UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 24, 2000

Center for Nuclear Waste
Regulatory Analyses (CNWRA)
Attn: Wesley C. Patrick, President
6220 Culebra Road
PO Drawer 28510
San Antonio, TX 78228-0510

SUBJECT: TASK ORDER NO. 008, Entitled "TECHNICAL ASSISTANCE IN PREPARING AND EVALUATING A BASELINE RISK-INFORMED, PERFORMANCE-BASED APPROACH FOR *IN SITU* LEACH URANIUM EXTRACTION LICENSEES" Under Contract No. NRC-02-98-002

Dear Mr. Patrick:

In accordance with the Section G.5, Task Order Procedures, of the subject contract, this letter definitizes Task Order No. 8. This effort shall be performed in accordance with the enclosed Statement of Work and the Contractor's technical proposal dated February 25, 2000, that is incorporated by reference and made a part of this task order.

Task Order number 8 shall be in effect from April 3, 2000, through December 29, 2000, with a cost ceiling of $170,536. The amount of $153,254. represents reimbursable costs, the amount of $5,022 represents the cost of facilities capital, and the sum of $12,260 represent the fixed fee.

The obligated amount shall, at no time, exceed the task order ceiling. When and if the amount(s) paid and payable to the Contractor hereunder shall equal the obligated amount, the Contractor shall not be obligated to continue performance of the work unless and until the Contracting Officer shall increase the amount obligated with respect to this task order. Any work undertaken by the Contractor in excess of the obligated amount specified above is done so at the Contractor's sole risk.

This task order obligates funds in the amount of $120,000 of which $104,740 represents reimbursable costs, $3,000 represents the cost of facilities capital, and 12,260 represents the fixed fee. Accounting data for this task order is as follows:

B&R NO.:	05-015-305-105	05-015-305-105	
JOB CODE:	J5220	J5220	
BOC:	252A	252A	
APPN. NO.:	31X0200.060	31X0200.060	
FFS NUMBER:	5000R064	5000R072	
OBLIGATED AMOUNT:	$50,000	$70,000	TOTAL:$120,000

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ADM02

The following individual is considered to be essential to the successful performance of the work hereunder: [redacted]. The Contractor agrees that such personnel shall not be removed from the effort under the task order without compliance with the Contract Clause H.1 Key Personnel.

Your contacts during the course of this task are:

Technical Matters:	Jayne Halvorsen,	Project Officer,	(301) 415-6001
	Michael Layton,	Technical Monitor,	(301) 415-6653
Contractual Matters:	Donald A. King,	Contracting Officer	(301) 415-6731

The issuance of this task order does not amend any terms or conditions of the subject contract.

Please indicate your acceptance of this task order by having an official, who is authorized to bind your organization, execute three (3) copies of this document in the spaces provided and return two copies to the U.S. Nuclear Regulatory Commission, Attn: Mr. Donald King, ADM/DCPM/CMB2, Mail Stop T-7I2, Washington, D.C. 20555. You should retain the third copy for your records.

If you have any questions regarding this matter, please contact me on (301) 415-6731, facsimile (301) 415-8157, or e-mail at DAK1@NRC.GOV.

Sincerely,

Donald A. King, Contracting Officer
Contract Management Branch No.2
Division of Contracts and
Property Management
Office of Administration

Enclosure:
As stated

ACCEPTED:

NAME R. B. Kalmbach

TITLE Director, Contracts

DATE April 5, 2000

STATEMENT OF WORK

PROJECT TITLE: TECHNICAL ASSISTANCE IN PREPARING AND EVALUATING A BASELINE RISK-INFORMED, PERFORMANCE-BASED APPROACH FOR *IN SITU* LEACH URANIUM EXTRACTION LICENSEES

NRC PROJECT MANAGER: Jayne Halvorsen, 301-415-6629, jxh3@nrc.gov

NRC TECHNICAL PROJECT MANAGER: Michael Layton, 301-415-6676, mcl@nrc.gov

1.0 Background

The Nuclear Regulatory Commission (NRC) goal of implementing more risk-informed, performance-based regulation of NRC-licensed activities is addressed in Direction Setting Issue (DSI) 12, part of the NRC Strategic Assessment and Rebaselining Initiative. An April 15, 1997, Staff Requirements Memorandum (SRM) relating to this DSI noted that accomplishment of the Commission's principal mission will, in the future, require a regulatory focus on those licensed activities that pose the greatest risk to the public. The SRM further noted that the required regulatory focus could be accomplished by building upon probabilistic risk assessment (PRA) concepts, where applicable, or other approaches that would allow a risk-graded or risk-informed, less prescriptive approach to the regulation of nuclear material. One class of Uranium Recovery licensee, known as *in situ* leach (ISL) uranium extraction facilities, is currently regulated and inspected by the NRC through specific, prescriptive license conditions issued under the broad licensing provisions of 10 CFR 40.32. Few specific regulatory requirements for this class of licensee currently exist.

