

SEP 17 1985

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CPrichard	RMinogue
RGrill	Gustave

MEMORANDUM FOR: Kellogg Morton, Chief
Technical Contracts Branch
Division of Contracts, ADM

FROM: Enrico Conti, Deputy Director
Division of Radiation Programs
and Earth Sciences, RES

SUBJECT: MAINTENANCE OF ESSENTIAL RESEARCH CAPABILITY AT ACADEMIC
AND NONPROFIT INSTITUTIONS IN THE HLW RESEARCH PROGRAM

Attached, for your review is the documentation related to the RES need to maintain essential research capability established at academic and nonprofit institutions in the HLW Research Program, as discussed with you and your staff on August 21, 1985.

The academic and nonprofit institutions currently performing contract research in HLW for the Office of Research, constituting an essential research and engineering capability for the office are the University of Arizona and Battelle Columbus Laboratories.

We will be initiating procurement actions for each of these contracts using the attached justification. In addition, there are other areas where such capability may be crucial to the integrity of our licensing capability. We anticipate identifying up to three or more institutions in these critical areas for which we will be using this justification.

Original Signed By

Enrico F. Conti, Deputy Director
Division of Radiation Programs
and Earth Sciences, RES

Attachment:
Documentation

RES Files

Subject File No.

Return #

2711

8509200210

XA

OFC: WMB: <i>am</i>	: WMB: SL	: WMB: BC	: DRPES: DD	:	:
NAME: CPrichard	: RGrill	: FCostanzi	: EConti	:	:
DATE: 9/17/85	9/17/85	: 9/17/85	: 9/17/85	:	:

SEP 17 1985

Under 6.302(a)(2)(ii) of the Federal procurement regulations, non-competitive procurement is justified if there is a need "to establish or maintain an essential engineering, research, or development capability to be provided by an educational or other non-profit institution or a Federally funded research and development center". Much of the NRC research program in high level radioactive waste is currently being conducted by several educational and non-profit institutions. These organizations are conducting work essential to the capability of NRC to license and regulate high level nuclear waste. This particular essential research capability is not available at the DOE national laboratories. There is a pressing need to maintain the availability of this research and engineering capability to the NRC regulatory program. This justification explains why this capability is essential and how it can be maintained.

The high-level waste management regulatory program at the Nuclear Regulatory Commission must be carried out in a manner which avoids the appearance of, or actual conflict of interest concerning NRC responsibilities for health and safety in the nuclear waste management area. The sole licensee in high-level nuclear waste management will be the U. S. Department of Energy. The NRC must endeavor to carry out its responsibilities in ways which do not give rise to potential conflict-of-interest problems with respect to DOE.

This is a particularly urgent concern for the regulatory research program at NRC. NRC information needs on which to base regulatory decisions cover a variety of highly specialized disciplines within the general fields of geology, geohydrology, chemistry, and engineering. NRC requires the development of technical reports, models, field and laboratory test results, and other deliverables to assist the regulatory staff at NRC. In addition, during the licensing process for high-level nuclear waste geologic repositories, NRC will require the services of research organizations which have produced the above deliverables to consult with the NRC staff, to review relevant technical materials, and to be available for expert witness testimony in public hearings. NRC must fill these needs through available contractual support.

DOE, as the entity with the responsibility to develop and manage HLW geologic repositories, has many information needs in the very same specialized disciplines. To fill these information needs, DOE must also rely on contractor support, and presently does utilize a large number of academic and non-profit contractors as well as for-profit contracting firms.

The results of the startup of the high-level waste geologic repository program is that a very limited pool of expertise in a few highly specialized disciplines is being subjected to vastly increased demands for its services. NRC is experiencing considerable difficulty in arranging for the services of this pool of expertise. It must be borne in mind that, because of conflict-of-interest concerns, it is not practical for NRC to utilize the same contractors as does DOE. This would create the potential for having the technical information presented as part of the DOE license applications being reviewed by the same organizations responsible for developing the information. Another potential concern would involve situations where the same research organization could be called upon for expert testimony in the hearings by both NRC and DOE. They would be testifying about research conducted by their organization, not just as general expert witnesses.

