Common Pool Water Problems
To Identify a Pool Problem

- Test and analyze the water
- Use your 5 senses (sight, smell, touch, taste, hearing)
- Check pressure gauges and flowmeters
- Eliminate the possibilities one by one
- Identify, then take steps to minimize or correct the problem
Algae

- Common types of pool algae
  - Green
  - Mustard
  - Black

- Introduced into pools by:
  - Bathers
  - Make-up water
  - Wind and windborne debris
  - Rain
Problems Caused by Algae

- High chlorine demand
- Water color or turbidity
- Slipperiness
- Bacterial growth
- Odors
- Gradual removal of carbon dioxide from the water in order to manufacture food
- Radical increase in pH over several hours
- Noticeable algae growth on the pool bottom or walls
To Control Algae Growth

- Use algaecides and algaestats
- Superchlorination
- Scrub or brush pool walls
- Uniform water circulation pattern
- Maintain adequate chlorine and ORP levels
Algaecides

• Quaternary ammonium salts (quats)
  • Wetting agent which decreases water surface tension so positively charged algaecide is attracted to negatively charged algae which disrupts algae cell membranes and suffocates the algae plant

• Chelated copper salts
  • Copper based algaecide with a sequestering agent kills algae by blocking the formation of enzymes needed by algae for metabolism

• Silver based colloidal algaecides
  • Small suspended silver particles prevent algae from feeding or breathing
Algaecides

• Polyquats
  • Non foaming positive charged polymer algaecide with a stronger charge than quats which disrupts the algae membrane and suffocates algae (also work as a clarifier)
• Granular trichloro-s-triazinetrione
• Chlorine enhancers (ammonium sulfate)
  • Forms combined chlorine in quantity to act as an algaecide
  • May contain sodium bromide
Nitrates

• Nitrates are introduced into pools from:
  • Fill water in areas where fertilizer has worked its way down into the ground water
  • Contaminated reservoirs or wells
  • Fertilizers or grass blown into the pool from the adjoining landscaping
  • Rain
  • Human or animal urine or fecal matter
  • Bird droppings

• Nitrates stimulate plant growth
• When high levels of nitrates (greater than 25 ppm) are present in pool water, uncontrolled algae growth often occurs
Nitrates

• Check nitrate levels if the pool:
  • Has unusually high chlorine demands (using unaccountably large amounts of chlorine)
  • Experiencing algae problems
• Pools that commonly experience nitrate problems:
  • Pools located in agriculture areas
  • Screened pools
  • Pools bordering large bodies of water
• Eliminating nitrates:
  • Shock the pool to 30 ppm to lower nitrate levels
  • Drain and refill pool with water not contaminated with nitrates
• Nitrates can be tested using:
  • Color comparitor kits using reagents in shades of purple
  • Test strips that measures both nitrites and nitrates
Phosphates

• Keep phosphates in pool water below 125 ppb / 0.2 - 0.5 ppm
• Introduced to pool water through bather urine and sweat, laundry detergents, leaves, dirt, and other organic wastes
• If phosphate levels are too high, uncontrollable algae growth will result
• To prevent algae growth, remove phosphates by adding lanthanum carbonate (AKA “Starver”)
• Insoluble lanthanum phosphate will form and precipitate the phosphate compounds out of the water solution
• Vacuum or filter the precipitate out of the pool
Blue Colorants

- Purpose
  - Aesthetically enhance appearance of water
  - Control aquatic weeds and algae
  - Obscure machinery or objects below in amusement rides
- For use in ponds, lakes, fountains, water features, water rides
- Brand names: Aquashade, Lake Colorant WSP, Admiral
- Non toxic: Not harmful to bird, fish, animals, environment
- pH 6.9
- Can be applied to water used for irrigation
Blue Colorants

- Should not be used in water intended for human consumption
- Should not be used in swimming pools or body contact recreational water lakes
  - Will obscure vision below the water surface
  - Chlorine will degrade it
- Caution:
  - Do not handle with wet hands
  - Possibility of staining during application, but no threat of staining once dispersed
  - Store in a cool, dry location
Eye Irritation

- Several possible causes of eye irritation:
  - pH imbalance
  - Chloramines
  - Excessive turbidity
  - Reflective sunlight
- To eliminate eye irritation:
  - Adjust the pH and water balance
  - Perform breakpoint chlorination
  - Vacuum, backwash filters, use clarifiers
  - Recommend the use of reflective goggles while swimming
Pseudomonas aeruginosa

- Gram negative bacterium present in the environment and human skin and gastrointestinal tract
- Warm, moist, aerated environments present favorable conditions for bacterial growth
- Pseudomonas can grow in swimming pool water as well as spa water, on the pool edge and decks, into filter liners, in the filter media, in garden hoses or lane lines coiled on a pool deck, and inside PVC pipe
- Bathers who spend extended amounts of time in warm water, and staff members who wear wet bathing suits throughout their work shift are most likely to experience problems
Pseudomonas aeruginosa

- Most common sign or symptom: red, bumpy, itchy rash that looks like measles or poison ivy
- On most bathers, the rash appears on the legs, trunk, inside of the arms, lower back, neck and shoulders, or anywhere the skin is broken, or where a swim suit rubs against and irritates the skin
- Pool associated folliculitis or skin rashes can be prevented by:
  - Taking a hot soapy shower in the nude immediately after leaving the pool
  - Before cooling down and allowing pores to close over bacteria
Pseudomonas aeruginosa

- Other symptoms may include:
  - Ear aches
  - Breast, lymph gland, or eye membrane inflammation
  - Coughing and sore throat caused by inflammation of the mucous membrane of the pharynx
  - Fever, nausea, and other flu-like symptoms
  - Urinary tract infections causing impaired ability to pass urine
Pseudomonas aeruginosa

