

August 17-19, 2003, Adam's Mark Hotel, Houston, Texas

Room Rate: \$105 single/\$115 double occupancy.

Call 1-800-436-2326 for reservations.

Be sure to identify yourself as a participant in the WJTA Conference.

- **Pre-Conference Seminars** (seminars are concurrent)

- **An Overview of Waterjet Fundamentals and Applications** (see topics/presenters listed at right)
- **Advance Topics on Surface Preparation** by Lydia M. Frenzel, Ph.D.

- **Research and Development Papers**
- **Contractor Topics**
- **The largest exhibit of equipment and products dedicated to waterjet technology**
- **Onsite Live Demonstrations**

To reserve an exhibit space or arrange to present a live demonstration, contact Ken Carroll at the WJTA office, 314-241-1445. For general conference information and a registration packet, visit www.wjta.org or contact: WJTA, 917 Locust Street, Suite 1100, Saint Louis, MO 63101-1419, Phone: 314-241-1445 • Fax: 314-241-1449 • Email: wjta@wjta.org.

An Overview of Waterjet Fundamentals and Applications 2003

Revised and Updated

The Cutting and Cleaning Programs will be presented concurrently.

Cutting Program	Cleaning Program
Waterjet Fundamentals by Andrew Conn, PhD, Conn Consulting	Introduction to Waterjetting by David Summers, PhD, University of Missouri-Rolla (UMR)
Jet Material Interaction by Mohamed Hashish, PhD, Flow International Corporation	Waterjet Fundamentals by Andrew Conn, PhD, Conn Consulting
Equipment and Tools Overview by Thomas Kim, PhD, University of Rhode Island (URI)	Waterblast Equipment by Michael Woodward, PhD, Gardner Denver Water Jetting Systems
Factory Applications by Mohamed Hashish, PhD, Flow International Corporation	Waterblast Applications by John Wolgamott, StoneAge, Inc.
Machine Shop Practices by John Olsen, PhD, OMAX	Contractor Practices by Tim Bonvillian, HydroChem Industrial Services, Inc.
Safety by Richard Ward, RICHEL, Inc.	Safety by David Summers, PhD, UMR

**2003 WJTA Conference
August 17-19, 2003
Adams Mark Hotel, Houston, Texas
Preliminary Schedule of Events**

Sunday, August 17, 2003

- | | |
|---------------------|--|
| 8:00 a.m.-5:00 p.m. | Concurrent Pre-Conference Seminars <ul style="list-style-type: none">• An Overview of Waterjet Fundamentals and ApplicationsConcurrent Overview Sessions: Cutting and Cleaning Programs• Advance Topics on Surface Preparation |
| 6:30 p.m.-9:30 p.m. | Welcoming Reception, Official Opening of Exhibit Hall |

Monday, August 18, 2003

- | | |
|-----------------------|--|
| 8:00 a.m.-10:00 a.m. | Onsite Live Demonstrations |
| 10:00 a.m.-11:30 a.m. | Poster Session In Exhibit Hall |
| 10:00 a.m.-5:00 pm. | Exhibits Open |
| 11:30 a.m.-1:00 p.m. | Lunch in Exhibit Hall |
| 1:30 p.m.-5:00 p.m. | Research and Development Paper Presentations |
| 2:00 p.m.-3:00 p.m. | Contractor Topic |
| 5:00 p.m.-6:00 p.m. | WJTA Membership Meeting |
| 7:30 p.m.-10:30 p.m. | Awards Presentation/Party |

Tuesday, August 19, 2003

- | | |
|-----------------------|--|
| 8:00 a.m.-10:00 a.m. | Onsite Live Demonstrations |
| 10:00 a.m.-11:30 a.m. | Poster Session in Exhibit Hall |
| 10:30 a.m.-5:00 pm. | Exhibits Open |
| 11:30 a.m.-1:00 p.m. | Lunch in Exhibit Hall |
| 1:30 p.m.-5:30 p.m. | Research and Development Paper Presentations |
| 2:00 p.m.-3:00 p.m. | Contractor Topic |

Seven Easy Ways To Attend The 2003 Waterjet Conference

1. FULL CONFERENCE

Includes admission to all research and applications sessions (except preconference workshops on Sunday, August 17), onsite live demonstrations, pass to Welcoming Reception in Exhibit Hall (Sunday, August 17), exhibits, luncheon on Monday, August 18, and Tuesday, August 19, coffee breaks, and WJTA Party on Monday, August 18. **Each full registration also receives one copy of the Conference Proceedings on CD-ROM.**

2. COMBO

Includes everything listed under Full Conference **PLUS** your choice of one of the two preconference workshops on Sunday, August 17.

