

I. CHLORINE EMERGENCY PROCEDURES

These procedures are to be followed in the event that a chlorine spill, leak or alarm condition occurs at the UNF Aquatic Center.

A fixed chlorine detector has been installed in the chlorine room on the east end of the Aquatic Center, building 26. It is set to alarm locally and at the University Police Department (UPD) if chlorine is detected at or above a concentration of 8 parts per million (ppm). According to the manufacturer's instructions, this detector must be tested monthly for proper operation (see attached owner's manual for test procedure). A windsock or other device has been installed to monitor wind direction. Physical Facilities (PF) personnel involved with chlorine use must be certified pool operators, receive annual training in respiratory protection, chlorine safety, proper emergency response procedures and periodic medical monitoring for respirator use.

EMERGENCY RESPONSE EQUIPMENT: Includes cylinder repair kits (□A□ kit for 150 lb cylinders), replacement valves, spare chlorinators, lead washers, tubing, portable chlorine and oxygen monitor with operator's manual and calibration kit, air purifying respirators, aprons and gloves rated for use in chlorine atmospheres. This equipment must be available and stored by PF at a designated, remote location so that equipment can be retrieved without entering contaminated areas. Replacement valves and the cylinder repair kits are to be used by Jacksonville Fire and Rescue (JFR) only.

- 1) Upon notification of an alarm condition (chlorine release), the UPD will notify PF and Environmental Health & Safety (EH&S) of the situation and communicate any special instructions. (If PF cannot handle the situation, then JFR shall be notified to respond with a Hazmat team.) If the release occurs during business hours, the UPD shall inform personnel in the Aquatics Center office of the situation. A pager notification may also be appropriate.
- 2) The UPD should dispatch two (2) officers to the scene for site security. One officer should remain upwind from the chlorine room at a distance where no chlorine odor is detectable (minimum of 150 ft). This area shall be designated as the **Command Post** and its location should be communicated to all responding personnel. The area between the Command Post and the chlorine room shall be designated as the **Hot Zone**. The second UPD officer should be stationed at the site perimeter to prevent unauthorized personnel from entering the Command Post or Hot Zone.
- 3) JFR's mission is to stop the release and then declare the area safe for PF personnel to complete repairs, as necessary per the steps below.
- 4) Once notified of a release, PF personnel should report to the Command Post with tools,

spare parts, chlorine/oxygen alarm, full- face respirator, apron and protective gloves rated for use in chlorine atmospheres. They must remain at the Command Post until the all clear is given by JFR.

- 5) Once the area is cleared by JFR, PF personnel can complete any follow-up or repairs with the use of a portable chlorine/oxygen alarm. PF personnel must ensure that the door to the chlorine room is propped open, the exhaust fan is on and visual or radio contact is maintained with standby personnel. If the portable chlorine alarm is activated, PF response personnel will don full-face air purifying respirator, apron and protective gloves to complete the activity. They shall continue to monitor chlorine/oxygen levels, check the integrity of the chlorine gas cylinders and immediately depart the area should they detect the odor of chlorine gas through their respirator during the repair.
- 6) If the reading on the portable detector exceeds 5 ppm chlorine OR falls below 19.5% oxygen, PF response personnel shall immediately leave the chlorine room and wait for the chlorine to disperse and oxygen levels to rise. PF response personnel will not re-enter the room until the chlorine reading is again below 5 ppm AND the oxygen level is above 19.5%.
- 7) PF personnel shall utilize ammonia and the chlorine detector to verify that repairs have been effective. Remember that the white cloud created when ammonia reacts with chlorine is also toxic. Once repairs are complete, response personnel shall leave the chlorine room prior to removing respirators, apron, gloves, etc. The chlorine supplier should be contacted to remove the defective/empty cylinder and replace any parts or kits utilized in the repair.
- 8) Response personnel shall store emergency equipment away from the chlorine room and ready for the next response.
- 9) The UPD shall notify Aquatics Center personnel when the all clear is given and follow with pager notifications as appropriate.

