EORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. ____

roject No. A-3484 GTRI/~~GAIT~~ DATE 3/11/83

roject Director: David H. Poss ~~School~~/Lab EDL/IED

ponsor: Elberton Granite Association, Inc.

ype Agreement: Standard Research Agreement dtd. 2/25/83

ward Period: From 2/25/83 To ~~6/30/83~~ (Performance) 6/30/83 (Reports)

ponsor Amount: Total Estimated: $ 1,585 6/30/85 Funded: $ 1,585

Cost Sharing Amount: $ Cost Sharing No:

Title: Engineering Assistance for the Elberton Granite Association, Inc.

ADMINISTRATIVE DATA

OCA Contact Faith G. Costello

1) Sponsor Technical Contact:

William A. Kelley, Executive Vice Pre.
Elberton Granite Association, Inc.
P. O. Box 640
Elberton, GA 30635

2) Sponsor Admin/Contractual Matters:

William A. Kelley, Executive Vice Pres.
Elberton Ganite Association, Inc.
P.O. Box 640
Elberton, GA 30635

Defense Priority Rating: N/A

Military Security Classification:

(or) Company/Industrial Proprietary: N/A

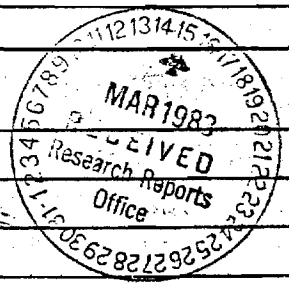
RESTRICTIONS

See Attached NA Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with Sponsor; however, none proposed.

COMMENTS:



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FORM OCA 4:781 (Rev 982)

EORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 4/15/85

oject No. A-3484 ~~XXXXX~~/Lab EDL-IED

cludes Subproject No.(s)

oject Director(s) David M. Poss GTRC ~~XXX~~

ponsor Elberton Granite Association, Inc.

tle Engineering Assistance for the Elberton Granite Association, Inc.

fective Completion Date: 4/5/85 (Performance) (Reports)

rant/Contract Closeout Actions Remaining:

- [ ] None
- [X] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other

ntinues Project No. Continued by Project No.

OPIES TO:

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Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

ERING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

February 4, 1983

MEMORANDUM

TO: Elberton Granite Association Research Committee

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Towler Hydraulics Trip Report - February 1 & 2, 1983

Tuesday, February 1

Arrived at 1:00 p.m. on February 1, and met Jim Conley, Towler Field Service Manager. The intensifier unit was running upon my arrival and I was told it had been running through the morning. Testing seemed to be progressing satisfactorily. Most of the afternoon was spent with Jim and Tom Kuss, Test Manager reviewing the operation of the unit. Later in the afternoon the inner high pressure cylinder developed a leak through the rear packings and testing was discontinued.

Wednesday, February 2

Arrived at 7:00 a.m. and watched Tom Kuss replace seals on the inner cylinder. The cylinder continued to leak when the unit was restarted so the cylinder was disassembled again. The reason for the leak was determined quickly and should not be a further problem.

I noticed that the set of new seals had become impregnated with fine metal particles in this very short time. Further investigation revealed quite a bit of this contamination. I observed that the intensifier ram slides on a "spacer" in the cylinder and there was a wear pattern on the ram and spacer. The previously damaged ram was found and the same wear pattern was observed. The other (outer) cylinder was then disassembled. The wear on this ram and spacer was very minimum and very little contamination was found.

The contamination as a result of this wear is most likely the cause of the clogged nozzles during previous testing.

Towler personnel discussed the problem among themselves. I could see no apparent quick solution and decided that it would be best that Towler engineers consider the problem in depth, rather than rely on a quick realignment of the cylinder or similar quick fix.

I departed Towler at 2:00 p.m., February 2.

Comments:

I became familiar with the unit and observed the operation in enough detail to spot the problems and trouble shoot as required.

The hydraulic portion of the unit operated very well.

I was told that the unit will again be shipped less hydraulic oil.

I observed that the wiring for the auxiliary equipment is in very bad condition and plans should be made for rewiring, preferably in conduit.

Towler Hydraulics appears to be a very high quality, well organized operation. They apparently have been very busy for the past two years on very large oil field equipment causing delays on the Elberton project.