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 research and applications sessions, onsite live demonstrations, exhibit hall, coffee breaks, and luncheon on that day. Register for one day and receive a "50% off" coupon for the 2003 Conference Proceedings on CD-ROM. Register for two days and the Proceedings are included. **NOTE:** Admission to the WJTA Party on Monday is **NOT** included in the daily registration fee, and tickets for this event must be purchased separately.

5. PRECONFERENCE WORKSHOPS

- Waterjet Short Course
- Advanced Topics in Surface Preparation

Includes handout materials for workshop, coffee breaks, luncheon, and August 17 Welcoming Reception in Exhibit Hall.

6. EXHIBIT HALL and/or LIVE DEMO PASS

A \$25 exhibit hall and/or live demonstration pass for one day includes admission to the WJTA Exhibit Hall where you'll see waterjet equipment, supplies, and services and onsite live demonstrations between the hours of 8:00 a.m.-10:00 a.m. Passes do **NOT** include luncheon in the exhibit hall. Tickets for lunch can be purchased separately.

You must purchase a ticket to attend the Welcoming Reception in the Exhibit Hall on Sunday, August 17, if you are not registered as a Full or Combo, or you are not registered for one of the two Preconference Workshops.

STUDENTS

7. The registration fee for WJTA student members is \$20. Student registration includes admittance to technical programs, onsite live demonstrations, and the exhibit hall on Monday and Tuesday, but does **NOT** include copies of the Proceedings, Welcoming Reception in Exhibit Hall on Sunday, August 17, or admittance to any food/social functions. **NO** discount is available for students that are not members of the WJTA. WJTA student members must be enrolled **full-time** in a university graduate or undergraduate program.

WJTA members and early-bird registrants **SAVE up to \$120!**

WJTA members receive a special discount off the regular registration fees. You will also receive a discount if your registration is postmarked or received in the WJTA office by **August 1, 2003.**
Total Savings: Up to \$120!

2003 WJTA AMERICAN WATERJET CONFERENCE PROCEEDINGS

The *Conference Proceedings* for 2003 will be on CD-ROM only. The two-volume books that were available in past years will not be produced.

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. Refunds will not be processed until after the Conference.

Hotel Reservations

It's not too early to make hotel reservations for the 2003 WJTA American Waterjet Conference to be held August 17-19, 2003, at the Adams Mark Hotel, Houston, Texas, USA. For room reservations call the Adams Mark at (800)436-2326. Be sure to identify yourself as a participant in the WJTA Conference.

WaterJet Technology Association

Telephone: (314)241-1445

Fax: (314)241-1449

Web Site: www.wjta.org

2003 WJTA Conference Registration Form

Name _____ Member# _____
 Company _____ Title _____
 Address _____ Mailing Address: ☐ Home ☐ Work
 City _____ State _____ Country _____ Postal Code _____
 Telephone # [] () _____ Fax # [] () _____
 E-mail Address: _____
 Information for name tag _____
Print name as you wish it to appear on your name tag

THREE EASY WAYS TO REGISTER

By Phone: Just call (314)241-1445 and have your credit card information ready. (MC/VISA/Am. Exp. ONLY).

By Fax: Fill out the registration form with your credit card information and call our 24-hour fax number at: (314)241-1449.

By Mail: Fill out the registration form and mail with applicable payment to: **WJTA, 917 Locust Street, Suite 1100, St. Louis, MO 63101-1419.**

Payment Method: ☐ Enclosed is my check, payable to **WaterJet Technology Association (U.S. DOLLARS ONLY).**
☐ Please charge my ☐ MasterCard ☐ VISA ☐ American Express

Credit Card # _____ Expiration Date _____

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Join the WaterJet Technology Association now and receive a substantial discount off Conference registration fees.