Several educational and non-profit organizations have been conducting contract research in the waste management area for the NRC Office of Research for several years. They are organizations possessing the requisite knowledge and skills in research and engineering in the types of disciplines needed for regulatory oversight of the high-level waste program. To date, these organizations have performed capably for NRC and have not been under contract to do any similar research for DOE. It is crucial to maintain the essential engineering and research capability to be provided by these educational and non-profit institutions in order for NRC to carry out its regulatory responsibilities in the U.S. high-level radioactive waste program. The loss of the expertise provided by these organizations would severely handicap the NRC regulatory program. A lack of support by NRC would result in a loss of key personnel to other organizations doing contract research for DOE or for these organizations to take on DOE contract work. Either event would render these organizations incapable of assisting NRC's waste management program in the future. This is clearly a case in which the provisions of 6.302-3(a)(2)(ii) of

the procurement regulations apply -- non-profit procurement needed to establish and maintain an essential engineering, research, or development capability to be provided by an educational or other non-profit institution.

If the Office of Research should utilize the competitive procurement process for HLW research contracts of this type, the essential capability of the academic and nonprofit institutions performing this contracted research is likely to be lost. With competitive procurement, it is probable that these academic and nonprofit institutions would undergo a period where NRC was not supporting them. This would result in the organizations accepting contract funding from DOE. This action would bring into being the afore-mentioned conflict of interest problems, and result in a loss of an essential capability to the NRC HLW program.

SOW "SALT SEALING AND SUPPORT"

RES RESPONSE SUMMARY

WMRP COMMENT #

RES RESPONSE

1 The Revised SOW contains two additional tasks (1.2 @ 1.3) for the purpose of applying the literature study (Task 1.1) to tasks 2 through 4.

2 & 3 The SOW has been modified to emphasize bedded salt.

NOV 07 1985

MEMORANDUM FOR: Joseph O. Bunting, Chief
Policy Planning and Control Branch
Division of Waste Management, NMSS

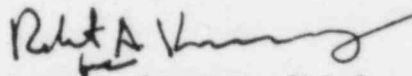
FROM: Leon L. Beratan, Chief
Earth Sciences Branch
Division of Radiation Programs
and Earth Sciences, RES

SUBJECT: REQUEST FOR WMRG REVIEW AND APPROVAL OF RES PROJECT FIN
D-1192, "SALT SEALING AND SUPPORT"

We request that you schedule a WMRG meeting for review of the above cited RES project.

We have attached a copy of the review comments on the statement of work (SOW) received from Hubert J. Miller, Chief, Repository Projects Branch (Enclosure 1) and our revised SOW reflecting the comments (Enclosure 2). We have also attached a summary sheet (Enclosure 3) explaining our response to Mr. Miller's comments and a Project Descriptive Summary (Enclosure 4).

If you have any questions, please call the project manager J. Philip on extension 74604.



Leon L. Beratan, Chief
Earth Sciences Branch
Division of Radiation Programs
and Earth Sciences, RES

Enclosures: As stated

Distribution/R-2811:

Circ/Chron	RMinogue	EConti	FCostanzi	HMiller
DCS/RDR	DRoss	LBeratan	WOtt	AEIzeftawy
ESB Sbj/Rd	KGoller	AMurphy	JPhilip	JGreeves

OFC: ESB:pd :ESB :WMB :WMB :ESB :
NAME: JPhilip :AMurphy :WOtt :FCostanzi :LBeratan :
DATE: 11/4/85 : 11/6/85 : 11/7/85 : 11/7/85 : 11/07/85 :



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

JUL 9 1985

MEMORANDUM FOR: Frank Costanzi, Chief
Waste Management Branch
Division of Radiation Programs
and Earth Sciences, RES

FROM: Hubert J. Miller, Chief
Repository Projects Branch
Division of Waste Management

SUBJECT: REVIEW OF RES PROJECT FIN D1192 "SALT SEALING AND SUPPORT"

As you requested by memorandum dated June 14, 1985 the DWM staff has reviewed the Statement of Work for the RES Project D1192, "Salt Sealing and Support". DWM supports this project, subject to resolution of the comments which are documented in the enclosures. If you have any questions or would like further clarification of our comments, please contact Atef Elzeftawy of my staff (x74675).

A handwritten signature in dark ink, appearing to read "H. J. Miller", written over the typed name.

