*The Official Publication of the U.S. Water Jet Technology Association*

U.S. WATER JET TECHNOLOGY ASSOCIATION

JET NEWS
JANUARY, 1987

**Post Office Box 19057 • St. Paul, MN 55119 • 612/ 731-1227**

# WJTA Retains Management Firm

The U.S. Water Jet Technology Association has retained Carousel Management Services as its association management company.

**G. Dian**

Gretchen Dian, president of Carousel, was previously retained by CEMA (Cleaning Equipment Manufacturers Association) and will serve as WJTA's Executive Director.

Dian has been in the communications field for over 19 years, and in addition to CEMA, has also been retained by the St. Paul Winter Carnival as Public Relations Counsel, the Executive Director of a local Chamber of Commerce, and in a voluntary capacity has served on numerous boards, committees, etc., for professional and community organizations.

**L. Simpson**

Carousel will also provide the association with a semi-monthly newsletter, daily management duties, assistance with meetings and conventions, recruitment and retention of members, developing public relations programs, and other programs and activities to build greater awareness of the industry

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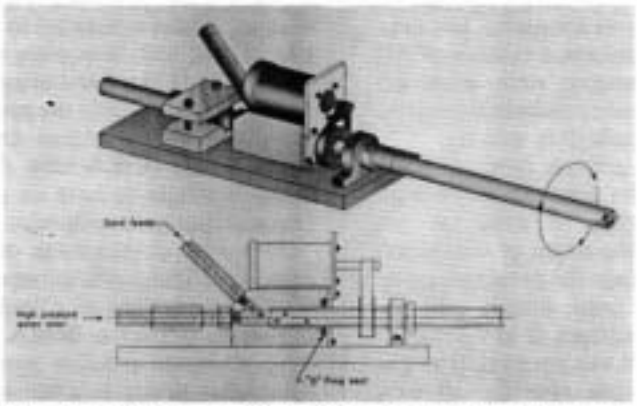
Please address all of your inquiries and correspondence to: U.S. Water Jet Technology Association, Post Office Box 19057, St. Paul, MN, 55119, (612) 731-1227.



**NEW ABRASIVE JET ROCK DRILL** incorporates several novel design features and the U.S. Department of the Interior, Bureau of Mines, would consider issuing an exclusive license to manufacture the abrasive jet drill to a commercial firm.

# Bureau of Mines Develops New Water Jet Drill

## Article Contributed By Dr. George A. Savanick

The U.S. Department of the Interior, Bureau of Mines, has applied for a patent on an abrasive jet rock drill.

This new type of drill operates with a 10,000 psi, 20 gpm water jet into which 16 pounds per minute of abrasive are entrained. This drill (figure 1) incorporates several novel design features including a collimator, a jet diverter, and a low pressure swivel. The collimator keeps the high velocity jet intact for distances in excess of 6 feet from the nozzle. The jet diverter permits the jet to cut wide enough clearance for the drill to follow into the rock. The seals in the swivel are not subject to high pressure levels as are the swivels in conventional water jet drills.

The abrasive jet drill offers several interesting advantages over conventional drills. First, the drill does not require a bit. Second, the drill does not physically contact the rock and, thus, does not have to absorb bending movements generated by the force of the rock pushing back on the drill rod. This permits the drill to be much lighter than conventional drills. Third, the operating pressure (10,000 psi) of this abrasive enhanced water jet drill is far lower than that of conventional water jet drills. Thus, abrasive jet drills are far simpler and safer than conventional water jet drills. Fourth, the drill offers the potential for enlarging (chambering) selected zones of the drill hole, a capability of extreme interest to mine operators who must blast tough strata. The chambers can be loaded with extra explosive to put the maximum energy density where it will do the most good. Fifth, the drill can penetrate a rubbleized zone of hard rock. A technical description of the abrasive jet rock drill will be presented at the Fourth U.S. Water Jet Conference.

The Bureau of Mines would consider issuing an exclusive license to manufacture the abrasive jet drill to a commercial firm. Interested parties should contact George Savanick at (612) 725-4543.

# 8th International Symposium of Jet Cutting Technology

## Contributed By Dr. David Summers

In September of 1986 the BHRA ran the eighth bi-annual waterjet conference in Durham, UK. Although attendance at the meeting was somewhat less than on previous occasions, a number of different developments were discussed which indicate the considerable progress which the technology is making.

Perhaps the greatest move forward has been in the application of high pressure waterjets to assist in the mechanical cutting action of rock picks. At earlier meetings the development of this tool has been traced, and by September the success of the commercial development was reported. It would now appear, that virtually all new roadheaders, a type of tunneling machine, will only be purchased if they are fitted with waterjet assistance on the cutting head. Papers now deal more with reports of their use in mines, than on equipment development.

