DOE/CE/15398-T14

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November 30, 1995

Mr. Elliott P. Levine, CE-521
U.S. Department of Energy
Energy Related Inventions Program
Forrestal Bldg.
1000 Independence Ave. S.W.
Washington, DC 20585

Subject: Technical Progress Report No. 15
Hydraulic Test Unit and Plugs
Grant No. DE-FG01-90CE 15398

Gentlemen:

Please find our subject Technical Progress Report for 2nd quarter period 1995 (July 1, 1995-September 30, 1995) detailing activities carried out per respective grant projected tasks. Grant schedule was officially extended through March 31, 1996 in July of this year. Please note that since Grant had expired March 31, 1994 no further activity was reported nor invoices submitted until extension approval was received in July 1995.

As per our correspondence of October 6, 1994, copy attached, wherein we requested a no cost time extension, a revised budget was generated to identify the reallocation of funds as of July 1, 1995. Please find attached financial table illustrating the reallocation of current balances to the respective tasks as requested.

TASK I

The quantitative performance success as analyzed and reported in Technical Progress Report No. 14 regarding the developed MCC-2000 Hydrotesting System was utilized for greater commercial improvement for both low pressure and high pressure tester applications. Design drawings were revised for more cost effective layout and component(s) costs for the MDD-2000 and MDD-10,000 models. The "roll bar" support structure was modified to allow the entire system to

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MASTER

fit into a 18" manway which is typical for condenser, heater access. Layout design drawing is attached for information. The details of the final component configuration are shown on separate drawing also attached. Design activities for Task I are complete. The balance of funds in this task shall be used for fabrication of the revised roll bar structure to be made from strong gage, however lighter weight aluminum tube material. Components previously purchased shall be reused in the final configuration. See attached Bill of Material (typical). The system shall be tested and checked upon completion.

TASK II

Grant funds have afforded fabrication of extrapolated designs of various test plug geometries and sizes which have all been field tested and proven. The remaining activity in this grant task from a commercial aspect is to allow for a final phase of redesign to permit the lowest fabrication costs for the low pressure models. We have had some thoughts, and generated some sketches along these lines (see attached sketches of test plug assembly). We shall first investigate using heavy wall tubing to fabricate the plug body. No further progress was made during this reporting period.

TASK III

In an effort to be more commercially competitive in the lower operating pressure applications while still incorporating the Powerfect patented approach of utilizing elastomer seals and having the versatility of removable, reusable mechanical seal plug designs, we reviewed our Alpha and Gamma plug component details. By utilizing standard fasteners, i.e. hex head bolts, washers and nuts we could save significant fabrication costs. We also wanted to shorten plug length configurations, which can be required in many low pressure applications. Standard fasteners, although not made to the same critical sizes and tolerances that are required in our high pressure models, could prove good enough for less demanding service and are available in many different materials and are usually stock items.

Initial designs were sketched for the .600-.660, 204 seal size range (see attached drawings). Brass material was selected for suitability in service water systems where brackish water is used for component cooling. Since our normal jaw material, 4140 Alloy, hardened steel, does not hold up well in brackish water, we researched and selected for trial the use of type 17-4 PH stainless steel which is heat treatable for the jaw components. An order was issued for fabrication of ten prototype plugs to be made in this size. See photos of Model "Beta" plug, (originally called Alma design). Utilizing test pieces already on hand, these plugs were tested in many trials by our technicians in different configurations. Summary of Model - Beta test results is as follows:

1. Initial trials in a stainless steel test piece (size .645) proved plug, (with internal nut design) could withstand approximately 2,000 psig (shell side direction) before plug would extrude from test piece.

2. Same tests as in No. 1 above, except in tube side direction, were much better (as expected). Plug failed at 6,400 psig.

3. Repeat No. 1 configuration, shell side direction, in a carbon steel test piece, (better gripping of jaws) and plug held 5,400 psig for over 20 minutes. No plug movement or damage.

4. Additional test trials in larger clearance test pieces were conducted:

a. Size .620 Beta plug in a .700 stainless steel test piece (shell side direction), plug held only 800 psig-1,000 psig.

b. Size .620 Beta plug in a .695 stainless steel test piece (tube side direction), plug failed at 4,800 psig.

5. Tests were also made with carbon steel test tube with jaws installed in reverse direction with internal nut on plug in tube side direction. Plug withstood 5,800 psig. No leakage, no movement, no damage.

In essence the above results were very encouraging since we would only market the Beta model plug for applications up to 1,000 psig and there is good flexibility in design. This Beta model plug utilizing standard fasteners for some components could be made for one third the cost of our high pressure plugs. We are continuing our efforts with this plug model in different sizes and different materials.

Relative to our high pressure Mechanical Seal Plugs more activity is planned for improvement of our double seal concepts for both Alpha and Gamma models. The objective is better performance while investigating lower fabrication costs.