Hubert J. Miller, Chief
Repository Projects Branch
Division of Waste Management

Enclosures:
1. General Comments
2. SOW Mark-up

Enclosure 1

GENERAL COMMENTS

1. The SOW does not describe how the literature study (Task 1) will be applied to Tasks 2-4. Laboratory tests should be developed based on results of previous tasks. Individual tasks should be more descriptive.
2. The SOW does not consider how a "representative" site will be chosen. A good site to study should be one that is reasonably similar to salt site(s) being studied by DOE. Sealing problems studied in an "ideal" salt mine may not provide enough data on sealing a bedded salt site.
3. The research project should emphasize bedded salt for two reasons. First, the DOE primary salt site is bedded (Palo Duro), and second, the work on domal salt may not be generic enough to generalize the results and apply it to bedded salt sites.

STATEMENT OF WORK

Title: Salt Sealing and Support

FIH: D1192

NRC Project Manager: Jacob Philip

Type of Contract: Request for Proposal

Period of Performance: 1 January 1986 - 31 December 1988

BACKGROUND

10 CFR Part 60 requires sealing of boreholes and shafts produced during the construction of the high-level waste repository to assure that such openings do not become preferential pathways for ground water. DOE also shall seal fractures produced by construction to assure that fractures produced do not create preferential pathways.

OBJECTIVE

The objective of this contract is to provide NRC with an independent capability to evaluate DOE documents which address sealing of fractures and openings in salt repositories for HLW. Specifically, this research is to assess the effectiveness of existing materials and technology for use in sealing repositories in bedded and/or domed salt.

WORK REQUIREMENTS

This contract will specify work which needs to be done by the contractor over a three year period beginning on the award of this contract.

SCOPE OF WORK

In the following tasks, NRC expects the contractor to adopt an approach which integrates field experience and experimentation, laboratory experimentation, and theoretical considerations with the goal of helping NRC develop a sufficient understanding of current sealing methods and techniques which will be considered in making licensing decisions and to prepare technical position papers. The tasks described below are written with these objectives in mind.

In performing these tasks the contractor shall investigate existing materials and technology for sealing strata around the salt and within the salt itself (e.g., bedded salt and/or salt domes). The contractor shall provide a salt site (e.g., existing salt mine or salt dome) or a shale, limestone or anhydrite site with suitable boreholes at which to investigate the effectiveness of emplaced seals. The contractor's proposal shall consist of a sufficiently detailed work plan with schedules and which identifies the experimental approach, theoretical methods and parameters to be examined for each task under SCOPE OF WORK. The work plan shall include but not be limited to analysis of uncertainty regarding extrapolation of data between sites and physical and chemical interaction between seal materials and host rock and shaft liners.

Emplaced Seals in Salt

Work required for this task is the experimental assessment of existing technology for sealing of penetrations, e.g., shafts and boreholes into the repository (i.e., in salt) and the sealing of formations surrounding the salt (e.g., anhydrites, sedimentary rocks in domed salt, or anhydrites, shale, clay, limestone, etc. in bedded salt formations). Seal material, emplacement techniques and required equipment shall be studied as well as laboratory and field characterization procedures. The sealing materials and the overall sealing systems technology (i.e., including emplacement effects) will be

applied towards the experimental performance assessment of sealing systems in mined geological repositories in salt. The work also includes a literature study of sealing techniques currently employed in mining in bedded and domed salt.

Task 1a) Literature Study of Sealing Techniques in Salt Mining

The contractor shall conduct a review of available literature on sealing techniques currently employed in salt mining (bedded and domed salt). The review shall include techniques employed to seal salt confining units and the salt formation itself during the drilling of boreholes, shafts, etc., the sealing materials used, the use of liners, grouting of aquifers, and failures in salt mining operations due to water ingress, creep, gas outbursts, etc., and decommissioning procedures.

TASK 1b) (SEE INSERT NEXT PAGE)

Task 2 Salt Sealing Laboratory Performance Assessment

Subtask 2.1 Sealing of ^{Heterogeneous} ~~Beds~~ Salt for the following conditions

- o Temperature: Ambient to 250°C (intermediate temperatures e.g., 60°C, 150°C, 200°C shall be included)
- o Stress: Atmospheric and up to 20MPa (some intermediate stress levels shall be included)
- o Combined Thermal and Stress Conditions:

The tests will involve installation and testing, (e.g., constant and variable pressure water injection tests, dye-injection tests, push out tests) of seals in salt blocks. Sealing materials to be used shall be cement, earthen materials and crushed salt. Additional materials may be identified and investigated during the term of this contract. Flow testing fluids ~~shall~~ ^{will} be saturated salt brine and/or gas.

insert

TASK 1(b)

ANALYTICAL STUDY TO SELECT SEALANT METHODOLOGIES
AND MATERIALS FOR Laboratory ^{and} in situ study.

