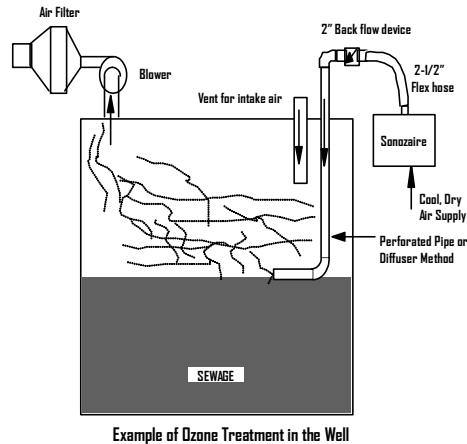
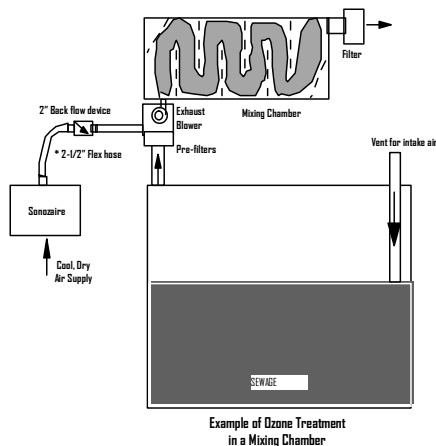


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A major consideration in designing an effective ozone system is mixing the ozone with the malodors. When a few ppm of odor molecules must “collide” with a few ozone molecules, it can be easily seen that effective mixing is extremely important for oxidation to occur. If ozone is injected near the suction side of an exhaust blower, as shown in the left figure above, this usually creates sufficient turbulence to ensure complete contact between the odor and ozone molecules. However, if ozone must be injected directly into a well, or upstream of an exhaust blower, then the ozone must be diffused adequately. Many methods of diffusing, such as a perforated pipe, can be used to disperse the ozone effectively. Care should be taken so that ozone does not channel in an exhaust pipe, or mixing chamber, or that it is not drawn directly to the exhaust pipe when injected into a well.

With efficient mixing, time must be allowed for the ozone and odor molecules to come in contact with each other. Some reactions can occur quickly, but generally require 10 - 15 seconds of retention at a minimum. If volumetric space allows, 30 - 40 seconds is recommended. Adequate space is determined by airflow of exhaust and volumes of exhaust pipe, wet-well volumes, or mixing chamber volumes. If retention time goes down, then higher ppm levels of ozone are required to compensate. Excessive ozone production may result in the necessity to scrub out the residual ozone being exhausted into the atmosphere. Also, avoid large excesses of ozone and long contact times, since sulfur trioxide can form. This further step is undesirable because sulfur trioxide combines with water to form sulfuric acid, a highly corrosive substance.

How much ozone is needed to treat the malodors from sewage lift stations? To properly size the amount of ozone for the treatment there is certain data that must be known.

Steps for sizing ozone requirement for lift stations and wet wells:

1. Determine the ppm of hydrogen sulfide, ammonia, methane, etc., with a Bendix air sampler or other approved method.
2. Determine or estimate the cubic footage of treatment area.
3. If system has blower, determine cfm (speed or number of changes per hour).
4. Determine the retention time for the airflow.

Calculate as per following example:

Determine that there is 8 ppm of H₂S in the discharge air stream.

Determine that the air volume in the well is 1000 cubic feet.

Determine that a 250 cfm exhaust fan is ventilating the well.

The retention time can be calculated by dividing 1000 cu ft by 250 cfm, which is 4 minutes.

Having 8 ppm of H₂S at 250cfm provides a malodor volume of 2000 ppm/min. Use a model 630A, at a conservative, continuous use rating of 6 gm/hour, with about 25ppm at 75cfm (airflow losses through the machine). This would be an ozone volume of 1875 ppm/min. Using a 1.5 to 1 ratio of ozone to hydrogen sulfide would require a volume of 3000 ppm/min ozone. Two model 630As would produce a volume of 3750 ppm/min, which would allow lower settings under normal conditions, and additional ozone during peak odor periods.

In some application automatic controls may be desired. Sensors that measure the discharge level of ozone or VOCs, can be added for controlling the production of ozone being injected.

Cautions should always be observed when working around high levels of hydrogen sulfide and methane due to their exposure limits and also their explosive capabilities.

