

Model Aquatic Health CODE

Draft Module

Operator Training CODE Section

Modified after the First 60-day Review that Closed on 10/31/2010

Informational Copy: NOT Currently Open for Public Comment

This version of the MAHC Operator Training module has been modified based on the first round of public comments received. It is being re-posted so users can view how it was modified but is not currently open to public comment. The complete draft MAHC, with all of the individual module review comments addressed will be posted again for a final review and comment before MAHC publication. This will enable reviewers to review modules in the context of other modules and sections that may not have been possible during the initial individual module review. The public comments and MAHC responses can be viewed on the web at <http://www.cdc.gov/healthywater/swimming/pools/mahc/structure-content/>

MAHC Operator Training Module Abstract

Increased pool code violations have been linked to the lack pool operator training. These violations may also be linked to an increased potential for health effects if a facility is not operated and maintained appropriately. The Operator Training Module is a first step towards assuring adequate training for all personnel who operate aquatic facilities. The Operator Training Module contains requirements for:

- 1) Training course elements to be included in curricula
- 2) Instructor qualifications
- 3) Certificate validity to be for 5 years maximum

To make the module more complete and interpretable, proposed language from the Regulatory Program Administration Module is also included (6.3.1.1, 6.3.1.2). This language outlines the requirement for operator training and the aquatic facilities requiring on-site qualified operators.

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Acronyms in this Module:

CDC	Centers for Disease Control and Prevention
CEU	Continuing Education Units
CPSC	Consumer Product Safety Commission
MAHC	Model Aquatic Health CODE
MSDS	Material Safety Data Sheet
NEISS	National Electrical Injury Surveillance System
NFPA	National Fire Protection Association
NPDS	National Poison Data System
OSHA	Occupational Safety and Health Administration
RWI	Recreational Water Illness}
TDH	Total Dynamic Head
TDS	Total Dissolved Solid

Glossary Terms in this Module:

“Aquatic Facility” means a physical place that contains one or more aquatic venues and support infrastructure under a single management structure.

“Aquatic Feature” means an individual component within an aquatic venue. Examples include mushrooms, slides, buckets, spray guns/nozzles, and other play features.

“Aquatic Venue” means an artificially constructed or modified natural structure where the general public is exposed to water intended for recreational or therapeutic purpose. Such structures do not necessarily contain standing water so water exposure may occur via contact, ingestion, or aerosolization. Examples include swimming pools, wave pool, river, spas (including spa pools and hot tubs), splash pads, slide landing pools, interactive fountains, and/or therapy pools. Facilities may contain more than one of these venues in any combination.

“Bather” means a person at an aquatic venue who has contact with water either through spray or partial or total immersion. Bathers can be exposed to contaminated water as well as potentially contaminate the water.

“Breakpoint Chlorination” means the conversion of inorganic chloramine compounds to nitrogen gas. When CHLORINE is added to water containing ammonia (from urine, sweat, or the environment, for example), it reacts with the ammonia to form chloramines. If more CHLORINE is added, the total residual CHLORINE continues to rise until the concentration reaches a point that forces the reaction with ammonia to go to rapid completion. In this reaction, the inorganic chloramines are converted to DICHLORAMINE, then to nitrogen trichloride, and then to nitrogen gas. Compounds of nitrogen and CHLORINE are released into the water, and the apparent residual CHLORINE decreases. The point at which the drop occurs is referred to as the “breakpoint”. The amount of free CHLORINE that must be added to the water to achieve breakpoint chlorination is approximately ten times the amount of combined CHLORINE in the water. As additional CHLORINE is added, all inorganic combined CHLORINE compounds disappear, resulting in a decrease in eye irritation potential and “CHLORINE odors.”

“Chlorine” means an element that at room temperature and pressure is a heavy green gas with characteristic odor and is extremely toxic. It can be compressed in liquid form and stored in heavy steel tanks, but most AQUATIC VENUES now add other CHLORINE compounds (e.g. hypochlorite) that similar to the liquid form release hypochlorous acid when dissolved in water. Chlorinating agents are the most commonly used disinfectants for AQUATIC VENUES.

“Code” means a systematic statement of a body of law, especially one given statutory force.

“Contaminant” means a substance that soils, stains, corrupts, or infects another substance by contact or association.

“CT Value” means a representation of the concentration of the disinfectant (C) multiplied by time in minutes (T) needed for inactivation of a particular contaminant. The concentration and time are inversely proportional; therefore, the higher the concentration of the disinfectant, the shorter the contact time required for inactivation.

“Disinfection” means the reduction of pathogens (disease causing organisms).

“Indoor Aquatic Facility” Note from Ventilation Committee: *1.2 Exclusions – This section does not apply to aquatic facilities that meet the definition of an Open Building per IBC. (Annex 1.2.2.)*

“Patron” means a bather or a person at an aquatic facility who may or may not have contact with venue water either through partial or total immersion. Patrons may not have contact with venue water, but could still be exposed to potential contamination from the aquatic facility.

