# SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS

*OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, & 30*

1. REQUISITION NUMBER: 4200417131

PAGE 1 OF 26

2. CONTRACT NO.

3. AWARD/ EFFECTIVE DATE

4. ORDER NUMBER

5. SOLICITATION NUMBER: NNA12417131Q

6. SOLICITATION ISSUE DATE: 01/13/2012

7. FOR SOLICITATION INFORMATION CALL:

a. NAME: ELIZABETH BAIERL

b. TELEPHONE NUMBER *(No collect calls)*: 6506045082

8. OFFER DUE DATE/LOCAL TIME: 02/10/2012 1630 LT

9. ISSUED BY CODE: ARC

NASA/Ames Research Center
Acquisition Division
M/S 241-1
Moffett Field CA 94035-0001

10. THIS ACQUISITION IS ☒ UNRESTRICTED OR ☐ SET ASIDE: % FOR:

☐ SMALL BUSINESS
☐ HUBZONE SMALL BUSINESS
☐ SERVICE-DISABLED VETERAN-OWNED SMALL BUSINESS
☐ WOMEN-OWNED SMALL BUSINESS (WOSB) ELIGIBLE UNDER THE WOMEN-OWNED SMALL BUSINESS PROGRAM
☐ ECONOMICALLY DISADVANTAGED WOMEN-OWNED SMALL BUSINESS (EDWOSB)
☐ 8(A)

NAICS: 333319

SIZE STANDARD: 500

11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED
☐ SEE SCHEDULE

12. DISCOUNT TERMS

☐ 13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700)

13b. RATING

14. METHOD OF SOLICITATION
☒ RFQ ☐ IFB ☐ RFP

15. DELIVER TO CODE

See Schedule

16. ADMINISTERED BY CODE: ARC

NASA/Ames Research Center
Acquisition Division
M/S 241-1
Moffett Field CA 94035-0001

17a. CONTRACTOR/ OFFEROR CODE

FACILITY CODE

TELEPHONE NO.

☐ 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER

18a. PAYMENT WILL BE MADE BY CODE

18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a UNLESS BLOCK BELOW IS CHECKED ☐ SEE ADDENDUM

| 19. ITEM NO. | 20. SCHEDULE OF SUPPLIES/SERVICES | 21. QUANTITY | 22. UNIT | 23. UNIT PRICE | 24. AMOUNT |
|---|---|---|---|---|---|
| | Contractor shall provide all labor, material, equipment, transportation, and supervision to fulfill the requirements of the contract for the leased equipment and associated support services, in accordance with the Statement of Work.<br><br>SEE SCHEDULE ON PAGE 2<br><br>*(Use Reverse and/or Attach Additional Sheets as Necessary)* | | | | |

25. ACCOUNTING AND APPROPRIATION DATA

26. TOTAL AWARD AMOUNT *(For Govt. Use Only)*

☒ 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4. FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA ☒ ARE ☐ ARE NOT ATTACHED.

☐ 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4. FAR 52.212-5 IS ATTACHED. ADDENDA ☐ ARE ☐ ARE NOT ATTACHED.

☐ 28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN _____ COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED.

☐ 29. AWARD OF CONTRACT: REF. _____ OFFER DATED _____. YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:

30a. SIGNATURE OF OFFEROR/CONTRACTOR

31a. UNITED STATES OF AMERICA *(SIGNATURE OF CONTRACTING OFFICER)*

30b. NAME AND TITLE OF SIGNER *(Type or print)*

30c. DATE SIGNED

31b. NAME OF CONTRACTING OFFICER *(Type or print)*: Manuel Herrada

31c. DATE SIGNED

**SCHEDULE OF SUPPLIES/SERVICES**

This is a combination Firm Fixed Price (FFP)/ Indefinite Quantity (IQ) contract for monthly lease of Electro Dialysis Metathesis (EDM) System, as described in the Statement of Work. The EDM System will be used for testing of the water recovery systems and processes at NASA Ames Research Center, with the intent for future use on board of the International Space Station (ISS). The system will serve as a proof of concept pilot unit. The lease includes two option periods, to be exercised at the Government's discretion. This contract includes Indefinite Quantity (IQ) Contract Line Items (CLINs) for fully burdened personnel labor rates, to be ordered if Government needs consulting of contractor's subject matter expert (SME) following the initial set up and training. The Contractor shall provide all resources (except as may be expressly stated in the contract as furnished by the Government) necessary to perform the requirements of the contract in accordance with the Statement of Work. All of the work in the Statement of Work is covered as the Firm Fixed Price portion of the contract, except for the two IQ CLINS, 0004 and 0005. Work order under those CLINS will be done in accordance with the FAR clauses 52.216-18, 52.216-19, and 52.216-22.

Schedule of Prices:

**Firm Fixed Price (FFP):**

| | | | |
|---|---|---|---|
| 0001 Lease, as per statement of work<br>Base Period of Performance | 6 | MO | $_____ |
| 0002 Lease, Option Period #1<br>1 Oct 2012 – 30 Nov 2012 | 2 | MO | $_____ |
| 0003 Lease, Option Period #2<br>1 Dec 2012 – 31 Jan 2013 | 2 | MO | $_____ |

**Indefinite Quantity (IQ)**

CLIN 0004: Remote On Call Hourly Consulting Services by Contractor's Subject Matter Expert (via electronic communications such as video, telephone, Web-Ex, etc.). This is a firm-fixed, fully burdened labor rate. This Indefinite Quantity Line Item will be ordered, if needed, in accordance with the Ordering clause in this contract.

| | | | Extended Total |
|---|---|---|---|
| Minimum guarantee | 32 hours | $_____ per hour | $_____ |
| Maximum hours | 120 hours | $_____ per hour | $_____ |

**Indefinite Quantity (IQ)**

CLIN 0005: On site (ARC), On Call Hourly Consulting Services by Contractor's Subject Matter Expert. This is a firm-fixed, fully burdened labor rate, inclusive of all labor, travel, and incidentals needed to perform services at NASA Ames Research Center, Moffett Field, CA.

| | | | Extended Total |
|---|---|---|---|
| Minimum guarantee | 16 hours | $_____ per hour | $_____ |
| Maximum hours | 80 hours | $_____ per hour | $_____ |

Contractor shall provide fixed rate, per hour, for both remote and on site consulting services of contractor's expert personnel. The fixed unit prices for IQ hours shall be inclusive of all travel, time, materials, logistics, and incidentals required to support NASA and the research being done using the leased EDM equipment. The Indefinite Quantity (IQ) hours may be ordered at the discretion of the government.

**B.2 1852.216-78 FIRM FIXED PRICE (DEC 1988)**

The total firm fixed price of this contract is TBD $_____

(End of Clause)

## ADDITIONAL PROVISIONS AND REPRESENTATIONS

## TERMS AND CONDITIONS OF ORDER

**FAR 52.212-4, CONTRACT TERMS AND CONDITIONS – COMMERCIAL ITEMS (JUN 2010), Incorporated by Reference**

(ADDENDUM TO FAR 52.212-4, CONTRACT TERMS AND CONDITIONS - COMMERCIAL ITEMS)

**PERIOD OF PERFORMANCE**

The period of performance of this contract commences the day following completion of set up, install, and initial 16 hours of customer training. Contract completion date is 30 September 2012.

**PLACE OF PERFORMANCE - SERVICES**

The leased equipment and associated support services covered under this contract shall be performed at NASA Ames Research Center, Bld 239, Room 242, Moffett Field, CA 94035.

**FAR 52.216-18, ORDERING (OCT 1995)**

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from award of contract through the final day of lease period.

(b) All delivery orders or task orders are subject to the terms and conditions of this contract. In the event of conflict between a delivery order or task order and this contract, the contract shall control.

(c) If mailed, a delivery order or task order is considered "issued" when the Government deposits the order in the mail. Orders may be issued orally, by facsimile, or by electronic commerce methods only if authorized in the Schedule.