Status:

Towler engineers will reply as to how they propose to fix the ram, spacer interference problem.

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ERING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

February 16, 1983

MEMORANDUM

TO: Elberton Granite Association Research Committee

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Towler Hydraulics Trip Report - February 14 & 15, 1983

Monday, February 14

Arrived at Towler at 7:30 a.m. and met with Gary Cushman of the Field Service Department, and later with Tom Kuss, Test Manager. The intensifier unit was running satisfactorily but had some water leakage around the plunger packing. This was detected in the lubrication system. I met with Harry Mahal, Chief Engineer, and he explained some changes in the seals and sleeves in the high pressure part of the unit. The changes seem to be satisfactory in concept. Mr. Mahal explained that the sleeve which the ram has been scraping was enlarged about 1/10 of an inch on the inside diameter. The units were then reassembled on a bedplate to insure alignment and then reinstalled on the unit.

About 9:30 a.m. one high pressure cylinder began to leak badly and caused the unit to shutdown.

After some discussion Mr. Mahal decided to replace the packing with an inexpensive "Polypack" type seal. This took about an hour and the unit was restarted. The unit ran about 5 hours on Monday without any sign of water leakage.

Tuesday, February 15

Arrived at 8:00 p.m. The unit was running very satisfactorily with no sign of leakage. The unit ran without problems until my departure at about 2:00 p.m.

Gordon Smith, Clyde Ruten, and I discussed what Towler would to to complete the rework of the unit:

(1) Towler will revise the drawings and forward copies to us.

(2) The unit will be cleaned and painted.

(3) Water piping will be reworked using galvanized pipe in place of the rubber hose. The rubber hose is deteriorating rather badly on the inside.

(4) The air logic supply lines and oil separator will be moved to a higher location. There will always be some hydraulic oil leakage into the air compressor tank but this should not be a problem with the modification.

(5) Relocate the "start-stop" switch.

(6) Provide taps to drain the heat exchanger.

The above work is without cost to Elberton Granite Association.

When the unit is cleaned and painted it will be given a final test. A schedule for delivery was not discussed.

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

INEERING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

July 12, 1983

MEMORANDUM

TO: Elberton Granite Association Research Committee

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: General Report of work to date EGA/Ga. Tech - June 30, 1983
Contract A-3484-000

March 16

Inspected unit as shipped to Elberton and found everything in good order. I sorted through all the materials in storage in order to plan for reassimbly of the unit.

Tom Robinson and I met with Ben Rice of Elberton Industrial Electric in order to obtain a quotation on rewiring the peripheral equipment attached to the unit.

April 15

Met with Ben Rice again to further instruct him on rewiring the machine. I inspected the quarry conditions in order to plan to move the unit when the rewiring was complete.

May 3

Moved the unit to the quarry and assembled those components which required the crane services. Completed most major reassembly of high pressure piping.

May 12 & 13

Completed all reassembly power and water hookup. Attempted to start the unit and found problems with the small air compressor. Made inquiries as to the nature of the problem and determined that the check valve between the first and second stage was stuck open. Tom Robinson arranged for repair of the compressor.

May 20 & 23

Air compressor had been repaired so I attempted to start the unit again without good results. After extensive checkout of the hydraulic and air logic systems the problem was narrowed to the exhause valve of Ram B failing to open. (Rained out on 5/20.)

May 27

Disassembled the control valve for Ram B and I found the air control portion inoperable because of an accumulation of moisture causing rusting. The unit was cleaned as well as possible and reassembled.

The unit was run for several hours as 40,000± psi with very good results.

June 1

Rained out.

June 3

The unit started successfully, however, the rotary joint or hydraulic motor began giving trouble. The pressure regulator and controls were removed from the hydraulic motor and the rotary joint was disassembled, cleaned, and relubricated. The unit operated successfully when reassembled.

June 7, 13, 14, 27, 28

A series of days of erratic operation of the hydraulic system. The pressure relief valve was disassembled along with parts of other valves to inspect for contamination. Towler Hydraulics has been contacted and assist in analyzing the problems.