“Performance measures/Performance-based design” means an engineering approach to design elements of a facility based on agreed upon performance goals and objectives, engineering analysis and quantitative assessment of alternatives against the design goals and objectives using accepted engineering tools, methodologies, and performance criteria. It is different from the prescriptive approach, which identifies specific requirements for the design of a facility.

“pH” means a symbol that expresses the negative log of the concentration of hydrogen ions. When water ionizes, it produces hydrogen ions (H+) and hydroxide ions (OH-). If there is an excess of hydrogen ions the water is acidic. If there is an excess of hydroxide ions the water is basic. PH ranges from 0 to 14. Pure water has a PH of 7.0. If PH is higher than 7.0, the water is said to be basic, or alkaline. If the water’s PH is lower than 7.0, the water is acidic. As PH is raised, more ionization occurs and CHLORINE disinfectants decrease in effectiveness.

“Qualified Operator” means a person who meets the requirements specified in MAHC 6.1.1.

“Responsible supervisor” means an individual responsible for water treatment operations when a “qualified operator” is not on-site at an aquatic facility.

“Standard” means something established by authority, custom, or general consent as a model or example.

Preface: This document does not address all health and safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate health and safety practices and determine the applicability of regulatory limitations prior to each use.

Model Aquatic Health CODE

Operator Training Module Code Section

6.0 Policies and Management

<i>Key word</i>	<i>Section</i>	<i>CODE</i>	<i>Grade</i>
	6.0	Policies and Management	
<i>Operator Availability</i>	6.3.1.1	<u>Proposed language from the Regulatory Program Administration module:</u> A QUALIFIED OPERATOR shall be available on-site during all hours of operation at the following AQUATIC FACILITIES: <ol style="list-style-type: none"> 1) Those with more than two AQUATIC FEATURES, 2) or with a facility of over 50,000 gallons of water, 3) or frequented by an average of more than 200 patrons daily, 4) or used for therapy, 5) or used to provide swimming training, 6) or run by a municipality, 7) or run by a school, 8) or facilities that include spray features, 9) or facilities with a history of CODE violations which in the opinion of the permit issuing official require additional on-site qualified supervisors. 	
<i>Contracted Off-Site Qualified Operator</i>	6.3.1.2	(a) All other AQUATIC FACILITIES as specified in 6.3.1.1 must have an on-site QUALIFIED OPERATOR or a contract with a QUALIFIED OPERATOR for a minimum of weekly visits and assistance whenever needed. Written documentation of these visits must be available at the aquatic facility. At a minimum the written reports must indicate that the circulation, filtration and disinfection systems were checked, the safety equipment was noted available on-	

Key word	Section	CODE	Grade
		<p>site, that the AQUATIC VENUE stairs and deck were in good condition, and that water chemistry (PH, sanitizer, saturation index) was tested and their resulting values recorded on the report. Finally, the report must state what corrective actions, if any, were taken by the operator.</p> <p>(b) Additionally, all AQUATIC FACILITIES without a full time, on-site QUALIFIED OPERATOR must have an on-site RESPONSIBLE SUPERVISOR. This supervisor must be capable of testing the water quality levels as required by this code and know how to make adjustments as needed to maintain water quality levels as specified in MAHC 5.7.3 and must be knowledgeable regarding AQUATIC VENUE operation, when a AQUATIC VENUE must be closed, and when and how to contact the QUALIFIED OPERATOR.</p>	
	6.1	Operator Training	
	6.1.1	Operator Qualifications and Certificate	B
<i>Qualifications</i>	6.1.1.1	A QUALIFIED OPERATOR shall have completed an operator training course that is recognized by the HEALTH AUTHORITY.	
<i>Training Documentation</i>	6.1.1.2	A QUALIFIED OPERATOR shall have a current certificate or written documentation acceptable to the HEALTH AUTHORITY showing completion of an operator training course.	
<i>Certificate Available</i>	6.1.1.2.1	Originals or copies of such certificate or documentation shall be available on site for inspection by the HEALTH AUTHORITY for each QUALIFIED OPERATOR employed at or contracted by the site, as specified in this CODE.	
	6.1.1.2.2	Originals shall be made available upon request by the health authority.	
	6.1.2	Essential Topics in Qualified Operator Training Courses	
<i>Operator Training Course Content</i>	6.1.2.1	All operator training courses recognized by the HEALTH AUTHORITY shall include, at a minimum, the following teaching elements:	
		1) Water DISINFECTION	

