

<b>AWARD/CONTRACT</b>		1. THIS CONTRACT IS RATED ORDER UNDER DPAS (15 CFR 350)	RATING N/A	PAGE OF PAGES 1
2. CONTRACT NO. (Proc. Ident.) NRC-04-03-046		3. EFFECTIVE DATE JUL 16 2003	4. REQUISITION/PURCHASE REQUEST/PROJECT NO.	
5. ISSUED BY U. S. Nuclear Regulatory Commission Division of Contracts Two White Flint North - MS T-7-I-2 ATTN: Deborah Neff Washington, DC 20555	CODE 3100	6. ADMINISTERED BY (If other than Item 5) U. S. Nuclear Regulatory Commission Div of Contracts Two White Flint North - MS T-7-I-2 ATTN: Deborah Neff Washington, DC 20555		

7. NAME AND ADDRESS OF CONTRACTOR (No., street, city, county, State and ZIP Code)  Engineering Mechanics Corporation of Columbus 3518 Riverside Drive Suite 202 Columbus OH 43221-1735	8. DELIVERY <input type="checkbox"/> FOB ORIGIN <input checked="" type="checkbox"/> OTHER (See below)
	9. DISCOUNT FOR PROMPT PAYMENT  Net 30
	10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN: ITEM

11. SHIP TO/MARK FOR U. S. Nuclear Regulatory Commission Office of Nuclear Regulatory Research Mail Stop T10E10  Washington DC 20555	CODE	FACILITY CODE	12. PAYMENT WILL BE MADE BY U. S. Nuclear Regulatory Commission Payment Team, Mail Stop T-9-H-4 ATTN: NRC-04-03-046  Washington DC 20555	CODE
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13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 U.S.C. 2304(c) <input checked="" type="checkbox"/> 41 U.S.C. 253(e)(3)	14. ACCOUNTING AND APPROPRIATION DATA APPN: 31X0200.360 B&R: 36015110191 BOC: 252A Job Code: Y6649 RES #: RES-C03-356 Obligated: \$150,000
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15A. ITEM NO.	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
	The NRC hereby accepts Engineering Mechanics Corporation of Columbus' technical proposal dated 5/22/03, which is hereby incorporated by reference and made a part of this cost-plus-fixed-fee contract.				

15G. TOTAL AMOUNT OF CONTRACT \$684,529.00

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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE

17. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return 2 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.)	18. <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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19A. NAME AND TITLE OF SIGNER (Type or print) PRABHAT KRISHNA SWAMY, VICE-PRESIDENT	19B. NAME OF CONTRACTOR BY <i>Prabhat Krishna Swamy</i> (Signature of person authorized to sign)	19C. DATE SIGNED 7/16/03	20A. NAME OF CONTRACTING OFFICER Stephen Pool Contracting Officer	20B. UNITED STATES OF AMERICA BY <i>Stephen Pool</i> (Signature of Contracting Officer)	20C. DATE SIGNED 7/19/03
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TEMPLATE - ADM001

ADM002

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**PART I - THE SCHEDULE****SECTION B - SUPPLIES OR SERVICES AND PRICE/COSTS****B.1 PROJECT TITLE**

The title of this project is as follows:

**PHASE II - ALLOY 600 CRACKING**

**B.2 BRIEF DESCRIPTION OF WORK (MAR 1987)**

The Contractor shall provide the necessary qualified, technical personnel to assist the Office of Nuclear Regulatory Research (RES) in addressing the enhancement of previous and/or ongoing efforts plus additional long term needs relative to the assessment of Control Rod Drive Mechanism (CRDM) cracking, such as residual stresses, crack driving forces, crack growth, etc.

**B.3 CONSIDERATION AND OBLIGATION--COST PLUS FIXED FEE  
(JUN 1988) ALTERNATE I (JUN 1991)**

(a) The total estimated cost to the Government for full performance of this contract is \$684,529, of which the sum of \$639,747 represents the estimated reimbursable costs, and of which \$44,782 represents the fixed fee.

(b) There shall be no adjustment in the amount of the Contractor's fixed fee by reason of differences between any estimate of cost for performance of the work under this contract and the actual cost for performance of that work.

(c) The amount currently obligated by the Government with respect to this contract is \$150,000, of which the sum of \$139,500 represents the estimated reimbursable costs, and of which \$10,500 represents the fixed fee.

(d) It is estimated that the amount currently allotted will cover performance through January 31, 2004.

(END-OF-CLAUSE)

**SECTION C - DESCRIPTION/SPECIFICATIONS/STATEMENT OF WORK**

SEE ATTACHMENT A FOR STATEMENT OF WORK

**SECTION D - PACKAGING AND MARKING****D.1 PACKAGING AND MARKING (MAR 1987)**

The Contractor shall package material for shipment to the NRC in such a manner that will ensure acceptance by common carrier and safe delivery at destination. Containers and closures shall comply with the Interstate Commerce Commission Regulations, Uniform Freight Classification Rules, or regulations of other carriers as applicable to the mode of transportation. On the front of the package, the Contractor shall clearly identify the contract number under which the product is being provided.

**SECTION E - INSPECTION AND ACCEPTANCE****E.1 NOTICE LISTING CONTRACT CLAUSES INCORPORATED BY REFERENCE**

The following contract clauses pertinent to this section are hereby incorporated by reference (by Citation Number, Title, and Date) in accordance with the clause at FAR "52.252-2 CLAUSES INCORPORATED BY REFERENCE" in Section I of this contract. See FAR 52.252-2 for an internet address (if specified) for electronic access to the full text of a clause.

NUMBER	TITLE	DATE
	FEDERAL ACQUISITION REGULATION (48 CFR Chapter 1)	
52.246-9	INSPECTION OF RESEARCH AND DEVELOPMENT (SHORT FORM)	APR 1984

**E.2 PLACE OF INSPECTION AND ACCEPTANCE (MAR 1987)**

Inspection and acceptance of the deliverable items to be furnished hereunder shall be made by the Project Officer at the destination.

**SECTION F - DELIVERIES OR PERFORMANCE****F.1 NOTICE LISTING CONTRACT CLAUSES INCORPORATED BY REFERENCE**

The following contract clauses pertinent to this section are hereby incorporated by reference (by Citation Number, Title, and Date) in accordance with the clause at FAR "52.252-2 CLAUSES INCORPORATED BY REFERENCE" in Section I of this contract. See FAR 52.252-2 for an internet address (if specified) for electronic access to the full text of a clause.

NUMBER	TITLE	DATE
	FEDERAL ACQUISITION REGULATION (48 CFR Chapter 1)	
52.242-15	STOP-WORK ORDER ALTERNATE I (APR 1984)	AUG 1989
52.247-34	F.O.B. DESTINATION	NOV 1991

**F.2 2052.211-70 PREPARATION OF TECHNICAL REPORTS (JAN 1993)**

All technical reports required by Section C and all Technical Progress Reports required by Section F are to be prepared in accordance with the attached Management Directive 3.8, "Unclassified Contractor and Grantee Publications in the NUREG Series." Management Directive 3.8 is not applicable to any Contractor Spending Plan (CSP) and any Financial Status Report that may be included in this contract. (See List of Attachments).

**F.3 2052.211-71 TECHNICAL PROGRESS REPORT (JAN 1993)**

The contractor 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, appropriate financial tracking code specified by the NRC Project Officer, 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.

**F.4 2052.211-72 FINANCIAL STATUS REPORT (OCT 1999)**

The contractor shall provide a monthly Financial Status Report (FSR) to the project officer and the contracting officer. The FSR shall include the acquisition of, or changes in the status of, contractor-held property acquired with government funds valued at the time of purchase at \$50,000 or more. Whenever these types of property changes occur, the contractor shall send a copy of the report to the Chief, Property and Acquisition Oversight Branch, Office of Administration. 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, the appropriate financial tracking code (e.g., Job Code Number or JCN) specified by the NRC Project Officer, 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:

- (a) Total estimated contract amount.
- (b) Total funds obligated to date.
- (c) Total costs incurred this reporting period.
- (d) Total costs incurred to date.
- (e) Detail of all direct and indirect costs incurred during the reporting period for the entire contract or each task, if it is a task ordering contract.
- (f) Balance of obligations remaining.
- (g) Balance of funds required to complete contract/task order.
- (h) Contractor Spending Plan (CSP) status: A revised CSP is required with the Financial Status Report whenever the contractor or the contracting officer has reason to believe that the total cost for performance of this contract will be either greater or substantially less than what had been previously estimated.
  - (1) Projected percentage of completion cumulative through the report period for the project/task order as reflected in the current CSP.
  - (2) Indicate significant changes in the original CSP projection in either dollars or percentage of completion. Identify the change, the reasons for the change, whether there is any projected overrun, and when additional funds would be required. If there have been no changes to the original NRC-approved CSP projections, a written statement to that effect is sufficient in lieu of submitting a detailed response to item "h".
- (i) Property status:
  - (1) List property acquired for the project during the month with an acquisition cost between \$500 and \$49,999. Give the item number for the specific piece of equipment.
  - (2) Provide a separate list of property acquired for the project during the month with an acquisition cost of \$50,000 or more. Provide the following information for each item of property: item description or nomenclature, manufacturer, model number, serial number, acquisition cost, and receipt date. If no property was acquired during the month, include a statement to that effect. The same information must be provided for any component or peripheral equipment which is part of a "system or system unit."
  - (3) For multi-year projects, in the September monthly financial status report provide a cumulative listing of property with an acquisition cost of \$50,000 or more showing the information specified in paragraph (i)(2) of this clause.
  - (4) In the final financial status report provide a closeout property report containing the same elements as described above for the monthly financial status reports, for all property purchased with NRC funds regardless of value unless title has been vested in the contractor. If no property was acquired under the contract, provide a statement to that effect. The report should note any property requiring special handling for security, health, safety, or other reasons as part of the report.
- (j) Travel status: List the starting and ending dates for each trip, the starting point and destination, and the traveler(s) for each trip.
- (k) If the data in this report indicates a need for additional funding beyond that already obligated, this information may only be used as support to the official request for funding required in accordance with the Limitation of Cost (LOC) Clause (FAR 52.232-20) or the Limitation of Funds (LOF) Clause FAR 52.232-22.

**F.5 PLACE OF DELIVERY--REPORTS (JUN 1988)**

The items to be furnished hereunder shall be delivered, with all charges paid by the Contractor, to:

- (a) Project Officer (4 copies)

Wallace Norris  
U.S. Nuclear Regulatory Commission  
Office of Nuclear Regulatory Research  
Mail Stop T10E10  
Washington, DC 20555

- (b) Contracting Officer (1 copy)

(END-OF-CLAUSE)

**F.6 DURATION OF CONTRACT PERIOD (MAR 1987)**

This contract shall commence on the award date and will expire thirty (30) months thereafter.

(END-OF-CLAUSE)

## SECTION G - CONTRACT ADMINISTRATION DATA

## G.1 2052.215-71 PROJECT OFFICER AUTHORITY

(a) The Contracting Officer's authorized representative hereinafter referred to as the Project Officer for this contract is:

Name: Wallace Norris

Address: U.S. Nuclear Regulatory Commission  
Mail Stop T10E10  
Washington, DC 20555

Telephone Number: 301-415-6976

(b) Performance of the work under this contract is subject to the technical direction of the NRC Project Officer. The term "technical direction" is defined to include the following:

(1) Technical direction to the contractor which shifts work emphasis between areas of work or tasks, authorizes travel which was unanticipated in the Schedule (i.e., travel not contemplated in the Statement of Work or changes to specific travel identified in the Statement of Work), fills in details, or otherwise serves to accomplish the contractual statement of work.

(2) Provide advice and guidance to the contractor in the preparation of drawings, specifications, or technical portions of the work description.

(3) Review and, where required by the contract, approval of technical reports, drawings, specifications, and technical information to be delivered by the contractor to the Government under the contract.

(c) Technical direction must be within the general statement of work stated in the contract. The Project Officer does not have the authority to and may not issue any technical direction which:

(1) Constitutes an assignment of work outside the general scope of the contract.

(2) Constitutes a change as defined in the "Changes" clause of this contract.

(3) In any way causes an increase or decrease in the total estimated contract cost, the fixed fee, if any, or the time required for contract performance.

(4) Changes any of the expressed terms, conditions, or specifications of the contract.

(5) Terminates the contract, settles any claim or dispute arising under the contract, or issues any unilateral directive whatever.

(d) All technical directions must be issued in writing by the project officer or must be confirmed by the Project Officer in writing within ten (10) working days after verbal issuance. A copy of the written direction must be furnished to the Contracting Officer. A copy of NRC Form 445, Request for Approval of Official Foreign Travel, which has received final approval from the NRC must be furnished to the Contracting Officer.

(e) The contractor shall proceed promptly with the performance of technical directions duly issued by the Project Officer in the manner prescribed by this clause and within the Project Officer's authority under the provisions of this

clause.

(f) If, in the opinion of the contractor, any instruction or direction issued by the project officer is within one of the categories as defined in paragraph (c) of this section, the contractor may not proceed but shall notify the Contracting Officer in writing within five (5) working days after the receipt of any instruction or direction and shall request the Contracting Officer to modify the contract accordingly. Upon receiving the notification from the contractor, the contracting officer shall issue an appropriate contract modification or advise the contractor in writing that, in the contracting officer's opinion, the technical direction is within the scope of this article and does not constitute a change under the "Changes" clause.

(g) Any unauthorized commitment or direction issued by the project officer may result in an unnecessary delay in the contractor's performance and may even result in the contractor expending funds for unallowable costs under the contract.

(h) A failure of the parties to agree upon the nature of the instruction or direction or upon the contract action to be taken with respect thereto is subject to 52.233-1 - Disputes.

(i) In addition to providing technical direction as defined in paragraph (b) of the section, the Project Officer shall:

(1) Monitor the contractor's technical progress, including surveillance and assessment of performance, and recommend to the Contracting Officer changes in requirements.

(2) Assist the contractor in the resolution of technical problems encountered during performance.

(3) Review all costs requested for reimbursement by the contractor and submit to the contracting officer recommendations for approval, disapproval, or suspension of payment for supplies and services required under this contract.

(4) Assist the contractor in obtaining the badges for the contractor personnel.

(5) Immediately notify the Personnel Security Branch, Division of Facilities and Security (PERSEC/DFS) (via e-mail) when a contractor employee no longer requires access authorization and return the individual's badge to PERSEC/DFS within three days after their termination.

(END-OF-CLAUSE)

## **G.2 2052.215-77 TRAVEL APPROVALS AND REIMBURSEMENT (OCT 1999)**

(a) All foreign travel must be approved in advance by the NRC on NRC Form 445, Request for Approval of Official Foreign Travel, and must be in compliance with FAR 52.247-63 Preference for U.S. Flag Air Carriers. The contractor shall submit NRC Form 445 to the NRC no later than 30 days before beginning travel.

(b) The contractor must receive written approval from the NRC Project Officer before taking travel that was unanticipated in the Schedule (i.e., travel not contemplated in the Statement of Work, or changes to specific travel identified in the Statement of Work).

(c) The contractor will be reimbursed only for those travel costs incurred that are directly related to this contract and are allowable subject to the limitations prescribed in FAR 31.205-46.

(d) It is the responsibility of the contractor to notify the contracting officer in accordance with the Limitations of Cost clause of this contract when, at any time, the contractor learns that travel expenses will cause the contractor to exceed the estimated costs specified in the Schedule.

(e) Reasonable travel costs for research and related activities performed at State and nonprofit institutions, in accordance with Section 12 of Pub. L. 100-679, shall be charged in accordance with the contractor's institutional policy to the degree that the limitations of Office of Management and Budget (OMB) guidance are not exceeded. Applicable guidance documents include OMB Circular A-87, Cost Principles for State and Local Governments; OMB Circular A-122, Cost Principles for Nonprofit Organizations; and OMB Circular A-21, Cost Principles for Educational Institutions.

**G.3 2052.216-71 INDIRECT COST RATES (JAN 1993)**

(a) Pending the establishment of final indirect rates which must be negotiated based on audit of actual costs, the contractor shall be reimbursed for allowable indirect costs as follows:

INDIRECT COST POOL	RATE	BASE	PERIOD
Overhead		[REDACTED]	Effective date through contract expiration
G&A		[REDACTED]	Effective date through contract expiration

(b) The Contracting Officer may adjust these rates as appropriate during the term of the contract upon acceptance of any revisions proposed by the contractor. It is the contractor's responsibility to notify the contracting officer in accordance with FAR 52.232-20, Limitation of Cost, or FAR 52.232-22, Limitation of Funds, as applicable, if these changes affect performance of work within the established cost or funding limitations.

(END-OF-CLAUSE)

**G.4 ELECTRONIC PAYMENT**

The Debt Collection Improvement Act of 1996 requires that all payments except IRS tax refunds be made by Electronic Funds Transfer. It is the policy of the Nuclear Regulatory Commission to pay vendors by the Automated Clearing House (ACH) electronic funds transfer payment system. The electronic system is known as Vendor Express. Payment shall be made in accordance with FAR 52.232-33, entitled "Mandatory Information for Electronic Funds Transfer Payment".

