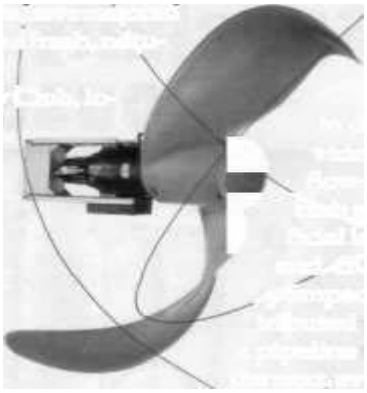
ADVANCED AERATION:

A Mechanical Solution for a Case of Lake Pollution in JAPAN

By Steve Minett, Ph.D.

Submersible mixers, carrying out "artificial respiration" to aerate lake water, have saved a Japanese golf club from a very nasty pollution problem. Its scenic, artificial lakes were overgrown with weeds Wind algae—and producing a very very unfashionable smell. The mixers have restored the water in the lakes to a' fresh, natural condition.

The Lakes Country Club, located approximately 100 kilometers northwest of Tokyo's city center, was constructed in 1983. It now has 1,500 members and employs 150 people, including caddies. The club covers a surface area of 1.5 million square meters, which makes it a middle-sized Japanese country club. One of its claims to fame is that it hosted the World Ladies Cup golf championship in 1989, when the United States and Japanese national teams competed for this trophy.



Artificial lakes

The club takes its name from the lakes constructed on its grounds. They form a prominent feature of the club's 18-hole golf course. Nine lakes, of various configurations, are distributed around the course. They/were constructed by earth excavation and their banks were concrete-lined. The beds are composed of stones and sand. The biggest of the lakes is about 400 meters long—one meter equaling 3.28 feet or roughly one yard—and about 60 meters wide, and each is between 1.5 and 3 meters in depth. The golf course is divided in two parts by arriver that flows through the middle of the club grounds. There are four artificial lakes on one side of the river and five on the other. Water is pumped up from the river and distributed to the lakes on each side by a pipeline that flows from one lake to the next, eventually linking back to the river.

Tax advantage

Apart from their scenic value, the lakes also have implications as to the size of the club's tax assessment. Under the Japanese system of property taxation, properties are taxed according to their surface area. Any bodies of water, however, are subtracted from the total area before the tax is calculated. The existence of these lakes means, consequently, that the club pays a lower property tax, and this was obviously a motivation in their construction.

Pollution problems

About four years after the opening of the club, however, these advantageous lakes began manifesting into severe pollution problems. They had accumulated thick sediment, containing washed-off fertilizers from the surrounding-g lawns and also wastewater form the clubhouse and other sources. This accumulation of organic matter in the/lakes led to atrophic conditions in the water, which resulted in a tremendous growth of vegetation and algae. This enormous increase in the quantity of organic material in the lakes threatened their biological balance.

The bacteria at the bottom of the lakes, which digest or ganic oxygen during the process. As the quantity of organic material increased, so did the populations of these bacteria— and, consequently, the amount of oxygen that they extracted from the water. The oxygen content of the water became severely depleted, re-

Conclusion

The radon-in-water industry has grown at a steady rate over the past five years, Passage of the 1996 Safe Drinking Water Act Amendment and subsequent regulations will boost that and, by the end of the year 2000, waterborne radon removal will be a multi-million dollar market the well water contractor oil retire is one who offers their elements a full ranger services. Opportunity is knockoff. Are you going to answer compounds, consume

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Water Factoid

Water helps kidneys purge toxins from the body;
hydration helps metabolize fat and keeps skin
moist and youthful

Radon danger: Water v. air

One conclusion of the National Research Council report issued last fall—September 1998—seemed to deflate the idea of radon risk in household drinking water. Stating the difference in risk of contracting cancer from radon in airs. Water was higher than previously thought. Another would seem to raise the fear of cancer risk from radon in water by suggesting a higher number of cancer deaths from radon released from water.

A New York Times article on the subject pointed out that stomach cancer is the most likely health threat from consuming radon in water, but that only about 20 of 13,000 U.S. stomach cancer deaths annually could be attributed to radon in rater. This compares with a USEPA assessment in 1994 that estimated 100 stomach, colon and liver cancer deaths from radon in water. The committee said radon was generally eliminated from the body before it harmed other organs.

Conversely, of about 160,000 people—costly tobacco smokers—that die of lung cancer each year in the United States, about 19,(#00can--" also be attributed to breathing indoor radon. Of this number, about 160 deaths could be connected to inhaling radon that escaped from contaminated household water. This was higher than USEPA risk estimates that projected 86 deaths a year due to radon released and in haled from contaminated water.

In both cases, the deaths are attributed to complicating factors involving damaging radioactive particles emitted as radon decays. The odorless element is more prominent in ground than surface water affecting predominantly wells, which supply half of the drinking water in the country,

The National Research Council—the research arm of the National Academy of Sciences—did point out that although small amounts of radon could escape whenever water was used, such as in showering, flushing toilets, washing dishes or doing laundry, this amount makes up only a small fraction of the overall gas concentration indoors.

The USEPA. in 1991. Proposed a maximum contaminant level (MCL) for radon in water of 300 Pico curies per liter (pCi/L). Noting that only

One in 14 Americans routinely consumes water with higher concentrations. Currently, an alternative MCL, or AMCL, of 4,000 pCi/L is in effect. The final proposed rule for an MCL was to be issued in August.