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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

JUL 22 1993

United States Department of Commerce
National Institute of Standards and Technology
ATTN: Dr. Richard Marshall
Building and Fire Research Laboratory
Building 226, Room B168
Gaithersburg, MD 20899

Dear Dr. Marshall:

SUBJECT: INTERAGENCY AGREEMENT NO. NRC-03-93-038 ENTITLED "EFFECTS OF TENDON GREASE-LEAKAGE ON THE INTEGRITY OF PRESTRESSED CONCRETE CONTAINMENT"

Pursuant to the Economy Act of 1932, as amended, the U.S. Nuclear Regulatory Commission (NRC) and the National Institute of Standards and Technology (NIST) desire to enter into an agreement whereby NIST will provide the NRC with technical services to perform a study into the subject effects.

Accordingly, upon your agreement as provided below, the terms and conditions of this interagency agreement are as follows:

Article I - Scope of Work

BACKGROUND

A typical prestressed concrete containment (PCC) consist of 100 ft. to 140 ft. diameter concrete cylinder with a shallow concrete dome, supported by a reinforced concrete basemat. The cylinder is between 3 ft. to 3.5 ft. thick, and the dome is between 2.5 ft. and 3.0 ft. thick. The cylinder is prestressed with post-tensioned tendons in the vertical and hoop directions. The dome is prestressed with post-tensioned tendons arranged at 120° to each other. The post-tensioning tendons consist of 90 to 170 wires or of about 50 seven wire strands. The tendons pass through 5½ in. to 6 in. diameter tendon sheathings (ducts). The ducts are made from thin, galvanized corrugated sheet metal. The post-tensioning tendons are protected from corrosion by injecting specially formulated petroleum base grease called also as sheathing filler or a corrosion protection medium. For the purpose of this project, it will be simply referred to as "grease." Configuration, size and length of tendons vary from plant to plant. Figure 1 shows three basic variations. There are 40 PCCs with greased tendons in the United States.

In the last ten years, the NRC staff has come to know about the grease leakages through concrete at a number of PCCs (e.g., Trojan, Fort Calhoun, Arkansas One). The reason(s) for grease leakages are not known. However, some of the contributory factors are stated as; temperatures around the tendons in Winter and Summer, high pressure used during reinjection of grease, sheet metal ducts with taped joints. In any case, the fact remains that the grease leaks from the ducts and finds its paths through the precompressed concrete.

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NRC requires technical expertise to determine the extent of the potential safety concern that exists, if any, of the effects of such grease leakages in PCCs.

OBJECTIVE

The objective of this agreement is to conduct a preliminary investigation of the effect of tendon duct grease on the structural performance of prestressed concrete containment.

TECHNICAL AND OTHER SPECIAL QUALIFICATIONS REQUIRED

Up to 2 Engineers (scientists), on a part-time basis, with expertise in concrete technology and in non-destructive examination of in place concrete.

Escorted site access will be required and will be coordinated through the Project Officer.

It is NIST's responsibility to assign technical staff, employees, subcontractors, or specialists who have the required educational background, experience, or combination thereof to meet both the technical and regulatory objectives of the work specified in this SOW. The NRC will rely on representations made by the NIST concerning the qualifications of the personnel assigned to this agreement including assurance that all information contained in the technical and cost proposals, including resumes, is accurate and truthful.

AGREEMENT TASKS

1. NIST shall perform a literature search and prepare and submit a summary report in accordance with Article II.

2. NIST personnel shall perform site visits to two representative prestressed concrete containments (access to be arranged by NRC). NIST shall document existing conditions by photographs, secure samples of grease from existing structures, secure samples of unused grease and perform rebound hammer tests to ascertain any gross changes to concrete properties due to grease. If NRC is able to obtain permission from plant owners, NIST shall secure core samples from grease-contaminated and grease-free portions of the structure and perform strength tests of core samples. NIST shall perform analysis of grease sample. NIST shall prepare and submit trip reports in accordance with Article II.