To receive payment, the contractor shall complete the "Company Information" portion of the Standard Form 3881, entitled "ACH Vendor/Miscellaneous Payment Enrollment Form" found as an attachment to this document. The contractor shall take the form to the ACH Coordinator at the financial institution that maintains its company's bank account. The contractor shall discuss with the ACH Coordinator how the payment identification information (addendum record) will be passed to them once the payment is received by the financial institution. Further information concerning the addendum is provided at Attachment E. The ACN Coordinator should fill out the "Financial Institution Information" portion of the form and return it to the Office of the Controller at the following address: Nuclear Regulatory Commission, Division of Accounting and Finance, Financial Operations Section, Mail Stop T-9-H-4, Washington, DC 20555, ATTN: ACH/Vendor Express. It is the responsibility of the contractor to ensure that the financial institution returns the completed form to the above cited NRC address. If the contractor can provide the financial information, signature of the financial institutions ACH Coordinator is not required. The NRC is under no obligation to send reminders. Only after the Office of the Controller has processed the contractor's sign-up form will the contractor be eligible to receive payments.

Once electronic funds transfer is established for payments authorized by NRC, the contractor needs to submit an additional SF 3881 only to report changes to the information supplied.

Questions concerning ACH/Vendor Express should be directed to the Financial Operations staff at (301) 415-7520."

**SECTION H - SPECIAL CONTRACT REQUIREMENTS****H.1 2052.209-72 CONTRACTOR ORGANIZATIONAL CONFLICTS OF INTEREST (JAN 1993)**

(a) Purpose. The primary purpose of this clause is to aid in ensuring that the contractor:

(1) Is not placed in a conflicting role because of current or planned interests (financial, contractual, organizational, or otherwise) which relate to the work under this contract; and

(2) Does not obtain an unfair competitive advantage over other parties by virtue of its performance of this contract.

(b) Scope. The restrictions described apply to performance or participation by the contractor, as defined in 48 CFR 2009.570-2 in the activities covered by this clause.

(c) Work for others.

(1) Notwithstanding any other provision of this contract, during the term of this contract, the contractor agrees to forego entering into consulting or other contractual arrangements with any firm or organization the result of which may give rise to a conflict of interest with respect to the work being performed under this contract. The contractor shall ensure that all employees under this contract abide by the provision of this clause. If the contractor has reason to believe, with respect to itself or any employee, that any proposed consultant or other contractual arrangement with any firm or organization may involve a potential conflict of interest, the contractor shall obtain the written approval of the contracting officer before the execution of such contractual arrangement.

(2) The contractor may not represent, assist, or otherwise support an NRC licensee or applicant undergoing an NRC audit, inspection, or review where the activities that are the subject of the audit, inspection, or review are the same as or substantially similar to the services within the scope of this contract (or task order as appropriate) except where the NRC licensee or applicant requires the contractor's support to explain or defend the contractor's prior work for the utility or other entity which NRC questions.

(3) When the contractor performs work for the NRC under this contract at any NRC licensee or applicant site, the contractor shall neither solicit nor perform work in the same or similar technical area for that licensee or applicant organization for a period commencing with the award of the task order or beginning of work on the site (if not a task order contract) and ending one year after completion of all work under the associated task order, or last time at the site (if not a task order contract).

(4) When the contractor performs work for the NRC under this contract at any NRC licensee or applicant site,

(i) The contractor may not solicit work at that site for that licensee or applicant during the period of performance of the task order or the contract, as appropriate.

(ii) The contractor may not perform work at that site for that licensee or applicant during the period of performance of the task order or the contract, as appropriate, and for one year thereafter.

(iii) Notwithstanding the foregoing, the contracting officer may authorize the contractor to solicit or perform this type of work (except work in the same or similar technical area) if the contracting officer determines that the situation will not pose a potential for technical bias or unfair competitive advantage.

(d) Disclosure after award.

(1) The contractor warrants that to the best of its knowledge and belief, and except as otherwise set forth in this contract, that it does not have any organizational conflicts of interest as defined in 48 CFR 2009.570-2.

(2) The contractor agrees that if, after award, it discovers organizational conflicts of interest with respect to this contract, it shall make an immediate and full disclosure in writing to the contracting officer. This statement must include

a description of the action which the contractor has taken or proposes to take to avoid or mitigate such conflicts. The NRC may, however, terminate the contract if termination is in the best interest of the Government.

(3) It is recognized that the scope of work of a task-order-type contract necessarily encompasses a broad spectrum of activities. Consequently, if this is a task-order-type contract, the contractor agrees that it will disclose all proposed new work involving NRC licensees or applicants which comes within the scope of work of the underlying contract. Further, if this contract involves work at a licensee or applicant site, the contractor agrees to exercise diligence to discover and disclose any new work at that licensee or applicant site. This disclosure must be made before the submission of a bid or proposal to the utility or other regulated entity and must be received by the NRC at least 15 days before the proposed award date in any event, unless a written justification demonstrating urgency and due diligence to discover and disclose is provided by the contractor and approved by the contracting officer. The disclosure must include the statement of work, the dollar value of the proposed contract, and any other documents that are needed to fully describe the proposed work for the regulated utility or other regulated entity. NRC may deny approval of the disclosed work only when the NRC has issued a task order which includes the technical area and, if site-specific, the site, or has plans to issue a task order which includes the technical area and, if site-specific, the site, or when the work violates paragraphs (c)(2), (c)(3) or (c)(4) of this section.

(e) Access to and use of information.

(1) If in the performance of this contract, the contractor obtains access to information, such as NRC plans, policies, reports, studies, financial plans, internal data protected by the Privacy Act of 1974 (5 U.S.C. Section 552a (1988)), or the Freedom of Information Act (5 U.S.C. Section 552 (1986)), the contractor agrees not to:

(i) Use this information for any private purpose until the information has been released to the public;

(ii) Compete for work for the Commission based on the information for a period of six months after either the completion of this contract or the release of the information to the public, whichever is first;

(iii) Submit an unsolicited proposal to the Government based on the information until one year after the release of the information to the public; or

(iv) Release the information without prior written approval by the contracting officer unless the information has previously been released to the public by the NRC.

(2) In addition, the contractor agrees that, to the extent it receives or is given access to proprietary data, data protected by the Privacy Act of 1974 (5 U.S.C. Section 552a (1988)), or the Freedom of Information Act (5 U.S.C. Section 552 (1986)), or other confidential or privileged technical, business, or financial information under this contract, the contractor shall treat the information in accordance with restrictions placed on use of the information.

(3) Subject to patent and security provisions of this contract, the contractor shall have the right to use technical data it produces under this contract for private purposes provided that all requirements of this contract have been met.

(f) Subcontracts. Except as provided in 48 CFR 2009.570-2, the contractor shall include this clause, including this paragraph, in subcontracts of any tier. The terms contract, contractor, and contracting officer, must be appropriately modified to preserve the Government's rights.

(g) Remedies. For breach of any of the above restrictions, or for intentional nondisclosure or misrepresentation of any relevant interest required to be disclosed concerning this contract or for such erroneous representations that necessarily imply bad faith, the Government may terminate the contract for default, disqualify the contractor from subsequent contractual efforts, and pursue other remedies permitted by law or this contract.

(h) Waiver. A request for waiver under this clause must be directed in writing to the contracting officer in accordance with the procedures outlined in 48 CFR 2009.570-9.

(i) Follow-on effort. The contractor shall be ineligible to participate in NRC contracts, subcontracts, or proposals therefor (solicited or unsolicited), which stem directly from the contractor's performance of work under this contract. Furthermore, unless so directed in writing by the contracting officer, the contractor may not perform any technical consulting or management support services work or evaluation activities under this contract on any of its products or services or the products or services of another firm if the contractor has been substantially involved in the development or marketing of the products or services.

(1) If the contractor, under this contract, prepares a complete or essentially complete statement of work or specifications, the contractor is not eligible to perform or participate in the initial contractual effort which is based on the statement of work or specifications. The contractor may not incorporate its products or services in the statement of work or specifications unless so directed in writing by the contracting officer, in which case the restrictions in this paragraph do not apply.

(2) Nothing in this paragraph precludes the contractor from offering or selling its standard commercial items to the Government.

## H.2 2052.215-70 KEY PERSONNEL (JAN 1993)

(a) The following individuals are considered to be essential to the successful performance of the work hereunder:



The contractor agrees that personnel may not be removed from the contract work or replaced without compliance with paragraphs (b) and (c) of this section.

(b) If one or more of the key personnel, for whatever reason, becomes, or is expected to become, unavailable for work under this contract for a continuous period exceeding 30 work days, or is expected to devote substantially less effort to the work than indicated in the proposal or initially anticipated, the contractor shall immediately notify the contracting officer and shall, subject to the concurrence of the Contracting Officer, promptly replace the personnel with personnel of at least substantially equal ability and qualifications.

(c) Each request for approval of substitutions must be in writing and contain a detailed explanation of the circumstances necessitating the proposed substitutions. The request must also contain a complete resume for the proposed substitute and other information requested or needed by the Contracting Officer to evaluate the proposed substitution. The Contracting Officer and the Project Officer shall evaluate the contractor's request and the Contracting Officer shall promptly notify the contractor of his or her decision in writing.

(d) If the Contracting Officer determines that suitable and timely replacement of key personnel who have been reassigned, terminated, or have otherwise become unavailable for the contract work is not reasonably forthcoming, or that the resultant reduction of productive effort would be so substantial as to impair the successful completion of the contract or the service order, the contract may be terminated by the Contracting Officer for default or for the convenience of the Government, as appropriate. If the contracting officer finds the contractor at fault for the condition, the contract price or fixed fee may be equitably adjusted downward to compensate the Government for any resultant delay, loss, or damage.

(END-OF-CLAUSE)

## H.3 2052.235-70 PUBLICATION OF RESEARCH RESULTS (OCT 1999)

(a) The principal investigator(s)/contractor shall comply with the provisions of NRC Management Directive 3.8 (Vol. 3, Part 1) and NRC Handbook 3.8 (Parts I-IV) regarding publication in refereed scientific and engineering journals or dissemination to the public of any information, oral or written, concerning the work performed under this contract. Failure to comply with this clause shall be grounds for termination of this contract.

(b) The principal investigator(s)/contractor may publish the results of this work in refereed scientific and engineering journals or in open literature and present papers at public or association meetings at interim stages of work, in addition to submitting to NRC the final reports and other deliverables required under this contract. However, such publication and papers shall focus on advances in science and technology and minimize conclusions and/or recommendations which may

have regulatory implications.

(c) The principal investigator(s) shall coordinate all such publications with, and transmit a copy of the proposed article or paper to, the NRC Contracting Officer or Project Officer, prior to publication. The NRC agrees to review and provide comments within thirty (30) days after receipt of a proposed publication. However, in those cases where the information to be published is (1) subject to Commission approval, (2) has not been ruled upon, or (3) disapproved by the Commission, the NRC reserves the right to disapprove or delay the publication. Further, if the NRC disagrees with the proposed publication for any reason, it reserves the right to require that any publication not identify the NRC's sponsorship of the work and that any associated publication costs shall be borne by the contractor.

#### **H.4 2052.235-71 SAFETY, HEALTH, AND FIRE PROTECTION (JAN 1993)**

The contractor shall take all reasonable precautions in the performance of the work under this contract to protect the health and safety of its employees and of members of the public, including NRC employees and contractor personnel, and to minimize danger from all hazards to life and property. The contractor shall comply with all applicable health, safety, and fire protection regulations and requirements (including reporting requirements) of the Commission and the Department of Labor. If the contractor fails to comply with these regulations or requirements, the contracting office may, without prejudice to any other legal or contractual rights of the Commission, issue an order stopping all or any part of the work. Thereafter, a start work order for resumption of work may be issued at the discretion of the contracting officer. The contractor may not make a claim for an extension of time or for compensation or damages by reason of, or in connection with, this type of work stoppage.

#### **H.5 GOVERNMENT FURNISHED EQUIPMENT/PROPERTY - NONE PROVIDED (JUN 1988)**

The Government will not provide any equipment/property under this contract.

#### **H.6 SEAT BELTS**

Contractors, subcontractors, and grantees, are encouraged to adopt and enforce on-the-job seat belt policies and programs for their employees when operating company-owned, rented, or personally owned vehicles.

#### **H.7 ANNUAL AND FINAL CONTRACTOR PERFORMANCE EVALUATIONS**

Annual and final evaluations of contractor performance under this contract will be prepared in accordance with FAR 42.15, "Contractor Performance Information," normally at the time the contractor is notified of the NRC's intent to exercise the contract option. If the multi-year contract does not have option years, then an annual evaluation will be prepared (state time for annual evaluation). Final evaluations of contractor performance will be prepared at the expiration of the contract during the contract closeout process.

The Contracting Officer will transmit the NRC Project Officer's annual and final contractor performance evaluations to the contractor's Project Manager, unless otherwise instructed by the contractor. The contractor will be permitted thirty days to review the document. The contractor may concur without comment, submit additional information, or request a meeting to discuss the performance evaluation. The Contracting Officer may request the contractor's Project Manager to attend a meeting to discuss the performance evaluation.

Where a contractor concurs with, or takes no exception to an annual performance evaluation, the Contracting Officer will consider such evaluation final and releasable for source selection purposes. Disagreements between the parties regarding a performance evaluation will be referred to an individual one level above the Contracting Officer, whose decision will be final.

The Contracting Officer will send a copy of the completed evaluation report, marked "For Official Use Only," to the contractor's Project Manager for their records as soon as practicable after it has been finalized. The completed evaluation report also will be used as a tool to improve communications between the NRC and the contractor and to improve contract performance.

The completed annual performance evaluation will be used to support future award decisions in accordance with FAR 42.1502(a) and 42.1503(c). During the period the information is being used to provide source selection information, the completed annual performance evaluation will be released to only two parties - the Federal government personnel performing the source selection evaluation and the contractor under evaluation if the contractor does not have a copy of the report already.

## PART II - CONTRACT CLAUSES

## SECTION I - CONTRACT CLAUSES

## I.1 NOTICE LISTING CONTRACT CLAUSES INCORPORATED BY REFERENCE

The following contract clauses pertinent to this section are hereby incorporated by reference (by Citation Number, Title, and Date) in accordance with the clause at FAR "52.252-2 CLAUSES INCORPORATED BY REFERENCE" in Section I of this contract. See FAR 52.252-2 for an internet address (if specified) for electronic access to the full text of a clause.

NUMBER	TITLE	DATE
	FEDERAL ACQUISITION REGULATION (48 CFR Chapter 1)	
52.202-1	DEFINITIONS	DEC 2001
52.203-3	GRATUITIES	APR 1984
52.203-5	COVENANT AGAINST CONTINGENT FEES	APR 1984
52.203-6	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT	JUL 1995
52.203-7	ANTI-KICKBACK PROCEDURES	JUL 1995
52.203-8	CANCELLATION, RESCISSION, AND RECOVERY OF FUNDS FOR ILLEGAL OR IMPROPER ACTIVITY	JAN 1997
52.203-10	PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY	JAN 1997
52.203-12	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS	JUN 1997
52.204-4	PRINTED OR COPIED DOUBLE-SIDED ON RECYCLED PAPER	AUG 2000
52.209-6	PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT	JUL 1995
52.215-2	AUDIT AND RECORDS--NEGOTIATION	JUN 1999
52.215-8	ORDER OF PRECEDENCE--UNIFORM CONTRACT FORMAT	OCT 1997
52.215-17	WAIVER OF FACILITIES CAPITAL COST OF MONEY	OCT 1997
52.216-8	FIXED-FEE	MAR 1997
52.217-2	CANCELLATION UNDER MULTIYEAR CONTRACTS	OCT 1997
52.219-8	UTILIZATION OF SMALL BUSINESS CONCERNS	OCT 2000
52.222-3	CONVICT LABOR	AUG 1996
52.222-19	CHILD LABOR - COOPERATION WITH AUTHORITIES AND REMEDIES	SEP 2002
52.222-26	EQUAL OPPORTUNITY	APR 2002
52.222-35	EQUAL OPPORTUNITY FOR SPECIAL DISABLED VETERANS, OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS	DEC 2001
52.222-36	AFFIRMATIVE ACTION FOR WORKERS WITH DISABILITIES	JUN 1998
52.222-37	EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS, VETERANS OF THE VIETNAM ERA, AND OTHER ELIGIBLE VETERANS	DEC 2001
52.223-6	DRUG-FREE WORKPLACE	MAY 2001
52.225-13	RESTRICTIONS ON CERTAIN FOREIGN	JUL 2000

	PURCHASES	
52.227-1	AUTHORIZATION AND CONSENT ALTERNATE I (APR 1984)	JUL 1995
52.227-2	NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT	AUG 1996
52.227-14	RIGHTS IN DATA--GENERAL	JUN 1987
52.228-7	INSURANCE--LIABILITY TO THIRD PERSONS	MAR 1996
52.232-17	INTEREST	JUN 1996
52.232-20	LIMITATION OF COST	APR 1984
52.232-22	LIMITATION OF FUNDS	APR 1984
52.232-23	ASSIGNMENT OF CLAIMS	JAN 1986
52.233-1	DISPUTES	JUL 2002
52.233-3	PROTEST AFTER AWARD ALTERNATE I (JUN 1985)	AUG 1996
52.242-1	NOTICE OF INTENT TO DISALLOW COSTS	APR 1984
52.242-3	PENALTIES FOR UNALLOWABLE COSTS	MAY 2001
52.242-4	CERTIFICATION OF FINAL INDIRECT COSTS	JAN 1997
52.242-13	BANKRUPTCY	JUL 1995
52.243-2	CHANGES--COST REIMBURSEMENT ALTERNATE V (APR 1984)	AUG 1987
52.244-2	SUBCONTRACTS ALTERNATE II (AUG 1998)	AUG 1998
52.244-5	COMPETITION IN SUBCONTRACTING	DEC 1996
52.246-25	LIMITATION OF LIABILITY--SERVICES	FEB 1997
52.249-6	TERMINATION (COST-REIMBURSEMENT)	SEP 1996
52.249-14	EXCUSABLE DELAYS	APR 1984
52.253-1	COMPUTER GENERATED FORMS	JAN 1991

## I.2 52.232-25 PROMPT PAYMENT (FEB 2002)

Notwithstanding any other payment clause in this contract, the Government will make invoice payments under the terms and conditions specified in this clause. The Government considers payment as being made on the day a check is dated or the date of an electronic funds transfer (EFT). Definitions of pertinent terms are set forth in sections 2.101, 32.001, and 32.902 of the Federal Acquisition Regulation. All days referred to in this clause are calendar days, unless otherwise specified. (However, see paragraph (a)(4) of this clause concerning payments due on Saturdays, Sundays, and legal holidays.)

