

ORDER FOR SUPPLIES OR SERVICES

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

BPA NO. FFS#RES-C05-367

1. DATE OF ORDER 05-24-2005		2. CONTRACT NO. (if any)		E. SHIP TO	
3. ORDER NO. DR-04-05-067		MODIFICATION NO.		a. NAME OF CONSIGNEE U.S. Nuclear Regulatory Commission	
4. REQUISITION/REFERENCE NO. RES-05-067		5. ISSUING OFFICE (Address correspondence to) U.S. Nuclear Regulatory Commission Div of Contracts Two White Flint North - MS T-7-I-2 Contract Management Center No. 1 Washington, DC 20555		b. STREET ADDRESS Attn: E. P. Jain, RES	
7. TO		c. CITY Washington		d. STATE DC	e. ZIP CODE 20555
a. NAME OF CONTRACTOR SOUTHWEST RESEARCH INSTITUTE INC		f. SHIP VIA		8. TYPE OF ORDER	
b. COMPANY NAME		<input checked="" type="checkbox"/> a. PURCHASE Reference your <u>4/20/2005</u> Please furnish the following on the terms and conditions specified on both sides of this order and on the attached sheet, if any, including delivery as indicated.		<input type="checkbox"/> b. DELIVERY Except for billing instructions on the reverse, this delivery/task order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.	
c. STREET ADDRESS 6220 CULEBRA RD		d. CITY SAN ANTONIO TX 782388510		e. STATE	f. ZIP CODE
B. ACCOUNTING AND APPROPRIATION DATA B&R 56015111191 JC: N6121 BOC: 252A 31X0200.560 Obligate: \$89,208		\$89,208.00		10. REQUISITIONING OFFICE RES B.P. Jain 301-415-6303	
11. BUSINESS CLASSIFICATION (Check appropriate box(es)) <input type="checkbox"/> a. SMALL <input type="checkbox"/> d. WOMEN-OWNED		<input checked="" type="checkbox"/> b. OTHER THAN SMALL <input type="checkbox"/> e. HUBZone		<input type="checkbox"/> c. DISADVANTAGED <input type="checkbox"/> f. EMERGING SMALL BUSINESS	
13. PLACE OF a. INSPECTION b. ACCEPTANCE		14. GOVERNMENT B/L NO.		12. F.O.B. POINT Destination	
				15. DELIVER TO F.O.B. POINT ON OR BEFORE (Date) See SOW	
				16. DISCOUNT TERMS N/A	

17. SCHEDULE (See reverse for Rejections)

ITEM NO. (A)	SUPPLIES OR SERVICES (B)	QUANTITY ORDERED (C)	UNIT (D)	UNIT PRICE (E)	AMOUNT (F)	QUANTITY ACCEPTED (G)
	Contractor shall provide services in accordance with the attached statement of work entitled, "GSI-191 PWR SUMP Blockage Chemical Effects Test- Thermodynamic Simulations" Period of Performance: Date of Award through 05/30/06					
1	Firm Fixed Price for completion of Draft NUREG/CR				\$68,679.00	
2	Firm Fixed Price for completion of Final NUREG/CR				\$18,263.00	
3	Estimated Cost for Travel to NRC Headquarters (One one person trip for one week) Total Amount: \$89,208 Project Officer is E. P. Jain 301-415-6303 Optional Task 6 is priced at \$10,716. If the Government exercises this option, this order will be modified to reflect that action. Duns #: 007936842				\$2,246.00	

SEE BILLING INSTRUCTIONS ON REVERSE	18. SHIPPING POINT		19. GROSS SHIPPING WEIGHT		20. INVOICE NO.		\$89,208.00	17(h) TOTAL (Cont. pages) 17(i) GRAND TOTAL
	21. MAIL INVOICE TO:							
	a. NAME U.S. Nuclear Regulatory Commission Contract Management Branch No. 3							
	b. STREET ADDRESS (or P.O. Box) Attn: (DR-04-05-067) M/S T712							
c. CITY Washington			d. STATE DC	e. ZIP CODE 20555		\$89,208.00		
2. UNITED STATES OF AMERICA BY (Signature) <i>Barbara Meehan</i>					23. NAME (Typed) Barbara Meehan TITLE: CONTRACTING/ORDERING OFFICER			

