



Wet Storage of Live Aquatic Animals

General Requirements – Holding Live Aquatic Animals in Food Establishments

Wet storage of seafood is the temporary maintenance of approved species of live fish, crab, lobster, shrimp, molluscan shellfish and other aquatic species for future sale and consumption.

Live aquatic animals fall under the definition of “fish” in the FDA food code and include “freshwater fish (i.e. trout, bass, tilapia, catfish, etc.) or saltwater finfish (i.e. flounder, cod, etc.)”, crustacean shellfish (i.e. crab, lobster, shrimp, crayfish) and other forms of aquatic life including alligator, frog, aquatic turtle, jellyfish, sea cucumber, sea urchin and the roe of such animals, freshwater and seawater snails, and molluscan shellfish (oysters, clams, mussels, scallops, etc.) if such animal life is intended for human consumption.

Live frogs, turtles, tilapia, catfish and other aquatic animals may come in live and be slaughtered in a food establishment. None of these animals are subject to inspection under the USDA’s Meat and Poultry Inspection Act and shall meet the handling and slaughter provisions of FDA food code.

Live aquatic animals shall be purchased only from commercial sources that are licensed according to applicable laws and regulations, are aware of the water quality of the harvest waters and limit their harvest to legal species. The source of live aquatic animals such as sale invoices, shall be available for examination by the Department. Molluscan shellfish or other aquatic animals that are recreationally caught may not be received for sale or service.

Molluscan shellfish and other aquatic animals shall be obtained from sources according to law and the requirements of the FDA and National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish. Molluscan shellfish received in interstate commerce shall be from sources that are listed in the Interstate Certified Shellfish Shippers List.

Wet storage is practiced only in strict compliance with the written provisions for the wet storage operation and operating procedures submitted to and approved by this Department. In addition, all wet storage activities shall be reviewed for the purpose of the wet storage activity and must meet the requirements of the current FDA National Shellfish Sanitation Program – Guide for the Control of Molluscan Shellfish.

Each wet storage site, facility and operation shall be evaluated and approved by this Department. A plan must be submitted giving the design of the storage facility, source of water to be used for wet storage, details of any water treatment system and an operating procedure. All plans for construction or remodeling of wet storage facilities shall be reviewed and approved prior to construction and operation.

Holding, storing and handling of live aquatic animals such as frogs, turtles, conch, farm-raised tilapia and catfish are considered “processing” under Seafood HACCP regulations in 21 CFR 123 Fish and Fishery Products Subpart A. The general provisions also require a hazard analysis to determine whether there are food safety hazards likely to occur for each species. The definition of “fish”, found in 21 CFR 123.3(d), is identical to the definition in the FDA food code. Therefore, operators of live aquatic molluscan shellfish and the slaughter of aquatic animals such as fish shall be inspected and require a HACCP variance. Viable turtle eggs and live turtles with a carapace length of less than 4-inches shall not be sold, held for sale or offered for any other type of commercial or public distribution in interstate or intrastate transport.



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General Requirements – Holding Live Aquatic Animals in Food Establishments (continued)

Every facility operating molluscan shellfish life-support system tanks used to display or store shellfish that are offered for human consumption shall conduct a hazard analysis to determine the food safety hazards that are reasonably likely to occur for shellfish that are maintained and processed by the operator and to identify the preventive measures that the operator can apply to control those hazards.

Facilities are required to have and implement a written HACCP plan specific to the facility for wet storage shellfish operations or the slaughter of live aquatic animals. Operators shall submit a request for a variance for the wet storage operations of shellfish or the slaughter of live aquatic animals.

Please contact the Variance/ HACCP Coordinator to request a variance. All HACCP variances shall be submitted, reviewed and approved prior to construction and operation of molluscan shellfish wet storage activities or the slaughter of live aquatic animals in a food establishment.

Temporary wet storage of live fish, crab, lobster, molluscan shellfish and other aquatic species in tanks is practiced for three primary reasons.

First, they can be harvested from remote areas at convenient times and held live for brief periods at locations close to the point of sale in containers from which they can be easily retrieved.

Second, wet storage also may be used to de-sand those molluscan shellfish species, which tend to accumulate sand in their mantles and gills, thus making them more palatable.

Thirdly, wet storage may be used to increase palatability by increasing salt content of molluscan shellfish harvested from low salinity waters.

