

WJTA Jet News

Water Jet Technology
Association



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Parts of a puzzle cut by a water jet. Photo courtesy of J.C. Ayer & Co.

Nominees sought for board of directors

The Nominating Committee hereby solicits nominees to serve on the Board of Directors. The Board will be elected at the meeting of the WJTA members held during the Sixth American Water Jet Conference in August in Houston. Send nominations to the Secretary, Evette Steele, c/o the WJTA Office, 818 Olive Street, Suite 918, St. Louis, MO 63101.

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Jigsaw puzzles

Jim Ayer is the spirit of "Yankee ingenuity." By fitting together an age-old pastime with a new technology, he has found a way to turn a life-long love of jigsaw puzzles into a thriving business enterprise.

From his home on Chestnut Street in the heart of historic Salem, MA, Ayer designs unique, intricate puzzles on his Compaq Deskpro 386 outfitted with AutoCAD design software. Later on, in his workshop in Old Town Marblehead, these designs are transformed into jigsaw puzzles – without a jigsaw. He uses a computer-controlled water jet – a razor-thin stream of water moving through a diamond nozzle at speeds in excess of Mach 3, over 2,000 miles an hour, making puzzle cuts only seven one-thousandths (7/1,000) of an inch wide. Avoiding the turning radius of the jigsaw blade, Ayer's puzzles fit together so perfectly that the assembled puzzle can be picked up by one corner and waved like a tapestry.

In addition to fulfilling the American dream of turning a labor of love into a livelihood, Ayer's ingenuity has also brought efficiency and affordability to the costly craft of custom puzzlemaking.

"Cutting a puzzle with a jigsaw by hand is extremely time consuming and prone to error and waste," notes Ayer. "While I may spend as many as ten hours designing a one-of-a-kind puzzle on computer, it takes only about two hours to cut by water jet, with precise repeatability. This means I can produce tighter fitting, more intricate puzzles at lower cost."

(continued on page 2)

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Jigsaw puzzles



Jim Ayers at his workstation. Photo Courtesy of J.C. Ayers & Co.

Leaving behind a successful career as a mechanical engineer, Jim Ayer has truly put all the pieces of his past together to create J.C. Ayer & Co.

As a youngster, he delighted in assembling the wooden jigsaw puzzles his grandfather brought home from the library. Later, a cousin began collecting puzzles and sending them to Jim to assemble and critique. His fascination with jigsaw puzzles continued during his studies at Yale University, where he earned a degree in mechanical engineering. After a career spent largely in the cutting tool industry, Jim seemed destined to "synthesize" his love of puzzles with his engineering background to become a full-time puzzlemaker.

It took Ayer more than a year to gather and perfect his high-tech tools - his CAD workstation, water jet cutting platform, and computer interface - but the expense and struggle have been well worth it.

"I always wanted to get into business for myself," Jim says. "I saw a small market where I could both innovate and follow my bliss to become the lowest-cost producer of this kind of puzzle. I really have fun with it!"

As his worldwide clientele knows, fun is Jim Ayer's real product - countless hours of fun. His puzzles have also won awards and have been featured in a museum at the Massachusetts Institute of Technology and Bates College.

The Berlin Wall



Human figures cut in section of Berlin Wall.

