

Model Aquatic Health Code (MAHC) Transition Guide for Pool Operators

Recreational Water Team
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MAHC Transition Guide for Pool Operators

All equipment must meet National Sanitation Foundation (NSF)/American National Standards Institute (ANSI) Standard 50.


 Indicates item is an Imminent Health Hazard meaning it will result in pool closure (unless corrected during time of inspection).

1. Recirculation Systems

General Guidelines

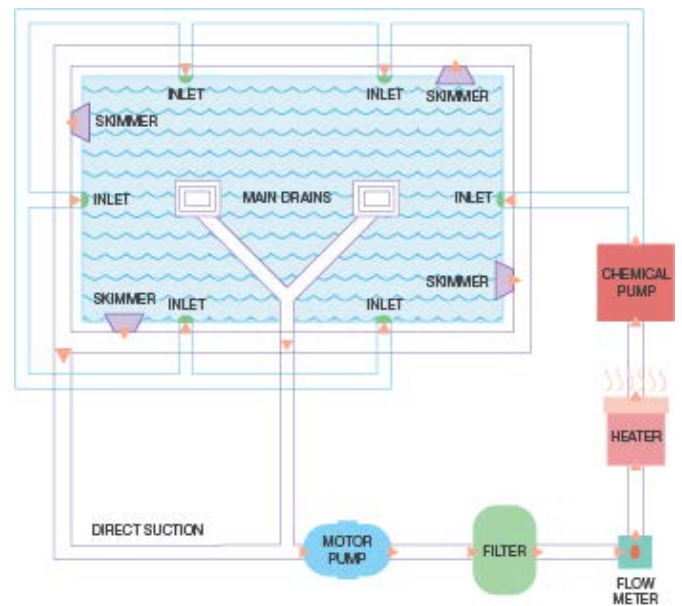
- ✓ Recirculation systems must be maintained to run continuously. 
- ✓ Minimum six-hour turnover rate required.

Main Drains

- ✓ Approximately 30% of water collected should go through main drains.
- ✓ Main Drains should not be able to trap a person with direct suction, a minimum of two main drains required. Drains required to be no less than three-feet apart.
- ✓ Main drain covers cannot be flat; covers must be secure and intact. 

Skimmers

- ✓ Overflow systems (gutters or skimmers) must be located below water level.
- ✓ Approximately 70% of water should go through skimmers/gutters.
- ✓ Skimmers are required to have weir doors present.



2. Filtration Systems

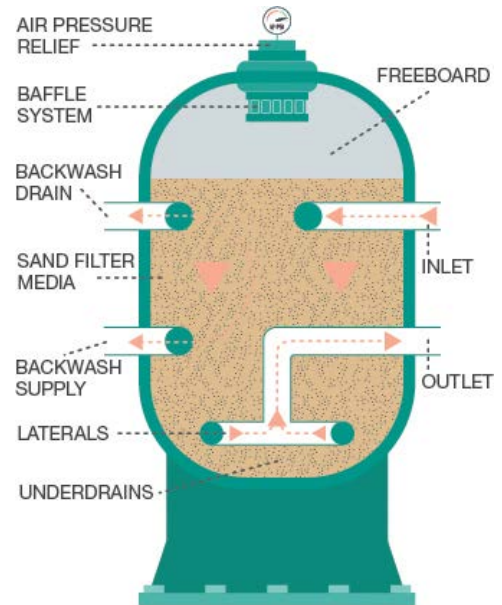
Filtration is important because adequate filtration ensures proper water clarity, sanitation, pathogen removal, and removal of particles from water that may interfere with disinfection.

Types of Sand Filters Allowed

- ✓ High rate sand
- ✓ Pressure (pump before filter)
- ✓ Vacuum (pump after filter)
- ✓ Horizontal modular high rate sand
- ✓ Multicell high-rate sand

Sand Filters Required to Have

- ✓ Influent pressure gauge
- ✓ Effluent pressure gauge
- ✓ Backwash sight glass
- ✓ Air relief valve



Note: Required accessories are the same for Diatomaceous Earth (DE) filters (vacuum and pressure).

