info

Location: **Seattle, Wash.**
Pool Builder: **Pacific Pools, Kirkland, Wash.**
General Contractor: **Edifice Construction Co., Seattle, Wash.**

This Seattle home on Lake Washington was built in 1925 and has been through a number of marquee home owners. The most recent titleholder spent $7 million to renovate it and added this pool to what used to be a Wild West-theme barroom, complete with the columns that still remain.

Construction access to the new pool was limited to one of the French doors; dirt was removed on a conveyor.

Today, the Mediterranean garden feel of the room is enhanced by frescoes on the wall, as well as custom Italian tile around the P-shaped pool. A 30-foot long lap lane is 9 feet wide; the spa is 7 feet in diameter, raised 24 inches and has a bench seat that faces the fireplace. The coping is custom cast concrete with a powder finish that required the installers to wear white gloves so skin oils wouldn't mark it.

equipment

Dehumidifier • 1-hp pump • 30-inch sand/gravel filter • 380,000-Btu heater • 2-inch layer of thermal insulation • 2.5-hp spa jet pump • Floor return system • Programmable controls

Photo by Eduardo Calderon

INNER SANCTUM

Where pool construction and structural design intertwine

By Elissa Sard Pollack
Additional reporting by Ann Langel

In many ways, an indoor pool is like any other pool. However, building a pool indoors brings about numerous additional considerations — humidity, noise and lighting, to name a few. Likewise, creating the structure that houses an indoor pool requires many of the same skills as other forms of residential design but cannot be done well without some understanding of the unique challenges presented by the pool.

When an indoor aquatic environment is created with finesse, the result can be a magical haven. "Environments that are built in harmony with nature enrich human lives," says Ron Dirsmith, an architect with studios in Chicago and Rome, adding, "Water has been used for centuries to create tranquil, calming, spiritual qualities that are difficult to describe."

John Fish, design consultant for Pacific Pools, a division of Frank L. Eagle Inc., in Kirkland, Wash., agrees that the pool's placement in its environment is what makes it come alive.

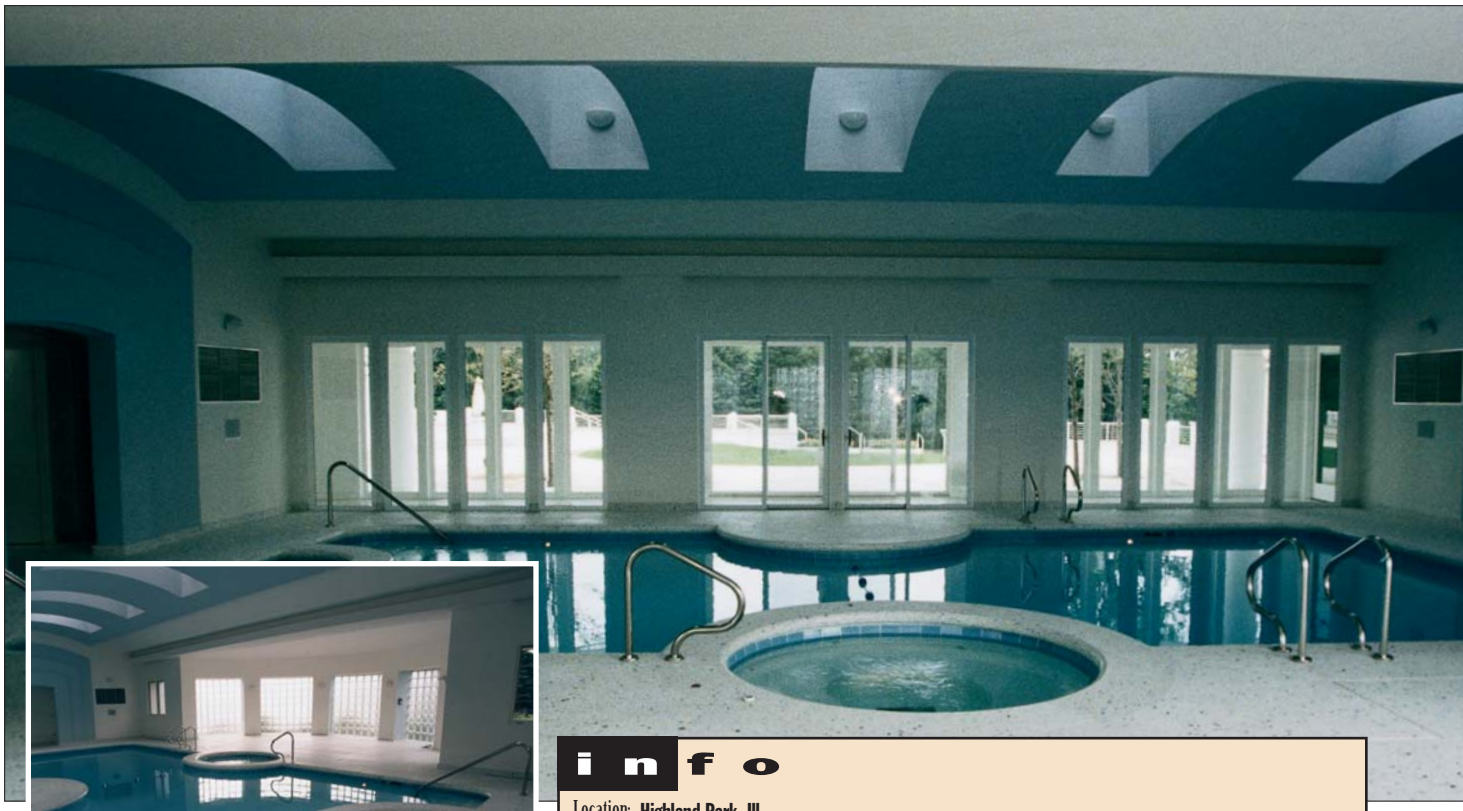
"I often tell people, a pool is just a photograph. The landscaping and amenities are the matting and framing. One without the other truly isn't something significant, but when you put them together, that's where the magic is," Fish says.