Key word	Section	CODE	Grade
		2) Water Chemistry 3) Mechanical Systems 4) Health and Safety 5) Operations.	
	6.1.2.1.1	Water DISINFECTION	B
<i>Water DISINFECTION</i>		Course work for water DISINFECTION shall include: <ol style="list-style-type: none"> 1) Contact Time (CT) Values 2) CHLORINE 3) Cyanuric Acid (CYA) 4) Bromine 5) BREAKPOINT/SUPERCHLORINATION 6) HYPERCHLORINATION 7) Combined CHLORINE 8) SECONDARY DISINFECTION 9) SUPPLEMENTAL DISINFECTION 	
<i>Disinfectants</i>	6.1.2.1.1.1	Disinfectant types including: <ol style="list-style-type: none"> 1) Descriptions of different types of disinfectants, 2) Their unique physical (e.g., shape or state [solid, liquid, or gas]) and chemical properties (e.g., how it reacts with acids or bases), 3) How they disinfect and impact water chemistry and monitoring systems, 4) How to calculate dosing, 5) How they are used safely, and 6) The advantages or disadvantages of using each disinfectant. 	
<i>CT VALUES</i>	6.1.2.1.1.2	CONTACT TIME (CT) VALUES including: <ol style="list-style-type: none"> 1) How to calculate the amount of time needed to inactivate PATHOGENS at a given concentration of a disinfectant, and 2) The importance and reasons for maintaining appropriate water pH and temperature. 	
<i>Bromine</i>	6.1.2.1.1.3	Bromine including: <ol style="list-style-type: none"> 1) Definition of bromine as an element, 2) Its use as a residual disinfectant and oxidizer in water, 3) Bromine chemistry, 4) The DISINFECTION role of hypobromous acid. 5) On site generation, 6) pH meter requirements to prevent 	

Key word	Section	CODE	Grade
		false readings, and 7) Bromine reuse	
<i>CHLORINE</i>	6.1.2.1.1.4	CHLORINE including: 1) Definition of CHLORINE as an element, 2) Its use as a residual disinfectant and oxidizer in water, 3) CHLORINE chemistry and the role of PH, 4) The DISINFECTION role of hypochlorous acid, 5) Unstabilized products (sodium hypochlorite, calcium hypochlorite, lithium hypochlorite, and CHLORINE gas), 6) Stabilized products (sodium dichloro-s-triazinetriene and sodium trichloro-s-triazinetriene), 7) Safe chemical handling, and 8) On-site CHLORINE generation.	
<i>Cyanuric Acid</i>	6.1.2.1.1.5	Cyanuric acid (CYA) including reasons for and against use and recommended concentrations.	
<i>BREAKPOINT/ SUPER- CHLORINATION</i>	6.1.2.1.1.6	BREAKPOINT CHLORINATION including how to achieve it through calculation of chemical dosing to reach the desired free CHLORINE level and its relationship to reducing and controlling formation of combined CHLORINE including guidance for how to perform BREAKPOINT CHLORINATION in indoor aquatic settings.	
<i>HYPER- CHLORINATION</i>	6.1.2.1.1.7	HYPERCHLORINATION including procedures for implementation of FECAL/Vomit/Blood Contamination Response.	
<i>Combined CHLORINE</i>	6.1.2.1.1.8	Combined CHLORINE including: 1) How different combined CHLORINE and DISINFECTION BY-PRODUCTS are formed in the water and air, 2) The maximum acceptable level of combined CHLORINE, 3) How methods such as water replacement, BREAKPOINT CHLORINATION, ultraviolet light, ozone, ventilation, and use of other oxidizers can reduce combined CHLORINE level, 4) The advantages and disadvantages of each, and	

Key word	Section	CODE	Grade
		5) Possible health effects of combined CHLORINE products in the air, particularly in indoor aquatic facilities.	
SECONDARY DISINFECTION	6.1.2.1.1.9	SECONDARY DISINFECTION including: 1) How ozone and ultraviolet disinfectants are used in conjunction with residual disinfectants to inactivate PATHOGENS, and 2) Sizing guidelines/dosing calculations, safe use, and advantages and disadvantages of each method.	
SUPPLEMENTAL DISINFECTION	6.1.2.1.1.10	SUPPLEMENTAL DISINFECTION including other DISINFECTION chemicals or systems on the market and their effectiveness in water treatment.	
	6.1.2.1.2	Water Chemistry	
Water Chemistry		Course work for water chemistry shall include: 1) Source Water 2) Water Balance 3) Saturation Index 4) Water Clarity 5) pH 6) Total Alkalinity 7) Calcium Hardness 8) Water Temperature 9) Total Dissolved Solids 10) Water Treatment Systems 11) Water Testing	
Source Water	6.1.2.1.2.1	Source water including requirements for supply and pre-treatment.	
Water Balance	6.1.2.1.2.2	Water balance including: 1) Effect of unbalanced water on DISINFECTION, AQUATIC FEATURE surfaces, mechanical equipment, and fixtures, and 2) Details of water balance including pH, total alkalinity, calcium hardness, temperature, and total dissolved solids (TDS).	
Saturation Index	6.1.2.1.2.3	Saturation index including calculations, ideal values, and effects of values which are too low or too high.	

