

STANDARD FORM 26 JULY 1963  
 GSA GEN. REG. NO. 27  
 (40 CFR 101-11.6)

**AWARD/CONTRACT**

1. CONTRACT NUMBER: **NRC-79-118**

2. EFFECTIVE DATE: **10/2/79**

3. REQUISITION PURCHASE REQUEST PROJECT NO: **NRR-79-118**

4. CERTIFIED FOR NATIONAL DEFENSE UNDER NSDA REG. 2 AND/OR DMS REG. 1.1: **YES**

5. ISSUED BY: **U.S. Nuclear Regulatory Commission  
 Division of Contracts  
 Washington, D.C. 20555**

6. ADMINISTERED BY: **(If other than block 3)**

7. DELIVERY ADDRESS: **U.S. Nuclear Regulatory Commission  
 Division of Contracts  
 Washington, D.C. 20555**

8. OTHER (See below): **NO**

9. DISCOUNT FOR PROMPT PAYMENT: **Net**

10. SUBMIT INVOICES (4 copies unless otherwise specified) TO ADDRESS SHOWN IN BLOCK:

11. SHIP TO/MARK FOR: **U.S. Nuclear Regulatory Commission  
 Attn: Mr. Gary Zeck  
 Division of Operating Reactors  
 Washington, D.C. 20555**

12. PAYMENT WILL BE MADE BY: **See Letter of Credit Procedures**

13. THIS PROCUREMENT WAS: ☐ ADVERTISED, ☒ NEGOTIATED, PURSUANT TO: ☐ 10 USC 2304 (a)(1), ☒ 41 USC 252 (a)(1)

14. ACCOUNTING AND APPROPRIATION DATA: **20-19-04-02-1 31X0200.209 B6590 (\$ 16,000.00 is covered by this appropriation only)**

15. ITEM NO.	16. SUPPLIES/SERVICES	17. QUANTITY	18. UNIT	19. UNIT PRICE	20. AMOUNT
	Review and Evaluation of Approximately 500 Pending Operating Reactors Licensing Actions				
	This is a Cost-Plus-Award-Fee Contract				
	Incremental Funding				

21. TOTAL AMOUNT OF CONTRACT \$ **1,519,830.00**

CONTRACTING OFFICER WILL COMPLETE BLOCK 22 OR 26 AS APPLICABLE

22. ☒ CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return 3 copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)

26. ☐ AWARD (Contractor is not required to sign this document.) Your offer on Solicitation Number \_\_\_\_\_, including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.

23. NAME OF CONTRACTOR: **The Franklin Institute**

24. NAME AND TITLE OF SIGNER (Type or print): **John K. Stoen**

25. DATE SIGNED: **9/28/79**

27. SIGNATURE OF CONTRACTING OFFICER: **D. J. Cougherty**

28. NAME OF CONTRACTING OFFICER (Type or print): **D. J. Cougherty**

29. DATE SIGNED: **9/28/79**

LISTING OF CONTRACT ARTICLES

Section 1.0 Description of Work

- Article 1.1 Scope of Work
- Article 1.2 Reporting Requirements
- Article 1.3 Level of Effort

Section 2.0 Performance and Delivery

- Article 2.1 Period of Performance
- Article 2.2 Options to Extend The Terms of the Contract
- Article 2.3 Place of Performance

Section 3.0 Consideration and Payment

- Article 3.1 Estimated Cost, Base Fee, Award Fee, and Obligation of Funds
- Article 3.2 Award Fee and Performance Evaluation
- Article 3.3 Payment of Indirect Costs
- Article 3.4 Payment of Base and Award Fee
- Article 3.5 Letter of Credit
- Article 3.6 Billing Instructions

Section 4.0 Inspection and Acceptance

- Article 4.1 Inspection
- Article 4.2 Acceptance

Section 5.0 Special Provisions

- Article 5.1 Identification of NRC Project Officer
- Article 5.2 Responsibilities of NRC Project Officer
- Article 5.3 Technical Direction
- Article 5.4 Private Use and Protection of Unclassified Government Information and Control Information and Data
- Article 5.5 Protection of Proprietary and Company Confidential Information
- Article 5.6 Disclaimer
- Article 5.7 Continuity of Services
- Article 5.8 Key Personnel
- Article 5.9 Contractor Organizational Conflict of Interest
- Article 5.10 Government Furnished Material/Data
- Article 5.11 Representation and Certification
- Article 5.12 Subcontracts

Section 6.0 General Provisions

- Article 6.1 General Provisions
- Article 6.2 Alterations to General Provisions

Section 7.0 Contract Documents

- Article 7.1 Documents Incorporated Physically

THE CONTRACT SCHEDULESection 1.0 Description of WorkArticle 1.1 - Scope of Work

The Contractor independently, and not as an agent of the Government, shall manage and review that portion of the license backlog set forth in Attachment A, which list is representative of the anticipated first year effort.

