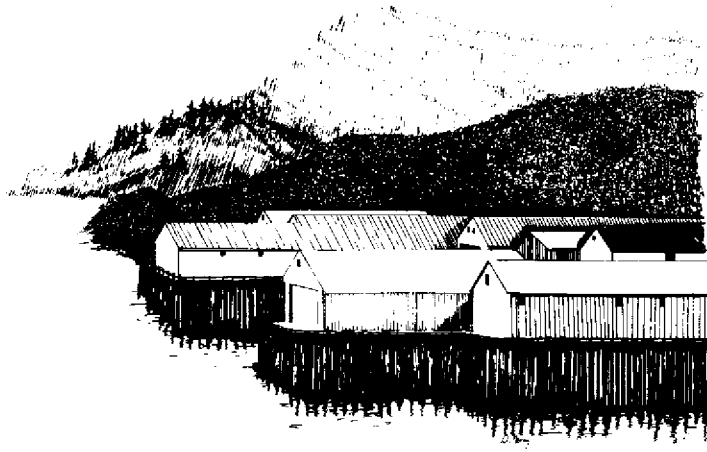
Ketchikan
District Office, Room 203
State Office Building
415 Main Street
Ketchikan, AK 99901
Phone: 225-6200 or

Kodiak
Seafood and Animal Industries
Griffin Memorial Building
P.O. Box 515
Kodiak, AK 99615
Phone: 486-3350 or

Soldotna
Seafood and Animal Industries
Blazy Mall
P.O. Box 1207
Soldotna, AK 99669
Phone: 262-5210

Locating Markets

The Alaska Seafood Marketing Institute (ASMI) is capable of and willing to point a processor in the right direction for white fish markets. In addition to ASMI, the Alaska Fisheries Development Foundation (AFDF) also has lists available of existing and potential markets for Alaska white fish products. Trade publications are a good source of locating markets for the type of product being contemplated. The other source or sources are personal relationships with brokers and seafood companies and brokerage houses.



IV. SURVEY OF SITES

Power

Commercial: If the proposed facility is within a municipality, municipally supplied power will be used. In the highly competitive white fish business, however, the cost (worked back to a cost per pound) must be included in the proposed cost figure of the product. The question of demand charges must be addressed, and if they are too high, then other means of supplying power must be considered. The reliability of the power system also must be checked out to assure that there is, with rare exceptions, constant power available.

Cost figures for any backup power system also should be entered into the equation. The capacity of any exisiting municipal system must also be determined as in some cases the power required for a white fish operation is very high.

Self-Produced: An alternate to municipal power is self-produced power. This self-produced power must be worked into the equation: the cost and prorated cost of the unit supplying the power, what fuel costs are per kilowatt produced, and whether or not self-produced power is legal within the area being considered for the plant. Reliability of the proposed generator should be determined as well as the reliability of warranty and service contracts. Often self-produced power is used only as backup for municipal power.

Water

Again, if the proposed plant is located in a municipality then it will use municipal water. Quality of the water must be checked, not only by the municipality but the user as well. White fish processing is water intensive, and plants cannot afford to have anything less than bacterially clean water available. There also must be sufficient capacity in the existing system to supply the anticipated year-round needs of the processing facility. If it is necessary for supplemental private wells to be developed, they must be approved by the state and tested by both the processor and the state. Without those requirements being met, the product could be contaminated. If salt water is needed anywhere in the production facility, including dock washdown, then it must meet pure water standards, must be tested and approved by the state, and tested by the individual processor. The legality of utilizing salt water must be cleared prior to any use.

Routine tests of fresh water should be made not only for bacteria, but also for minerals which could cause boiler and flow problems throughout the plant, resulting in product contamination and product condemnation.

All fresh water entering the plant for production or processing purposes, including dock washdown, must be treated in some manner. Chlorine is the common agent utilized in water for purification. There are two common methods of chlorination: gas, and hypochlorides, which are dry products mixed and then added slowly to the incoming water. Flourides may be added, and the utilization of ozone as a bactericidal agent may also be employed.

The quantity of water available on an hourly and daily basis must be sufficient for processing needs. The cost of the water will be a major factor in production costs, and as such it must be determined prior to utilizing any particular system. If the plant is to be newly constructed, then its proximity to existing water lines must be assessed and the cost of new lines entered into the overall anticipated production costs.

Transportation

The type of transportation utilized by the existing or proposed plant depends upon the plant location. In most cases, ocean transportation is the most inexpensive, and quite possibly the most efficient, for a frozen fisheries operation. There are three basic methods of shipping by ocean. The most common is the van ship operation, featuring vans with a 40,000-pound capacity each. The second option is barges, which also utilize vans or built-in cold storages. The third method, most utilized for shipments to foreign nations, are trampers which store and haul up

to 5,000 to 10,000 tons. Such large shipments are obviously not yet practical in the frozen fish business.

Land transportation is used only by plants located on a major road system connecting to a city or port where the facility is located. Both commercial and privately owned vans and trucks are used. Commercial trucking is utilized by many plants but privately-owned trucks also can be contracted. Costs must be anticipated and planned so that the ultimate cost applied to the finished product is the most desirable one.

Air freight is used only for fresh shipments destined for fresh markets, principally on the West Coast, in Seattle, Portland, San Francisco and Los Angeles. Recently, air freight shipments of fresh product have been made to New York and Florida. Regarding air freight, the critical point to consider is adequate and reliable service. "Adequate" obviously means the frequency with which you need to ship and "reliable" means whether or not the airline meets schedules so that shipments can be made. Containerized air freight also should be considered to reduce handling and improve overall product quality at its destination. Full cargo should also be considered but the poundage required is usually more than one market can handle on a fresh basis.

Work Force

Staffing a plant requires many decisions critical to the success of the proposed operation. There must be an adequate number of employees available to fully staff the plant on the working floor, and they all must have some knowledge of fishery products in handling raw fish. The Alaska State Job Centers should be of help in determining if people are available for these jobs. Employee housing is also a major decision, in that if there is not sufficient private housing or the majority of the employees are transient, then the company is obligated to provide housing — usually in the form of a bunk house — to ensure the adequate number of personnel. A decision also must be made regarding whether company-owned housing should be co-ed. If company housing is provided, rules must be established, and a decision made whether or not there should be a kitchen, kitchen privileges, or a full galley with a dining room. These options are expensive, although some of the costs can be returned by setting fees for facility use.

Family housing should also be provided for long-term employees. For such employees, provisions often must also be made for children with additional bedrooms and quarters convenient to the proposed plant.

It is sometimes difficult to get top-notch management personnel, or skilled maintenance or clerical help, to locate onsite. Since such positions are of utmost importance to a successful operation, however, they

must be enticed. In the long run, any effort put into recruiting top employees usually pays off. In some existing Alaska plants, turnover is as high as 600 per cent per year, and training replacement employees is expensive. Development of a good employee incentive plan will help prevent the high turnover and constant influx of untrained employees which results in lower quality, poor handling, and generally disruptive production schedules.

Communication

A good communication system is a must for any facility. If there is potential for a fresh operation, then a good phone system must be available to ensure that the brokers can call in and calls can be made out in order to sell finished product. If the phone system is not reliable, then by no means should a fresh operation even be considered.

Radios are an absolute necessity for any white fish operation in that you must be in contact with vessels that are fishing for you to keep track of daily catches, species caught and days fished. Care should be taken to prevent the radio in use from being located in a dead spot from which communication is difficult.

If possible, a telex system should be considered. Telex provides a permanent record of messages sent and received.

Computers should be considered also, if not for the existing facility then at least for any future plans that would be made regarding the plant. (See Chapter VII.)

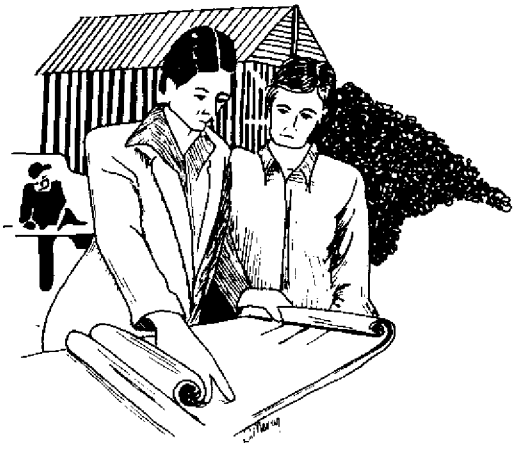
Management Personnel

If it is required to bring in management personnel, then several factors should be considered prior to the offer or acceptance of positions. An honest picture of the living environment should be explained in detail. If possible, prospective management personnel should be allowed to spend several days on site before being asked for a commitment so that they will have a good idea what to expect. Without question, if a married individual is happy and his family is happy, then performance will be much more satisfactory than in a situation featuring family unhappiness. To be able to conduct employee orientation, the plant supervisor should be familiar with the details of the local school situation, transportation facilities between plant and home, schools, churches and stores for the family, and with any community activities for family members.

Sales

Sales from the plant to local buyers should be discouraged unless the product is in a retail facility or is sold in the unit normally packed by the processing facility. Several issues must be addressed by manage-

ment in regard to sales: where the headquarters of the sales department should be; whether it should be at the plant site or on the West Coast, Seattle, San Francisco or Los Angeles, or in the middle of the United States in Chicago, St. Louis, or some other location in the Midwest. The decision also should be made as to whether this should be a full-time or part-time position. It should be decided whether this would be a commission-type operation, salary or a combination of both so as to ensure adequate financial remuneration for work expended. If the decision is made to deal with brokers, then the broker must be thoroughly checked out. His record must come under close scrutiny, and there should be a working relationship developed between the plant and broker. If expeditors are to be utilized in the shipping of finished product to any particular location, they should also be checked out very carefully.