ISL facilities use a series of injection wells, which introduce dissolved oxygen and sodium carbonate/bicarbonate (lixiviant), into a uranium ore zone. Uranium and other metals are mobilized by the lixiviant and extracted through a series of pumping wells. The uranium-rich water is then routed to an on-site processing building (satellite plant) where the uranium is selectively concentrated in ion-exchange resin tanks. The uranium-depleted fluids containing the mobilized metals are recharged with lixiviant and recirculated into the ore zone. The loaded ion-exchange resins are either transferred by truck to a main processing plant for elution and further processing, or eluted at the satellite plant and a yellowcake slurry is transferred by truck for final processing and drying at the main processing plant.

The ground water affected by the extraction operation is restored to the appropriate limits in the license, following the economic depletion of uranium from the ore zone. Generally the ground water is restored to a quality of use at least as good as the water use that could have been supported before ISL extraction occurred. The ground-water restoration techniques include pumping the well field without lixiviant injection (ground-water sweep), followed by circulating and injecting water treated by reverse osmosis to achieve final restoration. In some cases, reductant chemicals, such as hydrogen sulfide, are also added to the final injection water. These techniques are designed to precipitate the metals mobilized by the lixiviant during the extraction phase. Ground-water quality is monitored in perimeter monitoring wells, and wells above and below the extraction zone, during extraction operations and ground-water restoration activities

The Uranium Recovery licensing program previously instituted the use of a "Performance-Based License Condition," similar to the provisions of 10 CFR 50.59, at ISL facilities. Although the overall risks of dose to workers and the public are evaluated for ISLs at the time of licensing, detailed risk evaluations of specific processes within ISL operations have not been analyzed in the context of "what is the likelihood of a failure in that process" and "what is the likely consequence of that failure." The risk-informed aspects of ISL regulation - decreasing the oversight of low-risk (low probability/minimal consequence) activities while focusing emphasis in high-risk (high probability/severe consequence) areas - has not previously been addressed in the Uranium Recovery licensing program. General indications from the inspection and licensing history at ISLs indicate that some aspects of those operations may have a low-consequence if failure occurred, which suggests less prescriptive regulatory oversight.

Several analyses are needed in order to credibly determine whether the regulatory oversight of specific aspects of ISL operations should be decreased and or emphasized, commensurate with the risk. These analyses include: 1) a baseline risk profile detailing the probability or likelihood of failure occurrences; 2) the magnitude of the potential consequences, and 3) an assessment of those risk consequences to workers and the public. PRA and other quantitative or qualitative risk analysis methodologies could be used to develop the baseline risk profile of this class of licensee.

The results of these analysis could be used to meet the DSI 12 objectives through proposed rulemaking, which is presently before the Commission, or implemented by modifying specific license conditions under the existing licensing and inspection program. If the rulemaking effort is implemented, it will need to address or accommodate risk-informed, performance-based regulatory approaches, where applicable, in order to conform to DSI 12.

2.0 Objective

The objectives of this project are: (1) to use qualitative and, to the extent possible and reasonable, quantitative and probabilistic methods to identify and evaluate risks associated with the extraction and processing of uranium into yellowcake by *in situ* leach techniques; and (2) to use qualitative and, to the extent possible and reasonable, quantitative and probabilistic methods to identify and evaluate risks associated with *in situ* leach ground-water restoration

activities. The results of this effort will support the development of risk-informed, performance-based requirements in the upcoming uranium recovery rulemaking effort; or provide a basis for implementing risk-informed regulation under the current program if rulemaking is not initiated.

3.0 Technical and Other Special Qualifications Required

This project requires a multi-disciplinary team, including persons with sound knowledge of dose assessment and health physics; process engineering; ground-water science/engineering; systems analysis; risk assessment; probability and statistical analysis; analysis management; identification and evaluation of perceived risk; and NRC regulation of source and 11e.(2) byproduct material.

It is the responsibility of the contractor to assign senior technical staff, employees, subcontractors, or consultants who have the required educational background, experience, or combination thereof to meet both the technical and regulatory objectives of the work specified in the Statement of Work (SOW). The NRC will rely on representations made by the contractor concerning the qualifications of personnel assigned to this task order, including assurances that all information in the technical and cost proposals, including resumes, is accurate and truthful.

In performing the work in this SOW, it is understood that continued interaction will be required between the contractor and the NRC Technical Monitor for the purpose of exchanging information, resolving ambiguities, making timely modifications to the tasks, and maintaining focus on the desired product.