Specific Topics For First Year

- a. Mechanical Systems Engineering
- b. Control Rod Drive (CRD) Systems Modifications

The contractor shall review and evaluate General Electric Company final recommendations for CRD system modifications in order to reduce the creation and growth of reactor vessel nozzle cracks. The evaluation is to consider the effect of the modifications at each Boiling Water Reactor (BWR) plant on the CRD mechanisms individually and collectively during normal power operation and scrams. The contractor shall prepare reports that will contain: (a) a description of the modifications; (b) a comparison of General Electric's CRD system acceptance criteria with the test results following the modifications; (c) the reactor coolant makeup capability following the modifications as compared to that which existed before the modifications. Also, its adequacy to provide makeup water following the loss of all other makeup systems; (d) an evaluation of the potential for future CRD malfunctions as a result of the modifications (this includes long terms effects such as building up of foreign material in the system, increased duty requirements of components and changes in drive line friction and broken seals); (e) conclusions regarding the effectiveness of reducing reactor vessel return line nozzle cracking as a result of the modifications and the potential for acceptable future CRD system operation following the modifications; (f) recommendations to the NRC staff regarding acceptability of the modifications and any additional measures that would further enhance reliable CRD system operation and reduction in the development in reactor vessel return line nozzle cracks.

c. Inservice Testing

The contractor shall review and evaluate licensees' submittals in regard to its compliance with the ASME, Boiler and Pressure Vessel Code, Section XI, 1974 edition, as required by 10 CFR 50.55a (g), in the area of inservice testing practices for valves.

This activity will include the evaluation of the technical bases for the licensee's request for relief from the ASME requirements that have been determined to be impractical for his facility. The generic areas of the plant that are to be reviewed are:

PWR

1. Reactor Coolant System
2. Secondary System
3. High Pressure Injection System
4. Low Pressure Injection System
5. Accumulator Systems
6. Primary and Secondary Safety and Relief Valves
7. Containment Spray System
8. Auxiliary Feedwater Systems
9. Active Components in Service Water and Instrument Air Systems which are Required to Support Safety System Functions
10. Containment Isolation Valves Required to Change Position to Isolate Containment
11. Chemical and Volume Control System
12. Other Key Components in Auxiliary Systems Which are Required to Directly Support Plant Shutdown or Safety System Function

BWR

1. Reactor Coolant System
2. High Pressure Core Injection System
3. Low Pressure Core Injection System
4. Residual Heat Removal System (Shutdown Cooling System)
5. Low Pressure Core Spray System
6. Safety, Relief, and Safety/Relief Valves
7. Reactor Core Isolation Cooling (RCIC) System
8. Standby Liquid Control System (Boron System)
9. Automatic Depressurization System (Any Pilot or Control Valves, Associated Hydraulic or Pneumatic Systems, etc.)
10. Emergency Condenser System (Isolation Condenser System)
11. Containment Spray System
12. Containment Cooling System
13. Containment Isolation Valves Required to Change Position to Isolate Containment
14. Control Rod Drive Hydraulic System ("Scram" Function)
15. Active Components in Service Water and/or Closed Cooling Water and/or Fire Water and/or Well Water Systems and Other Auxiliary Systems Which are Required to Support Safety System Functions or Plant Shutdown

This activity will include the evaluation of the technical bases for the licensee's request for relief from the ASME requirements that have been determined to be impractical for his facility. The generic areas of the plant that are to be reviewed are:

WR

- . Reactor Coolant System
- . Secondary System
- . High Pressure Injection System
- . Low Pressure Injection System
- . Accumulator Systems
- . Primary and Secondary Safety and Relief Valves
- . Containment Spray System
- . Auxiliary Feedwater Systems
- . Active Components in Service Water and Instrument Air Systems which are Required to Support Safety System Functions
- . Containment Isolation Valves Required to Change Position to Isolate Containment
- . Chemical and Volume Control System
- . Other Key Components in Auxiliary Systems Which are Required to Directly Support Plant Shutdown or Safety System Function

WR

- Reactor Coolant System
- High Pressure Core Injection System
- Low Pressure Core Injection System
- Residual Heat Removal System (Shutdown Cooling System)
- Low Pressure Core Spray System
- Safety, Relief, and Safety/Relief Valves
- Reactor Core Isolation Cooling (RCIC) System
- Standby Liquid Control System (Boron System)
- Automatic Depressurization System (Any Pilot or Control Valves, Associated Hydraulic or Pneumatic Systems, etc.)
- Emergency Condenser System (Isolation Condenser System)
- Containment Spray System
- Containment Cooling System
- Containment Isolation Valves Required to Change Position to Isolate Containment
- Control Rod Drive Hydraulic System ("Scram" Function)
- Active Components in Service Water and/or Closed Cooling Water and/or Fire Water and/or Well Water Systems and Other Auxiliary Systems Which are Required to Support Safety System Functions or Plant Shutdown



d. Containment Air Dilution System

Most operating BWR plants have an inerted (i.e., oxygen deficient) containment atmosphere as part of the measures to control combustible gases that may be formed following a postulated Loss of Coolant Accident (LOCA). A recently issued Regulation (10 CFR 50.44) would allow these plants to deinvert by providing an alternate combustible gas control system involving repressurization of the containment for dilution.

