

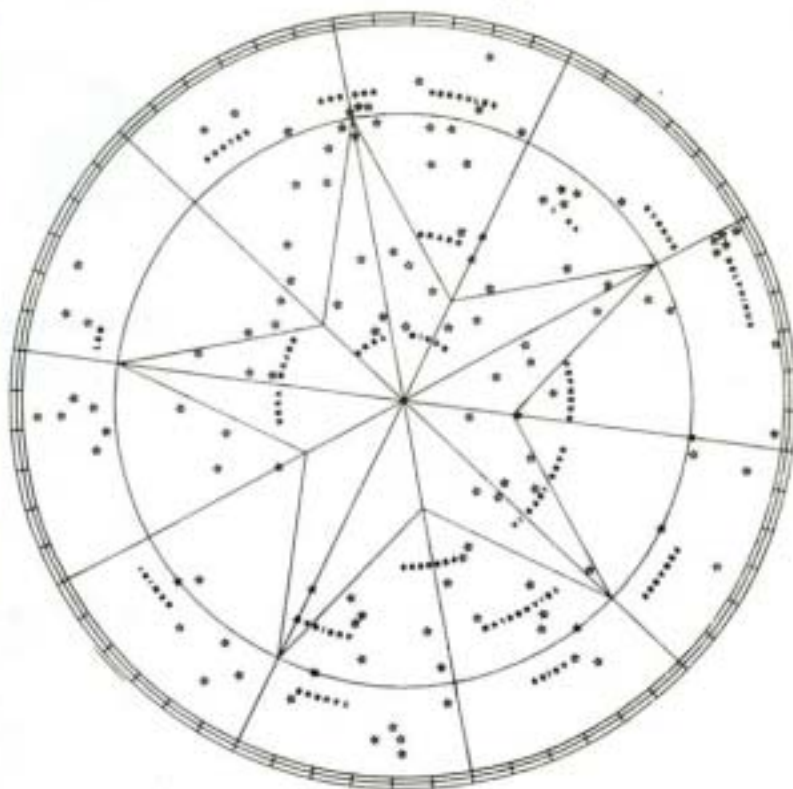


Jet Cutting At The U.S. Naval Academy



The floor of the Armel-Leftwich visitor center at the U.S. Naval Academy. The linoleum flooring was cut with high definition water jet cutting. Note the constellations.

Photographs courtesy of LAI Midwest, Inc., Minneapolis, Minnesota.



Drawing of the North Star design showing the constellations surrounding the North Star.

See article on page 6.

Customer Service And Sales & Marketing Experts Highlight 8th American Water Jet Conference Program

Customers want to feel that the people taking their time and/or money actually deserve it, and that their wants and needs are being satisfied," says **Steven R. Edwards**, owner of Edwards & Associates, Newark, Ohio. Steve will help examine different methods of communicating allowing participants to improve their individual communication skills for maximum impact with customers during his presentation, *Customer Service In The '90s—The Difference Is You* on Sunday, August 27, 1995, from 10:20 a.m. - Noon.

Participants will leave the workshop with very specific ideas and techniques enabling more positive interaction with customers. You will also examine the reality that "Customers aren't always who you think!"

(continued on page 2)

Customer Service and Sales & Marketing Experts Highlight 8th American Water Jet Conference Program, from page 1

The difference between a successful and an unsuccessful company is determined by it's employees..."THE DIFFERENCE IS YOU!"

Steve has a rich background in sales, marketing, public relations and advertising. He has developed skills and abilities in human relations, problem solving and relationship building. Steve's focus in training emphasizes the importance of good communications skills, and the fact that **YOU** make the difference when it comes to good customer service. Along with his degrees in counseling and human resource management, Steve has vast exposure to the corporate environment, having shared his customer service expertise with several companies, including Thompson Newspapers, the Defense Finance Accounting Service, Ohio State University, and numerous chambers of commerce.

* * * * *

"Everyone's A Winner!," says sales and marketing professional **Richard G. Cross**. Winning at sales and in life isn't something granted to only a select few people. Winning isn't simply keeping score, it's the attitude you have while you play the game. Everyone is given the ability to win. If you want to learn how to make winning a part of your life, you need to attend this seminar by Rick Cross on Monday, August 28, 1995, from 8:00-10:00 a.m.

Rick is the Chief Operating Officer of Mr. Rooter Plumbing, Aire Serv Heating and Air Conditioning and Mr. Electric Expert Electrical Services. He has owned a successful management consulting firm, but attributes much of what he knows to growing up on a dairy farm in Ohio.

Rick has spoken to thousands of people in the United States, Canada, Mexico and the United Kingdom on how to motivate yourself and your coworkers to be better salesmen of your company and its services or products. His entertaining style and belief in people's inherent ability to win make this a seminar you will want to attend.



Richard G. Cross



Steven R. Edwards

At The 8th American Water Jet Conference...

- Learn tested methods for profitable ways to market your products and services.
- Find out how the right motivation can make all the difference in your business operation.
- Discover how service and commitment make a difference to customers, including attracting new ones, and maintaining a profitable business relationship with current customers.

To register, see details on pages 10-11.

Autoclave Engineers invites you to stop by our booth #s 211, 213 and 215 to see new products and visit with our technical support staff at the 8th American Water Jet Conference.

8th American Water Jet Conference In Houston!