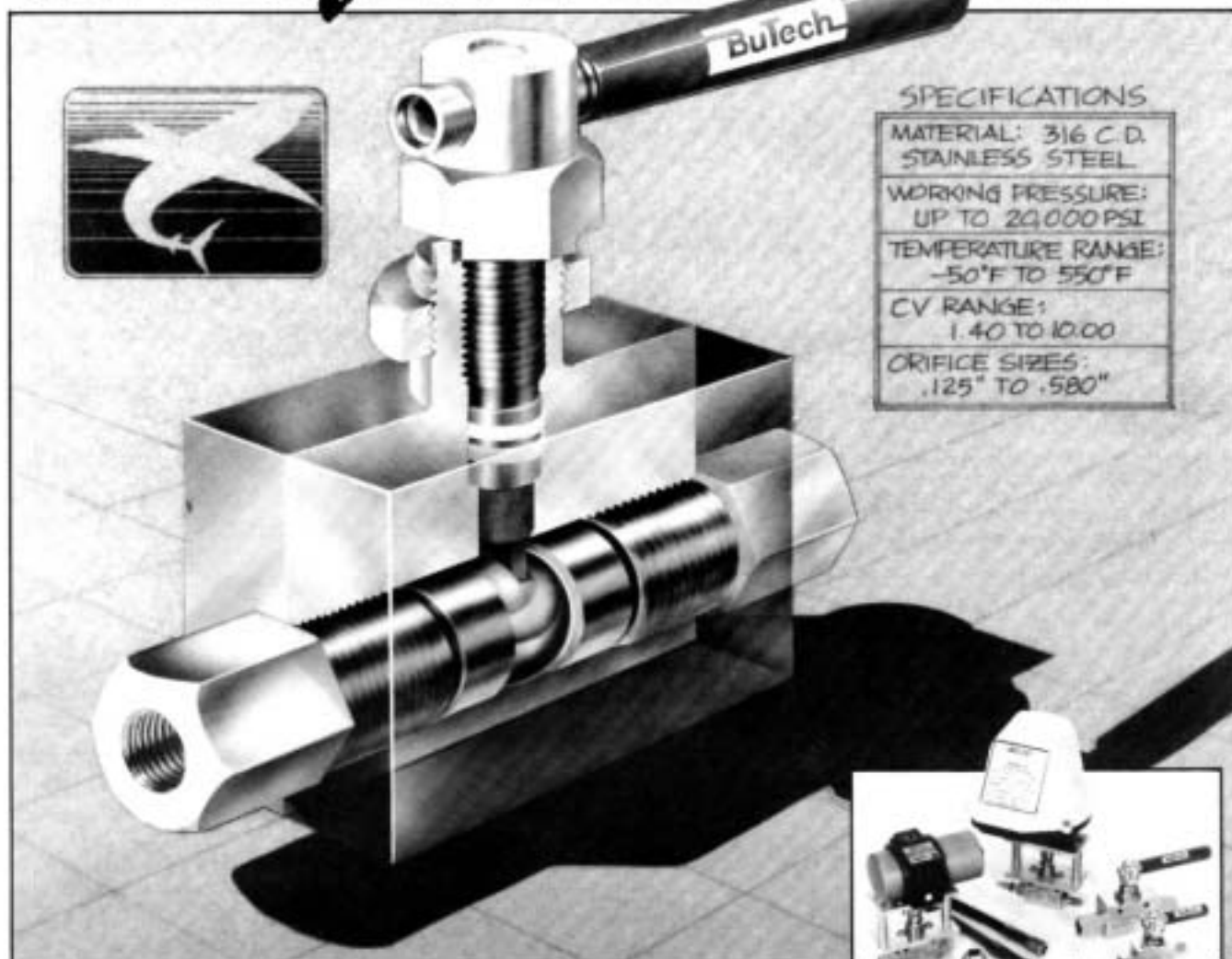
composed of granite cut by a computer-controlled abrasive jet.

Recently a segment of the Berlin Wall, in which human figures were cut with an abrasive jet, was installed at Westminster College in Missouri.

Westminster College is the site of Winston Churchill's famous "Iron Curtain" speech.

One of the most interesting recent developments in water jet technology has been the use of abrasive jets to create sculpture. The granite map of the World at the Navy Memorial was featured in the June 1990 issue of *Jet News*. This map is

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From the president's desk...

The Board of Directors met in Chicago on March 2, 1991, to discuss plans for the Sixth American Water Jet Technology Conference to be held in Houston, Texas, August 24-27, 1991.

The convention will begin on Saturday, August 24, with a short course on water jetting technology. This course will cover water jetting fluid dynamics, abrasive jets, equipment safety, and many applications.

Technical sessions will begin on Sunday, August 25. Approximately 50 papers will be presented in 10 sessions. Each presentation will be 20 minutes long and a 20-minute discussion period is scheduled for the end of each session.

