



JACOBS ENGINEERING GROUP INC.

ALBUQUERQUE OPERATIONS

5301 CENTRAL AVENUE N.E. — SUITE 1000 ALBUQUERQUE, NEW MEXICO 87108
TELEPHONE (505) 846-4030

WM DOCKET CONTROL

'86 NOV 17 AM 11:12

November 7, 1986

Mike Young
Nuclear Regulatory Commission
7915 Eastern Avenue
Silver Spring, Maryland 20910

WM Record File _____

WM Project 39

Docket No. _____

PDR

LPDR _____

Distribution:

myoung

Enugoli

Sollenberger

(Return to WM, 623-SS)

DEM

df

Dear Mike:

Here is a copy of the RFP sent to the consultants (government and non-government) for the special infiltration study. The contractual boilerplate has been removed. If you have any questions or comments or would like to discuss, please give me a call.

Very truly yours,
JACOBS ENGINEERING GROUP INC.

James E. Brinkman
Senior Hydrologist

JEB:jw
Enclosure

8612020040 861107
PJR WASTE
WM-39 PDR



JACOBS ENGINEERING GROUP INC.

ALBUQUERQUE OPERATIONS

5301 CENTRAL AVENUE N.E. — SUITE 1700, ALBUQUERQUE, NEW MEXICO 87108
TELEPHONE (505) 846-4030

November 6, 1986

See Bidder's List - -

Dr. Daniel Hillel
11 Stockbridge Hall
University of Massachusetts
Amherst, MA 01003

Re: RFP No. ASD-34-6704-R-87-0008
Project No. 34-6704-40-07-71

Dear Dr. Hillel:

Transmitted herewith is Request for Proposal No. ASD-34-6704-R-87-0008 applicable to Radon Barrier Moisture Content Determination for the Uranium Mill Tailings Remedial Action (UMTRA) Project.

The following Request for Proposal (RFP) is part of a special study to develop an acceptable approach for long-term prediction of soil moisture, infiltration and exfiltration through repositories for uranium mill tailings as part of the Uranium Mill Tailings Remedial Action Project. The purpose of this RFP is to contract consultants who have a strong background in, and understanding of, the hydraulics of partially saturated flow. The role of the consultants is identified in Section 5.1 of the Scope of Work.

You are hereby requested to submit a proposal based upon the attached Instructions and Conditions (Attachment A) and Draft Subcontract (Attachment B) recognizing all General Provisions, the Scope of Work and Delivery Requirements.

You may quote on a per item or all basis. In turn, the Subcontract may be awarded on a per item or all basis.

Proposal Submittal - Technical and Cost

The Offeror shall submit its proposal in two volumes. Volume I will be the Technical Proposal and Volume II, the Cost/Price Proposal.

The offeror shall submit documentation requirements requested in Attachment "C" (Evaluation Criteria). This technical proposal shall be completely separate from the balance of your proposal and should not contain any reference to cost or prices. Your technical proposal should be specific, complete, and summarize the approach to each component of the study discussed in Section 4 of the Scope of Work. One of two paragraphs per component should be sufficient. Your proposal should demonstrate thorough understanding of the requirements of the Scope of Work and a logical plan for accomplishing the subcontract requirements. It should include, where applicable, sketches, drawings, description of new techniques, and a complete explanation of any procedures you propose to follow.

Volume II - Cost Proposals

The offeror shall submit Attachment D (Pricing Proposal/Schedule) that covers all work, materials, travel, etc., required to perform the requirements described in the Scope of Work, and General Provisions clauses.

All sections of the "Consultant and Related Personal Services Biographical Data," (Attachment E) must be completed and returned with your Technical Proposal (Volume I).

Two (2) copies of your proposal are required, and should be received in this office not later than 5:00 P.M., local time, November 21, 1986, and marked as follows:

Addressed to:

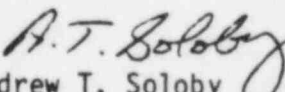
Mr. Andrew T. Soloby
Contracts Manager
Jacobs Engineering Group Inc.
5301 Central Avenue, N.E., Suite 1700
Albuquerque, NM 87108

You are also requested to complete all applicable blocks on the "Subcontract Summary Page" (Section I of Attachment B), and submit three (3) signed and dated copies with your proposal.