WJTA MEMBER

By 8/1/03 After 8/1/03

NONMEMBER

By 8/1/03 After 8/1/03

Seven Ways To Register

- ☐ **Full Conference ONLY** \$ 495 \$ 555 \$ 555 \$ 615 = \$ _____
- ☐ **Combo** (Full Conference PLUS Preconference Seminar) \$ 665 \$ 725 \$ 725 \$ 785 = \$ _____
- Specify preconference seminar:
☐ Waterjet Short Course ☐ Advanced Topics on Surface Prep
- ☐ **Daily**
- ☐ Sunday (includes lunch) \$ 280 \$ 340 \$ 340 \$ 400 = \$ _____
- Specify: ☐ Waterjet Short Course ☐ Advanced Topics on Surface Prep
- ☐ Monday (includes Luncheon in Exhibit Hall) \$ 265 \$ 295 \$ 295 \$ 325 = \$ _____
- ☐ Tuesday (includes Luncheon in Exhibit Hall) \$ 265 \$ 295 \$ 295 \$ 325 = \$ _____
- ☐ **Exhibit Hall/Live Demo Pass**
- ☐ Monday (does NOT include Luncheon in Exhibit Hall) \$ 25 \$ 25 \$ 25 \$ 25 = \$ _____
- ☐ Tuesday (does NOT include Luncheon in Exhibit Hall) \$ 25 \$ 25 \$ 25 \$ 25 = \$ _____
- ☐ **Student** (WJTA members ONLY) \$ 20 \$ 20 N/A N/A = \$ _____

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

- ☐ **Full Conference ONLY** \$ 445 \$ 505 \$ 505 \$ 565 = \$ _____
- ☐ **Combo** (Full Conference PLUS Preconference Seminar) \$ 615 \$ 675 \$ 675 \$ 735 = \$ _____
- Specify: ☐ Waterjet Short Course ☐ Advanced Topics on Surface Prep

WJTA MEMBERSHIP (US, Mexico, Canada)

☐ \$60 Individual ☐ \$20 Student ☐ \$400 Corporate = \$ _____

INTERNATIONAL MEMBERSHIP (all other countries)

☐ \$80 Individual ☐ \$40 Student ☐ \$460 Corporate = \$ _____

- ☐ **Conference Proceedings** _____ Copies x \$89.00 = \$ _____

2003 WJTA Conference registrants may purchase extra copies of the Conference Proceedings on CD-ROM for only \$89. Regularly priced at \$109, you will **SAVE \$20. Offer valid through 8/31/03.**

SPECIAL OFFER!

→ EXTRA TICKETS — The Full and Combo registrations include one ticket per registration for the Exhibit Hall Luncheons (Monday and Tuesday), Welcoming Reception in Exhibit Hall (Sunday evening) and Awards Presentation/Party (Monday evening). Each Daily registration includes a luncheon ticket for the day registered: Sunday, Monday and/or Tuesday. Sunday daily includes Welcoming Reception in Exhibit Hall. Additional tickets may be purchased as follows:

- ☐ **Welcoming Reception in Exhibit Hall - Sunday** \$ 75 \$ 75 \$ 75 \$ 75 = \$ _____
- ☐ **Luncheon in Exhibit Hall - Monday or Tuesday or both (\$60)** \$ 30 \$ 30 \$ 30 \$ 30 = \$ _____
- ☐ **WJTA Awards Presentation/Party - Monday** \$ 75 \$ 75 \$ 75 \$ 75 = \$ _____

TOTAL ENCLOSED \$ _____

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- * TW Metals * Precision H2O
- * Raytheon * Midwest Waterjet

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How To Enter:

- 1.) Go to www.wardjet.com
 - 2.) Click on the link to WARD 2
 - 3.) Click on Cancun link
 - 4.) Submit entry...It's Easy!
- (Maximum 1 entry per person per day)**

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Polymer blasting eliminates hard deposits in refinery heat exchangers