AUTHORIZED FOR LOCAL REPRODUCTION
REVISION EDITION NOT OBSOLETE

OPTIONAL FORM 347 (REV. 3/2005)
PRESCRIBED BY GSA/FAR 48 CFR 53.213(i)

TEMPLATE - ADM001

SISP REVIEW COMPLETE

ADM002

ADDITIONAL SIMPLIFIED ACQUISITION TERMS AND CONDITIONS

A.1 NOTICE LISTING CLAUSES INCORPORATED BY REFERENCE

The following clauses 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" contained in this document. FAR 52.252-2 contains the internet address for electronic access to the full text of a clause.

NUMBER	TITLE	DATE
52.222-42	FEDERAL ACQUISITION REGULATION (48 CFR Chapter 1) STATEMENT OF EQUIVALENT RATES FOR FEDERAL HIRES	MAY 1989
52.222-47	SERVICE CONTRACTS ACT (SCA) MINIMUM WAGES AND FRINGE BENEFITS	MAY 1989
52.223-6	DRUG-FREE WORKPLACE	MAY 2001
52.233-4	Applicable Law for Breach of Contract Claim	OCT 2004
52.237-1	SITE VISIT	APR 1984
52.237-2	PROTECTION OF GOVERNMENT BUILDINGS, EQUIPMENT, AND VEGETATION	APR 1984
52.242-10	F.O.B. ORIGIN--GOVERNMENT BILLS OF LADING OR PREPAID POSTAGE	APR 1984
52.243-1	CHANGES--FIXED PRICE ALTERNATE I (APR 1984)	AUG 1987

A.2 52.204-8 ANNUAL REPRESENTATIONS AND CERTIFICATIONS (JAN 2005)

(a)(1) If the clause at 52.204-7, Central Contractor Registration, is included in this solicitation, paragraph (b) of this provision applies. (2) If the clause at 52.204-7 is not included in this solicitation, and the offeror is currently registered in CCR, and has completed the ORCA electronically, the offeror may choose to use paragraph (b) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The offeror shall indicate which option applies by checking one of the following boxes: (i) Paragraph (b) applies. (ii) Paragraph (b) does not apply and the offeror has completed the individual representations and certifications in the solicitation.

(b) The offeror has completed the annual representations and certifications electronically via the Online Representations and Certifications Application (ORCA) website at <http://orca.bpn.gov>. After reviewing the ORCA database information, the offeror verifies by submission of the offer that the representations and certifications currently posted electronically have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer and are incorporated in this offer by reference (see FAR 4.1201); except for the changes identified below [offeror to]insert changes, identifying change by clause number, title, date]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

Change	FAR Clause #	Title	Date
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Any changes provided by the offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications posted on ORCA.

52.213-3 NOTICE TO SUPPLIER APR 1984
**A.3 52.213-4 TERMS AND CONDITIONS - SIMPLIFIED ACQUISITIONS
 (OTHER THAN COMMERCIAL ITEMS) (APR 2005)**

(a) The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses that are incorporated by reference:

(1) The clauses listed below implement provisions of law or Executive order:

(i) 52.222-3, Convict Labor (June 2003) (E.O. 11755).

(ii) 52.222-21, Prohibition of Segregated Facilities (Feb 1999) (E.O. 11246).

(iii) 52.222-26, Equal Opportunity (Apr 2002) (E.O. 11246).

(iv) 52.225-13, Restrictions on Certain Foreign Purchases (MAR 2005) (E.o.s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).

(v) 52.233-3, Protest After Award (Aug 1996) (31 U.S.C. 3553).

(vi) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (Pub. L. 108-77, 108-78).

(2) Listed below are additional clauses that apply:

(i) 52.232-1, Payments (Apr 1984).

(ii) 52.232-8, Discounts for Prompt Payment (Feb 2002).

(iii) 52.232-11, Extras (Apr 1984).

(iv) 52.232-25, Prompt Payment (Oct 2003).

(v) 52.233-1, Disputes (Jul 2002).

(vi) 52.244-6, Subcontracts for Commercial Items (Dec 2004).

(vii) 52.253-1, Computer Generated Forms (Jan 1991).