(End of clause)

**FAR 52.216-19 ORDER LIMITATIONS (OCT 1995)**

(a) *Minimum order*. When the Government requires supplies or services covered by this contract in an amount of less than 32 hours for Remote On-Call Consulting Service (IDIQ CLIN 0004), or in an amount less than 16 hours for On Site Consulting Service (IDIQ CLIN 0005), the Government is not obligated to purchase, nor is the Contractor obligated to furnish, those supplies or services under the contract.

(b) *Maximum order*. The Contractor is not obligated to honor—

(1) Any order for a single item in excess of 120 hours for Remote On-Call Consulting Service (IDIQ CLIN 0004), or in excess of 80 hours On Site Consulting Service (IDIQ CLIN 0005) ;

(2) Any order for a combination of items in excess of 200 hours for Consulting Service (IDIQ CLINs 0004 and 0005); or

(3) A series of orders from the same ordering office within two days that together call for quantities exceeding the limitation in paragraph (b)(1) or (2) of this section.

(c) If this is a requirements contract (*i.e.*, includes the Requirements clause at subsection 52.216-21 of the Federal Acquisition Regulation (FAR)), the Government is not required to order a part of any one requirement from the Contractor if that requirement exceeds the maximum-order limitations in paragraph (b) of this section.

(d) Notwithstanding paragraphs (b) and (c) of this section, the Contractor shall honor any order exceeding the maximum order limitations in paragraph (b), unless that order (or orders) is returned to the ordering office within two days after issuance, with written notice stating the Contractor's intent not to ship the item (or items) called for and the reasons. Upon receiving this notice, the Government may acquire the supplies or services from another source.

(End of clause)

**FAR 52.216-22 INDEFINITE QUANTITY (OCT 1995)**

(a) This is an indefinite-quantity contract for the supplies or services specified, and effective for the period stated, in the Schedule. The quantities of supplies and services specified in the Schedule are estimates only and are not purchased by this contract.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. The Contractor shall furnish to the Government, when and if ordered, the supplies or services specified in the Schedule up to and including the quantity designated in

the Schedule as the "maximum." The Government shall order at least the quantity of supplies or services designated in the Schedule as the "minimum."

(c) Except for any limitations on quantities in the Order Limitations clause or in the Schedule, there is no limit on the number of orders that may be issued. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(d) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the contract's effective period; *provided*, that the Contractor shall not be required to make any deliveries under this contract after 31 January 2013.

(End of clause)

**FAR 52.217-8, OPTION TO EXTEND SERVICES (NOV 1999)**

The Government may require continued performance of any services within the limits and at the rates specified in the contract. These rates may be adjusted only as a result of revisions to prevailing labor rates provided by the Secretary of Labor. The option provision may be exercised more than once, but the total extension of performance hereunder shall not exceed 6 months. The Contracting Officer may exercise the option by written notice to the Contractor prior to contract expiration. (End of clause)

**FAR 52.217-9, OPTION TO EXTEND THE TERM OF THE CONTRACT (MAR 2000**)

(a) The Government may extend the term of this contract by written notice to the Contractor within one (1) day prior to contract expiration; provided that the Government gives the Contractor a preliminary written notice of its intent to extend at least three (3) days before the contract expires. The preliminary notice does not commit the Government to an extension.

(b) If the Government exercises this option, the extended contract shall be considered to include this option clause.

(c) The total duration of this contract, including the exercise of any options under this clause, shall not exceed 12 months. (End of clause)

**SUBMISSION OF INVOICES (ARC 52.232-90) (JUN 2008)**

(a) Invoices shall be prepared in accordance with the Prompt Payment clause of this contract and submitted in quadruplicate, unless otherwise specified, to the address below:

NASA Shared Services Center (NSSC)
Financial Management Division (FMD), Accounts Payable
Bldg. 1111, Road C
Stennis Space Center, MS 39529

This is the "designated billing and payment office" for purposes of the Prompt Payment Act. Invoices shall include the Contractor's Taxpayer Identification Number (TIN). Electronic

submission is also authorized, via email NSSC-AccountsPayable@nasa.gov or fax 866-209-5415.

(b) In the event that amounts are withheld from payment in accordance with the New Technology clause or other provisions of this contract, a separate invoice for the amount withheld shall be required before payment of that amount is made.

(c) This contract ☒ does ☐ does not provide for partial payments. If applicable, partial payments will be valued in accordance with the phases of work set forth in the Statement of Work and after verification of progress by COTR.

(End of Clause)

**1852.215-84 OMBUDSMAN (OCT 2003)**

(a) An ombudsman has been appointed to hear and facilitate the resolution of concerns from offerors, potential offerors, and contractors during the preaward and postaward phases of this acquisition. When requested, the ombudsman will maintain strict confidentiality as to the source of the concern. The existence of the ombudsman is not to diminish the authority of the contracting officer, the Source Evaluation Board, or the selection official. Further, the ombudsman does not participate in the evaluation of proposals, the source selection process, or the adjudication of formal contract disputes. Therefore, before consulting with an ombudsman, interested parties must first address their concerns, issues, disagreements, and/or recommendations to the contracting officer for resolution.

(b) If resolution cannot be made by the contracting officer, interested parties may contact the installation ombudsman. The current list of Center Ombudsmen is available at http://prod.nais.nasa.gov/pub/pub_library/Omb.html. Concerns, issues, disagreements, and recommendations which cannot be resolved at the installation may be referred to the NASA ombudsman, the Director of the Contract Management Division, at 202-358-0445, facsimile 202-358-3083, e-mail james.a.balinskas@nasa.gov. Please do not contact the ombudsman to request copies of the solicitation, verify offer due date, or clarify technical requirements. Such inquiries shall be directed to the Contracting Officer or as specified elsewhere in this document.

(End of clause)

**1852.225-70 EXPORT LICENSES (FEB 2000)**

(a) The Contractor shall comply with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this contract. In the absence of available license exemptions/exceptions, the Contractor shall be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data, and software, or for the provision of technical assistance.

(b) The Contractor shall be responsible for obtaining export licenses, if required, before utilizing foreign persons in the performance of this contract, including instances where the work is to be performed on-site at [*insert name of NASA installation*], where the

foreign person will have access to export-controlled technical data or software.

(c) The Contractor shall be responsible for all regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

(d) The Contractor shall be responsible for ensuring that the provisions of this clause apply to its subcontractors.

(End of clause)

**1852.237-73 RELEASE OF SENSITIVE INFORMATION (JUN 2005)**

(a) As used in this clause, "Sensitive information" refers to information, not currently in the public domain, that the Contractor has developed at private expense, that may embody trade secrets or commercial or financial information, and that may be sensitive or privileged.

(b) In accomplishing management activities and administrative functions, NASA relies heavily on the support of various service providers. To support NASA activities and functions, these service providers, as well as their subcontractors and their individual employees, may need access to sensitive information submitted by the Contractor under this contract. By submitting this proposal or performing this contract, the Contractor agrees that NASA may release to its service providers, their subcontractors, and their individual employees, sensitive information submitted during the course of this procurement, subject to the enumerated protections mandated by the clause at 1852.237-72, Access to Sensitive Information.

(c) (1) The Contractor shall identify any sensitive information submitted in support of this proposal or in performing this contract. For purposes of identifying sensitive information, the Contractor may, in addition to any other notice or legend otherwise required, use a notice similar to the following:

Mark the title page with the following legend:

This proposal or document includes sensitive information that NASA shall not disclose outside the Agency and its service providers that support management activities and administrative functions. To gain access to this sensitive information, a service provider's contract must contain the clause at NFS 1852.237-72, Access to Sensitive Information. Consistent with this clause, the service provider shall not duplicate, use, or disclose the information in whole or in part for any purpose other than to perform the services specified in its contract. This restriction does not limit the Government's right to use this information if it is obtained from another source without restriction. The information subject to this restriction is contained in pages [*insert page numbers or other identification of pages*]. Mark each page of sensitive information the Contractor wishes to restrict with the following legend:

Use or disclosure of sensitive information contained on this page is subject to the restriction on the title page of this proposal or document.

