

# W J T A

**WaterJet Technology  
Association**



# Jet News

JUNE/JULY 2000

*Published by the  
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## Hydraulic Mining



**A mining monitor on a crane (article on page 2).** Photograph courtesy of Stang Industrial Products, Santa Ana, CA.

**11th American Waterjet Conference • August 18-21, 2001**  
**Call for Papers and Request for International Advisors**

*See page 8*

# Hydraulic Mining, from page 1

**H**ydraulic mining is a process whereby minerals are extracted with the aid of a high velocity waterjet. The jet is directed at the mineralized rock and fragments it. The jet can also be used to impel the broken ore into a point of collection, usually the input of a slurry pipeline.

Phosphates are mined hydraulically in Florida and North Carolina using equipment such as that shown in figures 1 and 2. Figure 1 shows a jet working in tandem with a dragline. The dragline bucket (typically 42 cubic

yards in capacity) picks up the phosphate ore and deposits it in a pile at a slurrying station.

Hydraulic monitors working at this station emit jets at 150 psi, 2,000 gpm. These jets slurrify the ore. The ore slurry (about 30% by weight) is induced to flow into a pipeline (typically 24 inches in diameter) and is pumped to a processing plant.

Figure 2 shows the mining control tower from which an operator remotely controls the hydraulic monitors.



**Figure 3. Mining Monitors.** Photograph courtesy of Stang Industrial Products, Santa Ana, CA.



**Figure 4. A typical multi-monitor remote control station.** Photograph courtesy of Stang Industrial Products, Santa Ana, CA.

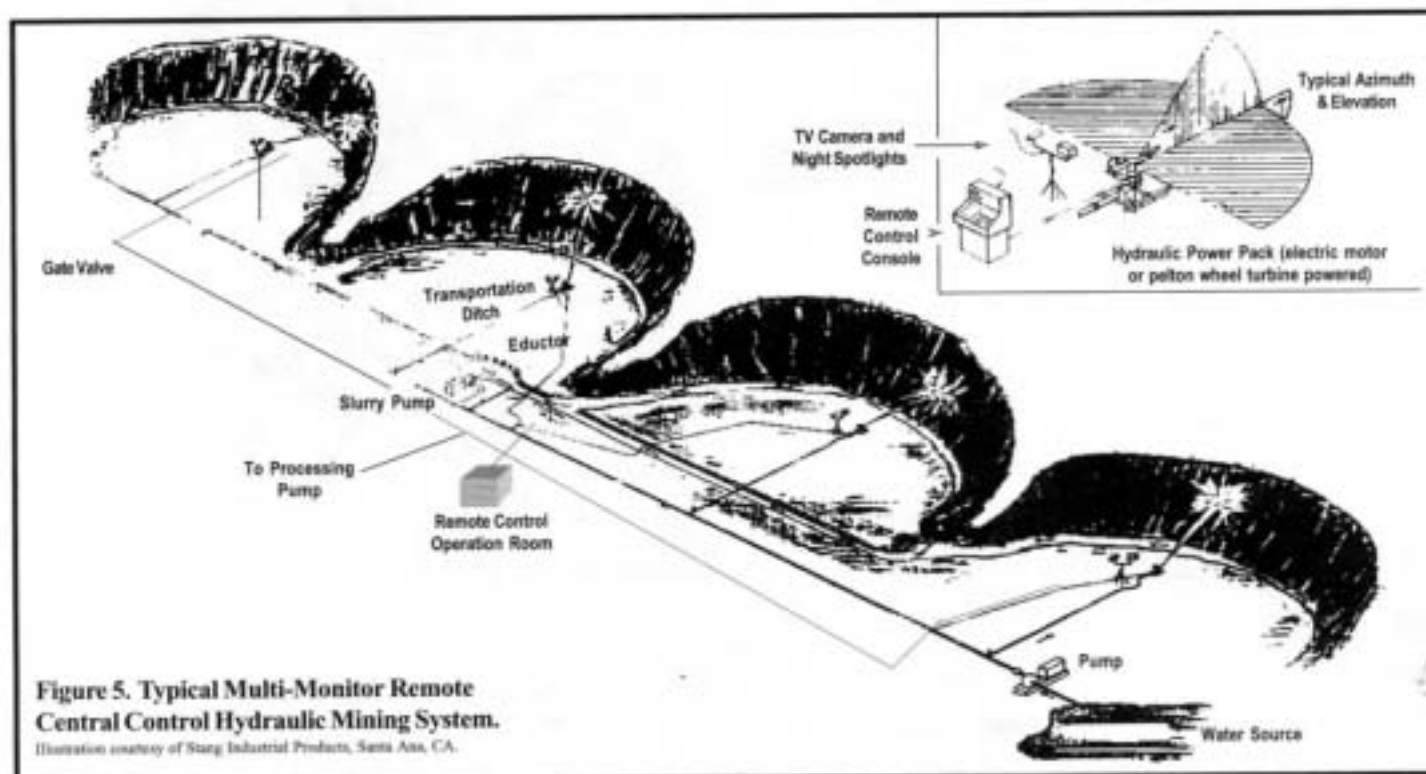
Other commodities, such as sand, are also mined hydraulically using mining monitors such as those shown in figure 3. A typical multi-monitor remote control system is shown in figure 4 and a remote control system in figure 5.



