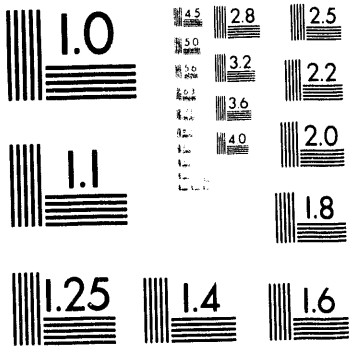
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PNL-SA-23171

VIATEC RECOVERY SYSTEM, INC. - A CASE STUDY

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October 1993

Presented at the
Natural Resource Recovery Technology
Leadership Forum
October 19-22, 1993
Whitefish, Montana

Work supported by
the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830

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Richland, Washington 99352

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Viatec Recovery Systems, Inc. - A Case Study

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Natural Resource Recovery
Technology Leadership Forum

Grouse Mountain Lodge
Executive Conference Center
Whitefish, Montana
Thursday, October 21, 1993

Good evening. I've been invited to tell you how we transferred a technology from the U.S. Department of Energy's Pacific Northwest Laboratory to the private sector. I'll begin by telling you about the technology and what it does. Then I'll tell you how we found a commercial partner to market the technology. And I'll end by telling you some of the lessons we learned and what our customer thinks about the partnership.

This is a success story for two reasons. First, the people who developed the technology had faith in its potential. And second, they took an active part in the transfer; they didn't sit back and wait for someone else to do it.

That reminds me of Joe. Night after night, Joe prayed for help in winning the lottery, but his prayers went unanswered. Finally he cried out in desperation: "Lord, give me a break! Please let me win the lottery!" Suddenly, lightning flashed across the sky and thunder crashed around him. Then he heard a voice from above: "Joe! You give *ME* a break! *BUY A TICKET!*"

To succeed in tech transfer, you've got to have more than faith. You've got to buy a ticket. You've got to invest time, energy, imagination, and effort. And that's just what the developers of the waste acid detoxification and reclamation process did.

Because waste acid detoxification and reclamation is such a mouthful, I'm going to call it the WADR process. That should cut five or ten minutes off my talk.

The Waste Acid Detoxification and Reclamation Process

We developed the WADR process to recover acids from nuclear fuel fabrication and processing operations at the Department of Energy's Hanford site in southeastern Washington state. But we realized it probably had much wider applications. The process is cost-effective. It's environmentally benign. And it recovers spent acid generated in many manufacturing and industrial operations, so the acid can be used again.

What It Does

With this process, users can concentrate metals, recover clean acid, and process water from metal-bearing spent acids. At the same time, they reduce the volume of hazardous waste drastically--in some cases even eliminate it entirely. In pilot-plant tests the volume of spent acid to be disposed of has been reduced up to 95 percent because the metals may be reclaimed, the acid is purified for re-use, and the water can be recycled.

Users also can control the purity of the recovered acid, even surpassing that of high-purity, industrial-grade acids. In addition, early case studies indicate that a system installed in an operating facility may pay for itself in less than a year. The operator has less waste to dispose of and less acid to purchase. Estimated savings may be as great as $1 to $5 per gallon of process waste treated.

Who Can Use It

The waste acid system can accommodate a wide variety of users. Typical operations include electroplating and surface finishing for electronics, aerospace, automotive, and metalworking applications and the iron and steel, chemical, petrochemical, pharmaceutical, and defense industries. The process can be adapted to treat almost any type of spent acid, and the system is flexible and modular. The design can be tailored to meet the requirements of large and small companies. Aerospace and metalworking manufacturers that generate tens of thousands of gallons of spent acid per week may need a large continuous system. On the other hand, small plating shops that only generate hundreds of gallons of spent acid per week may need only a portable batch system.

Why It's Valuable

The WADR process has both economic *and* environmental benefits. In the United States, more than 15,000 companies produce over 1 billion pounds of spent acids per year. To dispose of this waste, companies must comply with a host of federal, state, and local regulations and deal with public concerns about pollution. The new technology reduces disposal costs and produces cleaner process chemicals. It also offers an alternative to current practices of neutralizing spent acid and disposing of toxic metals in

landfills or injected into deep wells. For this reason, the waste acid process also may eliminate potential liabilities associated with the disposal of toxic wastes.