(2) The Contracting Officer shall evaluate the facts supporting any claim that particular information is "sensitive." This evaluation shall consider the time and

resources necessary to protect the information in accordance with the detailed safeguards mandated by the clause at 1852.237-72, Access to Sensitive Information. However, unless the Contracting Officer decides, with the advice of Center counsel, that reasonable grounds exist to challenge the Contractor's claim that particular information is sensitive, NASA and its service providers and their employees shall comply with all of the safeguards contained in paragraph (d) of this clause.

(d) To receive access to sensitive information needed to assist NASA in accomplishing management activities and administrative functions, the service provider must be operating under a contract that contains the clause at 1852.237-72, Access to Sensitive Information. This clause obligates the service provider to do the following:

(1) Comply with all specified procedures and obligations, including the Organizational Conflicts of Interest Avoidance Plan, which the contract has incorporated as a compliance document.

(2) Utilize any sensitive information coming into its possession only for the purpose of performing the services specified in its contract.

(3) Safeguard sensitive information coming into its possession from unauthorized use and disclosure.

(4) Allow access to sensitive information only to those employees that need it to perform services under its contract.

(5) Preclude access and disclosure of sensitive information to persons and entities outside of the service provider's organization.

(6) Train employees who may require access to sensitive information about their obligations to utilize it only to perform the services specified in its contract and to safeguard it from unauthorized use and disclosure.

(7) Obtain a written affirmation from each employee that he/she has received and will comply with training on the authorized uses and mandatory protections of sensitive information needed in performing this contract.

(8) Administer a monitoring process to ensure that employees comply with all reasonable security procedures, report any breaches to the Contracting Officer, and implement any necessary corrective actions.

(e) When the service provider will have primary responsibility for operating an information technology system for NASA that contains sensitive information, the service provider's contract shall include the clause at 1852.204-76, Security Requirements for Unclassified Information Technology Resources. The Security Requirements clause requires the service provider to implement an Information Technology Security Plan to protect information processed, stored, or transmitted from unauthorized access, alteration, disclosure, or use. Service provider personnel requiring privileged access or limited privileged access to these information technology systems are subject to screening using the standard National Agency Check (NAC) forms appropriate to the level of risk for adverse impact to NASA missions. The Contracting Officer may allow the service

provider to conduct its own screening, provided the service provider employs substantially equivalent screening procedures.

(f) This clause does not affect NASA's responsibilities under the Freedom of Information Act.

(g) The Contractor shall insert this clause, including this paragraph (g), suitably modified to reflect the relationship of the parties, in all subcontracts that may require the furnishing of sensitive information.

(End of clause)
(End of Addendum to FAR 52.212-4)

**FAR 52.212-5 CONTRACT TERMS AND CONDITIONS REQUIRED TO IMPLEMENT STATUTES OR EXECUTIVE ORDERS—COMMERCIAL ITEMS (JAN 2012)**

(a) The Contractor shall comply with the following Federal Acquisition Regulation (FAR) clauses, which are incorporated in this contract by reference, to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

(1) 52.222-50, Combating Trafficking in Persons (Feb 2009) (22 U.S.C. 7104(g)).

___Alternate I (Aug 2007) of 52.222-50 (22 U.S.C. 7104(g)).

(2) 52.233-3, Protest After Award (AUG 1996) (31 U.S.C. 3553).

(3) 52.233-4, Applicable Law for Breach of Contract Claim (OCT 2004) (Pub. L. 108-77, 108-78).

(b) The Contractor shall comply with the FAR clauses in this paragraph (b) that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

__ (1) 52.203-6, Restrictions on Subcontractor Sales to the Government (Sept 2006), with Alternate I (Oct 1995) (41 U.S.C. 253g and 10 U.S.C. 2402).

__ (2) 52.203-13, Contractor Code of Business Ethics and Conduct (Apr 2010) (Pub. L. 110-252, Title VI, Chapter 1 (41 U.S.C. 251 note)).

__ (3) 52.203-15, Whistleblower Protections under the American Recovery and Reinvestment Act of 2009 (June 2010) (Section 1553 of Pub. L. 111-5). (Applies to contracts funded by the American Recovery and Reinvestment Act of 2009.)

_X_ (4) 52.204-10, Reporting Executive Compensation and First-Tier Subcontract Awards (Jul 2010) (Pub. L. 109-282) (31 U.S.C. 6101 note).

__ (5) 52.204-11, American Recovery and Reinvestment Act—Reporting Requirements (Jul 2010) (Pub. L. 111-5).

_X_ (6) 52.209-6, Protecting the Government's Interest When Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment. (Dec 2010) (31 U.S.C. 6101 note).

__ (7) 52.209-9, Updates of Publicly Available Information Regarding Responsibility Matters (Jan 2012) (41 U.S.C. 2313).

__ (8) 52.209-10, Prohibition on Contracting with Inverted Domestic Corporations (section 740 of Division C of Pub. L. 111-117, section 743 of Division D of Pub. L. 111-8, and section 745 of Division D of Pub. L. 110-161).

__ (9) 52.219-3, Notice of HUBZone Set-Aside or Sole-Source Award (Nov 2011) (15 U.S.C. 657a).

_X_ (10) 52.219-4, Notice of Price Evaluation Preference for HUBZone Small Business Concerns (JAN 2011) (if the offeror elects to waive the preference, it shall so indicate in its offer) (15 U.S.C. 657a).

__ (11) [Reserved]

__ (12)(i) 52.219-6, Notice of Total Small Business Set-Aside (Nov 2011) (15 U.S.C. 644).

__ (ii) Alternate I (Nov 2011).

__ (iii) Alternate II (Nov 2011).

__ (13)(i) 52.219-7, Notice of Partial Small Business Set-Aside (June 2003) (15 U.S.C. 644).

__ (ii) Alternate I (Oct 1995) of 52.219-7.

__ (iii) Alternate II (Mar 2004) of 52.219-7.

__ (14) 52.219-8, Utilization of Small Business Concerns (Jan 2011) (15 U.S.C. 637(d)(2) and (3)).

__ (15)(i) 52.219-9, Small Business Subcontracting Plan (Jan 2011) (15 U.S.C. 637(d)(4)).

__ (ii) Alternate I (Oct 2001) of 52.219-9.

__ (iii) Alternate II (Oct 2001) of 52.219-9.

__ (iv) Alternate III (Jul 2010) of 52.219-9.

__ (16) 52.219-13, Notice of Set-Aside of Orders (Nov 2011)(15 U.S.C. 644(r)).

__ (17) 52.219-14, Limitations on Subcontracting (Nov 2011) (15 U.S.C. 637(a)(14)).

__ (18) 52.219-16, Liquidated Damages—Subcon-tracting Plan (Jan 1999) (15 U.S.C. 637(d)(4)(F)(i)).

__ (19)(i) 52.219-23, Notice of Price Evaluation Adjustment for Small Disadvantaged Business Concerns (OCT 2008) (10 U.S.C. 2323) (if the offeror elects to waive the adjustment, it shall so indicate in its offer).

__ (ii) Alternate I (June 2003) of 52.219-23.

__ (20) 52.219-25, Small Disadvantaged Business Participation Program—Disadvantaged Status and Reporting (Dec 2010) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

__ (21) 52.219-26, Small Disadvantaged Business Participation Program—Incentive Subcontracting (Oct 2000) (Pub. L. 103-355, section 7102, and 10 U.S.C. 2323).

__ (22) 52.219-27, Notice of Service-Disabled Veteran-Owned Small Business Set-Aside (Nov 2011) (15 U.S.C. 657 f).

_X_ (23) 52.219-28, Post Award Small Business Program Rerepresentation (Apr 2009) (15 U.S.C. 632(a)(2)).