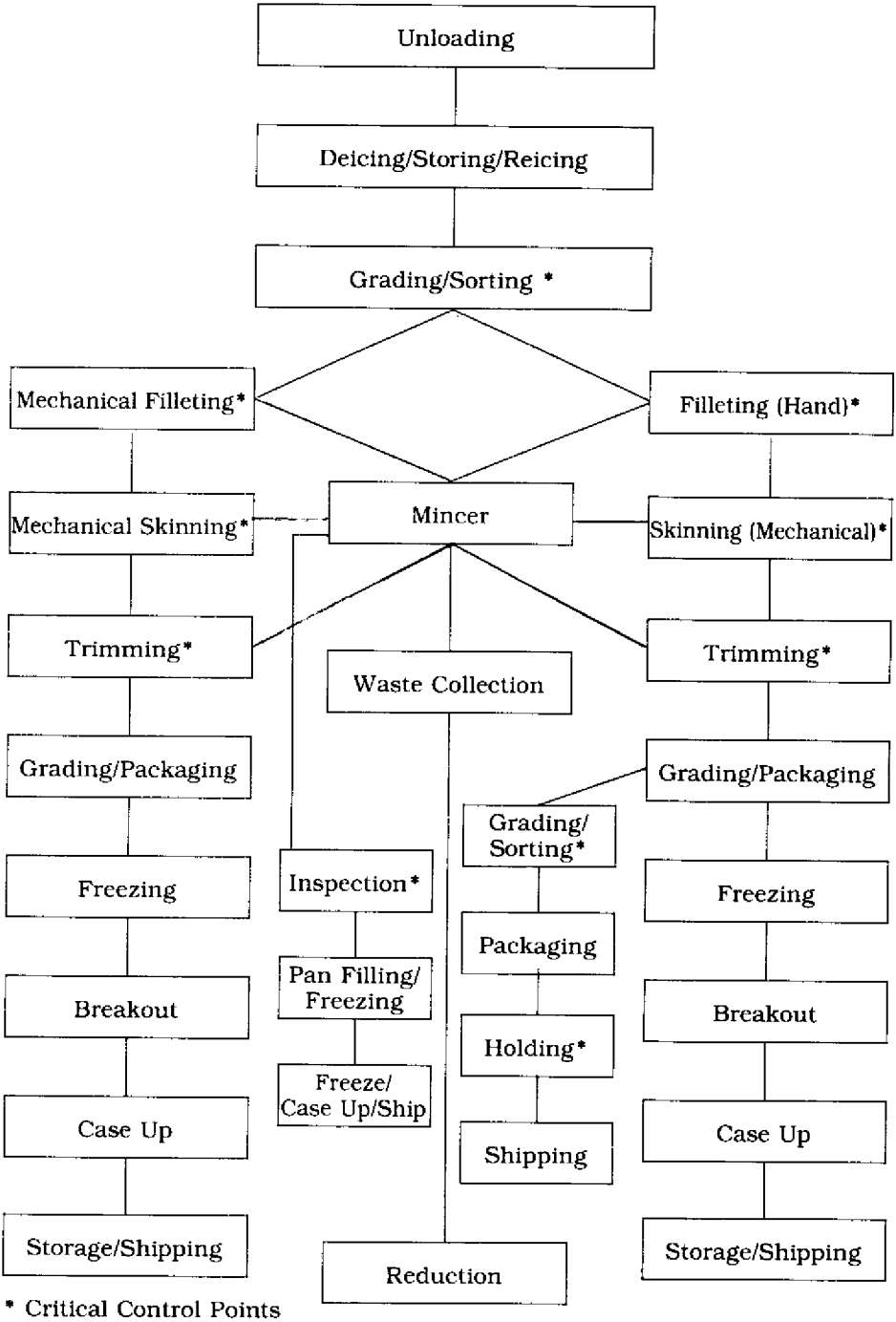
V. Plant Layout and Design

If you employ architects and/or engineers to assist in the renovation of an existing plant or construction of a new plant, they must be familiar with a) the area; b) the requirements of the various regulatory agencies; c) Alaska and Alaska's unique problems; and above all, d) seafood processing plants.

Construction material should be either stainless steel/aluminum/plastic or concrete or any combination of these. Insulation and natural lighting sources should be a prerequisite. Depending on the construction site you must decide whether to have a single or two-story plant. Planned dry storage should be increased at least 20 percent over what you think is needed. The facility should be built around a straight-line operation. Without the straight-line operation, problems in efficiency and increased labor costs will develop. It is essential to limit any unnecessary handling of the raw product to assure economic production of high quality products.

The following figures (14, 15, and 16) illustrate the straight-line concept for Cod-Pollock, Surimi and Flatfish lines.

Figure 14: Cod/Pollock Fillet Line



* Critical Control Points

Figure 15: Surimi, Frozen Fillets and Fresh Cod/Pollock Production Lines

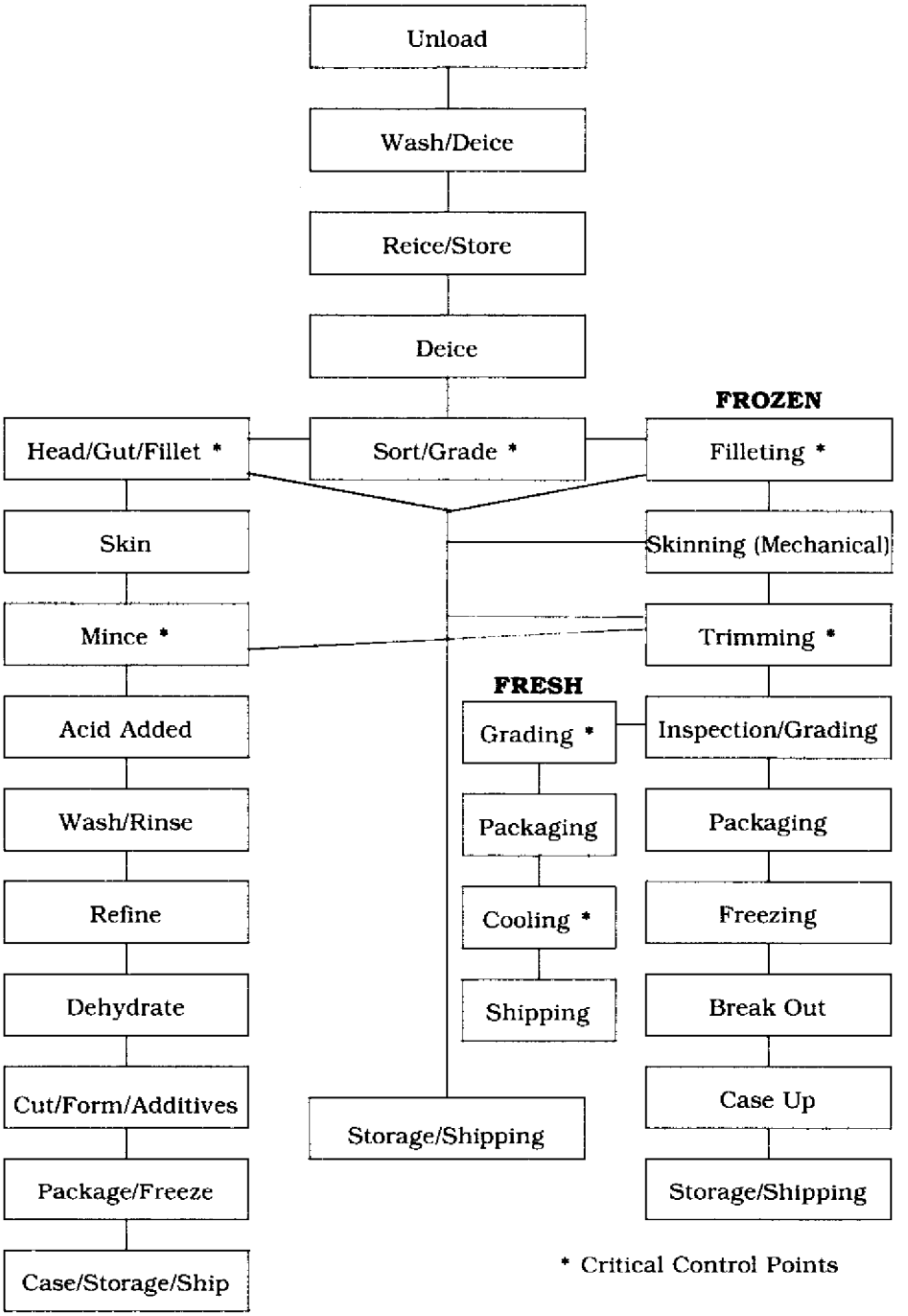
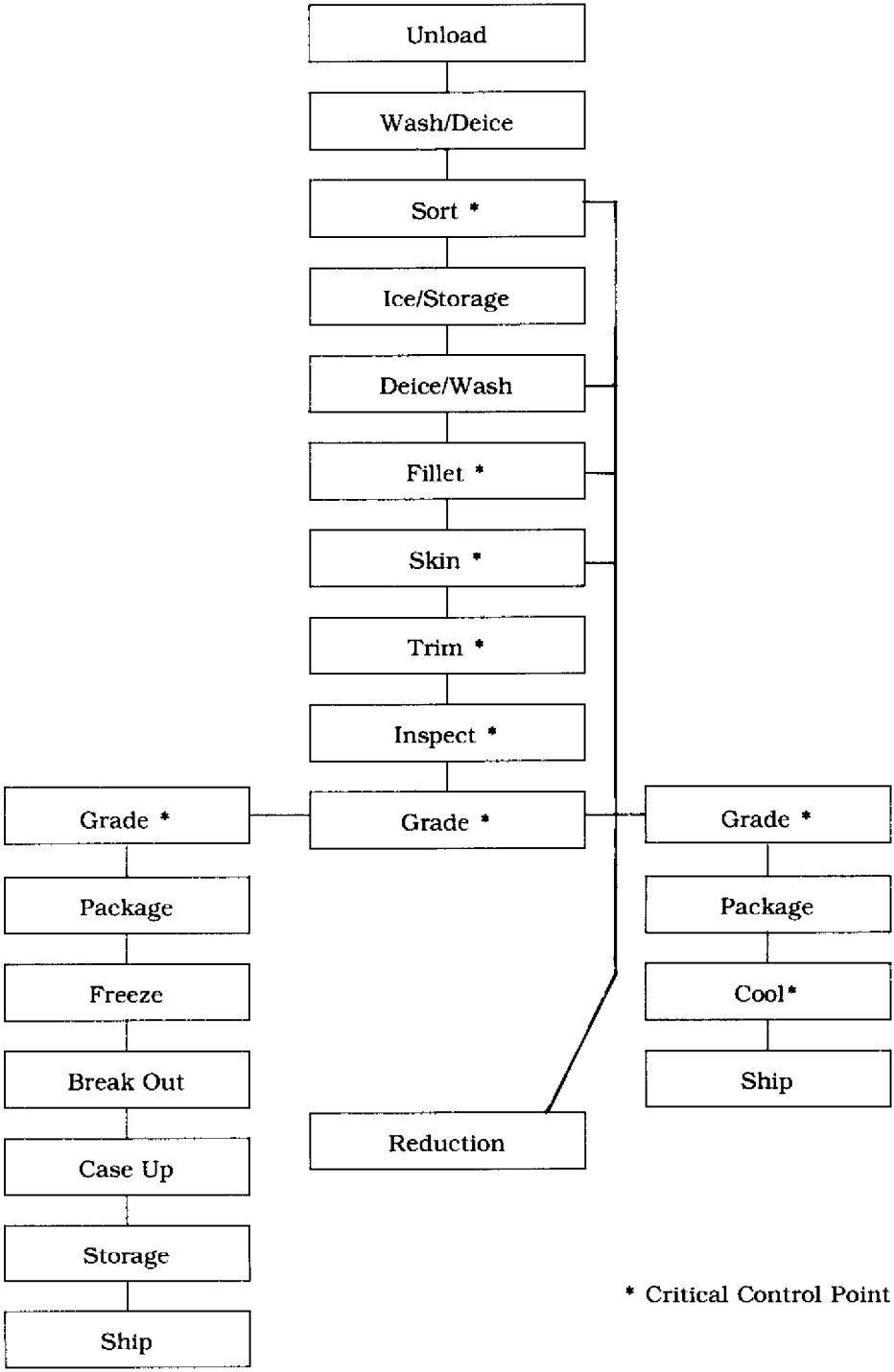
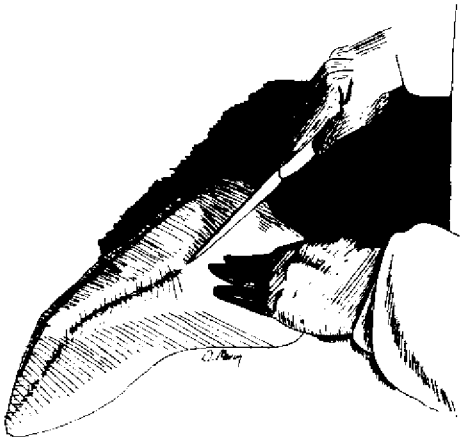