<i>Key word</i>	<i>Section</i>	<i>CODE</i>	<i>Grade</i>
<i>Water Clarity</i>	6.1.2.1.2.4	Water clarity including: <ol style="list-style-type: none"> 1) Causes of poor water clarity, 2) Maintenance of good water clarity, and 3) Closure requirements when water clarity is poor. 	
<i>PH</i>	6.1.2.1.2.5	PH including: <ol style="list-style-type: none"> 1) How PH is a measure of the concentration of hydrogen ions in water, 2) Effects of high and low PH on patrons and equipment, 3) Ideal PH range for patrons and equipment, 4) factors that affect PH, 5) How PH affects disinfectant efficacy, and 6) How to decrease and increase PH. 	
<i>Total Alkalinity</i>	6.1.2.1.2.6	Total alkalinity including: <ol style="list-style-type: none"> 1) How total alkalinity relates to PH, 2) Effects of low and high total alkalinity, 3) Factors that affect total alkalinity, 4) Ideal total alkalinity range, and 5) How to increase or decrease total alkalinity. 	
<i>Calcium Hardness</i>	6.1.2.1.2.7	Calcium hardness including: <ol style="list-style-type: none"> 1) Why water naturally contains calcium, 2) How calcium hardness relates to total hardness and temperature, 3) Effects of low and high calcium hardness, 4) Factors that affect calcium hardness, 5) Ideal calcium hardness range, and 6) How to increase or decrease calcium hardness. 	
<i>Temperature</i>	6.1.2.1.2.8	Water temperature including: <ol style="list-style-type: none"> 1) How low and high water temperatures increase the likelihood of corrosion and scaling, respectively, 2) Its effect on DISINFECTION, , 3) Its health effects, and 	

Key word	Section	CODE	Grade
			4) Other operational considerations.
<i>Total Dissolved Solids</i>	6.1.2.1.2.9	Total dissolved solids (TDS) including:	<ol style="list-style-type: none"> 1) Why the concentration of TDS increases over time, 2) Association with conductivity and organic CONTAMINANTS, and 3) Key TDS levels as they relate to starting up an AQUATIC FACILITY and galvanic corrosion.
<i>Water Treatment Systems</i>	6.1.2.1.2.10	Water treatment systems including:	<ol style="list-style-type: none"> 1) Descriptions of system use, monitoring, calibration and maintenance of automatic controllers, 2) Descriptions of common types of liquid, dry chemical, and gas mechanical feeders, 3) CHLORINE, bromine, and ozone generators, 4) Ultraviolet systems, 5) Unique features of feeders, generators, and systems, 6) How to generally operate and maintain them, and 7) Advantages and disadvantages of different feeders, ultraviolet systems, and ozonator types. 8) Alternate treatment methods
<i>Water Testing</i>	6.1.2.1.2.11	Water testing including:	<ol style="list-style-type: none"> 1) How different methods (including but not limited to colorimetric, titrimetric, turbidimetric and electronic) test water to determine free available and total CHLORINE, total bromine, PH, total alkalinity, calcium hardness, temperature, TDS, CYA, metals, and any other tests (including but not limited to salt concentrations, phosphates, nitrates, potassium monopersulfate Cu, Fe, and bacterial testing), 2) The advantages and disadvantages of each method, 3) How to maintain testing equipment, 4) How to collect water samples, 5) How to perform and interpret tests, 6) How frequently to test, 7) The steps of the dilution method, and 8) How to calculate combined

Key word	Section	CODE	Grade
		CHLORINE levels.	
	6.1.2.1.3	Mechanical Systems	B
<i>Mechanical Systems</i>		Course work for mechanical systems shall include:	
		<ol style="list-style-type: none"> 1) Calculations 2) Circulation 3) Main Drains 4) Gutters and Surface Skimmers 5) Mechanical System Balance 6) Circulation Pump and Motor 7) Valve 8) Return Inlets 9) Filtration 10) Filter Backwashing/Cleaning 11) Maintenance 	
<i>Calculations</i>	6.1.2.1.3.1	Calculations including:	
		<ol style="list-style-type: none"> 1) Explanations of why particular calculations are important, 2) How to convert units of measurement within and between the English and metric systems, 3) How to determine the surface area of regularly and irregularly shape AQUATIC VENUE, 4) How to determine the water volume of regularly and irregularly shaped AQUATIC VENUES, and 5) Why proper sizing of filters, pumps, pipes, and feeders is important. 	
<i>Circulation</i>	6.1.2.1.3.2	Circulation including:	
		<ol style="list-style-type: none"> 1) Why circulation is needed, 2) Factors that affect water flow, 3) How direct suction and overflow systems work, 4) How to calculate turnover and flow rates, 5) How the following components of the circulation system relate to each other: main drains, gutters and surface skimmers, circulation pump and motor, surge tanks, vacuum ports, valves, and return inlets, 6) How to read flow meters, 7) How to safely operate pressurized systems after the pump, 8) Information on dye testing, 9) An understanding of total dynamic head (TDH), 	