DON ALEXANDER

Supervisor, Retired
Chemical Cleaning Dept.
Chevron U.S.A. Inc.
Richmond, CA

J. THOMAS REGAN

Los Angeles Regional Editor

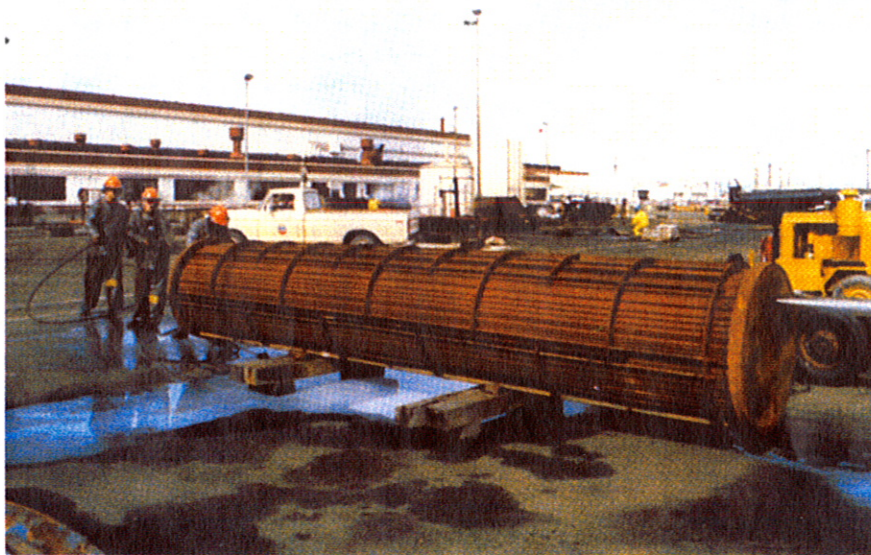
New Solutions to Plant Problems

Problem: In 1974, the maintenance department at the Chevron refinery in Richmond, California was beset by the difficult task of dismantling and cleaning a Hydroprocessing reactor exchanger for the first time since it was installed. Over 1500 U-shaped tubes were clogged or nearly closed with extremely hard deposits of fused coke.

The conventional methods used to clean heat exchangers were not working to any degree primarily because of the immovable buildup lodged in the U-shaped sections. Hydrodrilling was not effective; alternate methods were very high pressure water with flex lance, steel shot blasting, sand jetting, or a "rattler." A rattler, which is a rotating flexible metal whip, tends to remove pipe metal along with deposits. Sand and shot can also be detrimental depending upon the pipe's hardness and/or metallurgy.

Eventually, a combination of the cleaning methods described above was used. After being out of commission for three months, the Hydroprocessing reactor was finally put back into service. Obviously, the amount of time the heat exchangers were out of service could not be tolerated further, and alternate cleaning methods were investigated.

Solution: Water soluble polymers had been available commercially for a number of years, but no one had seriously considered them as cleaning aids in conjunction with hydroblasting in refineries. Very little had been published on the subject until 1973 when it was reported that Russian workers could cause the destruction of metallic objects by a jet of dilute polymer solution. This served as an incentive to form an unofficial alliance between a water jet cleaning contractor, a chemical supply company and the chemical cleaning group at Chevron



Heat exchanger undergoing polymer blasting



Comparison of untreated water (top) and solution of 0.3% polymer in water (bottom) depicts effectiveness of polymer in focusing the water jet



Red brick and fire brick (foreground) first blasted with water (left) and then with polymer solution under identical conditions

to develop a polymer blasting method to remove hard deposits in refinery equipment.

After nearly six months of research, a product, method of application and solution were developed. A polyacrylamide/polyacrylic acid copolymer metered continuously at 0.3% to a jet stream of water increased the cleaning efficiency from 2 to 50 times depending on the nature of the material being removed. The polymer selected is linear with some degree of branching and has an extremely high molecular weight.

Because the additive is a polymer, the process in which it is used is described as polymer blasting although water is still the principal blasting liquid. Even at the low concentration used, the polymer has a marked effect on the cleaning efficiency.

The shell side of heat exchangers clean up unusually well with polymer blasting. The high velocities with which the polymer molecules strike the substrate surface greatly enhance the usual effects of high pressure water blasting. In addition, the polymer focuses the water jet, thus improving the cleaning effectiveness in the 9 to 48 inch range. It is now possible to clean the exterior of tube bundles when they are fouled deep in the center of the bundle whereas, previously, the water jet would not reach these areas.

Polymer blasting was found to be less effective on soft buildups such as wax, grease or oil. In these areas, detergent and water still produce the best results.

In general, a time savings of 30-35% can usually be expected with polymer blasting in comparison with other conventional methods of high pressure cleaning. However, there is a corresponding increase in expense due to the handling and use of the polymer.

The polymer additive, an anionic polyacrylamide in emulsion form, costs about \$30 per gallon. About 20 gallons are required to clean both the shell and tube-side of a heavily fouled 1000 tube heat exchanger bundle. Normally, 3000 ppm (0.3 wt %) of the polymeric additive is continuously fed to the blast water at approximately 9000 psi. This represents a polymer cost of about 9¢/gallon of water used.

A heat exchanger of 750-1000 tubes can be cleaned about three to four hours faster with polymer blasting, but with an added cost of \$275-300. If the work is being handled by an outside cleaning contractor, which is usually the case, then their \$80-100 per hour fee will nearly justify the expense. If time is of the essence and a quick turnaround is needed, then expense is less a factor and polymer blasting is clearly recommended.

