The lightweight shell of the Eronator can be easily transported by one man. Robert E. Eron, inventor of the device, told WTT the unit's total weight is approximately 100 to 200 pounds, depending upon accessories added.

The Eronator

A Boost for Water Quality

IRRIGATION WATER, sewage treatment ponds, golf course water hazards — did you ever consider the importance of the *quality* of the water you have to deal with each day?

Robert E. Eron, "inventor and developer of marketable and needed inventions," thinks water quality is pretty important, but is too often neglected. On that premise, he is introducing one of his latest inventions — the Eronator — an aerator and treatment device for eutrophic water.

The Eronator is designed to transfer oxygen-laden water to the surrounding water at any predetermined level of the water column. The oxygenated-water outlet may be effectively placed on the bottom of the impoundment, thus causing an upward and outward flow of treated water.

Operation

Floating on the water's surface, the lightweight unit consists of a closed plenum-type exchange chamber which houses the Eronator's sole moving part, a rotating impeller, at the upper end of the intake tube. This impeller forcefully disperses and slings finely divided water into almost a fog, thus increasing the interfacial exchange of water to oxygen and other gases or chemicals which may be within the chamber.

This cloud then collapses back to liquid water with one important difference — it is now oxygen rich. The liquid builds up a pressure head inside the chamber, and the pressure differential (gravity) forces the treated water out the discharge tube down to the desired depth.

According to the St. Petersburg, Fla., inventor, "We are putting oxygen-saturated water into the impoundment by positive displacement, blending or pushing the bad water away. The water that goes down the outlet tube is better water."

Chemical Mixing

The Eronator is also reported to be a highly effective and convenient method for adding prescribed chemicals to water which may be necessary for the well-being of fish and aquatic crops. Herbicides for controlling algae and other nondesirable aquatic vegetation, chemicals for purifying and conditioning water, even medications and feed for improving fish health can all be easily introduced via the mixing chamber, Eron said. Activated charcoal can also be used for controlling water odors and tastes. Chemical mixing through the exchange chamber prevents loss of the chemical from spillage or the danger of contamination to the surrounding environment, including the atmosphere.

There is another obvious advantage to being able to add chemicals (especially herbicides) to the water through the Eronator's mixing chamber: the potential danger of drift when herbicides are applied by surface or aerial spraying is eliminated. By directing a flow of water carrying well-mixed herbicides to the bottom of a body of water infested with submersed aquatic vegetation, the herbicides are placed where they can do the most good — at the root system where they can be readily picked up the plant.

Eron told WTT that preliminary tests and documented research have indicated that most chemicals react more favorably and effectively in a highly-oxygenated environment, thus a savings can be realized by reducing the strength or amount of chemicals needed. Also,

the volume of chemicals required for treatment is reduced since the entire water column is not involved during the treatment process

Sewage Treatment Application

The machine can be used as an aerating and treating apparatus for sewage and industrial waste treatment systems or lagoons, too. Oxygen or other chemicals can be incorporated into the water to aid bacteriological or viral action, control algae and reduce water turbidity.

The Eronator is said to be effective for adding various chemicals used during tertiary treatment of sewage waste waters. The addition of alum, lime or iron salts used to remove phosphorus during advanced waste water treatment can be accomplished by using a modified unit. The chemical is placed in the exchange chamber and the exhaust pipe can be raised or lowered as necessary to get total coverage of the water area, Eron said. The Eronator can also be used to obtain extended and controlled aeration of waste materials such as bottom muds, algae and any accumulation of disintegrated organic or inorganic debris.

Several aeration systems on the market today are designed to introduce air at the bottom of a lake by means of air stones or small-diameter plastic pipe with small aperatures. Some water circulation *does* result from air bubbles rising from the bottom of the lake to the surface. However, the amount of oxygen picked up by the water as the air bubbles rise is rather low, Eron said.

On the other hand, the Eronator is reported to move water which is supersaturated with oxygen to the bottom of a pond where muds and muck can receive maximum benefits of large amounts of highly oxygenated water.

Compared with conventional aerators, "the Eronator doesn't destratify the water," explained Eron. "We want that crud to stay at the bottom, and to allow the oxygen and so forth to work on it there. Then animal life will prosper. You see, what we are doing is assisting a natural process."