BASED upon Results of Literature Review & since
the contractor shall perform an Analysis to ~~identify~~ ^{show} identify
Sealant Methodologies and materials which ~~present~~ ^{show} identify
reasonable promise for potential usage within
the SALT Reporting Program, METHODOLOGIES ~~for~~ ^{during operation}
~~for use in operation sealing~~ (both
SALT SEALING AND Aquitard Sealing). And in
Decommissioning Sealing ^{for closure and decommissioning} should be considered.
These ~~Sealant MATERIALS to be considered~~ should
include: (1) cement based sealants Tailored to
be compatible with ^{the potential} host rock environment; (2)
epithem Based sealant materials Tailored to
be compatible with potential SALT ROCK environment,
and (3) Crushed Salt MATERIALS ^{materials} ~~at~~ ^{other} which ~~may be~~
~~identified during the process of this effort.~~
~~Those~~ all identified in the literature review as promising will
be included with the approval of the project manager.

Subtask 2.2 Sealing of nonhomogeneous salt

INTERBEDDING
Boreholes in blocks of salt with representative in-situ ~~impurities~~
Laminations (e.g., anhydrite, clay seams, carnallite, etc.) shall be sealed and
tested in a series of experiments *How differ?* similar to that described in
Subtask 2.1. *INTERBEDDING* ~~Laminations~~ *should be ORIENTED horizontally*
to simulate bedded salt environments and vertically to
simulate dome environments.

Task 3

Laboratory Assessment of Sealing Performance of Salt Confining

Units

Sealing of Anhydrites, Shales, Anhydrite-Shale Salt

specify
Boreholes in blocks of the above rock types shall be sealed with
cementitious and earthen plugs. Sealing performance shall be tested
by injecting appropriate fluids (brine, water, gas) and measuring
flow through the seals. Testing for stress and thermal effects shall
be similar to that outlined in Subtask 2.1. The upper temperature
for these tests should not exceed 150°C.

Task 4

In-situ (field) Assessment of Borehole Seals

Holes will be drilled, sealed and tested in a salt mine or salt dome or
alternatively ~~in~~ a shale, limestone, or anhydrite formation. Sealing
materials shall be selected based on laboratory test results. Flow testing
shall be conducted with saturated salt brine, water or gas. Tracer tests shall
also be performed to determine travel times.

of the rock materials to be
A complete geotechnical properties evaluation will be
accomplished to identify the ^{value of} pertinent rock materials properties
to be used in designing the sealant materials. Rock
properties to be tested include rock classification
including dynamic moduli, index properties, rock strength properties, rock
thermal properties, petrographic analysis, creep,
geochemical characteristics, in situ stress fields,
hydrologic properties (porosity, permeability, ^{AND} extent of
(NEXT PAGE)

The material used for backfill and shaft sealing should be selected based upon consideration of the in situ rock characteristics to ensure compatibility with the host rock and upon the ~~expected~~ thermal and hydrologic ~~properties~~ loading to be superimposed during testing. Considerations for seal material selection should include: chemical properties, hydrologic conductivity and porosity of seal materials, ~~and~~ seal material mechanical properties including ^{elasticity} ~~elasticity~~, creep, strength, ~~and~~ expansion and swelling, and thermal properties.

(? The technical and economic feasibility of testing in an in situ thermal environment that would simulate repository induced loading conditions should be considered.)

STATEMENT OF WORK

TITLE: Salt Sealing and SupportFIN: D1192NRC PROJECT MANAGER: Jacob PhilipTYPE OF CONTRACT Request for ProposalPERIOD OF PERFORMANCE: 1 January 1986 - 31 December 1988BACKGROUND:

10 CFR Part 60 requires sealing of boreholes and shafts produced during the construction of a high-level waste repository to assure that such openings do not become preferential pathways for ground water. Fractures produced by construction shall also be sealed to assure that fractures produced do not create preferential pathways.

OBJECTIVE:

The objective of this contract is to provide NRC with an independent capability to evaluate DOE documents which address sealing of fractures and openings in salt repositories for HLW. Specifically, this research is to assess the effectiveness of existing materials and technology for use in sealing repositories in bedded salt.

WORK REQUIREMENTS:

This contract will specify work which needs to be done by the contractor over a three year period beginning on the award of this contract.