• To prevent outbreaks:
  • Collect water samples and take swabs from inside the filter and hair & lint strainer and test for P. aeruginosa at least once per week
  • Pressure test circulation system to make sure there are no breaks on suction side lines which may allow dirt to enter the otherwise closed system
  • Institute rigorous deck maintenance procedures
  • Keep patrons in street shoes off the deck or away from the pool edge
Pseudomonas aeruginosa

• To prevent outbreaks (continued...):
  • Require that infants and young children not yet toilet trained wear tight fitting rubber pants or swim suit diapers
  • Shock spas daily and pools weekly, or as needed if CAC exceeds 0.2 ppm
  • Install controllers
  • Maintain a minimum 750 mV ORP
  • Buy fresh chemicals from a reputable vendor
  • Don’t use de-foamers
  • Keep cyanuric acid levels low, and don’t use cyanuric acid or isocyanurates in indoor pools.
  • Drain and refill the pool when TDS exceed 1,500 ppm
Pseudomonas aeruginosa

• If testing reveals high levels of Pseudomonas in the pool or on pool surfaces, immediate steps must be taken to eliminate the problem before general outbreaks occur.

• Eradication is time consuming and work intensive -- it’s easier to prevent than solve the problem.

• To eliminate P. aeruginosa:
  • Drain the pool
  • Remove filter media or elements from the filter tanks, and dispose of the media properly
  • Scrub the entire surface of the pool, decks, all pool maintenance, safety and instructional equipment; and the interior of the filter tanks with a solution of 1 part sodium hypochlorite to 20 parts of water.
Pseudomonas aeruginosa

• To eliminate P. aeruginosa (continued...):
  • Remember to:
    • Keep rinse water on at all times and rinse frequently
    • Wear appropriate personal protective gear including respiratory protection
    • Don’t allow chlorine to collect at the bottom of the pool
    • Neutralize the chlorine before pumping it to waste
  • Close the main drain and skimmer or gutter valves. Pour the hypochlorite and water solution into the gutter and main drains until the pipes fill to the top, and the gutters flood.
  • Replace the filter media. Plug the return inlets. Fill the filter and return lines with the hypochlorite and water solution.
  • Let everything just sit for at least 24 hours
  • Refill the pool, add chelating agents, balance the water, and closely monitor sanitizer levels
Cloudy Water

- Insufficient turnover rate
- High TDS
- Infrequent vacuuming
- Filter not sized properly
- Dirty filters
- Alum not being used in rapid sand filters
- Chemicals added to the water in too great a quantity in too short a period of time
- Water not balanced--oversaturated
- Torn D.E. screens
- High pressure forcing D.E. through elements
- Sand filter channeling, mudball formation
- Poor circulation (dead spots, low water level)
- Algae bloom--lack of residual disinfectant
- High cyanuric acid levels
- Excessively high CAC
- Metal particles in suspension
Fecal Contamination of Pool Water

Fecal contamination of pool water can result from:
• Human fecal matter intentionally or accidentally being deposited in the pool
• Animal, rodent, and bird droppings
• Fecal matter tracked into the pool area on shoes
• Fertilizers or grass blown into the pool from the adjoining landscaping
• Contaminated ground water, reservoirs, or wells, particularly in agricultural areas, where fertilizer or animal wastes have tainted the water used to fill or add water to the pool
• Rain and storm water run-off into the pool
• Cross connections between pool and sewage systems
Fecal Contamination of Pools

Fecal contamination of pool water can cause serious illnesses:
• Ingestion of contaminated water while swimming, inhalation of water vapor above the pool surface, and body contact with pathogenic organisms and absorption through the skin while swimming can result in transmission of a variety of diseases.
• Some pathogens may cause mild gastrointestinal discomfort, while others, if not recognized or if left untreated, can become life threatening.
Fecal Contamination of Pools

To lessen the likelihood of fecal contamination, ask swimmers to:

• Use the toilet before entering the pool
• Not to use the pool if they are suffering from an illness that causes diarrhea
• Take a hot, soapy shower in the nude, prior to entering the pool and after using the toilet
• Wear “swimsuit diapers” if they are not yet toilet trained or have difficulty with bowel control
• Remove their street shoes when walking on the pool deck
• Educate patrons about diaper changing policies
Fecal Contamination of Pools

- Do not allow pets to swim in the pool
- Try to prevent wild animals, birds and ducks from using the pool as a watering hole
- Good pool and deck design will prevent gray water, waste water or sewage from draining or backing up into the pool
- Maintain adequate sanitation and oxidation levels
- Filter pool water continuously 24-hours per day
- Make sure the water is balanced, and keep the water chemistry within acceptable parameters
Fecal Contamination of Pools

If a fecal accident does occur:
• Close the pool for 24 hours or a minimum of 3 - 4 complete turnovers
• Remove the fecal matter from the pool and dispose of matter is an approved manner - do not use an in-line vacuum system
• Disinfect the skimmer net or vacuum used to remove the fecal matter
• Shock the immediate area where the incident occurred and superchlorinate the pool to at least 20 ppm FAC, and maintain for 9 hours (10,000+ CT)
• Maintain pH between 7.2 and 7.4
Fecal Contamination of Pools

- Backwash the filters and disinfect the filter media or elements with a solution of 20 parts of water to 1 part of 10-15% sodium hypochlorite (liquid pool chlorine) prior to reopening the pool.
- Perform bacteriological analysis on water samples taken from the pool.
- If using the membrane filtration technique for testing total Coliforms, fewer than 1 colony per 100 milliliters should develop.
- You may also request that laboratory tests for Cryptosporidium protozoa be conducted.
- Do not allow swimmers back into the pool until tests show the water is not contaminated.