Yet the balance of the two environments can be difficult to achieve — especially without a thorough understanding of how the pool and the structure that houses it relate to each other. This is true from the design stages through construction and finally to how the indoor pool space is ultimately used and maintained.

"A lot of architects have no experience with indoor pool construction," says Lou Downes, owner of Downes Swimming Pools in Wheeling, Ill. "It's so important to make sure all the contractors on the job are familiar with pools." Floor-drain placement is one detail that Downes says general contractors with little pool experience often ignore. "A general contractor may not care where it goes, but you need a floor drain in the equipment room."

John Bently, owner of Rosebrook Carefree Pools in Highland Park, Ill., finds that most architects know very little about pools. But if they're responsible, architectural firms will approach the pool builder and ask for help.

Even some HVAC professionals can underestimate the needs of an indoor pool. Pat Brennan of Mid-American Pools in Covington, Ky., recalls being called by a customer who happens to own a large HVAC distribution firm. "He said his pool was leaking because the water level had dropped," Brennan recalls. "When I ran the numbers (water surface area, air and water temperatures and capacity of the dehumidifier), I calculated the pool should have lost about what it lost. The pool



wasn't leaking — it was evaporating."

So Brennan recommended a pool-savvy HVAC contractor who upgraded the environment-control equipment. The structure got a new geothermal heat-transfer system that loops though a nearby 15-acre lake, using the lake's near-constant temperature to remove unwanted heat from the structure and return cooled or warmed air as required by the system.

Deck designs also can vary from outdoor pool projects to indoor ones. For example, one amenity that adds a lot indoors but would be quite impractical outside is radiant heating to keep the floor of the room warm.

Another decking difference is the pitch. Outdoors, pool decks are typically sloped away from the pool to promote water runoff and minimize excess dirt in the pool. Indoors, however, it's often desired to have water from the deck run into the pool. "That keeps moisture away from the walls and out of the air ducts, which tend to be placed along the perimeter of the room," notes Brennan. Plus, depending on the size and layout of the room and the pool, pitching the deck toward the pool may eliminate the need for a floor drain in the living space.

Lighting, too, takes on different import inside. While outdoor pool areas can incorporate quite sophisticated lighting, when you move indoors, lighting becomes a requirement — not a luxury. This is particularly true when there's a desire to include plants.

Many projects use skylights to bring natural light into the room. At night, skylights can add magical moonlight and starry views when the weather's right.