An applications session will be held parallel with the technical sessions. The purpose of the applications session is to encourage discussion of the practical aspects of water jetting. The majority of time at this session will be devoted to a dialogue between speakers and attendees.

The convention will end with a technical tour on the afternoon of Tuesday, August 27. This tour will feature live demonstrations of equipment at four sites in the Houston area.

An exhibit will be held in conjunction with the meetings. Luncheon will be served in the exhibit hall in order to focus attention on the exhibits.

Entertainment is also being planned. Contacts during this meeting are sure to be informative and rewarding. Join us in Houston!

— George A. Savanick, Ph.D.

If we hope to live not just from moment to moment, but in true consciousness of our existence, then our greatest need and most difficult achievement is to find meaning in our lives.

— Bruno Bettelheim

Cutting decorative marble and granite

Founded in 1984, Rodeo Marble Corp., Van Nuys, CA, employs 22 people to produce customized marble and granite work. They serve developers, builders, and contractors by creating fireplaces, furniture, and other stonework for the residential housing market throughout the country. The firm also specializes in stone and metal inlays.

Rodeo Marble was using diamond wheels that could cut straight lines and simple geometric shapes in marble and granite, but the company was unable to cut intricate free-form shapes or interior angles at a reasonable cost. To provide their customers with these complex designs and special inlaid products, they had to assign this time consuming and expensive handwork to Italian craftsmen overseas. Needless to say, this overseas contracting created additional expense, shipping problems, and extended delivery times.

As a result, Carlos Fronti, consultant to the firm, was looking for new ways to cut marble and granite in the Van Nuys facility at a reasonable cost.

When Fronti saw the FLOW PASER™ abrasive jet cut complex shapes from stainless steel at a West Coast machine show, he immediately realized that if the system could cut stainless steel so quickly and cleanly, it should also be able to cut stone.

FLOW's intensifier pumps pressurized water up to 55,000 psi and expelled it through a precision orifice at up to three times the speed of sound. Abrasives, such as garnet, are entrained in the hair-thin water stream to create the abrasive action necessary to slice through marble and granite. Rodeo Marble primarily uses the abrasive jet system to cut three-quarter-inch thicknesses, but it successfully cuts through slabs up to three inches thick.

The company has received recognition throughout the industry for being the first in the world to introduce the newest technology since diamond wheels for cutting marble and granite.

Fronti says, "Designers, for example, have learned about our capabilities to do inlaid work in areas like floors, counter tops, tables, and reception areas. They're now selling this inlaid work to their customers."

After complete training by FLOW, one employee is all Rodeo Marble needs to operate the abrasive jet, and the system is reliably precise. It consistently cuts the inside and outside curves of stair railings and the ovals for tabletops.

The PASER™ abrasive jet cut a Guerlain perfume script logo in brass and an identical cutout in a slab of marble. The brass logo was then mounted in the marble cutout with minimal hand finishing.

For another client, uniform fleur-de-lis patterns were cut in 16 squares of three-quarter-inch marble, 18 inches square. The same system cut the brass inlays to fit precisely into the cutouts.

Fronti adds, "Our business is growing because we're better able to meet our client's needs for customized, unusually-shaped inlaid work in marble or granite. Clients are simply amazed by what we can do. This system can cut anything of any size in marble and granite — the potential for growth is unlimited."

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The cutting edge by George A. Savanick, Ph.D.

Noise from water and abrasive jets in factory applications has been of interest lately. Manufacturers using abrasive jets would like to reduce ambient noise to 80 dB in order to satisfy Occupational Safety and Health Administration (OSHA) standards. One solution is AB Best Matic's Cutting Box™ which is described in this issue of *Jet News*. Another solution may be the use of submerged cutting tables, although it may be difficult to get below 85 dB with this method.

The Environmental Protection Agency (EPA) is looking at waste process water. If water from water-jetting operations is judged by EPA to contain waste water pollutants, it may not be permissible to dump this water. It may then be necessary to work with closed-loop systems or to collect the water. EPA plans to promulgate a draft document on waste-process water in 1993 and to put a document in place in 1994. It is not clear whether or not water jetting effluent will fall under these regulations. If it does, life might be more complicated for water jetters.