Research is now turning to the use of the same technology for use in mining coal. Experiments have moved from the laboratory into mines, and machines have been tested underground in both Germany and the United Kingdom. Both machines were reported successful, although the report on the German unit was not available until reported by Mr. Koegelmann at the Innovative Mining Systems meeting, held at Penn State in October. Waterjet assisted cutting is thus becoming an accepted innovation in the world of mining.

In other applications of the technology, abrasive jet cutting has moved from laboratory to field application, and while a paper described its current use for slicing gold bearing rocks from the solid in S. African mines, perhaps the more dramatic paper, with more far-reaching consequences, was that presented by Fairhurst of BHRA. Over the last six years a technology has been established in which abrasive is added to the waterjet delivery line before the jet passes through the first nozzle. This is in contrast to the normal method of adding the abrasive after the first nozzle and before the second collimating nozzle in a special mixing chamber. The resulting system is reported to allow cutting of half inch steel plate with a jet pressure of 1500 psi and using less than 10 hp. Very obviously the system relies on the injection system and nozzle design which BHRA have developed, but it is certain to have an impact on future industry development.

The other development of possibly equal significance was the report on the waterjet equivalent of a jackhammer. For many years the BHRA symposia have discussed possible uses for accumulation nozzles in a variety of water cannons. With the development of the blowdown water cannon, Larry Pater described a way in which this can finally be put to widespread effective use. The device developed makes use of single pulses of water, fired through a specially designed nozzle at a rate of up to five times a second. In contrast to mechanical breakers with an energy delivery:weight ratio of around 3 J/kg, the waterjet unit was reported to have a ratio of 200 J/kg, and can increase the total pulse energy delivered by a factor of 100. Reports on progress were very encouraging.

Conn reported on the development of an apparently economic method for using cavitating waterjets for cutting concrete pavement, and the technologies being developed for this application were discussed in several other papers. As usual, perhaps, the most dramatic innovation announced at the meeting may not have been in one of the papers reviewed above, but might not be recognized for several years, and for this reason the concerned reader is referred to the Proceedings of the meeting, which are available from BHRA.

Not only novelty was stressed at the meeting, since the conference banquet was a mediaeval feast held at Lumley Castle, haunted, on this occasion, by the reappearance of the hoary sock joke.

# International Water Jet Symposium

## Beijing, China, September 9-11, 1987

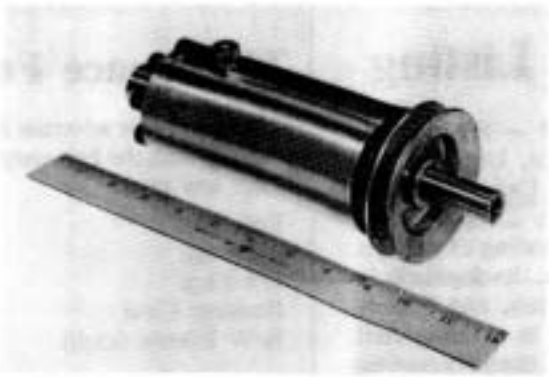
Sponsored By: Water Jet Technology Association, in collaboration with China Science & Technology Exchange Center and Ministry of Coal Industry (China)

A total of 48 abstracts have been accepted for presentation and publication in the conference proceedings. Technical sessions include basic studies, coal, cleaning, cutting, tunneling & drilling, industrial and special applications.

Technical tour will include visits of hydraulic mining and pipeline transport facilities, coal mining research center and China Mining Institute. An exhibition is planned to run concurrently with the conference.

Sight seeing tours of historical and scenic sites to Xian, Hongzhou and Guilin are also planned. Ladies program includes Palace Museum, Summer Palace, Great Wall and Ming Tomb, Temple of Heavenly Peace and shopping.

For more information and registration, please contact Conference Chairman, Dr. Fun-Den Wang, Dept. of Mining Engineering, Colorado School of Mines, Golden, CO 80401.



## Hydro-Ergon Designs Super High Pressure Rotating Coupling

The HYDRO-ERGON Model A-45 super high pressure rotating coupling transfers high pressure fluid from a stationary part to a rotating part at high rotating speeds.

External power from a hydraulic or electric motor is used to provide the rotating speed (600 RPM) for various types of transmissions. A hollow shaft rotates inside the sealing chamber to provide zero pressure drop. A special V-type sealing packing is energized by a spring to provide sealing at any pressure from 0 - 45,000 PSI. The Model A-45 rotating coupling can be used for any type of fluid from long chain polymers to pure water. Some applications are Water Jet Technology, Agitators, Oil Drilling Technology, and Cleaning Technology.

For further technical information, contact HYDRO-ERGON, 7100 North Lehigh Avenue, Chicago, IL 60646 (Telephone: 312/763-8201).