SCOPE OF WORK:

In the following tasks, an approach will be used which integrates field experience and experimentation, laboratory experimentation, and theoretical

considerations to investigate current sealing methods and techniques for salt and associated media. These investigations will be aimed at providing sufficient information and understanding to support informed licensing decisions and the preparation of technical position papers. The tasks described below are written with these objectives in mind.

In performing these tasks the contractor shall investigate existing materials and technology for sealing strata around the salt and within the salt itself (e.g., bedded salt). The contractor shall provide a salt site (e.g., existing salt mine) or a shale, limestone or anhydrite site with suitable boreholes at which to investigate the effectiveness of emplaced seals. The contractor's proposal shall consist of a sufficiently detailed work plan (with schedules) which identifies the experimental approach, theoretical methods and parameters to be examined for each task under SCOPE OF WORK. The work plan shall include but not be limited to analysis of uncertainty regarding extrapolation of data between sites and physical and chemical interaction between seal materials and host rock and shaft liners.

Emplaced Seals in Salt

Work required for this task is the experimental assessment of existing technology for sealing of penetrations, e.g., shafts and boreholes, into a salt repository and the sealing of formations surrounding the salt (e.g., anhydrites, shale, clay, limestone, etc. in bedded salt formations). Seal material, emplacement techniques and required equipment shall be studied as well as laboratory and field characterization procedures. The work also includes a literature survey of sealing techniques currently employed in mining in bedded and domed salt and analytical studies to select sealant methodologies.

Task 1 Literature Survey and Analytical Studies of Sealing Techniques in Salt Mining

Subtask 1.1 Literature Survey of Sealing in Salt

The contractor shall conduct a review of available literature on sealing techniques currently employed in salt mining (bedded and domed salt). The review shall include techniques employed to seal openings in salt confining units and the salt formation itself during the drilling of boreholes, shafts, etc., the sealing materials used, the use of liners, grouting of aquifers, and failures in salt mining operations due to water ingress, creep, gas outbursts, etc., and decommissioning procedures.

Subtask 1.2 Analytical Study to Select Sealant Methodologies and Materials for Laboratory and In-situ Research

Based upon results of the literature review, the contractor shall perform analyses to identify sealant methodologies and materials which are most likely for potential use within the salt repository program (bedded salt only). Methodologies for use in sealing during operation (both salt sealing and aquitard sealing) and in sealing prior to decommissioning should be considered. Sealing materials to be considered should include (1) cement base sealants tailored to be compatible with the potential rock environment; (2) earthen based sealant materials tailored to be compatible with the potential salt rock environment; (3) crushed salt materials; and (4) others which may be identified during the process of the effort.

Subtask 1.3 Detailed Work Plan

Based upon the results of Subtasks 1.1 and 1.2 the contractor shall prepare for review and approval by the NRC project manager a detailed work plan (including milestones and schedules) for accomplishing the study outlined in tasks 2 through 4. The detailed work plan shall be submitted no later than 4 months after award of the contract.

Task 2 Salt Sealing Laboratory Performance Assessment

Subtask 2.1 Sealing Homogeneous Salt

Tests shall be undertaken of the installation and testing (e.g., constant and variable water pressure injection tests, dye-injection tests, push out tests) of seals in salt blocks under the following constraints:

- o Temperature: Ambient to 250°C (intermediate temperatures e.g., 60°C, 150°C, 200°C, shall be included)
- o Stress: Atmospheric and up to 200MPa (some intermediate stress levels shall be included)
- o Sealing Materials: Cement, earthen materials, crushed salt, other materials identified and investigated during the term of this contract with the approval of the NRC Project Manager
- o Flow testing fluids: Saturated salt brine and/or gas.

Subtask 2.2 Sealing of Nonhomogeneous Salt

Boreholes in blocks of salt with representative in-situ interbedding laminations (e.g., anhydrite, clay seams, carnallite, etc.) shall be sealed and tested in a series of experiments. The experiments will involve the installation and testing (e.g., constant and variable water pressure injection tests, dye-injection tests, push-out tests) under the following constraints:

- o Temperature: Ambient to 250°C (intermediate temperatures, e.g., 60°C, 150°C, 200°C shall be included)
- o Stress: Atmospheric and up to 200MPa (some intermediate stress levels shall be included)
- o Sealing Materials: Cement, earthen materials, crushed salt, other materials identified and investigated during the term of this contract with the approval of the NRC Project Manager
- o Flow testing fluids: Saturated salt brine and/or gas