While awaiting placement in a wet storage activity, shellstock shall be protected from physical, chemical or thermal conditions which may compromise shellstock survival, quality or activity during wet storage.

Wet storage facilities are not designed and operated to increase safety of molluscan shellfish. Therefore, all controls pertaining to molluscan shellfish for direct consumption shall be applied.

Molluscan shellstock from different harvest areas shall not be commingled during wet storage. If more than one harvest lot of molluscan shellfish is being held in wet storage at the same time, the identity of each harvest lot shall be maintained throughout the wet storage process. It is recommended that the old harvest lot of molluscan shellfish be culled immediately and placed on drained ice before a new harvest lot is introduced.

In addition, live molluscan shellfish shall not be displayed for sale or temporarily held in tubs or containers filled with water. (i.e. Live clams or oysters stored in plastic containers filled with water and placed on ice for sale inside retail seafood display cases.)



Wet Storage of Live Aquatic Animals

General Requirements – Holding Live Aquatic Animals in Food Establishments (continued)

All live molluscan shellfish shall be stored in approved wet storage systems with a water temperature of 41°F or below. Live or culled molluscan shellfish may be placed on drained ice and held at 41°F or below. Also, live or culled molluscan shellfish may be held in their original shipping containers bearing legible source identification tags or labels and held under mechanical refrigeration at 41°F or below.

All shellstock harvester's tags are required by law to be kept on file for a period of 90-days.

Molluscan shellfish shall be thoroughly washed with water from an approved source prior to wet storage in tanks or culled prior to sale. Discard dead, badly broken or cracked molluscan shellfish.

Bivalve mollusks shall not be commingled with other species in the same tank. Commingling bivalve mollusks with other species in tanks may subject the bivalve mollusks to contamination from pathogenic organisms from the non-molluscan animals. Fish, crabs, lobsters and other aquatic species may be harvested from polluted areas and may have ingested pathogens or accumulated them on their body surfaces. Therefore, holding such animals in the same tank with bivalve mollusks presents a risk of cross contamination. The risk can be avoided by utilizing separate tanks for non-bivalve molluscan species. Where multiple tank systems use the same water for bivalve mollusks and other species, the process water shall be effectively disinfected prior to entering tanks containing the bivalve mollusks.

The wet storage facility operator shall complete accurate source records to enable a lot of shellstock to be traced back to the original harvest location and wet storage location, and include the dates the shellstock were held in wet storage. Also, the operator shall maintain all shellstock operational records, details of the process water treatment (disinfection) system, and provide any appropriate documentation of the wet storage operations as required by law.

Shellstock from a wet storage activity shall be harvested, handled, identified and processed according to the current Department and the FDA National Shellfish Sanitation Program requirements.



Wet Storage of Live Aquatic Animals

Wet Storage Facility

Each shall meet the following design, construction and operating requirements:

- ◇ Effective barriers shall be provided to prevent entry of birds, animals and vermin in the facility. This shall be accomplished by locating the system inside a building or structure.
- ◇ All walls, floors, ceilings, lighting, plumbing and sewage disposal systems shall meet the applicable provisions of the Maricopa County Environment Health Code and the Guide to Constructing Permitted Facilities. It is recommended that tank covers be installed and that they remain closed on tanks at all times when the system is operating except for when the product is being loaded, unloaded or for cleaning.
- ◇ Storage tanks and related approved plumbing shall be fabricated of safe material and shall be easily cleanable. Tanks shall be constructed so as to be easily accessible for cleaning and inspection, to be self-draining, and to be fabricated from nontoxic, corrosion resistant materials. Plumbing shall be designed and installed according to current code, and so that cleaning and sanitizing can be conducted on a regular schedule, as specified in the operating procedures and to prevent contamination of the tank and water.
- ◇ Storage tank design, dimensions, and construction are such that adequate clearance between molluscan shellfish and the tank bottom shall be maintained.
- ◇ Molluscan shellfish containers, if used, shall have a mesh-type construction, which allows water to flow to all shellfish in the containers.
- ◇ If a re-circulated water system is utilized, FDA regulations state that water samples should be taken at least weekly to determine that the system produces no detectable levels of total coliform bacteria under normal operating conditions.
- ◇ Careful consideration must be given to designing and operating wet storage tanks to assure that molluscan shellfish and other species are not contaminated during holding or do not die from physiological stresses such as low dissolved oxygen and unsuitable temperatures or salinity. Excessive mud on molluscan shellfish or dead animals may increase bacterial loads in the tanks and lead to increased levels in the molluscan shellfish during storage. Hence, washing molluscan shellfish and culling dead animals prior to and during storage are essential.
- ◇ Proper hydraulic design of the tank is important to assure an adequate quantity and quality of water with minimum turbulence at suitable temperatures to achieve the intended purpose of the storage operation. Inadequate flow can lead to oxygen deficiency and animal mortality if the animals are physiologically active. Minimum turbulence will permit feces and material to settle without being suspended and ingested.



