

Biosecurity Considerations in Water Recirculating Aquaculture Systems Design

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Definitions

Biosecurity

- ✓ Reducing the risk that fish pathogens will enter a facility,
- ✓ reducing the risk that pathogens will spread within a facility, and
- ✓ maintaining conditions that reduce the risk of infection and disease.

Definitions

Pathogens

- Biological agent that causes disease or illness to its host

Disease

- Condition that impairs normal functioning and is typically manifested by distinguishing signs and symptoms

Definitions

Cleaning

- Removal of dirt or extraneous matter

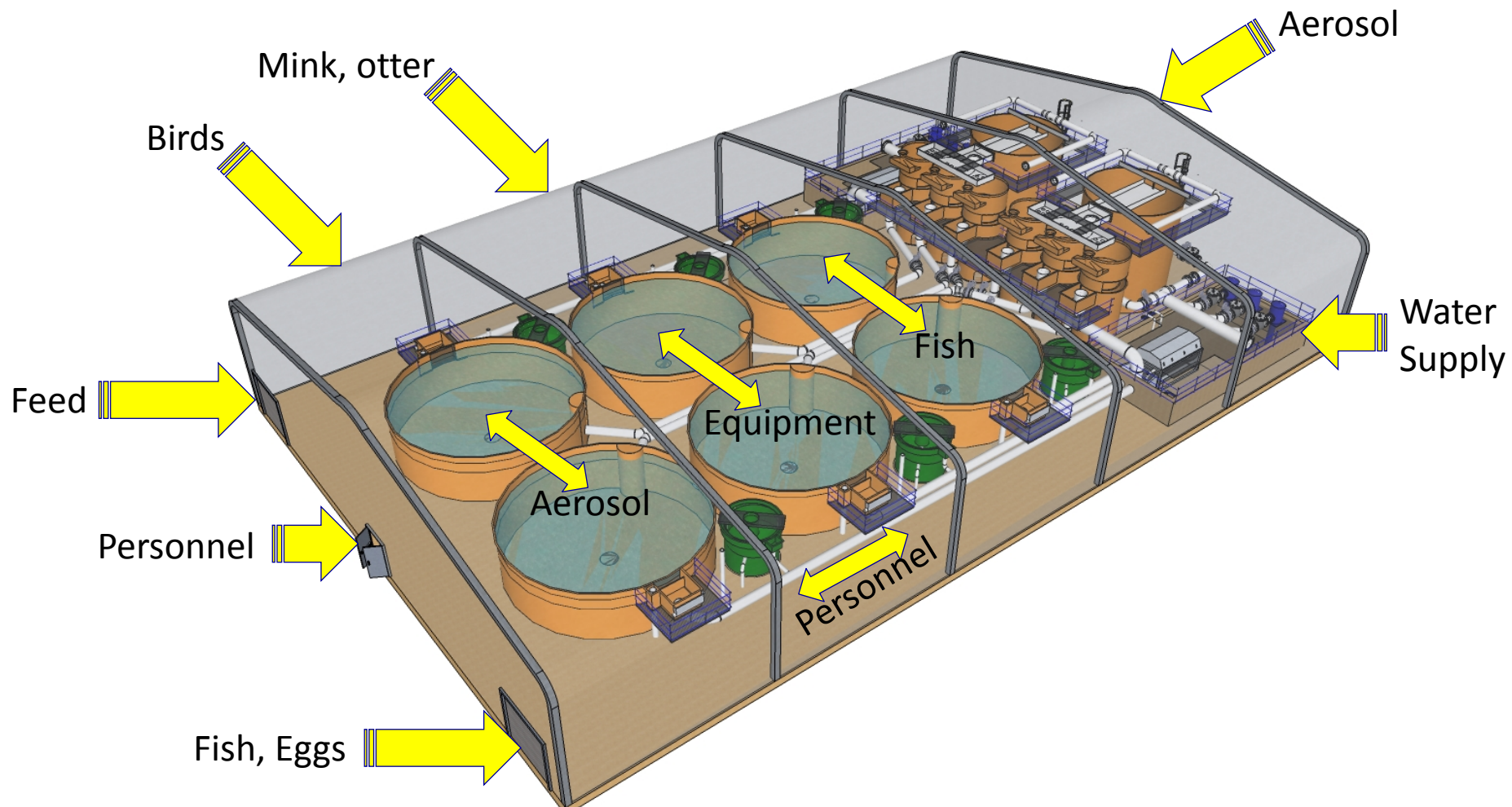
Disinfection

- Removal, deactivation or killing of pathogens

Sterilization

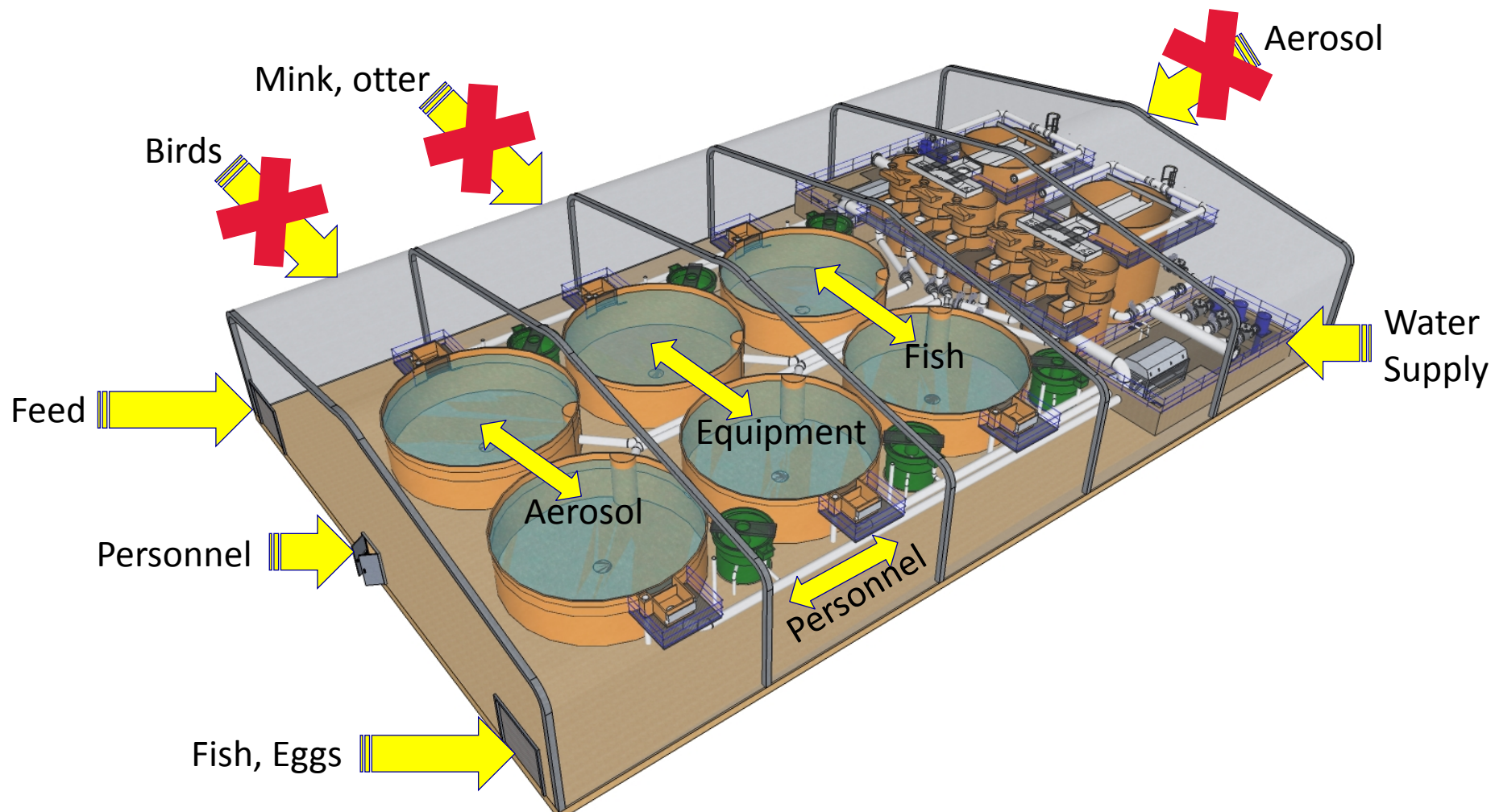
- Removal of all microbes, including pathogens