Note: Interbedding laminations should be oriented horizontally to simulate bedded salt environments

Task 3 Laboratory Assessment of Sealing Performance of Salt Confining Units

Sealing of Anhydrites, Shales, Anhydrite-Shale Salt

Boreholes in blocks of the above rock types shall be sealed with cementitious and earthen plugs. Sealing performance shall be tested by injecting appropriate fluids (brine, water, gas) and measuring flow through the seals. The experiment shall be performed under the following constraints;

- o Temperature: Ambient to 150°C (Intermediate temperatures, e.g., 60°C, 100°C, shall be included)
- o Stress: Atmospheric and up to 200MPa (some intermediate stress levels shall be included)

Task 4 In-situ (field) Assessment of Borehole Seals

Shallow holes (15 to 30 foot depths) will be drilled, sealed and tested in a salt mine reasonably similar to salt sites being studied by the DOE or alternatively on a shale, limestone, or anhydrite formation. Sealing materials shall be selected based on laboratory test results. Flow testing shall be conducted with saturated salt brine, water or gas. Tracer tests shall also be performed to determine travel times.

A complete geotechnical properties evaluation of the rock materials to be tested will be accomplished to determine the pertinent rock material properties to be used in selecting the sealant materials. Rock properties to be tested include rock classification, index properties, rock strength including dynamic moduli, rock thermal properties, petrographic analyses, creep, and hydrologic properties (e.g., porosity, permeability).

REPORTING REQUIREMENTS

1. The contractor shall submit monthly financial status reports within 15 days of close of each month.
2. The contractor shall submit Quarterly Progress Reports within 30 days of close of FY-Quarters. The Quarterly Progress Reports shall summarize all technical tasks conducted during the corresponding quarters. Significant findings and conclusions pertinent to the objective of the project should be highlighted in the Quarterly Progress Reports. Budgetary and administrative information shall be provided in a separate Quarterly Administrative Report which includes the comparison of actual and projected expenses, and other related administrative activities.
3. The contractor shall submit Technical Reports at the conclusion of research tasks. Technical Reports shall be self-contained, and will be suitable for publication as a NUREG/CR report. Technical Reports should

include an Executive Summary that summarizes the research results with regard to the project objectives as defined in the Statement of Work or contract. This is specifically designed to enhance the usability of reports to the licensing staff and the agency as a whole. Determination of topics and reporting schedules shall be made by the NRC project manager and contractor jointly.

4. A copy of all written and oral presentations given at professional meetings and technical papers submitted for publication in technical journals which is related to or funded by this project will be transmitted to the NRC technical project manager.

5. Report Distribution:

- (a) Technical and Quarterly Progress Reports

Technical Project Manager	7 copies
Director, Div. of Radiation Programs and Earth Sciences, Office of Nuclear Regulatory Research	1 copy
Chief, Earth Sciences Branch Division of Radiation Programs and Earth Sciences, Office of Nuclear Regulatory Research	1 copy
Chief, Waste Management Branch, Division Radiation Programs and Earth Sciences, Office of Nuclear Regulatory Research	1 copy
Director, Div. of Waste Management, Office of Nuclear Material Safety and Safeguards	1 copy
Document Control Center, Office of Nuclear Material Safety and Safeguards	1 copy

(b) Monthly Financial and Quarterly Administrative Reports

Technical Project Manager

1 copy

(c) Microfiche

Microfiche is required of all reports to be published as NUREG or NUREG/CR documents. The specifications for this microfiche are listed on the last page and the distribution is as follows:

Document Management Branch
Division of Technical Information
and Document Control, 1 master

Document Control Center
Division of Waste Management, Office of
Nuclear Material Safety and Safeguards, 1 duplicate

QUALITY ASSURANCE

The contractor shall develop and submit to NRC for review a quality assurance (QA) program plan for work to be performed under the contract or shall indicate that a previously approved, applicable Q.A. program will be applied to the work under this contract.

Any work (i.e., data, interpretations, analyses, computations, methods, etc.), developed under the contract shall be performed under an adequate quality assurance program. Quality assurance comprises all those planned and systematic actions necessary to provide adequate confidence that the research has been satisfactorily performed. Quality assurance includes sufficient documentation to assure the reproducibility of the results of the research. That is, the methods and techniques used to collect, reduce, and interpret data produced by research are sufficiently accurate, traceable, and articulate so that other researchers could duplicate the work done and independently evaluate the results.