Additional Features

Eron said the airtight mixing chamber can be fitted with oxygen or other gas cylinders. This permits high concentrations of gases to be absorbed by water in the chamber, which is then forced downward through the discharge pipe by the weight of the water in the head (gravity). This method of oxygen introduction could be used to prevent low-oxygen or ammonia related fish kills in fish ponds, hatcheries and aquaculture facilities. In the case of fish farms, Eron said many thousand dollars worth of fish can be lost in a short period if oxygen is depleted by an algae die-off, possibly triggered by a period of several cloudy days.

The Eronator can be fitted with filters which will remove suspended particles from the water column while gently recirculating the water. The addition of heating devices can serve to warm water temperatures, and Eron reports that the unit does cool water naturally by condensation within the chamber.

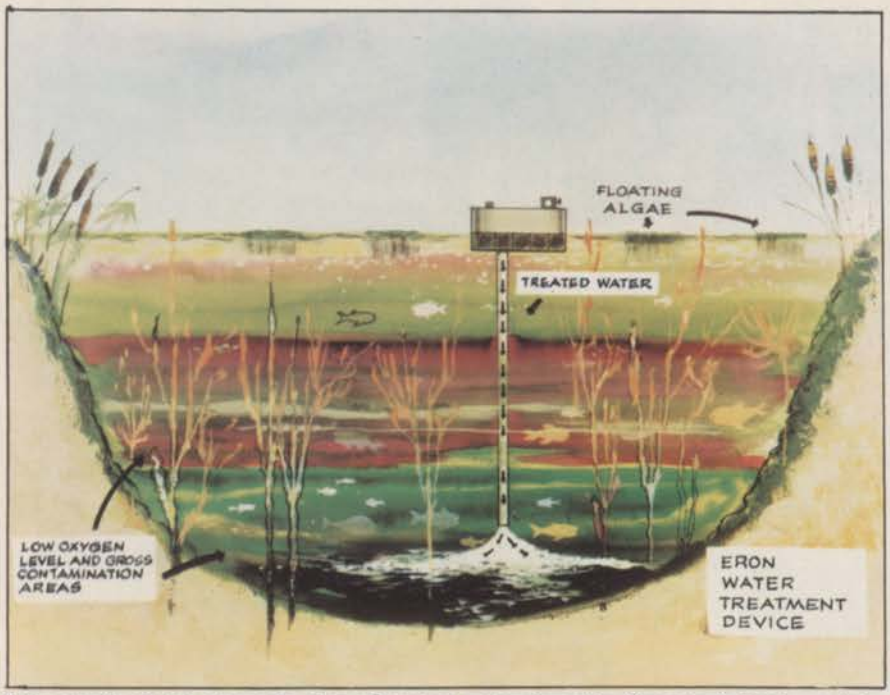
There is a possibility that the unit will also act as a fish attractor, Eron said, and thus actually cause fish to congregate where fishermen can be reasonably assured of success. This fish-attracting feature is one phase of the Eronator's testing program.

Early Testing

In one early test program, the Eronator was placed in a four-acre lagoon near St. Petersburg, Fla., which received water run-off from a sanitary land fill, coupled with sewage sludge. This water had a phytoplankton bloom and substantial growth of filamentous algae along the shoreline.

One section of the lagoon was

(continued)



This artist's sketch shows the flow of treated water down the Eronator's discharge tube, to the oxygen-depleted depths of an impoundment.