Figure 16: Flatfish Hand Fillet Line





VI. MECHANICAL OR HAND CUTTING OR COMBINATION

The cutting operation is dependent on the type of fish being considered. At this time the ideal flatfish production method is hand cutting. The larger flatfish such as starry flounder and Alaska plaice certainly require hand cutting, as most machines will not handle fish of this size. The smaller sole and flounder can be cut mechanically if they are of equal size. Varying size of smaller flatfish will create grading problems with existing flatfish machines. The sole must be graded closely to achieve maximum recovery in a mechanical operation. If grading is not carried out, the advantages in mechanical filleting is lost to decreased recovery and poor quality fillets. The advantages of hand cutting are high yield, low initial expense, easy clean-up and good quality. The hand cutting operation is inexpensive from a labor standpoint if it is based on incentive programs. Costs per pound of finished product will be a known factor from the first day of operation. The advantage of the mechanical cutting is the potential to handle large volumes of fish in short periods.

Available Skilled Labor

Nowhere in Alaska are sufficient premium hand filleters available to fully staff a proposed or existing white fish facility. Local people are capable of becoming premium hand filleters, but they need training. The training will have to be provided by either premium filleters or individuals capable of teaching filleting. Premium filleters are available from various towns and cities on the coasts of Washington, Oregon and

Northern California. These people could be hired and transported, fed and housed for the period necessary to develop the skills of local filleters. Imported workers also could be convinced to become permanent residents of Alaska.

If filleting machines are to be utilized, it is unlikely that a local talent will be available to maintain and adjust them. People capable of caring for filleting equipment are hard to find, but are an extremely important part of a mechancial operation. A skilled technician can maintain recovery rates at the highest possible point, turn out fillets that are of highest quality, and minimize down time for repair and maintenance. If it is necessary to import such individuals, then the cost of housing, transportation, and fringe benefits must be addressed prior to hiring.

VII. INCENTIVE PROGRAMS

The successful operation of a white fish plant depends upon the labor costs involved with producing the finished product. A good incentive program should be strongly considered. On catcher-processors, the incentive is already in place in the share system that is common on seagoing vessels today. On a shore facility, the incentive should be a minimum wage plus an incentive to up production. This can be based on personal production or daily or monthly production for the whole plant. Another possibility is piece work, with employees being paid on a poundage basis with these important considerations: the quality must be acceptable, the recovery must be consistent, and the defect level must be low. (Returns and rejects must be worked by the responsible individual without compensation.) The piece work plan is working successfully elsewhere and should be easy to incorporate in Alaska. The advantages of piece work or hourly plus incentive is that management knows its labor costs and can make projections and sales based on those numbers. The employees make more money and it costs the employer no more. Disadvantages of hourly plus incentive or piece work include difficulty in setting up a system that is fair to all concerned, additional work time from supervisory and office personnel and — most importantly — potential numerous employee complaints regarding who did what to whom and how much work actually was accomplished.

Prerequisites for Incentive or Piece Work Filleting

1. For each species, the maximum or optimum yield of both gutted and round fish should be determined. This will vary seasonally,

depending upon the presence or absence of roe, full or empty digestive tracts, and often, the post-spawning condition of the fish. It also can vary dramatically with the size of the fish. Pollock, for example, give much poorer yields if the fish are less than about 14.5 inches.

2. Are the fish gutted or not? The factor not only affects yield, but the condition of the fillet, especially the bellies. Bled fish will give slightly higher yield because there will be less bruising. If catch rates are high enough that several hours are required to gut all the fish from one tow, it is a good idea to work quickly through the haul and make bleeding cuts, then go back and gut the fish. This is especially true for gray cod. Whether or not the fish are gutted at sea can be a factor in both filleting production rate and incidence of ragged fillets. There is a potential problem with fillet contamination from round fish. If the gut cavity is cut into, sour gut contents can leak on the fillets. These fillets do not rinse well, leaving a faint "off" odor which can become more apparent with extended fillet holding.

3. In the course of researching incentive programs used in other areas, you probably will find some representative production rates for a variety of species. There can be a catch in those statistics, particularly for the West Coast. In most of the West Coast plants, the processing lines do not include a separate trimming table unless skinning machines are used. If the cutters skin the fillets by hand, it is traditional for them to do their own trimming as well (especially for flatfish). Production quotes for the Alaska Fishermen's Union are based on the filleters doing their own trimming. This will dramatically cut production of individual filleters. As a rule of thumb, double production figures for individual filleters when skinning machine is used. In fact, if the filleters are trimming after skinning, their individual production rates can be more than doubled by adding a skinning machine and a trim table.

4. The size of individual fish can dramatically affect production rates. Obviously, it takes the same number of cuts to fillet small fish as large fish, so more pounds of larger fillets can be produced hourly from larger fish. This is not an open-ended rule, however. With very large fish, production rates can be slowed because it takes longer to make the cuts, more strength is needed, and usually, the knives that people are accustomed to using will be too small.

5. Batch weighing, record keeping, and monitoring are basic processes of most incentive systems and managing filleting lines. In order for incentive systems to work, you have to be able to determine how much is being produced by an individual worker. You also need to

be able to look at a basket of fillets and tell who cut them.

If you are paying strictly on a poundage basis, all you need to know is the finished weight of fillets from an individual filleter. In this case you will need to weigh fillets coming off the fillet table and — by some form of identifying tag — know which filleter they came from. These weights will be recorded for tallies and payment.

Batch weighing is necessary if you want to keep track of individual recovery as well as production rates. A simple version involves weighing standard lots into baskets (e.g. 70 pounds) which are presented to the filleters. If a random weight is recorded into each basket, considerable cross-checking and extra record keeping is necessary in order to spot-check individual production rates. If, however, you know that 70 pounds are in each basket of fish, it is easy to get at individual recovery and production rates on the line, rather than having to track down the weight of an individual basket of fish when looking at the basket of fillets produced by an individual filleter. A similar system can also be set up for monitoring individual recovery and production rates on the trim table.

Record keeping is more involved with incentive systems than with other management systems for processing lines. You will need standard forms placed at each scale along the processing line. You also will need sufficient identifying tags for each processing worker. (Food grade plastic chips with food grade waterproof ink work well.) As a worker completes a basket of fillets, he places one of his chips in the basket so that the production can be credited to him when the fillets are weighed.

The real value of record keeping can be seen after the system has been in place for some time. You can spot seasonal variations in recovery, in trimming costs, and in fillet production. This information will be invaluable in helping you decide when and where to catch what species of fish. You also can monitor individual workers and spot fluctuations in individual production. If, for example, everyone on the line starts producing less or at a lower recovery rate, you know something is wrong and can look for causes. If a single person falls off in production, you can work with that person to see what the problem is. On the positive side, you can note improvements and provide some sort of recognition for that person.

Monitoring systems cannot be taken for granted. In the example of the base system used on large industrial operations such as the West German catcher/processor Friedrich Busse, workers tend to monitor each other. On smaller operations, you have to be in a position to take care of other problems in addition to changes in recovery or production. For example, some workers will get sloppy in their

filleting or trimming in an effort to increase their overall production. If you are monitoring the line and spot-checking individual workers, you can spot such a development quickly.

The easiest and most direct means to deal with chronic miscuts is to have the individual responsible clean up the fillets. If that worker has to stop cutting and clean his own miscuts, he will be sure to correct the problem rather than lose production time.

Incentive Programs

Quota systems

The Alaska Fishermen's Union (AFU) and several other employee groups rely on this form, but AFU has indicated a willingness to negotiate other systems as well. In essence, the quota system is based upon the possible production of the best of "premium" filleters. Such production rates are determined by species, and sometimes by size of fish. Wages are paid at an hourly rate, based upon what percentage of "premium" rates an individual filleter can produce.

Quota systems have some base or minimum production rate (usually 40 or 50 per cent of a "premium") that a filleter must achieve before acceptance as a full-time filleter. This base rate is such that a filleter is getting minimum wage for the plant at that production rate. Potential filleters are put through a training process including closely monitored learning periods. The training period is ended when the person achieves minimum production rates, or when some time period (negotiated) has lapsed and the cutter has still not achieved minimum rates.

The disadvantage of the system is that it has potential recovery problems. In all instances, recovery is the responsibility of the plant, and increased recovery is achieved only with considerable histrionics on the part of the foremen and plant supervisors. (Most cutters regard attempts to increase recovery as interference with their individual production rates, and in fact, will tend to "sandbag" a bit to prove their point when you start pressing them for more recovery).

Base systems

On large scale mechanized operations, this system works well. The Friedrich Busse used this system to great advantage.

At its heart, the base system revolves around overall production of the line. The workers are paid a base monthly salary plus a bonus for each ton of finished product produced by the whole operation. Monthly wage and bonus vary from a minimum for entry level personnel upwards to some maximum for the captain, with increases predicated upon time in service and promotions.

The system worked very well for the Friedrich Busse because all the workers monitored each other and tended to isolate and drive off other nonproductive workers. On the minus side, this system probably will not work well for seasonal operations, especially if production rates are so low that tonnage bonuses do not amount to much of an increase for individual workers.

Recovery base

This is the favored system because it results in optimum recovery rates from filleting lines, yet it rewards individual workers who strive for high production rates.

In a nutshell, filleters are paid on poundage, but their payment per pound is based on recovery. As with the quota system, entry levels are defined, training and monitoring are a prerequisite for individual workers. During the learning period they are paid minimum wage, and if at the end of a fixed learning period they still cannot achieve entry level, they are moved to some other job in the plant.

Workers who do not achieve high rates of recovery receive less per pound of fillets produced. Those who achieve higher rates of recovery are paid more per pound of fillets that they produce. There is flexibility in the system to allow each worker to make his or her own compromises on recovery versus production rates. One worker, for example, might be producing 80 pounds per hour at 45 per cent, while another elects to strive for higher production and settles for 37 per cent at 120 pounds per hour.