(b) The Contractor shall comply with the following FAR clauses, incorporated by reference, unless the circumstances do not apply:

(1) The clauses listed below implement provisions of law or Executive order:

(i) 52.222-19, Child Labor--Cooperation with Authorities and Remedies (Jun 2004) (E.O. 13126). (Applies to contracts for supplies exceeding the micro-purchase threshold.)

(ii) 52.222-20, Walsh-Healey Public Contracts Act (Dec 1996) (41 U.S.C. 35-45) (Applies to supply contracts over \$10,000 in the United States, Puerto Rico, or the U.S. Virgin Islands).

(iii) 52.222-35, Equal Opportunity for Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (DEC 2001) (38 U.S.C. 4212) (Applies to contracts of \$25,000 or more).

(iv) 52.222-36, Affirmative Action for Workers with Disabilities (June 1998) (29 U.S.C. 793). (Applies to contracts over \$10,000, unless the work is to be performed outside the United States by employees recruited outside the United States.) (For purposes of this clause, United States includes the 50 States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, and Wake Island.)

(v) 52.222-37, Employment Reports on Special Disabled Veterans, Veterans of the Vietnam Era, and Other Eligible Veterans (DEC 2001) (38 U.S.C. 4212) (Applies to contracts of \$25,000 or more).

(vi) 52.222-41, Service Contract Act of 1965, As Amended (May 1989) (41 U.S.C. 351, et seq.) (Applies to service contracts over \$2,500 that are subject to the Service Contract Act and will be performed in the United States, District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, Johnston Island, Wake Island, or the outer continental shelf lands).

(vii) 52.223-5, Pollution Prevention and Right-to-Know Information (AUG 2003) (E.O. 13148) (Applies to services performed on Federal facilities).

(viii) 52.225-1, Buy American Act--Supplies (June 2003) (41 U.S.C. 10a-10d) (Applies to contracts for supplies, and to contracts for services involving the furnishing of supplies, for use in the United States or its outlying areas, if the value of the supply contract or supply portion of a service contract exceeds the micro-purchase threshold and the acquisition--

(A) Is set aside for small business concerns; or

(B) Cannot be set aside for small business concerns (see 19.502-2), and does not exceed \$25,000.)

(ix) 52.232-33, Payment by Electronic Funds Transfer--Central Contractor Registration (OCT 2003). (Applies when the payment will be made by electronic funds transfer (EFT) and the payment office uses the Central Contractor Registration (CCR) database as its source of EFT information.)

(x) 52.232-34, Payment by Electronic Funds Transfer--Other than Central Contractor Registration (May 1999). (Applies when the payment will be made by EFT and the payment office does not use the CCR database as its source of EFT information.)

(xi) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (APR 2003) (46 U.S.C. Appx 1241). (Applies to supplies transported by ocean vessels (except for the types of subcontracts listed at 47.504(d).)

(2) Listed below are additional clauses that may apply:

(i) 52.209-6, Protecting the Government's Interest When Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment (JAN 2005) (Applies to contracts over \$25,000).

(ii) 52.211-17, Delivery of Excess Quantities (SEPT 1989) (Applies to fixed-price supplies).

(iii) 52.247-29, F.o.b. Origin (JUN 1988) (Applies to supplies if delivery is f.o.b. origin).

(iv) 52.247-34, F.o.b. Destination (NOV 1991) (Applies to supplies if delivery is f.o.b. destination).

(c) FAR 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):

<http://www.arnet.gov/far>

(d) Inspection/Acceptance. The Contractor shall tender for acceptance only those items that conform to the requirements of this contract. The Government reserves the right to inspect or test any supplies or services that have been tendered for acceptance. The Government may require repair or replacement of nonconforming supplies or reperformance of nonconforming services at no increase in contract price. The Government must exercise its postacceptance rights--

(1) Within a reasonable period of time after the defect was discovered or should have been discovered; and

(2) Before any substantial change occurs in the condition of the item, unless the change is due to the defect in the item.