The contractor shall review and evaluate licensees' submittals on the proposed combustible gas control system, e.g., containment air dilution system. The activities will include the evaluation of the system design, system operating procedure, instrumentation and control, and radiation dose release. The result of the evaluation shall include a recommendation for the licensee's request for de-inerting activities.

e. Reactor Containment Performance

The contractor shall review and evaluate licensees' submittals covering the following specific categories with regard to existing designs or design changes in the containment systems of operating reactors:

1. Containment Response to a LOCA
2. Subcompartment Differential Pressure Response
3. Containment Heat Removal Systems
4. Secondary Containment Functional Design
5. Containment Isolation System
6. Combustible Gas Control Systems
7. Containment Leakage Testing

The contractor shall review specific issues or licensee proposed modifications to determine the extent to which they satisfy the criteria set forth by the staff for containment design.

f. Containment Leakage Testing

The contractor shall review and evaluate licensees' submittals regarding its compliance with Appendix J to 10 CFR 50 and associated staff positions for the implementation of Appendix J to operating reactors. The activities will include the evaluation of the technical bases for licensee's request for exemption from Appendix J requirements that may have been determined to be impractical for his facility.

g. Electrical Engineering

h. Degraded Voltage of Offsite Power System and Interaction of the Offsite and Onsite Emergency Power Systems

The contractor shall review and evaluate licensees' submittals concerning onsite emergency power systems to assess the susceptibility of their associated redundant safety-related electrical equipment to:

- (a) Sustained degraded voltage conditions at the offsite power source;
- (b) Interaction of the offsite and onsite emergency power systems; and
- (c) Voltage drop of the offsite and onsite emergency power systems.

This review will be done with full consideration to the staff positions outlined in attachment B to this work scope.

i. Bypassing Related to Containment Purging.

The contractor shall review and evaluate licensees' submittals which will justify purging of containment and will address technical specification changes and plant modifications to permit proposed purging operations. The licensee may propose limited purging (limited to a number of hours per year) or unlimited purging.

The contractor shall evaluate the impact of emergency purging during Emergency Core Cooling System (ECCS) performance, the radiological consequence of a LOCA during purging operations, and conformance of isolation instrumentation and circuit design to IEEE-279-1971.

j. Reactor Protection System Power Supply

The NRC staff has requested that licensees of BWR's evaluate their reactor protection system power supplies and determine whether there is potential for undetected single failures to adversely affect the reactor protection system and whether there is a potential for a postulated sequence of events initiated by an earthquake which could adversely affect the reactor protection systems.

The contractor shall review and evaluate the licensee's proposals and any modifications or technical specification changes that are proposed.

k. Electrical Component Qualification

The contractor shall review the environmental qualification of electrical equipment subjected to the environment resulting from either LOCA or main steam line break (MSLB) accidents in nuclear power plants. The environmental qualification analyses will consider such factors as steam at pressure and temperature, radioactivity, chemical spray, electrical stress and mechanical stresses. The qualification data provided by licensees will have to be reviewed against criteria provided by NRC.

# 1. Mechanical Engineering

## m. Hydraulic Snubber Technical Specification Review

Periodic surveillance of hydraulic snubbers in nuclear power plants is necessary to insure proper operability and functionability of these supports throughout their design life. The NRC staff has developed standard surveillance requirements for hydraulic snubbers and is requiring the operating plants to implement these requirements to the extent practical. The review that is required shall be to assess the proposed licensee implementation program against the staff's standard requirements or acceptance criteria.

The standard surveillance program consists of two parts: first, the reservoir hydraulic fluid levels are inspected and compared, along with the time in service, to the manufacturer's limits. Secondly, a test for functional reliability must be performed which compares drag, activation rate and the bleed rate against manufacturer's limits.

The review will consider the following: the completeness of the proposed program, the areas where complete compliance with the staff's standards are not proposed, and proposed alternatives evaluated on the basis of consequences of the support failing.