__ (24) 52.219-29 Notice of Set-Aside for Economically Disadvantaged Women-Owned Small Business Concerns (Nov 2011).

__ (25) 52.219-30 Notice of Set-Aside for Women-Owned Small Business Concerns Eligible Under the Women-Owned Small Business Program (Nov 2011).

_X_ (26) 52.222-3, Convict Labor (June 2003) (E.O. 11755).

_X_ (27) 52.222-19, Child Labor—Cooperation with Authorities and Remedies (Jul 2010) (E.O. 13126).

_X_ (28) 52.222-21, Prohibition of Segregated Facilities (Feb 1999).

_X_ (29) 52.222-26, Equal Opportunity (Mar 2007) (E.O. 11246).

_X_ (30) 52.222-35, Equal Opportunity for Veterans (Sep 2010)(38 U.S.C. 4212).

__ (31) 52.222-36, Affirmative Action for Workers with Disabilities (Oct 2010) (29 U.S.C. 793).

_X_ (32) 52.222-37, Employment Reports on Veterans (SEP 2010) (38 U.S.C. 4212).

__ (33) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (Dec 2010) (E.O. 13496).

__ (34) 52.222-54, Employment Eligibility Verification (JAN 2009). (Executive Order 12989). (Not applicable to the acquisition of commercially available off-the-shelf items or certain other types of commercial items as prescribed in 22.1803.)

__ (35)(i) 52.223-9, Estimate of Percentage of Recovered Material Content for EPA–Designated Items (May 2008) (42 U.S.C. 6962(c)(3)(A)(ii)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

__ (ii) Alternate I (May 2008) of 52.223-9 (42 U.S.C. 6962(i)(2)(C)). (Not applicable to the acquisition of commercially available off-the-shelf items.)

__ (36) 52.223-15, Energy Efficiency in Energy-Consuming Products (DEC 2007) (42 U.S.C. 8259b).

__ (37)(i) 52.223-16, IEEE 1680 Standard for the Environmental Assessment of Personal Computer Products (DEC 2007) (E.O. 13423).

__ (ii) Alternate I (DEC 2007) of 52.223-16.

_X_ (38) 52.223-18, Encouraging Contractor Policies to Ban Text Messaging While Driving (AUG 2011) (E.O. 13513).

__ (39) 52.225-1, Buy American Act—Supplies (Feb 2009) (41 U.S.C. 10a-10d).

_X_ (40)(i) 52.225-3, Buy American Act—Free Trade Agreements—Israeli Trade Act (June 2009) (41 U.S.C. 10a-10d, 19 U.S.C. 3301 note, 19 U.S.C. 2112 note, 19 U.S.C. 3805 note, Pub. L. 108-77, 108-78, 108-286, 108-302, 109-53, 109-169, 109-283, and 110-138).

__ (ii) Alternate I (Jan 2004) of 52.225-3.

__ (iii) Alternate II (Jan 2004) of 52.225-3.

__ (41) 52.225-5, Trade Agreements (NOV 2011) (19 U.S.C. 2501, *et seq*., 19 U.S.C. 3301 note).

_X_ (42) 52.225-13, Restrictions on Certain Foreign Purchases (June 2008) (E.O.'s, proclamations, and statutes administered by the Office of Foreign Assets Control of the Department of the Treasury).

__ (43) 52.226-4, Notice of Disaster or Emergency Area Set-Aside (Nov 2007) (42 U.S.C. 5150).

__ (44) 52.226-5, Restrictions on Subcontracting Outside Disaster or Emergency Area (Nov 2007) (42 U.S.C. 5150).

__ (45) 52.232-29, Terms for Financing of Purchases of Commercial Items (Feb 2002) (41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

__ (46) 52.232-30, Installment Payments for Commercial Items (Oct 1995) (41 U.S.C. 255(f), 10 U.S.C. 2307(f)).

_X_ (47) 52.232-33, Payment by Electronic Funds Transfer—Central Contractor Registration (Oct 2003) (31 U.S.C. 3332).

__ (48) 52.232-34, Payment by Electronic Funds Transfer—Other than Central Contractor Registration (May 1999) (31 U.S.C. 3332).

__ (49) 52.232-36, Payment by Third Party (Feb 2010) (31 U.S.C. 3332).

__ (50) 52.239-1, Privacy or Security Safeguards (Aug 1996) (5 U.S.C. 552a).

__ (51)(i) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (Feb 2006) (46 U.S.C. Appx. 1241(b) and 10 U.S.C. 2631).

__ (ii) Alternate I (Apr 2003) of 52.247-64.

(c) The Contractor shall comply with the FAR clauses in this paragraph (c), applicable to commercial services, that the Contracting Officer has indicated as being incorporated in this contract by reference to implement provisions of law or Executive orders applicable to acquisitions of commercial items:

[*Contracting Officer check as appropriate.*]

__ (1) 52.222-41, Service Contract Act of 1965 (Nov 2007) (41 U.S.C. 351, *et seq*.).

__ (2) 52.222-42, Statement of Equivalent Rates for Federal Hires (May 1989) (29 U.S.C. 206 and 41 U.S.C. 351, *et seq*.).

__ (3) 52.222-43, Fair Labor Standards Act and Service Contract Act—Price Adjustment (Multiple Year and Option Contracts) (Sep 2009) (29 U.S.C. 206 and 41 U.S.C. 351, *et seq*.).

__ (4) 52.222-44, Fair Labor Standards Act and Service Contract Act—Price Adjustment (Sep 2009) (29 U.S.C. 206 and 41 U.S.C. 351, *et seq*.).

__ (5) 52.222-51, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment—Requirements (Nov 2007) (41 351, *et seq*.).

__ (6) 52.222-53, Exemption from Application of the Service Contract Act to Contracts for Certain Services—Requirements (Feb 2009) (41 U.S.C. 351, *et seq*.).

__ (7) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations (Mar 2009) (Pub. L. 110-247).

__ (8) 52.237-11, Accepting and Dispensing of $1 Coin (Sept 2008) (31 U.S.C. 5112(p)(1)).

(d) *Comptroller General Examination of Record*. The Contractor shall comply with the provisions of this paragraph (d) if this contract was awarded using other than sealed bid, is in excess of the simplified acquisition threshold, and does not contain the clause at 52.215-2, Audit and Records—Negotiation.

(1) The Comptroller General of the United States, or an authorized representative of the Comptroller General, shall have access to and right to examine any of the Contractor's directly pertinent records involving transactions related to this contract.

(2) The Contractor shall make available at its offices at all reasonable times the records, materials, and other evidence for examination, audit, or reproduction, until 3 years after final payment under this contract or for any shorter period specified in FAR Subpart 4.7, Contractor Records Retention, of the other clauses of this contract. If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement. Records relating to appeals under the disputes clause or

to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are finally resolved.

(3) As used in this clause, records include books, documents, accounting procedures and practices, and other data, regardless of type and regardless of form. This does not require the Contractor to create or maintain any record that the Contractor does not maintain in the ordinary course of business or pursuant to a provision of law.

(e)(1) Notwithstanding the requirements of the clauses in paragraphs (a), (b), (c), and (d) of this clause, the Contractor is not required to flow down any FAR clause, other than those in this paragraph (e)(1) in a subcontract for commercial items. Unless otherwise indicated below, the extent of the flow down shall be as required by the clause—

(i) 52.203-13, Contractor Code of Business Ethics and Conduct (Apr 2010) (Pub. L. 110-252, Title VI, Chapter 1 (41 U.S.C. 251 note)).

(ii) 52.219-8, Utilization of Small Business Concerns (Dec 2010) (15 U.S.C. 637(d)(2) and (3)), in all subcontracts that offer further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds $650,000 ($1.5 million for construction of any public facility), the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(iii) [Reserved]

(iv) 52.222-26, Equal Opportunity (Mar 2007) (E.O. 11246).