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		<ul style="list-style-type: none"> 10) How it is calculated, 11) How it is field-determined using vacuum and pressure gauges, and 12) Its effect on pump flow. 13) Cross Connections 	
<i>Main Drains</i>	6.1.2.1.3.3	Main drains including: <ul style="list-style-type: none"> 1) A description of the role of main drains, 2) Why they should not be resized without engineering and public health consultation, 3) The importance of daily inspection of structural integrity, and 4) Discussion on balancing the need to maximize surface water flow while minimizing the likelihood of entrapment. 	
<i>Gutters & Surface Skimmers</i>	6.1.2.1.3.4	Gutters and surface skimmers including: <ul style="list-style-type: none"> 1) Why it is important to collect surface water, 2) A description of different gutter types (at a minimum: scum, surge, and rim-flow), 3) How each type generally works, 4) The advantages and disadvantages of each, and 5) Description of the components of skimmers (e.g., weir, basket, and equalizer assembly) and their respective roles. 	
<i>Mechanical System Balance</i>	6.1.2.1.3.5	Mechanical system balance including: <ul style="list-style-type: none"> 1) An understanding of mechanical system balancing, 2) Methodology for setting proper operational water levels, 3) Basic hydraulics which affect proper functioning of the balance tank and AQUATIC VENUE, 4) Methods of setting and adjusting modulation valves, 5) Balance lines, 6) Skimmers, 7) Main drains, 8) The operation of the water make-up system, 9) Collector tanks/gravity drainage systems, and 10) Automatic controllers 	

<i>Key word</i>	<i>Section</i>	<i>CODE</i>	<i>Grade</i>
<i>Circulation Pump & Motor</i>	6.1.2.1.3.6	Circulation pump and motor including: <ol style="list-style-type: none"> 1) Descriptions of the role of the pump and motor, 2) Self-priming and flooded suction pumps, 3) Key components of a pump and how they work together, 4) Cavitation, 5) Possible causes of cavitation, and 6) Troubleshooting problems with the pump and motor. 	
<i>Valves</i>	6.1.2.1.3.7	Valves including descriptions of different types of valves (e.g., gate, ball, butterfly/wafer, multi-port, globe, modulating/ automatic, and check) and their safe operation.	
<i>Return Inlets</i>	6.1.2.1.3.8	Return inlets including a description of the role of return inlets and the importance of replacing fittings with those that meet original specifications.	
<i>Filtration</i>	6.1.2.1.3.9	Filtration including: <ol style="list-style-type: none"> 1) Why filtration is needed, 2) A description of pressure and vacuum filters and different types of filter media, 3) How to calculate filter surface area, 4) How to read pressure gauges, 5) A general description of sand, cartridge, and diatomaceous earth filters and alternative filter media types to include, at a minimum, perlite, zeolite, and crushed glass. 6) The characteristic flow rates and particle size entrapment of each filter type, 7) How to generally operate and maintain each filter type, 8) Troubleshooting problems with the filter, and 9) The advantages and disadvantages of different filters and filter media. 	
<i>Filter Backwashing/ Cleaning</i>	6.1.2.1.3.10	Filter backwashing/cleaning including: <ol style="list-style-type: none"> 1) Determining and setting proper backwash flow rates, 2) When backwashing/cleaning should be done and the steps needed for clearing a filter of fine particles and other CONTAMINANTS, 	

Key word	Section	CODE	Grade
		<ul style="list-style-type: none"> 3) Proper disposal of waste water from backwash, and 4) What additional fixtures/equipment may be needed (i.e., sump, separation tank). 	
	6.1.2.1.4	Health and Safety	B
<i>Health and Safety</i>		<p>Course work for health and safety shall include:</p> <ul style="list-style-type: none"> 1) Recreational Water Illness (RWI) 2) RWI Prevention 3) Risk Management 4) Record Keeping 5) Chemical Safety 6) Entrapment Prevention 7) Electrical Safety 8) Rescue Equipment 9) Injury Prevention 10) Drowning Prevention 11) Barriers 12) Signage and Depth Markers 13) Facility Sanitation 14) Emergency Response 15) Surveillance and Supervision 	
<i>Recreational Water Illness</i>	6.1.2.1.4.1	<p>Recreational water illness (RWI) including:</p> <ul style="list-style-type: none"> 1) How water can contain or become contaminated with parasites, bacteria, viruses, fungi, DISINFECTION BY-PRODUCTS, or unsafe levels of chemicals; and 2) The role of the operator in reducing risk. 	
<i>Causes of RWIs</i>	6.1.2.1.4.2	<p>Common infectious and chemical causes of RWIs, including but not limited to:</p> <ul style="list-style-type: none"> 1) Diarrheal illness (<i>CRYPTOSPORIDIUM</i>, <i>Giardia</i>, <i>Shigella</i>, and <i>NOROVIRUS</i>), 2) Skin rashes (<i>Pseudomonas aeruginosa</i>, molluscum contagiosum), 3) Respiratory illness (<i>Legionella</i>) 4) Neurologic infections (echovirus), 5) Eye/ear illness (<i>Pseudomonas aeruginosa</i>, adenovirus, <i>Acanthamoeba</i>, 6) Hypersensitivity reactions (<i>Mycobacterium avium</i> complex, Pontiac fever, endotoxins), and 7) Health effects of chloramines and DISINFECTION BY-PRODUCTS. 	

