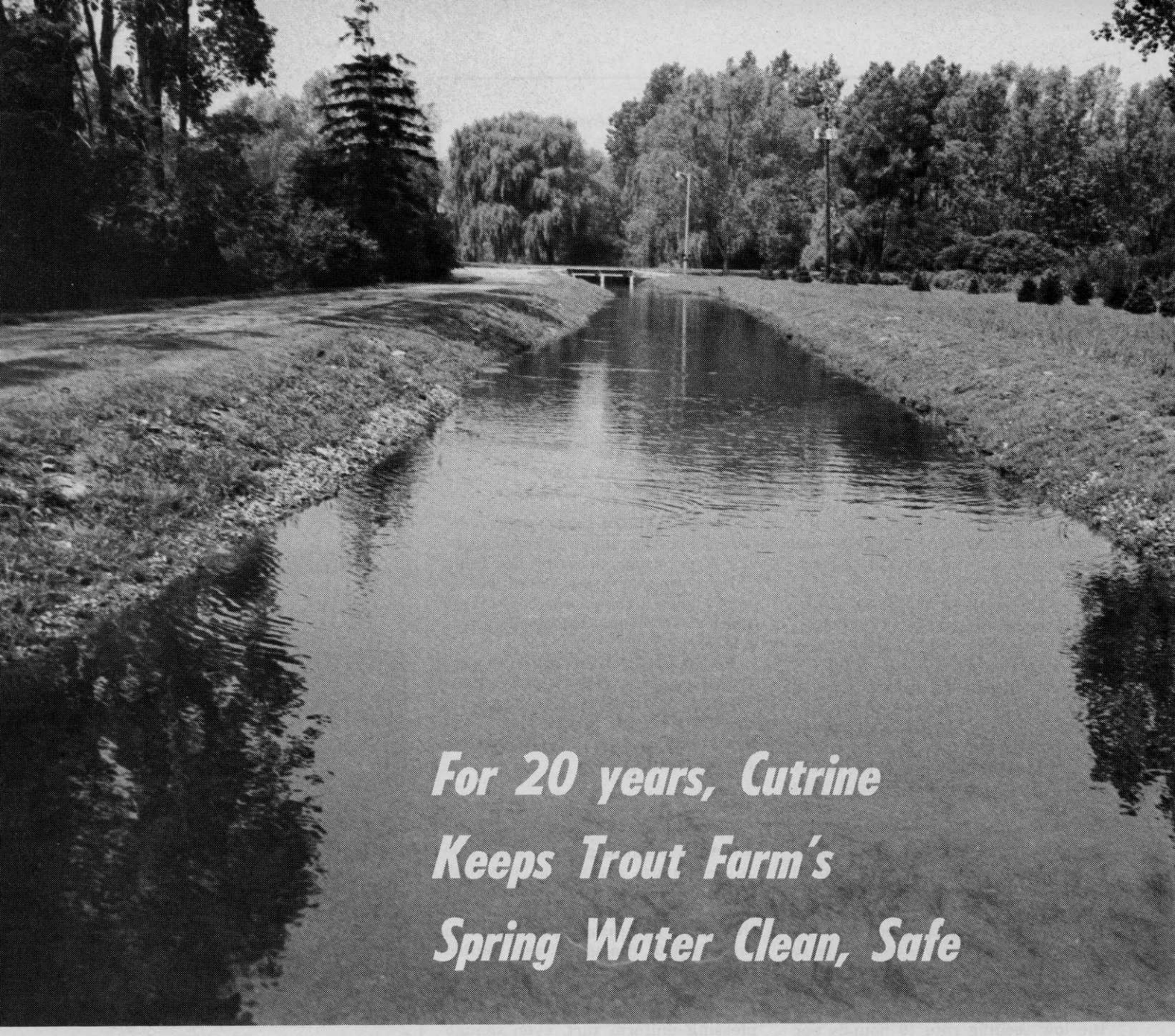


# For 20 years, Cutrine Keeps Trout Farm's Spring Water Clean, Safe

A SPRING-FED stream would seem to be the perfect resource for a trout farm. Yet the waters of one near Castalia, O., have required chemical treatment for the past 22 years to keep the fish alive and healthy.