(v) 52.222-35, Equal Opportunity for Veterans (Sep 2010) (38 U.S.C. 4212).

(vi) 52.222-36, Affirmative Action for Workers with Disabilities (Oct 2010) (29 U.S.C. 793).

(vii) 52.222-40, Notification of Employee Rights Under the National Labor Relations Act (Dec 2010) (E.O. 13496). Flow down required in accordance with paragraph (f) of FAR clause 52.222-40.

(viii) 52.222-41, Service Contract Act of 1965 (Nov 2007) (41 U.S.C. 351, *et seq.*).

(ix) 52.222-50, Combating Trafficking in Persons (Feb 2009) (22 U.S.C. 7104(g)).

___Alternate I (Aug 2007) of 52.222-50 (22 U.S.C. 7104(g)).

(x) 52.222-51, Exemption from Application of the Service Contract Act to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements (Nov 2007) (41 U.S.C. 351, *et seq.*).

(xi) 52.222-53, Exemption from Application of the Service Contract Act to Contracts for Certain Services-Requirements (Feb 2009) (41 U.S.C. 351, *et seq.*).

(xii) 52.222-54, Employment Eligibility Verification (JAN 2009).

(xiii) 52.226-6, Promoting Excess Food Donation to Nonprofit Organizations (Mar 2009) (Pub. L. 110-247). Flow down required in accordance with paragraph (e) of FAR clause 52.226-6.

(xiv) 52.247-64, Preference for Privately Owned U.S.-Flag Commercial Vessels (Feb 2006) (46 U.S.C. Appx. 1241(b) and 10 U.S.C. 2631). Flow down required in accordance with paragraph (d) of FAR clause 52.247-64.

(2) While not required, the contractor may include in its subcontracts for commercial items a minimal number of additional clauses necessary to satisfy its contractual obligations.

(End of clause)

## STATEMENT OF WORK

AES Water Recovery for Testing and evaluation of the Electrodialysis Metathesis (EDM) system.

1. Background

NASA is seeking offers from industry on potential systems, processes, and products that will achieve scaling compounds removal from concentrated urine to below solubility limit to prevent scale formation in distillation processor, such as electro dialysis metathesis (EDM) systems.

NASA intends to lease one (1) "ready-to-use" Electro dialysis Metathesis (EDM) System for testing the water recovery systems and processes at NASA Ames Research Center with the intent for future use on board of the International Space Station (ISS). The system will serve as a proof of concept pilot unit.

One of the objectives of this work plan is to evaluate the electro dialysis metathesis (EDM) process for the removal of calcium scale precursors from urine. Operation of the International Space Station (ISS) urine processor assembly (UPA) has demonstrated that calcium scale can be a limiting factor to achieving high water recovery ratios. The urine generated on ISS has a high potential for calcium scale formation due to microgravity initiated bone loss from astronauts and the use of sulfuric acid as a pretreatment. As a result, the ISS UPA has operated at reduced water recovery ratio in order to prevent the precipitation of calcium compounds-based scale. Examples of scale forming calcium salts are calcium sulfate and calcium carbonate (these salts have inverse solubility behavior, e.g. the solubility decreases with increasing temperature and salts precipitate on heat exchange surfaces of the UPA when the solution becomes supersaturated). The need to resupply water to ISS can be addressed by mitigating this calcium compounds scale problem and increasing the water recovery ratio of the UPA. This can be accomplished by removing the scaling compounds such as calcium and its ionic conjugates from solution. The EDM process may be developed as a method to remove scaling calcium compounds from solution and prevent its precipitation as calcium scale on the walls of equipment. The development of this technology also allows for the development of a new generation of spacecraft wastewater treatment systems, which are designed specifically to deal with precipitated scale forming solids.

2. Technical approach

NASA is presently familiar with the capabilities of zero discharge desalination (ZDD) systems that include EDM subsystems and seeks this kind or equivalent equipment to fulfill the ISS water processing need. The focus will be an evaluation of the existing technology and systems and their suitability for this application.

2.1. System Characteristics**:**

The system may incorporate an electro dialysis cell consisting of multiple compartments. Following is an example of possible system configuration that NASA seeks. This system is for reference only; NASA is seeking industry to find the best solutions at the best value. The contractor shall prepare a proposal that meets the capability requirements and the system characteristics are provided for reference only as is based on the information NASA currently

possesses.

The electro dialysis-metathesis cell module example may have individually-placed ion exchange membranes: 3 cation exchange membranes and 2 anion exchange membranes. The cell module has 2 electrodes: anode and cathode. The 2 cation exchange membranes are placed in a vicinity of electrodes. The assembly should allow easy membrane replacement with a possibility of replacement of electrodes to test various membranes and electrodes. The room between membranes should have optimized spacers, also with a possibility of easy spacer replacement. The stack assembly should have seals that provide positive sealing. Each membrane compartment shall have inlet and outlet ports for processed liquids: two compartments for rinsing of electrodes, one compartment for feed stream, one compartment for replacement ions solution (for example, NaCl), two compartments for processed liquids consisting exchanged ions. The total number of compartments in this example: 6. This number includes 2 electrode compartments. The compartments will consist spacers that facilitate liquid flow and separate ion exchange membranes. This is an example of a possible membrane stack configuration. Other configurations that can perform the function of effective scaling compounds removal may also be considered. The proposed overall configuration may be a square or rectangular stack, tubular or other compact geometry. The materials selection: the materials should be compatible with the product of highly concentrated salt solutions and acidic (pH2) conditions.

The anion and cation exchange membrane life span should be approximately the same under operational conditions. The expected membrane life shall be at least 2 years (if possible 3 years - in the typical ED processes the membranes may last up to 10 years, but the contractor shall consider the processing conditions when providing this estimate).

2.2. The feed streams:

The product feed stream is highly concentrated urine at about 80% of water removal level. The solids level in the tested concentrated streams may vary between 120 and 300 g/L.

The pretreated urine without a concentration step will also be tested in this system. In such urine stream the dissolved solids may be at the 35-50 g/L level.

The concentrated urine would pose more challenges to the EDM processing than the pretreated one due to the high solids content and liquid properties.

Other streams would have parameters as used in metathesis.

The active cross section areas of electrodes and ion exchange membranes and the stack design shall provide system capacity with the flow rate range of approximately 50-150 L per hour feed flow rate in recirculation mode. In the flow-through mode the tested flow rate can be lower (below 50 L per hour).

2.3. The operational conditions:

The feed stream description:

The urine is treated with sulfuric acid that decreases pH to pH2 and increases the sulfate level. In this step an oxidizing compound (for example, Oxone by DuPont Company) is also added to urine with the main component being potassium peroxymonosulfate ($KHSO_5$). This is a urine processing step which will take place outside of the EDM processing equipment (there will be no direct contact of EDM with the acid or with the oxidizing agent).

Scaling calcium compounds in the stream are calcium sulfate and calcium carbonate. Typical urine salts will also be present (for example, sodium chloride and calcium oxalate). Other urine compounds are urea, uric acid, creatinine, and in small quantities: carbohydrates, enzymes and proteins, fatty acids, pigments. In the raw (untreated) urine calcium oxalate and uric acid may

crystallize (these are the components of the kidney stones).
The level of calcium in the processed urine will be higher than the level of calcium in clinical urine samples due to the bone demineralization in microgravity (the calcium level in urine may be more than double in comparison to typical levels for clinical urine analysis). Normal clinical urine analysis gives the calcium levels from below 100 to more than 200 mg per day. Under microgravity conditions the bone demineralization may add 200-300 mg of calcium per day. Using an example of the 500 mg calcium in urine per day per person and approximate liquid volume per day of about 1.5 L per person (urine and flush water), the calcium level in untreated urine may be about 333 mg/L and even higher values may occur.
Urine concentration and water removal in the urine processor (UPA) would increase this level to a value when the precipitation may occur at high water recovery rates. For example, if the brine volume reaches 20% of initial liquid volume, the calcium concentration in this case might reach a level of about 1,665 mg/L. Since the calcium expression levels vary and the amount of urine per person per day may vary as well, the untreated urine may contain calcium within a relatively broad range of concentrations (for example, from 140 mg/L to 370 mg/L). Therefore, the experimental work may cover a broad range of urine composition. The above numbers are an illustrative example and the test conditions may use even broader range of the calcium concentration.