(e) Excusable delays. The Contractor shall be liable for default unless nonperformance is caused by an occurrence beyond the reasonable control of the Contractor and without its fault or negligence, such as acts of God or the public enemy, acts of the Government in either its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, unusually severe weather, and delays of common carriers. The Contractor shall notify the Contracting Officer in writing as soon as it is reasonably possible after the commencement of any excusable delay, setting forth the full particulars in connection therewith, shall remedy such occurrence with all reasonable dispatch, and shall promptly give written notice to the Contracting Officer of the cessation of such occurrence.

(f) Termination for the Government's convenience. The Government reserves the right to terminate this contract, or any part hereof, for its sole convenience. In the event of such termination, the Contractor shall immediately stop all work hereunder and shall immediately cause any and all of its suppliers and subcontractors to cease work. Subject to the terms of this contract, the Contractor shall be paid a percentage of the contract price reflecting the percentage of the work performed prior to the notice of termination, plus reasonable charges that the Contractor can demonstrate to the satisfaction of the Government, using its standard record keeping system, have resulted from the termination. The Contractor shall not be required to comply with the cost accounting standards or contract cost principles for this purpose. This paragraph does not give the Government any right to audit the Contractor's records. The Contractor shall not be paid for any work performed or costs incurred that reasonably could have been avoided.

(g) Termination for cause. The Government may terminate this contract, or any part hereof, for cause in the event of any default by the Contractor, or if the Contractor fails to comply with any contract terms and conditions, or fails to provide the Government, upon request, with adequate assurances of future performance. In the event of termination for cause, the Government shall not be liable to the Contractor for any amount for supplies or services not accepted, and the Contractor shall be liable to the Government for any and all rights and remedies provided by law. If it is determined that the Government improperly terminated this contract for default, such termination shall be deemed a termination for convenience.

(h) Warranty. The Contractor warrants and implies that the items delivered hereunder are merchantable and fit for use for the particular purpose described in this contract.

A.4 NRC ACQUISITION CLAUSES - (NRCAR) 48 CFR CH. 20

2052.209-72 CONTRACTOR ORGANIZATIONAL CONFLICTS OF INTEREST JAN 1993

A.5 OTHER APPLICABLE CLAUSES

See Addendum for the following in full text (if checked)

52.216-18, Ordering

52.216-19, Order Limitations

52.216-22, Indefinite Quantity

52.217-6, Option for Increased Quantity

52.217-7, Option for Increased Quantity Separately Priced Line Item

52.217-8, Option to Extend Services

52.217-9, Option to Extend the Term of the Contract

A.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.

A.7 COMPLIANCE WITH U.S. IMMIGRATION LAWS AND REGULATIONS

NRC contractors are responsible to ensure that their alien personnel are not in violation of United States Immigration and Naturalization (INS) laws and regulations, including employment authorization documents and visa requirements. Each alien employee of the Contractor must be lawfully admitted for permanent residence as evidenced by Alien Registration Receipt Card Form 1-151 or must present other evidence from the Immigration and Naturalization Services that employment will not affect his/her immigration status. The INS Office of Business Liaison (OBL) provides information to contractors to help them understand the employment eligibility verification process for non-US citizens. This information can be found on the INS website, <http://www.ins.usdoj.gov/graphics/services/employerinfo/index.htm#obl>.

The NRC reserves the right to deny or withdraw Contractor use or access to NRC facilities or its equipment/services, and/or take any number of contract administrative actions (e.g., disallow costs, terminate for cause) should the Contractor violate the Contractor's responsibility under this clause.

(End of Clause)

OFFICE OF NUCLEAR REGULATORY RESEARCH
DIVISION OF ENGINEERING TECHNOLOGY
STATEMENT OF WORK
RES-05-067

TITLE: GSI-191 PWR SUMP BLOCKAGE CHEMICAL EFFECTS TESTS -THERMODYNAMIC SIMULATIONS

BACKGROUND

A stuck pressurizer relief valve and the use of the emergency core cooling system (ECCS) at Three-Mile Island (TMI) led to the release of coolant water into the reactor building basement. The residual heat from the reactor pressure vessel produced a cycle of water evaporation, condensation, and drainage back down into the basement. By the time the TMI accident had ended, the discharged reactor coolant water contained fuel debris, radionuclides, and fission products. Reports from the time indicated that the total volume of sump water used was ~570,000 gallons which included approximately 188,000 gallons from the Susquehanna River. The maximum pool depth was about eight feet. After 153 days from the loss-of-coolant accident (LOCA), the TMI containment water with a green gelatinous precipitate phase covered the containment floor and walls. The containment water and gelatinous material were then chemically analyzed and documented by Oak Ridge National Lab (ORNL).