Windows, which enable indoor pool users to feel some connection to their surroundings, afford both light and scenery. Sometimes, however, what's outside the pool room isn't so scenic. Glass block can be an excellent material for letting in light when the view is less than perfect (see project, above).

info

Location: **Highland Park, Ill.**
Pool Builder: **Rosebrook Carefree Pools Inc., Highland Park, Ill.**
Architect: **Goldberg-Downey Architects, Lake Forest, Ill.**

The client's own measurements were the overriding factor in the design of this pool and spa. The home owner, a famous basketball player, requested that the spa be contoured to his body size.

The athlete's wife, whom the pool builder calls a "symmetry freak," then took over the pool plans and asked for a semi-circular 18-inch-deep kiddie pool at one end, and a platform opposite the spa for visual balance.

The 20-by-40-foot pool and 8-foot-diameter spa are in a natatorium framed on one side with glass block and on the other by sliding doors opening onto a large terrace. The look was intended to be sterile and contemporary, to go with the overall theme of the home.

equipment

45-lbs/hour dehumidifier • 1.5-hp pool pump • 5.1-square-foot sand filter (pool) • 300,000-Btu pool heater • 2.5-hp spa jet pump • Two 2-hp regenerative blowers for spa • 1-hp spa circulation pump • 350-square-foot stainless steel cartridge filter (spa) • 150,000-Btu spa heater • Programmable function control

Beyond INception

Once the initial plans are set, the potential for misunderstanding between all the parties involved is far from over. "Providing adequate room for all the mechanical systems should be a simple concept, but we've seen our space as designated on blueprints just disappear," says Downes. "Maybe the equipment room, which houses the pumps, filter, heater *and* HVAC equipment, is reconfigured because the owners want the closet on the other side to be a foot deeper." In one such case, Downes recalls giving in to the smaller equipment room, but "they jammed us in so tight that to get to the front panel of the heater, we needed to cut a hole in the wall of the room they wanted bigger."

Downes recalls one incident in which a general contractor decided the pool equipment should be diametrically opposite from where it was placed on the original plan — after the plumbing was laid. "They just sheared off all our plumbing, took our equipment and shoved it in a closet at the other end of the room," Downes says. "Mechanical rooms really take a beating when everyone's not on the same page. You may have to really fight to hold your ground. People often will sacrifice mechanical space before living space."

Timing, too, is more complicated on indoor pool jobs than

on outdoor pools. That's because an indoor pool is usually excavated before the structure is built, then the pool is finished while more of the structure's finishing touches are put on — and starting up the pool can still be months away. The time span from the initial excavation to filling the pool can be years.

That's a vast difference from outdoor pools that people can swim in just 30 to 45 days after obtaining a building permit.

The key to avoiding frustration over time delays is not taking things for granted. For example, pool builders who are accustomed to deciding when and where the pool shell will be shot shouldn't be thrown by having to coordinate with other contractors. The needs of the structure may trump the convenience of the pool contractor.

Adding a pool to an existing home presents even greater concerns, Fish points out. Will the walls maintain their positions? Will the earth collapse? Is the existing foundation stable?

Likewise, construction access can often be more challenging indoors, as Fish recently found out with a pool project in Seattle (see page 40). The 77-year-old home allowed access to the pool only through a narrow French door. A small excavator was used, with dirt first being transported through windows and later carried on a conveyor to the outside.

Home builders, too, find new challenges when working with pools. For instance, Ron Freeman, owner of C.W. Industries in Bedford, N.Y., recalls that creating the scaffolds needed to build a 25-foot-high vaulted ceiling over a pool was "an unusual obstacle." The pool on this page is the only indoor pool on the veteran builder's resume.

Indeed, combining pool construction with home building adds challenges exponentially, says Dirsmith. "If the pool design has a degree of difficulty we'll call 5, and the environment would otherwise be a 15, the two together are far greater than 20."

However, the difficulty levels can be managed when all the parties communicate well. "We're often trying to run the pool plumbing at the same elevation as the heat vents around the perimeter under the deck," Downes says. "It can be done, but it takes a lot of cooperation and planning. The pool itself is the same indoors or out. It's the environment control that's so critical."