Any questions concerning this RFP should be directed to the Subcontract Administrator, Bob Kern, at (505) 846-4026.

Please acknowledge receipt of this Request for Proposal no later than Monday, November 10, 1986.

Very truly yours,
JACOBS ENGINEERING GROUP INC.


Andrew T. Soloby
Manager, Contracts

ATS:mas
Attachments



SUBCONTRACT NO. ASD-34-6704-S-87-00--

SECTION II

SCHEDULE ARTICLES

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SUBCONTRACT NO. ASD-34-6704-S-87-00__

ARTICLE I - INTRODUCTION

This Subcontract is in support of Prime Contract Number DE-AC04-82A114086 between the Department of Energy, (hereinafter referred to as "DOE") and Jacobs Engineering Group Inc., (hereinafter referred to as "JEG"). The prime contract is a Technical Assistance Contract (hereinafter referred to as "TAC") for the DOE Uranium Mill Tailings Remedial Action Project, (hereinafter referred to as "UMTRAP").

THIS SUBCONTRACT is made and entered into effective _____, by and between JEG, a California Corporation and _____ (hereinafter referred to as the "Subcontractor"), whose principal office is located at _____.

The Subcontract is entered into in Los Angeles County, State of California and shall be governed by the laws of the State of California. Any action at Law or Equity under this agreement shall be brought in the appropriate court within the State of California.

ARTICLE II - SCOPE OF WORK AND DELIVERABLES

The Subcontractor shall furnish all supplies and/or services to perform the work described in Exhibit A and provide the deliverables set forth in Exhibit B.

ARTICLE III - PERIOD OF PERFORMANCE

Unless completely performed prior thereto or sooner terminated in accordance with Clause entitled, "Termination for Convenience of Jacobs," the work described in Exhibit A is scheduled as follows:

- o Initial meeting - week of December 8, 1986 in Albuquerque, New Mexico - Estimated 2 days.
- o Peer review - January 12-23, 1987.
- o Final meeting - week of February 2, 1987 in Albuquerque, New Mexico - Estimated 2-3 days.
- o Complete study - February 6, 1987.



ARTICLE IV - JEG REPRESENTATIVES

1.0 SUBCONTRACT MANAGER

Andrew (Bill) T. Soloby is hereby assigned as Subcontract Manager. Notwithstanding any of the other provisions of this Subcontract, the JEG Subcontract Manager shall be the only individual authorized to redirect the effort or in any way to change, amend or modify any of the terms of this Subcontract. Except as expressly otherwise provided in this Subcontract, where approval is required under the terms of this Subcontract, it shall be construed to mean the approval of the Subcontract Manager.

In the event that the Subcontractor effects any change at the direction of any other person, the change will be considered as having been made without authority and an adjustment will not be made in the Subcontract value or delivery schedule as a result thereof. No agreement or understanding will be binding on JEG unless made in writing and signed by the JEG Subcontract Manager. All correspondence applicable to this Subcontract shall be addressed to the Subcontract Manager as follows:

Jacobs Engineering Group Inc.
5301 Central Ave. N.E., Suite 1700
Albuquerque, NM 87108
Attn: Andrew T. Soloby
Subcontract No.: ASD-34-6704-S-87-00--

2.0 PROJECT MANAGER (PM)

Donald P. Dubois is hereby assigned to this Subcontract as Project Manager. He has been delegated the authority to provide technical direction and determine the acceptability of the Subcontractor's progress and overall technical performance. This authority is limited to technical direction and approval of work currently specified in this Subcontract. This individual does not have the authority to modify this Subcontract.

3.0 TECHNICAL REPRESENTATIVE (TR)

James Brinkman is hereby assigned to this subcontract as Technical Representative, and is appointed to act for the PM during field operations. His authority is limited to technical direction as approved by the PM, for work currently specified in this Subcontract. This individual does not have the authority to modify this Subcontract.



ARTICLE V - MODIFICATION OF SUBCONTRACT

This Subcontract contains all the agreements between the parties and is complete and accurate as written. The terms and conditions contained in this Subcontract may not be added to, modified, superseded or otherwise altered except by a written modification signed by the JEG Subcontract Manager and delivered by JEG to the Subcontractor. Each deliverable received by JEG from the Subcontractor shall be deemed to be only upon the terms and conditions contained in this Subcontract notwithstanding any terms and conditions that may be contained in any invoice or other form of the Subcontract, and notwithstanding JEG's act of accepting or paying for any deliverable or similar act of JEG.