With manufacturing becoming more competitive, operating costs increasing, regulations becoming more stringent, and public scrutiny intensifying, technologies such as the WADR process could make the difference between profit and loss--or even survival--for many companies. Because the system minimizes waste and recaptures useful materials, it can help industry meet economic, regulatory, and societal demands without completely changing operating practices or principles.

Finding a Commercial Partner

However, before anyone could realize benefits from this technology, we had to overcome some barriers, get the word out, and find a partner to commercialize the process.

Overcoming a Major Barrier

The most difficult barrier we had to overcome was demonstrating the process with a variety of corrosive acids using commercially available equipment. The spent acids were so corrosive, even exotic metals were destroyed quickly. The developers decided to build a pilot system using SOLVAY™-PVDF and other fluoropolymers. SOLVAY™-PVDF is an acid-resistant fluoropolymer produced by Solvay and Company (Solvay & Cie.) in Brussels, Belgium.

However, the solution to that problem brought us face-to-face with another obstacle. Although SOLVAY™-PVDF is perfect for this application, we learned that very few companies have worked with this material for use as heat exchangers. Finally, in Hastings, Michigan, we found our solution. Viatec is the parent corporation of a group of companies that design, manufacture, and service custom-built equipment for handling corrosive and contaminated liquids and gases. We got Viatec to produce the SOLVAY™-PVDF equipment for our pilot system, and Solvay and Company assisted Viatec with the materials of construction in the early stages of the project.

Getting the Word Out

Once we had a pilot system we could demonstrate, we knew the technology had commercial potential and we needed to get the word out to identify interest. The developers made many industrial contacts through exhibits at trade shows. Then, in 1992 a significant breakthrough occurred. The process received an R&D 100 award from *R&D Magazine* as one of the 100 most significant technologies of the year. As a result, the waste acid process was widely publicized and attracted quite a bit of attention.

Meanwhile, the team continued to refine the process, operating bench- and pilot-scale systems. They discussed the spent acid recovery technology with private companies and

other national labs. They made technical presentations at workshops and symposia. They attended waste minimization and tech transfer meetings to report on the process. They conducted several small projects for potential users who wanted to evaluate the process as a method for treating specific wastes. And they conducted many tours of the pilot plant for possible clients and others interested in the WADR process.

Going the "Extra Mile"

These activities turned up a lot of "tire kickers," people interested in *using* the process, but **not** many interested in *licensing it* or *manufacturing* the specialized equipment necessary to withstand the vacuum operation and acidic conditions. At this stage, the developers' belief in the technology and their continuing technical improvements were the only things that kept them from folding their tents and walking away from the concept of commercialization.

Instead of giving up, they used the feedback they had been getting from industry and looked for new ways to enhance the process technically. They collected critical performance data. They created know-how and techniques to provide the intellectual property base necessary to strengthen the technology package. They explored the potential market and user base. And they compiled a list of probable industrial and government clients that might need the process. *They did their homework!*

They even drew up facility and equipment requirements for a spin-off company and worked to better understand the commercial market opportunity. They evaluated possible business arrangements and continually refined the development and business plan. And they discussed possible participation in the start-up company with several venture-capital organizations.

One of their contacts was Viatec--the company that had helped solve the system corrosion problem. Building on the working relationship the development team had established with Viatec, we asked Ken Kensington, Viatec's Chief Executive Officer, whether he'd be interested in starting a company to manufacture the system. He told us he would be interested, but he wasn't sure there was a market for the process.

It was Catch 22. To find out if there was a market, somebody had to do treatability studies, marketing, system design, and so forth; and that required key staff. Viatec didn't want to assume all of the financial risk of putting staff on the payroll until they were confident there was a viable, long-term market. Somehow we had to get through the transition period between where we were--with a proven method of recovering spent acids--and where we wanted to be--with a spin-off company selling tailored waste acid recovery systems. How could we get there?

Well, we devised an operational strategy for the transition period, and that was the key. It reduced the financial risk for Viatec. Kensington would start a company and establish

an office in Richland near our Laboratory. Then, through the DOE Loaned Executive Program, we would provide someone who would work in the Viatec office but remain on the Laboratory payroll. This person would help identify market opportunities and do technical development.

Other key staff, also on the Laboratory payroll, would do treatability studies for potential clients. Companies could send us samples of spent acids, and we would process it to determine whether the technology worked on this specific type of waste. If it did, we'd turn over the lead to Viatec and they could engineer a tailored system for that particular waste stream.