When carefully conceived and implemented, this system provides a fair trade-off between raw product costs and labor costs. The payment schedule I provided you rewards or punishes for each 5 per cent increase or decrease in recovery, respectively. Each 5 per cent increment is valued at one cent labor cost. This is balanced against the following changes in raw product costs for $.25 per pound fish:

Recovery Change	Raw Product Cost	Net
25%	$1.00	0
30	.83	$.17
35	.71	.12
40	.62	.09
45	.55	.07

As the table illustrates, for each $.01 increase in labor cost, the savings in raw product costs are substantial. If, for example, you paid $.04 labor for 23 per cent recovery and $.08 for 45 per cent recovery, the additional $.04 in labor cost for 45 per cent recovery is balanced against a $.45 per pound decrease in raw product costs, for a net savings of $.41 per pound.

Listed below are poundage ranges for finished fillets that a good filleter could do per hour, leaving skin on (use of skinning machine urged).

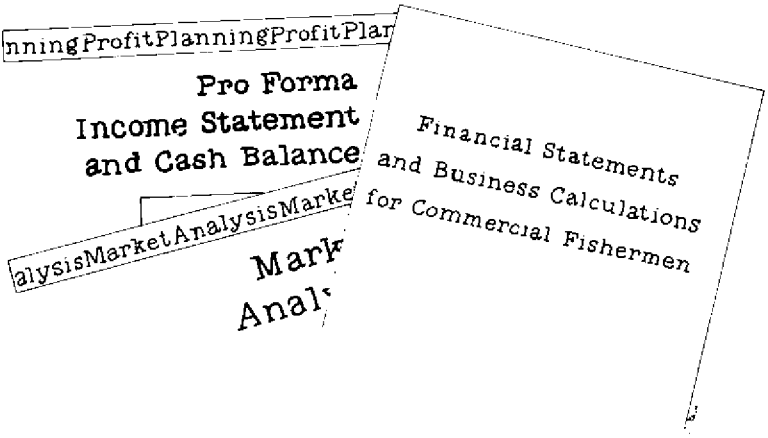
English Sole* (12½ inch)	38-44
Sand Sole (13 inch)	75-85
Flounder	85-92
Dover Sole (13 inch)	67-75
Ling Cod	200-250
True Cod	190-230
Rockfish	150-165
Turbot	90-100

Recovery ranges for the above fish are:

Rock Sole	25-29
English Sole	25-28
Sand Sole	25-30
Flounder	21-24
Dover Sole	26-28
Ling Cod	28-30
True Cod	27-29
Rockfish	27-30

*Comparable to flathead

Size of the whole fish will greatly influence the pounds cut per hour.



VIII. FINANCIAL CONSIDERATIONS

Financial considerations are most important to white fish operations. Without proper long-term financing, it is unlikely that the business will survive. The largest cause of business failures is underfinancing. If management is constantly concerned with cash flow and fending off bill collectors, it is impossible for proper attention to be given to the operational concerns of processing white fish. In most cases, quality control and quality of the product are the first to go in efforts to rush product out the back door and money in the front.

Renovation and construction costs, as well as the cost of installing the processing line, must be calculated in advance. It may be less expensive to build a new facility designed specifically for white fish production. The amount of investment capital needed and available will determine whether to lease or buy. There are both advantages and disadvantages to either buying or leasing which must be weighed in order to make the proper decisions. Operating costs for machines must be determined on a cost-per-pound basis. Maintenance and parts inventories for machines must be estimated with costs worked against the per-pound figure.

Another cost consideration is that of plant equipment, including, but not limited to unloading equipment, storage bins, conveying equipment, fillet, candling and packing tables, adequate lighting, and sufficient plumbing and water supplies.

The operation will need P & I, liability, fire, theft, and product insurance, as well as other necessary forms of protection. Bonds must be purchased to comply with the State Labor Department, Department of Revenue, Fish & Game, and other state agencies involved in the operation.

Computer use should be considered to cover as many aspects of the business as possible, particularly for accounting functions. Programs should be written or purchased for daily production reports, realistic projections on production, shipping, sales and catches. A program should be written or bought to play "what if" games. These can tell you quickly and easily what will happen if labor costs go up 6¼ per cent or if the price of fish goes up to 10 per cent and the price of water drops 3 per cent. These computations can be done with pencil and paper, but computers are infinitely faster.

An accounting system should be established, based on an analysis and recommendations by a Certified Public Accountant. Such a system should be as simple as possible so that management has no problem determining a bottom line.

Payroll accounting must accommodate hourly employees as well as salaried personnel. If computerized, payroll accounting should not require more than 12 to 16 hours per week.

Three bank accounts should be established: payroll, fish buying, and general. It is recommended that all checking accounts require dual signatures. If the plant uses municipal power and water, determine if deposits are required and what determines the size of the deposit. Stationery should be purchased utilizing a letterhead or logo. Accounting supplies, checks, and forms utilized in the payroll system must be purchased.

Refrigeration systems, pumps, emergency power, permanent hoists, ice houses, and ice makers all play important parts in the operation of a fish processing facility. Decisions must be made whether or not those items should be purchased outright, leased, or acquired through a combination lease-purchase contract. There are tax advantages to all three methods that can be determined by an accountant. The same information may be applied to moving equipment and radios, telex and other equipment necessary for the operation of a plant. Items to be considered are trucks, forklifts, movable cranes, in-plant cleaning systems, pallet jacks, etc. Office equipment includes typewriters, printing calculators, duplicators, computers, desks, file cabinets, lights, lamps and various other items.

Plant maintenance is a major financial load, requiring adequate tools, parts inventory, lubrication supplies and cleaning supplies.

The following determinations must be made to ensure proper cash flow. Should payroll be on a weekly, semi-monthly, or monthly basis? Who is going to be salaried (superintendent, maintenance supervisor, foreman, office manager, receptionist, sales manager)? Everyone else employed should be on an hourly wage and the rates for the different positions must be established prior to the actual start-up.

The largest single expense of a white fish operation will be raw product. A specific time frame for paying fishermen must be established. Ideally, the fishermen should receive a settlement once a month to allow for good fiscal planning and to allow management to know exactly how much money will be needed at a particular time. Fishermen must be paid on a scheduled basis and they must understand the basis of that schedule prior to the start of fishing. Purchase order systems can be established for the fishermen covering those necessary items for them to make their voyages. Every purchase order written should have maximum expenditure noted on it. Fuel for the plant must be contracted, with monthly billings. Federal and state taxes must be anticipated with special accruing accounts set up for these requirements. These include withholding for income tax, ESC for the state and federal, as well as fish taxes for the state. Insurance payments must be accrued on a monthly basis so that premiums are always met on time. Expendable supplies must be purchased prior to the actual start-up of the proposed operation. These include, but are not limited to office supplies, packaging, wearing apparel for employees, coffee-time supplies, paper products for restrooms, first-aid supplies, light bulbs, knives, and others.

A breakeven balance sheet must be developed and should be based on the lowest estimate of the daily plant capacity, the lowest reasonable recovery expected, the highest reasonable labor cost, and the highest reasonable overhead cost. It should include at least the following items: the costs of power per pound of finished product, the cost of water per pound of finished product, the cost of fuel per pound of finished product, the daily insurance costs broken down to a cost per pound basis, the daily lease or mortgage rate broken down to a cost per pound basis, the raw fish cost based on the anticipated low recovery, the raw fish tax and ice per pound of finished product, and the labor cost per pound of the finished product. When all that is done, project your selling price at the lowest reasonable price per pound and balance the totals of overhead, labor, recovery and capacity against the selling price. If the number is positive on paper, the operation can be successful.

It should be noted that the "break in" or training period *will not* be cost effective and as such should not be anticipated. Recovery numbers and labor costs will not approach normal for several weeks or even months. Make sure that allowances are made to give the operation a "fair chance."

Break Even Calculation
White Fish Processing

Fish Prices Per Pound	**Ex-Vessel**	**Tax %**	**TOTAL**
Pollock	.04	4	$0.416
Cod	.1	4	$.1040
Sole	.15	4	$.1560

Recovery Rates (In Percentages)	
Pollock Fillets	20%
Cod Fillets	25%
Sole Fillets	20%
Pollock Meal	85%

Finished Product Price/Pound	**Recovered Price/Pound**
(Ex-vessel + tax)/(recovery rate)	
Pollock Fillets	$.2080
Cod Fillets	$.4160
Sole Fillets	$.7800
Pollock Meal	$.0489
Wholesale Prices Per Pound	
Pollock Fillets	$1.15
Cod Fillets	$1.50
Sole Fillets	$1.75
Pollock Meal	$ .02
Product Mix (Percentage)	
Pollock Fillets	70%
Cod Fillets	20%
Sole Fillets	5%
Pollock Meal	5%
Weighted Average Recovered Price/Pound	
*(Recovered Price * Product Mix)*	
Pollock Fillets	$.15
Cod Fillets	$.08
Sole Fillets	$.04
Pollock Meal	$.00
	$.27
Weighted Average Wholesale Price/Pound	
*(Wholesale Price * Product Mix)*	
Pollock Fillets	$.80
Cod Fillets	$.30
Sole Fillets	$.09
Pollock Meal	$.00
	$1.19
Variable Costs/Pound	
Raw Fish (Finished)	$.27
Direct Labor	$.15
Fuel	$.01
Ice	$.01
Power	$.02
Water	$.01
Packaging	$.05
Storage	$.10
Freight	$.05
	$.67

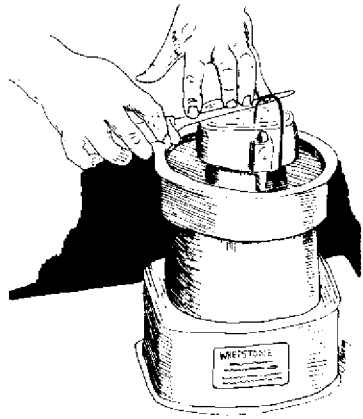
Direct Overhead (This Fishery Only)	**Recovered Price/Pound**
Equipment Lease/Purchase	$35,000
Insurance — Crew/Equipment	$15,000
	$50,000
General Overhead Costs (Annual)	
Loan Payments	$650,000
Insurance (Building)	$50,000
Administration	$210,000
Maintenance	$35,000
Property Tax	$10,000
Professional	$2,500
	$957,500
General Overhead Allocation for White Fish Operations	20%
Allocated Overhead	$191,500
Total Overhead (Direct and Allocated)	$241,500
Contribution Margin (CM)	
Average Selling Price	$1.19
– Variable Costs	– $.67
Contribution Margin	$.52

Break Even Volume (Pounds)

$$\text{Break Even Volume} = \frac{\text{Fixed Costs}}{\text{CM}}$$

Fixed Cost		$241,500
Contrib. Margins		$.52/Pound
Total Break Even Volume	=	365,980 Pounds
Pollock Fillets (20% of Total)	=	256,186 Pounds
Cod Fillets (25% of Total)	=	73,196 Pounds
Sole Fillets	=	18,299 Pounds
Pollock Meal	=	18,299 Pounds

Break Even Income	
Break Even Pounds	365,980 Pounds
* Average Selling Price	* $1.19
Break Even Income	**$436,797**



IX. TOOLS OF THE TRADE

The most important tools in a white fish operation are good knives. Some experimentation on the processor's part will be necessary to make proper decisions on the best type. Knives should have stainless steel blades and molded sanitary plastic handles. Other knives are available with wood handles, but approval from anyone of the several regulatory agencies will be unlikely, due to unsanitary construction of the knives. A major consideration in the selection of knives is the ease and method of sharpening. Depending on what type of operation is being run, either individual employees will sharpen their own or one individual would be trained to sharpen all knives. In most cases the latter is the best procedure.