The purpose of the GSI-191 study is to determine if the transport and accumulation of debris in a containment following a LOCA will impede the operation of the ECCS by increasing the head loss across the sump pump strainers. The purpose of this test plan is to determine whether or not some type(s) of gelatinous material similar to that found on the TMI containment water could be formed and once formed could exacerbate the sump strainer head loss either by (a) chemically reacting with or (b) agglomerating onto the insulation and other debris that may block the sump strainer. The objective of this investigation is to determine if plausible reactions may occur during credible post-accident time-temperature-pressure conditions to produce chemical compounds that would degrade the ability of the sump strainer to pass coolant water sufficiently enough to maintain the required recirculation rates. It should be noted that the goal of this work is not to reproduce the gelatinous material found at TMI since that incident is considered an atypical LOCA event.

A recent Los Alamos National Lab (LANL) report detailed a test program conducted at the University of New Mexico (UNM) that tried to establish the conditions for gelatinous material formation under laboratory conditions that simulated the time-temperature characteristics of representative LOCAs. The LANL/UNM analysis did not have access to the ORNL data and did not examine other major constituent elements found in the TMI gelatinous phase such as Cu, Ni, Mg, S, Cr, and Cl. At the time, LANL/UNM only considered the following elemental additions for typical cooling-system waters:

- ▶ Al from scaffolding and insulation jackets
- ▶ Fe from corroding steels
- ▶ Zn from paint leaching and corroding galvanic coatings
- ▶ Ca from eroding and corroding concrete
- ▶ B additions to the coolant waters at concentrations of ~2,000 ppm
- ▶ Li additions to the coolant waters at concentrations of 0.1-1.44 ppm
- ▶ HCl, Na₃PO₄, and NaOH for pH control.

Clearly, the amount of dissolved cationic additions assumed for this investigation must be reconciled with the ORNL TMI data which shows relatively high amounts of Cu, Ni, and S. The high Cu content was speculated to originate from the river water pumped into the TMI containment system, however, an Environmental Protection Agency report indicates that the Cu content in the Susquehanna River was three to five orders of magnitude lower than that found in the TMI containment system. Another major question is whether these elements played a significant role in the precipitation of the gelatinous material. This situation is further confused with the uncertainty associated with determining appropriate representative amounts of aqueous and spray-induced corrosion products contained in the sump water. This quantity depends on the typical corrosion rates of the aforementioned materials under the time-temperature-pressure-pH conditions of representative LOCA events. However, due to the lack of comprehensive data for leaching rates of the insulation materials, it is important that further experiments be conducted to ascertain the uncertainty bounds associated with the simulation inputs.

OBJECTIVES

The objective of this specific investigation is to (1) determine dissolution rate of Nukon fiber with and without the presence of aluminum in borated water samples, (2) assess the usefulness of commercially available modeling software in simulating the formation of corrosion products from debris components and their ability to provide useful insights into potential post-LOCA sump environment reactions during a postulated LOCA event in a PWR, (3) assess the capability of the modeling software to predict the environment generated in the University of New Mexico (UNM) integrated chemical effects tests (ICET) program, given known starting conditions as a function of time, (4) determine limits of applicability of codes to allow an assessment of precipitate formation in plant specific environments that have not been explicitly tested as part the ICET program at UNM, and (5) provide expert advice in support of head loss testing in ICET and similar chemical environments planned at ANL.

SCOPE OF WORK

Task 1: Dissolution rate of Nukon fiber

In this task, CNWRA staff will determine dissolution rate of Nukon fiber insulation under following conditions

- Nukon fiber insulation in borated alkaline solution at pHs of 7 and 10 at 60°C
- Nukon fiber insulation with aluminum in borated alkaline solution at pHs of 7 and 10 at 60°C
- Nukon fiber insulation in UNM prepared solution at 60°C

Tests will be conducted by scaling surface to volume ratio adopted in UNM tests. The dissolution rates will be measured per applicable ASTM C-1220.