This concludes our TPR No. 15, the first report since Grant schedule extension. Should there be any questions, please do not hesitate to call.

Yours truly,

Michael Catapano
President

MC/bc

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October 6, 1994

Mr. Elliott P. Levine, CE-521
U.S. Department of Energy
Energy Related Inventions Program
Forrestal Bldg.
1000 Independence Ave. S.W.
Washington, DC 20585

Subject: Request for No Cost Time Extension
Hydraulic Test Unit and Plugs
Grant No. DE-FG01-90CE 15398

Gentlemen:

We herein request a six (6) month "No Cost" time extension for completion of our grant activities. Although the time period allotted has elapsed there is still funding available which would allow us to 1) complete the scope of work as originally outlined in our Statement of Work that would not otherwise be completed should we stop at this time and 2) provide a more complete final report of our results.

Also based on the research results to date, we would like to request a reallocation of the funding available which would result in what we believe to be more commercially feasible products. The allocation would be as follows:

1. Task II A

Approximately \$3800 balance of funds for material is available primarily due to our ability to confirm new extended test plug designs through extrapolation of only (2) trial configurations as opposed to twelve as originally proposed. Also money was saved by utilizing test pieces, tubing and pipe from our existing company stock at no charge to the DOE. In order to bring this task to completion we request utilizing the funds to further the development of these plugs into a more cost effective product through less costly material, easier to fabricate and quicker to install and utilize.

Since some of the Consultant activities in this task was performed by the inventors, again at no charge to the DOE, a balance of \$1500 remains. We request this be allocated to technician test trials of the plugs upon final development.

2. Task IIB

While the test plugs proposed in Item 1 above may prove the multi-tube testing concept more economically feasible for low pressure applications, we feel that commercialization of this testing approach, through informal solicitation of our existing customers, may be somewhat limited. The system is fully designed and can be fabricated at any time for any actual application. However, to spend the balance of Task IIB funding to prove a system which we are confident will work may be somewhat academic. Conversely, our efforts in Task III through this funding have proven an underestimation of possible improvements to the Mechanical Seal Plug concepts. We therefore, propose to reallocate the total balance (approximately \$7,000) to further investigate more cost effective materials, improvement of fabrication requirements with shorter designs related to lower pressure operating criteria. We feel this would be our most commercially feasible product developed through this funding based on initial interest of existing customers.

With regards to Task 1 we request transfer of remaining funding from Consultant activity to Material which will allow us to finalize the test unit configuration as proven in actual field application. Also Task IV 3rd party testing activities can be further continued with monies allocated should extension be granted.

We thank you for your consideration in this matter and await your decision.

Yours truly,

Michael Catapano
President

Hydraulic Test Unit and Plugs
Grant No. DE-FG01-90CE 15398

Revised Budget as of July 1, 1995
(Grant Extension Approval)

	<u>BUDGET</u>	<u>ACTUAL</u>	<u>BALANCE</u>	<u>REALLOCATION OF FUNDS</u>
<u>TASK I</u>				
Material	5,500.00	5,207.21	292.79	350.00
Consultants	4,800.00	4,080.00	720.00	0
Design	800.00	800.00	0	500.00
Technicians	822.00	693.98	128.02	290.81
<u>TASK IIA</u>				
Material	9,000.00	5,114.56	3,885.44	2,941.92
Consultants	10,800.00	9,280.00	1,520.00	500.00
Design	2,500.00	2,500.00	0	1,000.00
Technicians	2,468.00	2,431.52	36.48	1,000.00

	<u>BUDGET</u>	<u>ACTUAL</u>	<u>BALANCE</u>	<u>REALLOCATION OF FUNDS</u>
<u>TASK IIB</u>				
Material	3,000.00	0	3,000.00	0
Consultants	5,400.00	2,430.00	2,970.00	0
Design	2,000.00	1,540.00	460.00	0
Technicians	1,234.00	329.00	905.00	0
 <u>TASK III</u>				
Material	2,200.00	1,803.96	396.04	4,306.29
Consultants	5,400.00	5,400.00	0	500.00
Design	1,200.00	1,200.00	0	1,500.00
Technicians	822.00	246.75	575.25	2,000.00
 <u>TASK IV</u>				
Material	408.20	408.20	0	
Labor	2,391.80	1,346.82	1,044.98	0
AMC/VIT	8,230.00	8,009.50	220.50	0
Consulting	570.00	570.00	0	
Administrative/Clerical	3,528.00	3,460.80	67.20	1,332.68