The environment in a natatorium is dependent on the

info

Location: **Rye, N.Y.**
Pool Builder: **Wagner Aquatech, Bridgeport, Conn.**
Architect: **Katz/Novoa Architects, Millburn, N.J.**
Construction Manager: **C.W. Industries, Bedford, N.Y.**

The owners of this weekend home wanted to continue their fitness swimming regimen year-round — not just during the week when they swim at a club in New York City, and not just during the short swim season when they use the outdoor pool on the same property. So an indoor pool and spa were added to the existing home, transforming the L-shaped house into a U. Across the pool from the atrium shown here is a wall that mirrors the style and elevation of the garage at the opposite end of the house. Small windows facing the street keep the pool a secret from passersby.

Also hidden from view is the environment-control and pool equipment, which is housed in a subgrade room that's separate from the home's basement and has an exterior door for convenient service access. Its subgrade position also works well with the placement of HVAC ducts and pool plumbing, which run in an ample trench around the perimeter of the natatorium.

Meanwhile, a cover controls humidity when the 14-by-50-foot pool is not in use and retracts beneath a teak panel. Ventilation is aided by triple-hung windows, which, when open, provide greater air flow than typical two-sash windows.

equipment

Dehumidifier • 3-hp filter pump • 30-inch-diameter sand filter • 350,000-Btu oil-fired pool/spa heater • Two 2-hp spa pumps • 1-hp blower • Automatic pool cover • In-floor cleaning system • Computerized chemistry monitor with remote dosage control