### (a) Invoice payments--

#### (1) Due date.

(i) Except as indicated in paragraphs (a)(2) and (c) of this clause, the due date for making invoice payments by the designated payment office is the later of the following two events:

(A) The 30th day after the designated billing office receives a proper invoice from the Contractor (except as provided in paragraph (a)(1)(ii) of this clause).

(B) The 30th day after Government acceptance of supplies delivered or services performed. For a final invoice, when the payment amount is subject to contract settlement actions, acceptance is deemed to occur on the effective date of the contract settlement.

(ii) If the designated billing office fails to annotate the invoice with the actual date of receipt at the time of receipt, the invoice payment due date is the 30th day after the date of the Contractor's invoice, provided the designated billing office receives a proper invoice and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

#### (2) Certain food products and other payments.

(i) Due dates on Contractor invoices for meat, meat food products, or fish; perishable agricultural commodities; and dairy products, edible fats or oils, and food products prepared from edible fats or oils are--

(A) For meat or meat food products, as defined in section 2(a)(3) of the Packers and Stockyard Act of 1921 (7 U.S.C. 182(3)), and as further defined in Pub. L. 98-181, including any edible fresh or frozen poultry meat, any perishable poultry meat food product, fresh eggs, and any perishable egg product, as close as possible to, but not later than, the 7th day after product delivery.

(B) For fresh or frozen fish, as defined in section 204(3) of the Fish and Seafood Promotion Act of 1986 (16 U.S.C. 4003(3)), as close as possible to, but not later than, the 7th day after product delivery.

(C) For perishable agricultural commodities, as defined in section 1(4) of the Perishable Agricultural Commodities Act of 1930 (7 U.S.C. 499a(4)), as close as possible to, but not later than, the 10th day after product delivery, unless another date is specified in the contract.

(D) For dairy products, as defined in section 111(e) of the Dairy Production Stabilization Act of 1983 (7 U.S.C. 4502(e)), edible fats or oils, and food products prepared from edible fats or oils, as close as possible to, but not later than, the 10th day after the date on which a proper invoice has been received. Liquid milk, cheese, certain processed cheese products, butter, yogurt, ice cream, mayonnaise, salad dressings, and other similar products, fall within this classification. Nothing in the Act limits this classification to refrigerated products. When questions arise regarding the proper classification of a specific product, prevailing industry practices will be followed in specifying a contract payment due date. The burden of proof that a classification of a specific product is, in fact, prevailing industry practice is upon the Contractor making the representation.

(ii) If the contract does not require submission of an invoice for payment (e.g., periodic lease payments), the due date will be as specified in the contract.

(3) Contractor's invoice. The Contractor shall prepare and submit invoices to the designated billing office specified in the contract. A proper invoice must include the items listed in paragraphs (a)(3)(i) through (a)(3)(x) of this clause. If the invoice does not comply with these requirements, the designated billing office will return it within 7 days after receipt (3 days for meat, meat food products, or fish; 5 days for perishable agricultural commodities, dairy products, edible fats or oils, and food products prepared from edible fats or oils), with the reasons why it is not a proper invoice. The Government will take into account untimely notification when computing any interest penalty owed the Contractor.

(i) Name and address of the Contractor.

(ii) Invoice date and invoice number. (The Contractor should date invoices as close as possible to the date of the mailing or transmission.)

(iii) Contract number or other authorization for supplies delivered or services performed (including order number and contract line item number).

(iv) Description, quantity, unit of measure, unit price, and extended price of supplies delivered or services performed.

(v) Shipping and payment terms (e.g., shipment number and date of shipment, discount for prompt payment terms). Bill of lading number and weight of shipment will be shown for shipments on Government bills of lading.

(vi) Name and address of Contractor official to whom payment is to be sent (must be the same as that in the contract or in a proper notice of assignment).

(vii) Name (where practicable), title, phone number, and mailing address of person to notify in the event of a defective invoice.

(viii) Taxpayer Identification Number (TIN). The Contractor shall include its TIN on the invoice only if required elsewhere in this contract.

(ix) Electronic funds transfer (EFT) banking information.

(A) The Contractor shall include EFT banking information on the invoice only if required elsewhere in this contract.

(B) If EFT banking information is not required to be on the invoice, in order for the invoice to be a proper invoice, the Contractor shall have submitted correct EFT banking information in accordance with the applicable solicitation provision (e.g., 52.232- 38, Submission of Electronic Funds Transfer Information with Offer), contract clause (e.g.,

52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration, or 52.232-34, Payment by Electronic Funds Transfer--Other Than Central Contractor Registration), or applicable agency procedures.

(C) EFT banking information is not required if the Government waived the requirement to pay by EFT.

(x) Any other information or documentation required by the contract (e.g., evidence of shipment).

(4) Interest penalty. The designated payment office will pay an interest penalty automatically, without request from the Contractor, if payment is not made by the due date and the conditions listed in paragraphs (a)(4)(i) through (a)(4)(iii) of this clause are met, if applicable. However, when the due date falls on a Saturday, Sunday, or legal holiday, the designated payment office may make payment on the following working day without incurring a late payment interest penalty.

(i) The designated billing office received a proper invoice.

(ii) The Government processed a receiving report or other Government documentation authorizing payment, and there was no disagreement over quantity, quality, or Contractor compliance with any contract term or condition.

(iii) In the case of a final invoice for any balance of funds due the Contractor for supplies delivered or services performed, the amount was not subject to further contract settlement actions between the Government and the Contractor.

(5) Computing penalty amount. The Government will compute the interest penalty in accordance with the Office of Management and Budget prompt payment regulations at 5 CFR part 1315.

(i) For the sole purpose of computing an interest penalty that might be due the Contractor, Government acceptance is deemed to occur constructively on the 7th day (unless otherwise specified in this contract) after the Contractor delivers the supplies or performs the services in accordance with the terms and conditions of the contract, unless there is a disagreement over quantity, quality, or Contractor compliance with a contract provision. If actual acceptance occurs within the constructive acceptance period, the Government will base the determination of an interest penalty on the actual date of acceptance. The constructive acceptance requirement does not, however, compel Government officials to accept supplies or services, perform contract administration functions, or make payment prior to fulfilling their responsibilities.

(ii) The prompt payment regulations at 5 CFR 1315.10(c) do not require the Government to pay interest penalties if payment delays are due to disagreement between the Government and the Contractor over the payment amount or other issues involving contract compliance, or on amounts temporarily withheld or retained in accordance with the terms of the contract. The Government and the Contractor shall resolve claims involving disputes and any interest that may be payable in accordance with the clause at FAR 52.233-1, Disputes.

(6) Discounts for prompt payment. The designated payment office will pay an interest penalty automatically, without request from the Contractor, if the Government takes a discount for prompt payment improperly. The Government will calculate the interest penalty in accordance with the prompt payment regulations at 5 CFR part 1315.

(7) Additional interest penalty.

(i) The designated payment office will pay a penalty amount, calculated in accordance with the prompt payment regulations at 5 CFR part 1315 in addition to the interest penalty amount only if--

(A) The Government owes an interest penalty of \$1 or more;

(B) The designated payment office does not pay the interest penalty within 10 days after the date the invoice amount is paid; and

(C) The Contractor makes a written demand to the designated payment office for additional penalty payment, in accordance with paragraph (a)(7)(ii) of this clause, postmarked not later than 40 days after the invoice amount is paid.

(ii)(A) The Contractor shall support written demands for additional penalty payments with the following data. The Government will not request any additional data. The Contractor shall--

(1) Specifically assert that late payment interest is due under a specific invoice, and request payment of all overdue late payment interest penalty and such additional penalty as may be required;

(2) Attach a copy of the invoice on which the unpaid late payment interest is due; and

(3) State that payment of the principal has been received, including the date of receipt.

(B) If there is no postmark or the postmark is illegible--

(1) The designated payment office that receives the demand will annotate it with the date of receipt, provided the demand is received on or before the 40th day after payment was made; or

(2) If the designated payment office fails to make the required annotation, the Government will determine the demand's validity based on the date the Contractor has placed on the demand, provided such date is no later than the 40th day after payment was made.

(iii) The additional penalty does not apply to payments regulated by other Government regulations (e.g., payments under utility contracts subject to tariffs and regulation).

(b) Contract financing payment. If this contract provides for contract financing, the Government will make contract financing payments in accordance with the applicable contract financing clause.

(c) Fast payment procedure due dates. If this contract contains the clause at 52.213-1, Fast Payment Procedure, payments will be made within 15 days after the date of receipt of the invoice.

(d) Overpayments. If the Contractor becomes aware of a duplicate payment or that the Government has otherwise overpaid on an invoice payment, the Contractor shall immediately notify the Contracting Officer and request instructions for disposition of the overpayment.

### **I.3 52.252-2 CLAUSES INCORPORATED BY REFERENCE (FEB 1998)**

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

[www.arnet.gov](http://www.arnet.gov)

**PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACHMENTS****SECTION J - LIST OF ATTACHMENTS**

ATTACHMENT NUMBER	TITLE
1	Statement of Work/Specification
2	Management Directive 3.8 entitled "Unclassified Contractor and Grantee Publications in the NUREG Series"
3	Billing Instructions for Cost Reimbursement Type Contracts
4	Contractor Spending Plan (CSP)

## STATEMENT OF WORK

TITLE: Phase II - ALLOY 600 CRACKING

I. INTRODUCTION

Cracking in the Control Rod Drive Mechanism (CRDM) nozzles and seal welds at Oconee Nuclear Station was first noted on Unit 1 when small amounts of boron residue was found on the top of the reactor pressure vessel (RPV) head in November 2000. Similar problems were found on Unit 3 in February 2001 and on Unit 2 in May 2001. Subsequent examinations of the CRDM nozzles with boron residue found through-wall axial cracking in all of these nozzles and through-wall circumferential cracking in three of the nozzles. Since April 2001, the NRC staff has frequently held public meetings with the industry at NRC Headquarters to discuss cracking of CRDM nozzles.

On August 3, 2001, the NRC issued Bulletin 2001-01, "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles." The bulletin requested information from the licensees of 69 pressurized water reactors (PWRs) regarding the structural integrity of their nuclear reactor RPV head penetrations. Because of the potentially serious consequences of the cracking and questions relative to the continued safe operation of these nuclear power plants, an urgent sole source purchase order was placed on June 22, 2001, with a contractor to perform an independent evaluation of industry submittals relative to circumferential cracking of reactor pressure vessel head penetration nozzles (Purchase Order no. DR-01-0106, "Control Rod Drive Mechanism Cracking"). This contractor had previously performed work for the NRC relative to cracking in stainless steel piping. Because of the similarities in materials and cracking mechanism (primary water stress corrosion cracking [PWSCC]), the contractor was requested to review industry submittals relative to CRDM cracking and assess whether nuclear power plant detection systems are adequate for detecting the type and size cracks that were reported in CRDM nozzles. In addition, as required, the contractor would provide expertise and assessments relative to: additional industry submittals, NRC staff analyses, and meetings with the NRC Advisory Committee on Reactor Safeguards (ACRS).

As plants began their scheduled inservice inspections in the fall of 2001 and examined CRDM nozzles in response to the bulletin, an alarming number of reports of additional nozzle cracking were received by the NRC staff. Fifteen PWRs reported 69 cracked CRDM nozzles. On January 2, 2002, a contract was awarded to the contractor to develop an improved probabilistic model for performing time to failure from leakage relative to circumferential crack evaluations in CRDMs (NRC-04-02-062). The efforts of the contractor provided some of the analyses required by the NRC staff to adequately disposition industry responses to the bulletin and to predict the service life of CRDMs for operating reactors.

On February 16, 2002, the Davis-Besse Nuclear Power Station in Oak Harbor, Ohio, began a refueling outage that included inspecting the CRDM nozzles (consistent with the licensee's commitments in response to NRC Bulletin 2001-01). In conducting its inspections, the licensee found that three CRDM nozzles had indications of axial cracking, which had resulted in leakage of the reactor's pressure boundary. On March 6, 2002, during the repair process, the licensee

discovered significant material wastage of the head of the RPV. Boric acid had consumed the RPV head down to the stainless steel cladding on the inside surface of the RPV head.

On March 7, 2002, the Office of Nuclear Reactor Regulation (NRR) requested additional support from the Office of Nuclear Regulatory Research (RES) to assess the causes and consequences of the RPV head wastage. Due to the serious nature of the occurrence, the assessment had to be initiated very quickly. On March 7, 2002, RES requested that the contractor assist in the Davis-Besse assessment (the head wastage issue is directly related to the tasks in the original statement of work (CRDM cracking). The contract was modified to address this occurrence.

On August 23, 2002, the contract was modified to make enhancements to the CRDM probabilistic code and provide further expert panel technical assistance in assessing industry submittals.

Phase II of this program addresses the enhancement of some previous and/or on-going efforts plus additional long term needs relative to the assessment of CRDM cracking. Cracking has occurred in CRDM nozzles not predicted to experience cracking for at least 15 more years. This has raised questions relative to the issues of residual stresses, crack driving forces, and crack growth. In addition, the head wastage at Davis-Besse has generic implications relative to using leakage detection as a viable tool for detecting CRDM cracking.

## II. OBJECTIVES

The contractor shall provide technical assistance to the NRC's Office of Nuclear Regulatory Research (RES) to:

- Further development of weld residual stress fields, K solutions, and crack growth rate (none of these are given in the new ASME Code Case).
- Incorporate the use of tetrahedral elements into the probabilistic computer code so that complex geometries can be meshed.
- More fully establish the influence of material properties and component geometry on the crack solutions for CRDM tubes.
- Provide insight into the effectiveness of surface treatment for stress corrosion cracking mitigation.
- Establish the effects of different manufacturing variables on the crack driving force.
- Continuance of technical assistance relative to review of licensee submittals and ACRS meetings.
- Incorporate state of the knowledge as well as a deterministic intermediate nozzle (approximately midway down side of head) into probabilistic model.

### III. SCOPE OF WORK - PHASE II

#### **Task 1: Efficient and Versatile Computational Procedure for J and K**

The computation of J and K in the standard commercial software ABAQUS is restricted to brick elements. Generating brick elements in the complex structure of CRDM requires much more effort than generating highly flexible tetrahedral elements. As the CRDM effort moves into more complex crack geometries than what have been analyzed so far, generating brick elements for the purpose of J and K computation becomes prohibitively time-consuming. In contrast, the tetrahedral elements are so flexible that complex geometries can be meshed easily with most commercial finite element modeling package such as PATRAN, FEMAP, and ABAQUS/CAE. Post-processing subroutines that enable the computation of J and K from tetrahedral elements have been developed for applications other than cracking of CRDMs. The subroutines have been validated against J and K values computed from brick elements for both through-wall and surface-cracked geometries. This limited validation shows that these subroutines are highly promising and accurate when properly used. Such a subroutine would have to be fine-tuned and validated for use in CRDM models, but the cost to do so is well worthwhile when compared to the total cost of modeling complex crack geometries using brick elements. This effort will also provide insight into the optimum meshing strategy for generating accurate J and K values from the tetrahedral elements.

The contractor shall obtain a post-processor computer subroutine which interfaces with the ABAQUS code stress analysis output files and:

- (1) Validate the J and K computational procedure of tetrahedral elements for CRDM models, generate models with tetrahedral elements, and compare the J and K values computed from the tetrahedral models with available J and K values generated using brick elements. It is anticipated that assistance from a subcontractor will be required to modify the probabilistic code developed in Phase I.
- (2) Expand the routine to produce Mode I, Mode II, and Mode III components of the elastic K.