Learn the latest information about applications for water jet technology in the construction, concrete, mining, drilling and manufacturing industries, as well as novel applications, at the 8th American Water Jet Conference, August 26-29, 1995, at the J.W. Marriott Hotel in Houston, Texas.

An optional short course on the basic techniques and applications of fluid jet technology, including suggested safety procedures for operating water jet equipment, will be presented in conjunction with the Conference on Saturday, August 26.

The Conference program includes educational sessions featuring over 61 papers covering a wide range of scientific and technical topics. A complete list of papers to be presented appears on pages 7-8.

Concurrent applications sessions designed specifically for contractors, users and manufacturers will cover topics that include ways to expand and improve services, safety and environmental practices, and industry trends.

See live field demonstrations of a variety of fluid jet systems and equipment during the technical tour and field demonstrations on Tuesday, August 29.

To register for the 8th American Water Jet Conference, please use the form on page 11 or call the WJTA office at (314)241-1445.

Hotel Reservations at the J.W. Marriott Hotel: Call Early

August 5, 1995, is the deadline date for guaranteed availability of hotel reservations at the J.W. Marriott Hotel. Make your hotel reservations early to take advantage of the special Conference rate of \$90, single or double occupancy.

To make reservations, call the J.W. Marriott directly at (713)961-1500. Be sure to request the special group rate for the 1995 WJTA Conference.

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Experience Houston's Multi-Cultural Flavor and Enjoy A Wide Selection of Attractions

Houston, Texas, America's fourth-largest city, is enriched with a broad ethnic flavor demonstrated by the number of languages spoken (90 at last count), the broad diversity of Houston's arts communities, award-winning restaurants and seasonal festivals. European, Mexican, African, Asian, Japanese and many other cultures are prevalent in this exciting city.

Houston also offers an interesting combination of down-home country mingled with big-city glitz. You'll find a mixture of cowboys and couture, acres and acres of lush, green gardens, parks and arboretums — all amid soaring skyscrapers and state-of-the-art architecture. A vast selection of attractions includes nature preserves, planetariums, trail rides, air shows, horse racing, theme parks, hundreds of stores and restaurants, and much more.

The J.W. Marriott Hotel is the site of the Water Jet Technology Association's 8th American Water Jet Conference. The Marriott is located in the heart of Houston's Galleria District and combines luxury, attentive service, and superior meeting facilities to ensure your comfortable and enjoyable visit to

Houston. The Marriott is located just across the street from the Galleria Shopping Complex and is in the midst of the highest concentration of corporate offices in Houston. Hotel amenities and services are designed for your comfort and include superb dining and a relaxing lounge, an indoor/outdoor pool, racquetball courts and a lavishly equipped health club. Deluxe guest rooms are spacious and elegantly furnished.

The Houston climate can be very humid in August, with temperatures ranging from 85-90 degrees. Loose comfortable clothing and comfortable walking shoes are recommended for outdoor activities. Most Conference activities take place in the air conditioned comfort of the J.W. Marriott Hotel. Meeting room temperatures do



Houston, Texas, site of the WJTA Conference.

vary and a lightweight jacket or sweater may be helpful if the meeting rooms are chilly.

Plan To Visit These Attractions During Your Stay In Houston:

- See the world-famous Astrodome, home of the Houston Astros baseball team and Houston Oilers football team. Stop in and see The Summit, home to 1995 NBA champions, the Houston Rockets.
- Tour the 670-acre Texas Medical Center campus, a dynamic complex and home to the famed Texas Heart Institute and the University of Texas M.D. Anderson Cancer Center.
- Plan an evening in the Tunnel System, a six-mile system of sky walks and underground pedestrian tunnels in downtown Houston. Browse through shops and boutiques, and have dinner at one of over 100 restaurants.
- Enjoy an evening of entertainment in the Theater District for the best in ballet, opera, theater, musicals and symphony. One-of-a-kind restaurants

(continued on page 9)

Authors Honored For Outstanding Papers

Jack Kollé of Quest Integrated, Kent, Washington, and **M. Agus, A. Bortolussi, R. Ciccu, R. Lassandro, P.P. Manca, and G. Massacci** representing the University of Cagliari, Italy, have each been honored by the Water Jet Technology Association for the preparation and presentation of the most outstanding papers presented at the 7th American Water Jet Conference held in Seattle, Washington, August 1993. The papers honored are *Development and Applications of a Hydraulic Pulse Generator* by Mr. Kollé and *The Influence of Rock Properties on Waterjet Performance* by Messrs. Agus, Bortolussi, Ciccu, Lassandro, Manca and Massacci.

The papers were chosen from 73 papers presented at the 1993 Conference. Criteria considered in the selection of the award includes an evaluation of the quality of the oral presentation, the degree to which the paper follows editorial guidelines, the originality of the content of the paper, the absence of advertising in the paper or presentation, and the value of the contribution to the state of the art of water jetting.

Each author will be recognized during the August 27, 1995, WJTA Awards Luncheon to be held during the 8th American Water Jet Conference at the J.W. Marriott Hotel in Houston, Texas. William Lees, representing Parker Hannifin Corporation (formerly Rogan and Shanley, Inc.) of Houston, Texas, sponsor and creator of the award, will present each of the authors with a special plaque during the awards program.