Castalia Trout Farm is fed by two springs. One is the famous Blue Hole, a tourist attraction; the other is "Castalia's own Blue Hole," as Walter Gysan calls it. Gysan has worked at the farm more than 30 years and has been manager for the past decade.

Begun in the mid-30s by about 45 sportsmen and called the Castalia Trout Club, the farm has served both as a peaceful retreat and a commercial venture for its owners.

Its current owner is the huge industrial firm, Owens-Illinois, Inc., a leading manufacturer of glass, plastic, paper, and ceramic containers and maker of a host of other products.

Owens-Illinois uses the farm—it looks more like a sprawling country estate with more than one main house—for gatherings of various kinds, to include business conferences. There's another use: to raise and sell some 200,000 trout a year.

**Table I**

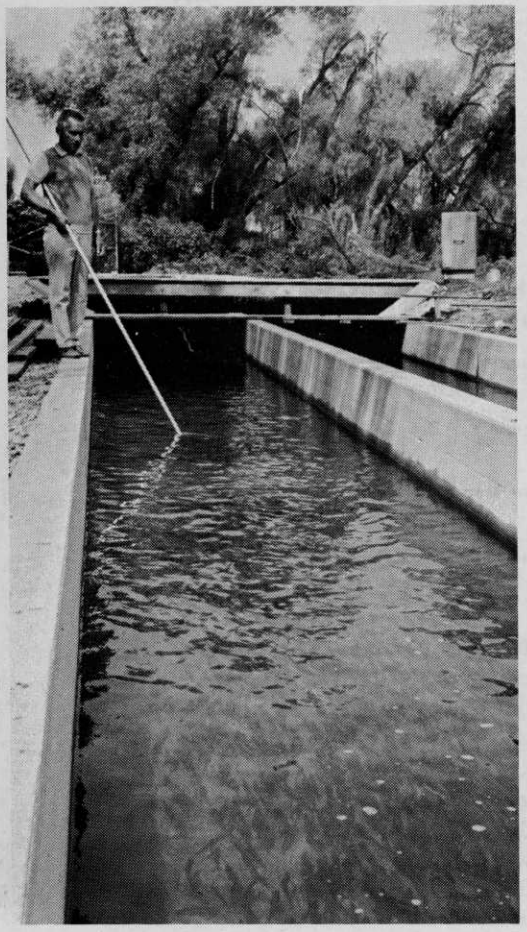
**Chemical Analyses of Trout Stream Entering Castalia Trout Farms. (As of September, 1954)**

| | In Terms of P.P.M. |
|---|---|
| Total Alkalinity | 230.0 |
| Total Hardness | 1148.0 |
| Carbonate Hardness | 230.0 |
| Non-carbonate Hardness | 918.0 |
| Chlorides | 22.0 |
| Nitrates | trace |
| Nitrites | 0.001 |
| pH Value | 7.0 |

### No Free Oxygen in Spring

A peculiar characteristic of the springs is that the water contains no free oxygen and, therefore, it will not support any life forms. It must be aerated, either naturally or artificially. Waters from Blue Hole become aerated in the six-mile flow before reaching the farm. Waters that swell out of Castalia's Blue Hole (not more than 25x60 yards but 40 to 60 feet deep) at the rate of from 1800 to 2700 gallons per minute are aerated by two huge city disposal type airifiers.

You can easily see that the waters of the Castalia Trout Farm, Castalia, Ohio, are free of aquatic weeds from the use of Cutrine algaecide. If you look closely, you can see in the picture below thousands of fingerling trout, kept healthy in part by Cutrine's effectiveness, also, in preventing a buildup of toxic hydrogen sulphide.



Another characteristic of the water is its unusually high carbonate content (See Table 1) which complicated an algae problem that developed in the mid-40s.

Several miles of this continuous trout stream became clogged with long filamentous algae, floating chiefly on the surface water. It hindered trout fishing and the efficient management of the trout farm.

Because of the high carbonate content, the use of copper sulphate as the algaecide would cause a heavy copper carbonate precipitate in the water and cause trouble with the fish and develop toxic copper accumulations in the bottom muds, resulting in the reduction of fish food organisms.

Furthermore, high doses of copper sulphate would be needed so that after the copper carbonate formation is satisfied there would still be some ionic copper left in the stream to kill the excessive algae growth.