#### **Task 2: Additional Circumferential Through-Wall Crack Solutions for the Center Hole Nozzle**

Because of the need for an expeditious determination relative to the extent of the problem, Phase I of the program analyzed only a set of baseline J-weld and tube installation conditions were analyzed. The results suggested that the stress states in the CRDM tube are highly dependent on a number of manufacturing factors. More importantly, questions were raised whether the baseline conditions produce the most severe stress fields for CRDM cracking. These significant probabilistic variables need to be more fully investigated to better quantify the effects of variables such as material properties and component geometry on the crack solutions, and also to provide a more representative range of crack solutions for the probabilistic code for the manufacturing and operating conditions that most likely exist for U.S. reactors.

Using the 3-D center nozzle model developed in Phase I and considering only one crack angle, the contractor shall perform weld stress computations and fracture analyses for the following variables:

- (1) Phase I efforts suggested that the J-weld groove angle is an important factor. A survey of the U.S. PWR fleet indicated that the J-weld groove angle varies from 15° to 30°. Phase I efforts only analyzed a J-weld groove angle of 22°. The contractor shall analyze J-weld groove angles of 15° and 30°.
- (2) A Phase I sensitivity study on the height of the weld indicated that the longitudinal stresses near the root and toe of the weld were very sensitive to weld height. During Phase I, the Electric Power Research Institute (EPRI) Material Research Project (MRP) released information regarding a survey of weld height information. Information has been obtained which indicates that the weld height can vary in either a constant volume manner or be higher or lower on the downhill side than the uphill side. In addition, to meet ASME Code requirements, the weld height will vary with changes in the J-weld groove angle. A correlation needs to be established between the longitudinal stresses and the height of the weld. The contractor is to suggest three appropriate weld heights for each groove angle which will be analyzed under Phase II.
- (3) On-going industry efforts relative to CRDM cracking show that Alloy 600 tube often exhibits strength variations which results from the tube manufacturing process. The contractor shall incorporate the strength variations used in the industry studies for Phase II activities.
- (4) The CRDM tube manufacturing process "builds in" stresses which may prove to be significant relative to cracking. Industry's efforts have assumed that the CRDM tubes are stress free, but a limited study showed residual stresses in the order of 18 ksi. Existing residual stresses in the CRDM tube due to different manufacturing processes needs to be characterized to determine the influence on the crack growth analyses. One experimental approach to evaluating the existence of residual stresses in the CRDM tube is to test as manufactured tubes that have not been placed in service and to test tube material that has been in service. The residual stress from tube manufacturing can be measured using a neutron diffraction technique. The NRC will address this under a separate contract. The NRC will transmit the results to the contractor. The measured residual stress field shall be applied as initial conditions in the contractor's weld stress analyses.
- (5) The industry has proposed various surface treatments (sand blasting, polishing, etc.) to introduce a compressive surface residual stress layer on the interior surface of the RPV head and tube inner surface as a means for SCC mitigation. Phase I efforts have shown that ASME system leakage testing and in-service pressure modify the surface stress states. Thus, the surface treatment may be less effective than expected. The contractor shall analyze the relief of compressive surface residual stress.
- (6) Phase I results indicate that the J-weld fabrication defects and the formation of an axial crack in the J-weld region would result in a redistribution of the stress fields. This would

increase the stresses at the root of the weld, which in turn would accelerate the initiation and growth of circumferential cracks. This will produce a crack-driving force value from the geometric singularity even in the absence of a stress-corrosion crack. Determining the K/J value is critical from a threshold stress viewpoint for initiation of primary water stress corrosion cracking (PWSCC) around the circumference of the J-weld in a water environment. In addition, this analysis is required to analyze the crack growth as a through-wall crack develops. The contractor shall evaluate the crack-driving force at the root of the weld without a crack for:

- Nozzles with different angles, and
- Different weld heights.

### **Task 3: Additional Circumferential Through-Wall Solutions for Steepest-Side-Hill Angle Nozzle**

The circumferential through-wall crack solutions in Phase I efforts dealt only with the baseline, low tube strength situations. Additional efforts are needed to address the tube strength effects on the crack solutions. The crack angle in the current side hill model is fixed at the radial direction around the circumference of the tube. The service load puts a shear stress on the cracked plane, thus creating a strong Mode III loading. In reality, sub-critical crack growth is more likely to follow a Mode I path. To model Mode I cracking, the crack angle needs to be varied along the circumference of the tube. The K solutions from such variable angle models are useful in determining whether the current K equivalence procedure is sufficiently accurate. Conducting these additional analyses of the circumferential through wall crack will establish the influence of material properties and component geometry on the crack solutions for the CRDM tube.

- (1) Using the existing steepest side-hill 3D finite element mesh and weld heat flow analysis results, the contractor shall conduct additional weld stress and fracture analyses to develop the K solutions for the highest tube strength conditions. A "high" interference fit case will also be considered. These solutions will be generated for one crack angle.
- (2) The contractor shall generate K-solutions at the steepest side-hill CRDM nozzle using models with variable crack angle along the circumference of the tube.

**NOTE:** This task addresses the development of a procedure to generate variable-angle cracks along the circumference, and the generation of K solutions for one crack angle. In the proposal, the contractor is to suggest the most appropriate crack angle to be used for this work based on the results to date.

### **Task 4: Angled Crack Through-Wall Thickness - Center-Hole Model**

Phase I results indicate a significant Mode III loading condition if the crack angle is perpendicular to the surface as modeled by the industry. Subcritical crack growth typically occurs in a Mode I loading direction. Hence, the cracks should grow at some angle through the thickness if the loading condition is mostly Mode I. This needs to be explored to determine the

differences in the driving force (K or J) compared with the combined-mode perpendicular-crack analyses conducted to date. In addition, a sensitivity study needs to be conducted relative to the yield strength, crack lengths, angles through the thickness, and interference fit.

- (1) To characterize the impact, the contractor shall modify the mesh generator to accommodate an angled crack in the CRDM center hole model. It is anticipated that a small subcontract will be required to modify the mesh generator.
- (2) The contractor shall conduct an initial investigation into an angled crack under constant stress field to determine if changing only the crack angle will have an effect on the  $K_{eq}$  solution.
- (3) The contractor shall conduct a sensitivity study using the weld residual stresses from Phase I to determine the crack angle producing a maximum  $K_{eq}$  driving force.
- (4) The contractor shall select K/J solutions from the finite element analyses and determine the optimum crack angle.
- (5) If the results indicate that angled cracks should be used for the remainder of the analyses, the contractor shall incorporate the new  $K_{eq}$  solutions into the probabilistic CRDM code.

#### **Task 5: Development of Axial Surface Crack Solutions**

Axial surface crack solutions are needed for the crack growth assessments and time to leakage modeling. ASME Section XI is currently developing a Code Case which would allow an axial surface crack below the weld if it can be demonstrated that it will not grow above the weld by the next refueling outage. The Code Case will not, however, address weld residual stress fields, K solutions, and the NRC acceptable crack growth rate. The effects of existing residual stresses in the CRDM tube due to different manufacturing processes, weld residual stress fields, K solutions, and the NRC acceptable crack growth rate could be incorporated into the axial surface crack procedure developed by the contractor. This task will generate K-solutions for axial surface cracks. These solutions will form part of the probabilistic analysis methodology for axial surface cracks.

To assess crack growth and time to leakage, the contractor shall develop an analysis procedure for use by the NRC staff to assess submittals using weld residual stress fields, K solutions, and the NRC acceptable crack growth rate. The contractor shall vary  $a/t$  and crack length and place the crack above and below the weld as well as on the ID and OD. *Regulatory questions have been raised relative to leakage limits in plant technical specifications and the ability to observe leakage from CRDM nozzles. This task is to be considered a high priority and be immediately initiated. This task is to be completed 5 months after the contract is awarded.*

NOTE: This effort addresses the development of the K solutions for one residual stress field. In the proposal, the contractor shall make a recommendation as to the residual stress field to used.

#### **Task 6: Intermediate Nozzle Angle**

The contractor shall conduct an analysis of an intermediate nozzle angle. Analyses of a center-hole nozzle and a steepest angle side-hill nozzle were performed in Phase I. To date, there is no apparent correlation between nozzle location and cracking. Many of the important parameters such as weld sequencing, interference fit, and tube yield strength can vary widely depending on the location of the nozzle or heat of material. At this time, it is not known how the variables studied in Phase I are affected by the location of the CRDM nozzle in the RPV head. Because of the large variance between the top of the reactor vessel head and lowest side-hill nozzle, interpolation of the results may be very difficult. In the proposal, the contractor shall make a recommendation as to the nozzle angle to be modeled and analyzed.

#### **Task 7: Upgrade of Probabilistic Computer Code**

Phase I CRDM probabilistic efforts involved the development of an analysis procedure for determining the failure probability from the time of leakage. The current release of the computer code does not allow for easy incorporation of user-friendly improvements. Some of the shortfalls of the current code include the inability to specify filenames, to control the placement of windows on the screen, and to control the graphical presentation of the data and results. In order to improve the user-interface and to allow the incorporation of future probabilistic routines, the contractor shall upgrade the computer code by adding a Visual Basic front-end to the existing Fortran code. The Visual Basic code will allow user-friendly improvements to be incorporated into the program more easily. In addition, additional data has become available from the Spring and Fall 2002 plant outages. The contractor shall incorporate the time to initiation data from plant experiences.

#### **Task 8. Expert Panel Assistance/Coordination and Program Reports**

Phase I coordination efforts and consultations with the NRC staff and industry were very time intensive due to questions raised relative to facilities being able to continue to safely operate. Phase II efforts are aimed at addressing longer-term aspects, and it is anticipated that work under this task will be less frenetic. However, the effort required relative to industry coordination and in providing technical assistance to the NRC staff should not be underestimated because this research will be used in support of regulatory activities. The following activities are necessary to support the technical efforts:

- (1) Industry coordination, meetings, and conference calls (e.g., comparison of results with industry analyses on regular basis).
- (2) ACRS/NRC meetings – provide briefings as required.
- (3) Technical assistance – provide technical expertise to the NRC as required.
- (4) Reports – monthly status and a program final (yearly) report are necessary to document progress and report the findings of this study.

## **Task 9. Comparison with Industry Results**

In Phase I of the program, information exchanges with industry contractors including results were begun. One of the purposes of the exchange was to compare the residual stresses for a low yield strength CRDM tube. Different modeling techniques are used, and the industry's technique is based on some previous efforts in this area. In Phase II, the contractor shall continue to exchange information and results with industry contractors for the purpose of comparing: stress versus location line plots across the weld metal or tube; and residual stress comparisons for a high yield strength tube. Since the information exchanges will take place over the entire performance period as results become available, the contractor shall describe the results of the comparison in detail in the subsequent monthly report.

## **Task 10. Steepest Side-hill Weld Residual Analysis - Instantaneous Weld Bead Sequencing**

In Phase I, discussions with industry welding personnel revealed that a "standard" CRDM welding procedure was not developed for the construction of existing plants, i.e., reliance was placed on the skill of each qualified welder. Certain nuclear power plant constructors such as B&W, however, made some attempts to standardize the weld sequencing procedure as experience was gained. As a result, the contractor in Phase I used the B&W procedure whereas the industry contractor, in an attempt to simplify the analysis, placed the weld beads in one continuous pass. Differences in solutions in the limited information exchanges conducted in Phase I may be the result of the effect of sequencing on the location of maximum residual stress. The purpose of this task is to determine the effect of sequencing on the circumferential crack K-solutions for the steepest side-hill model. Using the model generated in Phase I, a weld residual stress analysis shall be performed on a low yield strength tube, 0-mil interference fit, 605°F operating temperature, where the weld beads are placed as one continuous pass. The resulting residual stress patterns shall be compared to those calculated in Phase I. In addition, at least 10 circumferential crack lengths shall be analyzed and K-solutions developed. A letter report is to be provided summarizing this task 12 months after project initiation.

## **IV. TECHNICAL QUALIFICATIONS**

- (1) Expertise in materials and structural mechanics.
- (2) Expertise in finite element analyses (ABAQUS).
- (3) Expertise in developing probabilistic codes.
- (4) Expertise in leakage detection methodology and leak-rate calculations with existing leak-rate codes.
- (5) Detailed knowledge of PWR vessel head and CRDM design and manufacturing methods including material property information.
- (6) Detailed knowledge of techniques used to reduce residual stresses in CRDMs (e.g., weld sequencing).

- (7) Detailed knowledge of industry and NRC staff analyses regarding reported occurrences of CRDM cracking and NRC actions (e.g., notices, bulletins).
- (8) Knowledge of NRC regulatory process as it relates to CRDM cracking.

#### **Level of Effort**

The estimated level of effort for the Phase II efforts are 4,669 person-hours with a period of performance of 30 months.

#### **Deliverables**

- (1) Letter report detailing the characterization of prior residual stresses in CRDM tubes due to the tube making process. The NRC staff is presently negotiating to obtain samples of Alloy 600 CRDM tubing. It appears likely that the NRC will be able to obtain samples, but this is not a certainty. Hence at present, there is no "availability date."

**DUE DATE:** 15 months from the effective date, contingent upon NRC obtaining samples of Alloy 600 CRDM tubing.

- (2) Letter report describing the development of axial surface crack solutions with an analysis procedure to be used by the NRC staff to assess submittals using weld residual stress fields, K solutions, and the NRC acceptable crack growth rate.

**DUE DATE:** To be completed 5 months after award of contract.

- (3) Letter report recommending NRC enhancements to the ASME Code Case.

**DUE DATE:** 7 months from the effective date of the contract.

- (4) Letter report summarizing the comparison of the residual stress patterns using different weld sequencing

**DUE DATE:** 12 months from the effective date of the contract.

- (5) Revision of the probabilistic code.

**DUE DATE:** Draft - 15 months from the effective date of the contract  
Final - 28 months from the effective date of the contract

- (6) Monthly progress reports (including financial updates).

**DUE DATE:** See Section F.3 of contract.

#### **IV. MEETINGS AND TRAVEL REQUIREMENTS**

Three trips, one individual, to NRC Headquarters in Rockville, Maryland for two days each shall be required at dates to be determined.

One trip, two individuals, location to be determined within continental U.S., to Westinghouse/CE facility to acquire information relative to reactor pressure vessel head and CRDM manufacturing.

#### V. PUBLICATIONS

RES encourages the publication of the scientific results from RES sponsored programs in refereed scientific and engineering journals as appropriate. If the contractor proposes to publish in the open literature or present the information at meetings in addition to submitting the required technical reports, approval of the proposed article or presentation will be obtained from the NRC Project Manager (PM).

#### VI. GOVERNMENT FURNISHED MATERIALS

Documents related to this effort (e.g., industry presentations to the NRC) will be furnished as requested at the time of the contract being awarded.

***Unclassified Contractor and  
Grantee Publications in the  
NUREG Series***

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***Handbook  
3.8***

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## Part I

### Introduction

This handbook specifies the procedures that the Nuclear Regulatory Commission (NRC) contractors and grantees need to follow when preparing the following publications for the NRC: (A)

- Final NUREG reports (1)
- International agreement reports (2)
- Books (3)
- Grant publications (4)

The handbook is divided into six major parts and includes a glossary and exhibits. Part II provides general information for staff consideration in preparing statements of work. Parts III, IV, V, and VI provide publishing guidelines specific to, respectively, contractor reports, international agreement reports, books, and grantee publications. (B)

*Contractor* means a private contractor, consultant, expert, another State or Federal agency working under an interagency agreement, or a Department of Energy (DOE) facility or subcontractor, such as a national laboratory, working under the DOE/NRC Memorandum of Understanding of February 24, 1978, and any subcontractors of these organizations. (C)

This directive and handbook, as well as a copy of "Publishing Documents in the NUREG Series" (NUREG-0650, Revision 1), must be included or referenced in all contracts, interagency and international agreements, and grants for which the publications previously listed are contract deliverables or grant obligations. In addition to the guidelines specific to each type of publication that appear in subsequent parts of this handbook, all statements of work must contain the applicable guidelines outlined in Part II. (D)

## **Part II**

# **Preparing Publication Requirements for Statements of Work for Contracts**

### **Specifying Publication Requirements (A)**

List and describe the type of technical reports required from each project, task, or subtask, as applicable. State when, how many, and to whom the reports should be submitted and the scope of information they should contain. These reports may be unclassified, sensitive unclassified, or classified. For guidelines and requirements covering sensitive unclassified and classified publications, refer to Management Directive (MD) 12.2, "NRC Classified Information Security Program," and MD 12.6, "NRC Sensitive Unclassified Information Security Program." (1)

This directive and handbook pertain to publications that will be issued in the NUREG/CR, NUREG/IA, and NUREG/GR series. (2)

### **Publishing Formal Reports (B)**

NUREG series reports will be printed and distributed by NRC from camera-ready copy submitted by the contractor to the Publications Branch, Mailstop T-6 E7, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. The camera-ready copy is to be prepared in accordance with the provisions of this handbook. Recommended guidelines for the organization and format of formal reports are specified in "Publishing Documents in the NUREG Series" (NUREG-0650, Revision 1). (1)

When the report contains sensitive unclassified or classified information, the contractor must comply with MD 12.2. (2)

## **Publishing Formal Reports (B) (continued)**

If a draft is desired before completing a final report, specify in the statement of work (SOW) the due date for delivering the final camera-ready copy after receiving comments from NRC staff or participants (if applicable) on the draft. State that all draft material be submitted to the cognizant NRC contact. (3)

When the contractor is to submit draft material for comment before preparing the final report, state that the contractor will be asked to make changes if there are comments from NRC staff or participants. If agreement on the changes is reached, the NRC contact will authorize the contractor to prepare the final copy and submit it to the NRC contact if it is a letter report or input to a Safety Evaluation Report or an Environmental Statement, or to the Director, Division of Freedom of Information and Publications Services (DFIPS) if it is a camera-ready copy for printing and distribution. This procedure will ensure proper publication, handling, distribution and, among other things, preclude further changes that might nullify the agreement. (4)

If special caveats were agreed to between the contractor and the NRC contact, the caveats should accompany the NRC Form 426A (Exhibit 1) for approval when it is sent to the NRC contact. A copy of special caveats should also accompany the camera-ready copy sent to DFIPS. (5)

If agreement on changes to a formal technical report to be issued in the NUREG/CR series is not reached, the NRC contact may request the contractor to prepare the camera-ready copy with, in addition to the standard disclaimer required on all contractor formal reports (see Section (F), Part III of this handbook), any caveats deemed necessary to cover NRC objections. These caveats may range from "The views expressed in this report are not necessarily those of the U.S. Nuclear Regulatory Commission" to the addition of a preface setting forth the NRC opinion or footnotes at appropriate locations within the text. (6)

If NRC objections cannot be covered in this manner, NRC can refuse to publish the report. In the case of DOE/national laboratory reports, the DOE Operations Office Manager responsible for the laboratory should be informed by the NRC office director or regional administrator of the decision and the reasons therefor. A copy of the decision should be sent to the laboratory director. In the case of another Federal agency, a State, or a private contractor, the person who entered into the contract should similarly be informed by the

## Publishing Formal Reports (B) (continued)

NRC contracting officer. The contractor is then free to publish the report without identifying NRC as the funding sponsor of the report and without the NRC disclaimer. Decisions by the office director or designee may be appealed to the appropriate Deputy Executive Director for Operations. (7)

## Publishing Unclassified Information in the Open Literature and Presenting Papers (C)

Specify whether the contractor's principal investigator is permitted to publish in the open literature instead of submitting a final report and/or to present papers at public or association meetings during the course of the work. If this arrangement is authorized, add the following statement to the SOW: (1)

The principal investigator may publish the results of this work in the open literature instead of submitting a final report or may present papers at public or association meetings at interim stages of the work.

