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High Pressure Waterjet Casting Cleaning

A new and unique product designed for the investment casting and foundry industry has been introduced by Triplex Systems, Inc., of Minneapolis, MN. The machine is designed to clean castings utilizing high pressure waterjets with adjustable pressures from 1,000 psi to 12,000 psi.

The high pressure waterjets are contained in a stainless steel waterblasting cabinet. Castings are fixed on a trolley-mounted, stainless steel pneumatic turntable with the capability of tilting to 45° while rotating. The trolley runs on tracks to a loading station for ease of

*“...specially designed
gimbal mounted
lance and spray
nozzle arrangement.”*

loading and unloading parts into the casting cleaning cabinet. The high pressure waterjets are directed at the casting via specially designed gimbal mounted lance and spray nozzle arrangement.

All phases of the cleaning operation can be monitored by the operator through the lexan viewing window. All controls on the machine are located for operator ease of operation and are low pressure pneumatic configuration so the operator is not exposed to high pressure valves or plumbing.

The unit is an economical and effective means of cleaning castings and shell removal. The system efficiently eliminates airborne dust particles and labor intensive manual cleaning approaches currently practiced.

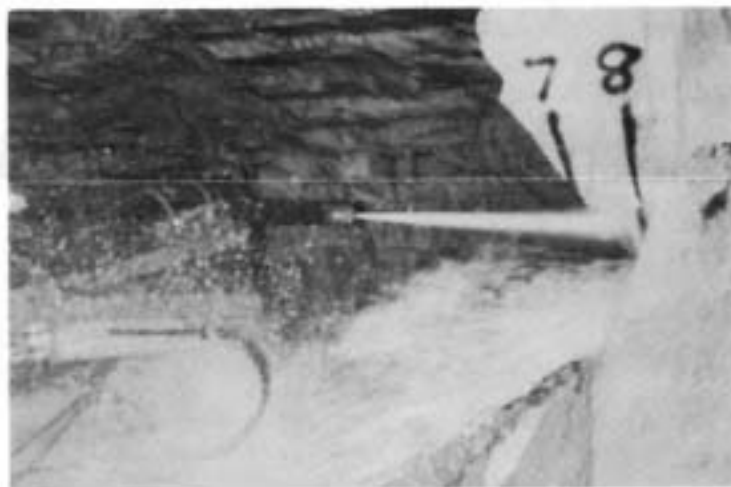


Figure 1. Monitor Mounted on a Drill Carrier

A Water Jet Mining System for Underground Sandstone Mines

The Problem

Sandstone mining operations that employ a traditional drill-blast-load-haul-dump mining system are hindered by the low unit value of sand coupled with the costs involved in repeated handling of the rock, abrasive wear on machine parts and silica dust control. These problems can be overcome by a hydraulic mining system that uses water to cut, liberate and transport the sand. The unit operations of drilling, blasting, loading, hauling and crushing can be replaced by the continuous operation of water jet cutting integrated with slurry transport. Many sandstones are ideal for hydraulic fragmentation and transport because they disaggregate into individual sand grains. The Bureau of Mines has designed and fabricated a high-volume, low-pressure hydraulic mining system capable of effectively cutting sandstone.

How the Water Jet System Works

The water jet system consists of a 1,000-psi, 400-gpm water jet which issues from a 0.62-inch-diameter nozzle housed in a monitor. The monitor is a 4.5-foot length of steel tubing fitted with a flow straightener upstream of the nozzle (see Figure 1). The monitor is connected to the arm of either a drill carrier driven by compressed air or to a backhoe. If a backhoe is used, it must have its articulated arm strengthened to withstand the reaction force of the jet.

The monitor is fed pressurized water through 50 feet of hose from a seven-stage centrifugal pump. The pump suction is fed by the output of another pump which draws water from an impoundment area.

A miner controls the mobile monitor carrier, directing the water jet onto the sandstone face. A remote station that controls the monitor from a distance of 50 feet can also be used.

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U.S. Water Jet Technology Ass'n

ATTN: Dr. George Savanick

5629 Minnehaha Avenue South

Minneapolis, MN 55417, USA

From the President's Desk

The state of the Association is good, but significant improvements are possible. Membership for 1988 stands at 64 individual and 23 corporate members. We hope to increase membership substantially through an advertising campaign being planned by our Membership Committee (Mike Woodward, head).

The balance of our treasury is \$13,000. Most of this will be spent on the advertising campaign for new membership and for expenses attendant to the Fifth Water Jet Technology Conference to be held in Toronto in Aug. 1989.

The Board of Directors met April 15 (see Minutes this issue) and decided on the conditions of sponsorship of the 1989 meeting. We will sponsor the Fifth Water Jet Technology Conference in cooperation with the National Research Council of Canada (NRCC). A short course will be held the day prior to the opening of the conference. Dr. Tom Labus, University of Wisconsin at Parkside, will organize the short course. Dr. Mohan Vijay, NRCC, is the Organizing Committee Chairman for USWJTA.

Recently we mailed an address verification card to each member. We will publish a directory and mail it to each member after these cards are returned.

Water Jet Mining System for Underground Sandstone Mines

Continued from page 1

Sand liberated from the face by the force of the water jet flows as a slurry into a sump where it is drawn into a suction box containing a jet pump and pumped through a slurry hose away from the face.

Test Results

A water jet mining system was tested in a sandstone mine at Clayton, Iowa. This underground mine was developed in the St. Peter sandstone through an adit in the bluff along the Mississippi River.