Backwashing Sand Filters

- ✓ Filter gauges should show pressure difference of 7-10 psi. If difference is more, it needs to be backwashed.
- ✓ Rate of backwash should be about the same as the rate of filtration, and the process should only take about 2-3 minutes.
- ✓ Ensure that backwash is being discharged into wastewater system, between end of discharge pipe and flood rim level there should be an air gap two times the diameter of the discharge pipe.

Diatomaceous Earth (DE) Filter

- ✓ DE Filters can be vacuum (pump after filter) or pressure filters (pump before filter).
- ✓ Disposable DE filter should be replaced twice per year after each backwash.
- ✓ DE powder should be handled with care with proper safety equipment such as respiratory protection, gloves, and goggles.

3. Disinfection Systems

Required to perform daily monitoring and adjusting of pH, calcium hardness, total alkalinity, temperature, and chlorine/bromine. Automated controllers/feeders will be required within one year of MAHC adoption.

- ✓ pH must be between 7.2-7.8, and preferably between 7.4-7.6. ⚠
- ✓ Free chlorine residual must be at least 1.0 mg/L (without cyanuric acid) or 2.0 mg/L (with cyanuric acid) and must not be above 10 mg/L. ⚠
- ✓ Bromine concentration must be at least 3.0 mg/L in pools and 4.0 mg/L in spas and must not be above 10 mg/L. ⚠

4. Pool and Spa Area

Barriers and Enclosures/Doors and Gates ⚠

- ✓ Must be at least six-feet high.
- ✓ Cannot have openings large enough for a child to fit through (spaces more than two inches).
- ✓ Primary access gates/doors must be self-closing and self-latching.
- ✓ Knobs/handles must be at least 4.5-feet high.
- ✓ Doors and gates must swing outward.

Electrical Hazard Clearance ⚠

- ✓ Overhead electrical lines may not be present within 20-feet of swimming pool, unless operator obtains letter from utility company stating that lines are compliant with National Electric Codes 680 standards.
- ✓ Unprotected electrical circuits may not be within six-feet of aquatic venue.
- ✓ Non-Ground Fault Circuit Interrupter protected electrical receptacles prohibited within 20-feet of the inside wall of aquatic venue.

Grab Rails and Ladders

- ✓ Requirement of at least two means of access/egress per pool (stairs with handrails/grab rails, ladders, ramps, zero depth entries).
- ✓ Pools wider than 30-feet must have means of access/egress on each side of pool that are no more than 75-feet apart.

Deck Area must

- ✓ Be in good condition, no cracks or surface disturbance.
- ✓ Be wide enough for bathers to pass without tripping on equipment.
- ✓ Have enough clearance for emergency personnel to pass.
- ✓ Have no standing water present.
- ✓ Have no glass/broken glass or sharp objects present. ⚠

Safety Markings

- ✓ Pools deeper than five-feet must have clear and permanent line of contrasting color 2-6 inches in width; should be installed on pool floor at shallow end of break in slope, and extend up walls to waterline.
- ✓ Float line should be present, starting 12-inches in shallow end before contrasting band begins.
- ✓ Depth and no diving markings must be present on vertical pool wall and on pool deck next to pool. ⚠
- ✓ Depth and no diving markings must be at least four-inches high, be of contrasting color, permanent, and slip resistant.



Emergency/Safety Equipment

- ✓ Required to have functional telephone, communication system, or device capable of dialing 911.
- ✓ Emergency phone should be clearly visible and easily accessible, with sign stating address and phone number of aquatic facility.
- ✓ Must have first aid kit and bloodborne pathogen kit available.
- ✓ Required to have safety equipment including spinal injury board, throw device, rescue tube (if lifeguard is present) and shepherd's hook. ⚠
- ✓ Emergency lighting source is available and maintained. ⚠
- ✓ If lifeguard is not present, there must be a "No Lifeguard on Duty" sign.
- ✓ Required to have signs containing information regarding bather load, pool rules, chemicals, and spa rules.



Spas

- ✓ Maximum temperature must not exceed 104°F.
- ✓ Jets/agitation system must not be on timer that can run for longer than 15 minutes.
- ✓ Must have emergency shutoff/control switch which is clearly labeled.

5. Water Chemicals

- ✓ Aquatic venue should have adequate water clarity (main drains are visible). ⚠
- ✓ Chemicals being used are approved and are being used appropriately. ⚠

Test Kits

- ✓ Test kit must be present during inspection. Test kit should be certified to NSF/ANSI Standard 50 by ANSI-Accredited Certification Organization.