Task 2: Usefulness of commonly used commercial aqueous chemistry modeling software

In this task, CNWRA staff will evaluate the effectiveness (e.g., technical robustness, ease of use) of commonly used commercial aqueous chemistry modeling software such as Stream Analyzer Ver 1.2 (OLI Systems), Stream Analyzer Ver. 2.0 (OLI Systems), PHREEQC Ver. 2.8 (USGS), Geochemists Work Bench Ver. 4.0, and EQ3/EQ6 Ver. 7.2b to thermodynamically simulate reactions between borated containment water at pH 7 and 10 with debris components

to form corrosion products during a postulated LOCA event in a PWR. The CNWRA staff will critically review and summarize the capabilities of the various modeling software listed above and will use the software programs to perform equilibrium speciation and saturation calculations for a set of test cases. The bench mark test cases will use input data from Table 3-2 of the draft NUREG/CR, "Corrosion Rate Measurements and Chemical Speciation of Corrosion Products, Using Thermodynamic Modeling, of Debris Components to Support GSI-191," (currently issued for NRC comments) to represent a borated alkaline solution at pH 10. Results of the simulations will be compared with respect to pH and the predicted formation of aqueous species and solid phases. Differences in thermodynamic databases for the various modeling software and the different approaches or formalisms used by the modeling software for calculating charge balance, activity coefficients, redox, speciation, and mass transfer in multi-component solutions could result in different output data for the test cases. The observed differences will be analyzed and reconciled, if possible. At the conclusion of this task, CNWRA will recommend the appropriate modeling software which is best suited for speciation prediction in anticipated PWR sump environments.

Task 3: Correlation with the results of UNM tests # 1 - 5

This task will be performed concurrently with task 2. In this task, integrated chemical effects tests # 1 to # 5 performed at UNM will be simulated using the actual measured pH and modeling software recommended in task 2. Simulations should initiate from the starting conditions in the LANL/UNM tests and predict chemical by-products and speciation as a function of testing time. Results of the thermodynamic simulation will be correlated with observed results of UNM tests, and any differences will be identified and reconciled.

Task 4: Determine validity limits for applicability of chosen code for plant specific conditions

In this task, sensitivity analysis will be conducted for key parameters using the recommended modeling software to determine its applicability for different chemical conditions. At the conclusion of this task, limitations of the recommended modeling software shall be clearly identified and the applicability range of parameters shall be specified. The limits of applicability can either be based on identified modeling deficiencies or uncertainties, or may be developed with respect to expected bounds of sump environments.

Task 5: Staff Support

In this task, CNWRA staff will provide expert advice in support of chemical tests planned at ANL and UNM. This advice will focus on the identification of key variables and conditions which lead to representative chemical species which are most likely to result in net positive suction head loss. Initially, this effort will be limited to 50 man-hours. Expenditure of additional effort requires prior approval.

Task 6: Technical Assistance (Optional)

In this task, CNWRA staff will provide technical assistance to the NRC staff for predicting speciation based on individual plant environments. Initially, this effort will be limited to 100 man-hours. Expenditure of additional effort requires prior approval.

PUBLICATION NOTE

RES encourages the publication of the scientific results from RES sponsored programs in referred scientific and engineering journals as appropriate. If CNWRA proposes to publish in the open literature or present the information at meeting in addition to submitting the required technical reports, approval of the proposed article or presentation should be obtained from the RES Project Manager. The RES Project Manager shall either approve the material as submitted, approve it subject to NRC suggested revisions, or disapprove it. In any event, the RES Project Manager may disapprove or delay presentation or publication of papers on information that is subject to Commission approval that has not been ruled upon or which has been disapproved. Additional information regarding the publication of NRC sponsored research is contained in NRC Management Directives 3.8, "Unclassified Contractor and Grantee Publications in the NUREG Series," and 3.9, "NRC Staff and Contractor Speeches, Papers, and Journal Articles on Regulatory and Technical Subjects."

If the presentation or paper is in addition to the required technical reports and the RES Project Manager determines that it will benefit the RES project, the Project Manager may authorize payment of travel and publishing costs, if any, from the project funds. If the Project Manager determines that the article or presentation would not benefit the RES project, the costs associated with the preparation, presentation, or publication will be borne by CNWRA. For any publication or presentations falling into this category, the NRC reserves the right to require that such presentation or publication will not identify the NRC's sponsorship of the work.