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Safety Committee Solicits Comments On Recommended Practices

The Safety Committee hereby solicits comments regarding improvements to the publication, *Recommended Practices For The Use Of Manually Operated High Pressure Water Jetting Equipment*. The Safety Committee endeavors to make periodic changes and improvements to the publication, especially when reprinting is contemplated.

Please address your suggestions to:

**Safety Committee
c/o WJTA
818 Olive Street - Suite 918
St. Louis, MO 63101-1598.**

Stop by and visit with Barton's staff, booth #116 at the WJTA Conference.

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Jet Cutting At The Naval Academy

High Definition Waterjet Cutting has gained a place of honor in the United States Naval Academy. LAI Midwest, Inc. of Minneapolis, Minnesota, cut the North Star design out of Forbo ExiDual 280 Linoleum. The flooring is the centerpiece of the new Armel-Leftwich Visitor Center at the Annapolis School.

The constellation was sent to LAI in a DXF formatted computer file. The file was imported, stored and nested for efficient use of the material. LAI's 6' x 10' cutting table allowed even the largest sections of the floor to be nested.

While the flooring company could have cut the design by hand, the repetition of pieces in the design was an ideal application for the CNC waterjet systems at LAI. Over 100 stars are laid into the background field and all of the constellations are labeled. The letters, stars and background pattern were cut without using abrasive.

Packed with a map, the pieces were individually marked for easy installation. Floors Etc. assembled the puzzle like layout of pieces. "It is a jewel!" said Lonnie Wornom, manager of the Visitor's Center.

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— **StoneAge**

8th American Water Jet Conference
Houston, Texas August 26-29, 1995

Technical Program

SUNDAY, AUGUST 27, 1995

8:20 a.m. - 10:00 a.m. — Research Session I

1. "Borehole Mining Of Gold From Permafrost," by A. Miller and G. Savanick.
2. "High Pressure Water Jet Assistance Of Hard Rock Cutting Process," by J. Vasek
3. "Abrasive Performance In Rock Cutting With AWJ And ASJ," by M. Agus, A. Bortoluzzi, R. Ciccu, W.M. Kim and A. Vargiu.
4. "Tunnel Boring Machine Enhancement," by J. Xu, D. Summers and D. Wright.
5. "A Fracture Model For Hydrodemolition," by A. Momber and R. Kovacevic.

8:20 a.m. - 10:00 a.m. — Applications Session I

1. "Historical View On The Soft Ground Improvement Method Utilizing Water Jet," by M. Shibasaki and H. Yoshida.
2. "High Performance, Dual Colliding Water Jet On Ground Improvement," by M. Shibasaki, H. Yoshida, M. Tanji, Y. Tomita, I. Kataoka, T. Kim, F. White and K. Horii.
3. "Cutting Steel And Concrete With Ultra-High Pressure Water And Abrasive," by M. Gracey and R. Smith.
4. "The Application Of Water Blasting And Water Jetting In Surface Preparation Of Industrial And Marine Structures," by L. Frenzel.
5. "370 Sapphires For Tire Recycling," by G. Veres and F. Trieb.

10:20 a.m. - 12:00 Noon — Research Session II

1. "Analysis Of The Process Output In Abrasive Water Jet Cutting," by H. Louis, G. Meier and J. Ohlsen.
2. "Abrasive Air Water Jet Modelization," by K. Raisi, G. Basile, A. Cornier and O. Simonin.
3. "Interaction Of Abrasive Water Jet With Cut Material At High Velocity Of Impact—Development Of An Experimental Correlation," by A. Tazibt, F. Parry, N. Abrik and B. Thery.
4. "Experimental Estimation Of Energy Dissipative Processes In Workpieces During Abrasive Water Jet Cutting," by A. Momber, R. Kovacevic, H. Kwak and R. Mohan.
5. "Fields Of Application For Abrasive Water Suspension Jets Of Pressures From 15 To 200 MPa," by C. Brandt, H. Louis, G. Meier and G. Tebbing.

10:20 a.m. - 12:00 Noon — Applications Session II

Program presented by: Steven Edwards, Consultant, Edwards Associates.

2:30 p.m. - 3:50 p.m. — Research Session III

1. "Abrasive Waterjet Cutting With A Shapejet™," by G. Rankin and S. Wu.
2. "Cutting Refractory Ceramics With Abrasive Water Jets—A Preliminary Investigation," by A. Momber, I. Eusich and R. Kovacevic.
3. "Microstructural And Mechanical Characterization Of Threaded Composite Tubes Machined Using AWJ Cutting," by Y. Wen, M. Sheridan, D. Taggart and T. Kim.
4. "Results Of Abrasive Water Jet Market Survey," by G. Mort.

2:30 p.m. - 3:50 p.m. — Applications Session III

1. "Control Of Substances Hazardous To Health," by T. Grieve.
2. "Worker's Compensation—Friend Or Foe?," by M. Rankin.
3. "High Pressure Water Blast Training—A Primer For Training Your Trainer," by L. Moers.
4. "Development Of An Extremely Durable High Pressure Pump For Cement Suspension," by T. Yoshida and T. Masumoto.

4:10 p.m. - 5:30 p.m. — Research Session IV

1. "Potentiality Of Water Jet Method For Cutting Of Sheet Materials," by T. Machida, T. Okai, J. Ozaki, H. Kawano, T. Nagai and K. Saeki.
2. "A Generalized Abrasive Water Jet Cutting Model," by A. Momber.
3. "Development Of An AWJ Deep Hole Drilling System For Metals," by M. Hashish.
4. "Abrasive Waterjet Machining Of Titanium Alloy," by D. Arola and M. Ramulu.