Disinfection Levels ⚠

- ✓ Free and combined chlorine must both be measured.
- ✓ Combined chlorine level should not be at or greater than 0.4 ppm.
- ✓ Cyanuric acid levels cannot exceed 100 ppm.
- ✓ Total alkalinity should be between 60-180 mg/L.
- ✓ Ideal calcium hardness should be between 100-200 ppm and cannot exceed 1,000 ppm.

6. Equipment and Chemical Room

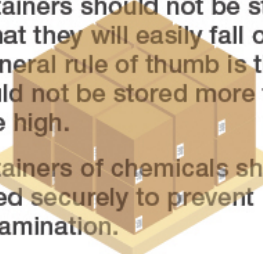
- ✓ Automated feeders are required by the MAHC, should be able to monitor free available chlorine or total bromine, and pH. Must be installed within one year of MAHC adoption.
- ✓ Piping and valves must be properly labeled with arrows and colors. (shown to the right)
- ✓ Flow meters must be present and functioning, as well as cleaned and inspected annually. Most accurate flow meters are magnetic and ultrasound.
- ✓ Recirculation pumps should never be run without strainer in place. Strainer should always be primed or filled with water. Required to be self-priming or flooded suction. Pump must be strong enough to fully recirculate pool water. ⚠
- ✓ Filters must be operating correctly and meet regulatory standards. ⚠
- ✓ Pump strainer should be checked and cleared every week.

	Potable water lines (Dark blue)
	Backwash waste (Dark brown)
	Filtered water (Aqua)
	Sewer (Dark gray)
	Skimmer or gutter return (Olive green)
	Deck drains (Light brown)
	Main drain (Black)
	Alum (Orange)
	Chlorine (gas/solution) (Yellow)
	Compressed air (Dark green)
	Soda ash (White)
	Gas (Red)
	Acid (Pink)

- ✓ Filter gauges must be operable, sight glass at top of filter should show clear water, gauges need to be present at filter inlet and outlet, showing pressure differential.
- ✓ Chemicals should be stored in enclosed, labeled area that is not easily accessed by bathers. Should not be combustion, electrical, or air-handling equipment nearby. ⚠
- ✓ Personal Protective Equipment (PPE) including respirator, skin protection (gloves), eye protection, and protective clothing type, should be accessible and available.

The MAHC recommends the following best practices

- ✓ Place all chemical containers, drums, boxes, and bags on pallets to raise them off the floor.
- ✓ Containers should not be stacked so that they will easily fall over. A general rule of thumb is that they should not be stored more than three high.
- ✓ Containers of chemicals shall be closed securely to prevent contamination.
- ✓ Any shelving units used to store chemicals should be sturdy enough to support the weight of the chemicals being stored.



7. Hygiene Facility

Aquatic facilities should have easily accessible/visible water fountains, toilets, diaper changing stations, hand washing stations, trash receptacles, and showers.

None of the hygiene facility requirements are listed as imminent health hazards, details of hygiene facility requirements can be found in [MAHC](#).

8. Records and General Inspection Items

Aquatic facility provides appropriate supervision and staffing as required. ⚠

Potable water is coming from approved and non-contaminated water supply source. ⚠

Number of bathers/patrons will not exceed theoretical peak occupancy. ⚠

Records room should contain items including training certifications, emergency action plan, and daily operator logs.

Operator certification: Must have available record of aquatic facility operator training certification.

Daily Operator Inspection: Items checked daily by operator should include:

- ✓ Operational conditions such as water chemistry, temperature, filter pressure differential, flow meter readings and water clarity.
- ✓ Maintenance performed such as backwashing or change of equipment.
- ✓ Incidents and responses such as fecal incidents in water and injuries.
- ✓ Staff training and attendance.

Corrective Actions: After completion of daily checklist, corrective actions should be performed by pool operator and recorded. This should be done prior to pool opening.

Chemical Inventory Log: Log should be up to date with list of chemicals received and used as well as approximate quantities.

Emergency Action Plan: Plan should include procedures to respond to severe weather events, drowning or injury, contamination of water, chemical incidents, communication and coordination with emergency responders and local health department.