Key word	Section	CODE	Grade
<i>RWI Prevention</i>	6.1.2.1.4.3	Recreational water illness (RWI) prevention including:	
		<ol style="list-style-type: none"> 1) Methods of prevention of RWIs, including but not limited to chemical level control; 2) Why public health, operators, and patrons need to be educated about RWIs and collaborate on RWI prevention; 3) The role of showering, 4) The efficacy of swim diapers, 5) Formed-stool and diarrheal FECAL incident response, and 6) Developing a plan to minimize PATHOGEN and other biological (e.g., blood, vomit, sweat, urine, and skin and hair care products) contamination of the water. 	
<i>Risk Management</i>	6.1.2.1.4.4	Risk management including techniques that identify hazards and risks and that prevent illness and injuries associated with AQUATIC FACILITIES open to the public.	
<i>Record Keeping</i>	6.1.2.1.4.5	Record keeping including the need to keep accurate and timely records of the following areas:	
		<ol style="list-style-type: none"> 1) Operational conditions (e.g., water chemistry, water temperature, filter pressure differential, flow meter reading, and water clarity), 2) Maintenance performed (e.g., backwashing, change of equipment), 3) Incidents and response (e.g., FECAL incidents in the water and injuries), and 4) Staff training and attendance. 	
<i>Chemical Safety</i>	6.1.2.1.4.6	Chemical safety including steps to safely store and handle chemicals including:	
		<ol style="list-style-type: none"> 1) How to read labels and material safety data sheets, 2) How to prevent individual chemicals and inorganic and organic CHLORINE products from mixing together or with other substances (including water) or in chemical feeders, and 3) Use of personal protective equipment. 	

<i>Key word</i>	<i>Section</i>	<i>CODE</i>	<i>Grade</i>
<i>Entrapment Prevention</i>	6.1.2.1.4.7	Entrapment prevention including: <ol style="list-style-type: none"> 1) Different types of entrapment (e.g., hair, limb, body, evisceration/disembowelment, and mechanical), 2) How to prevent and/or decrease likelihood of entrapment, and 3) Requirements of the Virginia Graeme Baker Pool and Spa Safety Act 	
<i>Electrical Safety</i>	6.1.2.1.4.8	Electrical safety including possible causes of electrical shock and steps that can be taken to prevent electrical shock (e.g., bonding, grounding, ground fault interrupters, and prevention of accidental immersion of electrical devices).	
<i>Rescue Equipment</i>	6.1.2.1.4.9	Rescue equipment including a description and rationale for the most commonly found rescue equipment including: <ol style="list-style-type: none"> 1) Rescue tubes, 2) Reaching poles, 3) Ring buoys and throwing lines, 4) Backboards, 5) First aid kits, 6) Emergency alert systems, and 7) Emergency phones with current numbers posted 8) Resuscitation Equipment. 	
<i>Injury Prevention</i>	6.1.2.1.4.10	Injury prevention including basic steps known to decrease the likelihood of injury, at a minimum: <ol style="list-style-type: none"> 1) Banning the use of alcohol and glass containers at AQUATIC FACILITY, 2) Patron education, and 3) Daily visual inspection for hazards. 	
<i>Drowning Prevention</i>	6.1.2.1.4.11	Drowning prevention including causes and prevention of drowning.	
<i>Barriers</i>	6.1.2.1.4.12	Barriers including descriptions of how fences, gates, doors, and safety covers can be used to prevent access to water; and basics of design that effectively prevent access to water.	
<i>Signage & Depth Markers</i>	6.1.2.1.4.13	Signage and depth markers including the importance of maintaining signage and depth markers.	