## Call for Papers

### FOURTH U.S. WATER JET CONFERENCE

August 27-28, 1987, University of California, Berkeley

The Fourth U.S. Water Jet Conference will be held on August 27-28, 1987, at the University of California, Berkeley. It will focus on three areas: advances in fundamental understanding of fluid jet interactions with solids; new developments in the application of water jets; and field or factory experience in mining/civil engineering and manufacturing engineering.

Papers are invited on such areas as fundamental and applied research, jet-assisted cutting, mining and rock excavation, concrete cutting, abrasive jet machining, factory applications, advances in abrasive and nonabrasive water jets, and cleaning.

Abstracts of up to 1,000 words, with up to two relevant figures, are due by February 23, 1987. Abstracts should include sufficient detail for review and preselection by the program committee and nominated referees. Three copies should be submitted as follows: papers on mining and rock breaking — send to Professor Michael Hood, Department of Materials Science and Mineral Engineering, Hearst Memorial Mining Building, University of California, Berkeley, CA 94720; papers on mechanical engineering — send to Professor David Dornfeld, Department of Mechanical Engineering, Etcheverry Hall, University of California, Berkeley, CA 94720.

Information about exhibitions, industrial support and conference organization may be obtained from Nanette Pike, University of California Extension, 2223 Fulton St., Berkely, CA 94720; (415) 642-4151.

## New Brochure Available From Tracor Hydro-Services

Tracor Hydro-Services has produced an eight-page brochure describing the capabilities of its Manufacturing Division.

Recently acquired by Tracor, Inc., together with other divisions of Hydro-Services, the Manufacturing Division has been a pioneer in hydro-blasting technology and has shared significant advances with the industry worldwide.

The Division's new brochure provides information on various products and services: hydro-blast cleaning systems, equipment for cleaning tubulars, equipment for surface preparation, equipment for line and vessel cleaning, and special

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## Safety Engineers Meet

The Association of High Pressure Waterjetting Contractors (AHPWC) held their first Safety Engineers Meeting in Birmingham UK on September 17, 1986. The meeting was attended by roughly 40 plant engineers who have responsibility for safety when waterjetting operations are active. While only some of the waterjet contractors in the UK belong to the Association, it was interesting to hear that the safety engineers were increasingly relying on the Safety code developed by AHPWC as a way of improving plant safety. There is at present no British Government Safety Standard for waterjet operations.

The meeting discussed the development of safe practices, the need for improved maintenance and supervision and common habits which can lead to accidents. The need for the meeting was perhaps emphasized by a doctor, one of only three who had ever published information on waterjet related injuries. Based on that low number he concluded that such injuries were very rare. An informal survey of the room then revealed that over half the attendees had, at one time or another, sent employees to the hospital with waterjet injuries.

The meeting closed with a general discussion following a paper on protective clothing, with the point being made that while in general you get what you pay for, this is not always true, and some relatively inexpensive garments can be as effective as more expensive alternatives.

## Dr. Cooley Presents Papers in Tokyo

The first Chairman of the Board of the U.S. Water Jet Technology Association, Dr. William C. Cooley, of Rockville, Maryland, was invited to present a paper in Tokyo on the occasion of the third anniversary of the formation of the Water Jet Technology Society of Japan, on November 27, 1986.

The conference proceedings included the paper entitled "Research and Trends in the Application of High Speed Water Jets in the USA."

Dr. Cooley is now an Associate Professor in the School of Information Technology and Engineering at George Mason University, Fairfax, Virginia.

## WJTA

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to appropriate firms and persons.

Laurie Simpson, a senior at St. Thomas College (St. Paul), is serving as a student intern at Carousel, on behalf of the association. Laurie will receive a degree in marketing with a communications minor this spring.

## Brochure

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equipment and services. Dozens of applications, accessories and options are given in-depth coverage, both in the brochure's body copy and through detailed photographs and technical illustrations. In addition, "performance charts" list pertinent specifications for various Tracor Hydro-Services hydroblast units.

The brochure is now available from local Tracor Hydro-Services distributors, or directly from Tracor Hydro-Services, Inc., Manufacturing Division, P.O. Box 308, Missouri City, Texas 77459-0308. Telephone (713) 499-8611. Telex: 46-9849.

## Calendar Listing

**August 27-28, 1987** — Fourth U.S. Water Jet Conference, University of California, Berkeley. Call for papers: abstracts due February 23 on topics in fundamental understanding of fluid jet interactions with solids, developments in application of water jets, and field or factory experience in mining/civil engineering and manufacturing engineering. Information: Nanette Pike, University of California Extension, 2223 Fulton St., Berkeley, CA 94720; (415) 642-4151.

**IS SOMEONE YOU KNOW** not on our mailing list? If you know of an interested person, who should be on our JET NEWS mailing list, please send his/her name to:

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## Dues Statements

Your membership investment statements are being mailed out this month for 1987. Please check your mail. Your prompt remittance for your investment is greatly appreciated.

## This Space For Sale

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