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

AUG 7 1980

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

Gentlemen:

SUBJECT: CONTRACT NO. NRC-05-80-251, Task Order No. 4

Pursuant to the pertinent provisions of this contract, I hereby authorize the expenditure of $10,000.00 of the funds currently obligated under this contract to provide technical assistance and services in the independent metallurgical analysis of cracked bolts as outlined in the enclosed Task Order No. 4.

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 forth copy is for your retention.

Sincerely,

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

Enclosure: Task Order No. 4 (4)

Received: AUG 7 1980

Parameter, Inc.

(X) Agree
( ) Disagree
( ) Notification will be submitted by ______________
Date

BY: Richard C. [illegible]

TITLE: 8/13/80 [illegible]

DATE: ______________

PARAMETER INC.
CONTRACT NO. NRC-05-80-251
TASK ORDER NO. 4

1. Scope of Work

Provide NRC-IE assistance and services in the independent metallurgical analysis of cracked bolt as outlined in the statement of work below.

2. Background

Arkansas Power and Light Company reported to the NRC-IE that a steam leak was observed at the flange to turbine casing location on the emergency steam drive auxiliary feedwater pump. Visual inspections revealed five of eight bolts were failed. The failed bolts were consecutively located on the flange. The turbine had experienced an overspeed recently. Previously the water slugging or other causes may have caused vibrations or high loadings in the system. The bolts are of ASTM A-193-B7 material, 3/4 in. dia x 3-1/2 in. long.

3. Statement of Work

The actual laboratory analysis and evaluation shall consist of the following:

(a) Photograph the "as received" bolt to document the physical condition and to provide references for the location of sections removed for analysis.

(b) Perform optical examinations at appropriate magnification of the fracture face to characterize the macro topology of the fracture and identify crack initiation sites and of the bolt surfaces to identify cracks or other discontinuities that may be present. Document the examination results with representative photomicrographs.

(c) Perform optical metallography of selected specimen sections containing cracks to determine if the cracking is trans or intergranular. Provide an evaluation of the material structure to determine if the structure is representative for the material. Provide representative photomicrographs which document the structure, cracking mode, and any anomalies observed.

(d) Conduct scanning electron metallography (SEM) studies and EDAX analysis of the fracture surface(s). If further detail is required to identify the mode of failure, supplement the SEM evaluation with TEM using replica techniques. Provide an appropriately documented evaluation of the following:

(1) Characterization of fracture surfaces - initiation sites, fracture morphology with respect to fatigue, stress corrosion, stress overload, etc.

(2) Analysis of identified deposits on thread and crack surfaces, and qualitative correlation with chemical analysis of base material.

(e) Perform hardness survey of crack areas and a standard hardness test to determine if mechanical properties of the bolt meets specification.

(f) Perform quantitative chemical analysis of bolt by the most appropriate method to suitably characterize the stud material and determine conformance to specification limits.

4. Report Requirements

Upon receipt of the bolt sample at the designated laboratory for analysis, the following reports are required:

(a) Results of laboratory analysis and evaluation as the work progresses shall be verbally communicated to the IE Headquarters Project Officer on a weekly basis.

(b) A preliminary report on the complete analysis and evaluation shall be submitted within 20 days for the Project Officer's review.

(c) Forty (copies) of a written final report shall be submitted to the IE Project Officer within 45 days.

5. Special Instructions

The NRC shall reimburse the contractor as invoiced for allowable costs incurred in shipment of the bolt samples to the designated laboratory for analysis.

All unconsumed portions of the bolt are to be properly identified and retained by the designated laboratory, or the contractor, for a period of three months or until advised by NRC-IE Headquarters regarding disposition.

6. Places of Performance

(a) Parameter, Inc.

(b) Technimet, Inc.

7. Cost Ceiling

$10,000