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ROUTINE MAINTENANCE

The Sonozaire requires routine maintenance for years of service at maximum ozone output. This occasional maintenance requires only minor cleaning and will take only a few minutes. Failing to routinely clean the unit will reduce the ozone output and require longer times for treatment. A complete failure to perform maintenance can cause a total failure of ozone output and a possible failure of Sonozaire components, which voids the warranty.

The amount of time between cleaning will depend upon a few variables. Below is a list of important operating factors that increase the frequency for cleaning:

- ✕ Unit operated 24 hours a day.
- ✕ Unit operated 365 days a year.
- ✕ Unit mounted outdoors.
- ✕ Unit operated in a high moisture or humidity environment.
- ✕ Unit operated in an area of excessive dust or dirt.

The harder the service, the more often the maintenance is required. Sonozaire's, which are mounted outdoors, should be cleaned every 1-3 months. For fire restoration applications, check after every couple of jobs to determine if cleaning is necessary. Notice that if the unit is elevated above floor level, cleaning frequency should be less. This is because at floor level more moisture is drawn into the Sonozaire. Dry cleaners, hotels, motels, vehicles, or air purification applications should require cleaning approximately every 2-3 months. Please note the above cleaning suggestions are averages. Check your equipment more often initially to determine if your use will allow you to go longer or shorter periods between cleanings.

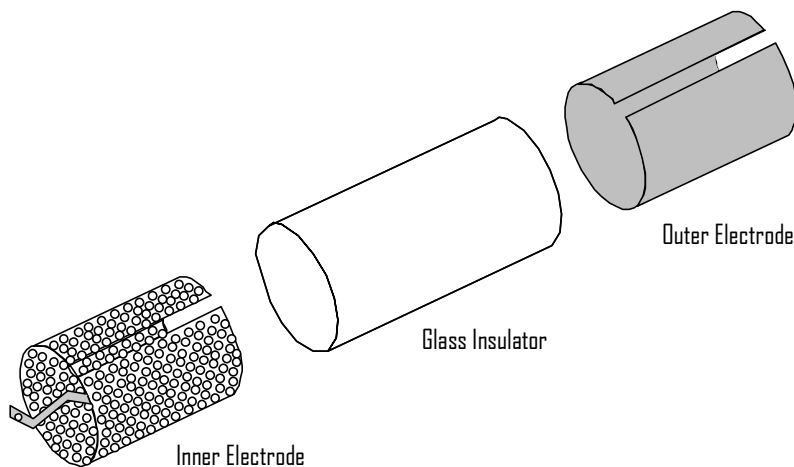
An easy way to determine if your machine is really dirty is to listen to it. With a clean Sonozaire, turn the ozone level knob to zero, and then turn on the machine. The blower will come on, and it has a low volume fan sound. Next, turn up the ozone knob briefly to hear the sound of corona being formed. This corona formation is the result of a high voltage causing an air gap to ionize. The sound is a low tone hissing or buzzing. A really dirty unit will have no corona sound. If a unit has too much moisture in it or is dirty, a snapping or arcing sound occurs. Please shutdown the unit and perform the necessary cleaning.

Routine maintenance consists of cleaning the air filter, cleaning the cabinet interior, cleaning of electrodes and glass, and oiling the blower motor. All of these tasks can be performed by almost anyone with a few simple instructions. The Sonozaire can be cleaned in the shop or on the job site. Cleaning supplies consist of clean water, glass cleaner, abrasive cleaner, abrasive brush, cleaning cloths or pads, and twenty-weight oil. Rubber gloves are recommended for handling the electrodes to prevent slippage or possible broken or breakage of glass.

- 1 Unplug the Sonozaire.** remove and clean the air filter from beneath the Sonozaire. Standard filter is of a spun polyester material and the enhanced air filter (outdoor use) is of electrostatic material and aluminum frame. Both can be cleaned by washing it out with water and possibly cleansing soap. Wash out both thoroughly and remove as much moisture as possible before reinstalling in the unit.
- 2** Remove the front cover by removing two or three screws at the bottom and pulling down on the cover. Look at the inside of the cabinet and compare it to the internal drawings of the proper model in this manual. Identify the following components: the high voltage transformer(s), the electrode assembly(s), and the blower motor. The electrode assembly(s) consists of an outer electrode(s), a glass cylinder(s), and a perforated inner electrode(s). See if the glass appears to be broken, dirty, or has a chalky appearance.
- 3** Clean the electrode assembly(s). If possible, the cabinet should be laid on its back with the opening upward. Begin by removing the high voltage wire connected to the inner electrode(s) directly or via the bus bar(s). This requires removing the wing nut from this connection point. Be careful not to break the glass insulator tube(s). Next, loosen the generator holder retaining straps around the electrodes. On the model 115A, only a single electrode is in the cabinet. On the models 330A and 630A, the electrodes are in sets of three. Disconnect the bus bar from the three inner electrodes and remove each individual electrode. They can also be carefully removed, as an assembly. Place the electrode assembly(s) on a table or counter for cleaning. Wipe off the high voltage transformer wire and the round gaskets on the blower or the plenum chamber where the glass contacts them to remove any moisture on substance on them.
- 4** Disassemble the electrodes. Remove the bus bar on the triple electrode assembly to individualize each electrode if not done in step 3. From each assembly remove the outer electrode by slightly springing it open and carefully sliding it off the glass insulator tube. If the outer electrode is stuck to the glass, soak the entire assembly in hot water (soapy if necessary), or in some other solution such as Lime-A-Way. Next, remove the inner electrode by slightly squeezing it together and sliding it out of the glass tube.