The St. Peter sandstone at the working face exhibited a mean uniaxial compressive strength of 573 psi when dry, but this strength fell to 117 psi when saturated with water. Thus, the strength of the sandstone is markedly moisture-dependent. The rock disintegrates readily to individual grains when it is saturated by water jet impact.

Cutting tests were performed to measure the ability of the jet to disaggregate the sandstone. These tests differed only in the vehicle used to carry the hydraulic monitor. One series of tests used a Gardner-Denver "Air-Trac" drill carrier as the monitor carrier. Completely liberated sand grains were produced at an average rate of 40 tph with peak production rates reaching 52 tph. A second series of cutting tests were performed with the monitor mounted on the reinforced arm of a backhoe. This mobile monitor yielded on average production rate of 25 tph of liberated sand grains with peak production rates reaching 97 tph.

A slurry pumping apparatus (see Figure 2) was designed and developed to pick up the slurry generated by water jet cutting. This apparatus was tested in the same mine. Pumping rates of 40 tph of sand were achieved, indicating that the simple apparatus could successfully pick up the slurry.

More information about this development or answers to technical questions can be obtained from: Dr. George A. Savanick at the Bureau of Mines, Twin Cities Research Center, 5629 Minnehaha Ave. S., Minneapolis, MN 55417 USA 612/725-4543

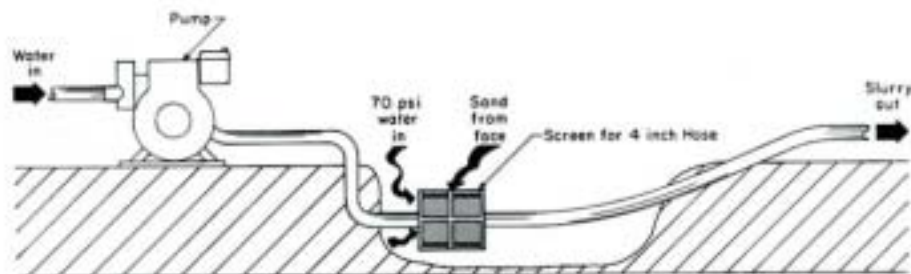


Figure 2. Slurry Pumping Apparatus

The 1988 UMR Short Course on Waterjet Technology August 8-9, 1988

In joint sponsorship between the University of Missouri-Rolla, the U.S. Water Jet Technology Association, and the Mining and Excavation Research Group of ASME.

Course Objective: This 2-day course will review the current state of the art in water jet cutting and cleaning. Discussion on the development of this technology will draw lessons for the most effective use of this new tool.

Text Material: Course notes and references will be provided. The final afternoon of the course will be spent at the High Pressure Water Jet Laboratory observing demonstrations of equipment and technology.

Fee and Registration: The fee of \$299 covers program materials, coffee breaks, and one evening meal. Advance registration is encouraged. The University reserves the right to cancel the course and return all fees if insufficient registration is received.

Deadline July 30, 1988. For further information, contact: High Pressure Waterjet Laboratory, Rock Mechanics Facility, University of Missouri-Rolla, Rolla, MO 65401 314/341-4311

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Minutes of the Board of Directors Meeting

April 15, 1988 Minneapolis, MN

Directors Present: George Savanick, John Wolgamott, Tom Labus, Fun-Den Wang, Michael Woodward, James Reichman, David Summers.

Guests: Mohan Vijay, Louis Finucane, D.M. Fryer.

• **President's Report** George Savanick presented a numerical filing system and financial report. Distributed a current list of members.

• **1989 Conference** Mohan Vijay presented a draft of the contract and budget for the proposed Toronto meeting. Board made several amendments; the documents will be rewritten. Key revisions pertained to the sharing of both risks and profits, honorariums restricted to short course speakers only and name change to Fifth American Water Jet Conference. G. Savanick was made responsible for completing negotiations on behalf of the USWJTA. Tom Labus will organize the short course using a format similar to that used at Berkeley. Dave Summers will write letters soliciting conference sponsors.

• **Management Group** Discussion regarding Association needs for assistance in maintaining phone and mail answering services. It was agreed to search for someone to provide these services. A revised list of required services (prepared in Berkeley) will be distributed to the Board. Individual Board members will then search for someone to provide these services in their chosen city. G.Savanick—Minneapolis; T.Labus—Chicago; D.Summers—St.Louis; M.Woodward—Houston; J.Reichman—Dallas-Ft.Worth; F.Wang—Denver; Forest Shook—Detroit. Proposals are to be sent to George Savanick by July 1. Decision to be made at or before the Sept. directors meeting.

• **International Journal** Mohan Vijay and Fun-Den Wang reported on the proposed new publication with a request for support by WJTA. Board agreed to endorse the concept, with no financial support at this time.

• **Committee Status**

Meetings - G. Savanick. Negotiate 1989 Conference.

Education - D. Summers. Set up short course to explain "Recommended Practices," to be scheduled before March 1989. Profits to USWJTA. Solicit materials from industry, (training films, etc.).

Management - G. Savanick. Find new group to provide services.

Membership - M. Woodward. Develop strategy to increase membership. Board approved \$5,000 budget for this purpose, pending approval of plans.

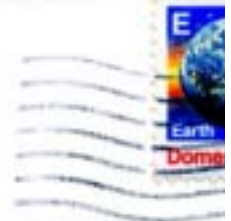
Publication - G. Savanick. Continue to produce newsletter. Requested material be sent to him.

Standards - D. Summers. Proposed that a sub-committee be set up to address "Industrial Applications." T. Labus, Chairman; Reichman; others to be recruited. Abrasives will not be addressed at this time.

• **Next Meeting** Tentatively scheduled for late September, 1988.

• **Meeting adjourned.**

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