II. CHLORINE MEDICAL CONSIDERATIONS

- 1) The chlorine utilized to treat the pool water at the UNF Aquatic Center is shipped in 150 pound, silver color-coded cylinders as a liquid which becomes a gas as it leaves the cylinder.
- 2) Chlorine gas has a characteristic bleach odor, is yellowish in color, and is highly corrosive and irritating to the eyes, nose, throat and mucous membranes. It reacts violently with

petroleum products such as gasoline, diesel, oil, grease, solvents and turpentine. It can form phosgene (a toxic and corrosive gas) in the presence of carbon monoxide (from fire) and sulfuryl chloride (a toxic and corrosive gas) in the presence of sulfur dioxide (from auto exhaust). **Chlorine gas is heavier than air and will settle in low-lying areas unless there is sufficient wind for dispersal.**

- 3) The odor threshold for chlorine gas is around 0.2 ppm, the 8-hour exposure limit is 0.5 ppm, and the gas can be fatal in one hour at 35-51 ppm or a few breaths at 1,000 ppm. Symptoms of increasing exposure include tearing, burning eyes, nose and throat, coughing, difficulty in breathing, fluid in the lungs, unconsciousness and death. Delayed symptoms include sore throat, bronchitis, erosion of tooth enamel and frostbite from rapid pressure release.
- 4) Victims of over exposure should be taken to fresh air (observe wind direction), treated for shock and prepared for transport by emergency medical service. If breathing has stopped, administer CPR and treat for shock.
- 5) Contaminated clothing should be removed; exposed skin and eyes should be flushed with clean water for 15 minutes.
- 6) Treatment for shock includes laying the victim down, elevating the feet, keeping the victim warm and still, giving fluids upon request and administering oxygen if available.

III. CHLORINE CYLINDER CHANGE-OUT PROCEDURES

The following procedures shall be utilized during routine replacement of empty chlorine cylinders at the UNF Aquatic Center.

- 1) A minimum of two (2) PF personnel shall be involved in cylinder change-out. These personnel shall follow the procedures outlined in section I, items 1- 8 above, be certified pool operators, trained in respiratory protection, chlorine safety and be medically cleared for respirator use
- 2) Close the valve on the empty cylinder and then close the manifold isolation valve on the chlorinator.
- 3) Crack open the yoke clamp. When it is loosened, some chlorine gas will escape. Check with ammonia vapor and the portable chlorine alarm to ensure that gas has stopped before

proceeding. If the chlorine monitor exceeds 5 ppm immediately leave the room until the cloud is dispersed and the reading falls below 5 ppm.

- 4) Remove the yoke clamp and adapter. Discard the old lead washer, tighten the valve and replace the valve outlet cap. Install the valve protection hood and label the cylinder as empty.
- 5) Remove the retaining chain and roll the cylinder onto a hand dolly for transport to the storage area for empty cylinders.
- 6) Using the dolly, move a full cylinder to the chlorine scales. Roll the cylinder on to the scales and secure with the chain.
- 7) Remove the valve protective hood and inspect for any obvious damage or discoloration. Hand tighten the packing nut.
- 8) Remove the outlet cap and check with ammonia. If a white cloud appears, the valve is not seated properly. Tighten the valve by hand and check for leaks again. If a white cloud still appears, replace the outlet cap, protective hood and advise the supplier of the defective valve.
- 9) Select another cylinder and repeat step 9.
- 10) Using a new lead washer fit the adapter to the valve and hand tighten the yoke clamp. Using the standard 6" wrench, tighten the yoke clamp and crack open the isolation valve.
- 11) Using the standard wrench slap the valve open and closed and check for leaks. If no leaks are found, open the valve $\frac{1}{4}$ turn and check for leaks again. Adjust the chlorinator as needed.
- 12) If the system is operating normal, turn off the lights, leave the exhaust fan on, close and lock the door to the chlorinator room.
- 13) Remove protective equipment, clean and store for the next use.

IV. CHLORINE STORAGE AND HANDLING PRECAUTIONS

- 1) Never work with chlorine gas alone.
- 2) Never store any reactive substance with chlorine (acetylene, fuels, turpentine, oils,

hydrogen gas, etc.).

- 3) Always store calcium hypochlorite or sodium hypochlorite on a pallet in a cool, dry location. (These are dry chemicals that when mixed with water makes a water solution of Chlorine similar to bleach.)
- 4) Never store or transport a chlorine cylinder on its side.
- 5) Store all chlorine cylinders behind a secure chain and transport while chained to a dolly.
- 6) All empty cylinders shall be labeled as □EMPTY□. Cylinders shall not be left outside, or subjected to heat or impacts.
- 7) Valve protection caps must be kept on cylinders while not in use.
- 8) Always inspect chlorine containers upon arrival for signs of impact, deterioration, missing caps, lead washers and refuse delivery of suspect containers.
- 9) Do not keep a cylinder on-site for more than six (6) months. Always record incoming and outgoing container serial numbers for tracking purposes.
- 10) Always inspect valves before placing cylinders on-line and mark suspect containers for return shipment.