Modes of Pathogen Transmission in WRAS Facilities





Design Element: WRAS Enclosure











Design Element: WRAS Enclosure

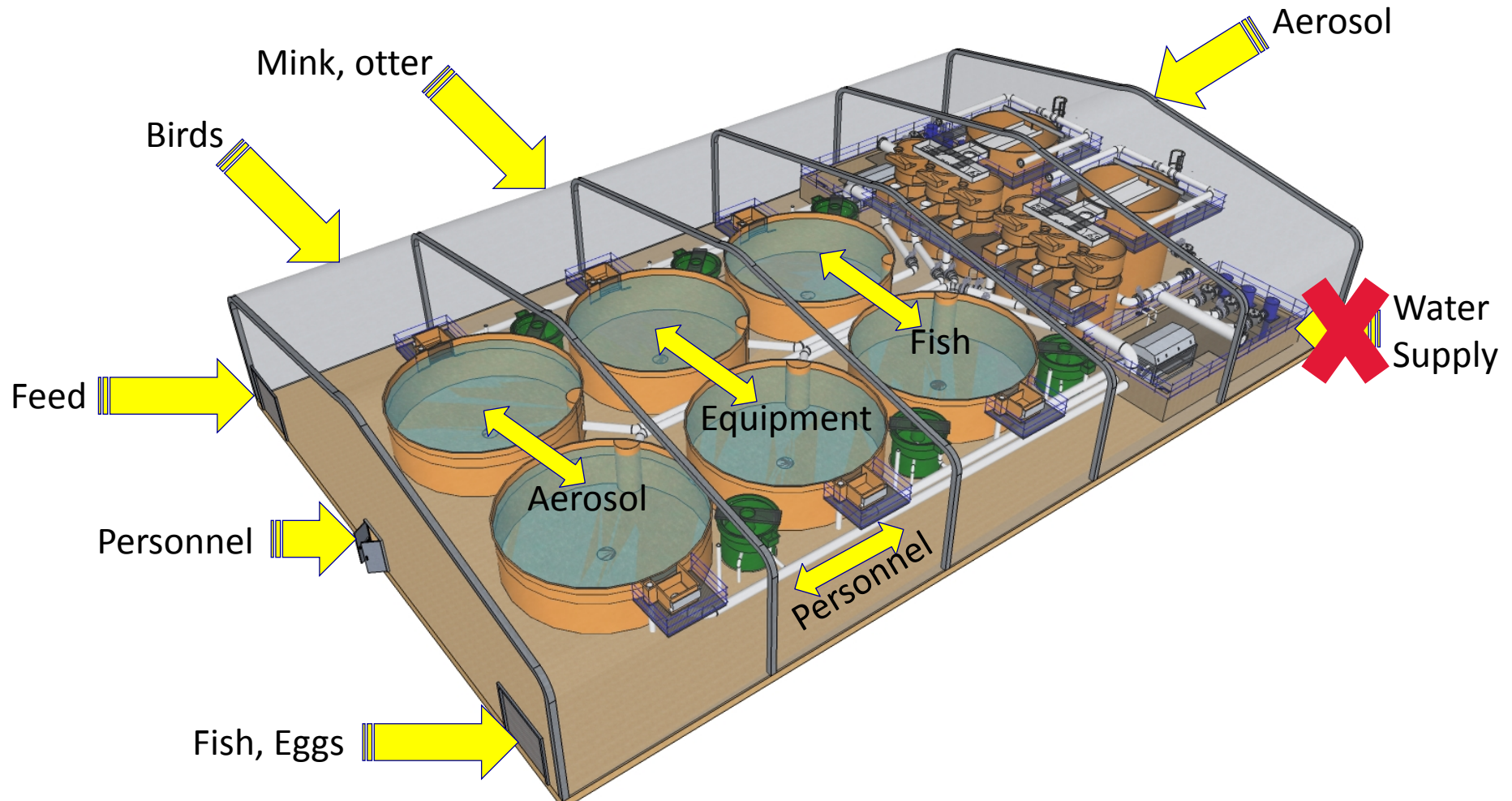
Pros:

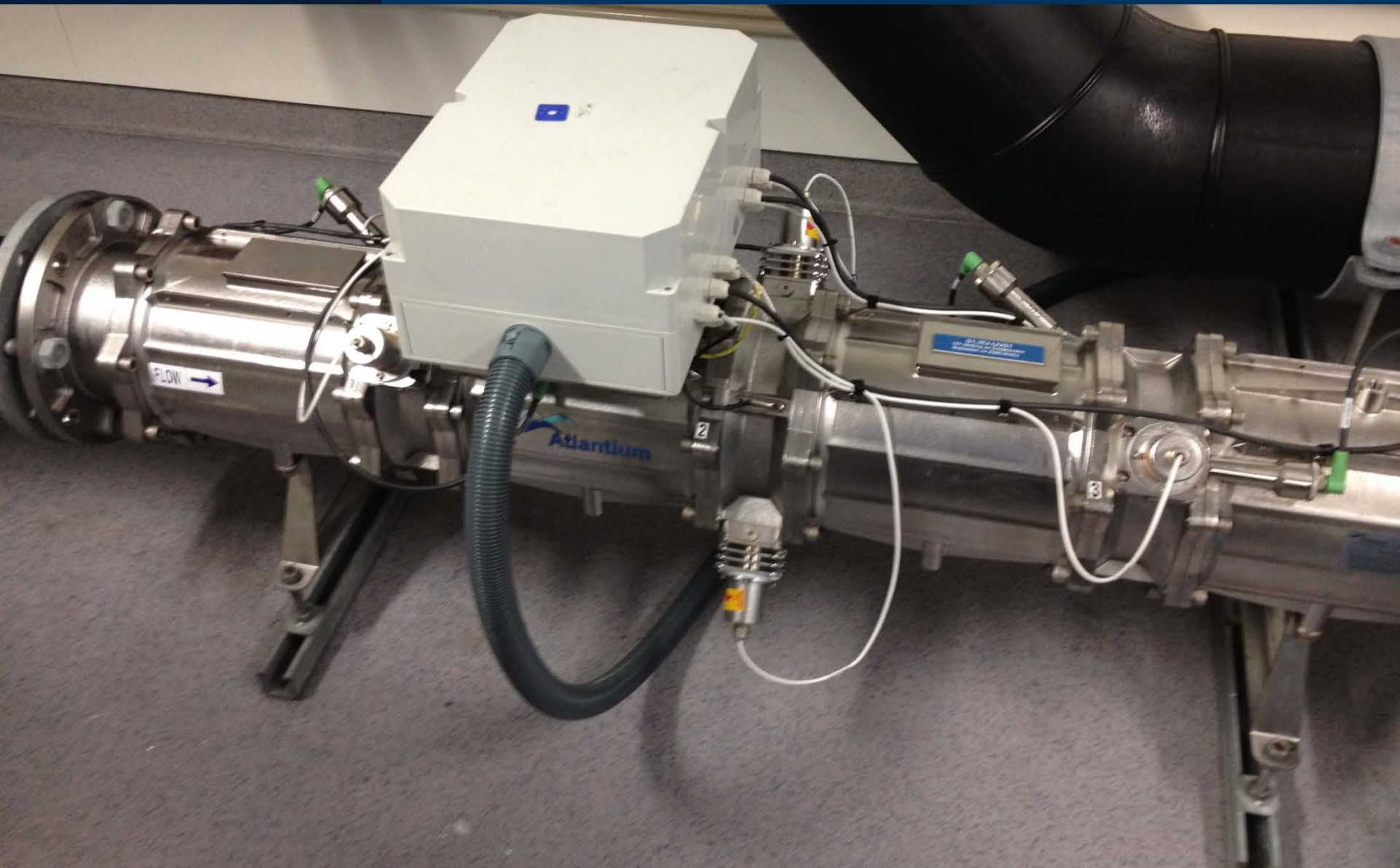
- Minimizes or eliminates bird and mammal contact
- Seriously impacts the probability of pathogen entry via personnel, fish, and eggs

Cons:

- Enclosure can be one of the most expensive capital components of a WRAS facility