If the NRC contact wants to review the paper or journal article before presentation or submission for publication, so state in the SOW, as follows: (2)

The principal investigator may publish the results of this work in the open literature instead of submitting a final report or may present papers at public or association meetings at interim stages of the work if the article or paper has been reviewed by the NRC contact in draft form and agreement has been reached on the content.

If agreement is not reached, NRC may also require that the paper include in addition to the standard statement "Work supported by the U.S. Nuclear Regulatory Commission," any caveats deemed necessary to cover NRC objections. If NRC objections cannot be covered in this manner, NRC may refuse to authorize publication in the open literature and/or presentation of papers. (3)

In the latter case, NRC will inform the contractor of the decision, as previously stated. The contractor is then free to publish without identifying NRC as the funding sponsor of the information. Decisions by office directors or designees may be appealed to the appropriate NRC Deputy Executive Director for Operations. (4)

## Publishing Unclassified Information in the Open Literature and Presenting Papers (C) (continued)

If the contractor proposes to publish in the open literature or present the information at meetings *in addition* to submitting the required technical reports, approval of the proposed article or presentation should be obtained from NRC. NRC shall approve the material as submitted, approve it subject to NRC-suggested revisions, or disapprove it. In any event, NRC may disapprove or delay presentation of papers on information that is subject to the Commission's approval that has not been ruled upon or that has been disapproved (5)

If the contractor requests permission to publish in the open literature even though the contract does not explicitly provide for this type of publication, the contract can be modified to provide for such presentations. (6)

When the contractor submits journal articles for publication, each must be accompanied by the following statement: (7)

The submitted manuscript has been authored by a contractor of the U.S. Government under Contract\* No. \_\_\_\_\_. Accordingly, the U.S. Government has a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes.

All published papers and articles must include the following disclaimer: (8)

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use or the results of such use of any information, apparatus, product, or process disclosed in this report, or represents that its use by such third party would not infringe privately owned rights. The views expressed in this paper are not necessarily those of the U.S. Nuclear Regulatory Commission.

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\*For DOE work orders, the appropriate job code number is applicable.

## Publishing Unclassified Information in the Open Literature and Presenting Papers (C) (continued)

If the contractor is requested by the journal or other publisher to transfer the copyright, the contract author will respond to the journal or other publisher in writing in accord with the sample letter shown as follows: (9)

Dear (Copyright Holder's Name):

We recently received a document for signature assigning copyright and republication rights in the submitted article (title) to (name of publication). This letter is offered in lieu of the document as a means of completing the transfer of ownership. Accordingly, we hereby expressly transfer and assign our rights of ownership in the above-cited work to (name of publisher).

You are advised, however, that the above assignment and any publication or republication of the above-cited work is subject to the following Government rights:

The submitted manuscript has been authored by a contractor of the U.S. Government under Contract No. \_\_\_\_\_. Accordingly, the U.S. Government has a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes.

Sincerely,

If NRC approves open literature publication and page charges and travel costs are required for the presentation of papers, see MD 3.9, "NRC Staff and Contractor Speeches, Papers, and Journal Articles on Regulatory and Technical Subjects." (10)

## Reports Containing Sensitive Unclassified and Classified Information (D)

Examples of the proper marking of reports designated Official Use Only, Limited Official Use, Proprietary Information, Safeguards Information, and classified (CONFIDENTIAL, SECRET, and TOP SECRET) are specified in MD 12.2.

### **Conference and Workshop Proceedings (E)**

If NRC approves publication of compilations of papers presented at NRC-sponsored or cosponsored meetings, conferences, and symposia, see MD 3.11, "Conferences and Conference Proceedings."

### **Distribution of Reports to Contractors (F)**

Up to 50 copies of printed unclassified NUREG/CR, NUREG/GR, and NUREG/IA reports will be bulk shipped to the contractor by NRC. (The Joint Committee on Printing's *Government Printing and Binding Regulations* permit contractors to receive free of charge up to 50 copies of reports they have produced for NRC.) If fewer than 50 copies are needed, indicate the desired quantity on NRC Form 426A (Exhibit 1). Contractors requesting single copies for specific individuals in organizations other than the contractor's organization who are not included in the distribution requested by the NRC contact may address such a request, with written justification, to the NRC contact. If the additional distribution is approved by the NRC contact, the contractor shall send address labels with the camera-ready copy to the Publications Branch, DFIPS, USNRC, Washington, DC 20555-0001, and that distribution will be made along with the standard distribution.

### **Coordinating Contractor Press or Other Media Releases of Information (G)**

A contractor may request permission to issue a press or other media release on the work being done. That request must be made to the NRC office director or designee, who will consult with the staff of the Office of Public Affairs. The contractor must not issue a press release on nonroutine information without this prior approval. This approval may be obtained by a telephone call to the office director or designee to expedite the request. The contractor may appeal decisions not to authorize the release of information or delays in handling the request to the appropriate Deputy Executive Director for Operations.

## **Part III**

# **Draft and Final NUREG Reports**

### **Identification Information (A)**

#### **NUREG Number (1)**

Each contractor report published by NRC must be identified by a unique alphanumeric designation controlled and maintained by the Division of Freedom of Information and Publications Services (DFIPS). To obtain an NRC report number, call the Publications Branch, DFIPS, at (301) 415-7008. (a)

The NRC identification numbers will have one of the following forms: (b)

- NUREG/CR-0000
- NUREG/GR-0000
- NUREG/IA-0000

CR indicates contractor report, GR indicates grant report, and IA indicates international agreement report. The contractor report number, if any, will be placed below the NUREG number on the title page and cover. (c)

When a report consists of more than one volume or binding, or is issued in more than one edition, an appropriate volume, number, supplement, part, addendum, or revision designation must appear immediately below the NRC report number and the contractor's report number, if any. (d)

#### **Authors' Names (2)**

Authors' names must appear on the report cover and title page, unless placing them there is impractical, as for an annual report having many contributors. Editors or compilers with subject-area expertise may also be identified as such on the cover and title page. The authors'

## Identification Information (A) (continued)

### Authors' Names (2) (continued)

affiliation need not be listed unless it differs from the organization creating the report.

### Organizational Identification (3)

The Publications Branch, DFIPS, prepares the covers and title pages for all reports and will list information about the organization that created the report as it is provided.

### Previous Reports in Series (4)

If the report being prepared is one in an ongoing series, list all previous reports in the series. Include report numbers and issuance dates. Place this list on the back of the title page. If this list cannot be placed on a single page, place the pages at the end of the front matter rather than on the back of the title page.

### Report Dates (5)

The report dates are shown on the title page. These dates include the month and year the report is completed and the month and year it is published.

## Report Organization and Components (B)

The organization and components of contractor reports vary, depending on their purpose and scope. Recommended format and organizational guidelines appear in "Publishing Documents in the NUREG Series" (NUREG-0650 Revision 1). (1)

Each draft and final report prepared for NRC must include an abstract of 200 words or less that appears on a separate page preceding the table of contents. The abstract also must appear on the "Bibliographic Data Sheet," NRC Form 335 (Exhibit 2). Instructions for completing NRC Form 335 appear on the back of the form. Guidelines on the special writing requirements for preparing abstracts appear in Section 5.5 of NUREG-0650, Revision 1. (2)

## Pre-Publication Reviews (C)

### Patent Review (1)

Patent implications must be considered before approval of reports for public release so that disclosure will not adversely affect the patent

## **Pre-Publication Reviews (C) (continued)**

### **Patent Review (1) (continued)**

rights of NRC or the contractor. If the work being reported is contractually managed through another Government agency (e.g., DOE national laboratories), the contractor should request that Government agency to perform the patent review. The result of the review must be reported on NRC Form 426A under item 8 (see Exhibit 1). (a)

If NRC directly administers the contract, or the contractor is unable to obtain a patent clearance from the Government agency administering the contract, the responsible NRC contracting officer must be consulted, and the responsible NRC technical contact shall consider the patent implications. If the report does not require a patent review because the report does not contain any description of novel technical developments that may be of an inventive nature, mark "N/A" on the NRC Form 426A in the space for the Patent Counsel's signature. If a possibility exists that developments of an inventive nature are disclosed, the contracting officer shall request assistance from the NRC Assistant General Counsel for Administration, Office of the General Counsel, on (301) 415-1553. (b)

### **Security Review (2)**

If a report of sensitive unclassified or classified work is required, the NRC contact must work with the NRC Division of Security to establish the appropriate procedures and inform the contractor of these procedures through the contracting officer. The standards for marking and handling these reports are given in Management Directive (MD) 12.2, "NRC Classified Information Security Program."

### **Copyright Review (3)**

Copyrighted material must not appear in NRC-sponsored publications without written permission from the copyright holder. See Section 3.4 of NUREG-0650, Revision 1, for information about obtaining copyright permission.

## **Color Printing (D)**

Regulations issued by the Joint Committee on Printing (JCP) restrict the use of color in printed materials to those uses that are of demonstrable value. JCP regulations specify that "demonstrably valuable multicolor printing" includes the following categories: (1)

## **Color Printing (D) (continued)**

- Maps and technical diagrams for which additional color is necessary for clarity. (a)
- Object identification (medical specimens, diseases, plants, flags, uniforms, etc.). (b)
- Safety programs, fire prevention, savings bonds programs, and competitive areas of personnel recruiting. (c)
- Areas wherein clearly identifiable savings in costs can be soundly predicated on multicolor use. (d)
- Printing for programs required by law, whose relative success or failure is in direct ratio to the degree of public response, and for which that response can be logically attributable to the number of colors planned and the manner in which they are proposed to be used. (e)
- Color for promotional or motivational purposes, such as programs concerning public health, safety, and consumer benefits, or to encourage utilization of Government facilities, such as programs for Social Security, Medicare, and certain areas of need for veterans. (f)

The regulations indicate that the following categories do not meet the "demonstrable value" criteria: (2)

- Printed items wherein additional color is used primarily for decorative effect. (a)
- Printed items for which additional color is used primarily in lieu of effective layout and design. (b)
- Printed items for which additional color is used excessively, that is, four colors when two or three will fulfill the need, three colors when two are adequate, two colors when one is adequate. (c)
- Printed items wherein the inclusion of multicolor does not reflect careful, competent advance planning that recognizes the contribution that the use of color is expected to make to the ultimate end-purpose. (d)

## **Color Printing (D) (continued)**

If color printing is anticipated when the statement of work or standard order for DOE work is being prepared, contact the Publications Branch, DFIPS. Prior approval must be granted by the Director of DFIPS. If a requirement for color printing arises as the report is being prepared, submit a written justification for its use to the Director of DFIPS. (3)

## **Microfiche (E)**

NRC contractors and DOE laboratories submitting microfiche with reports must submit a hard copy of each microfiche, include headers on each microfiche as shown in Exhibit 3, and conform to the following NRC specifications.\*

- Microfiche must conform to either the 24/98 format for source documents with 14 columns and 7 rows (reduction ratio of 1 to 24) or the 48/270 format for computer output microfilm with 18 columns and 15 rows (reduction ratio of 1 to 48). (1)
- The microfiche sheet must be standard 105 mm by 148 mm. (2)
- The microfiche must be either a silver-halide master or a black or blue-black diazo placed in acid-free envelopes. (3)
- The microfiche must contain headers as shown in the sample in Exhibit 3. Specifically, the first block of the header must contain the NUREG number (include volume or revision, if applicable), the contractor identification number, and the classification (e.g., unclassified, proprietary). The second block must contain the description of the microfiche and may include the contractor's name. The third block must contain the publication date and the sheet identification. (4)
- The header information must be eye readable on a clear background. (5)
- A foldout page must be microfilmed in sections if the page is too large to be microfilmed in a double frame. No less than 25-mm overlap of original material is acceptable. (6)

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\*With the exception of items (3), (4), and (8), these specifications are consistent with the American National Standards Institute "Standard for Micrographics-Microfiche, ANSI/AIIM MS5-1985." Copies of this standard are available from the American National Standards Institute, ATTN: Sales Department, 11 West 42nd Street, 13th floor, New York, NY 10036 (212) 642-4900, or from the Association for Information and Image Management, ATTN: Publications Section, 1100 Wayne Avenue, Silver Spring, MD 20910 (301) 587-8202.

## Microfiche (E) (continued)

- The first frame must be blank (on the first sheet only), and the second frame must contain the National Institute of Standards and Technology's (NIST's) Reference Material resolution target in Microcopy Test Charts (NBS SRM 1010A). (7)
- Jacketed microfiche is unacceptable. (8)

## Disclaimers (F)

The following notice will be added by the Publications Branch, DFIPS, before the printing process on the inside front cover: (1)

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use, or the results of such use, of any information, apparatus, product, or process disclosed in this report, or represents that its use by such third party would not infringe privately owned rights.

The branch will print the additional statement, "The views expressed in this report are not necessarily those of the U.S. Nuclear Regulatory Commission," below the standard disclaimer, if appropriate. Other qualifying statements may be added, if needed. (2)

## Availability Information (G)

### Reference Material (1)

Reports or other documents referenced in text, reference sections, bibliographies, and appendixes of unclassified regulatory and technical reports in the NUREG series must be available to the public either in the public domain (as in a public library, at the Government Printing Office (GPO), at the National Technical Information Service (NTIS), or at other reference or sales outlets) or in the NRC Public Document Room (PDR). This means that references should not be made to personal communications and interviews, unpublished information and information with restricted distribution (e.g., proprietary, National Security, and Official Use Only). If the unretrievable information is important and unrestricted, quote it in

## **Availability Information (G) (continued)**

### **Reference Material (1) (continued)**

the text or in footnotes. Provide any credit due to individuals in the text or in an acknowledgment section. Availability may be stated collectively for all entries. (a)

Although proprietary reports may not be included in a list of references, listing or identification of proprietary reports may be included in an appendix or in a separate listing following the reference section titled "Proprietary Sources of Information." (b)

In addition, reference to Institute of Nuclear Power Operations (INPO) documents may not be made without prior approval from INPO. Approval to reference INPO documents must be stated on the NRC Form 426A. (c)

Guidelines for developing and presenting reference material are provided in NUREG-0650, Revision 1. (d)

### **Reports (2)**

Most final reports are sold by GPO and NTIS. A statement indicating this availability is added to each report, as appropriate, by the Publications Branch staff before the report is printed. (a)

Draft reports for which comments are requested are typically announced in the *Federal Register* as being available from the NRC. These reports are not sold at GPO or at NTIS. (b)

## **Forms (H)**

### **Bibliographic Data Sheet (NRC Form 335) (1)**

All published NRC reports must include an NRC Form 335 as the final right-hand page of the manuscript. Instructions for completing the NRC Form 335 appear on the back of the form. A completed NRC Form 335 must be submitted to the Technical Publications Section, DFIPS, with the camera-ready copy of the report. Exhibit 2 shows a completed NRC Form 335.