Reminder: An electronic version of camera-ready papers and draft and final versions of the paper shall be submitted to the NRC Project Manager with the paper versions.

MEETINGS AND TRAVEL

All travel shall be approved by and coordinated with the NRC Project Manager. For the purpose of estimate, the project should assume five one -person trip to NRC Headquarters (Rockville, MD) to brief the NRC Project Manager on the results.

NRC FURNISHED MATERIALS

None.

CNWRA ACQUIRED MATERIAL

None.

DELIVERABLE/SCHEDULE AND/OR MILESTONES

PROGRAM MANAGER'S PERIODIC REPORT (PMPR)

A Program Manager's Periodic Report (PMPR) will be submitted by the 20th of each month, for the previous month, to the NRC Project Manager, with copies to the Director, Division of Engineering Technology; Chief, Engineering Research Applications Branch; Chief, Mechanical and Structural Engineering Section, Engineering Research Applications Branch; and to the Division of Contracts, Office of Administration. Each PMPR will provide information in accordance with NRC Management Directive 11.1 Handbook, with the agreed upon capability of

the CNWRA accounting system, including the title of the project, the JCN, the Principal Investigators, the period of performance, and the reporting period.

The PMPR will contain two sections as follows:

a) Project Status Section:

- (1) Objective: A brief statement of CNWRA's understanding of the objective of the program.
- (2) Progress During Reporting Period: A brief discussion and conclusion of efforts completed during the period, milestones reached, or if missed, and explanation provided. This will include all contacts made with industry during this period.
- (3) Travel: Travel taken during the reporting period will be described.
- (4) Anticipated and Encountered Problem Areas: Any problems or delays encountered or anticipated, and recommendations for resolution will be identified. (Note: if the recommended resolution involves a contract modification, i.e., change of work requirements, level of effort (costs), or period of performance, a separate letter will be prepared and submitted to the NRC Project Manager).
- (5) Plans for Next Reporting Period: A brief summary of plans for the next reporting period, including work to be performed and anticipated travel. Milestones that will be completed will be described.
- (6) Variance: Any variance in either schedule or spending will be identified and discussed, including the cause and proposed solutions.

b) Financial Status Section:

- (1) Financial Status: CNWRA will provide a narrative description of the financial status of the project, including a discussion of the status of the projected cost and the schedule of the project. In addition, financial information will be provided in accordance with NRC Management Directive 11.1 within the agreed-upon capabilities of the CNWRA accounting system.
- (2) Spending Plan (SP) Update: Any required updates to the spending plan will be reported and discussed.

Major Milestones:

The results of the study should be provided in a NUREG/CR report that will include a recommendation of a commercial aqueous chemistry modeling software for analyzing chemical effects to support GSI-191. The report will provide useful insights, clearly identify any limitation of the modeling software, and will also specify the applicable range of parameters. Analytical support as required by other tasks described herein should also be summarized.

NUREG/CR Report:

- (1) Deliverable: A draft NUREG/CR report documenting the method, results, and conclusions for tasks 1 through 4, and their ramifications on the modeling of the chemical reactions in representative sump waters is required. The report should include a recommendation of a software for analyzing chemical effects to support GSI-191. The report will provide useful

insights, clearly identify any limitation of the modeling software, and will also specify the applicable range of parameters.

An electronic version of the camera-ready NUREG/CRs, and draft and final versions of NUREG/CRs shall be submitted to the NRC Project Manager with the paper versions.

(2) Delivery Schedule: A draft NUREG/CR report shall be delivered by October 31, 2005. NRC will provide comments within four weeks of delivery of the draft report. The final NUREG/CR report shall be provided to the NRC PM by January 31, 2006.

NRC PROJECT OFFICER

B.P. Jain, RES, 301-415-6303
Engineering Research Applications Branch
Division of Engineering Technology
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
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TECHNICAL REVIEWER

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PERIOD OF PERFORMANCE

Date of award through 5/30/06

LEVEL OF EFFORT

The estimated effort level for the performance period of this order is 0.3 staff-year.