Design Element: Inlet Disinfection





Design Element: Inlet Disinfection

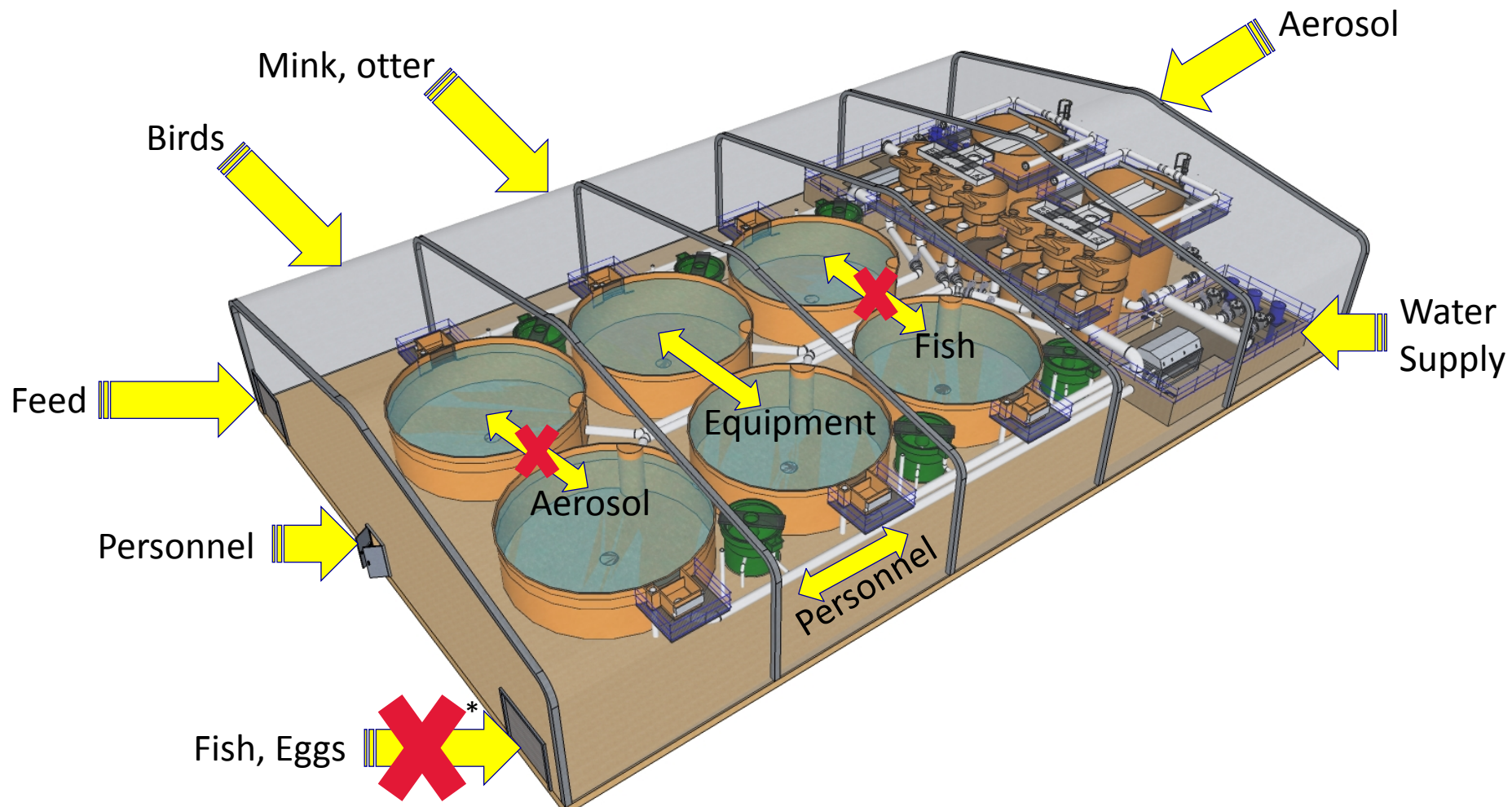
Pros:

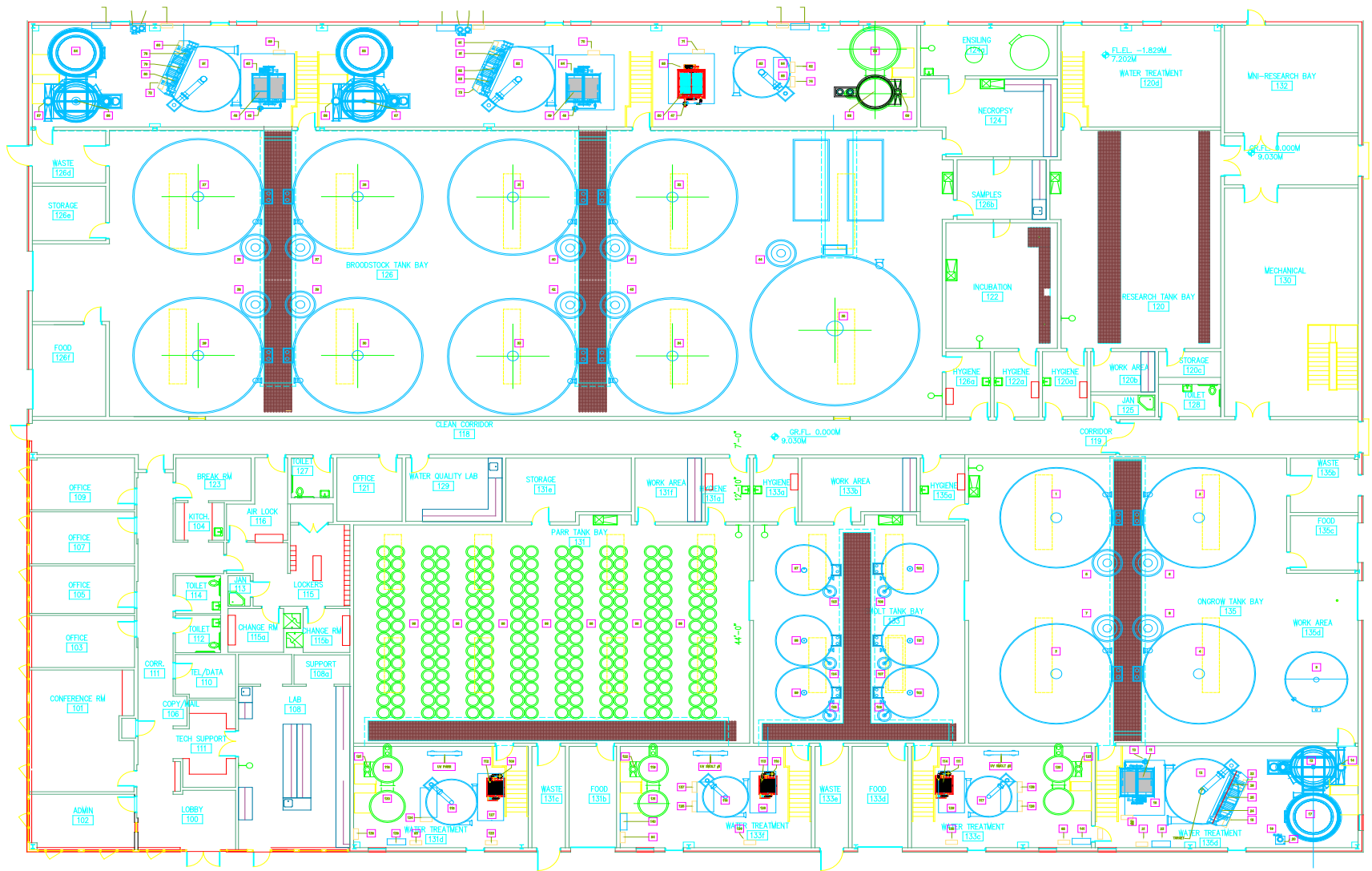
- Minimizes pathogen transfer via the inlet water supply

Cons:

- Capital cost of the unit
- Operating cost for power and lamps
- Requires backup systems for maintaining treatment (gen-set and UPS)

Design Element: Division of Modules





USDA ARS NCWMAC (ME)





Quarantine Module

A separately managed, dedicated area to receive and hold fish for a specified period prior to introduction to the main facility, in order to reduce the risk of pathogen introduction. Screening, stress-testing, etc. to take place during the quarantine period. Optimally a separate building but can be incorporated into the main building if necessary with proper safeguards.