### Cutrine Use Begun in 1949

Dr. B. Domogalla, President and Director of Research, Applied Biochemists and Associates, recommended a then new organic copper algaecide compound, Cutrine.

Unlike copper sulphate, the copper ions in Cutrine are all available to kill the excessive algae growths. They stay in clear solution in the trout stream and do not react or form a precipitate with the carbonates in the water.

Dr. A. S. Hazzard, Assistant Director of the Pennsylvania Conservation Commission, had been doing consulting work for the farm and gave this report after the initial treatment in 1949:

"After the addition of 3,700 lbs. of dry Cutrine algaecide, we found no nuisance algae growth present; the water cress was growing luxuriantly and we found throughout the stream an abundance of sow bugs, snails, shrimp, caddis and black flies. All trout caught were found to be in good condition."

So Cutrine has been used at Castalia Trout farms ever since. Its use is multiple—to kill algae, bacteria and to control certain fish diseases.

The recurring problem, says Gysan, is that with algae present, fecal matter is trapped; and in the decaying process hydrogen sulfide gas, highly toxic to fish, is formed.

Keeping the raceways clean enables the fecal matter to move downstream.

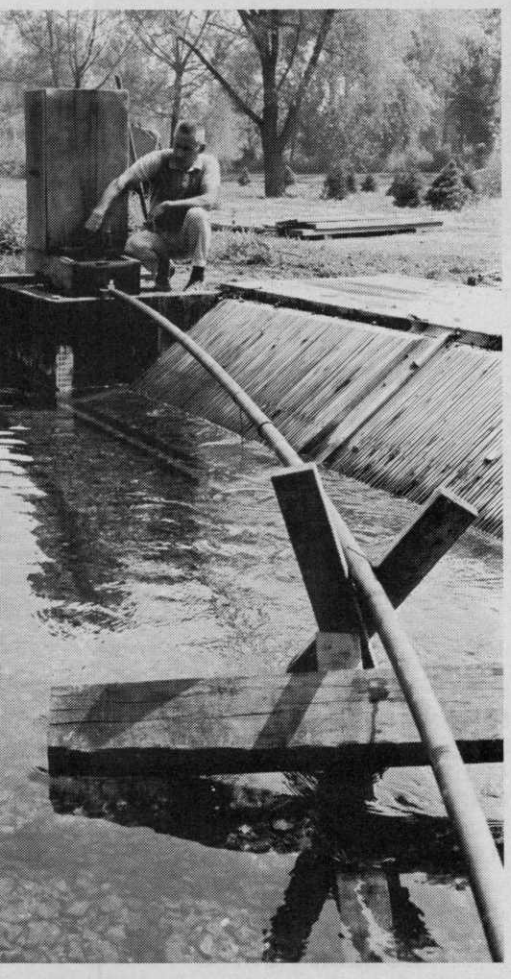
### Method of Application

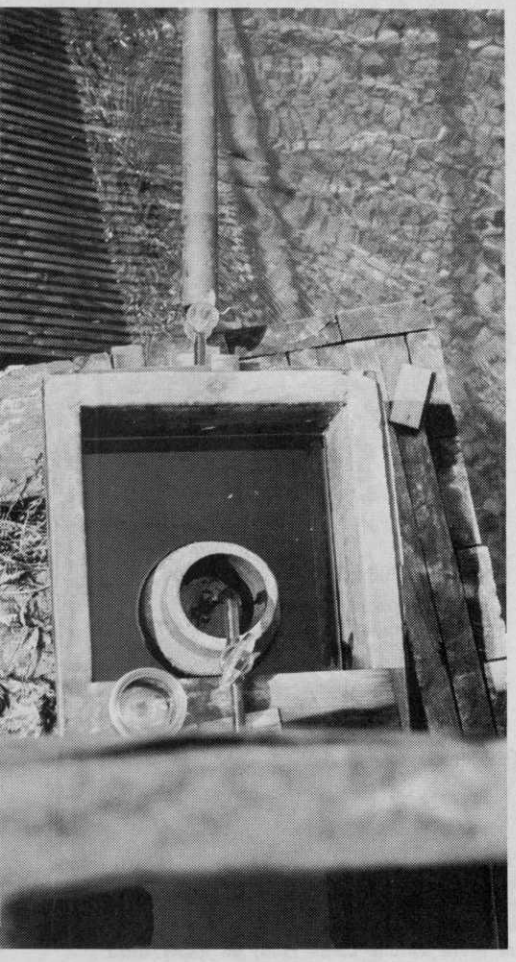
"You have to introduce the Cutrine solution carefully and slowly," cautioned Gysan, "otherwise it will drive the fish downstream and into bunches. Then you have another problem."