Another important tool is something for extracting parasites. This can be a knife, pick, tweezer, or any suitable instrument that serves the purpose. Many companies are finding that pointed tweezers work very well and quickly, with the added advantage of not mutilating the fillet as badly as knives.

Tables used in the facility should be constructed for each specific operation. A critical factor in the construction of these tables is the working height, which influences the efficiency of the employee greatly. It should be considered in the planning stages to provide footstands of various heights so that employees of different heights may be accommodated. On the candling table, the light source for examining fillets should be dual fluorescent tubing no more than 48 inches in length. The

work surface of the candling table should be translucent plastic in combination with stainless steel. The fillet table should have gutters and have either a stainless steel or plastic cutting surface. For cost purposes, it must be assumed that the stainless steel will result in wear and tear and dull knives more quickly and require more frequent knife sharpening. Use the same plastic surface material as the candling table. That surface is soft enough to prevent dulling of knives and sanitary enough to meet all the requirements of the various regulatory agencies. The inspection tables should be all stainless steel with access to drain gutters, plus sufficient lighting.

The packing area should have stainless steel tables and good light for grading and packing. Good scales, either "over and under" or full dial, or electronic digital read-out scales should be used in this area and checked frequently.

During the renovation or construction of the facility, freezer and cool storage rooms must be incorporated within the confines of the processing area. The type of product will determine the type of freezer and storage room necessary. If you produce blocks and/or shatter pack, then you will need contact plate freezers, such as Dole or Birdseye. The force exerted by the plate freezer must be high enough to produce blocks of an acceptable formation and density. A blast freezer cannot be used in the production of blocks or shatter pack. If other forms of product such as IQF fillets are produced a blast cell may be necessary. If so, it should be designed to guarantee proper circulation of chilled air and hold the lowest temperature possible (at least minus 25°F).

The decision to use either ammonia or Freon for these systems should be based on efficiency, safety, cost and availability of the freezing medium. If you plan to produce fresh fillets and the operation is of sufficient size, a chill room to be maintained at 31°F should be constructed. It should be large enough to hold the raw — as well as finished — product. An ice machine will be an integral part of the operation. A major decision must be made about the size of the ice maker and the ice storage room, depending upon whether or not the ice is to be utilized in-plant only, or for vessels as well. If it is necessary to furnish ice for the vessels, then the storage room must have sufficient capacity to supply three or four boats on a daily basis. To determine the size of an ice storage room needed, use 32 pounds of flake ice per cubic foot, thus a 10x10 foot storage room will give you 32,000 pounds of possible storage. The storage room should be capable of holding a temperature of at least 0°F or below. If possible, this temperature should be maintained in the delivery system used. All too frequently ice is too warm when delivered, resulting in waste, shorter onboard holding, and ill feelings.

Totes are an efficient and economical method of handling large quantities of round fish. They should be strong, of known weight, and should stack and nest easily. They should be easily cleaned and sanitized. The inexpensive type are not necessarily the best investment. Size of the totes should be determined by the maximum weight of fish that can be stored without crushing. All totes should have a cover and, if possible, insulation.

Wearing apparel for employees, rain gear, boots and gloves may or may not be provided. If it is possible, wearing apparel should be provided by the employee. However, due to traditional and existing contracts with various labor groups, most of that apparel is provided by the production facility. A method whereby employees are responsible for issued apparel should be established, as replacement cost is high and will reflect negatively on the balance sheet.

A chlorine system should be installed for the purpose of guaranteeing that your water will not contaminate the final product. A variable flow gas system will allow a crew to increase the amount of chlorine in the water during clean-up and rinse time.

It will be worthwhile to lease or buy a foam cleaner, particularly if machinery is being utilized for production. The cleaner will pay for itself by reducing clean-up costs.

Type of lighting needed within the plant should be determined and the proper amount provided for all phases of the operation.

Heat within the plant should be kept stable, and the lower the temperature the better. Hot and cold water must be provided for the plant as well as the employee's restrooms.

Packaging for fresh product must be designed to meet requirements of the market place as well as the freight carrier. Fresh packaging may require plastic bags, large boxes, small boxes with liners, small boxes with masters or any combination of the above. Packaging for blocks and shatter pack is standard throughout the industry. It should be readily available with only printing and logo to be decided.

Knife Sharpening

How your knives are sharpened, and by whom, when and how often can have a tremendous effect on the productivity of your operation. People not skilled or properly trained in sharpening techniques can hurt productivity rate and produce more ragged cuts by simply picking up a sharpening steel and incorrectly stroking their knife with it a couple of times. Production time losses due to stops for knife sharpening are costly, and in the case of individual workers sharpening their own knives,

can be used for frequent "breaks" not scheduled into the production day. The following are broad recommendations aimed at new operations. You might change them to suit yourself once your operation is well established, but initially it is recommended that you set up your operation around the following guidelines.

Knife Selection

You can seriously handicap your workers and increase the incidence of miscuts by selecting the wrong style of knife for your operation. All knives should be constructed of stainless steel and have sanitary plastic handles. Most manufacturers use the terms "flex" or "full-flex," "semi-flex," and "rigid" to describe the stiffness of the spine in a knife's blade.

For filleting flatfish, use only "flex" or "full-flex" blades, at least seven and preferably eight inches in length. The blades should be sharply pointed and narrow to keep the knife from riding up and away from the backbone and reducing yield during the cutting stroke. Wide blades have a tendency to ride up in this fashion, and once the filleter detects such a movement, it takes a considerable portion of the cutting stroke to correct the knife angle and guide it back down onto the backbone.

For filleting cod and rockfish, avoid the long, flexible blades that are so desirable for flatfish. These blades are hard for beginners to control on a round fish, and they will result in a high proportion of miscuts and accidents. The best knives are as narrow as flatfish knives, but are "semi-flex" rather than "flex" or "full-flex." Length should be kept to six inches maximum, unless there are very large fish. If it is necessary to resort to longer blades, make sure that they are fairly stiff.

It is a good idea, especially for beginners, to reshape the tips on knives to be used for round fish. If the point has a conventional straight back, it will have a tendency to hang up in the ribs during the cutting stroke.

When reshaping the blades, do not use a conventional bench grinder to remove excess metal. Such a grinder will overheat the blade and remove the temper you need to help keep knives sharp. Also, be sure to keep a sharp tip after reshaping so that the tip of the knife will readily penetrate the skin of the fish during the cutting stroke.

Sharpening method

The secret to sharp knives is consistency in the angle of the sharpening stroke. If your sharpener changes the angle slightly with each stroke, you will be lucky to get a sharp knife, much less one that holds its edge. What you will have is a rounded cutting edge that is very difficult to keep sharp. Beginners in particular have an especially difficult time maintaining a consistent angle in their sharpening strokes.

For most purposes the sharpening angle should be held somewhere between seven and eleven degrees. Angles less than seven degrees results in a sharper, but more delicate edge. Angles exceeding eleven degrees result in a durable and sharp knife, but one more suitable for cutting wood and plastic than fish. High sharpening generally result in more "drag" on the blade as it passes through the flesh, making cutting more difficult and time consuming.

In determining whether knives are sharp or not, do not feel the edge with your fingers or attempt to shave the hair on your arm. Not only will you run out of arm hair before the week is out, but your fingers will become too insensitive to really feel an edge. The problem is especially bad if your hands are cold.

It is best to determine sharpness with two methods. First, hold the knife up to a light and look directly down on the sharpened edge. If you can see bright spots, the reflections are coming from burrs that will hang in the fish flesh, no matter how sharp the rest of the blade. If you do not see any bright spots of reflected light along the sharpened edge, you can now check for overall sharpness. Put the knife blade very lightly against your thumbnail or fingernail at a 90° angle. Attempt to move the blade sideways along your nail. If, even with light pressure, the knife hangs up against your nail and will not move, it is sharp. If it slides along your fingernail when you try to move it sideways, it is too dull for fish. Check several spots along the blade in this fashion, paying special attention to the last three inches closest to the tip, because this is the part of the blade that does the most work.

Steels are used to remove burrs and knicks from the blades, along with extra "feathers" of metal sometimes left as a result of sharpening on a stone. Used correctly, a steel can dramatically increase the sharpness of your knives by putting a polish on the edge and eliminating the knife drag that costs so much in production time and cut quality.

Sharpening Strategy

Do not expect all of your workers to learn to sharpen knives right away. They will not really know what they are looking for until they are accustomed to cutting fish with sharp knives. Truly experienced filleters generally insist upon sharpening their own. However, for beginners it is best to provide them with properly sharpened knives as they need them.

It is best to designate one person as knife sharpener and to train that person well. Plan on having six knives for each person on the line. Six may sound excessive, but there is good reason for so many knives. At the start of operations, each person should have three knives safely

stowed close at hand. As one knife dulls, the worker can exchange it for a sharp one. As knives are dulled, they should be placed in another spot within easy reach of the worker. Under no circumstances should you put a sharpening steel on the table for use by your workers.

The person designated for sharpening should circulate around the table and collect dull knives, while replacing them with sharp ones. He should have plenty of extra knives already sharpened so that individuals on the line do not have to slow down or stop while waiting for sharp knives. Breaks and shut-down periods are the best opportunities for your sharpener to catch up on all the knives that need resharpening. Your sharpener can take a separate break right after the rest of the line, and can either come in early or stay late to get all the knives sharp and ready for the next production day.

Sharpening Machines

Numerous sharpening machines are available today. Some work better than others. The use of a machine will definitely speed up knife sharpening and will result in sharper knives most of the time. Used incorrectly, they will result in very rapid knife wear, and will not necessarily produce the kind of sharp knives you need.

If you are going to buy a sharpening machine, consider the following points:

1. The stone and the knife generally should be water cooled, both to prevent a build-up of shavings on the stone, and to prevent overheating of the blade and a resulting loss of temper.
2. Some provisions should be made for holding the knife at a consistent angle to the stone. The more precise this method, the less variations you will get when different individuals use the machine.
3. Do not try to "save time" by using a coarse sharpening stone, except for the initial shaping of the blade. You will wear out knives at an alarming rate with a coarse stone.
4. The machine should be durable. You can find some real bargains, but if a cheap machine is not built for heavy use, the constant use on a fillet line will mean rapid replacement.

X. SELECTION OF MARKETS AND MARKET STRATEGY

A. Fresh Only

If, in the analysis of the operation, it appears that fresh fish or fillets give fewer problems and greater return, then the following factors must be considered.

Transportation

The method of transportation depends on plant location and markets. This will require considerable research into the availability of consistent air and truck service with advantageous rates. Weather must be taken into consideration for problems associated with delays. If the plant is located in an area connected by a road system to a major airport, then it might be cheaper and more convenient to contract to use existing commercial lines or to lease or purchase your own trucks.

