

1. CONTRACT (Proc. Inst. Ident.) NO. NRC 03-79-124	2. EFFECTIVE DATE MAR 26 1979	3. REQUISITION/PURCHASE REQUEST/PROJECT NO. NRR 79-124	4. CERTIFIED FOR NATIONAL DEFENSE UNDER BDSA REG. 2 AND/OR DMS REG. 1. RATING.
5. ISSUED BY U.S. Nuclear Regulatory Commission Division of Contracts Washington DC 20555		6. ADMINISTERED BY (If other than block 5)	7. DELIVERY FOR DESTINATION <input type="checkbox"/> NATION <input type="checkbox"/> OTHER (See below)

8. CONTRACTOR NAME AND ADDRESS <i>(Street, city, county, State, and ZIP code)</i> International Structural Engineers, Inc. P.O. Box 9595 Glendale, CA 91206	FACILITY CODE	9. DISCOUNT FOR PROMPT PAYMENT n/a
10. SUBMIT INVOICES (4 copies unless otherwise specified) TO ADDRESS SHOWN IN BLOCK 12		

11. SHIP TO/MARK FOR U.S. Nuclear Regulatory Commission Division of System Safety Structural Engineering Branch Washington DC 20555	12. PAYMENT WILL BE MADE BY U.S. Nuclear Regulatory Commission Office of the Controller Washington DC 20555
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13. THIS PROCUREMENT WAS ADVERTISED, NEGOTIATED, PURSUANT TO: 10 U.S.C. 2304 (a)(1) U.S.C. 252 (c)(3)

14. ACCOUNTING AND APPROPRIATION DATA
 20-19-03-07-1 Fin No. B-6581 31X0200.209 \$7,259.00

15. ITEM NO.	16. SUPPLIES/SERVICES	17. QUANTITY	18. UNIT	19. UNIT PRICE	20. AMOUNT
	EVALUATION OF THE BUCKLING STRESS CRITERIA FOR THE STEEL CONTAINMENT OF WATTS BAR				

21. TOTAL AMOUNT OF CONTRACT \$ 7,259.00

CONTRACTING OFFICER WILL COMPLETE BLOCK 22 OR 26 AS APPLICABLE

22. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return <u>4</u> 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. <input type="checkbox"/> 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.
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23. NAME OF CONTRACTOR BY <u>Bengt A. Mossberg</u> <i>(Signature of person authorized to sign)</i>	27. UNITED STATES OF AMERICA BY <u>Dora J. Hargett</u> <i>(Signature of Contracting Officer)</i>
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24. NAME AND TITLE OF SIGNER (Type or print) Bengt A. Mossberg, C.H.	25. DATE SIGNED 3/16/79	28. NAME OF CONTRACTING OFFICER (Type or print) Dora J. Hargett,	29. DATE SIGNED 3/28/79
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ARTICLE I - STATEMENT OF WORK

Background

In the Final Safety Analysis Report (FSAR) of Watts Bar Nuclear Plant, the applicant discussed the design criteria of the steel containment subjected to a set of postulated load combinations. In this discussion, the applicant indicated that the response of the containment vessel to seismic and pressure transient loadings results in a condition in which buckling of the steel shell must be considered. Since the ASME code does not provide the methodology or the assumptions for obtaining the allowable stresses for this type of loading condition, a suggested buckling criteria with appropriate factors of safety were furnished by the applicant as given in Appendix 3.8B of the FSAR.

The criteria provided by the applicant consist primarily of the empirical formulas used in the aerospace industry with a good deal of engineering judgement involved.

Objective

The objective of the contract is to provide the NRC staff with expert technical assistance in evaluating the criteria used to design the steel containment of Watts Bar Nuclear Plant to withstand all postulated loading combinations which may cause buckling.

Task 1:

The NRC Structural Engineering Branch will provide the Contractor with Appendix 3.8B and Section 3.8.2 of the Watts Bar/FSAR. With this information, the contractor shall perform the following:

1. Evaluate the methods and the assumptions used by the applicant to design the containment to withstand all loading combinations including the unsymmetric loading produced by LOCA.
2. Evaluate the assumptions and methodology which are included in the structural computer programs used by the applicant. This may require a preliminary evaluation of the validity of these programs.
3. Perform a simplified evaluation of the ability of the steel containment to withstand the design loading. The detail and analytical extent of this evaluation shall be in accordance with the Contractor's judgement, but the results of the evaluation shall demonstrate whether the approach used by the applicant is conservative.

Task 2

Based upon the evaluation performed under Task 1, the contractor shall prepare a list of questions to be answered by the applicant to fully identify the methods and assumptions used to design the containment. The contractor shall submit this list of questions to the Contracting Officer's Authorized Representative (COAR) who will transmit them to the applicant. This list of questions shall be used as an agenda for a two (2) day meeting in Knoxville, Tennessee with the applicant, the contractor and the COAR. Meeting shall be arranged by the COAR at a mutually agreed upon time.

The applicant will be required to submit formal responses to these questions to the NRC after this meeting. The contractor will be provided with a copy of the responses to these questions. The contractor shall review and evaluate the responses to these questions and generate a list of supplemental questions that require responses for completion of the overall contractor evaluation.