4.0 Level of Effort

The staff estimates the level of effort to have approximately the following breakdown:

Task 8 (36 staff weeks)

Subtask A	6 weeks
Subtask B	7 weeks
Subtask C	7 week
Subtask D	3 weeks
Subtask E	7 weeks
Subtask F	6 weeks

5.0 Completion Dates

Task 8	award date + 36 weeks
Subtask A	award date + 6 weeks
Subtask B	award date + 13 weeks
Subtask C	award date + 20 weeks
Subtask D	award date + 23 weeks
Subtask E	award date + 30 weeks
Subtask F	award date + 36 weeks

6.0 Work Required

Subtask A

Assemble a team and review NRC provided information pertaining to ISL uranium extraction. Visit an operating ISL facility for familiarization. Complete subtask by award date + 6 weeks.

Subtask B

Based on the reviewed information and the ISL facility familiarization, determine the points in the extraction and processing operations that pose the dominant risks involving radioactive and non-radioactive materials to workers, the public, or environment during normal operation, upset conditions, and catastrophic failure. Estimate the approximate maximum quantities that could potentially be released and the associated radiological hazards. Identify and describe the current safety controls to prevent or mitigate the risks, under normal operations, upset conditions, and catastrophic failure. Complete subtask by award date + 13 weeks.

Subtask C

Based on the reviewed information and the ISL facility familiarization, determine the points in the ground-water restoration operations where the potential exists for licensed materials to be released during normal operation, upset conditions, and catastrophic failure. Estimate the approximate maximum quantities that could potentially be released and the associated radiological and non-radiological hazards. Identify and describe the current controls to prevent or mitigate radiation

risk to workers and the public, under normal operations, upset conditions, and catastrophic failure. Complete subtask by award date + 20 weeks.

Subtask D

Submit for NRC review, an interim report detailing the findings of Subtask B and Subtask C. The interim report must also include an outline of the approach and proposed methodologies for completing Subtask E. Complete subtask by award date + 23 weeks.

Subtask E

To the extent possible apply quantitative and probabilistic methods to evaluate the effectiveness of the current controls to prevent or mitigate the risks associated with failure for extraction, processing, and ground-water restoration activities. The evaluation of controls should consider issues such as defense-in-depth, redundancy and diversity of barriers, potential for failure, and safety precedence sequence (e.g., 1. design for minimum hazard, 2. incorporate passive engineered safety devices, 3. incorporate safety warnings, 4. establish procedures, 5. conduct training and assure awareness, and 6. notify management of risk and accept the situation without corrective action). Complete subtask by award date + 30 weeks.

Subtask F

The contractor shall submit a draft and final technical report. The draft report, submitted near the conclusion of Task E, shall include information contained in the interim report, a detailed description of the process(es) used at ISL facilities, identification of potential hazards in the operational and restoration phases of an ISL facility, and a status of the current barriers and risk evaluations. The final technical report shall summarize all the work performed by the contractor including conclusions and the basis for such conclusions. The final report shall include the technical analyses performed and specify the references used as the bases for its conclusions. Complete task by award date + 36 weeks.

7.0 Meetings and Travel

NRC anticipates one trip to an operating *in situ* leach facility will be needed for contractor familiarization purposes under Subtask A. No other travel is anticipated.

8.0 NRC Furnished Material

NRC will provide the following to the contractor:

Copies of example licenses, standard review plan(s), regulatory guides, and guidance documents for regulating *in situ* leach facilities.

Copies of pertinent environmental impact assessments and safety evaluation reports for licensed *in situ* leach facilities.

A listing of incidents reported to the NRC regarding releases of licensed material from *in situ* leach facilities.

9.0 Contractor Acquired Material

No materials are expected to be acquired under this task order.

10.0 Schedule

The schedule for the various Subtasks are stated in section 5.0.

11.0 Reports

The final report will be published by the NRC as a NUREG-CR report; therefore, the document should meet the requirements for preparation of such reports (NUREG-0650, Revision 1, copies of which will be furnished to the contractor, if necessary). An electronic version of the final report, suitable for placement in NRC's Agency-wide Document Access and Management System (ADAMS) is also required.

A monthly letter status report (MLSR) shall be prepared by the 20th of the following month. The report shall describe the work activities accomplished and in progress with an estimate of the degree of completeness. The MLSR will also include a graphical chart showing the cumulative expenditures to date, plotted along with a projected total contract spending curve. Completion dates should be tracked and reported on the Subtask level. These progress reports shall highlight the current status of the project, any potential difficulties encountered, a status of effort expended versus budget, spending for the current month, and overall spending on the project to date.

The contractor will make periodic oral progress reports by telephone to the NMSS Technical Project Manager through the course of this task. These reports should contain information more current than the previously issued MLSR, recognizing that such information may be preliminary.

12.0 Technical Direction

Michael Layton is designated as the NMSS Technical Project Manger for this Task. Jayne Halvorsen is designated as the NRC Project Manager. Technical instructions may not constitute new assignments of work or changes of such a nature as to justify an adjustment in cost or period of performance. Directions, if any, for changes in scope of work, cost, or period of performance will be issued by the NRC Contracting Officer.