**Figure 1. Mining Application.** Photograph courtesy of Stang Industrial Products, Santa Ana, CA.



**Figure 2. Mining Control Tower.** Photograph courtesy of Stang Industrial Products, Santa Ana, CA.



**Figure 5. Typical Multi-Monitor Remote Central Control Hydraulic Mining System.**

Illustration courtesy of Stang Industrial Products, Santa Ana, CA.

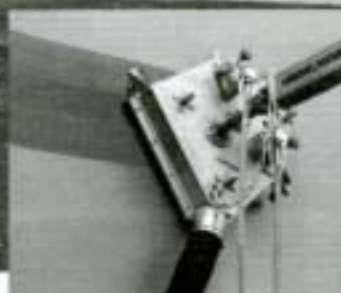


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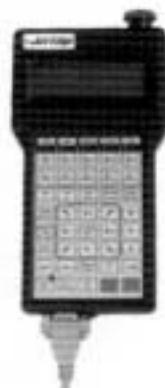
ment are right at your fingertips. It is fully networkable, allowing part programs to be generated offline and easily transferred to the system's hard drive for production.

The process interactive trajectory automatically varies feed rate and acceleration based on known features of the specific job, such as material type, thickness, orifice size, nozzle size, and abrasive flow which are stored in an on-board database. This gives users the precision they need to eliminate guess-work. AquaVision® uses G & M codes so programming can be modified easily at the controller in its edit screen.

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For more information, contact Jet Edge, (800)jetedge, fax: (612)497-8701, web site: [www.jetedge.com](http://www.jetedge.com), email: [sales@jetedge.com](mailto:sales@jetedge.com).

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Minneapolis Skyline

## 11th American Waterjet Conference

**August 18-21, 2001**

**Hyatt Regency  
Minneapolis**

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## Clean Water — Safe Harbor Conference

Environmental regulations and policies related to the shipbuilding and ship repair industry vary from state to state along the Gulf Coast. The Clean Water / Safe Harbor Conferences held May 9 in Houston, Texas and May 17 in Houma, Louisiana brought together leaders from all aspects of the coatings industry to discuss compliance assistance for shipyards, bridges, and other facilities. Building partnerships between regulatory agencies and industry was promoted along with steps for pollution prevention in surface preparation.

Loy Stewart shared his experiences as president of Detyens Shipyard. Stewart has used waterjetting for coatings removal in his shipyard for six years. Mr. Stewart stated that his shipyard has used dry abrasive blasting

on the external surfaces of ships only two times in the last six years and that they do not plan to do this type of dryblasting again.