The electro dialysis system should be able to remove calcium from the solution also during the concentration process, e.g. in the laboratory setup the urine with increasing concentration of solids will be tested.

The example of a typically encountered scale-forming calcium compound is calcium sulfate. Its concentration needs to be maintained at a level below the precipitation threshold (the solubility is low, at about 2.6-2.7 g/L at ambient temperature and decreases at elevated temperatures).

Solubility of calcium sulfate does not show dependency on pH, for example in one reported experimental work the solubility was determined at pH2.5 to be 2.70 g/L, at pH5 to be 2.68 g/L and at pH7 to be 2.54 g/L. The experiments were conducted at 35 deg C. The presence of sodium chloride can affect the solubility of calcium sulfate. For example, the solubility can be around 6.9 g/L at about 58 g/L of NaCl in solution and around 9.5 g/L at 145 g/L of NaCl. However, further increase of sodium chloride level led to decrease in calcium sulfate solubility. Untreated urine typically contains about 8 g/L of sodium chloride, thus the effect on solubility of calcium sulfate is relatively small. Urine concentration process would increase level of sodium chloride and thus its effect on solubility of calcium sulfate would increase.

One shall notice that the calcium sulfate solubility may also vary depending on the presence of other compounds and ions. This calls for a certain reserve in a system performance capacity. However, the complete removal of $CaSO_4$ may not be necessary. For example, the amount of calcium sulfate left in the processed solution may still be at the level approximately 0.3-0.4 g/L, although lower levels provide broader processing margin for the distillation equipment.

The solubility of calcium carbonate is lower than the calcium sulfate under the standard conditions (it is at about 14 mg/L level). In the presence of carbon dioxide the solubility may increase 4-5 times. Calcium carbonate solubility increases with lowering the pH (for example, lowering the pH from pH7 to pH6 may cause more than 3 times increase in solubility). Operating near pH2 would increase the solubility of calcium carbonate even further. Adding the acid may also aid in carbonate conversion into dissolved carbon dioxide.
The presence of ammonium salts may also increase solubility of calcium carbonate.

Calcium oxalate has low solubility at normal conditions and precipitation can occur at concentrations even below 10 mg/L. Lowering the pH can reduce precipitation and the calcium oxalate levels in solution can be as high as 100 mg/L at pH3. Lowering the pH to about pH2.6 showed no precipitation at calcium oxalate level of 150 mg/L. Experience from the paper industry has shown that lowering the pH to pH2.5 practically eliminated calcium oxalate precipitation at the calcium oxalate range of 50-100 mg/L. These data may indicate that the calcium oxalate would not precipitate at pH2 at the level of 150 mg/L and possibly at higher levels as well.

The above data are examples based on literature and were not obtained from testing of concentrated urine, thus are provided for information only.

For comparison, the calcium ion levels recorded in the reverse osmosis concentrates in desalination plants have varied between 540 and 2,080 mg/L and the sulfate ion levels between 1,553 and 5,920 mg/L. The total dissolved solids levels were between 17 and 50 g/L.

Since the composition of such feed streams is different from the concentrated urine, these are only the illustrative examples of use of electro dialysis treatment for calcium sulfate- and calcium carbonate-containing brines and waters.

Selected operation details and requirements:
There may be an effect on solubility of calcium compounds from the presence of urine components, but the exact solubility thresholds are not exactly known at this time.

The calcium removal may probably proceed to lower the calcium level below 500-550 mg/L (like 300-400 mg/L) during the urine concentration process to avoid precipitation of calcium salts, but the exact values will be determined by this experimental work.

No significant gas release shall occur. The gas formation shall be minimized. The system design shall have means for safe removal of formed gases. Measures of handling of gas bubbles in microgravity shall be proposed to prevent degradation of electrodes performance. No excessive temperatures (no more than 20-25 deg C above ambient) are allowed (operation at ambient temperature is preferred; a need for external cooling shall be avoided). Any increase in temperature shall be avoided because of decrease in solubility of calcium salts as well as for operational and safety reasons. The system shall not use excessive pressures (if possible, no more than 0.15-0.3 bar, e.g. lower than in the typical commercial ED systems) and shall not have any high flow resistance components. If necessary, special spacers may be needed to reduce pressure drop and maintain adequate turbulence.

System shall use optimized power levels, considering processing membrane stack (current and voltage), as well as in the system components (for example, pumps and actuators). The values of current and voltage shall be optimized regarding the EDM ion exchange performance as well as minimizing the power use. One of the factors can be a level of the electrical resistance of ion exchange membranes.

The pretreated urine and the pretreated concentrated urine will be tested. These two feed sources may require different operating conditions, for example, have different electrical currents and power requirements that may produce different operating efficiencies.

Formation of solid deposits inside the EDM stack shall be avoided by combination of system design features and operational parameters.

Addition of chemicals should be minimized and if possible eliminated. For example, the streams produced by the EDM stack may be used for electrode rinsing, and possibly the eluate may become a source of sodium and chloride (re-using the NaCl), or other applicable ions. System must be capable of handling particles in the processed liquids (design of compartments, spacers and ports). Coarse particles may be separated prior to the EDM system using an external filter.

3. Deliverables.

3.1. The system.

The contractor shall provide an operating EDM research system for scaling compounds removal from the pretreated urine with varying solids composition and concentration. The EDM system shall demonstrate ability to remove the scaling compounds to a level that eliminates scale formation. The experimental results from the test EDM system will provide background for designing the ground-based and future flight EDM systems. Possible modifications will be evaluated with the cost/benefit provided for further hardware development and future testing needs.

Upon delivery and set up of the EDM equipment, contractor shall provide the following documentation of the EDM System:
1- The EDM System Manual shall include detailed description of the proposed research system with the anticipated performance range and operating conditions (including ranges of operational parameters). The individual components specifications shall be included.
2-The contractor shall provide written operating procedures for the system.
3-The contractor shall provide safety information regarding system assembly and operation, including risk evaluation. Safety features and measures shall be described with identification of potential safety hazards. This shall include electrical, chemical and mechanical safety issues. List of materials and consumables shall include MSDS and identify hazardous materials and substances, if present.

Failure to provide these supporting documents upon delivery of unit may result in non acceptance, adjustment of contract price, or other administrative actions.

The Requirements:

a) The system will serve as a research/pilot unit to prove the concept and establish a range of performance parameters. Therefore, the parameters given in these Requirements are the guideline numbers only to aid the contractor in calibrating system performance.

b) The EDM system shall be able to process 50-150 L/hr of concentrated solution (pretreated urine) in a recirculation mode and remove scaling compounds to levels that permit safe operation of the UPA system on board of the ISS. Lower flow rates may be tested in a flow-through mode, e.g. below 50 L/hr, and then down even to the 10-25 L/hr range. Calcium compounds shall be focused on due to their low solubility and tendency to scale formation. The amount of calcium sulfate shall be reduced to approximately 300-400 mg/L level and the amount of calcium carbonate to less than 10 mg/L level. It will be desirable if the system can exceed these requirements and deliver even lower concentrations of these salts.

c) The delivered EDM system shall be a complete turn-key system, ready to operate at the NASA facilities.

d) The EDM system shall possess construction materials compatibility with the highly acidic (pH2) and highly concentrated solutions (the concentrated urine with the total solids up to 300 g/L). Specifications of materials of construction shall be provided upon delivery and set up of the system.

e) The contractor shall provide rationale in their proposal for the selection of system components (such as ion exchange membranes, spacers and electrodes), the system configuration and the system operational conditions (such as voltage and current, power requirement, gas release, composition and concentration of solutions, flow rates, pressures, temperatures, etc.).