Quarantine Module

- Independent WRAS
- Must be physical separated
- Allow for two or more months of production
- Provide an option for stress testing (e.g., temperature)

Design Element: Module Divisions

Pros:

- Reduces pathogen transfer by having separate WRAS
- Reduces or eliminates pathogen transfer by aerosols and splashing when physical walls are present
- With effective quarantine, reduces or eliminates pathogen transfer from bringing fish into a facility

Cons:

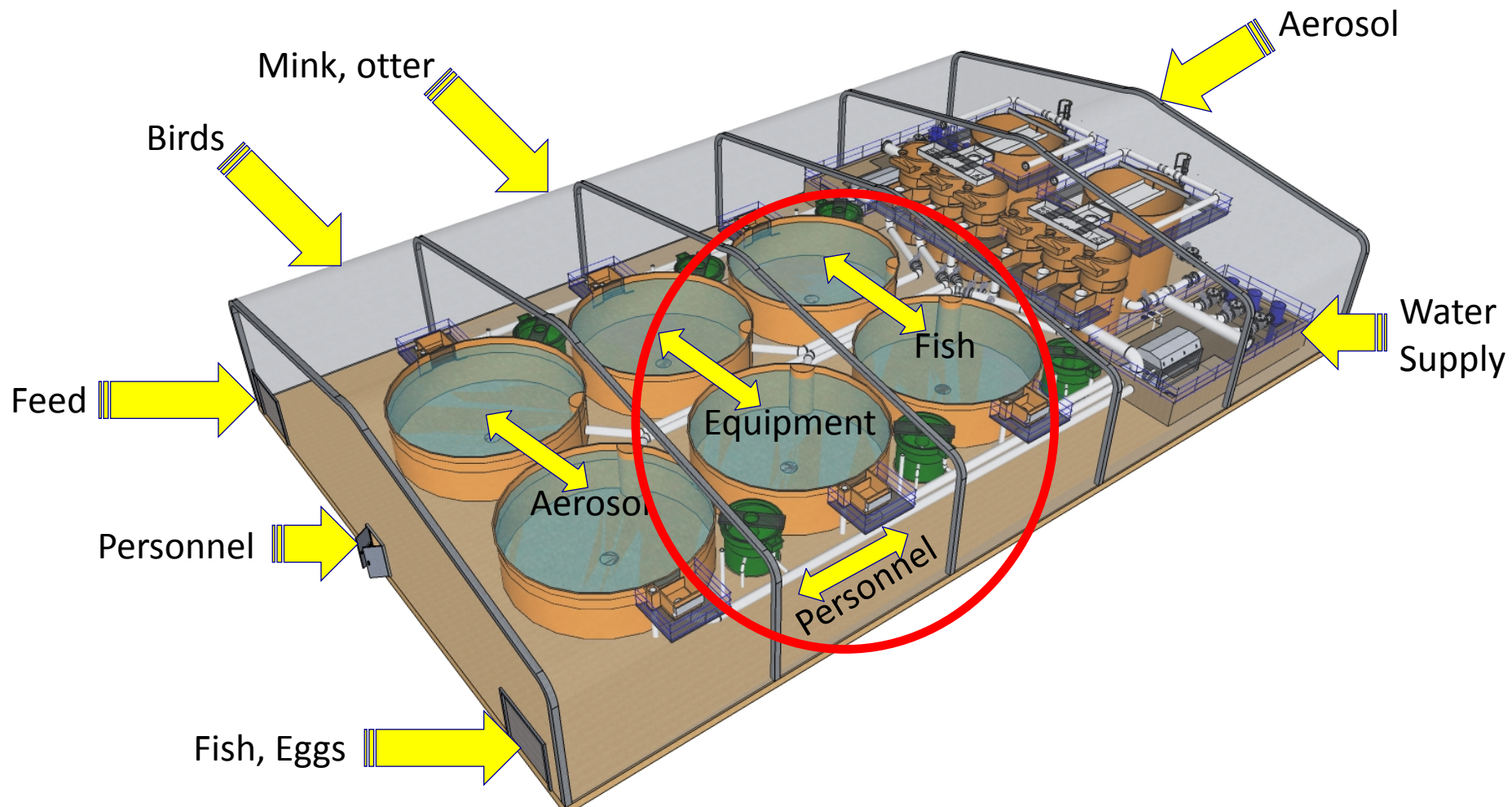
- Capital cost of creating WRAS modules
- Can be circumvented by not implementing SOPs







What About Personnel, Equipment, & Fish Inside the Facility



What About Personnel, Fish, and Equipment Inside the Facility?

- Requires a biosecurity plan and following standard operating procedures
- Can be aided by physical barriers, but that does not secure implementation





AREA
SUCIA

Mantenga
Limpio

No
Fumar

Acknowledgement

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