Sponsored by the Texas Natural Resource Conservation Commission, the Louisiana Department of Environmental Quality, EPA Region VI Pollution Prevention Roundtable, and the Advisory Council, the hot topic of the day was maintaining environmental compliance without breaking the bank. Presenters stated that waterjetting is quickly becoming the preferred method of



Waterjetting demonstration.

removing coatings while reducing pollution. Stewart said, "Environmentally it's a safer way to go. You don't have dust going everywhere. We are able to contain the water and the run off. The yard stays clean. We're not always getting grit out of our

(continued on page 12)

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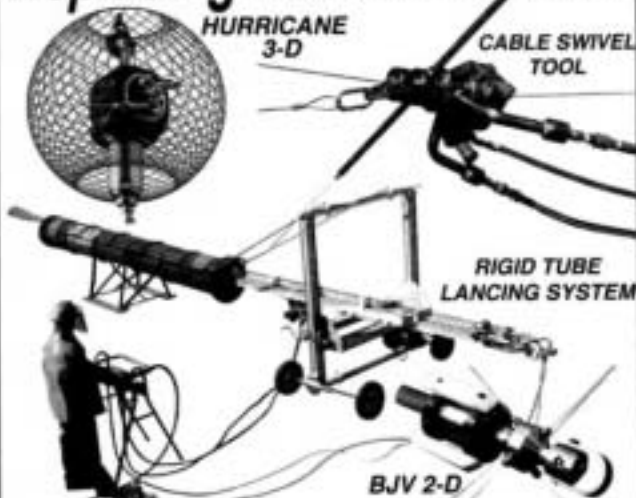
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## Safety Committee Solicits Comments On Improvements To Recommended Practices

The WJTA Safety Committee solicits comments regarding improvements to the publication, *Recommended Practices for the Use of Manually Operated High Pressure Waterjetting Equipment*. While the Recommended Practices is reviewed periodically at the biennial conferences of the WaterJet Technology Association, your comments and suggestions for improving the publication are invited and welcome anytime.

Please address your comments and suggestions to: Safety Committee, c/o WJTA, 917 Locust Street, Suite 1100, St. Louis, MO 63101-1413, fax: (314)241-1449, e-mail: [wjta@wjta.org](mailto:wjta@wjta.org), web site: [www.wjta.org](http://www.wjta.org).

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## WJTA Seeks International Representatives

The WaterJet Technology Association (WJTA) is seeking volunteers from around the world to help promote the 11th American Waterjet Conference to WJTA members and colleagues in their country and in neighboring countries. The Conference is being held August 18-21, 2001, at the Hyatt Regency Minneapolis Hotel on the Nicollet Mall in Minneapolis, Minnesota.

The WJTA seeks individuals who will enhance the awareness of waterjet technology, promote the

Conference, and encourage the submission of abstracts and papers. The WJTA office will be happy to supply promotional literature to distribute to colleagues.

If you are interested in serving as an international advisor, please complete the reply form below and fax to (314)241-1449, or contact the WJTA office by e-mail: [wjta@wjta.com](mailto:wjta@wjta.com), phone: (314)241-1445, or by mail: WJTA, 917 Locust Street, Suite 1100, St. Louis, MO 63101-1419.

### International Advisor Response Form

11th American Waterjet Conference

August 18-21, 2001

Hyatt Regency Minneapolis on Nicollet Mall  
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# 11th American Waterjet Conference

August 18-21, 2001

Hyatt Regency Minneapolis on Nicollet Mall  
Minneapolis, Minnesota, USA

## First Announcement and Call for Papers

Impressive progress and a fast-growing understanding of the diversified applications of waterjet technology are generating a growing excitement in the industry. New techniques and applications are being developed and current ones are being improved. Waterjet technology, now being used in nearly all types of industry — manufacturing, mining, construction, concrete, stone, aerospace, engineering, process, and medical industries — continues to expand at a rapid pace.