4:10 p.m. - 5:30 p.m. — Applications IV

1. "Development Of The CUSP Mining Tool For Automated Underground Excavation," by D. Wright, W. Macneil and D. Summers.
2. "Hydro-Demolition An Alternative Method For Concrete Removal," by D. Bernard.
3. "Multipurpose Mobile Plant For Demilitarization," by M. Yeomans and H. Alba.
4. "Abrasive Water Jets For Demilitarization Of Explosive Materials," by D. Miller.

8:00 a.m. - 10:00 a.m. — Research Session V

1. "Effect Of Offset Bore On The Performance And Life Of Abrasive Waterjet Mixing Tubes," by *M. Nanduri, D. Taggart, T. Kim, E. Ness and E. Risk.*
2. "Measurement Of Surface Displacements By Moiré In Abrasive Waterjet Piercing Process," by *Z. Guo and M. Ramulu.*
3. "Water Peening—An Advanced Application Of Water Jet Technology," by *H. Tönshoff, F. Kroos and M. Hartmann.*
4. "Advances In Fluidjet Beam Processing," by *M. Hashish.*
5. "Feasibility Study Of The Use Of Ultrahigh-Pressure Liquified Gas Jets For Machining Of Nuclear Fuel Pins," by *C. Dunsky and M. Hashish.*
6. "High Pressure Waterjet Application To Improve Performance Of Machining Operations," by *R. Kovacevic, and R. Mohan.*

8:00 a.m. - 10:00 a.m. — Applications Session V

Program presented by: *Rick Cross, Vice-President Of Marketing, Mr. Rooter.*

10:20 a.m. - 12:00 Noon — Research Session VI

1. "Direct Drive Pumps Improve Competitiveness Of Ultrahigh-Pressure Waterjets For Surface Preparation & Industrial Cleaning," by *R. Schmid.*
2. "Test Research Of Super High Pressure Reciprocating Seal Under 300 MPa," by *S. Xue, W. Huang and Z. Chen.*
3. "Computational Fluid Dynamic Analysis And Visualization Of High Frequency Pulsed Water Jets," by *M. Vijay, M. Jiang and M. Lai.*
4. "CFD Analysis Of Submerged Turbulent Jet Flowfield Of Organ-Pipe Nozzle," by *W. Zhiming and S. Zhonghou.*
5. "Some Advances In The Passive Control Technology Of Submerged Water Jet Flowfield," by *W. Zhiming and S. Zhonghou.*

10:20 a.m. - 12:00 Noon — Applications Session VI

1. "Rocket Propellant Washout System Using A Pulsing Nozzle," by *M. Gracey and B. McMillion.*
2. "The Development Of A Portable WOMBAT Facility," by *R. Fossey, D. Summers, P. Kalim and U. Nejib.*
3. "Thermal Coating Removal System," by *D. Rainey and G. Reece.*
4. "Hazardous Waste Retrieval Strategies Using A High Pressure Water Jet Scarifier," by *B. Hatchell, M. Rinker and O. Mullen.*
5. "The Use Of Low Reaction Dislodging Tools For Waste Retrieval From Underground Storage Tanks," by *D. Summers, G. Galecki, M. Rinker, C. Christensen and J. Randolph.*

2:00 p.m. - 3:20 p.m. — Research Session VII

1. "A Comparison Between Laser And AWJ Cutting Of Portuguese Marbles—A Phenomenological Study," by *R. Miranda and A. Miranda.*
2. "Numerical Simulation Of Striation Formations On Water Jet Cutting Surface," by *Y. Fukunishi, R. Kobayashi and K. Uchida.*
3. "Development Of Ice Jet Machining Technology," by *E. Geskin, L. Tsimenetskiy and F. Li.*
4. "Physical Analysis Of The Energy Balance Of The High Energy Liquid Jet Collision With Brittle Non-Homogeneous Material," by *L. Hlaváček.*

2:00 p.m. - 3:20 p.m. — Applications Session VII

1. "Ultrahigh-Pressure Waterjetting Gains Acceptance As Surface Preparation Method," by *R. Schmid.*
2. "Waterjet Cost Effectiveness: Case Studies In Cutting And Coating Removal," by *J. Shunk.*
3. "Development Of A Windows-Based Expert System For Abrasive Waterjet Cutting," by *P. Singh.*
4. "Waterjet Abrasives: Evaluating Cost Analysis Procedures," by *W. Ranney Jr.*

3:40 p.m. - 5:00 p.m. — Research Session VIII

1. "Observation Of Submerged Abrasive-Suspension Jet Cutting For Deep Ocean Applications," by *D. Alberts and M. Hashish.*
2. "Improvement Of The Waterjet Based Precision Cleaning Technology," by *E. Geskin, M. Ushitskiy, P. Meng, L. Tsimenetskiy and M. Leu.*
3. "The Use Of Self-Resonating Cavitating Water Jets For Rock Cutting," by *G. Chahine, K. Kalumuck and G. Frederick.*
4. "An Application Study Of Plain Waterjet Process For Coating Removal," by *S. Wu and T. Kim.*

Poster Session

MONDAY, AUGUST 28, 1995 — 8:00 a.m. - 10:00 a.m.

