



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

AUG 10 1979

Parameter, Inc.
ATTN: Mr. Richard A. Lofy, President
13545 Watertown Plank Road
Elm Grove, WI 53122

Gentlemen:

Subject: Contract No. NRC-05-77-186, Task Order No. 5

Pursuant to the pertinent provisions of this contract, I hereby authorize the expenditure of \$50,000.00 of funds under this contract to provide to the Office of Inspection and Enforcement assistance and consultation services in independent metallurgical analysis of cracking problems experienced in feedwater systems piping at selected PWR facilities, and review of licensees' analysis and repair programs as outlined in the enclosed Task Order No. 5.

If you believe that the total ceiling price is inadequate for the purposes of this task order, you must so notify me within ten (10) business days after its receipt. Said notification shall contain your estimate of the required total ceiling cost. Within ten (10) business days after receipt of such notification, the Contracting Officer shall either ratify the total ceiling cost or adopt the proposed revised estimate or some combination of the two and revise or confirm the task order accordingly.

This letter, executed on behalf of the Commission, is forwarded to you in quadruplicate. Please acknowledge receipt on three (3) copies hereon and return them to me as soon as possible. The fourth copy is for your retention.

Sincerely,

A handwritten signature in cursive script, appearing to read "Kellogg V. Morton".

Kellogg V. Morton, Chief
Research Contracts Branch
Division of Contracts
Office of Administration

Enclosure:
Task Order No. 5 (4 copies)

790970059

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Task Order No. 5

1. Scope of Work

Provide NRC IE assistance and consultation services in an independent metallurgical analysis of cracking problems experienced in feedwater systems piping at PWR facilities as assigned, and review of licensees analysis and repair programs as outlined in the statement of work below.

2. Background

Cracking in two feedwater lines at D. C. Cook Unit 2 was reported to NRC IE by the licensee following plant shutdown to investigate leakage inside containment. Leaking circumferential cracks were identified in the 16-inch elbows joined to the steam generator nozzles. Subsequent radiographic examinations revealed cracking indications in all feedwater loops of Units 1 and 2 at similar locations.

In response to an NRC IE generic review request, radiographic examination by licensees revealed cracking indications in the steam generator nozzle-to-piping weldments in the San Onofre-1, H. B. Robinson Unit 2, Beaver Valley Unit 1 and Salem Unit 1 facilities at this time. Further investigation on the extent of the cracking problem is ongoing.

3. Statement of Work

Task a.

Provide assistance as required in the review of licensees' original design bases including stress analysis, design modifications and test program results relative to feedwater system repair programs.

Task b.

Provide travel and participation of Parameter, Inc. in NRC staff meetings with licensees concerning the feedwater piping system cracking problems.

Emphasis of Tasks (a) and (b) will be directed to obtaining an informed bases for an engineering evaluation of the original design analysis, redesign and testing, and assessment as to the acceptability of licensees' modifications to affected piping systems.

Task c.

Review the metallurgical analysis of the cracked weldments by the licensees and their contractor(s) in parallel with NRC IE metallurgical investigations.

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Task (c) will be directed to a first-hand review of the licensees and their contractors failure analysis of cracked weldments and conclusions reached.

Task (d).

As assigned, conduct independent metallurgical examination of cracked weldments removed from plant specific feedwater piping to determine probable causes of cracking.

Actual laboratory analysis and evaluation under Task (d) shall consist of the following:

- (1) Photograph "cracked pipe weldments" as received to preserve physical features prior to removing specimens for other tests.
- (2) Examine specimen I.D. surfaces and photographically record, at suitable magnification, surface pathology characteristic of corrosion attack and crack initiation sites.
- (3) Analysis of weldment I.D. surface deposits for chemical correlation with EDAX analysis of deposits in cracks (i.e., Item 8).
- (4) Examine weldment by x-radiography techniques to determine crack distribution for selective removal of metallurgical specimens.
- (5) Conduct optical metallography evaluation of grain structure, substructures and corrosion associated with typical cracking and corrosion attack.
- (6) Perform chemical analysis of weld and base metals of weldment for acceptance to specifications.
- (7) Evaluate tensile properties and matrix anomalies of weldment utilizing hardness traverse techniques.
- (8) Based on optical metallography studies, conduct SEM examination of microstructures and evaluate the following:
 - (a) Nature of cracking, crack initiation and propagation mode.
 - (b) EDAX analysis of corrosion deposits in fractures and correlation with chemical analysis of surface deposits (i.e., item 3).

The NRC will reserve the option to terminate any of the above tasks if, at any point in the activities, meaningful results appear unlikely. Likewise, the scope may necessitate expansion if any information obtained indicates the need to expand the effort.

5. Report Requirements

Written reports of the work done under tasks (a) and (b) are to be submitted separately from task (c). Status reports as work progresses on task (c) are to be verbally communicated to IE Headquarters - Division of Reactor Operations Inspection (301-492-8180).

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Reports under tasks (a) and (b) shall be completed within 30 days following the review of the licensees' programs, as assigned by NRC IE Headquarters. The independent metallurgical analysis of samples received from plant specific piping weldments under task (d) shall be completed on a collective bases within 45 days, with a final report due two weeks following completion of analysis.

6. Special Instructions

The NRC shall reimburse Parameter as invoiced for allowable costs occurred in shipment of samples to their designated laboratories for analysis.