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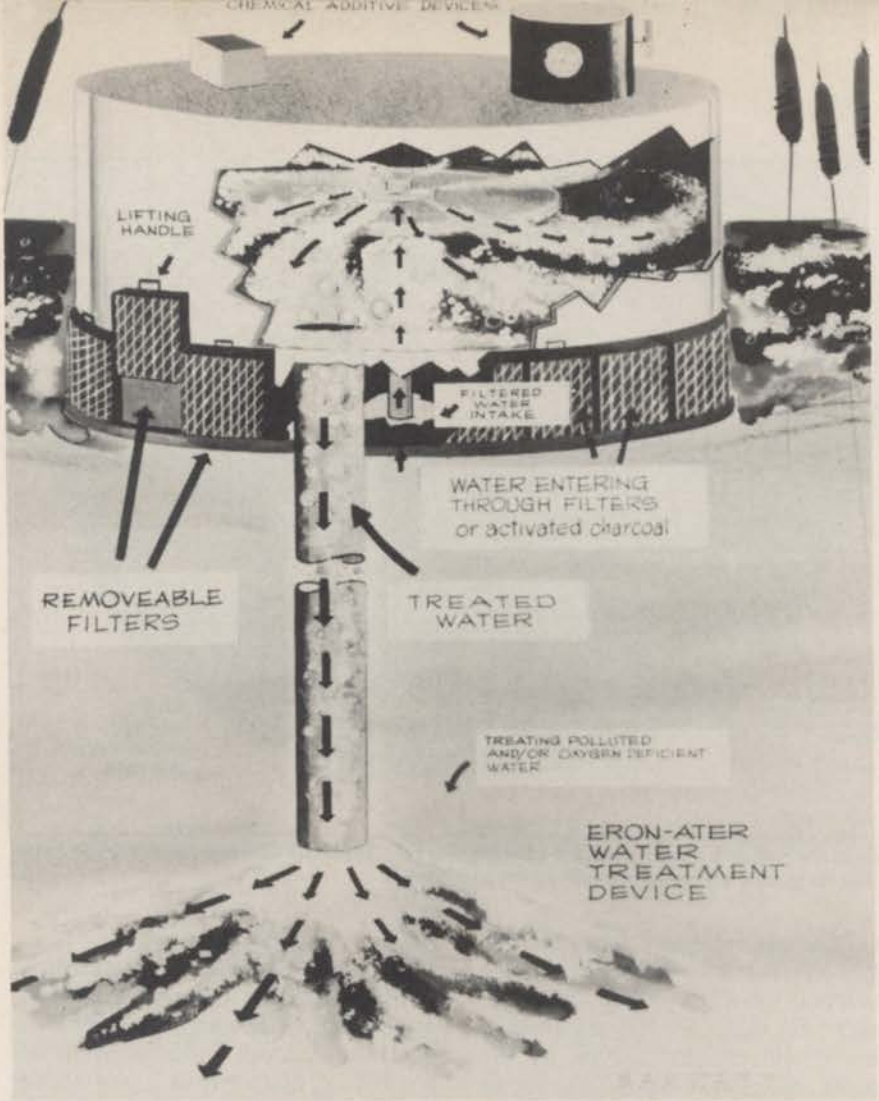

This cut-away drawing shows the unit in operation — filtered water enters through the intake tube, the rotating impeller breaks the water into a fog, and treated water leaves via the discharge tube to the desired depth.

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isolated by means of a plastic barrier from the bottom to several inches above the surface. This enclosure served as a control area for the water quality tests and field observations.

Water chemistry samples were collected before the Eronator was started, after one hour's operation and from the control area. A Hach Water Test Kit Model AL-36-B was used to test carbon dioxide, dissolved oxygen, phenolphthalein and total alkalinity, hardness and pH. The Eronator had been in operation for several weeks prior to the testing period, Eron said.

When tested, the dissolved oxygen on the surface and for a two-foot depth was reported to be the same (7.0 ppm) at an 85 degree F. water temperature, thus indicating that the Eronator was not only circulating the water, but was also maintaining higher oxygen levels in the water column. Tests for dissolved oxygen in the control area ranged from 7.0 ppm at the surface to 4.0 ppm two feet below the surface.

Then the Eronator was started and run for one hour, and water samples were collected at a location adjacent to the reservoir or exchange chamber (Station No. 1) and in the effluent of the discharge hose (Station No. 3).

The surface dissolved oxygen increased from 7.0 ppm to 15.0 ppm after the Eronator had been in operation for an hour. Dissolved oxygen samples collected and analyzed from Station No. 3 indicated 8.4 ppm so the Eronator apparently was increasing the dissolved oxygen found in the effluent of the discharge hose.