The 11th American Waterjet Conference will focus, from a practical and scientific viewpoint, on the most up-to-date industry advances in waterjetting equipment, techniques, and applications. The areas to be addressed include but are not limited to:

- Abrasives, Water, and the Environment
- Advanced Industrial Applications
- Advances in High Pressure Technology
- Automotive Applications
- Cleaning and Coating Removal
- Components and Systems
- Construction and Non-Manufacturing Applications
- Contractor Applications and Processes
- Demilitarization, including removal of land mines (demining).
- Drilling Applications
- Excavation, Tunneling, and Mining Applications
- High Pressure Equipment and Systems
- Jet Mechanics
- Jet-Material Interaction
- Manufacturing Processes
- Market and Future Needs
- Novel Jets and Applications
- Process Modeling and Control Studies
- Rock Cutting
- Safety, Training, and Environmental Protection

Commercial and academic authors are encouraged to submit titles and abstracts for consideration. To submit an abstract(s), please complete the abstract submission form on page 10, attach a copy of your abstract(s), and forward to the attention of the Conference Coordinator at the Waterjet Technology Association. **The deadline date for submission of abstracts is November 1, 2000.**

An Abstract Review Committee consisting of four referees, chosen from the Organizing Committee and the International Advisors, will review the abstracts. Authors will be advised by February 19, 2001, regarding the decision of the Abstract Review Committee.

The 11th American Waterjet Conference is organized by the **Waterjet Technology Association** and is endorsed by the **International Society of Water Jet Technology**. The Waterjet Technology Association looks forward to providing this forum and to your involvement and participation.

## 2001 WJTA Conference Committee

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St. Louis, MO 63101-1419  
Telephone: (314)241-1445  
Fax: (314)241-1449  
Email: [wjta@wjta.org](mailto:wjta@wjta.org)  
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## 11th American Waterjet Conference

August 18\*-21, 2001 • Hyatt Regency Minneapolis on Nicollet Mall • Minneapolis, Minnesota

### Abstract Submission Form

For each paper to be submitted for consideration, please complete this form, **attach a copy of the abstract**, and mail or fax to WJTA by November 1, 2000. Authors will be advised by February 19, 2001, regarding the decision of the Abstract Review Committee. Please send this form even if you e-mail your abstract.

#### Paper Information

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Authors \_\_\_\_\_

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- ☐ Cutting
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#### Related Industry

- ☐ Generic
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- ☐ Waterjet
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- ☐ Abrasive suspension jet
- ☐ Pulsed
- ☐ Cavitation
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- ☐ Other \_\_\_\_\_

#### Material

- ☐ Metal
- ☐ Rock
- ☐ Glass
- ☐ Ceramic
- ☐ Composite
- ☐ Concrete
- ☐ Other \_\_\_\_\_

#### Environment

- ☐ Field work
- ☐ Factory work
- ☐ Submerged
- ☐ Nuclear
- ☐ Demilitarization
- ☐ Offshore
- ☐ Other \_\_\_\_\_

\*August 18 is reserved for the Waterjet "Short Course," safety seminar, and Conference Welcoming Reception.

Mail completed form and abstract, **NO LATER THAN NOVEMBER 1, 2000**, to: Conference Coordinator, 11th American Waterjet Conference, Waterjet Technology Association, 917 Locust Street, Suite 1100, St. Louis, MO 63101-1419, USA, telephone: (314)241-1445, fax: (314)241-1449, email: [wjta@wjta.org](mailto:wjta@wjta.org), web site: [www.wjta.org](http://www.wjta.org)

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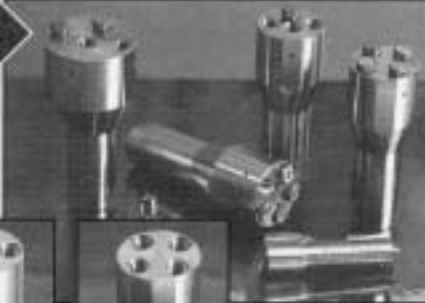
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## Clean Water — Safe Harbor Conference, from page 6

equipment. The customer's equipment is much, much cleaner. He's not cleaning grit out six months after he leaves the shipyard. Believe it or not it's a safer way to work."