Results: Polymer blasting was initiated at the Chevron refinery on a regular basis in 1977 and has been used in various cleaning areas since. The Hydro-processing reactor exchanger that initially took 3 months to clean can now be put back into operation in approximately 24 hours with polymer blasting.

A 20 inch natural gas line that develops very hard sulfur deposits and is cleaned once a year during the annual shutdown is handled in a considerably shorter time with polymer blasting.

Because the tradeoff of polymer expense has not always been justified by the manpower savings alone, only about 10% of the applicable cleaning jobs employ the polymer at Chevron. But use of polymer expedites routine jobs, reduces downtime, allows more thorough cleaning and makes possible the removal of scale or deposits that were previously impossible to remove. ■

SUPER-WATER® concentrated industrial water blasting additive is a product of Berkeley Chemical Research, Inc. P.O. Box 9264, Berkeley, CA 94709.

Polymer blasting cleaning service is available from Pacific Industrial Service Corp., 2119 Gaylord St., Long Beach, CA 90813.

Polymer blasting nationwide on a contract basis may be arranged through D.E. O'Connell & Associates, P.O. Box 307, Martinez, CA 94553.

Applications of polymer blasting

Previously, bundles fouled with heavy coke or hard deposits, if not requiring complete retubing, would have been mechanically reamed. Now, often, they can be put back into service after polymer blasting. At the February 1982 National Petroleum Refiners Association (NPRA) meeting, during the Conference's Workshop on Chemical Cleaning, participants related the use of polymer blasting for these applications:

- Heat exchangers: shell-side (more effective stand-off distance); plugged tube-side (rigid lance with nozzle small enough to allow debris to be flushed backwards)
- Removal of epoxy-bound rubber from various vessels/containers
- Internal (large diameter) pipeline cleaning
- Vacuum filter piping "L's" and "T's"
- Falling film evaporators
- Removal of hard coke deposits after refinery fire
- Plugged second-stage urea decomposer tubes
- Coke from cokers and gas effluent overhead
- Coke from discharge headers of coke gas compressors
- Calcium carbonate and slurry deposits from boiler slagging slurry lines
- Dense magnesium salts from boiler tubes
- Calcium carbonate from boiler tubes
- Calcium and iron fluorides from hydrofluoric acid alkylation plants
- Hard scale from sulfur condensers in (Benson) sulfur recovery systems
- Removal of coke from vapor lines
- Removal of coke from coke heater barrels
- Removal of plastic, at large stand-off distances, from batch reactors
- Removal of otherwise intractable shell-side deposits, saving bundle retubing

The participants supplying information for this report came from throughout the United States, including Hawaii, plus Canada, Europe, Israel and the Caribbean.

Candidates Sought For 2003 WJTA Awards

You are invited to submit candidates for the special awards that are presented biennially by the WaterJet Technology Association to honor a company, organization or individual who has made a significant contribution to the industry through accomplishments that directly enhance waterjet technology and the industry as a whole. A list of previous WJTA award recipients appears at the right of this sheet.

Candidate nominations must be received no later than July 2, 2003. The award recipient(s), to be selected by the Awards Committee of the WaterJet Technology Association, will be honored at a presentation ceremony on Monday, August 18, 2003, in conjunction with the WJTA 2003 American Waterjet Conference in Houston, Texas.

An official form for candidate nominations appears on the reverse side of this sheet. Complete one form for each nomination submitted. Please make additional copies of the form as needed. Completed nomination forms may be faxed to (314)241-1449 or mailed to:

WaterJet Technology Association
917 Locust Street, Suite 1100
St. Louis, MO 63101-1419 USA