3. Based on the information gathered to date, NIST shall perform theoretical calculations on the permeation of grease into concrete and examine the feasibility of developing a laboratory procedure for impregnating concrete samples with the tendon duct grease. NIST shall attend a meeting at NRC, if requested, to report on the status of the project. This task shall be completed four weeks after completion of task 2.

4. NIST shall develop a preliminary assessment of the potential effects of grease permeation on the performance of reinforced concrete. NIST shall develop a research plan for an in-depth study into the problem if the

preliminary investigation reveals the potential for detrimental effects. NIST shall prepare and submit a final technical letter report in accordance with Article II.

MEETINGS AND TRAVEL

The following is NRC's estimate of the travel which will be required to complete the required tasks.

Two-person, three-day trips to plants with PCC's. For planning purposes, use the Trojan site in Oregon and the Palisades site in Michigan.

Two-person, one-day trips to NRC Headquarters.

Article II - Deliverables and Delivery Schedule

TECHNICAL PROGRESS REPORT

NIST shall provide a monthly Technical Progress Report to the project officer and the contracting officer. The report is due within 15 calendar days after the end of the report period and must identify the title of the project, the contract number, Financial Identification Number (FIN), project manager and/or principal investigator, the contract period of performance, and the period covered by the report. Each report must include the following for each discrete task/task order:

(a) A listing of the efforts completed during the period, and milestones reached or, if missed, an explanation provided;

(b) Any problems or delays encountered or anticipated and recommendations for resolution. If the recommended resolution involves a contract modification, e.g., change in work requirements, level of effort (cost) or schedule delay, the contractor shall submit a separate letter to the contracting officer identifying the required change and estimated cost impact.

(c) A summary of progress to date; and

(d) Plans for the next reporting period.

FINANCIAL STATUS REPORT

NIST shall provide a monthly Financial Status Report to the Project Officer and the Contracting Officer. The report is due within 15 calendar days after the end of the report period and shall identify the title of the project, the contract number, job code, project manager and/or principal investigator, the contract period of performance, and the period covered by the report. Each report shall include the following for each discrete task:

(a) Provide total estimated cost (value) of the project as reflected in the contract, the amount of funds available in the contract to date, and the balance of funds required to complete the work as follows:

(1) Total Estimated Contract Amount.

(2) Total Funds Obligated to Date.

(3) Total Costs Incurred this Reporting Period.

(4) Total Costs Incurred to Date.

(5) Balance of Obligations Remaining.

(6) Balance of Funds Required to Complete Contract.

(b) Detail of all direct and indirect costs incurred during the reporting period for each task.

Technical Reporting Requirements

1. Five weeks after the effective date of this agreement NIST shall submit a brief technical letter report in NIST's own format to the Project Officer that contains a list of the sources reviewed and a synopsis of the general findings in the literature.

2. Within one week after completion of each trip under task 2., NIST shall submit a trip report in NIST's own format to the Project Officer that contains a summary of the work performed to include problems encountered and a general assessment of the results of the work.

3. Within eight weeks after completion of the analysis in tasks 3, NIST shall submit a letter report with three copies to the Project Officer that contains a summary of the work performed and the results in the following content/format: (1) Introduction - purpose, background, scope, (2) Discussion of the development of theoretical modelling of the phenomenon and its potential effects on the concrete constituents and reinforcing bars, (3) Discussion of results of NDE, (4) Correlation of theoretical modelling with the NDE results and other literature search, (5) Conclusion describing the potential effects of grease leakage on the strength of PCCs, and need for additional work (if warranted).

Article III - Period of Performance

The period of performance of this agreement shall be from the acceptance date of the agreement through six months after the acceptance date. The Scope of Work as set forth in Article I - Scope of Work above, and period of performance may be increased as mutually agreed to by both parties by the NRC Contracting Officer's issuance of a modification to this agreement.