Constant Supply of Raw Material

During the search for plant sites, a prime consideration is the supply of the raw product. Do not set up a year-around operation for particular species when it is only available for a few weeks or months every year. The success of any white fish operation, especially from a marketing standpoint, is dependent upon a constant supply of good quality raw product for processing on a daily basis.

Confirmed Market Disposal of Finished Product

When entering the domestic or foreign white fish market for the first time, sound fiscal policy demands a signed contract between seller and

buyer. This document should outline methods of payment and an irrevocable letter of credit at the seller's bank with funds payable upon evidence of product being shipped. The buyer should outline the quality guidelines, packaging requirements, and time and method of shipping. This will eliminate cash flow problems for the seller and will assure the buyer that he is receiving what he intended to buy.

Time Constraints

All aspects of a white fish operation must be carried out as rapidly and efficiently as possible. When the fish hits the deck, it must be gutted, washed, iced and stowed rapidly. When the fish is delivered, it must be unloaded, processed and shipped to market as soon as possible. The retailer must also offer it to the consumer with dispatch. All of this is done with only one thought in mind: to get the best possible product to the consumer to ensure repeat sales.

Shipping from processor to market is the one area strewn with bones of failed fresh fish businesses. Deal with an established business; know your shipper and deal with a good expeditor. Make contingency arrangements to deal with product that is bumped by the shipper for whatever reason. Each pound of product lost in shipping to delays, heat or spoilage requires new sales of at least 12 more pounds of product to make up the loss incurred.

B. Frozen Only

Frozen product from Alaska will move in one of two ways. For domestic as well as certain foreign markets, vans of commercial carriers will be used. These vans are available and unless the plant is on a major road system, there will be no need for investment in this type of equipment. To satisfy both producer and primary consumer, temperatures should be maintained at or below 0°F. To provide additional protection for both producer and primary consumer, temperature recording devices should be utilized in shipments from the processing facility. If a large order is to be processed for foreign consumption, small trampers should be investigated. These small trampers can serve as cold storage facilities as well as methods of transportation. Currently, with the exception of a few cities in Alaska, large enough cold storage facilities do not exist. As a result, frozen product must be shippped immediately. The recipient of the product is then responsible for storage of the finished product.

Style of Pack

Block

Critical control points of blocks for further processing are exact weights, exact dimensions, and square corners. These blocks must be frozen under sufficient pressure in a contact plate freezer to achieve the

desired denseness and thickness of the individual block. They must consist of whole, skinless, boneless fillets to compete in domestic and world markets. The fillets can be high graded and cut so that loins are removed for another type of product or market, while the remaining portion of that fillet is utilized in blocks. The advantage of that method is that the loins will be of high value and the price of the blocks will not be adversely affected.

Shatter pack or layer pack

This is an accepted and popular method of freezing white fish fillets for domestic markets. The majority of shatter pack is produced from cod and pollock. Pollock should be considered in producing both a loin and fillet cut. Premium prices are paid for loin packs. The standard fillet shatter pack is produced by many companies and many nations. The standards call for the grading by weight, no bones, no skin, no overlap of fillets during freezing, and freezing in a contact plate freezer to assure the package is of consistent size for ease in casing. Any IQF product is packaged in one-pound or five-pound cello packs. The cello pack is the premium method of packaging cod and pollock fillets.

Minced

In order to increase revenues, all scrap should be minced and put into blocks for utilization in added value products. This revenue from minced product will help cover the overhead in the operation.

Combined Fresh and Frozen

Ideally, your facility should be set up with flexibility to allow production of all the different styles of product for which there are markets. The production facility and the people running it must be versatile and able to adapt from one day to the next for the different products needed by primary consumers. Without that ability, the plant will be unable to compete in a satisfactory manner. In trying to be versatile, both production and management people have to determine whether or not both methods of production can be incorporated. Remember that the style of packaging and production methods of the finished products must be compatible. That means if you are turning out a skinless, boneless, frozen product, you must also turn out a skinless, boneless product for the fresh market. There is no problem with flatfish as both marketing methods call for skinless, boneless product. In the cod-pollock fishery, the fresh market allows pin bones, while the frozen market will not accept pin bones. Therefore, if a portion of the pack of fillets are destined for the fresh market, conforming to the requirements of the frozen product lets you freeze it if there is a problem with transportation.

Species of fish for a fresh or frozen pack should be researched carefully to determine which species are the most valuable fresh and which

are the most valuable frozen. Any fillet that commands a premium fresh price should be marketed as fresh product only. Any that has a deflated price in the fresh market should be frozen. The percentage of frozen to fresh production can be determined only by the production and management people in response to the condition of the market. Ideally, one production method should be the backbone of the operation. It should pay the overhead and show a small profit, with the other providing the "gravy."

Surimi (Minced)

Surimi is minced fish flesh that is washed, mixed with sugars and salts to produce an easily formed, high protein product commonly referred to as "kamaboko" in Japan. There are two ways of establishing line flow for producing surimi: 1) all fish flesh utilized for surimi production, and 2) surimi as a secondary product for a pollock fillet line. Fillets should be high graded from the production line to go into a shatter pack or blocks, both of which give higher recovery and command higher prices than surimi. The Alaska Fisheries Development Foundation is able to supply set-up costs, labor costs, recoveries and the roe recovery percentage from fish when they enter the spawning period.

The United States is importing considerable poundage of "kamaboko" in the form of crab legs, crab pieces, shrimp, and scallops. Only two active surimi processors operate in the United States, with two more proposed. In looking for Asian markets, it would be advantageous to check with the Alaska Seafood Marketing Institute (ASMI) or the State of Alaska office in Tokyo.

Salted

Cod is the only fish being salted commercially. The markets for it are primarily in the southern European countries, Africa and the east coast of South America. The quality problems involved in salting are numerous and must be checked constantly to ensure a good product being sold to both foreign and domestic markets. The biggest quality problems are bad cuts and insufficient salt curing. Since appearance is very important, machines or well-trained splitters must be employed. Most of the fish are size graded to ensure maximum return on investment.

APPENDIX A

I. SUBJECT: Instructions for Grading Fish Fillets

II. AUTHORITY: 50 CFR 260; 50 CFR 263 Subpart A

III. INTRODUCTION: These instructions are designed to simplify and guide the user in the application of the "United States General Standards for Grades of Fish Fillets." The purpose of the instructions is to supply additional information when needed for clarity and specificity to achieve uniform interpretation and application.

The material is arranged in the order which would be logically followed in grading the product. Reference to the standards are given throughout these instructions as follows: 263.104(c) (2). The fillets will be graded according to the standards; the score sheet and these instructions are intended to help guide the inspector or quality control personnel through these standards. This standard applies both to fresh and frozen, fresh water and salt water species. It does not apply to fillets covered by specific U.S. Standards and Grades as follows:

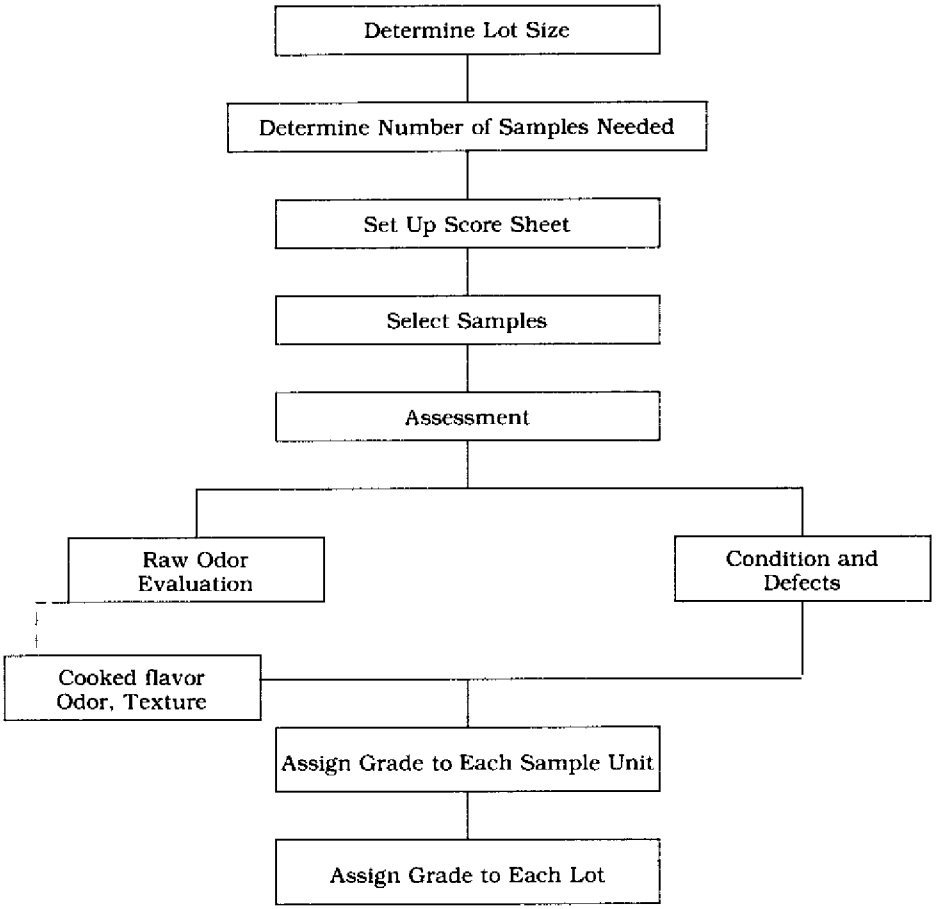
Part 263:
- Subpart B - U.S. Standards for Grades of Cod Fillets
- Subpart C - U.S. Standards for Grades of Flounder and Sole Fillets
- Subpart D - U.S. Standards for Grades of Haddock Fillets
- Subpart E - U.S. Standards for Grades of Ocean Perch and Pacific Ocean Perch Fillets

IV. MATERIALS:

A. Documents:
1. "United States General Standards for Grades of Fish Fillets." 50 CFR 263.10 subpart A.
2. Regulations Governing Processed Fishery Products, 50 CFR 260.
3. These instructions: "Instructions for Grading Fish Fillets," Part II, Chapter 03, Section 01.
4. Blank Score Sheet for Fish Fillets (See Appendix A to these instructions for example). (NOAA Form 89-851).

B. Equipment:
1. Plastic grid marked in one inch squares. Each square has one inch sides and an area of one square inch.
2. Balance or scale having adequate capacity and a sensitivity of .01 ounces or .1 grams
3. Equipment for cooking product: The standards give a choice of one out of three methods in 263.104(C)(2) i, ii, iii.

V. PRODUCT GRADING FLOW CHART: The following flow chart represents a progression that will in most situations be the logical order followed in grading fish fillets:



NOTE: Steps with dotted lines used only when necessary.