Previous Award Recipients

1981	Pioneer Award	Jacob Frank (deceased)
1983	Pioneer Award	H.D Stephens, Bedford, England
1985	Pioneer Award	William Cooley, Chevy Chase, MD
1987	Pioneer Award	Norman Franz, Ph.D., Vancouver, BC, Canada
1989	Pioneer Award	Richard Paseman, Houston, TX
1991	Pioneer Award	John H. Olsen, Ph.D., Kent, WA
1993	Pioneer Award	Fun-Den Wang, Ph.D., Golden, CO
	Safety Award	David Summers, Ph.D., Rolla, MO
		NLB Corporation, Wixom, MI
	Service Award	George A. Savanick, Ph.D., Apple Valley, MN
		Mohan Vijay, Ph.D., Gloucester, ON, Canada
	Technology Award	Mohamed Hashish, Ph.D., Kent, WA
		Autoclave Engineers, Erie, PA
		Hammelmann Corporation, Dayton, OH
1995	Pioneer Award	George Rankin, Houston, TX
	Safety Award	Autoclave Engineers, Erie, PA
	Service Award	Thomas J. Labus, Lake Geneva, WI
	Technology Award	Thomas J. Kim, Ph.D., Kingston, RI
1997	Pioneer Award	David A. Summers, Ph.D., Rolla, MO
	Service Award	Andrew F. Conn, Ph.D., Baltimore, MD
	Technology Award	Prof. Dr.-Ing. Hartmut Louis, Hannover, Germany
1999	Pioneer Award	Mohamed Hashish, Ph.D., Kent, WA
	Safety Award	Bruce Wood (deceased)
	Service Award	John Wolgamott, Durango, CO
	Technology Award	Ryoji Kobayashi, Ph.D., Ishinomaki, Japan
2001	Pioneer Award	George A. Savanick, Ph.D., Apple Valley, MN
	Technology Award	Richard Ward, Kent, OH

Apply For Complimentary Registrations For The 2003 WJTA Conference

The WaterJet Technology Association (WJTA) has available up to five (5) complimentary full registrations for the 2003 American Waterjet Conference to be held August 17-19, 2003, at the Adams Mark Hotel in Houston, Texas.

Applicants must be WJTA members in good standing at the time of application. Preference will then be given to students and then to other visitors traveling the greatest distance.

The complimentary registration covers the welcoming reception in the exhibit hall, research and applications sessions, party, onsite live demonstrations, exhibits, coffee breaks and luncheons. The complimentary registration does **not** include pre-Conference seminars, room or travel expenses.

Requests for the complimentary registrations will be taken through **April 11, 2003**. The complimentary registrations will be awarded on or before May 5, 2003.

Submit your request for consideration in writing to the WaterJet Technology Association. Be sure to include in your request details about why you should be considered for a complimentary full registration. Include any other background information that you wish to be taken into consideration when your information is reviewed.

Submit your request by mail to:

WJTA Conference
917 Locust Street, Suite 1100
Saint Louis, MO 63101-1419

or fax to: (314)241-1449

OVER

2003 WJTA Awards Nomination Form

Instructions: Complete each section below and submit a narrative (300-word maximum) to support your nomination on a separate sheet of paper. Please print or type all information.

I nominate the following company, organization, or person as a candidate to receive a 2003 WJTA Award (please print or type full individual, company or organization name):

Check award (check only one award per form) for which nomination is being made:

☐ **Distinguished Pioneer Award**

The nominee must:

- Have made contributions to the waterjet industry;
- Have made contributions to the achievement of the goals of WJTA;
- Have high moral character;
- Have strong personal and business ethics;
- Be dedicated to the future of the waterjet industry and to the growth of WJTA.

☐ **Service Award**

How has the nominated company, organization or individual contributed in time and talent toward improvement in the WaterJet Technology Association?

☐ **Technology Award**

What has the nominated company, organization or individual done to introduce new and innovative ideas in engineering or manufacturing? This could include, but is not limited to, new products, new manufacturing techniques, patents . . . any unique activity that advanced the technology of the waterjet industry.

☐ **Safety Award**

What has the nominated company, organization or individual done to introduce new and innovative ideas in safety? This could include, but is not limited to new products, new concepts, new safety techniques . . . any unique activity which increases the overall safety of waterjet equipment.

CANDIDATE: _____ Company: _____

Address: _____

City: _____ State: _____ Country: _____ Postal Code: _____

Phone In US/Canada (_____) _____ Fax (_____) _____
area code area code

Phone Outside US/Canada ____ _____ Fax ____ _____
country code city code country code city code

CANDIDATE SUBMITTED BY: _____ Company: _____

Address: _____

City: _____ State: _____ Country: _____ Postal Code: _____

Phone In US/Canada (_____) _____ Fax (_____) _____
area code area code

Phone Outside US/Canada ____ _____ Fax ____ _____
country code city code country code city code

Nominations must be received no later than July 2, 2003.

For a prompt response, fax completed form to (314)241-1449, or mail to the WJTA, 917 Locust Street, Suite 1100, St. Louis, MO 63101-1419, USA.