Mark Johnson of the Lower Colorado River Authority (LCRA) described how he dealt with strict zero emissions requirements when removing lead coatings from Texas' Wirtz Dam. "The primer on this super structure that was painted (the original primer painted back in 1938) was in excellent shape in most of the structure. It was the topcoat, an alkyd type topcoat, that was starting to flake and peel exposing the primer. In those places the primer started to deteriorate. We did an assessment and realized that maybe there was a technology out there that would allow us to peel this coating like an onion skin } to where we could selectively take off the bad coatings and leave the coatings that were still tightly adhered in place and we might save a little money } and it appeared that there were some waterjetting technologies that allowed us to do that." The LCRA began the removal process by comparing bids by contractors using different methods. By using waterjetting technology their hazardous waste volumes were reduced by 90%. "Only five tons of hazardous waste was produced, compared to the 82 tons originally bid. The project cost \$411,000 compared to the \$750,000 original bid," said Johnson. "From an

environmental perspective the project was a success. From a project management prospective the project was a success. It's great when you can have these win-win situations where not only do you prevent a lot of waste from being generated, you also save a considerable amount of money."

Pat Killeen, Director of Environmental Compliance for Friede-

Goldman-Halter shared his impression of specular hematite versus coal slag used in traditional dry blasting. Killeen said, "Hematite is rating far better than all the other abrasives. We know it's about half or less of the material usage depending upon the metering valves, substrate that was blasted, recycling, labor cost, and cleanup cost." Friede-

(continued on page 16)



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# High Pressure Waterjets In Australian Mining Research

High volume (500-2,000 gpm), low pressure (100-2,500 psi) waterjets have been used successfully in mining for many years.



Field trials on the waterjet-alone drill used in the draining of gases.

Photograph courtesy of CMTE.

Equipment similar to that shown on pages 1 and 2 of this issue of *Jet News* is used routinely to mine phosphates and sand.

High pressure waterjets are less widely used in the mining industry. One of the rare examples of the

successful use of high pressure waterjet cutting in mining is the Ned-Jet 2000 slot cutting system used for granite quarrying. This system operates at 37,000 psi and 7 gpm and is described in the February 1999 *Jet*

## Decals

The WaterJet Technology Association logo is now available in a decal form suitable for application to hard hats or equipment. Each corporate member will receive ten free decals and each individual member will receive one free decal as a benefit of membership in the association.

Additional decals are available for purchase through the WJTA catalog shown below.

*News.* The Ned-Jet 2000 is used in granite quarries in South Dakota, Texas and California.

(continued on page 21)

## WaterJet Technology Association's Order Form for Publications, Caps and Shirts

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## Fireboats

The February 2000 issue of *WorkBoat Magazine* includes two articles on fireboats. These articles describe a barge fitted for firefighting by the Port Authority of Montreal; the General Roy S. Kelley, an automated fireboat out of the Port of New Orleans; a Seattle police patrol boat doubling as a fireboat; and the Lone Star, a new fireboat in the Port of Corpus Christi, Texas. These vessels include monitors similar to those described in the January issue of *Jet News*.

The General Roy S. Kelley has four 2,500 gpm Stang monitors and four 1,000 gpm Stang monitors. Seattle Patrol Boat #4 has a four-inch Stang monitor and a two and one-half inch Stang monitor. The main monitor delivers 2,750 gpm at 150 psi and can throw water about 250 feet. The smaller monitor has a capacity of 1,000 gpm at 150 psi and a range of 195 feet. The Lone Star has four Williams 2,000 gpm, six-inch monitors and a Hydro-Chem 2,000 gpm nozzle assembly.