Photo by Steven Lopez

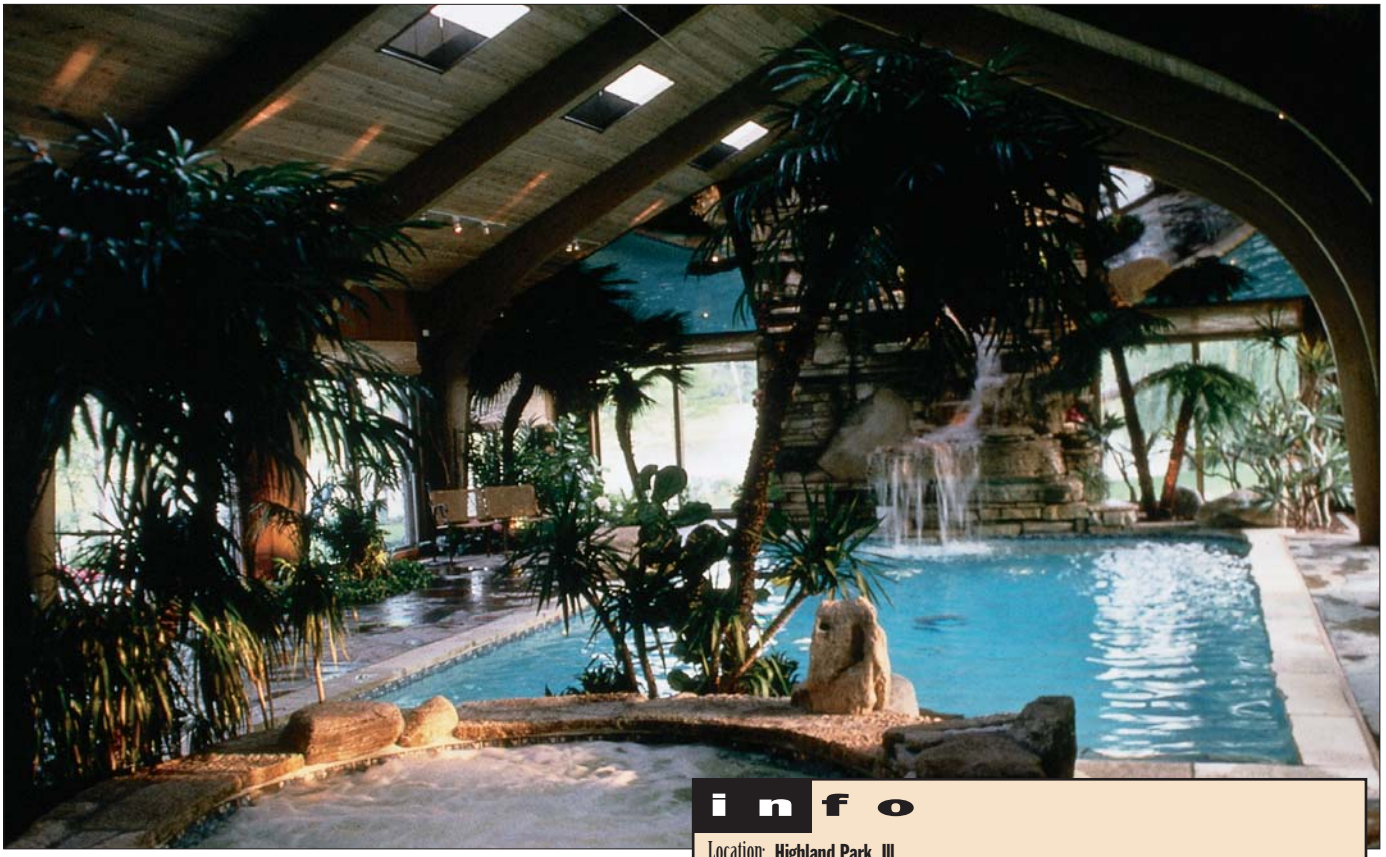


Photo by Ron Dirsmith

evaporation rate from the pool and other moisture sources. The evaporation rate is determined by the pool surface area and the temperature of the water and air. It is typically measured in pounds of moisture added to the air per hour. A dehumidifier is sized by how many pounds of moisture it removes per hour, explains Bill Pendergast, a regional sales manager for Desert Aire in Milwaukee, Wis.

Here's how the evaporation and dehumidification process works in a typical pool room: Water evaporates from the pool at a rate that increases when the water is warmer and the pool's surface area is larger. (The dehumidifier's job is easiest when the water is 2 to 4 degrees Fahrenheit warmer than the air.)

The evaporation process drops the pool water temperature and raises the room's humidity level. A dehumidifier senses the humidity rise and/or pool water temperature drop and begins extracting moisture (and latent heat) from the air. The recovered heat can be returned to the pool water when required (and sensed by a thermostat). Remaining heat can also be used to heat the room — unless air conditioning is required — although supplemental space heaters are also used. Meanwhile, the moisture removed from the air may be returned to the pool, as well. Depending on the design of the system, it can provide the equivalent of the pool's volume once per year, according to Virginia Beach, Va.-based manufacturer Dectron USA.

Of course, making all these systems work together can be very expensive, and it's even more costly when people want their water in the 80s (Fahrenheit) and their rooms in the 70s, as many pool owners do, says Vic Lehmann Jr., general manager of Lehmann Pools in Mahwah, N.J. "In the long run, though, it's well worth it to put in expensive dehumidification equipment, which can cost as much as the pool, and not have to deal with mold, mildew, odors and damage to the room down the road," he adds.

Other pool builders agree wholeheartedly. "The HVAC system is the most critical thing," says Downes. "This is where experienced architects will keep the job going in the right direction and inexperienced architects will drop the ball and give into the cost consciousness. We've seen ceilings fall in and mold crawl up walls because builders, architects and home owners ignore us on the subject of dehumidification."

Bently, too, has seen houses "self destruct" in five years because they lack good dehumidification systems. His firm is called in to consult on two or three jobs a year that have turned into disaster zones. The trouble comes when humidity goes through the wall, freezes, and starts breaking down the structure, Bently explains. Walls need adequate vapor barriers.

Dirsmith recommends 6-mil Visqueen surrounding the entire building. He even half laps it for a tight seal. He also cautions against using green board, also known as waterproof gypsum. "It can't stand up to 24-hour-a-day humidity," Dirsmith warns.

Brennan, too, cautions against green board, which often is used in shower rooms and thus is considered (falsely) to be resilient to high humidity. Instead, he recommends a waterproof board, such as Wonder Board.

Back inside the space, air flow also is critical to environ-

info

Location: **Highland Park, Ill.**
Pool Builder: **Rosebrook Carefree Pools Inc., Highland Park, Ill.**
Architect: **The Dirsmith Group, Highland Park, Ill.**

Several aquatic features challenge the dehumidification equipment used in this 1,850-square-foot gable-roofed enclosure. The 18-by-35-foot rectangular concrete pool, 8-foot-diameter spa, 18-foot-high waterfall with a modulating valve that allows the owners to dial up and down the amount of water in the feature, and 12-foot streams of water arching into the pool from behind plant beds all raise the evaporation potential in the room.