VI. SETTING UP THE SCORE SHEET: Keeping accurate records is extremely important. The inspector should consider each score sheet as one he may be required to defend if subpoenaed by court to verify an inspection. Record all information pertinent to the species under inspection, the lot, and significant information taken from the label. A completed model is provided (Appendix B) for use as an example.

VII. SAMPLING THE PRODUCT (263.104[b]):

A. Determine the Number of Sample Units Required: To determine the number of sample units required, use "Regulations Governing Processed Fishery Products," Section 260.61, latest issue. For normal situations the appropriate sampling plan and acceptance numbers are given in Table II entitled "Frozen or Similarly Processed Fishery Products and Products Thereof Containing Units of Such Size and Character as to be Readily Separable." Section 260.61 gives instructions for the use of this table. For unusual situations, use Table VI as explained in 50 CFR 260.61. If you use a multiple sampling plant (Table VI), remember that the results of each examination are additive. The cumulative number of deviants as defined in connection with the specific requirement must be *either:* (1) equal to or less than the *acceptance number*, or (2) equal to or greater than the *rejection number*, before a decision to accept or reject the product can be made.

VIII. GRADING THE RAW PRODUCT (263.104[e]):

A. Abnormal Condition (263.104[e][1]): The conditions and degrees of condition referred to below are defined in the standards:

The "jellied" condition is usually found first at the edge, but as the severity of the condition increases, the thicker portions of the fish become affected. The moisture content of jellied fish may range from 85 to 95 percent, depending on the severity of this condition.

The "milky" condition is usually found randomly distributed as liquefied pockets on the surface or interior of the fillet. The number and size of these pockets increase with the intensity of the condition. Fish exhibiting the milky condition contain protozoan spores. These spores can be readily demonstrated under the microscope in wet mounts or hanging drops of magnifications of 450 to 1,000.

The "chalky" condition is usually recognized by the chalky white, almost cooked appearance of the surface of the fish. Any condition that is more than scarcely noticeable is to be considered a moderate defect. If the condition is conspicuously noticeable and does seriously affect the appearance, desirability, and/or eating quality of the fish, it is to be considered an excessive defect.

There are only 2 degrees of abnormal conditions which are defined as follows:

A. (moderate): refers to a condition that is distinctly noticeable but does not seriously affect the appearance, desirability, and/or the eating quality of the product.

B. (excessive): refers to a condition which is both distinctly noticeable and seriously objectionable.

B. Appearance Defects (263.104[e][2]): These defects refer to the color of the fish flesh and to the degree of surface dehydration of the product.

(1) Color defects: refers to any readily discernable abnormal coloration including bruises, blood spots, browning, yellowing, and melanin spotting. Each square inch (6.5 cm^2) of affected area

is counted as one instance as determined by a transparent grid of one inch squares.

The extent of appearance defects is defined as follows:

A. Slight - 2-4 instances
B. Moderate - 5-6 instances
C. Excessive - over 6 instances.

(II) Dehydration: refers to loss of moisture from fish surfaces during frozen storage. Look for dehydration on the surface of the fish. Dehydration is characterized by a white porous appearance and by affected areas that feel relatively dry to touch. Base your deductions for dehydration on the total area affected and on depth of the defect - that is, whether or not it is easily scraped off with a blunt instrument. The 5 per cent surface area is used to cover limited dehydration often occurring only on the edges.

C. Workmanship Defects: (263.104[e][3]): Workmanship defects refers to (i) Cutting and trimming imperfections, ragged edges, holes, tears, and improper or misplaced cuts; (ii) Scales, fins or pieces of fins or extraneous material. These are defined in the standard.

D. Bones (263.104[e][4]): Bones refers to a bone, or piece of bone that exceeds either the dimension 15 mm in length or .355 in diameter. Each area of one inch square (6.5 cm^2) which contains a bone or a cluster of bones shall be regarded as one instance of bones.

E. Skin (263.104[e][5]): Skin defects include exterior skin and black membranes (belly lining). These defects mainly affect the visual desirability of the product, but they may also affect the eating quality. All of these visual defects are the result of poor commercial practice. Although their complete removal is not economically practical; they can, in a large part, be eliminated during processing.

F. Size of Fillets (263.104[e][6]): Size of fillets refers to the freedom from undesirably small pieces of fillets. Undesirably small shall mean any piece of fillet weighing less than 1 ounce (30 grams) per container. If, after proper thawing, the product is found to contain small pieces weighing less than the allowed size, the grader shall determine whether the piece was originally added for weight purposes or resulted from breakage of the fillet during the grading examination. If the small pieces have resulted from breakage of the fillet, no deduction should be made. Tiny slivers of fish flesh are not to be considered as pieces.

G. Evaluating Raw Odor (263.104[c][1]): This determination shall be carried out only by those trained to do so. For evaluating the odor of the raw fillets, the thawed fillets shall be broken and the broken flesh held close to the nose immediately to detect off odor. If any off odors are detected in the raw state, then evaluation of the product in the cooked state must follow.

IX. GRADING THE COOKED PRODUCT (263.104[c] & [e]):

A. Cooking (263.104[c][2]): This determination, when necessary must be performed on 25 per cent of the fillets in the sample unit when dictated by the results of the raw odor evaluation.

The fish shall be cooked by one of the methods in the standard 264.104(c)(2)(i, ii, iii).

B. Texture: (263.104[e][7]): Texture defects refer to the texture of the cooked fillets, not characteristic of the species used. You should note the texture of the cooked fillet both before you start to chew the sample and while you are chewing it.

Schedule I — Texture (Cooked State)

ASSESSMENT OF			Degree
Firmness	Texture	Juiciness	
Firm, neither tough nor soft	Compact not stringy	Juicy	
Slightly tough or "chewy"	Compact not stringy	Juicy	Minor
Tough, rubbery or mushy or soft	and/or Fibrous	and/or dry	Major
Excessively tough	and/or Stringy coarse	Dry	Serious

Note the texture of the cooked fish sample both before you start to chew the sample and while you are chewing it. Base your decuctions for texture on the overall texture of all the fish in the sample. In judging the texture, adhere to the prescribed time and temperature of cooking, since overcooking may materially toughen and dry out the fish. Also, be sure to examine the fish for texture as soon as possible after cooking has been completed; since as fish cools, it becomes drier and tougher. This method is used when cooking is required.

The texture of the fillet may also be evaluated by feeling the fillet to determine whether the flesh is undesirably hard or soft; is tough, rubbery, or mushy; or is dry or watery (whether it loses moisture when compressed slightly). Judging texture of the fillet is subjective, and proficiency is gained largely through experience. Therefore, it is important to standardize one's technique such as the amount of sample placed between the teeth, the general tooth area used, the rate of application of jaw pressure, etc. The trained use of the fingers and of the oral cavity can provide an accurate, fast method of evaluating texture.

C. Cooked Flavor and Odor (263.104 [c][2]): Section 263.14(c) (2) of the standards requires a cooked flavor and odor evaluation of the sample: If the raw odor evaluation indicates the existence of any off-odors, the levels for grade compliance are as follows:

(1) Good flavor and odor - "Good flavor and odor" (essential requirement for a Grade A product) means that the fish flesh has good flavor and odor characteristic of the species and is free from staleness and off-flavors and off-odors of any kind.

(2) Reasonably good flavor and odor - "Reasonably good flavor and odor" (minimum requirement of a Grade B product) means that the fish flesh may be somewhat lacking in good flavor and odor and is free from objectionable off-flavors and off-odors of any kind.

(3) Minimal acceptable flavor and odor - "Minimal acceptable flavor and odor" means that the fish fillets are entirely edible with no objectionable off-flavor or off odors.

D. Categorization of Physical Defects (263.10[f]): Instances shall be assessed on a per pound basis for physical defects, except for defects relating to abnormal condition, texture, dehydration, and size of fillets. Refer to Table I of the standards for categorizing defects. (See Appendix C).

X. ASSIGNING THE GRADE (263.104[g]):

A. Sample Unit Grade

(1) Each sample unit shall be assigned the grade into which it falls

in accordance with the "Tolerances for Various Defects" contained in Table I for Group Species (See Appendix D for species belonging to the respective groups.)

(2) The numbers assigned under Minor, Major and Serious Defect Table are points and are additive for determining grade.

(3) Warning: Remember "serious" defects are a limiting rule and non-additive which limits the grade assignment of the sample unit to a Grade "C" or substandard depending on the number of "serious" defects found.

B. Lot Grade

(1) The grade to be assigned a lot is the grade indicated by the average of the total points, provided that the number of sample units in the next lower grade for both **Physical Defects** and **Flavor and Odor** does not exceed the acceptance number indicated in the Sampling Plan (260.61).

(2) In making this assignment, remember that for this standard, if a sample unit falls more than one grade below the indicated grade for either Physical Defects or Flavor and Odor, the assigned grade for the lot can be no more than one grade above the sample unit grade as determined by Table I. (See 50 CFR 260.21 [b][5]. Reason - fails to meet the tests for (b)(3) and (4) of 260.21. EXAMPLE: In a lot size requiring six sample units, if 5 sample units are Grade A and 1 sample units is Grade C for physical defects, the lot grade is Grade B.

NMFS FISHERY PRODUCTS INSPECTION MANUAL

List of Group Species

Groundfish	**Flatfish**	**Other**
Whiting	Greenland turbot	All fresh water species
Pollock	Witch	All salt water species not listed
Ling	Halibut	
Polar cod	All right-eyed flounder	
Arctic cod	Sole	
Greenland cod		
Cusk		
Four bearded rockling		
Burbot		
Red hake		
White hake		
Gulf hake		
Toothed cod		
Pacific cod		
Tom cod		
Alaskan pollock		
Ocean catfish		
Hake		
Rock fish		
Sablefish or Black cod		

Grouping is based upon similar shape and bone structure. If species are not included in these groups, use tolerances for all others.

Table I: Defect Table

Defect Description	Classification Minor	Major	Serious
1. Abnormal Condition:			
Moderate		2	
Excessive			4
2. Appearance:			
(a) Color defects			
slight (2-4 instances)	1		
moderate (5-6 instances)		2	
excessive (6 instances)			4
(b) Dehydration:			
slight (surface 5% of area)	1		
moderate (deep 1 to 5% of area)		2	
excessive (deep 5% of area)			4
3. Workmanship defects:			
(a) Cutting and trimming:			
slight (1-2 instances)	1		
moderate (2-4 instances)		2	
excessive (over 4 instances)			2
(b) Scales, fins, extraneous material:			
slight (1-2 instances)	1		
moderate (3-4 instances)		2	
excessive (over 4 instances)		2	
4. Bones:			
slight (1 instance)	1		
moderate (2-4 instances)		2	
excessive (over 4 instances)			4
5. Skin and Membrane:			
slight (1 instance)	1		
moderate (2-4 instances)		2	
excessive (over 4 instances)			2
6. Size of Fillets:			
moderate (2 instances)		2	
excessive (over 4 instances)			2
7. Texture:			
slight	1		
moderate		2	
excessive			4

Tolerances for Various Defects

Combined minor and major defects	Serious Defects	Group Species
U.S. Grade A:		
Up to 4 points	None	Groundfish
Up to 5 points	do	Flatfish
Up to 6 points	do	All others
U.S. Grade B:		
Up to 8 points	do	Groundfish
Up to 10 points	do	Flatfish
Up to 12 points	do	All others
U.S. Grade C:		
Up to 10 points	Up to 8 points	Groundfish
Up to 12 points	do	Flatfish
Up to 14 points	do	All others

Groundfish (white fish) includes cusk, ocean catfish, pollock, hake, whiting, and ling. Flatfish includes Greenland turbot and halibut.

