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Firm helps avert further disaster at Fukushima



By Chuck Crumbo
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A few weeks after a massive earthquake and tsunami ravaged the Fukushima Daiichi Nuclear Power Station last March, **Avantech Inc.** got a call.

The Japanese nuclear plant was out of commission. Backup systems had failed, and emergency workers were pumping water out of the ocean to cool the six boiling water reactors at the Tokyo Electric Power Co. facility.

While a total meltdown was being avoided, another potential environmental disaster was in the offing.



Jim Braun, left, and Tracy Barker are the co-founders of Avantech Inc. The two were given the challenge to design, test, build and deliver a unit to remove radioisotopes from wastewater following the earthquake and tsunami that ravaged the Fukushima Daiichi Nuclear Power Station.

For Jim Braun and Tracy Barker, founding partners of Columbia-based Avantech, the challenge was to design, test, build and deliver a unit to remove radioisotopes from the wastewater.

They had six weeks to get it done.

"If we didn't deliver it on time they ran the risk of overflowing right into the ocean," said Braun, president of Avantech. "That stuff was so contaminated it would have caused an environmental and health disaster along Japan's Pacific coast."

Founded in 1999, Avantech is a privately-held company that operates a 35,000-square-foot manufacturing facility in an

industrial park near Monticello Road and Interstate 20. It offers comprehensive water treatment solutions for industrial, commercial and nuclear power applications.

For the Fukushima task, Avantech, under contract with Toshiba Corp., joined Shaw Global Services and a Honeywell International subsidiary called UOP to come up with a system to treat the radioactive water that was effective and simple to operate.

"Tracy (Barker) knew we could put the system together," Braun said. "We had the foundation based on other work we had done."

Just two days after they were asked to design the system, Braun and Barker presented a plan to TEPCO. By May, they got approval and proceeded with the project.

"All the time we were proving it in the laboratory, we were still designing and building it, because we knew it was going

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to work,” Braun said.

The major challenge, though, was getting a highly complicated job done in a short period of time.

“We were putting everything we had into this,” said Barker, principal engineer.

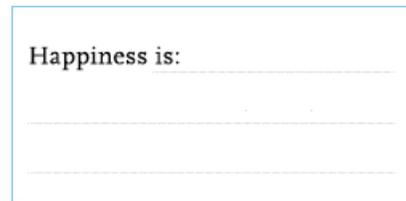
Avantech’s entire staff swung into action. Welders, pipefitters and other shop employees were put on 12-hour shifts, working around the clock, seven days a week. Engineers and support staff worked 18-20 hours a day, seven days a week.

Employees focused solely on the Fukushima project, knowing that the Japanese, and the world, needed them to come through, Braun said.

Their families also had to sacrifice, Barker added.

“With us working 16 to 20 hours a day, it was a great imposition on our families. They had to pull up the slack,” he said.

The Avantech team worked without a day off, straight through the Memorial Day weekend, and into June.



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On the Fourth of July, when relatives, friends and neighbors were enjoying backyard barbecues and fireworks, Avantech workers put the finishing touches on the system, and delivered it to Hartsfield-Jackson Atlanta International Airport.

There, the system was loaded on a Boeing 747 freighter and flown to Japan.

What Avantech helped develop was a highly-specialized, patent-pending water treatment system called the Simplified Active Water Retrieval and Recovery System, or SARRY.

The SARRY system uses two ion exchange processes to filter out highly radioactive Cesium-134, Cesium-137, and Strontium-90 from the contaminated seawater.

The mixing of seawater and fission products like cesium and strontium produced a “challenging waste stream” because of the high salt content and high radioactivity, according to a paper Braun and Barker wrote about the project.

The process involves swapping sodium for cesium or strontium by letting the water flow through a Shielded Ion Exchange Module.

Inside the ion exchanger are crystalline materials, developed by UOP, which can remove radioactive material from water.

According to Honeywell, the crystalline material has been used commercially for 30 years in nuclear power plants, alkaline waste tanks and spent fuel storage pool water.

But never had the process been used on such a large scale.

Avantech, along with Babcock & Wilcox Co., also designed and built a remote sampling station — integral to the SARRY system — with online detectors. The sampling station can measure how much radioactivity enters and exits key components as well as cesium accumulation in the absorption modules.

A selling point for the SARRY system is its simplicity, Braun said. It’s fully automated. The only maintenance required

is the removal of filters from the modules, which are about the size of a residential LP gas storage tank.

Since its start up Aug. 18, the SARRY system has achieved more than 90% online availability.

"It's unbelievable how well this has worked," Braun said. "It's been spot on."

There's little time for Braun and Barker, as well as their employees, to rest, though, as there's plenty of other work to do.

In 2011, the company recorded about \$15 million in sales and expects to double that in 2012, Braun said. About 50% of Avantech's work is for commercial power plants, both nuclear and non-nuclear, and another 20% for governmental units. Another 20% is for industrial customers, and the remaining 10% falls under miscellaneous, he said.

To accommodate future growth, Avantech plans this year to add another 30 employees to its present workforce of 58. The company also is looking for a place to build a new plant and expand.

For Braun and Barker, who are both 49 and chemical engineers, the partnership has been highly profitable and complementary.

"It's been a very good relationship," Barker said. "Between us, there's very little we can't overcome."

The Fukushima project, though, has been their most challenging and rewarding experience.

"Certainly everything that we ever did in our careers culminated in what we provided at Fukushima," Barker said. "Even though it was a great experience for us and a great opportunity, it's something that I hope we'll never see again."

Added Braun: "It seems that for the last 13 years we slaved away working together to put this thing together at this point in time so that we could deliver on this project. The karma of it was incredible.

"It wasn't just Tracy (Barker) and me, but it was everybody around here."

Reach Chuck Crumbo at 803-401-1094, ext. 204.

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