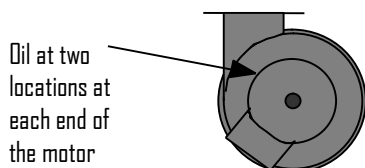
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SINGLE ELECTRODE ASSEMBLY

- 5 Clean each of the electrode components. Thoroughly clean the glass by normal methods used with glassware such as window cleaner, ammonia cleaners, or detergent and water. If the glass tube is extremely dirty, or appears to have oxidized, then clean thoroughly using a stiff bottlebrush. The inner and outer electrodes should then be cleaned. To remove any oxidation that might have built up on the electrodes, use an abrasive means, such as wire brush, SDS pad, stiff plastic brush with abrasive powders (Ajax or Comet), etc. The chalky substance on the aluminum electrodes is aluminum oxide that is a result of moisture. Clean the electrodes until they are back to the basic metal surfaces. Make sure to wash off any residue. Dry each of the electrode(s) and the glass tube(s) thoroughly.
- 6 Reassemble the electrode assembly(s). Spring the inner electrode(s) open slightly to insure a tight fit, and install into the glass tube(s) until it is in the center of the glass (approximately 1-1/2 inches of clear glass on each end). Next, slide the outer electrode(s) over the glass and align it with the inner electrode(s) in the center of the glass. The bus bar can be installed for the model 330A and 630A here, but may be easier to install in next step.
- 7 Reinstall the electrode assembly(s) into the cabinet. Look at the gaskets on the blower (115A), or on the plenum (330A & 630A), and verify they are in good shape. If they have any deterioration, order new ones and change out at next cleaning. Next, insert the electrode assembly(s) back into the generator holder and push the end of the glass firmly against the gasket on the blower, or plenum. Align the electrodes with the inner electrode tab down for the 115A and directed toward the back of the cabinet so that the bus bar (330A & 630A) dimples will slip into the holes on the inner electrode strap. Reattach the generator holder retaining straps around the electrode assembly and tighten securely all straps. Duplicate this for remaining electrode assemblies on the 330A and 630A models. Connect the bus bar if not done previously. Connect the high voltage lead wire from the transformer back to the inner electrode tab, or the bus bar. To prevent arcing, do not get the high voltage wire lead, bus bar, or inner electrode tab too close to the side or rear of the cabinet. Please refer to the internal drawing of the cabinet in this manual to verify that all components look as shown.
- 8 Use a damp cloth to wipe out the cabinet's interior to remove dust, dirt, etc. If a cleanser is required, use one that does not have an alcohol or hydrocarbon base that might be flammable. Over scrubbing the cabinet's exterior or interior might destroy the paint. Wipe the interior out with a clean, dry, cloth.
- 9 Newer models have permanently lubricated bearings and do not require oiling, but older models require oiling. If the blower part number begins with "42" then it does not require oiling. Oil the older blower motor with 10-20 drops of 20W oil or Teflon lubricant at each end of the blower motor. Do not over oil. Once every three months should be adequate. Wipe off the motor and verify that no oil has leaked onto the bottom of the cabinet.



OLDER MODELS REQUIRE OILING OF BLOWERS

- 10 Replace the cover and test the unit. Test by plugging in the unit and turning it up slowly to raise the ozone level. Determine if the corona sound occurs and the smell of ozone is present. The unit should be ready to put back into operation.

After cleaning, if no ozone is detected, or corona sound is heard, unplug the unit. Remove the door and verify that the glass electrode(s) is up against the gasket(s), and that transformers are connected to the inner electrode, or bus bar. If all appears correct, refer to the troubleshooting section of this manual for directions.