Wet Storage of Live Aquatic Animals

Wet Storage Tank Description and Design

A complete marine life support system includes a tank or aquarium, biological, chemical, mechanical, water circulation system for each individual species, temperature control and U. V. filtration (molluscan shellfish only).

Specifications:

- ◇ Materials: Use NSF approved acrylic or tempered glass for display aquariums. Fiberglass covered wooden holding tanks with FDA approved resins and gel coats are acceptable. All raw wood must be pressure treated, sealed and or painted with marine type sealers/ paints. All material must be light in color, smooth and easily cleanable. All metal or steel supports shall be sealed and maintained to prevent rust and water damage.
- ◇ Source Water:
 - ◇ The quality of the source water prior to treatment, at a minimum, shall be from an approved supply and meet bacteriological standards as required by law.
 - ◇ Disinfection or other water treatment such as the addition of salt cannot leave residues unless they are Generally Recognized as Safe (GRAS) and do not interfere with the shellstock's survival, quality or activity during wet storage.
 - ◇ Disinfected/treated process water entering wet storage tanks shall have no detectable levels of total coliform bacteria under normal operating conditions.
- ◇ Filtration:
 - ◇ Biological filtration:
 - ◇ Use only high quality 100% usable crushed corals.
 - ◇ Chemical filtration:
 - ◇ Activated carbon to remove color and odor-producing contaminants. Use high quality bituminous coal.
 - ◇ Mechanical Filtration:
 - ◇ Use only high quality polyester foam filter pads that are washable, odorless and non-allergenic. This filter is used as the first defense against solids and other non-desirable materials before entering the pump and other filter components.
 - ◇ Install high quality high-rate sand filters fabricated of durable, corrosion-proof materials to provide crystal clear water.
 - ◇ Ultra- Violet (U. V.) Filtration:
 - ◇ For water receiving U. V. filtration (required for molluscan shellfish only), the water turbidity shall be minimal. U. V. sterilizers reduce disease transmission by destroying disease-causing microorganisms as they pass through the unit. Each shellfish tank shall be equipped with its own U. V. filter.
 - ◇ For water that is disinfected by U. V. treatment, turbidity shall not exceed 20 nephelometric turbidity units (NTUs) measured in accordance with the *Standard Methods for the Examination of Water and Wastewater, APHA*.



Wet Storage of Live Aquatic Animals

Wet Storage Tank Description and Design (continued)

- ◇ Ultra- Violet (U. V.) Filtration: (continued)
 - ◇ The facility shall be required to demonstrate that disinfection for the recirculation system functions and consistently produces approved water under normal operating conditions.
 - ◇ The water should be sampled weekly to demonstrate that the disinfected water is negative for total coliform bacteria.
 - ◇ Each time a U.V. bulb change is required, either to replace a burned out bulb or for servicing, a new U.V. bulb shall be installed and the old bulb discarded, and the weekly disinfected process water sample should be collected and analyzed.
- ◇ Recommended water Changes:
 - ◇ The disinfection unit(s) for the process water supply shall be cleaned and serviced as frequently as necessary to assure effective water treatment.
 - ◇ It is recommended that 1/2 of the tank water should be changed once weekly.
- ◇ Plumbing:
 - ◇ Approved back flow prevention measures and devices are required and shall be installed according to code. Plumbing material should be constructed of PVC.
- ◇ e. Holding Temperatures:
 - ◇ Molluscan Shellfish: Live and culled molluscan shellfish shall be held at 41°F or below. Other Live Aquatic Animals: Do not require refrigeration below 41F but should be held at the optimal water temperature for that animal. Examples:
 - ◇ Crab: 50°F, Lobster: 40°F to 50°F, Catfish 75°F to 85°F, Tilapia 82°F to 86°F, Striped Bass 66°F to 72°F.
- ◇ Water Balancing:
 - ◇ Use high quality water balancing rocks/stones from approved sources or approved chemicals to balance the water.

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