Gysan begins with a ¼ p.p.m. He fashioned a 50-gallon drip tank that controls the flow as accurately as possible. The tank is filled with 4% Cutrine.

To compensate for the variations in the weight of the solution during the hours of dripping (the more weight, the faster it would flow), Gysan added a feeding box to the tank outlet that contains a simple float.

Once the Cutrine feeding rate is calculated to the volume and flow





Manager Walter Gysan fashioned a simple, but efficient, automatic 'drip tank' to introduce Cutrine into raceways at a calculated rate. The large tank in the top picture flows into the small holding tank shown in the bottom picture. A fitted wooden block float inside an ordinary clay drain tile regulates the flow from the large to small tank. The flow is stopped when a dowel in the center of the float is raised upward into the spigot. Cutrine drips into the stream through holes at intervals in the pipe that extends across the raceway.

**Table No. 2**

**Soluble Copper Content of Main Stream, Castalia Farms, (May 2, 1953)**

Grab samples taken at different stations along Main Stream after we started dripping dilute Cutrine at head end of stream (¼ P.P.M. rate of drip).

| | P.P.M. Sol. copper One Hour after treatment | P.P.M. Sol. copper 8 Hours started |
|---|---|---|
| Main Stream upon entering Castalia Farms sampled just **before** the Cutrine drip | 0.0 | 0.0 |
| Grab sample taken below the Cutrine drip; at first wooden bridge | 0.05 | 0.20 |
| Grab sample taken at second bridge below entrance of Main Stream | 0.0 | 0.15 |
| Grab sample taken of Main Stream at Guest House | 0.0 | 0.01 |
| Main Stream ½ mile below Guest House (2 miles from Cutrine dripping station) | 0.0 | 0.005 |

**Table 3**

**Toxic Hydrogen Sulphide Found in the Castalia, Ohio Trout Streams (August 24 to August 30, 1957)**

Hydrogen Sulphide Content **before** Cutrine Treatment:
- In the lower nursery muds ..... 20 P.P.M.
- In the water above the mud ..... 2 P.P.M.
- Total bacteria count in water above the mud ..... 55,000 per c.c. (fungi also found present)

Hydrogen Sulphide Content **one week after** Cutrine Treatment:
- In the lower nursery muds ..... 5 P.P.M.
- In the water above the mud ..... 0 P.P.M.
- Total bacteria count in water above the mud ..... 5,000 per c.c.

rate of the water and the setup installed, the dripping of the solution is automatic, thereby keeping manual labor to a minimum for this aquatic weed and disease management practice.

After the fingerling trout get use to the Cutrine (it looks like ordinary bluing) the dripping rate is increased to ½ p.p.m.

"We drip for an 8- to 10-hour run three consecutive days about once a month through the summer," Gysan said.

### Controls Fin Rot

Cutrine has been especially effective in controlling fin rot. The chemical kills the gyrodactylidae bugs that eat the dorsal fin then enter the body and kill the trout.

"When we take inventory at fingerling size, those fish showing evidence of fin rot are dipped with a wire basket in a solution of one part Cutrine to 100 parts water for two minutes.

"We tried one experiment with a dozen mature trout in which the dorsal fin had been eaten right down to the body. We sponged them with full-strength Cutrine. In 24 hours, two died but the others recovered and had even reestablished a healthy film."

To determine Cutrine's effect on fish food organisms, Dr. Hazzard placed a known number in a "Vibert" plastic hatching box then placed them in various parts of the stream being treated. Though some of the animals escaped, Dr. Hazzard concluded that even at ½ p.p.m., of ionic copper in the water, it was not toxic to small fish food organisms. After subsequent checks, Dr. Hazzard wrote that "the important trout foods such as sowbugs, shrimp and caddis worms appear to be abundant as ever.