Georgia Institute of Technology
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ATLANTA, GEORGIA 30332

RING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

July 14, 1983

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Weekly Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Tuesday, July 12

I began evaluating the intensifier system to determine the cause of the erratic operation. I began with a complete step-through of the air logic system including taking pressure readings of the signals. This system checked out O.K.

The pressure relief valve was reset to a lower pressure (3,500 psi) in order to be able to run the unit safely during the checkout procedures. All air pilot valves were disassembled and checked for proper operation and no trouble was found. Next, the precompression control valve and Ram A main valve spools were inspected. They were found to be free of contamination or other obstructions and were reassembled.

Towler (Jim Connley) was contacted and both him and myself think that the flow control sandwich valve in Ram A valve is not functioning properly. Plans are to disassemble this unit on July 18.

DHPII/jh

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

:RING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

July 26, 1983

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Weekly Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Monday, July 18

I disassembled the control valve for Ram A and cleaned it. I also ran a check on the air logic system and found it to be operating properly. The unit was started and I found no precompression on Ram A, but otherwise good operation. The unit was run for a few passes at cutting pressures with good results. After discussing the lack of precompression with Jim Conley of Towler Hydraulics we believe the exhaust valve is not properly closing and a check and reapir should be easy.

DHPII/jh

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

RING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

July 28, 1983

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Weekly Report
Elberton Granite Association, Georgia Tech
A-3484-000

Wednesday, July 27

I had discussed the current problem of lack of precompression on Ram A with Jim Conley of Towler. Several checks were made and an air logic element was replaced correcting the problem. A wheel assembly was removed from the unit and repaired. The unit ran about 1½ hours at 40,000 psi and is functioning well.

DHPII/jh

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ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

ERING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

September 30, 1983

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Weekly Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Tuesday, August 2, 1983

The unit was run for the purpose of preparing video tapes of the operation. This was completed. A combination of items caused a shutdown of the unit. The nozzles were worn to the point that the unit was cycling very fast and a high pressure seal had broken in Ram B. Parts were put on order.

Wednesday, September 28 - Thursday, September 29, 1983

Ram B was taken apart in order to replace the high pressure seals. In the process of removing the end block, three screws holding a retainer plate to the block were broken. This is an unavoidable event due to the design. The unit was taken to a local machine shop and bigger screws were installed as a repair and hoping to avoid the same problem next time.

The unit was reassembled and successfully started without leaks. A total of about 2 hours running time was put on the unit. A telephone call was made to Jim Connely of Towler to insure the end block bolts have been tightened properly. The bolts will need to be retightened.

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ATLANTA, GEORGIA 30332

ERING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

October 19, 1983

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office DHP

SUBJECT: Weekly Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Tuesday, October 18, 1983

The water cylinder part of Ram B was retightened and the unit was started. The unit ran 1½ hours continuously at 40,000+ psi. The operation was very smooth but slow. This was due to the use of a two nozzle holder. I approximate the pump was operating at about one-half capacity. The cut made was 5'0" long by 9½" deep for one hour's operation. There were some stops to check various items and the end run-off where no cutting took place consumed 1/6 of the time. The unit was shut down for lunch and to refill the water supply tank. When restarted, it operated erratically. I did not attempt to make adjustments. I want to see if the unit will run as set up when restarted cold. I suspect the valve operation varys with temperature. Oil holding tank temperature had risen to about 120°F during the 1½ hours operation. This is similar to problems experienced in the summer.

Summary of Cutting Data

Nozzle:	2 each @ .016" diameter
Pump Setting:	8½
Pressure:	3,000+ @ Ram A (about 40,000 psi)
Traverse Speed:	6 ft. per minute
Down Feed:	3/16" per pass
Actual Cut:	5'0" x 9½" in one hour, including stops, adjustments, etc.

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RING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

October 21, 1983

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Weekly Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Thursday, October 20, 1983

The unit was started with no special preparation from the way it was left Tuesday and it ran well. This confirms to me that the unit is temperature sensitive. After 2 hours continuous running, the same erratic operating characteristics appeared and the unit was shut down with cooling water circulating. The unit was restarted with no problems after about 45 minutes and ran about 1½ hours without problems.