1. "A Comparative Study Of Concrete Behavior During Compression Testing And Water Jet Erosion," by *A. Momber, R. Kovacevic, D. Pfeiffer and R. Schünemann.*
2. "A Simplified Mathematical Energy Dissipation Model For Water Jet And Abrasive Water Jet Cutting Processes," by *A. Momber.*

1995 Calendar Of Events

August 26-29: WJTA 8th American Water Jet Conference, Houston, Texas, (314)241-1445.

October 11-14: CETA PowerClean '95, Georgia World Conference Center, Atlanta, Georgia, (800)441-0111.

September 3-6, 1996: The International Conference Geomechanics '96. Contact Dr. Z. Rakowski, Institute of Geonics, Studentska 1768, 708 Ostrava Poruba, Czech Republic, phone: (42)696914164, fax: (42)696919452.

Experience Houston's Multi-Cultural Flavor and Enjoy A Wide Selection of Attractions, from page 4

from Continental to casual are conveniently located for dinner before or after the show.

- See the Houston Zoo, home to more than 3,000 animals. Features include the Wortham World of Primates, Janice Suber McNair Asian Elephant habitat, and five of the world's fastest animal—the Cheetah.
- Experience the natural beauty of a living rain forest in the Moody Gardens' ten-story glass pyramid.
- Stroll down the Richmond Avenue Entertainment District for great food,

dancing and live entertainment nightly at some of Houston's most exciting hot spots.

- Experience the past, present and future of manned space flight at Space Center Houston.
- Sample sun and surf on the Gulf Coast, located less than an hour from Houston by car. Sandy sun-kissed beaches stretch over 32 miles.
- Browse the Galleria Mall, a landmark center of over 300 stores. The Galleria also features an ice rink, four movie theaters, and a variety of restaurants.



The Astrodome, home of Houston's Astros baseball team and Oilers football team.

Schedule Of Events

Friday, August 25

Noon - 5:00 p.m. WJTA Board Meeting

Saturday, August 26

7:30 a.m. - 8:00 a.m. Short Course Registration
 8:00 a.m. - Noon Short Course on the Fundamentals and Applications of Water Jet Technology
 Noon - 1:00 p.m. Luncheon for "Short Course" Participants
 1:00 p.m. - 5:00 p.m. Short Course, cont'd.
 6:30 p.m. - 9:30 p.m. Welcoming Reception In The Exhibit Hall
 Exhibit Hall Opens

Sunday, August 27

8:00 a.m. - 10:20 a.m. Applications Workshops for Contractors/ Users/Manufacturers
 8:00 a.m. - Noon Research & Development Sessions
 9:30 a.m. - 5:00 p.m. Exhibit Hall Open
 10:20 a.m. - Noon Customer Service in the '90s
 by: **Steven Edwards**,
 Edwards & Associates
 Noon - 2:00 p.m. WJTA Awards Luncheon
 2:30 p.m. - 5:30 p.m. Applications Workshops, cont'd

Sunday, August 27, continued

2:30 p.m. - 5:30 p.m. Research & Development Sessions, cont'd
 5:30 p.m. - 6:30 p.m. WJTA Biennial Business Meeting

Monday, August 28

8:00 a.m. - 10:00 a.m. Everyone's A Winner!
 By: **Rick Cross**, VP Marketing
 Mr. Rooter
 8:00 a.m. - Noon Research & Development Sessions
 9:30 a.m. - 2:30 p.m. Exhibit Hall Open
 10:00 a.m. - Noon Applications Workshops for Contractors/ Users/Manufacturers
 Noon - 2:00 p.m. Luncheon In Exhibit Hall
 2:00 p.m. - 5:00 p.m. Applications Workshops, cont'd
 2:00 p.m. - 5:00 p.m. Research & Development Sessions, cont'd
 5:15 p.m. - 6:30 p.m. WJTA Board Meeting
 6:30 p.m. - 11:00 p.m. Texas Theme Party

Tuesday, August 29

9:30 a.m. - 3:00 p.m. Technical Tour And Field Demonstrations

To Register: Complete the form on page 11. Register by August 15 and **SAVE** on your registration fee!

Eight Easy Ways To Attend The 1995 Water Jet Conference

1. **FULL CONFERENCE:** Includes admission to all technical and scientific sessions (except Short Course), exhibition, coffee breaks, luncheons, receptions, Texas theme party, and technical tour and demonstration. Each full registration also receives one copy of the Conference *Proceedings*.
2. **COMBO:** Includes everything listed under Full Conference PLUS admission to the Water Jet Short Course.
3. **SAVE \$ ON MULTIPLE EMPLOYEE FULL/COMBO REGISTRATIONS:** Companies that purchase three or more full or combo registrations receive a special discount for each additional employee registered after the first two. To take advantage of the special discount, register the first two (2) employees from your company at the regular FULL/COMBO rates and receive the discounted rate for the third and subsequent employee registrations.
4. **DAILY ATTENDANCE:** Includes admission to all technical and scientific sessions, exhibition, coffee breaks, and luncheon on that day.

NOTE: The official Conference *Proceedings* and admission to the Texas theme party are **NOT** included in the daily registration fee. The *Proceedings* and tickets to the Texas theme party must be purchased separately.