f) Contractor shall provide in their proposal a listing/description of the ion exchange membranes selection with their proposal for Government review. The projected membranes life shall be no less than two years (if possible, longer membrane life will be desirable) under the process operational conditions with the life for anion and cation exchange membranes being approximately the same.

g) The system internals shall be able to operate under the presence of particulate material with particle size below 100 micrometer.

h) The system configuration and operational conditions shall minimize use of additional chemicals (if possible external chemicals addition shall be eliminated when the system reaches stable operation – for example by recycling).

i) The EDM system shall be safe to operate (no presence of leaks, elevated temperature, electrical discharge). Appropriate safety information shall be provided by the contractor upon delivery and set up of the equipment.

j) The contractor shall perform system startup and demonstration after delivery to the NASA Ames Research Center laboratory site.

k) The contractor shall provide, as part of this base lease price, at least 16 hours ( 2 working days) of initial equipment training for up to ten NASA employees. This training shall follow the complete system startup and demonstration, and shall be arranged to be conducted at a mutually-agreeable time shortly thereafter.
This training shall include, at a minimum, sufficient training on the system design and operation for the NASA personnel at the NASA site.

l)The contractor shall provide in their proposal for evaluation purposes, specifications and information needed to install the EDM system in the NASA laboratory, such as system dimensions, weight, support needed, power required (individually for each voltage), utilities needed (water, compressed air, vacuum, etc.).

m) The contractor shall provide system cleaning and storage procedures including required cleaning agents with safety information (including the MSDS sheets). This information shall be provided at the time of delivery and set up of the equipment.

n) For the duration of the lease, the contractor shall be able to promptly deliver replacement parts for the system in a case of degradation of performance, breakdown or damage during testing. The examples can be ion exchange membranes, spacers or electrodes, but also shall include other system components if they fail (power supply, pumps, valves, controls, piping, etc.) The delivery shall not exceed 3 working days after notification of need for the membranes, spacers electrodes

and small parts, and 5 working days for other major components.

3.2. Contractor support:

The personnel:

Qualified personnel familiar with contractor's technology, equipment and processes shall be available as a part of contractor support. Personal familiarity with the electro dialysis metathesis technology details is required. Personal publications and patents related to the EDM technology are desirable.

Following installation and training, for the duration of the lease period, contractor shall provide support for experimental testing. This support shall come from contractor's subject matter experts (SME). Should this support be required, it will be ordered from one of the pre priced IQ Contract Line Items (CLINS), 0004 and 0005. Support may be needed in the following areas: technical analysis, equipment and component selection, system setup, conduction of experiments and system modifications as needed, and data analysis using contractor expertise. Contractor technology-specific expertise and know-how are the essential part of contractor support.

The contractor shall provide names and information on their SME's with their proposal, and ensure that the personnel are available during the length of the project for support should the Government order hours under the IQ Contract Line Items (CLINs 0004 and 0005). The contractor's support personnel shall provide needed expertise on contractor's technology. These experts shall be available during the workweek, Monday through Friday, from 8 AM – 4 PM local time (PST) to provide phone support. Additional forms of remote support may include email, fax or teleconferencing.

The equipment:

The contractor shall use its expertise to select the most appropriate set of EDM stack, ion exchange membranes, spacers and electrodes to ensure the best performance of the EDM system for this application. A set of various types of electrodes, spacers and ion exchange membranes shall be available from the contractor to test multiple options and optimize performance if necessary.

The membranes:

The ion exchange membranes are the key component that may determine performance of the EDM system.
Multiple types of anion and cation exchange membranes shall be available to be promptly delivered within 3 working days on a short notice from the contractor site to the NASA laboratory at Ames Research Center. The minimum number of each type of membrane included at delivery (cation and anion) will be two. This also applies to ion selective membranes, for example if there are two types of cation exchange membrane to be used in the stack and one is a standard type and second is a ion selective type, two membranes of each type shall be available. If the contractor has more than two suitable types of each cation and anion exchange membranes that can lead to system performance optimization such information shall be provided.

The membranes shall be well characterized and information shall be provided with offeror's proposal for evaluation purposes. Membranes specifications shall be provided and include such parameters as membrane composition (including ionic groups), ion-exchange capacity of

membrane, membrane electrical resistance (NaCl solution at certain concentration), thickness, transport number, permselectivity, burst strength, thermal stability, chemical stability (with pH range), limiting current density. Membrane hydrophilicity shall be described (if this information is available) since it may affect water dissociation. Additional characteristics shall be provided if beneficial to this application. Examples can be a calcium ion transport number and membrane selectivity for various ions. The EDM processes have been known to utilize the selective ion exchange membranes that may target specific ions. If a commercial membrane is proposed, it also shall be well characterized using the manufacturer's data and if possible the contractor own experience with the membrane in the ED and EDM processes. The contractor may propose to use own membranes or to use membranes manufactured by others.

The contractor shall select membranes according to the current state of the art and its expertise and experience. The EDM process may require ion exchange membranes with specific ion selectivities.

Noncommercial high performance membranes (if offered) will also be considered if beneficial for this application, for example membranes with selective ion permeability, structural modifications, use of conductive fillers, special surface properties, antifouling characteristics. The membrane selection justification and benefits of proposed membranes shall be described in offeror's proposal.

The electrodes:

The contractor shall have available at least two types of anode and two types of cathode. If contractor can provide more different types of electrodes to optimize system performance this information shall be provided. The electrode selection justification and benefits of proposed electrodes shall be described.

The spacers:

The contractor shall also provide information on the recommended spacers as well as on available spacer designs, including spacer thickness, hydrodynamic characteristics and if available, spacer conductivity. The spacer selection justification and benefits of proposed spacers shall be described.

The EDM stack:

The contractor shall provide information on the EDM stack, including pressure rating, flow rates ranges for fluids involved, hydraulic resistances, temperature rating, electrical rating (current, voltage), current leakage through the stack. Data on geometry of the internal channels shall be provided to allow estimating the liquid flow velocities between membranes. Additional information can include data on uniformity of solution flow distribution in the EDM stack between the membranes (this may affect concentration distribution, electric resistance distribution, and current density distribution). High current efficiency shall be achievable in the system. The contractor shall provide a range of approximate current efficiencies based on those obtained in the contractor equipment under the high level of dissolved solids conditions. The stack shall be easy to dismantle and reassembly, including inspection, service and cleaning, and membrane, spacer and electrode replacement, as well as possible addition or reduction of number of membrane compartments depending on system tested capacity and operational conditions. The stack design and configuration selection justification and benefits shall be described.

The power supply:

The power supply shall match the stack design and active electrode and membrane dimensions and have adequate operational range (current, voltage, power rating) to accommodate anticipated testing conditions (high ionic content, high total dissolved solids content, recirculating batch or a flow-through scheme) and permit operational parameters optimization of the EDM system. The power supply needs to deliver high power rates while treating solutions with high total solids content.
NOTE: The room in which the equipment will be placed has electrical power supply that includes 3-phase 208V AC in "delta" configuration and single phase 110V AC.

The controls:

The contractor shall provide ready-to-run system that includes a set of controls that facilitate system operation and monitoring. These controls shall permit the adjustment and monitoring of flow rates for each stream, measurement of liquid streams electrical conductivities, pressures monitoring (pressures on inlets to the EDM stack, pressure drop across the stack and pressure differentials between the membranes), and measurements of temperature, electric current and voltage, e.g. typical parameters that are measured and monitored in the electrodialysis and electrodialysis metathesis systems. The liquid flow rate monitoring results shall not be affected by released gas bubbles (using adequate flowmeters types and their locations). The flow rates adjustment may use throttling valves or variable speed pumps. Any anticipated limitations in the performance or deficiencies of control systems considering this project operating conditions shall be described by the contractor, for example, the monitoring range limits, construction materials compatibility issues, etc. The piping system shall possess fittings that facilitate insertion of control components by NASA on as needed basis (for example, pH, pressure or conductivity sensors, or flowmeters).