High-pressure water jets have recently been used to augment oil well drills according to an article in the March 11, 1991, issue of *Oil and Gas Journal*. Four wells were drilled using this system. Flow Drill Corp., Kent, WA, is cooperating with Grace Drilling, Dallas, TX, in this venture.

The March 1991 issue of *Manufacturing Engineering* describes water-jet cutting equipment used by Ford Motor Co., Ltd., Melbourne, Australia.

The March 1991 issue of *Mechanical Engineering* mentions that hydroblasting is being extensively used to remove the Zebra mussel from intake pipes in power plants in the Great Lakes.

Pioneer award

The Pioneer Award, presented at each Water Jet Technology Conference, honors long-time innovators in water jet technology. Past winners include Jacob Frank, H. S. Stevens, Norman Franz, and Dick Paseman.

The Board of Directors hereby requests nominations from the membership for the awardee at the Sixth Annual Water Jet Technology Conference to be held in Houston, TX, August 27-30, 1991. Please send your nominations to:

President George Savanick
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Ingersoll-Rand introduces first high-accuracy, moving gantry waterjet cutting system



Ingersoll-Rand Waterjet Cutting Systems introduces the HS-1000, the first high-accuracy, X,Y and Z axis moving gantry system designed for cost-effective cutting in a wide variety of applications, including composites, plastic, foam, rubber, glass and metals.

The new stand-alone system, which is offered in a wide variety of work envelopes, utilizes the omni-directional, noncontact attributes of waterjets for smooth, programmable cutting ideal for just-in-time manufacturing and low-cost maintenance.

Matt Boylan, Manager of Sales and Marketing, Ingersoll-Rand Waterjet Cutting Systems, points out that the system will make high-technology cutting a cost-effective option for a much larger number of applications. "No longer will precise waterjet cutting require a major investment. The programmable efficiency of this system makes it a practical option for cutting needs as diverse as large automotive production lines and small job shops."

The user-friendly HS-1000 system is suited for semi-automated production, controlled by a menu-driven PC-based system. The computer provides excellent contouring accuracy (± 0.015 -inch per axis over total travel) and full control of the waterjet functions through standard RS-274D NC programming language.

The operator-loaded sacrificial steel grid cutting area has a 125-lb/ft² load capacity with a maximum 6-foot by 8-foot cutting area, making it possible to cut large-scale pieces. A high-rail gantry system allows easy access to the cutting area, while providing rigid support for the X, Y, and Z axes.

The catcher tank is designed specifically for waterjet and hydroabrasive™ cutting. The reinforced-steel unit is fitted with sacrificial steel plates for effective dissipation of spent-stream energy.

Optional features include accordion-type way covers, programmable 12-inch Z-axis motion, second-waterjet cutting head, alignable-orifice hydroabrasive cutting assemblies, bulk-abrasive transfer, and metering systems and an off-line orifice alignment station.

For more information about the new HS-1000 system, contact:

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Phone number: (316) 856-2151

Conference Proceedings Available

A limited supply of the official Proceedings of the 5th American Water Jet Conference, held August 27-31, 1989, in Toronto, Ontario, Canada, are available in a single, hard-cover volume. A variety of presentations relating to the following general topics are included: Rock Cutting; Basic Studies; Concrete, Construction and Industrial Uses; Coal and Soil Cutting; Medical Applications; and Safety Considerations.

The Proceedings are available for \$75.00 each, plus \$5.00 for shipping and handling (in continental U.S.). Additional shipping charges apply for destinations outside the U.S. To order, contact:

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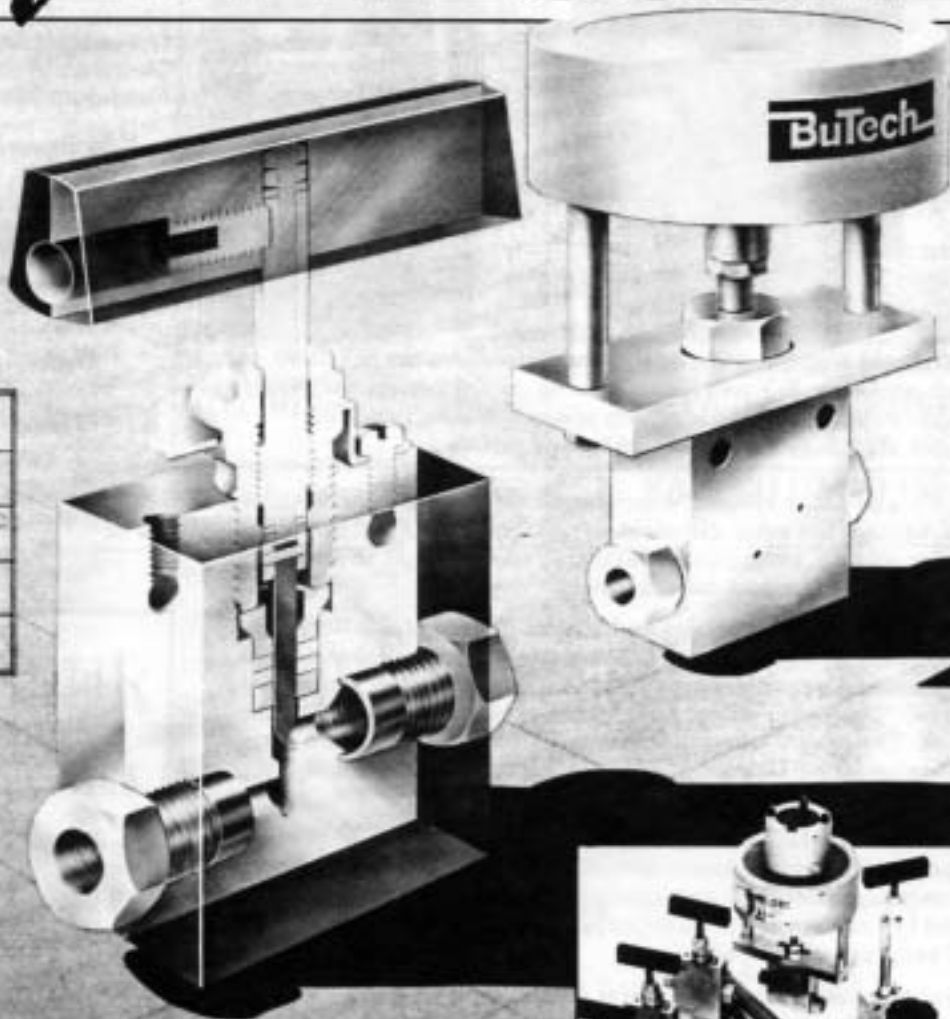
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Water jet cutting of glass

Western Glass in Maywood, CA, employs 40 people to produce an assortment of bevelled and polished glass products ranging from tabletops and mirrors to room dividers, cabinet doors, and fireplace screens. Serving designers, architects, furniture companies and other clients throughout the country, the company also cuts holes in glass for decorative and functional purposes, and provides artistic sandblasting services.

Western Glass used conventional diamond-wheel cutters for straight and circular cuts, but diamond wheels couldn't make intricate or interior-angle cuts. Sandblasting could make intricate cuts, but it was a costly and time-consuming process. Moreover, its inability to maintain the necessary tolerances produced inexact results.

Worse, either one of these cutting techniques could shatter the glass, destroying whatever work had already been put into the sometimes expensive materials. Finally, many of the exciting, new artistic shapes desired by designers and architects could not be cut at all because of the lack of a precision cutting method. Western Glass needed a fast, clean, and cost-effective way to cut both simple and complex shapes in glass.

In 1987, the company installed a FLOW PASER™ abrasive jet system with a FLOW/ESAB CNC X-Y cutting table. The system quickly and precisely cuts light-switch holes in mirrors and bolt holes in table tops and cabinet doors.

FLOW's intensifier pumps pressurize water up to 55,000 psi and force it through a precision orifice at up to three times the speed of sound. Abrasives, such as garnet, are entrained in the hair-thin water stream to create the abrasive action necessary to cut quickly and precisely through glass.