### **Release To Publish Unclassified NRC Contractor, Consultant, or Conference Proceedings Reports (NRC Form 426A) (2)**

The NRC contact must submit a completed NRC Form 426A (see Exhibit 1) with the camera-ready copy of the report to the Technical Publications Section, DFIPS. NRC Form 426A must be signed by the staff member designated by the appropriate office director.

## **Printing and Reprinting (I)**

The Publications Branch, DFIPS, will review the camera-ready report submitted for printing for its adherence to the standards and requirements set forth in this directive and handbook, as well as any relevant guidelines from NUREG-0650, Revision 1. Unsatisfactory manuscripts will be returned to the NRC contractor for appropriate action. (1)

Submit a memorandum requesting a reprint to the Director, DFIPS, or designee, for approval. Include with the request a written justification and the approval of the office director or designee for reprinting. Also provide address labels for recipients not on NRC standard distribution lists. (2)

## **Distribution (J)**

The Publications Branch, DFIPS, will arrange distribution for all copies of unclassified formal contractor reports in accordance with instructions on NRC Form 426A (Exhibit 1). The Publications Branch will also arrange automatic distribution of these reports to NRC NUDOCS, the NRC PDR, NTIS, GPO, and the GPO Federal Depository Library Program. (1)

Sensitive unclassified and classified reports will be distributed by the NRC sponsoring office on a case-by-case basis. (2)

## **Part IV**

# **International Agreement Reports**

### **Background and Rationale (A)**

NRC has cooperative nuclear safety research programs that involve either or both foreign governments and organizations and U.S. industry. These programs include monetary contributions, information exchange, and comments on program plans and results as authorized in the Energy Reorganization Act of 1974. To this end, international and U.S. industry agreements have been signed that provide for transmitting unclassified technical information from foreign participants to NRC. These procedures apply only to NRC-managed work. (1)

The interests of all NRC international nuclear safety research program participants are served best by formal dissemination of information on these programs or codes developed for or in cooperation with NRC. (2)

### **Identification Information (B)**

#### **Cover and Title Page (1)**

The cover and title page will contain a title, a subtitle (if appropriate), the names of the authors, the performing organization, and the NRC office sponsoring the project. The cover and title page will be prepared by the Publications Branch, Division of Freedom of Information and Publications Services (DFIPS).

#### **NRC Report Number (2)**

Each report must be identified by an NRC-controlled alphanumeric number as the prime number unique to that report. The centralized document control system for unique identification is maintained by DFIPS. Numbers may be obtained by calling the Publications Branch at (301) 415-7008. (a)

## Identification Information (B) (continued)

### NRC Report Number (2) (continued)

The NRC identification number will have the form "NUREG/IA-000," where IA indicates "international agreement." The foreign participant's report number, if any, may be inserted below the NUREG number on the cover, if desired. (b)

When a report consists of more than one volume or binding or is issued in more than one edition, include an appropriate volume, number, supplement, part, addendum, or revision designation below the report number and the foreign participant's report number, if any. (c)

### Previous Reports in Series (3)

If the report being prepared is one in an ongoing series, list all previous reports in the series. Include report numbers and issuance dates. Place this list on the back of the title page. If this list cannot be placed on a single page, place the pages at the end of the front matter rather than on the back of the title page.

## Report Organization and Components (C)

The organization and components of cooperative agreement reports vary somewhat, depending on their purpose and scope. Each of these reports must include an abstract of 200 words or less that appears on a separate page before the table of contents. The abstract must also appear on the "Bibliographic Data Sheet," NRC Form 335 (Exhibit 2). Instructions for completing NRC Form 335 appear on the back of the form (Exhibit 2). Guidance on the special writing requirements for preparing abstracts appears in Section 5.5 of NUREG-0650, Revision 1.

## Availability Information (D)

### References and Bibliographies (1)

Reports or other documents referenced in text, reference sections, bibliographies, and appendixes of unclassified regulatory and technical reports in the NUREG series must be available to the public either in the public domain (as in a public library, at the Government Printing Office (GPO), at the National Technical Information Service (NTIS), or at other reference or sales outlets) or in the NRC Public Document Room. This means that references should not be made to personal communications, interviews, and unpublished information with restricted distribution (e.g., proprietary, National Security, Official Use Only). If the unretrievable information is important and

## **Availability Information (D) (continued)**

### **References and Bibliographies (1) (continued)**

unrestricted, it can be quoted in the text, in footnotes or in appendixes. If the title of a document containing proprietary information is unclassified, it can also be quoted in the text or in a footnote. If credit is due to individuals, they can be mentioned in the text or in an acknowledgment section. Availability may be stated collectively for all entries. (a)

Although proprietary reports may not be included in a list of references, listing or identification of proprietary reports may be included in an appendix or in a separate listing following the reference section titled "Proprietary Sources of Information." (b)

In addition, reference to Institute of Nuclear Power Operations (INPO) documents may not be made without prior approval from INPO. Approval to reference INPO documents must be stated on the NRC Form 426A. (c)

Guidelines for developing and presenting reference material are provided in NUREG-0650, Revision 1. (d)

### **Reports (2)**

These reports will be made available for sale by GPO and NTIS.

## **Disclaimer (E)**

The following notice will be added by the Publications Branch, DFIPS, on the inside front cover before printing.

### **NOTICE**

This report was prepared under an international cooperative agreement for the exchange of technical information. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use, or the results of such use, of any information, apparatus, product, or process disclosed in this report, or represents that its use by such third party would not infringe privately owned rights.

## **Forms (F)**

### **Bibliographic Data Sheet (NRC Form 335) (1)**

Submit a typed NRC Form 335 (Exhibit 2) with the camera-ready copy to the Technical Publications Section, DFIPS, as the final right-hand page.

### **Release to Publish Unclassified NRC Contractor, Consultant, or Conference Proceedings Reports (NRC Form 426A) (2)**

An NRC Form 426A (Exhibit 1) must be completed and signed by the office director or designee and submitted with the camera-ready copy of the report to the Technical Publications Section, DFIPS.

## **Classified or Sensitive Unclassified Information (G)**

The NRC contact should refer to Management Directive 12.2 or call the Division of Security for answers to questions about the status of classified or sensitive unclassified information in NUREG/IA reports.

## Part V

### Books

#### General (A)

These guidelines apply to books written by contractors and grantees that are printed by NRC. See Part VI of this handbook for guidance on publications, including books, by grantees.

#### Definition (B)

A book refers to a publication intended as a permanent reference or as a textbook or major critical review of a technical or regulatory topic.

#### Format (C)

Books are usually 6 by 9 inches in trim size, but size will be based on requirements such as ease of use and legibility for graphics, foldouts, and the like. The binding (casebound or paperback) will be chosen according to the need for durability. Additional guidance on manuscript preparations can be found in the *U.S. Government Printing Office Style Manual* and the Chicago University's *A Manual of Style*. Refer also to NRC's "Publishing Documents in the NUREG Series" (NUREG-0650, Revision 1). (1)

The contractor shall submit to the NRC project manager the typeset (photocomposed) manuscript suitable for printing. The NRC contact shall submit the manuscript to the Chief, Publications Branch, Division of Freedom of Information and Publications Services, (DFIPS), where it will be reviewed for adherence to the standards set forth and referenced in this directive and handbook. The manuscript will also be reviewed for printing acceptability by the Printing and Mail Services Branch, DFIPS. Unsatisfactory manuscripts will be reported to the NRC contact for appropriate contractual action by the NRC contracting officer or, in the case of Government agency or interagency agreement work, the publications manager of the performing organization. (2)

## Format (C) (continued)

DFIPS will approve the design of the cover and title page containing appropriate information concerning—(3)

- Authors' names (a)
- Organizational identification (b)
- Public availability and sales (c)

All books must include a comprehensive subject index of the book's contents, unless the book is made up almost exclusively of graphical or tabular matter. See NUREG-0650, or *The Chicago Manual Style* (13th ed.) for guidelines on creating an index. (4)

## NRC Document Number (D)

Each book must be identified by an NRC-controlled alphanumeric code unique to that book. The alphanumeric code will have the form NUREG/CR for books prepared by contractors and NUREG/GR for books prepared by grantees. (1)

When a book consists of more than one volume or binding, or is issued in more than one edition, include an appropriate volume, number, supplement, part, addendum, or revision designation directly below the document number. (2)

Numbers are assigned by the Publications Branch, DFIPS. The number may be obtained before the manuscript is submitted to DFIPS for printing by calling the Publications Branch at (301) 415-7266. The DFIPS staff will arrange to meet with the NRC contact for the project and, when appropriate, the author(s), to discuss the publication production requirements and the schedule for the book. (3)

## Availability of Reference Materials (E)

The guidelines for availability of reference material given in Section G of Part III of this handbook also apply to books prepared by contractors and grantees that are published by NRC.

## Reviews (F)

### Peer (1)

Books published by NRC must undergo peer review by experts within and outside NRC. Peer review refers to a critical evaluation of the technical contents of a publication. These reviews may be conducted anonymously by reviewers from the author's own or a related field who are totally independent of the work leading to the manuscript. (a)

Reviewers should be chosen by the NRC office sponsoring the book from the potential audience for the publication and should provide an independent judgment about whether the publication successfully accomplishes the author's aims. Peer reviewers should be chosen for their expertise in the subject matter of the book. They may come from academia, the national laboratories, other Federal agencies, or from other research institutes or consulting firms. They may be identified from the membership rolls of professional societies, American National Standards Institute (ANSI) subcommittees, and the like. Do not choose more than one reviewer from the same organization. (b)

When assessing potential peer reviewers, screen for demonstrated competence and achievement in a specific discipline or research specialty. Assess competence based on the quality of research accomplished, publications in refereed journals, and other significant technical activities, achievements, and honors. Consider the judgment, perspective, and objectivity of reviewers. Consider also the personal integrity of those selected to ensure the confidentiality of information reviewed. Finally, avoid real or perceived conflicts of interest. Do not choose reviewers who are licensees or consultants to licensees, nor reviewers from intervenor groups. Likewise, do not choose reviewers who may profit financially from influencing the information reviewed. (c)

The services of reviewers from outside the agency may be acquired through consultant services contracts. The decision as to whether to reimburse peer reviewers should be made on a case-by-case basis, however. Recognize that reimbursing peer reviewers may give the appearance of a conflict of interest, suggesting to some that because NRC is paying for this service, the agency will seek only reviewers thought to be favorably disposed to the material reviewed. One way to offset this impression is to seek recommendations for peer reviewers from independent organizations, such as the American Physics

## Reviews (F) (continued)

### Peer (1) (continued)

Society, the American Nuclear Society, the American Society of Mechanical Engineers, or appropriate universities. Reimbursement could then be made to the organization. (d)

### Copyright (2)

Copyrighted material must not be reproduced in NRC books without appropriate authority, usually written permission of the copyright holder. See Section 3.4 of NUREG-0650, Revision 1, for information about obtaining copyright permission.

### Security (3)

On the basis of the knowledge of the information sources used, the author is responsible for ensuring that the manuscript does not contain classified or other access-controlled information. If uncertainty exists with respect to the security classification of a reference document or manuscript, an authorized classifier or the NRC Division of Security should be contacted for assistance. See also Management Directive 12.2, "NRC Classified Information Security Program."

### Patent (4)

The patent review guidelines for draft and final formal reports specified in Section (C)(1) of Part III of this handbook also apply to books prepared by contractors and grantees.

## Publishing Authorization Form (G)

A completed NRC Form 426A (Exhibit 1), signed by the office director or designee or by a DOE national laboratory authorized official if the publication is prepared for the Office of Nuclear Regulatory Research, must be submitted to DFIPS with the book manuscript.

## Disclaimers (H)

The following standard U.S. Government notice will be added before printing: (1)

## Disclaimers (H) (continued)

This document was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use, or the results of such use, of any information, apparatus, product, or process disclosed in this document, or represents that its use by such third party would not infringe privately owned rights.

The following additional statement may be printed below the standard disclaimer, if authorized by the NRC office director or designee: (2)

This document was prepared under U.S. Nuclear Regulatory Commission (NRC) Contract No. \_\_\_\_\_. The opinions, findings, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the NRC.

Other qualifying statements may be added, if needed. (3)

## Printing (I)

DFIPS will submit book manuscripts to GPO for printing. The printing cycle requires from 6 to 8 weeks.

## Distribution and Sales (J)

The DFIPS staff will arrange distribution in accordance with distribution guidance provided by the NRC project manager on NRC Form 426A (Exhibit 1). (1)

Free distribution should be limited to those who contributed materially to the book or to those for whom the book's subject matter bears directly on their work at or for NRC. (2)

DFIPS will arrange to make the book available for sale through GPO. DFIPS also will arrange to have it made available at the NRC PDR and for the GPO Federal Depository Library Program. (3)

## Part VI

# Grant Publications

### Background and Rationale (A)

The Nuclear Regulatory Commission funds grants for educational and nonprofit institutions, State and local governments, and professional societies for the expansion, exchange, and transfer of knowledge and ideas pursuant to the Atomic Energy Act of 1954, as amended, Sections 31.a and 141.b.

### Publication of Results (B)

The grant will specify the publication requirements of the award. Grant results may be published by NRC, by the grantee, or in the open literature.

#### Publication by NRC (1)

This publication option must be governed by the guidelines specified in Part III of this handbook for reports or in Part V of this handbook for books, as appropriate. See "Identification Information," Section (C) of this part.

#### Publication by a Grantee (2)

When the grant specifies that the grantee is to publish the results of his or her work, the grantee must grant to the Government a royalty-free, nonexclusive, irrevocable license to reproduce, translate, publish, use, and dispose of all copyrightable material first produced or composed in the grantee's performance under the grant.

#### Publication by a Grantee in the Open Literature (3)

When the grantee submits journal articles for publication, each article must be accompanied by the following statement: (a)

## Publication of Results (B) (continued)

### Publication by a Grantee in the Open Literature (3) (continued)

The submitted manuscript has been authored by a grantee of the U.S. Government under Grant No. \_\_\_\_\_. Accordingly, the U.S. Government has a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes.

All open literature publications prepared under this grant must contain the following statement: (b)

This paper was prepared with the support of the U.S. Nuclear Regulatory Commission (NRC) under Grant No. \_\_\_\_\_. The opinions, findings, conclusions, and recommendations expressed herein are those of the author(s) and do not necessarily reflect the views of the NRC.

If the grantee is requested by the journal or other publisher to transfer the copyright, the grantee author will respond to the journal or other publisher in writing in accord with the sample letter shown as follows: (c)

Dear (Publisher's Name):

We recently received a document for signature assigning copyright and republication rights in the submitted article (title) to (name of publication). This letter is offered in lieu of the document as a means of completing the transfer of ownership. Accordingly, we hereby expressly transfer and assign our rights of ownership in the above-cited work to (name of publisher).

You are advised, however, that the above assignment and any publication or republication of the above-cited work is subject to the following Government rights:

The submitted manuscript has been authored by a grantee of the U.S. Government under Grant No. \_\_\_\_\_. Accordingly, the U.S. Government has a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes.

Sincerely,

## **Publication of Results (B) (continued)**

### **Reprints of Open Literature Publications (4)**

When any article resulting from work under the grant is published in a scientific, technical, or professional journal, two reprints of the publication must be sent to the cognizant NRC program officer, clearly labeled with the grant number and other appropriate identifying information.

## **Identification Information (C)**

Each report or book published by NRC that results from a grant must be identified by an alphanumeric number, "NUREG/GR-000," where "GR" indicates "grant report." (1)

When the publication consists of more than one volume, number, supplement, part, or binding, or is issued in more than one edition, an appropriate volume, supplement, part, or revision designation must appear below the NUREG/GR number. (2)

Numbers may be obtained from the Publications Branch at (301) 415-7008. (3)

## **Pre-Publication Reviews (D)**

The U.S. Congress characterizes the relationship between a Federal agency and a grant recipient as one in which "the recipient can expect to run the project without agency collaboration, participation, or intervention as long as it is run in accordance with the terms of the instrument."

## Glossary\*

**Book.** A publication intended as a permanent reference or textbook or as a major critical review of a technical or regulatory topic. It may be *casebound* (hardback) or paperbound.

**Camera-Ready Copy.** Pages ready for printing by the offset printing process. This is a colloquial term used even though the printing process may not involve the so-called copy camera (see also *reproducible masters*).

**Casebound.** Term denoting a book with a hard cover.

**Compose.** To arrange letters, in type or film, for printing. Usually synonymous with *typesetting*.

**Composition.** The process of setting type by hot-metal casting, phototypesetting, or electronic character generating devices (e.g., computers) for the purpose of producing *camera-ready copy*, negatives, a plate, or an image to be used in the production of *printing* or microform.

**Contractor Report.** Record of work done (a report) prepared in accordance with the provisions of a contract or under or pursuant to an interagency agreement.

**Copyright.** A form of protection provided by the laws of the United States (Title 17, U.S. Code), to the authors of "original works of authorship," including literary, dramatic, musical, artistic, and certain other intellectual works. This protection is available to both published and unpublished works. Generally, copyrighted material may not be reproduced without the permission of the author or the publisher.