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## Clean Water — Safe Harbor Conference, from page 12

Goldman-Halter estimated material use as averaging 50% less when using hematite.

One of the largest conferences of its kind, Clean Water-Safe Harbor had around 250 attendees ranging from contractors to suppliers to regulatory agencies. During break times attendees viewed demonstrations of the latest waterjetting and wet abrasive blasting technology. NLB Corporation gave attendees an up-front look at their vacuum equipped Ultra-Chem 36® while Aqua-Dyne Inc. displayed their new robotic cleaning Water Energy™ system. Elcometer presented tests for surface, abrasive, and water quality. Attendees marveled as a Flow International HydroCat™ blasted a makeshift steel ceiling at 36,000 psi with vacuum. Keizer Technology and Carolina Equipment demonstrated wet abrasive blasting techniques with their Torbo® and Aqua Miser B.O.S.S.®. Freemyer Industrial Pressure showed attendees the effectiveness of waterjetting at different pressure levels. Proceedings from the Clean Water-Safe Harbor Workshops, including the Texas Natural Resource Conservation Commission and the Louisiana Department of Environmental Quality panel discussions, are available on-line at [www.waterjetting.org](http://www.waterjetting.org) in both a bound version and a multi-media CD-Rom version.

For more information, contact:

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## Dr. Galecki Suggests An Addendum To Recommended Practices

There are many terms available to researchers when referring to waterjets. I would like to offer an addendum to the glossary in *Recommended Practices For The Use of Manually Operated High Pressure Water Jetting Equipment*, published by the WJTA, 1994, to fill some existing gaps. First let me offer a little background on some existing definitions.

First, the different ranges of pressure: low, medium, high, ultra high, super high, exotic pressures, etc. Components for pressure systems working under pressures in the range up to 15,000 psi are called medium pressure, but what was the criterion used to set these limits? I would like to propose that in order to name the pressure range, the basic theoretical equation determining jet velocity be used. My suggestion is that the theoretical pressure required to produce the jet with the speed of sound in air, be the upper limit of the first pressure level. It could have the name such as low pressure or just pressure level I (one). A multiplication factor of two will be used for the next pressure level. Again, another name needs to be chosen for this pressure range. Following this pattern we can cover the range of pressures that are in use.

Second - interrupted, discontinuous, or pulsating jets. What is the difference between them? According to the cited document: "Pulsating Water Jet is a jet that consists of individual slugs of water or liquid." I would like to add more precision to that description: "a Pulsating Water Jet is a jet that produces dynamic pressures which are varying in their amplitude such that the lowest pressure remains at a level of no less than 25% of the maximum pressure." What should be the criterion used for this case? The interrupted or discontinuous jet can be characterized as "a jet that produces dynamic pressures which are varying in their amplitude from zero to the maximum pressure."

The third definition to consider is jet quality. At the present time, a jet is characterized by its diameter and sometimes the name of the nozzle manufacturer is given. Based on my experience this is not sufficient information. We need to establish standards for the purpose of comparison of jet quality. Numerous research results have been published, but are these results trustworthy? I feel that even the research I carry out cannot be used effectively without a defining standard. Whatever is decided upon, the procedure as well as the testing device has to be very simple so that it can be used in the laboratory as well as in field applications.

If you would like to express your opinion on these matters or discuss a solution please contact: Dr. Greg Galecki, University of Missouri-Rolla, phone: (573)341.4938, email: [ggalecki@umr.edu](mailto:ggalecki@umr.edu).