Ass unconsumed portions of the weldments are to be retained with identification for a period of three months, or until advised by NRC IE Headquarters regarding disposition.

7. Places of Performance

- (a) Parameter, Inc.
- (b) Westinghouse Research Center - Pittsburgh
- (c) University of Wisconsin - Milwaukee
- (d) Architect/Engineers' Offices (American Electric Power, Westinghouse, Bechtel, etc.)

8. Cost Ceiling

\$50,000

Received:

Parameter, Inc.

Agree

Disagree

Notification will be submitted by _____

Date

BY: _____

TITLE: Richard A. Lofy, President

DATE: _____

8/15/79

1016 034



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

1979

Parameter, Inc.
ATTN: Mr. Richard A. Lofy, President
13545 Watertown Plank Road
Elm Grove, WI 53122

Gentlemen:

Subject: Contract No. NRC-05-77-186, Task Order No. 6

Pursuant to the pertinent provisions of this contract, I hereby authorize the expenditure of \$14,000.00 of funds under this contract to provide to the Office of Inspection and Enforcement pipe weld testing and evaluation services at the Washington Nuclear Project No. 2 (WNP-2) site in Benton County Washington as outlined in the enclosed Task Order No. 6.

If you believe that the total ceiling price is inadequate for the purposes of this task order, you must so notify me within ten (10) business days after its receipt. Said notification shall contain your estimate of the required total ceiling cost. Within ten (10) business days after receipt of such notification, the Contracting Officer shall either ratify the total ceiling cost or adopt the proposed revised estimate or some combination of the two and revise or confirm the task order accordingly.

This letter, executed on behalf of the Commission, is forwarded to you in quadruplicate. Please acknowledge receipt on three (3) copies hereon and return them to me as soon as possible. The fourth copy is for your retention.

Sincerely,

A handwritten signature in dark ink, appearing to read "Kellogg V. Morton".

Kellogg V. Morton, Chief
Research Contracts Branch
Division of Contracts
Office of Administration

Enclosure:
Task Order No. 6 (4 copies)

1016 035

AUG 10 1979

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Received:

Parameter, Inc.

() Agree
() Disagree
() Notification will be submitted by _____
(Date)

BY: 

TITLE: Richard A. Lofy, President

DATE: 8/15/79

1016 036

TASK ORDER NO. 6

1. SCOPE OF WORK

Provide pipe weld testing and evaluation services for Region V, USNRC. Two welds are to be examined in situ at the Washington Nuclear Project No. 2 (WNP-2) site, in Benton County, Washington.

2. OBJECTIVE OF TASK

Determine whether the two welds in question have been subjected to radically excessive and non-uniform postweld heat treatment temperatures.

3. STATEMENT OF WORK

Perform hardness tests and metallographic examinations on two welds at WNP-2. The two welds are located in two reactor feedwater lines inside the containment vessel. The welds are identified as: (1) weld no. 7 on WBG Isometric Drawing No. RFW-418-4 (entitled "Reactor Feedwater from Flowmeter to Reactor Vessel (Line A)"); and (2) weld no. 7 on WBG Isometric Drawing No. RFW-419-4 (entitled "Reactor Feedwater from Flowmeter to Reactor Vessel (Line B)"). In both cases the welds connect a 24" check valve to a pipe spool. Two types of tests are to be performed on each weld as described below:

Hardness Tests:

Reference hardness tests and grain size determinations.

Perform hardness tests in accordance with ASTM E-110-61, at six locations around the circumference of the weldment. At each location, test undisturbed base metal, base metal which has been exposed to heat treatment, the weld heat affected zone and the weld metal.

Metallographic Estimation of Average Grain Size:

Perform in situ metallographic estimation of average grain size at two locations around the circumference of the weldment. At each location, perform grain size estimation of the surface of undisturbed base metal, base metal within the zone of heat treatment, and the weld heat affected zone.

Estimation shall be accomplished in accordance with specification ASTM E112-74. Photomicrographs shall be taken.

Evaluation:

The results of the above testing and estimation shall be evaluated to determine if the welds have been subjected to radically non-uniform and excessive postweld heat treatment temperatures.

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4. REPORTING REQUIREMENTS

Testing and evaluation shall be reported in a final report, as follows:

Business Tests

Describe the technique and equipment used, list equipment serial numbers and calibration dates, dates of tests, identify equipment operators, provide sketch and table to describe locations and actual values of hardness readings.

Metallographic Examination

Describe the technique and equipment used, identify equipment operators, provide sketches to depict actual locations of examination, grain size estimation technique, ASTM E-112 worksheets, and photomicrographs.

Evaluation

Describe the evaluation method, assumptions, basis for conclusions, and conclusions. Identify the names and qualifications of evaluators.

Any unusual observations shall be verbally communicate to Region V, USNRC within two working days (George Spencer (415) 932-8300), and included in the final report.

5. DESIRED COMPLETION DATE

Testing, evaluation, and report should be completed within one month of the date of issuance of this Task Order.

6. PLACE OF PERFORMANCE

WNP-2 site, Benton County, Washington. Actual dates of testing to be coordinated with the Contractor and Washington Public Power Supply System by the NRC Region V.

7. COST CEILING

\$14,000.00