MDD-10,000
BILL OF MATERIALS

October 10, 1995

ITEM	QTY.	COMPONENTS	SUPPLIER	PART NO.	PRICE	DELIVERY	REMARKS	DATE REC'D
1	1	PUMP	Berendsen	10-5000WO60	565.00	3 wks		
2	1	MUFFLER	"	M-07	11.00	3 wks		
3	1	FILTER	Truesdell	F26-04-000	34.50	3-4 wks		
4	1	REGULATOR	"	R21-04-000	45.53	3-4 wks		
5	1	LUBRICATOR	"	L26-04-000	37.13	3-4 wks		
6	2	10,000 lb 1/4" dragon valve	"	10F053	57.00	3-4 wks	\$114.00 for (2)	
7	1	GAGE - 10,000 lbs	Schneider	US126629	87.20	4 wks		
8	1	SNUBBER	"	OPO 22S	25.16	stock		
9	2	BALL VALVES	Northland	DIX SS BV50	29.15	1 wk	\$58.30 for (2)	
10	1	1/2" ELBOW	RS Crum	SS-8-E	31.20	1 wk		
11	1	1/4" ELBOW	"	SS-4-E-10K	42.60	1 wk		
12	2	REDUCING NIPPLE	"	SS-8-HRN-4-10K	19.80	1 wk	\$39.60 for (2)	
13	1	1/2" T	"	SS-8-T-10K	129.50	1wk		
14	2	1/2" HEX NIPPLE	"	SS-8HN-10K	16.50	1 wk	\$33.00 for (2)	
15	1	1/4" HEX NIPPLE	"	SS-4HN-10K	10.70	1 wk		
16	1	SYNFLEX HOSE x 20 OAL	Van Sant	3900-04104-390VO4104	164.00	1 wk		
17	1	SYNFLEX HOSE x 15 OAL	"	3900-04104-390VO4104	134.00	1 wk		
18		3/4" OD .049 ALUM. TUBE	Coventry	6061T6	366.60	5-7 wks		
19	1	FLEXIBLE HOSE	MSC	484 17018	17.00		page 2908	
20	6	PIPE NIPPLES	"	9107145	2.54		page 2908	
21	2	PIPE THREAD	"	9107848	2.41			
22	1	QUICK DISCONNECT	NORMAN	SPHC-4-4F

PLAN - TOP VIEW

ELEV. "A - A"

SECT. "C - C"

SECT. "B - B"

This drawing is the property of Powerfect Inc. and is not to be used for any other purpose than that for which it is specifically furnished.

DETAIL - SUPPORT BRACKET

HYDRAULIC TEST UNIT
MODEL MCC - 10000 - DD
ROLL BAR STRUCTURE

POWERPECT inc.
Power Plant Heat Transfer Consultants

P.O. BOX 375

LIVINGSTON N. J.

07039

DRAWN.....CHECKED.....SCALE 1/4" = 1"

DATE 9/95.....EXAMINED.....

AUTH.....APPROVED.....

NO: 95000 - 2

LOWER PLAN VIEW

ELEV. "3 - 3"

**HYDRAULIC TEST UNIT
MODEL MCC -- 10000 -- DD
PIPING ARRANGEMENT**

P.O. BOX 375

LIVINGSTON N. J.

07039

DRAWN.....CHECKED.....SCALE 1/4" = 1"

DATE.....9/1.....EXAMINED.....

AUTH.....APPROVED.....

NO: 95000 - 1

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P.O. NUMBER	
NUMBER REQ.	
DATE REQ.	

POWERFECT, INC.	
PART NAME -	TEST PLUG 2000 LBS
PART NUMBER -	
DATE -	7/7/95
FILE NAME -	STP

P.O. NUMBER	
NUMBER REQ.	
DATE REQ.

POWERFECT, INC.

PART NAME -	TEST PLUG 2000 LBS
PART NUMBER -	
DATE -	7/7/95
FILE NAME -	STP1

P.O. NUMBER	
NUMBER REQ.	
DATE REQ.

POWERFECT, INC.	
PART NAME -	TEST PLUG 2000 LBS
PART NUMBER -	
DATE -	7/7/95
FILE NAME -	STP2

P.O. NUMBER	
NUMBER REQ.	
DATE REQ.

POWERFECT, INC.

PART NAME-	ALMA 204 ASSEMBLY
PART NUMBER-	
DATE-	7/10/95
FILE NAME-	204ALMAA

P.O. NUMBER
NUMBER REQ.
DATE REQ.
MATERIAL

TURN HEAD DOWN TO
.595 DIA.

1/16 SLOT X .125 DEEP

3/8-16 X 1 3/4 LONG

POWERFECT, INC.

PART NAME -	ALMA 204 BOLT
PART NUMBER -	
DATE -	7/10/95
MATERIAL -	
FILE NAME -	204ALMA BOLT

3/23/95
"ALMA"

WEDGE JAW

PLUG SIZE RANGE

204 SIZE

(4) TEETH
ONLY

MATERIAL

17-4 PH 5.5,

HEAT TREAT

FINISH

Q "ALMA" 1' 3/23-24/95
 145p.

204 size

WEDGE RING PLUG SIZE RANGE

17-4 S.S. P.H.

(1) per plug.

Initial Prototype of brass "BETA" Plug