ARTICLE VI - SUBCONTRACT AMOUNT/PRICING SCHEDULE

MEASUREMENT FOR PAYMENT, DETERMINATION OF UNIT PRICES AND EXTENDED SUBCONTRACT VALUE (APPLICABLE TO EACH LINE ITEM) AND TOTAL AMOUNT OF SUBCONTRACT WILL BE BASED ON THE FOLLOWING:

A. COMPENSATION - The Subcontractor shall be compensated for the actual work performed and accepted by JEG. However, in no event shall the Subcontractor be paid in excess of the "TOTAL AMOUNT OF SUBCONTRACT" as shown on the "Subcontract Summary Page." A Modification must be executed by the JEG SM prior to the Subcontractor proceeding with or receiving compensation for any changes in the Scope of Work, Deliverables or Pricing Schedule.

No cost will be charged for time spent in travel under this Agreement unless specifically provided for herein.

B. TOTAL AMOUNT OF SUBCONTRACT - Is obtained by summing the Extended Subcontract Values for all line items for the Required Work.

C. PAYMENT - The Subcontractor shall, within the period of performance stated in Article III perform the Scope of Work set forth in Exhibit A and deliver the specified items in Exhibit B for the fixed amount(s) specified below. The total amount of this Subcontract, as provided on the "Subcontractor's Pricing Schedule/Proposal" (Attachment D) after price negotiations are concluded, and the final subcontract amount is agreed to, will be incorporated into and made a part of this Article.



EXHIBIT "A"

DATED OCTOBER 30, 1986

SCOPE OF WORK
FOR
SUBCONTRACT NUMBER
ASD-34-6704-S-87-00--



CONTRACT NO. ASD-34-6704-R-87-00 _____

DATED OCTOBER 30, 1986

SCOPE OF WORK
SOIL MOISTURE/INFILTRATION STUDY

- 1.0 Introduction
 - 1.1 Background
 - 1.2 Objectives

- 2.0 Governing Regulations
 - 2.1 Radon Barrier
 - 2.2 Ground Water

- 3.0 Current Design Methods

- 4.0 Description of Special Study
 - 4.1 Climatic Events
 - 4.2 Soil Moisture
 - 4.3 Infiltration, Percolation and Ground-Water Contamination
 - 4.4 Exfiltration and Upward Movement of Contaminants
 - 4.5 Peer Review

- 5.0 Additional Information
 - 5.1 Special Study Organization



1.0 Introduction

1.1 Background

The Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) authorized the Department of Energy (DOE) to undertake remedial action at 24 abandoned uranium mill tailings sites. The remedial action involves either stabilizing the tailings in place or moving them to a more appropriate location. Remedial Action Plans (RAPs) are prepared for each site to detail design features of the stabilized tailings that will ensure environmental protection.

One of the principal design features of the stabilized piles is a low-permeability radon barrier placed over the tailings. The radon barrier serves to:

- o Attenuate radon emissions from the tailings.
- o Inhibit infiltration of precipitation and snowmelt into foundation soils and eventual percolation into the ground water.

The rate at which radon gas moves through the radon barrier is very sensitive to the moisture content of the radon barrier: the greater the radon barrier moisture content, the lower the radon flux. Accordingly, changes in the design value of the radon barrier moisture content have a significant influence on the thickness of the radon barrier required to meet EPA standards, and hence on the cost of the remedial work.

Similarly, the rate at which water percolates through a radon barrier depends on the barrier moisture content: the drier the barrier the less water that will percolate through the barrier. In order to reduce percolation of water through the pile and limit potential ground-water contamination, it is best to achieve as dry a barrier as possible.

In addition to downward percolation, upward exfiltration due to capillary forces, and resulting upward migration of contaminants must be addressed. A technical approach for estimating exfiltration based on fluctuating soil moisture will be developed.