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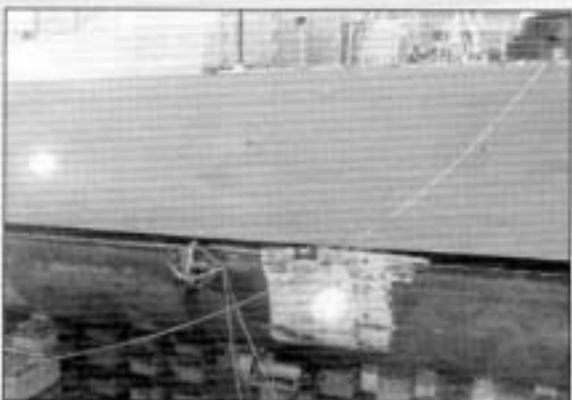
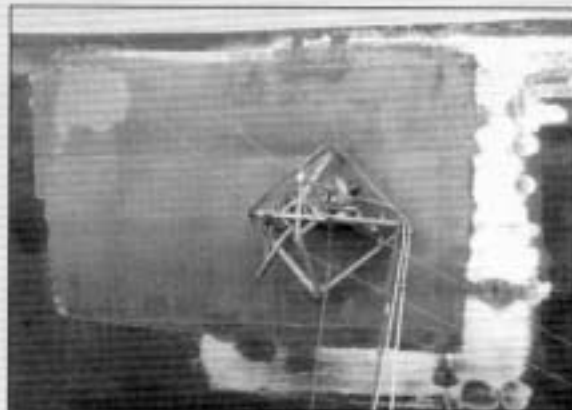


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## Aqua-Dyne's Aqua-Spider At Work In A Shipyard.

Photographs courtesy of Aqua-Dyne, Inc.



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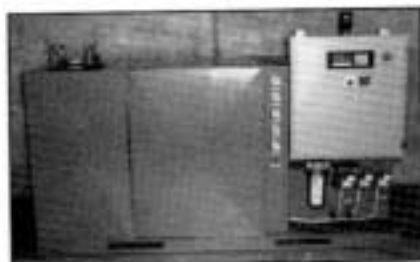
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(continued on page 22)

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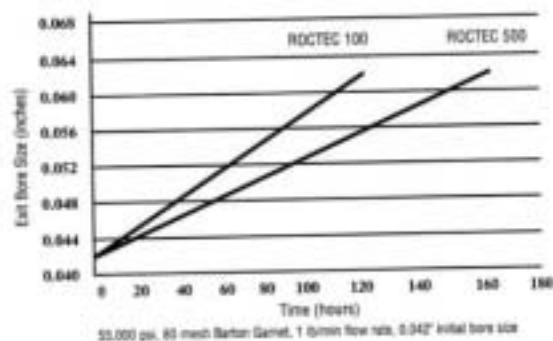
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## High Pressure Waterjets In Australian Mining Research, from page 13

Despite the relative lack of commercial access thus far with high pressure waterjetting systems in mining and rock excavation applications, the potential benefits to be gained by either replacing conventional mechanical drill bits or cutting tools with jets or by increasing the life of these bits or tools by using jets is enormous.

The Cooperative Research Center for Mining Technology and Equipment (CMTE) has developed and is presently commercializing waterjet drilling systems for use in underground coal mines. Established in Australia in 1991, the CMTE is a joint venture between six major mining companies<sup>1</sup> and two major universities<sup>2</sup>.