This second list of questions shall be furnished to the COAR for transmission to the applicant. This list of questions shall be used as an agenda for a second two day meeting in either Knoxville, Tennessee or Bethesda, Maryland. This meeting shall be arranged by the COAR at a mutually agreed upon time and date.

The applicant will be required to submit formal responses to these questions to the NRC after this meeting. The contractor will be provided with a copy of the responses to these questions.

Task 3

The contractor shall submit a final report incorporating the findings and conclusions and recommendations regarding the adequacy of the applicant's containment design for buckling. This report shall be based upon the evaluations performed under Task 1 and the applicant responses to the questions prepared by the contractor under Task 2. The final report shall include recommendations for appropriate alternatives to the methods of analysis and assumptions used by the applicant.

Delivery Schedule

<u>Document</u>	<u>Time</u>	<u>Quantity</u>
Task 2 - First list of questions	- 3 weeks after effective date of contract	1
Task 2 - Second list of questions	- 3 weeks after receipt of formal responses to first list of questions.	1
Task 3 - Final Report	4 weeks after receipt of formal responses to second list of questions	6

Place of Delivery

The first and second list of questions shall be submitted in letter report form to the COAR.

A reproducible copy of the final report with five additional copies shall be submitted to the COAR.

Meetings & Travel

One trip shall be required with the applicant in Knoxville, Tennessee and another trip shall be required to meet with the applicant either in Knoxville or in Bethesda, Maryland. Each meeting will last up to two days.

Level of Effort

An estimated 25 mandays of effort over a five month period shall be required for completion of this contract.

ARTICLE II - PERIOD OF PERFORMANCE

The period of performance under this contract will commence on the date of award and all effort shall be completed five months thereafter.

ARTICLE III - CONSIDERATION

In full consideration of the Contractor's performance hereunder, NRC shall pay the Contractor the firm fixed price of \$7,259.00.

ARTICLE IV - OBLIGATIONS

The amount presently obligated by the NRC with respect to this contract is \$7,259.00.

ARTICLE V - PAYMENT

Payment shall be made in accordance with Clause 2 of the General Provision entitled "Payment" as soon as practicable after completion and acceptance of all of the work, upon submission by the Contractor of voucher(s) in a form satisfactory to the Contracting Officer; provided however, that said payment(s) shall not be deemed to prejudice any rights which the Government may have by law or under other provisions of this contract.

ARTICLE VI - SPECIAL PROVISIONS

VI.1 - GOVERNMENT FURNISHED MATERIAL

Appendix 3.8B and Section 3.8.2 of the FSAR will be supplied to the contractor. The formal responses to the first and second list of questions will be supplied to the contractor.

VI.2 CONTRACTING OFFICER'S AUTHORIZED REPRESENTATIVE (COAR)

Performance of the work hereunder shall be subject to the technical instructions issued by the U.S. Nuclear Regulatory Commission. The technical instructions shall be signed by the COAR.

The COAR is responsible for:

- (1) monitoring the Contractor's technical progress, including the surveillance and assessment or performance and recommending to the Contracting Officer changes in requirement;
- (2) interpreting the statement of work;
- (3) performing technical evaluation as required;
- (4) performing technical inspections and acceptances required by this contract;
- (5) assisting the Contractor in the resolution of technical problems encountered during performance.

Within the purview of this authority, the COAR is authorized to approve payment vouchers for supplies/services required under the contract. The Contracting Officer is responsible for directing or negotiating any changes in terms, conditions, or amounts cited in the contract.

For guidance from the COAR to the Contractor to be valid, it must:

- (1) be consistent with the description of work set forth in this contract;
- (2) not constitute new assignment of work or change of the expressed terms, conditions, or specifications incorporated into this contract;
- (3) not constitute a basis for an extension to the period of performance or contract delivery schedule;
- (4) not constitute a basis for any increase in the contract price.

If the Contractor receives guidance from the COAR which the Contractor feels is not valid under the criteria cited above, the Contractor shall immediately notify the COAR. If the COAR and the Contractor are not able to resolve the questions within five days, the Contractor shall notify the Contracting Officer.

VI.3 - KEY PERSONNEL

For the purposes of Clause 25 of the General Provisions, S. Masri, V. Weingarten and P. Seide are identified as being essential to the work being performed.

VI.4 - INSPECTION AND ACCEPTANCE

Acceptance of the services and reports to be delivered herein will be made by the COAR.

VI.5 - DISSEMINATION OF CONTRACT INFORMATION

The Contractor shall not publish, permit to be published, or distribute for public consumption any information, oral or written, concerning the results or conclusions made pursuant to the performance of this contract, without the prior written consent of the Contracting Officer. (Two copies of any material proposed to be published or distributed shall be submitted to the Contracting Officer).

VI.6 - GENERAL PROVISIONS

This contract is subject to the Fixed Price Research & Development Contracts under \$10,000, dated November 14, 1977, which incorporates the FPR Changes and Additions and NRC additions, attached hereto and made a part hereof except as follows:

Clause 14 entitled "Patents" is hereby deleted in its entirety.