5. **WATER JETTING SHORT COURSE:** Includes the manual *Fluid Jet Technology — Fundamentals And Applications*, coffee breaks, and luncheon.
6. **EXHIBIT HALL ONLY:** Includes admission to the WJTA Exhibit Hall where you'll see water jetting equipment, supplies, and services on display. Does **NOT** include the luncheon in the exhibit hall on Monday. Luncheon tickets may be purchased separately.
7. **TECHNICAL TOUR:** Includes round-trip bus transportation, luncheon, and admission to company sites where you'll see live water jetting demonstrations.
8. **STUDENTS:** The registration fee for full-time university graduate and undergraduate students that are WJTA

members is \$20. Student registration includes admittance to technical programs, but does **NOT** include copies of books or admittance to food/social functions. **NO** discount is available for students that are not members of the WJTA.

CANCELLATION POLICY

Fees will be refunded in full for cancellations received at least four weeks prior to the Conference. Cancellations received more than 10 days and less than four weeks prior to the Conference will be subject to a \$50 charge. No refund will be made for cancellations received less than 10 days prior to the Conference. However, substitutions may be made at anytime.

Discounts for WJTA members and early-bird registrants!

WJTA members receive a special discount off the regular registration fees. You will also receive an additional discount if your registration is postmarked or received in the WJTA office by August 15, 1995.

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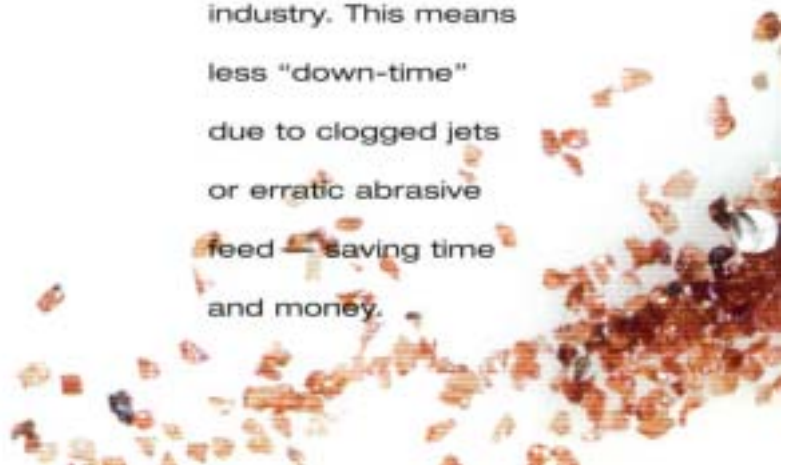
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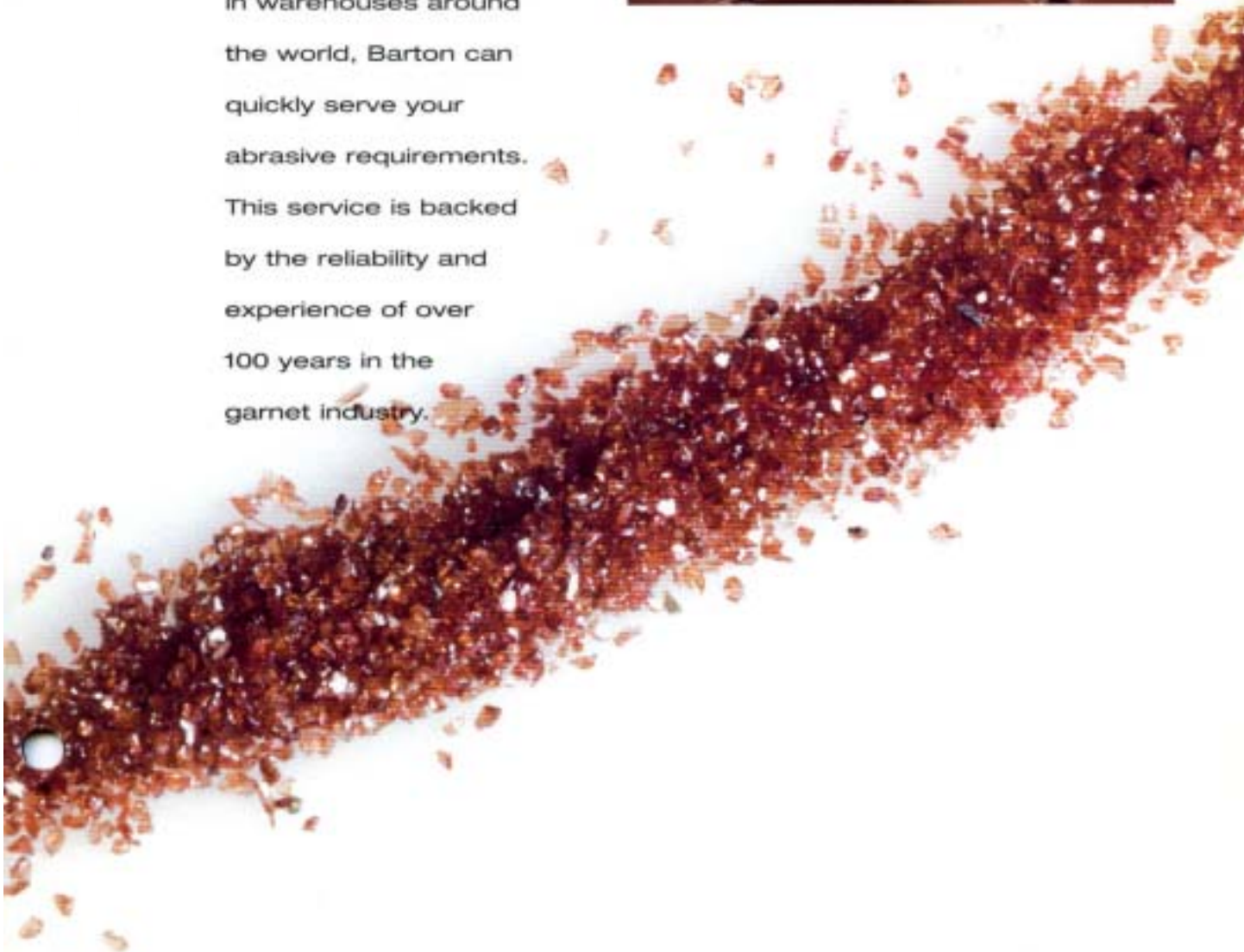