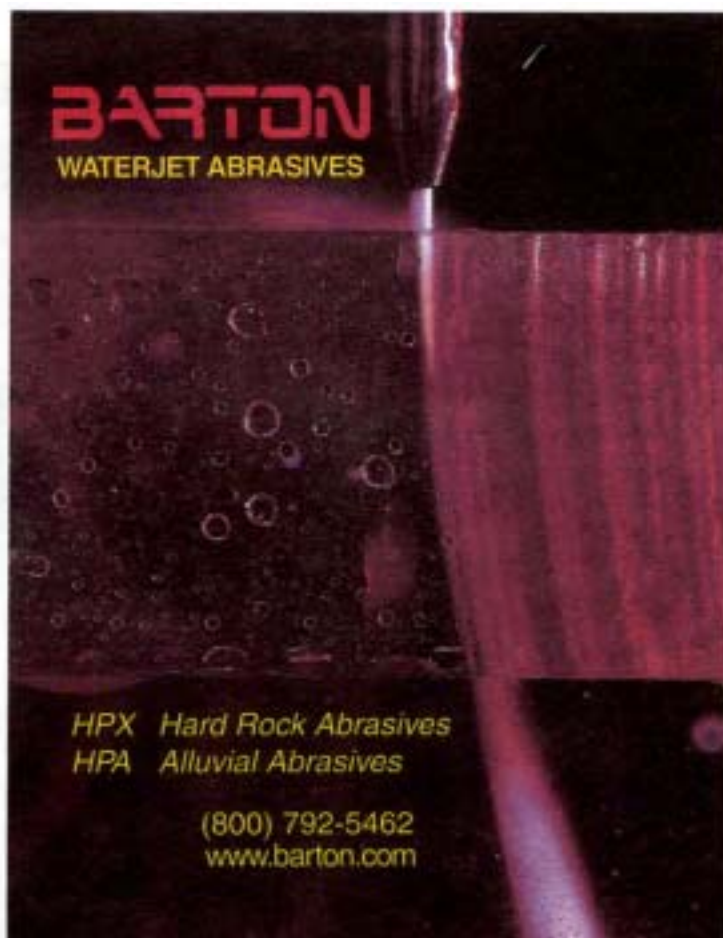
The Center's drilling work has concentrated on the development of systems for drilling holes in coal seams in order to drain the gases (mostly natural gas and carbon dioxide) from the seams in advance of the mining.

The CMTE has developed systems for use in underground coal mines that use either mechanical bits assisted by waterjets or waterjets alone with self-rotating, self-advancing bits attached to high pressure hoses. The jet-assisted system drills much straighter holes than conventional drills. The jet-alone system drills more than 10 times faster than conventional drills.

The most exciting work in this area has been the development of a waterjet-alone drill for the draining of gases, which is operated from the surface. In this system, vertical holes are drilled from the surface to intercept one or more coal seams. The waterjet drill is lowered down each hole to the seam horizon. A whipstock arrangement is used to elevate the drill and orient it to the desired azimuth. The drill then penetrates the seam, it is withdrawn, the whipstock is oriented to a new azimuth and the process is repeated. All of the seams penetrated by the vertical well can be drilled out in this manner.

The Center and its industry partner have spent more than AUD\$7.5 million developing this technology and testing it in a series of mining field trials. The technology is now being commercialized for two market areas: (i) commercial gas production and (ii) mine drainage.

The CMTE has also developed a breakthrough technology for machining hard rock. This technology, termed the oscillating disc



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cutter (ODC) by its inventor David Sugden, cuts rock with much lower tool forces than conventional excavation machines, such as tunnel boring machines (TBM). One of its key features is a system of waterjets directed ahead of the cutter that reduce cutter forces and, by keeping the tool cool, reduce the rate of cutter wear.

These developments, along with a plethora of other work in the field of waterjets, will be presented at the upcoming 6<sup>th</sup> Pacific Rim International Conference on Waterjetting Technology. Hosted by the CMTE, the Conference will be held in Sydney, Australia, October 9-11, 2000, immediately after the Olympic Games. This promises to be an important conference with delegates from many countries in Asia, Europe and the Americas. More than 90 abstracts were submitted from countries around the Pacific Rim and Europe. The meeting will provide a forum for people involved in waterjetting in this fast-growing region of the world to exchange ideas and information that will keep the waterjet business "at the cutting edge." For further information, see: [www.cmte.org.au/waterjet/index.html](http://www.cmte.org.au/waterjet/index.html)

<sup>1</sup> BHP Coal, Shell Coal, Hamersley Iron, Rio Tinto, WMC and Pasminco

<sup>2</sup> The University of Queensland and University of Sydney

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