Visual observations in the treated lagoon revealed the presence of a high zooplankton population in contrast to the high phytoplankton bloom in adjacent untreated lagoons and in the control area, Eron said. And filamentous algae in the treated lagoon was, for all practical purposes, reported to be non-existent when compared with adjacent non-treated lagoons.

Coliform counts, often used as indicators of fecal contamination in water supplies, were taken by Florida's Department of Health and Rehabilitative Services. According to Eron, a Coliform count of 1,000 is considered safe for swimming. In the control area, the Coliform counts ranged from 7,000 to over 10,000. In the treated areas, the average Coliform count was 100, and was reported to be as low as 20 in some sample areas. Later tests for phosphates, which were made at distances of 300 feet from the Eronator, showed that phosphate levels in the treated areas were significantly decreased — from 25 mg/liter to only .15 mg/liter.

Recent Field Testing

In a more recent Eronator demonstration, Eron was called upon by a group of Lummi Indians in Marietta, Wash., last fall. The Indians operate a 750-acre fish farm and hatchery where they raise salmon, trout and some salt-water species. Conventional methods of water oxygenation were not proving effective, and their fish kills were tremendous.

Although the unit was in operation for only a short time before winter shutdown, it performed quite satisfactorily. According to Jim Ellis, fisheries consultant for the

Lummi Indian Tribal Enterprises, "The machine functioned very well. Oxygen levels were increased from 6 ppm to 9 ppm.

"Dye studies indicated a rapid movement of effluent water from the unit, along the bottom of the pond and towards the far end," he said. "This means that any chemical introduced into the unit would be distributed uniformly along the bottom where the need might be the greatest.

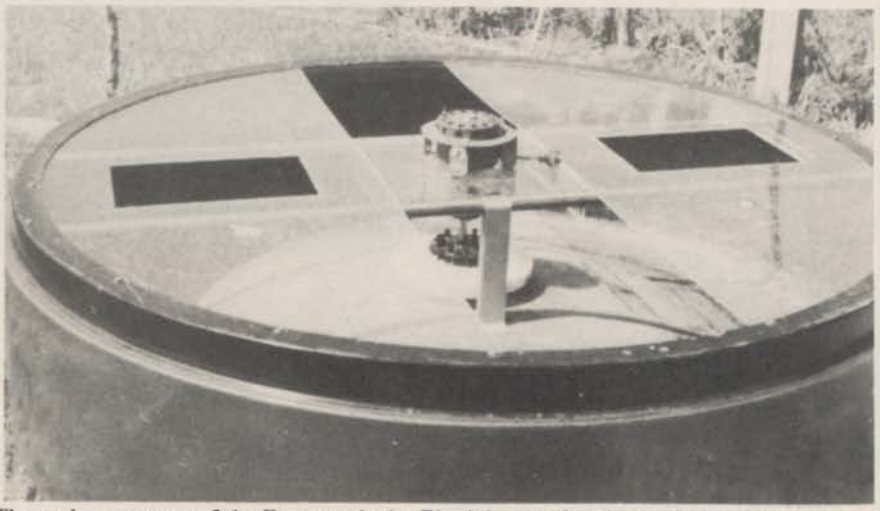
"We feel that the unit will increase dissolved oxygen levels in a pond," Ellis said, "and we hope to use it again in 1975."

Eron has recently been introducing his invention through speaking engagements. He has addressed a group at a Catfish Farmers' Convention in Little Rock, Ark., was on the program at a lake restoration conference in Wisconsin, and has spoken to several civic groups.

Marketing

Eron told WTT that his marketing plans for the Eronator involve franchising it to people in different regions and for different applications, such as fish farms, irrigation water, city ponds, and so on. The machine will be operated and maintained by the franchise holders, except in the case of sewage treatment plants. Eron said that one man can be trained to service possibly up to 100 of the units in his specific field of application. The rental fee will probably be about $800 to $1,000 annually.

The Eronator is just about as near to its perfected state as possible, Eron told WTT. But, he added, there will always be changes and modifications to be made as new uses for his device continue to develop. □



The early prototype of the Eronator had a Plexiglas top for observation. The transparent top was discarded, however, due to cost and sunlight penetration which gave false algae readings and created heat.

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