Cross Connections: Acceptable cross connection prevention measures include adequate air gap (vertical distance of two times pipe diameter) or Reduced Pressure Zone (RPZ). ⚠️

Emergency Lighting: Aquatic facilities required to have emergency lighting that is compliant with local building codes. ⚠️

Emergency action plans should contain the following information:

- ✓ Outline the types of emergencies and IHH
- ✓ Outline the methods of communication between responders, emergency services and patrons
- ✓ Identify each anticipated responder
- ✓ Outline the tasks of each responder
- ✓ Identify required equipment for each task
- ✓ Emergency closure requirements

Is my aquatic facility ready for MAHC checklist?

1. Recirculation System

- Recirculation system is operating continuously. ⚠️
- Recirculation equipment ensures a minimum six-hour turnover rate is achieved.
- Approximately 30% of water collected will go through main drains.
- There are at least two main drains, which are a minimum of three feet apart.
- Main drain covers are not flat, covers are secure and intact. ⚠️
- Overflow systems (skimmers/gutters) are below water level and have weir doors.
- Skimmers account for approximately 70% of water collected.

2. Filtration Systems

- Filters are sand, diatomaceous earth or cartridge.
- Filters have all accessories required by MAHC.

3. Disinfection Systems

- Chlorine/bromine, pH, calcium hardness, total alkalinity and temperature measurements all meet set standards and are recorded daily. ⚠️

4. Pool and Spa Area

- Barriers/enclosures are at least six-feet high, and don't have openings large enough for a child to fit through.⚠️
- Doors and gates are self-closing and latching, handles are at least 4.5-feet high.⚠️
- Overhead electrical lines are not present within 20-feet of swimming pool.⚠️
- Unprotected electrical circuits are not present within six-feet of aquatic venue.
- Non Ground-Fault Circuit Interrupter protected electrical receptacles are not present within 20-feet of inside wall of aquatic venue.⚠️
- There is a minimum of two means of access/egress per pool (stairs with handrails/grab rails, ladders, ramps, zero-depth entries), pools wider than 30-feet have means of access/egress on each side of pool that are no more than 75-feet apart.
- Deck area is in good condition, has no cracks or surface disturbance, is wide enough for bathers and emergency personnel to pass without tripping and does not have any standing water present.
- Pools deeper than five-feet have clear and permanent line of contrasting color 2-6 inches in width, installed on pool floor at shallow end of break in slope, and extends up walls to waterline, along with float line present.
- Depth and no diving markings are present on vertical pool wall above water line and on surrounding pool edge and are at least four-inches high, of contrasting color, permanent, and slip resistant.⚠️
- There is a functional telephone, communication system, or device capable of dialing 911 which is clearly visible and easily accessible.
- Emergency light source is present and properly maintained.⚠️
- First aid kit and bloodborne pathogen kit are available.
- Safety equipment including spinal injury board, throw device, rescue tube (if lifeguard present), shepherd's hook, and "No Lifeguard on Duty" sign is present.⚠️
- Signs containing information on bather load, pool rules, chemicals, and spa rules are present.
- Glass is prohibited on pool deck.⚠️
- Spa does not exceed temperature of 104°F, jet/agitation system does not run longer than 15 minutes at a time and has emergency shutoff/control switch that is clearly labeled.

5. Water Chemicals

- Aquatic venue does not smell of chlorine or other chemicals.
- Test kit is an approved NSF/ANSI Standard 50 DPD test kit.
- Chemicals being used are approved and being used appropriately. ⚠️

6. Equipment and Chemical Room

- Automated feeders are present or will be installed within one year of MAHC adoption.
- Piping and valves are clearly labeled.
- Flow meters are present and functioning.
- Recirculation pumps always have strainer primed or filled with water, is strong enough to fully circulate water.