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HOSE SPECIFICATIONS

| Hose Size (in) | | Pressure Ratings (psi) | | Min. Bend Radius (in) | Weight Lb/ft |
|----------------|-----|------------------------|---------|-----------------------|--------------|
| ID | OD | BURST | WORKING | | |
| .15 | .37 | 75,000 | 30,000 | 3.9 | .13 |

Ratings are based on hose working temperature between -40°F and +140°F. Contact Parker/Polyflex for temperatures outside this range.

STANDARD END FITTINGS

| Thread | ID | Max OD | Length | Pressure Rating (psi) | Part # |
|---------------------------------------|------|--------|--------|-----------------------|----------|
| Type "M" Swivel (9/16" - 18 thd) s/s | .100 | .875 | 2.50 | 30,000 | E404CXC1 |
| 1/4" - 28 Left Hand Nozzle Nipple s/s | .100 | .460 | 2.40 | 30,000 | E404UAA1 |
| 1/4" High Pressure Tube Nipple s/s | .100 | .460 | 3.00 | 30,000 | E404HAA1 |
| 3/8" High Pressure Tube Nipple s/s | .100 | .460 | 3.50 | 30,000 | E404HBA1 |



Type "M" Swivel
9/16" - 18 thd



Tube Nipple
1/4" - 28 Left Hand thread Nozzle Nipple



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Eight Ways To Register

| | | | | | |
|--|--------|--------|--------|--------|------|
| <input type="checkbox"/> Full Conference ONLY | \$ 440 | \$ 470 | \$ 490 | \$ 520 | = \$ |
| <input type="checkbox"/> Combo (Full Conference PLUS Water Jet Short Course) | \$ 610 | \$ 640 | \$ 660 | \$ 690 | = \$ |
| <input type="checkbox"/> Saturday, Short Course | \$ 225 | \$ 240 | \$ 250 | \$ 265 | = \$ |
| <input type="checkbox"/> Sunday | \$ 175 | \$ 190 | \$ 195 | \$ 210 | = \$ |
| <input type="checkbox"/> Monday | \$ 175 | \$ 190 | \$ 195 | \$ 210 | = \$ |
| <input type="checkbox"/> Tuesday, Technical Tour | \$ 85 | \$ 95 | \$ 85 | \$ 95 | = \$ |
| <input type="checkbox"/> Exhibit Hall Admission ONLY | \$ 20 | \$ 20 | \$ 20 | \$ 20 | = \$ |
| <input type="checkbox"/> Student (WJTA members ONLY) | \$ 20 | \$ 20 | N/A | N/A | = \$ |

MULTIPLE CORPORATE REGISTRATIONS (Applies to third and subsequent registrants from same company)

| | | | | | |
|--|--------|--------|--------|--------|------|
| <input type="checkbox"/> Full Conference ONLY | \$ 365 | \$ 395 | \$ 415 | \$ 445 | = \$ |
| <input type="checkbox"/> Combo (Full Conference PLUS Water Jet Short Course) | \$ 535 | \$ 565 | \$ 585 | \$ 615 | = \$ |

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EXTRA TICKETS — These tickets are included in the Full and Combo registration. A lunch ticket is included in a daily registration.

| | | | | | |
|--|--------|--------|--------|--------|------|
| <input type="checkbox"/> Awards Luncheon | \$ 30 | \$ 35 | \$ 30 | \$ 35 | = \$ |
| <input type="checkbox"/> Luncheon In Exhibit Hall | \$ 20 | \$ 25 | \$ 20 | \$ 25 | = \$ |
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By Phone: Just call (314)241-1445 and have your credit card information ready. (MasterCard/VISA/American Express ONLY).

By Fax: Here's our 24-hour Fax number for your convenience: (314)241-1449. Fill out the registration form with your credit card information.