<i>Key word</i>	<i>Section</i>	<i>CODE</i>	<i>Grade</i>
<i>Facility Sanitation</i>	6.1.2.1.4.14	Facility sanitation including: <ol style="list-style-type: none"> 1) Steps to clean and disinfect all surfaces that patrons would commonly come in contact with (e.g., deck, restrooms, and diaper-changing areas), and 2) Procedures for implementation of CODE Section 6.5 FECAL/Vomit/Blood Contamination Response in relation to responding to a body fluid spill on these surfaces. 	
<i>Emergency Response Plan</i>	6.1.2.1.4.15	Emergency response plan including: <ol style="list-style-type: none"> 1) Steps to respond to emergencies (at a minimum, severe weather events, drowning or injury, contamination of the water, chemical incidents), and 2) Communication and coordination with emergency responders and local health department notification as part of an emergency action plan. 	
	6.1.2.1.5	Operations	B
<i>Facility Operations</i>		Course work for operations shall include: <ol style="list-style-type: none"> 1) Regulations 2) Local and State Health Departments 3) Aquatic Facility Types 4) Daily/Routine Operations 5) Preventive Maintenance 6) Weatherizing 7) Aquatic Facility Renovation and Design 8) Heating 9) Air Circulation 10) Spa and Therapy Pool Issues 	
<i>Regulations</i>	6.1.2.1.5.1	Regulations including the application of local, regional, state, and federal regulations and STANDARDS relating to the operation of AQUATIC FACILITIES. <p>Course work shall also highlight reasons why an inspector or operator would immediately close an AQUATIC FACILITY.</p>	
<i>Local & State Health Departments</i>	6.1.2.1.5.2	Local and state health departments including stressing the importance of a good working relationship with the local and state health department.	

<i>Key word</i>	<i>Section</i>	<i>CODE</i>	<i>Grade</i>
<i>AQUATIC FACILITY Types</i>	6.1.2.1.5.3	AQUATIC FACILITY types including common AQUATIC VENUE types and settings and a discussion of features and play equipment that require specific operation and maintenance steps.	
<i>Daily/Routine Operations</i>	6.1.2.1.5.4	<p>Daily/routine operations including listing and describing the daily inspection and maintenance requirements of an AQUATIC FACILITY including, but not limited to:</p> <ol style="list-style-type: none"> 1) Drain covers, vacuum fitting covers, skimmer equalizer covers, and any other suction outlet covers are in place, secure, and unbroken, 2) Skimmer baskets, weirs, lids, flow adjusters, and suction outlets are free of any blockage, 3) Inlet and return covers and any other fittings are in place, secure, and unbroken, 4) Safety warning signs and safety equipment as required by this CODE are in place and in good repair, 5) Entrapment prevention systems are operational, 6) Recirculation and DISINFECTION systems are operating, 7) Secondary and/or supplemental DISINFECTION systems are operating, 8) Underwater lights are intact with no exposed wires or water in lights, 9) Emergency communication systems are operational, 10) Fecal/vomit/blood incident contamination response protocols, materials, and equipment are available, 11) Water features and amenities are functioning in accordance with the manufacturer's recommendations, and 12) Gates locks, and alarms, if required, are tested and functioning properly. 	
<i>Preventive Maintenance</i>	6.1.2.1.5.5	<p>Preventive maintenance including how to develop:</p> <ol style="list-style-type: none"> 1) A preventive maintenance plan, 2) Routine maintenance procedures, and 3) Record keeping system needed to track maintenance performed. 	
<i>Weatherizing</i>	6.1.2.1.5.6	Weatherizing including the importance of	

Key word	Section	CODE	Grade
<i>Facility Renovation & Design</i>	6.1.2.1.5.7	<p>weatherizing and the steps to prevent damage to AQUATIC FACILITIES and their mechanical systems due to very low temperatures or extreme weather conditions (e.g., flooding). AQUATIC FACILITY renovation and design including:</p> <ol style="list-style-type: none"> 1) Definitions of AQUATIC FACILITY renovation and remodeling, 2) When it is necessary to renovate, 3) When it is necessary to notify the HEALTH AUTHORITY of planned renovations and remodeling, and 4) Current trends in facility renovation and design. 	
<i>Heating</i>	6.1.2.1.5.8	<p>Heating issues including:</p> <ol style="list-style-type: none"> 1) Recommended water temperatures and limits, 2) Factors that contribute to the water's heat loss and gain, 3) Heating equipment options, 4) Sizing gas heaters, and 5) How to troubleshoot problems with heaters. 	
<i>Air Circulation</i>	6.1.2.1.5.9	<p>Air circulation including:</p> <ol style="list-style-type: none"> 1) Air handling system considerations for an INDOOR AQUATIC FACILITY, 2) The importance of regulating humidity, 3) The need to maintain negative pressure, 4) How poor indoor air quality can affect patrons and staff, and 5) How to balance air change and energy efficiency. 	
<i>SPA & Therapy Pool Issues</i>	6.1.2.1.5.10	<p>SPA and therapy pool issues including:</p> <ol style="list-style-type: none"> 1) Operational implications of smaller volumes of water and hot water, 2) How to maintain water chemistry, 3) Typical water temperature ranges highlighting maximum temperatures, 4) Risks of hyperthermia and hypothermia, 5) Need for emergency shut-off switches, and 6) Frequency of cleaning, draining, and DISINFECTION. 	