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

SCORE SHEET

FISH FILLETS ☐ FRESH ☐ FROZEN ☐ IQF ☐ SOLID

Styles:
☐ Single ☐ Unscaled ☐ Scaled
☐ Skin On
☐ Skin On (White Side Only)
☐ Skin Off ☐ Butterfly

Sampling Plan

Page ___ of ___ Pages

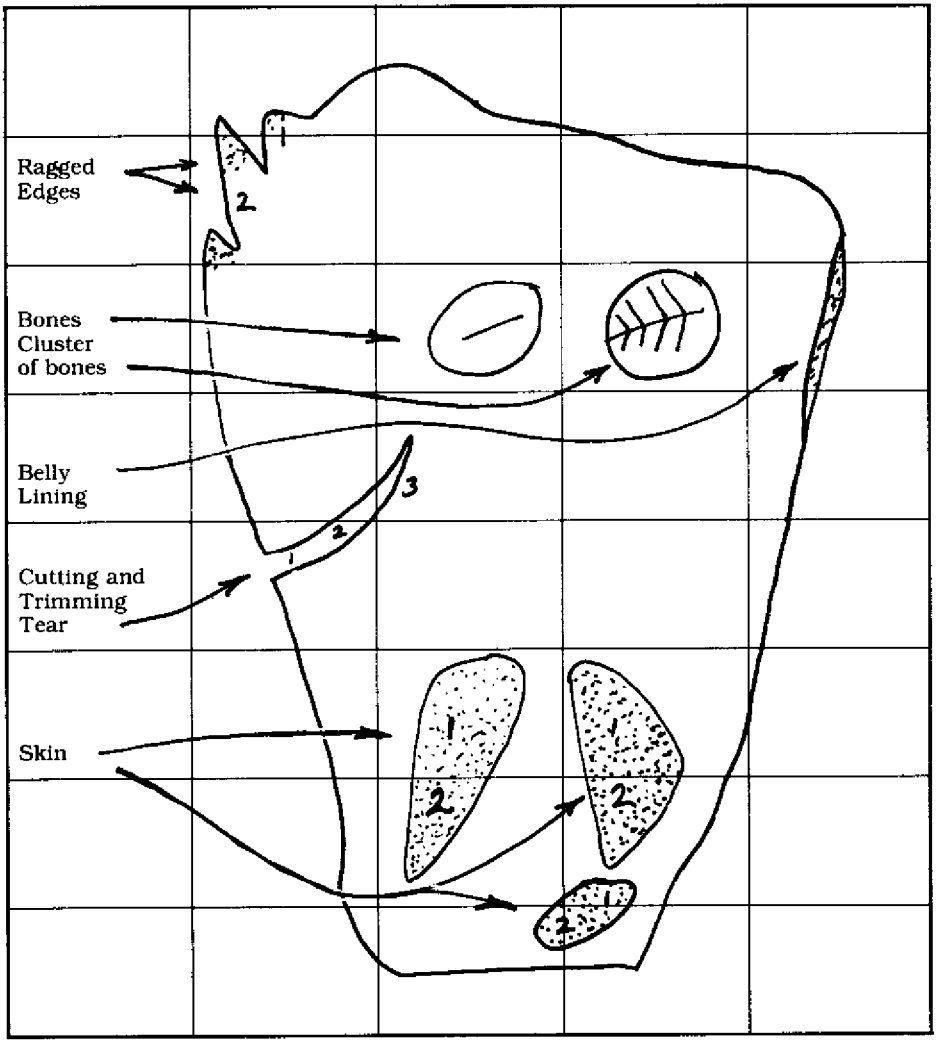
Company, Code or Applicant	Inspector's Number	Label Code	Ref. Lot No. / Lot Size	Poundage	Container Size / Sample Size	Group Species ☐ Ground Fish ☐ Flat Fish ☐ Other	Type of Inspection ☐ Lot ☐ Contract	Date / Country of Origin

	ITEMS INSPECTED		SAMPLE NUMBER *(insert as needed)*						AVG.
GENERAL	CONTAINER IDENTIFICATION	Carton Code							
		Case Code							
	NET WEIGHT IN OUNCES								
	NUMBER OF FILLETS PER CONTAINER								
	ABNORMAL CONDITION	Major							
		Serious							
FRESH OR THAWED	Appearance Defects — COLOR	Minor							
		Major							
		Serious							
	Appearance Defects — DEHYDRATION (FROZEN)	Minor							
		Major							
		Serious							
	Workmanship Defects — CUTTING, TRIMMING	Minor							
		Major							
		Serious							
	Workmanship Defects — SCALES, FINS, EXTRANEOUS MATERIAL	Minor							
		Major							
		Serious							
	BONES	Minor							
		Major							
		Serious							
	SKIN AND MEMBRANE	Minor							
		Major							
		Serious							
	SIZE OF FILLETS	Major							
		Serious							
COOKED	TEXTURE	Minor							
		Major							
		Serious							
TOTAL MINOR AND MAJOR									
TOTAL SERIOUS									
ODOR RAW									
FLAVOR AND ODOR (Cooked) A, B, C, or SST									
FINAL GRADE A, B, C, or Substandard									

Remarks (Reasons for degrading product):

Signature (Official Inspector)

Minor = 1; Major = 2; Serious = 4



Showing the Use of the One Inch Square in making deductions for defects.

Appendix B

Material Specifications

Pollock, Alaska (Species: Theregra Chalcogramma) 16.5 lb. Blocks

Proper Fill — Refers to surface and internal air or ice voids, pitting, ragged edges or damage. The block shall be examined in 1-ounce unit that must be 4 X 1 X 5/8 and no more than two 1-ounce portions per block shall show any evidence of improper fill.

Defects in Thawed Product

Blemishes: Any piece of skin exceeding ¾ square inch.
Blood Spots: Any spot no matter that size that can be seen.
Belly Lining: Any piece of lining over ½ inch square.
Fin: Any piece of fin that is identifiable as part of the fin.
Scales: One or more scales observed in block.

Total Number of Defects shall not exceed 5 per block.

Bones: Limit any piece of bone that after cooking is capable of hurting the palate. There shall be no more than 3 bones per block.

Drip Weight not to exceed 7 per cent weight of block.

Packing Requirements:
Cartons shall be 16½ lb. seafood cartons, 19 X 10 X 2½ inch, 1 piece Britewood Blank, not glued, dust flaps on cover, 1 — 7/8 inch tuck embossed. .018 C/C SBS overall dimple embossed, cold waxed, embossing should contain "Carton made in U.S.A."

The pollock shall be placed with the length of the pollock parallel to the 19-inch dimension of the carton otherwise known as long pack.

Pollock shall be placed with skinside facing the bottom of carton. This will allow no skin to skin contact.

It is important that the flaps of carton be folded so they won't become imbedded with the frozen block, thereby making it difficult to unfold carton from block.

The block and master carton are not to be packed in cartons with staples or similar metal fasteners. The cartons must be glued or taped.

After freezing, the cargo shall be immediately packed in corrugated containers 200 PSI stock. They are to be identified as to packer, date code, contents, weight and fish species.

They shall be stored in a room not to exceed + 10 degrees F. Each case to be banded with at least 2 plastic bands.

Shipping Requirements
Each packing plant shall be plainly marked.

Each carton will be plainly marked as to production date code, using the international Julian date code system — XXXYY where XXX is the Julian day of the year and YY is the year.

No shipment shall consist of production date codes exceeding a 60-day time span.

It shall be the supplier's responsibility using accepted stevedore practices to see that the hole of the vessel is loaded in a defined manner. The manner in which the vessel is loaded shall be such that the unloading, using acceptable stevedore practices shall make it possible to segregate the pollock blocks by plant. The storing pattern in the hole shall be recorded by the suppliers and shall be provided to Mrs. Paul's prior to arrival of the vessel.

Any containerized blocks shall be loaded in a segregated by plant manager.

Bacteriological

Standard Plate — Count/Gram	Less than 100,000
Coliform - Count/Gram	Less than 100
E. Coli - Count/Gram	No Tolerance — Negative
Staphylococcus	No Tolerance — Negative
Salmonella	No Tolerance — Negative
Molds — Count/Gram	Less than 200

All shipments must be free of any chemicals or preservatives or sodium tripoly phosphate or similar product.

Warranty

Seller warrants that all deliveries of material shall conform with the requirements of the U.S. Food, Drug and Cosmetic Act as amended; and applicable state law or municipal ordinance.

The product shall have been manufactured, stored and shipped under good standards of sanitation in packaging free, from dirt or contamination substances and shall arrive at the buyer's plant in clean, undamaged condition.

Technical

Frozen fish blocks are rectangular shaped masses of cohering frozen fish flesh of a pollock. They consist of adequately drained whole, wholesome pollock but not ground or comminuted and they are frozen and maintained at temperatures necessary for the preservation of the product. Product to be keep skinned and filleted at sea.

All pollock must be candled and all worms removed.

Blemishes caused from blood spots, stains, discoloration from bruised fish and belly lining must be removed.

The strip of dark flesh under the skin is to be removed. Do not use any pollock discolored and flesh darker than a light yellow color along the lateral line.

Pollock washed with fresh potable water, are to be completely drained to prevent ice pockets in blocks.

Good odor and flavor required in that the cooked product has a typical flavor and odor of the pollock and is free from rancidity, bitterness, staleness, and off flavors and off odors of any kind.

Color of frozen block shall be reasonably uniform and free from noticeable yellowing and or rusting of the fish surface.

Dehydration, the loss of moisture: The fish surfaces during frozen storage shall not exceed the moderate stage in any block. Moderate dehydration can be easily scraped off with fingernail pressure.

Uniformity of size: Dimension shall be 19 inches long X 10 inches wide by 2½ inches deep. Each dimension has a tolerance of + 1/8 inch.

Uniformity of Weight: Net weight. Declared weight which shall be 16½ pounds. Tolerance: 0 to +4 ounces.

Block Edges: An acceptable block edge is an angle formed by two adjoining surfaces whose apex is within 3/8 inch of a carpenter's square placed along the surface. An acceptable corner angle is an angle formed by three adjoining surfaces whose apex is within 3/8 inch of the apex of a carpenter's square placed on the edge surfaces.

CONCLUSION

To compete in the domestic (world) white fish market, a processor must:

1. Control the quality of the landed raw product.
2. Keep the raw product cool and protected after receiving.
3. Observe good quality control during processing.
4. Maintain an excellent sanitation program.
5. Ensure, through good quality control, a consistently good product for the consumer.

Additional Reading

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