## n. Structural Engineering

### o. Heavy Loads Near Spent Fuel Pools

Heavy loads transported over or near spent fuel pools involve the postulation of an accidental drop of the heavy load with potential for subsequent damage to the stored spent fuel, the spent fuel pool structures or other safety related equipment or systems. The licensee submittals include a survey of potential accidents resulting from heavy loads near spent fuel pools and an assessment of the results. The review will entail an assessment of the fuel and equipment handling cranes for structural design and operational interlock devices, the completeness of heavy load analysis of potential drop accidents and assessment of resulting consequences. Specific acceptance criteria will be supplied by the NRC staff.

### p. Mark-I Hydrodynamic Loads

New suppression pool hydrodynamic loads associated with a postulated LOCA and Safety Relief Valve (SRV) discharge have been identified which were not considered in the original design of the Mark-I containment systems. Load definitions for the loading transients have been approved by the NRC staff. The licensee's submittals will include a reanalysis of the containment system response to the new loading transients. The containment systems include the torus structure, its supports and attached piping. Specific acceptance criteria will be provided by the staff.



q. Materials Engineeringr. Atypical Weld Material

A number of Babcock and Wilcox reactor pressure vessels potentially have weld material which has not been reviewed and approved for use. The contractor shall review Quality Assurance (QA) records or the results of the records search conducted by Babcock and Wilcox and determine whether this unapproved weld material was used. Experimental programs to determine the weld material properties including environmental effects will be assessed. Proposed changes in the operating pressure-temperature limits will also be reviewed and assessed.

Article 1.2 - Reporting Requirements

The contractor shall furnish a monthly letter-type progress report by the fifteenth of the month for the previous month being reported. This report shall state in concise form:

- a. A short description of the project and objectives;
- b. A brief statement on what was actually accomplished in completing each assigned task during the reporting period;
- c. Funds committed during the reporting period;
- d. What is planned for accomplishment during the next reporting period;
- e. Preliminary or interim results, conclusions, trends, or other items of information that the contractor feels are of timely interest;
- f. Problems or delays that the contractor has experienced in the conduct of his effort;
- g. Specific action that the contractor would like NRC to undertake to alleviate a problem;
- h. Updated task and sub-task schedules, network flow chart, program milestone chart, program management summary, personnel assignments, and funding from those initially submitted in the plan of work and methodology.

The contractor shall prepare a report for each licensee submittal at the completion of his review. This report shall as a minimum include:

The licensee's submittals should be reviewed to determine the adequacy of the information presented with the information requirement stated by the staff. If the submittals are found to be incomplete, the contractor will provide requests to be transmitted to the NRC staff for forwarding to licensees to obtain additional information. The contractor will determine the extent to which the licensee's design criteria comply with criteria provided by the staff. The contractor will provide a written technical evaluation for each plant addressing the acceptability of the licensee's proposed design and technical specification modifications as appropriate and the adequacy of these modifications. Copies of all progress reports shall be submitted in accordance with the above criteria and shall be forwarded to the following NRC personnel:

Fee Determination Official (FDO) - Darrell Eisenhut  
 Performance Evaluation Board (PEB) - B. Grimes, L. Shao, D.J. Dougherty & C. Beckwith  
 Evaluation Coordinator - A.F. Glagola  
 Performance Monitors - V. Panciera, J.R. Fair, G. Zech, A.F. Glagola

The contractor shall prepare and arrange the monthly progress meeting to be held each month. Final arrangements for the meeting (i.e. agenda, date, time, and location) shall be made with the NRC Project Officer named in Article 5.1-Sec.5.0. Generally, these meetings will be held alternately at the NRC facilities in Bethesda, Md. and the contractor's facilities in Philadelphia, Penna.

### Article 1.3 Level of Effort

During the performance of work under this contract, the contractor agrees to utilize personnel in the following categories for the approximate time indicated.

<u>Category for Franklin Research Center</u>	<u>Approximate Person - Months</u>
Department Director	3.6
Laboratory Manager	1.2
Principal Scientist/Engr.	7.2
Sr. Staff Scientist/Engr.	60.0
Sr. Research Scientist/Engr.	36.0
Res. Scientist I/Res. Engr.I	36.0
Res. Scientist II/Res. Engr.II	12.0
Technical Associate I	12.0
Report Prep.-Tech.	5.8
Report Prep.-Typing	5.8
TOTAL	179.6
<u>Category for Science Info. Services Organ.</u>	<u>Approximate Person - Months</u>
Ass. Director	0.46
Project Supervisor	0.92
Sr. Info. Analyst	5.37
Keyboard Operator/Sec.	5.77
TOTAL	12.52

The contractor agrees to use his best efforts to accomplish all the work outlined or referenced above. His obligation will be deemed complete if the work is performed in accordance with high standards of scientific and professional skill, and the approximate level of effort has been diligently applied; except, however, all other requirements must be met including delivery of reports and materials as may be required under the contract.