Key word	Section	CODE	Grade
<i>Recognized Courses</i>	6.1.3	General Requirements for Training Courses	B
		<p>Providers of recognized QUALIFIED OPERATOR training courses, <i>if required by the HEALTH AUTHORITY to verify that the course meets the requirements and intent of this CODE</i>, shall submit course information including:</p> <ol style="list-style-type: none"> 1) Course development expertise 2) Course content 3) Course length 4) Instructor qualifications 5) Exam administration 6) Certificate procedures 7) Updates of information as changes are made 	
<i>Providers</i>	6.1.3.1	Course Providers	B
		<p>QUALIFIED OPERATOR courses shall be developed by individuals or organizations with expertise in AQUATIC FACILITY operation and maintenance and expertise in education or training as evidenced by combined work experience and training.</p>	
<i>Content</i>	6.1.3.2	Course Content	B
		<p>Training materials at a minimum, covering all of the essential topics as outlined in Sec. 6.1.2.1 shall be provided and used in QUALIFIED OPERATOR training courses.</p>	
<i>Course Length</i>	6.1.3.3	Course Length	B
		<p>Course agenda or syllabus shall show amount of time planned to cover each of the essential topics.</p>	
<i>Instructors</i>	6.1.3.4	Instructor Requirements	B
		<p>QUALIFIED OPERATOR training course providers shall furnish course instructor information including:</p> <ol style="list-style-type: none"> 1) Expertise in AQUATIC FACILITY operation and maintenance—as evidenced by work experience and/or training, 2) Completion of an operator training course, which at a minimum, covers all of the essential topics as outlined in Sec 6.1.2.1, including passing the final exam, 	

Key word	Section	CODE	Grade
		3) Successful completion of an operator training instructor course, and 4) If the operator training course is online, procedures which make such an instructor available to answer students' questions during normal business hours.	
	6.1.3.5	Final Exam	B
<i>Final Exam</i>	6.1.3.5.1	QUALIFIED OPERATOR training course providers shall furnish course final exam information including: 1) Final exam, which at a minimum, covers all of the essential topics as outlined in Sec 6.1.2.1, 2) Final exam passing score criteria, and 3) Final exam security procedures.	
<i>Final Exam Administration</i>	6.1.3.5.2	QUALIFIED OPERATOR training course providers shall provide final exam administration, proctoring and security procedures including: 1) Checking student's government-issued photo identification, to ensure that the individual taking the exam is the same person who is given a certificate documenting course completion and passing of exam and, 2) Final exam is passed, prior to issuance of a QUALIFIED OPERATOR certificate.	
	6.1.3.6	Course Certificates	B
<i>Certificates</i>		QUALIFIED OPERATOR training course providers shall furnish course certificate information including: 1) Procedures for issuing nontransferable certificates to the individuals who successfully complete the course work and pass the final exam, 2) Procedures for delivery of course certificates to the individuals who successfully complete the course work and pass the final exam, 3) Instructions for the participant to maintain their originally issued certificate, or a copy thereof, for the duration of its validity, and 4) Procedures for the QUALIFIED OPERATOR	

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		training course provider to maintain an individual's training and exam record for a minimum period of five years after the expiration of the individual's certificate.	
	6.1.3.7	Continuing Education (Reserved)	
<i>Renewal</i>	6.1.3.8	Certificate Renewal QUALIFIED OPERATOR training course providers shall furnish course certificate renewal information including: 1) Criteria for re-examination with a renewal exam that meets the specifications for initial exam requirements and certificate issuance specified in this CODE, or 2) Criteria for a refresher course with an exam that meets the specifications for the initial course, exam, and certificate issuance requirements specified in this CODE.	B
<i>Suspension & Revocation</i>	6.1.3.9	Suspension and Revocation of Certificate 1) Course providers shall have procedures in place for the suspension or revocation of certificates. 2) <i>Course providers may suspend or revoke an operator's certificate based on evidence that the operator's actions or inactions unduly created safety and health hazards.</i> (3) Course providers may suspend or revoke an operator's certificate based on evidence of cheating or obtaining the certificate under false pretenses.	B
<i>Additional Training & Testing</i>	6.1.3.10	Additional Training or Testing <i>The HEALTH AUTHORITY may, at its discretion, require additional operator training or testing.</i>	C
<i>Certificate Recognition</i>	6.1.3.11	Health Authority Certificate Recognition <i>The HEALTH AUTHORITY may, at its discretion, choose to recognize, not to</i>	C

Key word	Section	CODE	Grade
		<i>recognize, or rescind a previously recognized certificate of a QUALIFIED OPERATOR based upon demonstration of inADEQUATE knowledge, poor performance, or due cause.</i>	
Course Recognition	6.1.3.12	Health Authority Course Recognition	C
		<i>The HEALTH AUTHORITY may, at its discretion, recognize, choose not to recognize, or revoke a previously accepted course based upon demonstration of inADEQUATE knowledge or poor performance of its QUALIFIED OPERATORS, or due cause.</i>	
Certificate Validity	6.1.3.13	Length of Certificate Validity	B
		The maximum length of validity for QUALIFIED OPERATOR training certificate shall be 5 years.	
	6.2	Lifeguard Training	