But the system was well thought out, according to dehumidifier manufacturer Dectron. In fact, all 10 skylights remain condensation-free, thanks to heat tape on their perimeters and tiny fans blowing on them. Large splayed bronze mirrors on either side of the waterfall — which are angled so swimmers can see the lake, fountain and garden sculpture outside — also remain unaffected by moisture.

equipment

60-lbs/hour dehumidifier • Supplemental air conditioner • Gas-fired boiler for space heating • 250,000-Btu gas-fired pool heater • 400,000-Btu gas-fired spa heater • 1.5-hp pool pump • Two 5-hp spa jet pumps • 1-hp spa circulation pump • Two 2-hp spa blowers • 5.1-square-foot sand filter (pool) • 150-square-foot cartridge filter (spa) • Two 2-hp water feature pumps • Ozone generator • Programmable controls

ment control. On glass surfaces, for example, "You must run the air flow the entire width of the glass, or else there'll be condensation and eventual rotting of wood at the bottom corner of the glass frame," notes Dirsmith.

Lehmann recalls one customer who refused to spend the money on a system that would keep the windows fog-free when the pool was uncovered. "Whenever they use the pool, they lose their view — and that's a real shame seeing that the property is on a mountainside overlooking the Hudson River." Lehmann says the pool structure is holding up so far because the pool is kept covered when not in use.

INgenuity

Covers are often cited as an excellent way to reduce humidity and evaporation. "Even if you cover only 60 percent of the pool, you eliminate 60 percent of the evaporation potential," explains Rob Carrico, president of Air-Trol in Indianapolis, Ind.

Carrico was recently called in to update the dehumidification system for a residential natatorium that was suffering extensive water damage in the ceiling and support beams. The 20-year-old structure had an undersized dehumidifier and no means to heat the space. Plus, the pool was not covered.

In addition to new dehumidification and heating equipment and extensive structural remodeling, the pool got a new cover — well, 25 covers, technically. Sold by Classic Pool & Patio of Indianapolis, Ind., 25 circular thermal blankets float like lily pads on the pool surface and can be removed in less than 10 minutes, according to Marc Jacuzzi, a salesperson for cover manufacturer MacBall Industries.

The pool owner primarily uses the pool for water aerobics, notes Shelly St. Claire Stuck, vice president of Classic Pool & Patio. "She can just take a few of the disks out of the shallow end, do her exercises and easily toss them back on the surface when she's done. And the pile of disks takes up a lot less space than a big ugly reel."

A more common way to avoid reels is to install an automatic cover.

"There's nothing more unsightly than a big cover reel," says Downes. "At least with an automatic cover, you flip a switch and it disappears. There's nowhere to hide a solar blanket. You either have a big reel or it's balled up in a corner." Then again, Downes, for one, seldom recommends any kind of cover. "I know it cuts the humidity and can help people save on energy costs, but people who buy indoor pools aren't trying to economize. Viewing a pool is a big part of owning a pool. It's very calming to look at water. What's that worth in dollars and cents?"

Still, covers are being used more and more on indoor pools. One architect, Ileana Martin-Novoa of Katz/Novoa Architects in Millburn, N.J., says most of the indoor pools her firm is involved with use power covers. "The pool-cover covers nowadays can easily be disguised to look like part of the decking," she says. In fact, her firm has selected such materials as teak and limestone for cover covers.

Despite all the challenges of excavating through doorways, homes self-destructing and tiffs with contractors, Fish and other pool builders wouldn't have it any other way.

"The big payoff is when someone walks in the room and says, 'Wow!' That's why I sell pools," Fish says. ■

info

Location: **Oakbrook, Ill.**
Pool Builder: **Downes Swimming Pool Co., Wheeling, Ill.**
Architect: **A.W. Wendell & Sons Inc., Downers Grove, Ill.**

This 18-by-38-foot kidney pool is in a two-story room that's also sort of kidney shaped. The equipment is housed in two separate rooms — the dehumidifier's room is directly above space that houses the pool equipment. This setup affords a closed system in which gravity helps the condensate collected by the dehumidifier feed back into the pool without the use of a condensate pump, explains Tim O'Neil, vice president of Downes Swimming Pool Co.

equipment

18-lbs/hour dehumidifier • 100,000-Btu gas-fired space heater • 1.5-hp pump • 150-square-foot cartridge filter • 250,000-Btu gas-fired pool heater • Two 1.5-hp jet pumps • Ozone generator