7. Hygiene Facilities

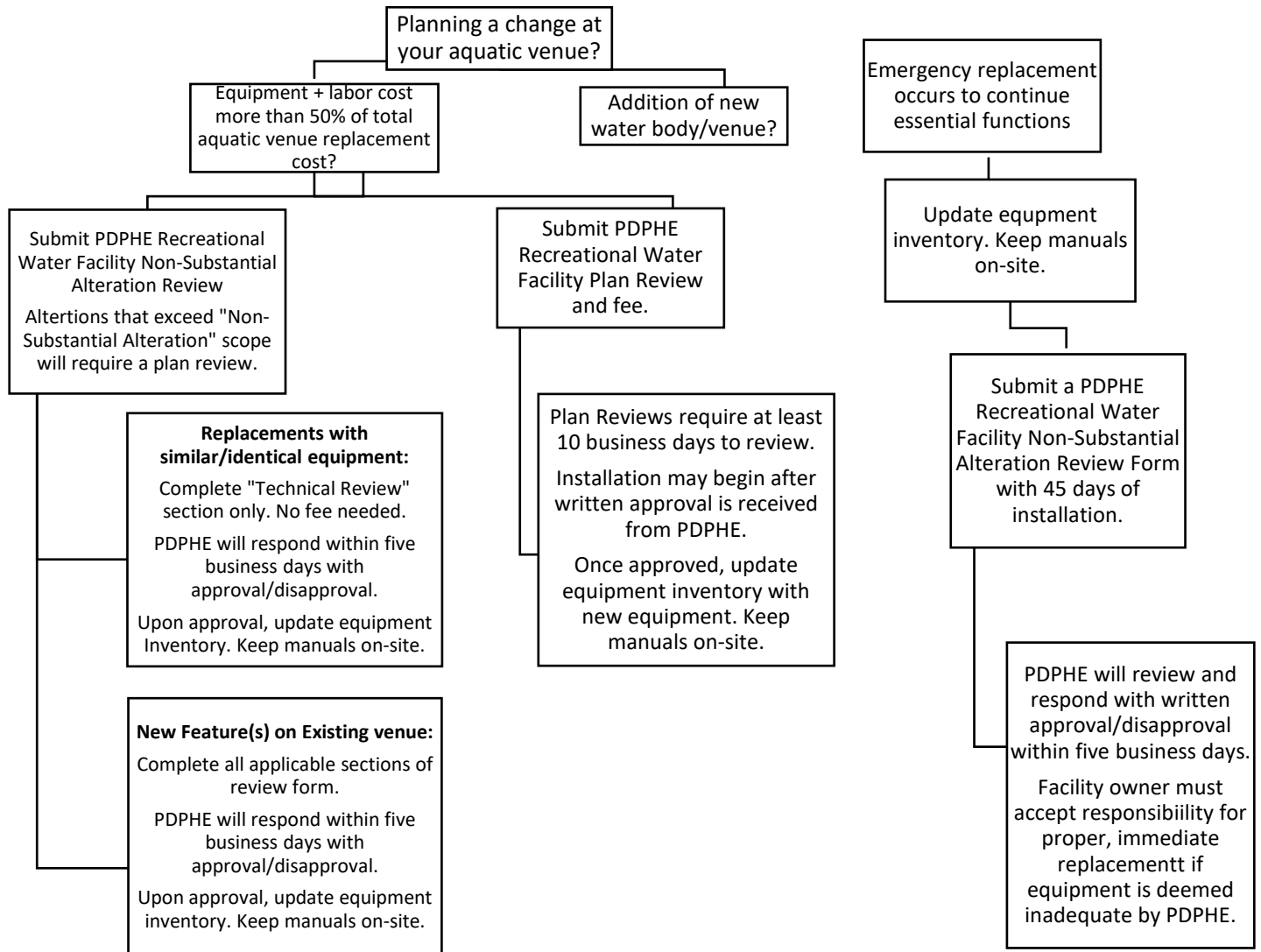
- Diaper changing stations are present and meet MAHC requirements.

8. Records and General Inspection Items

- Daily operational records are maintained and available along with corrective actions log.
- Aquatic facility provides appropriate supervision and staffing as required. ⚠️
- Number of bathers/patrons will not exceed peak occupancy. ⚠️
- Emergency action plan is updated and available.
- Cross connections are avoided through adequate air gaps and/or Reduced Pressure Zone (RPZ). ⚠️
- Aquatic facility has emergency lighting that is compliant with local building codes.
- Water supply is approved and noncontaminated. ⚠️
- The bottom of the pool is clearly visible. ⚠️

Recreational Water Facility Plan Review Decision Tree

This document is intended to determine if a facility change will require a Plan Review or Non-Substantial Alteration Review. Please read the Model Aquatic Health Code (MAHC) at www.cdc.gov/mahc/index.html for more information regarding plan reviews and alterations. See page 2 for MAHC references.