**Disseminate.** To announce the publication of reports and make them available for free distribution, sale, or copying.

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\*Words in *italics* in definitions are also defined in the glossary.

## Glossary (continued)

**Distribution.** Reports dispensed to specific organizations and individuals to ensure their participation in the regulatory process and support of research and technological investigations. Such distribution may be accomplished by the use of standard distribution lists established and maintained by the Division of Freedom of Information and Publications Services at the request of the originating office or region.

**Documentation.** Classification and associated markings required for classified or sensitive unclassified documents, the NRC report number unique to the report, title (and subtitle, if any), author or correspondent (if any), organization identification and contract number (or job code number), date, and availability.

**Edition.** All copies of a book printed from the same type. Edition also refers to format, such as *paperback*, *casebound*, or to the text, as revised, expanded, and so on. If extensive revisions have been made to the text and the book is reprinted, the revised version is the new edition.

**Grant.** A legal instrument which defines the relationship between the Government and a recipient for the transfer of money, property, services, or anything of value to the recipient for the accomplishment of a public purpose of support or stimulation authorized by law. A grant presumes a limited amount of involvement by the agency in the performance by the recipient.

**Grant Report.** A record of work done prepared in accordance with the provisions of the *grant*.

**Index.** An alphabetical list of all major topics discussed in a book. It cites the page numbers where each topic can be found. The index is the last section of a book.

**International Agreement.** Cooperative nuclear safety research programs that involve either or both foreign governments and organizations and U.S. industry. Such involvement, authorized under 42 U.S.C. 5801, includes monetary contributions, information exchanges, and comments on program plans and results.

**International Agreement Report.** A record of work done prepared in accordance with the provisions of an *international agreement*.

## Glossary (continued)

**Manuscript.** A handwritten, typewritten, or *composed* version of a document, as distinguished from a printed copy.

**NRC Project Manager.** The NRC staff member responsible for the work performed by consultants or contractors and their subcontractors, or for work performed under or pursuant to an interagency agreement.

**Paperback.** A *book* with a flexible paper cover.

**Peer Review.** A critical evaluation of the technical contents of a publication. These reviews are conducted by reviewers from the author's own or a related field who are totally independent of the work leading to the *manuscript*. Reviewers should be chosen from the potential audience for the publication and should provide an independent judgment about whether the publication successfully accomplishes the author's aims.

**Photocomposition.** *Typesetting* performed when photosensitive paper or film is exposed to light in the form of letters and characters. Photocomposition is to be distinguished from hot-metal and typewriter *composition*.

**Printing.** As defined by the Joint Committee on Printing, includes and applies to the process of *composition*, platemaking, presswork, collating, and microform; the equipment used in such processes; or the end product produced by such processes and equipment.

**Proprietary Information.** Trade secrets; privileged or confidential research, development, commercial, or financial information exempt from mandatory disclosure under 10 CFR Part 2 (Sections 2.740 and 2.790) and under 10 CFR Part 9 (Section 9.17); and other information submitted in confidence to the NRC by a foreign source and determined to be unclassified by the NRC.

**Public Domain.** Materials for which a *copyright* never existed, such as U.S. Government publications, or for which a copyright has expired.

**Publicly Available Documents.** Information (reports and references) that is available in the NRC Public Document Room (PDR) for public inspection and copying or available in the *public domain*.

## Glossary (continued)

**Reproducible Masters.** *Camera-ready copy* that includes (1) originals of line drawings (or prints that can be copied); (2) glossy prints of black and white photographs; (3) original *typeset* or printed text, tables, cover, title page, contents, and abstract; or (4) other forms of the materials that a printer can reproduce.

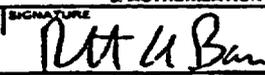
**Trim Size.** The final size of the whole page, margins included.

**Typesetting.** The placement of type on a page (letters, numbers, and other characters) in conformance with specific style and layout instructions.

**Unique Identification.** NRC identification (NUREG number) used on a report and its attachments, revisions, and supplements that is not used on any other publication.

Volume 3, Part 1 - Publications, Mail, and Information Disclosure  
 Unclassified Contractor and Grantee Publications in the NUREG Series  
 Handbook 3.8 Exhibits

**Exhibit 1**  
**NRC Form 426A, "Release to Publish Unclassified NRC Contractor, Consultant, or Conference Proceedings Reports"**

NRC FORM 426A (2-89) NRCN 1102, 3202		U.S. NUCLEAR REGULATORY COMMISSION		1. REPORT NUMBER (if any)  NUREG/CR-5627 BNL-NUREG-52257
RELEASE TO PUBLISH UNCLASSIFIED NRC CONTRACTOR, CONSULTANT, OR CONFERENCE PROCEEDINGS REPORTS (Please Type or Print)				Obtain from Technical Publications Section on 442-7833
2. TITLE AND SUBTITLE (Show in full as shown on document)  Alternate Modal Combination Methods in Response Spectrum Analysis			3. FUND OR GRANT NUMBER (if not the DOE contract number)  A-3955	
4. AUTHORS (If more than three, name first author followed by "and others")  P. Bezler and others				
5. CONTRACTOR Brookhaven National Laboratory Department of Nuclear Energy		MAILING ADDRESS (Number and Street, City, State and ZIP Code) Building 129 Upton, NY 11973		TELEPHONE NUMBER 666-2447
6. TYPE OF DOCUMENT (Check appropriate box)				
<input checked="" type="checkbox"/> A. TECHNICAL REPORT				
<input checked="" type="checkbox"/> FORMAL <input type="checkbox"/> LETTER REPORT				
B. CONFERENCE PAPER (If so, complete items (1), (2), and (3) below)				
(1) TITLE OF CONFERENCE PAPER:				
(2) DATE(S) OF CONFERENCE:				
(3) LOCATION OF CONFERENCE:				
C. OTHER (Indicate type of item)				
7. DISTRIBUTION (For NRC distribution copies, provide mailing labels for special distribution not covered by NRC forms. If NRC copy, provide name and mail stop only. If external, provide complete mailing address.)  RA 50 copies: Judy Liu, Technical Information Division, Bldg. 477B, Brookhaven National Laboratory, Upton, NY 11973 10 copies: Nilesh Chokshi, RES, NLS-217				
8. CERTIFICATION (ANSWER ALL QUESTIONS)				
YES	NO	A. REFERENCE AVAILABILITY - Is an original reference on this report on file in the public domain through a public library, the Government Printing Office, the National Technical Information Service, or the NRC Public Document Room? If so, list the specific availability of a microform document with the reference listing below.		
X		SPECIFIC AVAILABILITY		
	X	B. COPYRIGHTED MATERIAL - Does this report contain copyrighted material? If yes, attach a copy of release from the owner that owns the copyright.		
	X	C. COMPUTER CODES - Does this report contain a computer code? If yes, does it comply with the standards in NRC Manual Chapter 6504, "Planning and Control of Automatic Data Processing (ADP) Programs"?		
	X	D. PATENT CLEARANCE - Does this report require patent clearance? If yes, the NRC Patent Counsel must signify clearance by signing below.		
		NRC PATENT COUNSEL (Type or Print Name)	SIGNATURE	DATE
	X	E. INFORMATION REQUESTS - Does this report contain any questionnaires, surveys, or data collection requests?		
	X	F. LICENSING REQUIREMENTS - Does this report impose requirements on licensees?		
9. AUTHORIZATION				
A. DOE LAB AUTHORIZING OFFICIAL (if applicable) (Type or Print Name)		SIGNATURE		DATE
R.A. Bari				9/25/90
B. NRC RESPONSIBLE STAFF MEMBER (Type or Print Name)		SIGNATURE	OFF/DIV	TELEPHONE
A. Murphy			492-3860	NLS217A 10/10/90

NRC FORM 426A (2-89)

## Exhibit 2 NRC Form 335, "Bibliographic Data Sheet"

NRC FORM 335 (2-89)		U.S. NUCLEAR REGULATORY COMMISSION	1. REPORT NUMBER <i>(Assigned by NRC, Add Vol., Sub., Rev., and Addendum Numbers, if any.)</i>  NUREG/CR-5603 EGG-2607
BIBLIOGRAPHIC DATA SHEET <i>(See instructions on the reverse.)</i>			3. DATE REPORT PUBLISHED MONTH   YEAR October   1990
2. TITLE AND SUBTITLE  Pressure-Dependent Fragilities for Piping Components: Pilot Study on Davis-Besse Nuclear Power Station			4. FIN OR GRANT NUMBER B5699
5. AUTHOR(S)  D.A. Wesley, T.R. Kipp, D.K. Nakaki, H. Hadidi-Tamjed			6. TYPE OF REPORT Technical
8. PERFORMING ORGANIZATION - NAME AND ADDRESS <i>(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide agency and mailing address.)</i> ABB ImPELL Corporation 27401 Los Altos, Suite 480 Mission Viejo, CA 92691			7. PERIOD COVERED <i>(Include years)</i>
Under contract to: Idaho National Engineering Laboratory EG&G Idaho, Inc. Idaho Falls, ID 83415			
9. SPONSORING ORGANIZATION - NAME AND ADDRESS <i>(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)</i> Division of Safety Issue Resolution Office of Nuclear Regulatory Research U.S. Regulatory Commission Washington, D.C. 20555			
10. SUPPLEMENTARY NOTES			
11. ABSTRACT <i>(200 words or less)</i> The capacities of four, low-pressure fluid systems to withstand pressures and temperatures above the design levels were established for the Davis-Besse Nuclear Power Station. The results will be used in evaluating the probability of plant damage from Interfacing System Loss of Coolant Accidents (ISLOCA) as part of the probabilistic risk assessment of the Davis-Besse nuclear power station undertaken by EG&G Idaho, Inc. Included in this evaluation are the tanks, heat exchangers, filters, pumps, valves, and flanged connections for each system. The probabilities of failure, as a function of internal pressure, are evaluated as well as the variabilities associated with them. Leak rates or leak areas are estimated for the controlling modes of failure. The pressure capacities for the pipes and vessels are evaluated using limit-state analyses for the various failure modes considered. The capacities are dependent on several factors, including the material properties, modeling assumptions, and the postulated failure criteria. The failure modes for gasketed-flange connections, valves, and pumps do not lend themselves to evaluation by conventional structural mechanics techniques and evaluation must rely primarily on the results from ongoing gasket research test programs and available vendor information and test data.			
12. KEY WORDS/DESCRIPTORS <i>(For words or phrases that will assist researchers in locating the report.)</i> pressure-dependent fragilities piping components Interfacing System Loss of Coolant Accidents (ISLOCA) probabilistic risk assessment Davis-Besse Nuclear Power Station			13. AVAILABILITY STATEMENT Unlimited
			14. SECURITY CLASSIFICATION <i>(This Page)</i> Unclassified <i>(This Report)</i> Unclassified
			15. NUMBER OF PAGES
			16. PRICE

## Exhibit 2 (continued)

DO NOT PRINT THESE INSTRUCTIONS AS A PAGE IN THE NUREG REPORT

### INSTRUCTIONS

NRC FORM 335, BIBLIOGRAPHIC DATA SHEET, IS BASED ON GUIDELINES FOR FORMAT AND PRODUCTION OF SCIENTIFIC AND TECHNICAL REPORTS, ANSI Z39.18-1987 AVAILABLE FROM AMERICAN NATIONAL STANDARDS INSTITUTE, 1430 BROADWAY, NEW YORK, NY 10018. EACH SEPARATELY BOUND REPORT--FOR EXAMPLE, EACH VOLUME IN A MULTIVOLUME SET--SHALL HAVE ITS UNIQUE BIBLIOGRAPHIC DATA SHEET.

- 1. REPORT NUMBER.** Each individually bound report must carry a unique alphanumeric designation (NUREG) assigned by the Regulatory Publications Branch, Division of Freedom of Information and Publications Services, in accordance with American National Standard ANSI Z39.23-1983, Standard Technical Report Number (STRN). Use uppercase letters, Arabic numerals, slashes, and hyphens only, as in the following examples: NUREG-0100, NUREG/CP-0010, NUREG/CR-0100, and NUREG/BR-0010. For reports in a series add Vol., Supp., Rev., and Addendum, when necessary. Add contractor cross-reference identification number (if any) below NUREG-series number, e.g., PNL-XXXX, SANDXX-XXXX, SAI-XXXX.
- 2. TITLE AND SUBTITLE.** Title should indicate clearly and briefly the subject (coverage) of the report; including any subtitle to the main title. When a report is prepared in more than one volume, repeat the primary title, add volume number and include subtitle for the specific volume. Use upper and lower case letters, but capitalize computer code names. Do not use acronyms and initialisms in titles; may be added in parenthesis.
- 3. DATE REPORT PUBLISHED.** Each report must carry a date indicating month and year published.
- 4. FIN OR GRANT NUMBER.** Insert the FIN or grant number under which report was prepared.
- 5. AUTHOR(S).** Give name(s) in conventional order (e.g., John R. Doe, J. Robert Doe). List author's affiliation if it is different from the performing organization.
- 6. TYPE OF REPORT.** State draft final, preliminary, topical, technical, regulatory, annual, quarterly, etc.
- 7. PERIOD COVERED.** Add inclusive ds....
- 8. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS.** Give name, street, city, state, and ZIP code. List no more than two levels of an organizational hierarchy. Display the name of the organization exactly as follows: Division, Office, Organization or Government agency, and address.
- 9. SPONSORING ORGANIZATION.** If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.
- 10. SUPPLEMENTARY NOTES.** Enter information not included elsewhere but useful, such as: Prepared in cooperation with ... Presented at conference of ... To be published ... Docket No. ... When a report is revised, indicate whether the new report supersedes or supplements the older report.
- 11. ABSTRACT.** Include a brief (200 words or less) factual summary of the most significant information contained in the report. If the report contains a significant bibliography or literature survey or multiple volumes, mention it here. Abstract is to be prepared by author or project manager.
- 12. KEY WORDS/DESCRIPTORS.** Select from the Energy Data Base Subject Thesaurus, DOE/TIC-700R R-5, the proper authorized terms that identify the major concept of the research and are sufficiently specific and precise to be used as index entries for cataloging.
- 13. AVAILABILITY STATEMENT.** Denote public releasability, for example "unlimited", or limitation for reasons other than security.
- 14. SECURITY CLASSIFICATION.** Enter U.S. Security Classification in accordance with U.S. Security Regulations (i.e., unclassified).
- 15. NUMBER OF PAGES.** Leave blank. (Added by NTIS)
- 16. PRICE.** Leave blank. (Added by NTIS)

U.S. GOVERNMENT PRINTING OFFICE: 1988 0-544-854

### Exhibit 3

### Microfiche Sheet Sample

The image shows a microfiche sheet with a grid. A large, diagonal watermark reading "SAMPLE" is overlaid on the grid. The grid is divided into three main sections at the top:

- Left Section:** NUREG/CR-XXXX  
CONTRACTOR ID NO.  
CLASSIFICATION
- Middle Section:** DESCRIPTION OF MICROFILM  
(e.g., Appendix A)  
CONTRACTOR NAME (Optional)
- Right Section:** PUBLICATION DATE  
81 of 89 (Sheet ID)

There is a small icon in the top-left corner of the grid area, and a small box in the top-right corner of the grid area.

**BILLING INSTRUCTIONS FOR  
COST REIMBURSEMENT TYPE CONTRACTS**

**General:** The contractor shall prepare vouchers/invoices for reimbursement of costs in the manner and format described herein. **FAILURE TO SUBMIT VOUCHERS/INVOICES IN ACCORDANCE WITH THESE INSTRUCTIONS WILL RESULT IN REJECTION OF THE VOUCHER/INVOICE AS IMPROPER.**

**Number of Copies:** An original and three copies, including supporting documentation shall be submitted. A copy of all supporting documents must be attached to each copy of your voucher/invoice. Failure to submit all the required copies will result in rejection of the voucher/invoice as improper.

**Designated Agency Billing Office:** Vouchers/invoices shall be submitted to the following address:

U.S. Nuclear Regulatory Commission  
Division of Contracts - T-7-I-2  
Washington, DC 20555

**HAND DELIVERY OF VOUCHERS/INVOICES IS DISCOURAGED AND WILL NOT EXPEDITE PROCESSING BY NRC.** However, should you choose to deliver vouchers/invoices by hand, including delivery by any express mail services or special delivery services which use a courier or other person to deliver the voucher/invoice in person to the NRC, such vouchers/invoices must be addressed to the above Designated Agency Billing Office and will only be accepted at the following location:

U.S. Nuclear Regulatory Commission  
One White Flint North  
11555 Rockville Pike - Mail Room  
Rockville, MD 20852

**HAND-CARRIED SUBMISSIONS WILL NOT BE ACCEPTED AT OTHER THAN THE ABOVE ADDRESS.**

Note that the official receipt date for hand-delivered vouchers/invoices will be the date it is received by the official agency billing office in the Division of Contracts.

**Agency Payment Office:** Payment will continue to be made by the office designated in the contract in Block 12 of SF 26 or Block 25 of SF 33, whichever is applicable.

**BILLING INSTRUCTIONS FOR COST REIMBURSEMENT TYPE CONTRACTS - (Page 2 of 10)**

**Frequency:** The contractor shall submit claims for reimbursement once each month, unless otherwise authorized by the Contracting Officer.