"Abrasive-jet cutting is enabling us to significantly reduce the time required to cut holes," says plant manager, Louie De La Rosa. "For example, holes in one-quarter-inch glass took 35-40 minutes to sandblast. Now, we can cut them in 5-10 minutes because the abrasive jet cuts faster and the computerization eliminates the time required to position them manually."

This amounts to a reduction of 75 percent in the time required to cut holes and an overall production time savings of 50 percent on all jobs involving hole cutting. Moreover, the holes are smoother, more accurate, and require less final polishing.

The PASER™ abrasive jet system also cuts thicker specialty laminated glass, such as decorative architectural laminated glass, and bullet-resistant products made of five alternating layers of glass and vinyl.

According to De La Rosa, "Abrasive-jet cutting is safer than sandblasting because the possibility of shattering or delamination is eliminated and it's faster, cleaner, and better controlled."

Western Glass is acquiring new jobs that formerly could not have been handled by the company. De La Rosa says, "These are artistic jobs involving intricate shapes which we previously would never have dreamed of doing, but when designers and architects know you have this specialized cutting capability, they take advantage of it because they are always looking for something new and different in the way of glass shapes."

De La Rosa adds, "We are continuing to experiment to learn what the abrasive jet can do. We plan to go out and actively promote its ability to cut materials other than glass." The company already uses the PASER™ abrasive jet to cut materials such as marble and metal - marble tabletops for the furniture trade and metal lettering for company signs.

"Considering everything, we anticipate that abrasive-jet cutting will pay for itself in a couple of years," the Western Glass plant manager concludes.

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Since noise levels do not exceed 80 dBA, noise monitoring and the attendant expense of complying with Federal standards may not be required. The need for costly special fixturing or tooling to reduce noise by diffusing the cutting stream is eliminated.

A 180° reciprocating turntable or shuttle with two work stations and pallet locating points provides accurate positioning of workplace fixtures. Worktables are calibrated to allow part and fixture flexibility. Parts can be cut while finished parts are being unloaded and new parts loaded.

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- The enclosure is double safety interlocked to prevent unauthorized entry.
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Upcoming events

May 7-8, 1991: First Asian Conference on Recent Advances in Jetting Technology, Singapore. Please contact CI-Premier PTe Ltd., 150 Orchard Road, #07-14, Orchard Plaza, Singapore - Tel: 733 2922; Fax: 235-3530.

August 24-27, 1991: Sixth American Water Jet Technology Conference, Houston, Texas. Please contact the Water Jet Technology Association, (314) 241-1445.

September 24-26, 1991: Geomechanics '91, Hrodec, Czechoslovakia. Please contact Z. Rakowski, Mining Institute of Czechoslovak Academy of Science, A. Rimana 176B, 70800 Ostrava Poruba, Czechoslovakia.

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Mark Your Calendars!

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6th American
Water Jet
Technology
Conference

August 24-27, 1991 Westin Galleria Houston, Texas

PRELIMINARY SCHEDULE OF EVENTS

Saturday, August 24, 1991

8:00 a.m. - 4:30 p.m.	Water Jetting Short Course
6:30 p.m. - 8:00 p.m.	Welcoming Reception

Sunday, August 25, 1991

8:30 a.m. - 4:30 p.m.	General Session
Noon - 5:00 p.m.	Exhibits Open
8:30 a.m. - 4:30 p.m.	Concurrent Session on Applications for Water Jet Contractors
4:30 p.m. - 6:00 p.m.	WJTA Biennial Business Meeting

Monday, August 26, 1991

7:30 a.m. - 5:00 p.m.	Exhibits Open
8:30 a.m. - 5:00 p.m.	General Session
7:00 p.m. - 11:00 p.m.	Reception and Dinner Banquet

Tuesday, August 27, 1991

7:30 a.m. - 10:30 a.m.	Exhibit Hall Open
8:30 a.m. - Noon	General Session
Noon - 7:00 p.m.	Technical Tour and Demonstration

For a Conference registration packet, contact:

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