A plan review is necessary for substantial alterations. Substantial alteration means the alteration, modification, or renovation of an aquatic venue (for outdoor aquatic facilities) or indoor aquatic facility (for indoor aquatic facilities) where the total cost of the work exceeds 50% of the replacement cost of the aquatic venue (for outdoor aquatic facilities) or indoor aquatic facility (for indoor aquatic facilities).

A non-substantial alteration review is necessary for non-substantial alterations such as new features costing less than 50% of replacement cost of the aquatic venue. Replacement of

pumps, filters, feeders, controllers, skimmers, flow-meters, valves, or other similar equipment with identical or substantially similar equipment require an alteration review. Non-Substantial Alterations means the alteration, modification, or renovation of an aquatic venue (for outdoor aquatic facilities) or indoor aquatic facility (for indoor aquatic facilities) where the total cost of the work does not exceed 50% of the replacement cost of the aquatic venue (for outdoor aquatic facilities) or indoor aquatic facility (for indoor aquatic facilities).

MAHC guidelines used in the decision tree on page one regarding plan reviews, alterations, and replacements are included below. Utilize the MAHC for more guidance on specific requirements.

- The aquatic facility owner planning a non-substantial alteration shall contact the authority having jurisdiction to review proposed changes prior to starting the non-substantial alteration. (MAHC 4.1.3.2.1)
- The aquatic facility operator shall consult with the authority having jurisdiction to determine if new or modified plans must be submitted for plan review and approval for other non-substantial alterations proposed. (MAHC 4.1.3.2.2)
- Prior to replacing equipment, the aquatic facility owner shall submit technical verification to the authority having jurisdiction that all replacement equipment is equal to that which was originally approved and installed. (MAHC 4.1.3.3.1)
- Replacement Equipment Equivalency: The replacement of pumps, filters, feeders, controllers, skimmers, flow-meters, valves, or other similar equipment with identical or substantially similar equipment may be done without submission to the authority having jurisdiction for approval of new or altered aquatic facility plans. (MAHC 4.1.3.3.2)
- Equipment Inventory: A comprehensive inventory of all mechanical equipment associated with each aquatic venue shall be available at the aquatic facility (MAHC 5.4.2.2.2)
- This inventory shall include: 1) Equipment name and model number, 2) Manufacturer and contact information, 3) Local vendor/supplier and technical representative, if applicable, and 4) Replacement or service dates and details. (MAHC 5.4.2.2.3)
- Operation manuals for all mechanical equipment associated with each aquatic venue shall be available at the aquatic facility. (MAHC 5.4.2.2.4)
- If no manufacturer's operation manual is available, then the aquatic facility should create a written document that outlines standard operating procedures for maintaining and operating the piece of equipment. (MAHC 5.4.2.2.4.1)
- In emergencies, the replacement may be made prior to receiving the authority having jurisdiction's approval, with the owner accepting responsibility for proper immediate replacement, if the equipment is not deemed equivalent by the authority having jurisdiction.
- Where emergency replacements are installed as per MAHC 4.1.3.3.3, the owner shall submit documentation for review and approval of the replacement to the authority having jurisdiction within 45-days. (MAHC 4.1.3.3.3.1)
- The authority having jurisdiction shall provide the aquatic facility owner written approval or disapproval of the proposed replacement equipment's equivalency. (MAHC 4.1.3.3.4)
- Documentation of proposed, approved, and disapproved replacements shall be maintained in the authority having jurisdiction's aquatic facility files. (MAHC 4.1.3.3.5)

CDC Incident Response Guidelines:

www.cdc.gov/healthywater/swimming/pdf/fecal-incident-response-guidelines.pdf

www.cdc.gov/healthywater/swimming/pdf/hyperchlorination-to-kill-crypto-when-chlorine-stabilizer-is-in-the-water.pdf

www.cdc.gov/healthywater/swimming/pdf/hyperchlorination-to-kill-crypto-when-chlorine-stabilizer-is-not-in-the-water.pdf

www.cdc.gov/healthywater/pdf/swimming/pools/water-contamination-response-log.pdf