Article IV - Payment

Payment shall be made on a reimbursable basis. The Contractor shall submit invoices in accordance with Attachment 1, Billing Instructions for Interagency Agreements, which is attached hereto and made a part thereof.
Each invoice shall cite the following data:

Appropriation No.: 31X0200.320
B&R No.: 320-19-15-09-0 BOC: 2542
Job Code: J-2027
Interagency Agreement No.: NRC-03-93-038

Article VI - Estimated Amount

The total estimated amount of this agreement for performance of work is $56,700.

Article VII - Obligation of Funds

The total amount presently obligated by the NRC for this agreement for performance of work is $56,700.

Article VIII - Points of Contact

The NIST contact responsible for the successful completion of this agreement is Nicholas J. Carino, (301) 975-6063.

The NRC contacts for this agreement are:

Technical Contact: Hansraj Ashar, Project Officer
(301) 504-2851

Contractual Contact: Joanna Lilley, Contract Administrator
(301) 492-8292

If this agreement is acceptable to NIST, please so indicate by signing in the space provided below and returning two fully executed copies to me at the

address below. You may retain the third copy for your records.

U.S. Nuclear Regulatory Commission
ATTN: Stephen Pool
Division of Contracts and Property Management
Mail Stop P-1042
Washington, DC 20555

In addition, the Inspector General has requested that we provide each Contractor with a hotline poster. The hotline program was developed to provide a mechanism for reporting fraud, waste, and abuse within NRC's programs and its contracts operations. Please display the enclosed poster in a conspicuous area within your place of business. If you have multiple offices, please contact the OIG at (301) 492-9093 for additional posters.

Sincerely,

Mary H. Mace

Mary H. Mace, Contracting Officer
Contract Negotiation Branch No. 2
Division of Contracts and Property
Management
Office of Administration

Enclosure:
Billing Instructions
Hotline Poster

ACCEPTED:

BY: John C. McGuffin

TITLE: Comptroller

DATE: 8-6-93

BILLING INSTRUCTIONS FOR INTERAGENCY AGREEMENT

The Agency shall submit an original and four copies of vouchers for cost-reimbursment in the following manner:

Claims shall be submitted on the Standard Form 1081, Voucher for Transfers Between Appropriations and/or Funds.

Frequency. The Agency shall submit claims for reimbursement on a monthly basis.

Billing of Costs After Expiration of Agreement. If reimbursable costs are incurred during the agreement period and claimed after the agreement has expired, the period during which these costs were incurred must be cited.

The Agency shall furnish the information set forth below:

(a) Address the original voucher (with copies) to the Contracting Officer, U.S. Nuclear Regulatory Commission, Mail Stop P-902, Washington, D.C. Payment will be made by U.S. Nuclear Regulatory Commission, Office of the Controller, Division of Accounting and Finance, General Accounting Branch, Washington, DC 20555.

(b) Voucher Number. Insert the appropriate serial number of the voucher. This must be in sequential order beginning with 001 as the number to be used for the first voucher submitted under this agreement.

(c) Date of Voucher. Insert the date the voucher is prepared.

(d) Agreement Number, FIN Number, and Date. Insert the agreement number, the FIN number, and the effective date of the agreement.

(e) Payee's Name and Address. Show the name and address of the Agency and include name of voucher preparer and telephone number.

(f) Billing Period. Insert the beginning and ending dates (day, month, and year) of the period in which costs were incurred and for which reimbursement is claimed.

(g) Billing Detail. Insert the major cost elements as follows:

(1) Direct Labor. This Consists of salaries and wages paid (or accrued) for direct performance of the contract.

(2) Materials and Supplies. This is consumable materials and supplies and equipment. Upon oral or written request, the Agency will identify separately material items over $1,000.

(3) Other. List all other direct costs.

(4) Overhead. Show that amount of the billing which is overhead.

(h) Amount Billed for Current Period. Insert the amount billed for adjustments and adjusted amounts for the period.