Two of the new nozzles had worn out after about 8 hours of operation and new nozzles were installed. It is noted that best cutting occurs with the new nozzles even though the volume of water is reduced considerably. The unit was cutting at the rate of 13.75 sq. ft. per hour with new nozzles. The traverse speed was set at 11 ft. per minute and the down feed was set at ¼" per pass. About ½ hour cutting time was logged at this rate after about 3 hours of cutting at lesser rates. The nozzle configuration was .016" diameter nozzles in a two nozzle holder.

DHPII/jh

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ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

ERING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30902
Area Code 404/828-3901

November 23, 1983

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Weekly Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Tuesday, November 2, 1983

The unit developed a water leak at the stationary seal of Ram B. This is the seal that was replaced on October 18.

Tuesday, November 8, 1983

A seal was fabricated by a local machine shop and installed in the unit. The unit was started without leaks. The unit was run only about ½ hour as a check-out prior to a demonstration being scheduled.

Tuesday, November 15, 1983

Scheduled demonstration was cancelled due to rain and rescheduled for 11/22.

Tuesday, November 22, 1983

The unit was demonstrated to EGA membership. The unit ran well.

At this point indications are that the unit can run a full production day. Several contacts have been made with persons who may be able to fabricate nozzles. Laser drilling techniques look promising.

DHPII/jh

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION
ATLANTA, GEORGIA 30332

March 30, 1984

IEERING EXTENSION LABORATORY
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30901
Area Code 404/828-3901

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office DHP

SUBJECT: Daily Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Tuesday, March 20, 1984

The unit was started after a 4 month shut down and a leak was found between the water and oil in the heat exchanger.

DHPII/cf

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION

DUSTRIAL EXTENSION DIVISION
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30901
Area Code 404/828-3901

May 22, 1984

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Daily Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Tuesday, May 15, 1984

A new heat exchanger (oil cooler) was installed and water was drained from the oil reservoir. An estimated 150 gallons of hydraulic oil was lost through the damaged heat exchanger. The unit ran briefly and everything functioned well. Arrangements were made to purchase oil for the unit.

Thursday, May 17, 1984

The unit was filled with 165 gallons of oil. The unit ran well for several hours. New nozzles (.010") were used and it appears that the nozzles are too small to supply energy for efficient cutting. Four nozzles will be drilled to .016" by the EDM process and used. This drilling should be completed in about one week.

DHP/pld

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION

DUSTRIAL EXTENSION DIVISION
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30901
Area Code 404/828-3901

June 18, 1984

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director, Augusta Area Office

SUBJECT: Daily Report
Elberton Granite Association, Georgia Tech Contract
A-3484-000

Tuesday, June 12, 1984

Nozzles have been drilled to .016" diameter by Georgia Tech machine shop using EDM method. The unit was run and cutting was effective. A "Harwood" rotary joint began leaking (40,000 psi joint) and new seals were installed. The unit was shut down when cutting efficiency seemed to be reduced. I couldn't determine if the nozzle geometry has caused a bad jet flow, or if the system was hot and consumming energy in the hydraulic rams.

Thursday, June 14, 1984

The unit was run briefly with the "Vascomax" nozzles and it appeared the water flow was not a good jet. "D-2" nozzles were installed and cutting was very efficient. A power failure caused the unit to shut down. The cause of this failure has not been determined.

DHP/pld

Georgia Institute of Technology
ENGINEERING EXPERIMENT STATION

INDUSTRIAL EXTENSION DIVISION
Augusta Area Office
500 Building, Suite 217
Augusta, Georgia 30901
Area Code 404/828-3901

August 16, 1984

MEMORANDUM

TO: Elberton Granite Association

FROM: David H. Poss, II, Director
Augusta Area Office

SUBJECT: Daily Report

Tuesday, July 10, 1984

The unit was run for several hours with no problems. Seals in the Harwood rotary joint were replaced with common "O" rings. Ran out of water in holding tank. The quarry is being pumped dry now.

Tuesday, July 24, 1984

The unit was started but the water boost pump failed. The pump was taken for rewinding.

Wednesday, August 15, 1984

The unit is being run with a two nozzle holder with one nozzle of about .025" orifice and one .010" orifice. The large orifice nozzle seems to cut extremely well even at reduced pressures. The unit was operated for several hours at 26,000 psi water pressure and was as effective as 40,000 psi cutting. Specific data needs to be collected on this cutting method.

DHP/pld