**Format:** Claims should be submitted in the format depicted on the attached sample form entitled "Voucher/Invoice for Purchases and Services Other than Personal" (see **Attachment 1**). The sample format is provided for guidance only. The format is not required for submission of a voucher/invoice. Alternate formats are permissible provided all requirements of the billing instructions are addressed. The instructions for preparation and itemization of the voucher/invoice are included with the sample form.

**Task Ordering Contracts:** If the contractor bills for more than one task order under a voucher/invoice, detailed cost information for each individual task order shall be submitted, together with a cumulative summary of all charges billed on the voucher/invoice. This includes all applicable cost elements discussed in paragraphs (a) through (n) of the attached instructions.

**Fee Recovery Billings:** Pursuant to the provisions of 10 CFR Part 170 and 171 on license fees, the NRC must recover the cost of work performed. Accordingly, the contractor must provide the total amount of funds billed during the period, fiscal year to date and the cumulative total for each task or task assignment by facility or report. The fee recovery billing reports shall be on a separate page, and shall be in the format provided in **Attachment 2**. The billing period for fee recovery costs should be from the first day of each calendar month to the last day of the same month. Each separate fee billing report must be attached to the monthly invoice and cover the same period as the invoice.

Each report will contain a docket number or other unique identifier. The NRC will provide a unique identifier for all work performed. Costs should be reported as whole number to the nearest cent. For work that involves more than one facility at the same site, each facility should be listed separately and the costs should be split appropriately between the facilities. Common costs, as defined below, shall be identified as a separate line item in the fee recovery billing report each month.

Common costs are those costs that are not licensee unique and associated with the performance of an overall program that benefit all similar licensees covered under that program or that are required to satisfactorily carry out the program. Common costs include costs associated with the following: preparatory or start-up efforts to interpret and reach agreement on methodology, approach, acceptance criteria, regulatory position,

BILLING INSTRUCTIONS FOR COST REIMBURSEMENT TYPE CONTRACTS - (Page 3 of 10)

or technical reporting requirements; efforts associated with the "lead plant" concept that might be involved during the first one or two plant reviews; meetings and discussions involving the above efforts to provide orientation, background knowledge or guidance during the course of a program; any technical effort applied to a docket or other unique identifier; and project management. Common costs must be reporting monthly for each docket or unique identifier. Common costs must be computed based on the proportion of direct costs incurred against each docket or unique identifier for the billing period.

Billing of Cost After Expiration of Contract: If costs are incurred during the contract period and claimed after the contract has expired, the period during which these costs were incurred must be cited. To be considered a proper expiration voucher/invoice, the contractor shall clearly mark it "EXPIRATION VOUCHER" or "EXPIRATION INVOICE".

Final vouchers/invoices shall be marked "FINAL VOUCHER" or "FINAL INVOICE".

Currency: Billings may be expressed in the currency normally used by the contractor in maintaining his accounting records; payments will be made in that currency. However, the U.S. dollar equivalent for all vouchers/invoices paid under the contract may not exceed the total U.S. dollars authorized in the contract.

Supersession: These instructions supersede any previous billing instructions.

INVOICE/VOUCHER FOR PURCHASES AND SERVICES OTHER THAN PERSONAL

(SAMPLE FORMAT)

Official Agency Billing Office  
 U.S. Nuclear Regulatory Commission  
 Division of Contracts MS: T-7-I-2  
 Washington, DC 20555-0001

Payee's Name and Address

(a) Contract Number \_\_\_\_\_

Task Order No. (If Applicable) \_\_\_\_\_

(b) Voucher/Invoice # \_\_\_\_\_

(c) Date of Voucher/Invoice \_\_\_\_\_

Individual to Contact  
 Regarding this Voucher

(d) Fixed Fee \_\_\_\_\_

Name: \_\_\_\_\_

Tel. No.: \_\_\_\_\_

(e) This voucher represents reimbursable costs for the billing period for the billing period from \_\_\_\_\_ through \_\_\_\_\_.

		<u>Amount Billed</u>	
		<u>Current Period</u>	<u>Cumulative</u>
(f)	<u>Direct Costs</u>		
	(1) Direct labor*.....	_____	_____
	(2) Fringe benefits (     %, if computed as percentage).....	_____	_____
	(3) Capitalized nonexpendable equipment (\$50,000 or more - see instructions)*.....	_____	_____
	(4) Non-capitalized equipment, materials, and supplies.....	_____	_____
	(5) Premium pay (NRC approved overtime).....	_____	_____
	(6) Consultants*.....	_____	_____
	(7) Travel*.....	_____	_____
	(8) Subcontracts*.....	_____	_____
	(9) Other costs*.....	_____	_____

Total Direct Costs \_\_\_\_\_

(g) Indirect Costs

(A) Overhead \_\_\_\_\_ % of  
 \_\_\_\_\_ (Indicate Base)..... \_\_\_\_\_

(B) General & Administrative Expense  
 \_\_\_\_\_ % of Cost Elements  
 Nos. \_\_\_\_\_

Total Direct & Indirect Costs \_\_\_\_\_

(h)	Fixed-Fee (Cite Formula):	_____	_____
(i)	Total Amount Billed.....	_____	_____
(j)	Adjustments.....	_____	_____
(k)	Grand Totals.....	_____	_____

\* (Requires Supporting Information -- See Attached)

SAMPLE SUPPORTING INFORMATION

1) Direct Labor - \$2400

<u>Labor Category</u>	<u>Hours Billed</u>	<u>Rate</u>	<u>Total</u>	<u>Cumulative Hrs. Billed</u>
Senior Engineer I	100	\$14.00	\$1400	975
Engineer	50	\$10.00	\$500	465
Computer Analyst	100	\$5.00	\$500	320
			\$2400	

3) Capitalized Non-Expendable Equipment

Prototype Spectrometer - item number 1000-01 \$60,000

4) Non-capitalized Equipment, Materials, and Supplies

10 Radon tubes @ \$110.00 = \$1100.00

6 Pairs Electrostatic gloves @ \$150.00 = \$900.00  
\$2000.00

5) Premium Pay

Walter Murphy - 10 hours @ \$10.00 Per Hour = \$100  
(This was approved by NRC in letter dated 3/6/95).

6) Consultants' Fee

Dr. Carney - 1 hour @ \$100 = \$100

7) Travel

<u>Start Date</u>	<u>Destination</u>	<u>Costs</u>
3/1/89	Wash., DC	\$200

BILLING INSTRUCTIONS FOR COST REIMBURSEMENT TYPE CONTRACTS (Page 6 of 10) -  
ATTACHMENT 1 (Cont.)

INSTRUCTIONS FOR PREPARING  
COST INFORMATION FOR NRC CONTRACT VOUCHERS/INVOICES

**Preparation and Itemization of the Voucher/Invoice:** In order to constitute a proper invoice, the contractor shall furnish all the information set forth below. These notes are keyed to the entries on the sample voucher/invoice.

**Official Agency Billing Office:** Address the original and 3 copies of the voucher/invoice, together with supporting documentation attached to each copy to: U.S. Nuclear Regulatory Commission, Division of Contracts, MS: T-7-I-2, Washington, DC 20555-0001.

Vouchers/invoices delivered by hand, including delivery by express mail or special delivery services which use a courier or other person to deliver the voucher/invoice in person to the NRC, should be addressed in accordance with the foregoing and delivered to: U. S. Nuclear Regulatory Commission, One White Flint North, 11555 Rockville Pike - Mail Room, Rockville, Maryland 20852. Hand-delivered vouchers/invoices will not be accepted at other than the above address. Note, however, that the official receipt date for hand-delivered vouchers/invoices will be the date it is received by the official agency billing office in the Division of Contracts.

**Payee's Name and Address.** Show the name of the contractor as it appears in the contract and its correct address. When an approved assignment has been made by the contractor, or a different payee or addressee has been designated, insert the name and address of the payee. Indicate the name and telephone number of the individual responsible for answering any questions that the NRC may have regarding the invoice. The following guidance corresponds to the entries required on the sample form.

(a) **Contract Number.** Insert the NRC contract number.

Task Order Number, if applicable. Insert the task order number.

(b) **Voucher/invoice number.** The appropriate sequential number of the voucher/invoice, beginning with 001 should be designated. Contractors may also include an individual internal accounting number, if desired, in addition to the 3-digit sequential number.

BILLING INSTRUCTIONS FOR COST REIMBURSEMENT TYPE CONTRACTS (Page 7 of 10) - ATTACHMENT 1 (Cont.)

- (c) Date of Voucher/Invoice. Insert the date the voucher/invoice is prepared.
- (d) Fixed-Fee. Insert total fixed-fee. Include this information as it applies to individual task orders as well.
- (e) Billing Period. Insert the beginning and ending dates (day, month, year) of the period during which costs were incurred and for which reimbursement is claimed.
- (f) Direct Costs - Insert the amount billed for the following cost elements, adjustments, suspensions, and total amounts, for both the current billing period and for the cumulative period (from contract inception to end date of this billing period).

- (1) Direct Labor. This consists of salaries and wages paid (or accrued) for direct performance of the contract itemized as follows:

<u>Labor Category</u>	<u>Hrs. Billed</u>	<u>Rate</u>	<u>Total</u>	<u>Cumulative Hrs. Billed</u>
-----------------------	--------------------	-------------	--------------	-------------------------------

- (2) Fringe Benefits. This represents fringe benefits applicable to direct labor and billed as a direct cost. Where a rate is used indicate the rate. Fringe benefits included in direct labor or in other indirect cost pools should not be identified here.
- (3) Capitalized Non Expendable Equipment. List each item costing \$50,000 or more and having a life expectancy of more than one year. List only those items of equipment for which reimbursement is requested. For each such item, list the following (as applicable): (a) the item number for the specific piece of equipment listed in the property schedule of the contract; or (b) the Contracting Officer's approval letter if the equipment is not covered by the property schedule.

BILLING INSTRUCTIONS FOR COST REIMBURSEMENT TYPE CONTRACTS (Page 8 of 10) -  
ATTACHMENT 1 (Cont.)

- (4) Non-capitalized Equipment, Materials, and Supplies. These are equipment other than that described in (3) above, plus consumable materials, supplies. List by category. List items valued at \$500 or more separately. Provide the item number for each piece of equipment valued at \$500 or more.
- (5) Premium Pay. This enumeration in excess of the basic hourly rate. (Requires written approval of the Contracting Officer.)
- (6) Consultants. The supporting information must include the name, hourly or daily rate of the consultant, and reference the NRC approval (if not specifically approved in the original contract).
- (7) Travel. Total costs associated with each trip must be shown in the following format:
- | <u>Start Date</u> |    | <u>Destination</u> |    | <u>Costs</u> |    |
|-------------------|----|--------------------|----|--------------|----|
| From              | To | From               | To |              | \$ |
- (8) Subcontracts. Include separate detailed breakdown of all costs paid to approved subcontractors during the billing period.
- (9) Other Costs. List all other direct costs by cost element and dollar amount separately.
- (g) Indirect Costs (Overhead and General and Administrative Expense). Cite the formula (rate and base) in effect in accordance with the terms of the contract, during the time the costs were incurred and for which reimbursement is claimed.
- (h) Fixed Fee. If the contract provides for a fixed fee, it must be claimed as provided for by the contract. Cite the formula or method of computation. The contractor may bill for fixed fee only up to 85% of total fee.
- (i) Total Amount Billed. Insert the total amounts claimed for the current and cumulative periods.

BILLING INSTRUCTIONS FOR COST REIMBURSEMENT TYPE CONTRACTS (Page 9 of 10) -  
ATTACHMENT 1 (Cont.)

(j) Adjustments. For cumulative amount, include outstanding suspensions.

(k) Grand Totals.

Further itemization of vouchers/invoices shall only be required for items having specific limitations set forth in the contract.

FEE RECOVERY BILLING REPORT

FIN: \_\_\_\_\_

Facility Name or Report Title:  
\_\_\_\_\_

\_\_\_\_\_  
TAC or Inspection Report Number:

\_\_\_\_\_  
(or other unique identifier)

Docket Number (if applicable): \_\_\_\_\_

Cost Categories	Period Amt.	Period Cost Incurred	Fiscal Year To Date Costs	Total Cumulative Costs
Labor				
Materials				
Subcontractor/ Consultant				
Travel				
Other (specify)				
Common Costs				
Total				

\_\_\_\_\_  
Remarks:

Table A.1 Detailed Costs and Spending Plan for Phase II Program - By Month

TOTAL PROGRAM COSTS - BY MONTH															
COST ITEMS	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15
	Labor Hours	247	203	333	302	324	193	187	187	150	166	105	105	178	178
DIRECT COSTS															
- Labor	\$ 11,447	\$ 8,571	\$ 14,354	\$ 13,257	\$ 13,988	\$ 7,981	\$ 7,684	\$ 7,499	\$ 6,073	\$ 6,751	\$ 4,349	\$ 4,349	\$ 7,422	\$ 7,422	\$ 7,596
Travel	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155
Materials	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subcontract - Sharif	\$ -	\$ -	\$ -	\$ -	\$ 1,667	\$ 4,167	\$ 4,167	\$ 1,667	\$ 417	\$ 417	\$ -	\$ -	\$ -	\$ -	\$ -
Subcontract - Parks	\$ 3,333	\$ 3,333	\$ 3,333	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOTAL DIRECT COSTS	\$ 14,936	\$ 12,060	\$ 17,843	\$ 13,413	\$ 15,810	\$ 12,303	\$ 12,006	\$ 9,321	\$ 6,645	\$ 7,323	\$ 4,505	\$ 4,505	\$ 7,577	\$ 7,577	\$ 7,751
INDIRECT COSTS (Overhead + G&A)	\$ 23,408	\$ 17,826	\$ 29,050	\$ 25,785	\$ 27,771	\$ 16,964	\$ 16,388	\$ 15,177	\$ 11,982	\$ 13,299	\$ 8,495	\$ 8,495	\$ 14,459	\$ 14,459	\$ 14,795
INFLATION	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 655	\$ 655	\$ 670
FEE	\$ 2,684	\$ 2,092	\$ 3,282	\$ 2,744	\$ 3,051	\$ 2,049	\$ 1,988	\$ 1,715	\$ 1,304	\$ 1,444	\$ 910	\$ 910	\$ 1,588	\$ 1,588	\$ 1,625
TOTAL COSTS	\$ 41,028	\$ 31,978	\$ 50,175	\$ 41,941	\$ 46,632	\$ 31,315	\$ 30,381	\$ 26,213	\$ 19,931	\$ 22,066	\$ 13,909	\$ 13,909	\$ 24,280	\$ 24,280	\$ 24,841

TOTAL PROGRAM COSTS - BY MONTH																
COST ITEMS	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24	Month 25	Month 26	Month 27	Month 28	Month 29	Month 30	TOTAL
	Labor Hours	144	189	182	175	135	154	141	97	97	97	70	47	42	29	29
DIRECT COSTS																
- Labor	\$ 6,144	\$ 7,908	\$ 7,560	\$ 7,298	\$ 5,796	\$ 6,528	\$ 6,041	\$ 4,117	\$ 4,117	\$ 4,117	\$ 3,063	\$ 2,180	\$ 2,007	\$ 1,450	\$ 1,450	\$ 198,521
Travel	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 155	\$ 4,657
Materials	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Subcontract - Sharif	\$ -	\$ 833	\$ 833	\$ 833	\$ -	\$ 417	\$ 417	\$ 1,250	\$ 1,250	\$ 1,250	\$ 417	\$ -	\$ -	\$ -	\$ -	\$ 20,000
Subcontract - Parks	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,000
TOTAL DIRECT COSTS	\$ 6,299	\$ 8,896	\$ 8,548	\$ 8,287	\$ 5,951	\$ 7,100	\$ 6,612	\$ 5,523	\$ 5,523	\$ 5,523	\$ 3,635	\$ 2,336	\$ 2,162	\$ 1,605	\$ 1,605	\$ 233,178
INDIRECT COSTS (Overhead + G&A)	\$ 11,978	\$ 15,685	\$ 15,010	\$ 14,502	\$ 11,302	\$ 12,866	\$ 11,919	\$ 8,471	\$ 8,471	\$ 8,471	\$ 6,141	\$ 4,285	\$ 3,949	\$ 2,866	\$ 2,866	\$ 397,136
INFLATION	\$ 542	\$ 698	\$ 667	\$ 644	\$ 511	\$ 576	\$ 533	\$ 363	\$ 363	\$ 737	\$ 549	\$ 391	\$ 359	\$ 260	\$ 260	\$ 9,433
FEE	\$ 1,317	\$ 1,770	\$ 1,896	\$ 1,640	\$ 1,243	\$ 1,438	\$ 1,335	\$ 1,005	\$ 1,005	\$ 1,031	\$ 723	\$ 491	\$ 453	\$ 331	\$ 331	\$ 44,782
TOTAL COSTS	\$ 20,136	\$ 27,049	\$ 25,922	\$ 25,073	\$ 19,008	\$ 21,980	\$ 20,399	\$ 15,362	\$ 15,362	\$ 15,762	\$ 11,048	\$ 7,502	\$ 6,923	\$ 5,062	\$ 5,062	\$ 684,529