1.2 Objectives

The ultimate objective of the special study is to obtain supportable methods of predicting long-term minimum and maximum values of design soil moisture content that meet EPA criteria and provide a cost effective design. The



predicted minimum design soil moisture content will be used to estimate radon exhalation. The maximum design soil moisture values will be used in infiltration and percolation models, and fluctuating soil moisture contents will be used to estimate exfiltration. These soil moisture contents will be used to develop a supportable method of estimating water movement through the barrier and tailings.

2.0 Governing Regulations

2.1 Radon Barrier

The EPA standards require that the radon barrier thickness be designed to give "reasonable assurance" that the average radon flux from the pile not exceed 20 pCi/m²s. The averaging of the flux is both over the areal extent of the pile and over time. Thus some areas of the pile may exceed the standard as long as the average over the pile does not exceed 20 pCi/m²s. The flux from the entire pile may exceed the standard during some seasons if compensating periods of low flux also occur. The EPA standards recommend averaging over periods greater than a year, but less than a person's lifetime. On this basis, the UMTRA Project considers a 30-year averaging period to be suitable.

2.2 Ground Water

The quantity of water percolating through the pile must be limited to a level that will not cause unacceptable degradation of the ground water below the pile. The maximum acceptable percolation rates through the repository are dependent on such factors as the value and use of the water resource, contaminant concentrations in the percolating water, site hydrostratigraphy, depth to the water table, ambient water quality, state and Federal water quality standards, and flow rates under the pile.

3.0 Current Design Methods

The present method adopted by the Technical Assistance Contractor (TAC) to estimate the long-term moisture content of the radon barrier is a regression technique which relates percentages of the different soil types (i.e., silts, sands and clays) to the capillary-moisture relationship, or laboratory measurement of the capillary moisture relationship by ASTM-D31552 or D2325. These calculations are supplemented by consideration of the following.

- o The compacted moisture content of the radon barrier.



- o The optimum moisture content of the soils as measured in laboratory tests.
- o Climatological data.
- o In-situ moisture content of the soils in the area of the pile (as they occur at the radon barrier borrow pit, for example).
- o The type of cover system that will be applied.

The data from the various sources are considered and an estimate made of the long-term moisture content.

The maximum percolation rate that does not cause unacceptable degradation of ground-water quality is calculated. From laboratory tests of soil, the hydraulic conductivity of the proposed cover material is estimated. If the average saturated hydraulic conductivity of the cover is so high that water standards may be exceeded, then an unsaturated flow analysis is conducted. For an unsaturated flow analysis, an upper-bound long-term moisture content is estimated in order to determine percolation rates and evaluate ground-water impacts.

The TAC is currently engaged in the development of a computer program that models saturated and unsaturated flow of water through a cover system. This program will facilitate parametric studies of the moisture content and percolation rates, but will not resolve the issues of what design periods are appropriate or what weather patterns are likely to prevail over the 1000-year design life of a pile.

4.0 Description of Special Study

The special study will involve climatological analyses, estimation of long-term soil moisture, and prediction of percolation and exfiltration through the barrier and tailings. A brief description of each of these components follows.

4.1 Climatological Events

The objective of this part of the special study is to develop a methodology for determining design climatological events that the NRC and states/tribes agree are sufficiently conservative to meet EPA criteria. These include the long-term drought for estimating radon exhalation and the storm or extended wet period for estimating percolation. The length and magnitude of the events that will lead to conservative but reasonable estimates of soil moisture will be defined. A technical approach for defining site specific design events will be developed.

4.2 Long-term Soil Moisture

Once the design climatological events have been defined, a technical approach will be developed to relate climatological patterns to the long-term soil moisture of the radon barrier. The design drought will be used to estimate the minimum long-term soil moisture and the design storm or extended wet period will be used to determine the maximum long-term soil moisture. Factors such as pile configuration, runoff, barrier properties, and evapotranspiration will be considered in relating design events to long-term soil moisture.

4.3 Infiltration, Percolation, and Ground-Water Contamination

The third objective of the study is to arrive at an accepted method of modeling percolation through the barrier and tailings for use in determining the impact on water resources. The long-term maximum soil moisture can be used in a worst case estimate of percolation rate. Factors affecting the rate and amount of percolation through the pile and eventual ground-water impact are:

- o The climate of the pile site, in particular the pattern of precipitation and evaporation.
- o The design of the upper layers of the pile, and in particular the top surface slopes and the hydraulic conductivity of the filter layer.
- o The hydraulic conductivity and thickness of the radon barrier.
- o The depth of tailings through which percolation occurs and the geochemical characteristics of the tailings.
- o The depth to the ground water.
- o The ground-water flow regime.