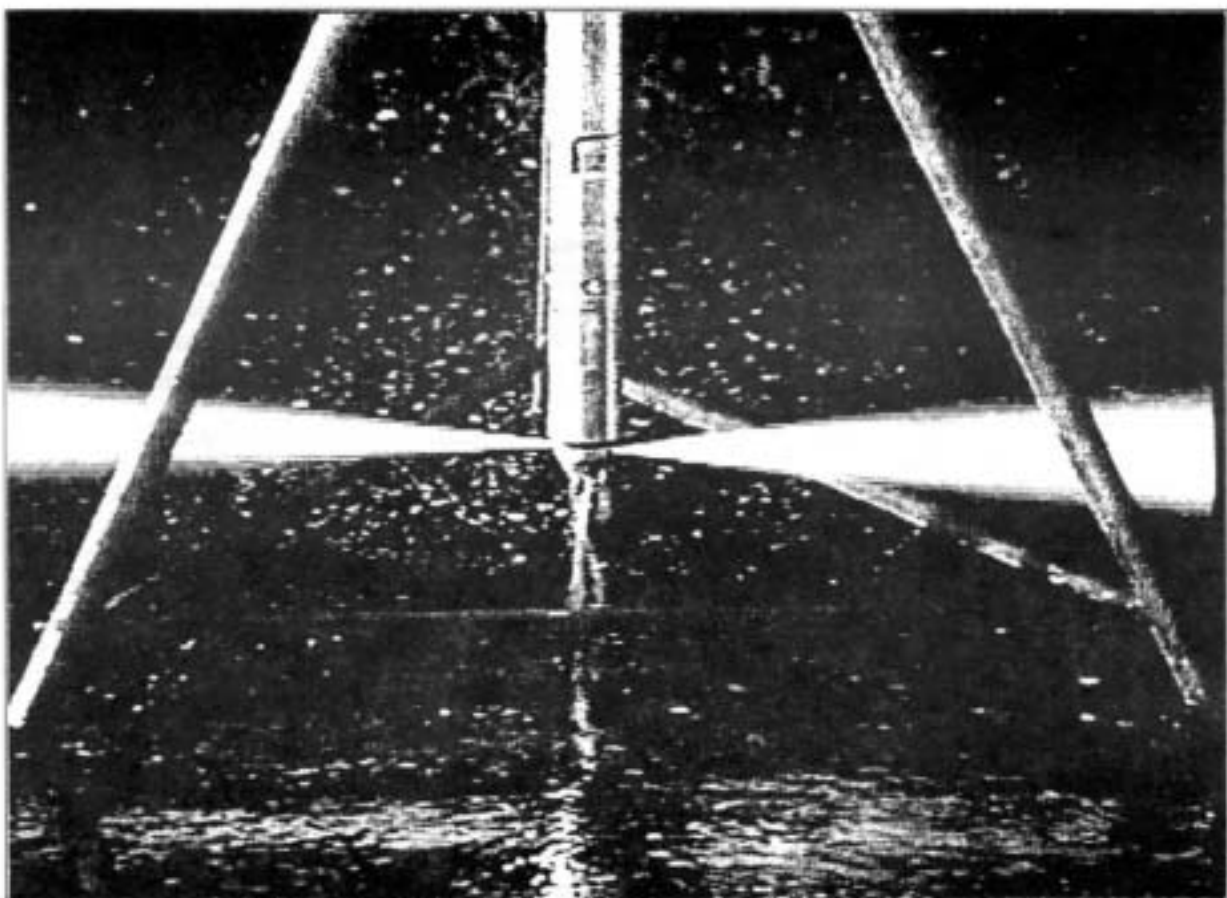
By Mail: Fill out the registration form and mail with applicable payment to: WJTA, 818 Olive Street, Suite 918, St. Louis, MO 63101-1598.

Water Jet Cleaning In Oil Wells

by Gordon Latos, NOWSCO Well Service, Calgary, Alberta, Canada.

It may seem surprising that some water jet cleaning operations are performed efficiently and economically with pressures below 3000 psi. This is true in the petroleum industry where downhole deposits of scale or petroleum solids sometimes form in production, injection and storage wells.

Over the last ten years, field-proven downhole



Working end of 2-1/8" Roto-Jet with jets oriented 90° from the tool axis.

Photograph courtesy of NOWSCO Well Service, Calgary, Alberta, Canada.

water jetting tools have evolved from simple cylinders with multiple jet orifices, to sophisticated rotary devices with various mechanisms for regulating speed. Recently, NOWSCO Well Service introduced the Roto-Jet to markets in North America, Europe and Southeast Asia. Its success at removing a wide variety of downhole deposits has been proven by well caliper logs, before and after downhole videos, and significant well performance enhancements. Sulphur, gypsum, iron sulfide, asphaltenes and wax are among the most common deposits tackled.

Markets serviced to date have included oil and gas production wells, oilfield injection wells, and gas storage wells. Even new wells can benefit from this technology. In some cases, the performance of production wells has been improved immediately after drilling by removal of drilling mud filter cake and near wellbore formation damage.

Well service tools such as those used for jet cleaning, are typically run on oilfield coiled tubing. This is jointless steel tubing which is temporarily lowered into a well during a service operation. Coiled tubing lengths of up to 15,000 feet are common. It serves both as a physical support for the tool and as a fluid supply conduit.

The downhole environment offers several special design challenges. Small wellbores require compact tool geometries comparable to those of boiler tube lances. However, downhole conditions compound the performance impact of abrupt flow direction changes and other design features required to operate in confined spaces. At the relatively low water pressures which can be delivered by coiled tubing, jet cavitation is suppressed by the elevated ambient pressures present downhole. This has a significant negative impact on overall tool performance especially when cleaning brittle materials found in oil wells.

Tool reliability and durability are also important issues with service temperatures which often approach 400° F. Similarly, tool integrity is threatened by acids and other highly corrosive fluids which are substituted for water in particularly difficult cleaning applications. The Roto-Jet overcomes these challenges and performs well under almost all downhole conditions.