Spare parts available from the contractor:

The contractor shall provide a listing with pricing of unique system components-- that can only be obtained from the contractor-- and that contractor considers spare or replacement parts. This shall be provided with contractor’s technical proposal. The price list is needed in the event of part damage or system expansion (like increasing the stack size).

Examples are: replacement and additional ion exchange membranes, spacers, electrodes, or stack compartments. If contractor has other unique/proprietary spare parts for the system these shall be listed and priced as well. The availability of these components and parts are essential to the research and shall be available throughout this lease with no more than a 5 day lead time from date needed to delivery.

Consumables:

The contractor shall provide list and quantities of other consumables and off shelf replacement parts required to operate the system that may need to be procured by NASA Ames Research Center laboratory on the open market for the testing. This listing shall be provided upon delivery and set up.

Completion of lease agreement:

Following the completion of the lease, at a mutually-agreeable time, the contractor shall conduct

a joint inspection of the equipment with Government personnel to document any wear that is considered other than ‘fair wear and tear’. Contractor is responsible for the disconnection, disassembly, and removal of the leased equipment upon completion of the contract.
NOTE: Contractor shall anticipate a reasonable level of "wear and tear" of the equipment that develops during testing. It is understood that degradation or damage to the ion exchange membranes, spacers or electrodes caused by processing of the liquid streams as described earlier in this SOW may be considered a normal "wear and tear" of the system.

-End of Statement of Work-

**FAR 52.212-1, INSTRUCTIONS TO OFFERORS - COMMERCIAL ITEMS (JUN 2008), Incorporated by Reference**

**ADDENDUM TO FAR 52.212-1, INSTRUCTIONS TO OFFERORS – COMMERCIAL ITEMS (JUNE 2008)**

**52.252-1 Solicitation Provisions Incorporated by Reference (IBR) (FEB 1998)**

This solicitation incorporates one or more solicitation provisions 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. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

www.acquisition.gov
http://prod.nais.nasa.gov/cgi-bin/nais/nasa_ref.cgi

(End of provision)

**1852.233-70 Protests to NASA. (OCT 2002)**

Potential bidders or offerors may submit a protest under 48 CFR Part 33 (FAR Part 33) directly to the Contracting Officer. As an alternative to the Contracting Officer's consideration of a protest, a potential bidder or offeror may submit the protest to the Assistant Administrator for Procurement, who will serve as or designate the official responsible for conducting an independent review. Protests requesting an independent review shall be addressed to Assistant Administrator for Procurement, NASA Code H, Washington, DC 20546-0001.

(End of provision)

**PROPOSAL PREPARATION--GENERAL INSTRUCTIONS**

Electronic (email) Submission of Offers ONLY:

Offers will only be accepted electronically and shall be sent only to the email addresses listed below:

elizabeth.a.baierl@nasa.gov

Submission of Offers in three (3) volumes, in Adobe .pdf format only, to the email address(es) indicated in this section. Each Volume shall be combined into one pdf document using Adobe Pro or similar software, and clearly labeled Vol I, Vol II, and Vol III. Files cannot exceed 10 MB in size. If a Volume exceeds this capacity, split the Volume (file) into separate pdf files and clearly label them Vol Ia, Vol Ib, Vol IIa, Vol IIb, etc. NOTE: .TIF, JPEG, and other files are not acceptable. Offerors are cautioned that no reference to the proposed price(s) shall be made in technical (VOL II) or past performance information (VOL III).

Offerors shall comply with all requirements of the proposal submission instructions. Deviations shall be fully explained; however, inclusion of proposed prices in the technical or in the past performance IS NOT AN ACCEPTABLE DEVIATION. Any offer that states, includes, or alludes to the proposed price(s) in those sections shall be determined to be unacceptable and shall not be considered for award.

VOL I - OFFER (Form SF1449) with pricing offer, as per the Schedule of Supplies/Services on page 2. Provide pricing for all Contract Line Items (CLINS) including the base lease period, the option months, and on-call service hours. Include completed FAR 52.212-3, Representations and Certifications with DUNS # annotated. Include signed acknowledgement of any solicitation amendments. Offeror's DUNS number will be used to verify contractor's records in the ORCA.gov, CCR.gov, and other administrative databases. The SF1449 must be signed before digitized and emailed.

VOL II MISSON SUITABILITY /TECHNICAL CAPABILITY–
**Do not include prices on this volume**.

1-Management/Technical Plan—include details on the support to be provided to NASA (not to exceed 20 pages)

2-Listing of personnel to be involved with this contract, scope of their involvement (with limits, if any), personal credentials

3-The commercial product literature and relevant articles, reports, and patents on the technology, and performance of the contractor's EDM systems.

4-Certificates and performance data of the contractor's EDM equipment working in industrial or research applications using high solid concentration brines with a possibility of precipitation of scaling compounds.

VOL III- PAST PERFORMANCE – Offerors shall provide information on at least two recent work projects/contracts of similar scope and magnitude, performed within the preceding three years. The references shall include a description of the work effort, total value and duration, and company contact information for reference verification. Past performance references must be recent and relevant. Recency is determined to be no more than three years prior to the issuance of this RFP. Relevancy is determined to be of similar scope and complexity with respect to this acquisition.

(End of Addendum to FAR 52.212-1)

**FAR 52.212-2, EVALUATION – COMMERCIAL ITEMS (JAN 1999)**

(a) The Government will award a contract resulting from this solicitation to the responsible offeror whose offer conforming to the solicitation will be most advantageous to the Government, price and other factors considered. The following factors shall be used to evaluate offers:

i) Mission Suitability/Technical Capability:

a)Offeror's technical proposal shall indicate the offered system can accomplish, at a minimum, the following:

1-The EDM system shall be able to process pretreated urine (including concentrated) with the following EDM system capacities: Flow rate 50-150 L/hr in recirculation mode and 10-25 L/hr in a flow-through mode. 2- The EDM system shall be able to process concentrated processed urine at pH2 with solids content up to 300 g/L. 3- The EDM system shall be able to reduce the level of scaling compounds to prevent their precipitation/crystallization. The targets are reducing the level of calcium sulfate below 300-400 mg/L level and the amount of calcium carbonate to less than 10 mg/L level.

b) Evaluation for Mission Suitability/Technical Capability will also include consideration on the availability and lead time of the system delivery, and for prompt replacement parts. The required delivery date for the EDM system shall not be later than 6 April 2012. For replacement parts, the minimum standard is 3 working days from the date the order was placed for parts, and 5 working days from the date the order was placed for components. Offeror shall provide their lead time for such replacement parts in their technical proposal.

c) Demonstrated expertise of contractor's key support/subject matter expert personnel. Offerors shall provide credentials/resumes on personnel providing support during this lease while NASA conducts the research.

ii) Past Performance:

Offeror's past performance will be evaluated to ascertain successful completion of previous contracts

iii) Price

Price will be evaluated for reasonableness and comprehensiveness.

Technical and past performance, when combined, are significantly more important when compared to price.

(b) *Options*. The Government will evaluate offers for award purposes by adding the total price for all options to the total price for the basic requirement. The Government may determine that an offer is unacceptable if the option prices are significantly unbalanced. Evaluation of options shall not obligate the Government to exercise the option(s).

(c) A written notice of award or acceptance of an offer, mailed or otherwise furnished to the

successful offeror within the time for acceptance specified in the offer, shall result in a binding contract without further action by either party. Before the offer's specified expiration time, the Government may accept an offer (or part of an offer), whether or not there are negotiations after its receipt, unless a written notice of withdrawal is received before award.

(End of provision)

**FAR 52.212-3, OFFEROR REPRESENTATIONS AND CERTIFICATIONS – COMMERCIAL ITEMS (NOV 2011) – Incorporated by Reference**