These factors will be considered in developing a defensible approach for estimating the rate of percolation through the pile.

4.4 Exfiltration and Upward Movement of Contaminants

The final objective of the study is to develop a technical approach for estimating potential exfiltration and upward migration of contaminants. Exfiltration is driven by capillary forces that may be significant when the surface of the pile is relatively dry. The sequence of wetting and drying conditions that result in a conservative estimate of exfiltration will be defined.



4.5 Peer Review

A short written peer review will be required upon completion of the study. The paper will outline the consultant's technical position on soil moisture, infiltration and percolation, and exfiltration as described in Sections 4.2, 4.3 and 4.4.

5.0 Additional Information

5.1 Special Study Organization

The participants in the soil moisture/infiltration study will include two or three outside consultants, one representative each from DOE, NRC, the Remedial Action Contractor (RAC) and selected states or tribes, and several members of the TAC staff. The responsibilities of these participants will be as follows:

Outside Consultants, DOE and RAC

- o Attend initial meeting and help formulate the direction of the study.
- o Evaluate computer codes and models.
- o Answer questions and provide suggestions as the study progresses.
- o Review site specific applications.
- o Review the completed study.
- o Attend final meeting to resolve any differences of opinion between consultants and representatives of other agencies.

TAC Staff

- o Oversee the management of the study.
- o Work with outside consultants and agencies to formulate the direction of the study.
- o Apply climatological analyses and computer models to specific tailings sites.
- o Respond to comments of outside consultants and agencies.

NRC, States and Tribes

- o Attend initial meeting and help formulate the direction of the study.
- o Review completed study.
- o Attend final meeting to resolve differences on the completed technical approach.



When submitting their proposals, the outside consultants should be aware that they will not be conducting the climatological analyses, computer modeling, and site applications. This part of the study will be conducted by the TAC staff with direction and review from the outside consultants.



ATTACHMENT C

TO

RFP NO. ASD-34-6704-R-87-0008

EVALUATION CRITERIA:

EVALUATION:

Proposals documentation requirements set forth in this RFP are designed to provide guidance to the proposer concerning the type of documentation that will be used by JEG. Offerors should be prepared to respond to requests by JEG for oral presentations and other areas deemed necessary to assist in the detailed evaluation process.

Proposals will be evaluated in two areas: Project Factors and Cost/Price Factors. A brief description of each, together with the method of evaluation, is set forth below.

Project Factors - Project Factors are those factors which indicate the excellence of work that is offered and the ability of the proposer to actually produce what is offered. Proposals will be evaluated and scored numerically based upon the criteria set forth herein. The evaluation of the work and product offered will deal primarily with what the proposer will do to meet the established requirements. After completion of the technical evaluation a composite score will be obtained using the weight factor indicated in parentheses following the criterion heading and the proposals will be ranked in order of highest to lowest scores. A technically competitive range (short list) of the highest scores will then be established.

A. Personnel Qualifications and Experience (weight: 25)

Each offeror will be evaluated for the level and quality of described experience pertinent to Section 4, Scope of Work.

1. Specific Experience - This experience must relate to the specific components of study enumerated in the Scope of Work included in this RFP as Section 4 and to the methodologies and techniques required to accomplish the tasks described therein.
2. General Experience - Experience in providing services similar to the components of study. Pertinent experience will be evaluated on the basis of the offeror's function and time commitments in the projects described.
3. Education - Relevance of education to the components of study.

B. Technical Approach to Defining Design Climatological Events.
(weight: 10)



- C. Technical Approach to Establishing Long-term Soil Moisture. (weight: 25)
- D. Technical Approach to Modeling Percolation through the Cover and Tailings. (weight: 25)
- E. Technical Approach to Modeling Exfiltration. (weight: 15)

JEG shall consider overall cost of services proposed to perform the Scope of Work described in Section 4 of this RFP in accordance with the estimated level of effort contained in the Pricing Proposal of this RFP. Pricing will not be scored, however, the CR will determine final award based on the best technically acceptable and satisfactory priced proposal.