We also had to figure out how we'd know when we were through the transition period. Together with Viatec, we decided that they would know whether or not there was a viable market when they had sold more than one but not more than three systems. Kensington even went so far as to negotiate employment offers for the development staff. If and when he decides there's a market for the business, the developers can choose to execute that agreement or to stay with Battelle.

The beauty of this approach is that the transition period before major startup reduces the risk to Viatec as well as to staff, who might want to go with the new company but not unless there's a validated business. It's a win-win situation with mutual benefits.

There's one other important element in this success story. Startup businesses need an environment that allows them to flourish, and we happen to have one in the Tri-Cities. The Technology Commercialization Partnership is a component of our local economic development infrastructure, and this group provided some hand-holding that was critical. Members of the Partnership help new companies with financing, special services, land, facilities, and other types of support that make startup much easier. In effect, our community has *bought a ticket too!*

Marketing the Technology

Today, we're still in the transition period. Viatec is providing start-up funds for the new company, and Viatec Recovery Systems, Inc., is marketing the spent acid recovery technology worldwide. The Laboratory staff are working with a variety of companies and waste forms to determine the feasibility and potential of the technology for industry.

New Subsidiary in Richland

Viatec Recovery Systems has opened an office in the Tri-Cities, adjacent to DOE's Hanford site and the Pacific Northwest Laboratory. Thanks to the community's interest in economic development, the office is located in a modern, new incubator facility that offers support services and very accommodating leases. And if our expectations about

the market prove to be valid, the firm eventually will build a manufacturing plant in the area.

Possible Uses at Hanford - Full-Circle Technology

As I said earlier, the Department of Energy sponsored development of the WADR process to recover acids from nuclear fuel fabrication and processing operations at Hanford. That need still exists. We're doing treatability studies and looking for opportunities to participate in Hanford cleanup efforts. In fact, I believe this is textbook example of how DOE would like things to work. Technology developed for DOE is transferred to the industrial sector and goes *full circle* to be used in a refined commercial form to solve DOE problems. And that's what Viatec is doing.

Lessons Learned

We learned some valuable lessons through our experiences with Viatec. In the process, we improved PNL's portfolio of methods for transferring technology to the industrial sector, and we expect Viatec to have opportunities for new business and create jobs in the our community.

How We Could Have Failed

Looking back, however, it's easy to see that we could have failed if we had been less flexible and creative. Traditionally, when we transfer technology like the WADR process, we look for a company to manufacture the system. We work out a licensing agreement and turn the technology over to the licensee. Sometimes we provide additional development support, but essentially we step out of the picture. We have nothing to lose; the licensee faces all the risks.

If we had been prescriptive in our approach, if we had been locked into using the conventional licensing method, the WADR process might still be sitting in our inventory.

Why We Didn't Fail

I don't want to seem immodest, but as Dizzy Dean once said, "It ain't braggin' if you done it." We did it; we succeeded! We recognized that a partnership with Viatec would be a marriage made in heaven. And we realized that there are lots of ways to do things. When conventional methods proved unsuitable, we decided to find another way to do the deal. We tailored a transfer mechanism to fit the situation and the players. We found a way to move forward and, at the same time, reduce the risk to the licensee.

We worked out a strategy for the transition period and included the experience and know-how of the development team. It would take years of research on spent acid

recovery to duplicate their process knowledge. They are experienced in managing staff, budgets, and schedules. They have the process engineering and hands-on technical skills needed to design, build, deliver, and service the equipment. They have in-depth understanding of the technology that could lead to proprietary improvements in the process. With these assets as part of the deal, and with the community's support for new business, Viatec became our partner.

What Our Partner, Viatec, Thinks

I think it's only fitting that I close with some thoughts from our new partner, Ken Kensington. According to Ken, and I quote, "Since the successful technology transfer and commercialization of the WADR technology, the response has been just short of phenomenal. The key to its present and future success is that the technology will not leave Richland, Washington, and the Tri-Cities area. This technology must grow where it was developed, with the scientific and intellectual capabilities of this community. There are few communities like it in the world.

"The resources, cooperation, and commitment by the Department of Energy, the Pacific Northwest Laboratory, the Tri-Cities Enterprise Center, and the Tri-Cities Commercialization Partnership really made it happen. As a result of this team effort, we all won--community, government, and business. But the biggest winner is the environment and the people, both here in America and around the world."

Thank you.

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