RFP NO. ASD-34-6704-R-87-0008
ATTACHMENT D

Pricing Schedule

	<u>Estimated Quantity</u>	<u>Firm Fixed Unit Cost</u>	<u>Extended Contract Value Not to Exceed</u>
1.0 Special Studies			
1.1 Climatic Events	5 hrs.	<u>lump sum</u>	_____
1.2 Soil Moisture	30 hrs.	<u>lump sum</u>	_____
1.3 Infiltration, Percolation and Ground-Water Contamination	30 hrs.	<u>lump sum</u>	_____
1.4 Infiltration and Upward Movement of Contaminants	15 hrs.	<u>lump sum</u>	_____
2.0 Travel expenses to and from Albuquerque	2 trips	\$ _____/trip	_____
3.0 Per Diem	5 Days	\$ _____/day	_____



JACOBS ENGINEERING GROUP INC.

CONSULTANT AND RELATED

PERSONAL SERVICES

BIOGRAPHICAL DATA

PERSONAL DATA		Social Security No.	
Name (Last, First, Middle)		Bus. Phone	
Mailing Address (Street)		Res. Phone	
(City, State, Zip)		Citizen of USA <input type="checkbox"/> Yes <input type="checkbox"/> No	
EDUCATION, PUBLICATIONS, ETC. (Continue on last page if necessary)			
School		School	
Major	Minor	Major	Minor
Degree	Date	Degree	Date
School		School	
Major	Minor	Major	Minor
Degree	Date	Degree	Date
Honorary Degree			
Theses/Dissertations			
Other Publications			
Professional Organizations/National Committees (Memberships & Offices Held)			

Patents

Field of Interest (Present & Former)

PROFESSIONAL EXPERIENCE

Name & Address of Present Employer

Date Started

Present Salary

9 Mo's
 12 Mo's

Position Title

Name & Address of Next Previous Employer

Employed From To

Position Title

Name & Address of Next Previous Employer

Employed From To

Position Title

Name & Address of Next Previous Employer

Employed From To

Position Title

Name & Address of Next Previous Employer

Employed From To

Position Title

CONSULTANT EXPERIENCE Name & Address of Company	Dates		Daily Fee
	From	To	

CONTINUATION

BIDDERS LIST - SOIL MOISTURE/INFILTRATION STUDY

GOVERNMENT EMPLOYEES

1. Glendon Gee FTS 444-8424
Battelle
Sigma V Building
P. O. Box 999
Richland, Washington 99352

2. Arnold Klute 303-482-3173
Agronomy Department or
Colorado State University 303-491-6314
Ft. Collins, Colorado 80523

3. John W. Nyhan, Ph.D. FTS 843-3163
Los Alamos National Laboratory
Mailstop K-495
Group HSE-12
Los Alamos, New Mexico 87545

4. Dr. Walter J. Rawls FTS 344-3490
USDA-ARS
Hydrology Laboratory
Building 007, Room 139
BARC - West
Beltsville, Maryland 20705

5. Alan Witten 615-574-5805
Oak Ridge National Laboratory or
P. O. Box X FTS 624-5805
Building 2001, Mailstop 049
Oak Ridge, Tennessee 37831

NONGOVERNMENT

1. Donald L. Brakesiek 208-376-6246
6018 Winstead Place
Boise, Idaho 83704

2. Gaylen Campbell 509-335-1719
Department of Agronomy and Soils
Washington State University
Pullman, Washington 99164

3. Dr. Keros Cartwright 217-333-5113
Illinois State Geological Survey
615 Peabody Drive
Champaign, Illinois 61820

4. David McWhorter 303-491-8452
Department of Civil Engineering
Colorado State University
Ft. Collins, Colorado 80523

5. Daniel B. Stevens 505-835-5313
Daniel B. Stevens and Associates
206 School of Mines Road
Socorro, New Mexico 87801

6. Dr. Dan Evans 602-621-7118
Aqua Science
5845 N. Mina Vista
Tucson, Arizona 85718
7. Dr. Daniel Hillel 413-545-2347
11 Stockbridge Hall
University of Massachusetts
Amherst, Massachusetts 01003
8. Bob Sterret 303-273-3059
Department of Geology and Geological
Engineering
Colorado School of Mines
Golden, Colorado 80401