An adequate QA program should address the following areas as appropriate.

experimental design and rationale--sample selection, number of samples, sampling frequency, controls;

statistical evaluation of experimental design--assessment of statistical power, of sampling scheme and measurement techniques, including expected accuracy and precision;

sample preparation--selection of sample type, treatment of samples, sample identification;

measurement techniques used--description of measurement process, description/identification of equipment used;

calibration methods--frequency, techniques, standards, traceability;

data recording--method of recording data, identification of person(s) recording/certifying data;

data reduction--methods and code(s) (including identification of modifications and updates);

data analysis--description of techniques used, methods of data verification (e.g., spot checking of measurements, calculations, etc.);

records management--identification, location, and retention time of data, analyses, associated records, duplicate data and/or records; and

statistical evaluation--interpretation of data, stating actual accuracy and precision of results achieved.

In addition, if standard test or calibration procedures are employed (e.g., ASTM standards) these should be cited in the program. Finally, if appropriate to the size and nature of the contract, the work and results should receive exposure in the scientific community through publication of results in refereed journals, or through peer reviews, or both.

MEETINGS AND TRAVEL

The contractor and subcontractor shall present the technical progress of the project at NRC headquarters at least annually. Any travel to be charged against project funds requires prior approval by the NRC project manager.

DOE FURNISHED MATERIALS

None

NRC FURNISHED MATERIALS

None

CAPITAL EQUIPMENT

All capital equipment expenditures require the prior written approval of the NRC Project Manager.

SUBCONTRACTS

Subcontracts require the prior written approval of the NRC Project Manager.

DISPOSAL OF PROPERTIES

Not applicable

LEVELS OF EFFORT

The expected level of effort for this project is approximately two and one quarter man-years per year.

TECHNICAL DIRECTION:

J. Philip, NRC Technical Project Manager (FTS 427-4604) will be responsible for directing this project.

MICROFORM SPECIFICATIONS FOR
WASTE MANAGEMENT CONTRACTS

Microfiche used for submittal purposes shall conform to the following specifications:

1. Microfiche containing source documentation shall conform to the NMA Type 1 format (ANSI/NMA MS.5) consisting of 98 frames arranged in 7 rows and 14 columns.
2. The reduction ratio shall be 24:1 for all microfiche.
3. The microfiche shall be standard 148 mm x 105 mm.
4. The microfiche shall be one silver-halide master and one diazo placed in individual acid free envelopes.
5. Diazo duplicates may be either blue/black or black.
6. The microfiche shall be titled in the following manner:

FIN No.	Title of Report	Date
Contract No.		
Nureg/CR No.		
Fiche No.		

Fiche number refers to 1 of 2, 2 of 2, etc. information.

7. Title information shall be eye readable on a clear background.
8. The submittal of microfiche containing proprietary material shall be coordinated with the Document Management Branch, Division of

Technical Information and Document Control, U.S. Nuclear Regulatory Commission, Washington, DC 20555, to set format and procedures for submittal.

9. Foldouts, if any, shall be segmented and filmed in logical order.
10. The first frame shall be blank, and the second frame shall contain the resolution target (NBS 1010A).
11. Questions on microfiche specifications should be submitted in writing to:

Document Management Branch, Division of Information and Document Control, U. S. Nuclear Regulatory Commission, Washington, DC 20555

SOW "SALT SEALING AND SUPPORT"

RES RESPONSE SUMMARY

WMPR COMMENT #

RES RESPONSE

- | | |
|-------|---|
| 1 | The Revised SOW contains two additional tasks (1.2 @ 1.3) for the purpose of applying the literature study (Task 1.1) to tasks 2 through 4. |
| 2 & 3 | The SOW has been modified to emphasize bedded salt. |

PROJECT DESCRIPTIVE SUMMARYDATE: October 28, 1985PPSAS NO.:PRIORITY:OFFICE: RESPROJECT TITLE: SALT SEALING AND SUPPORTFIN NO: D-1192TYPE OF CONTRACT: SOLE SOURCE CONTRACTCONTRACTOR: UNIVERSITY OF ARIZONAESTIMATED PERIOD OF PERFORMANCE: 3 YEARSPROJECT MANAGER: J PHILIP

<u>FY BUDGET (\$K):</u>	<u>FY86</u>	<u>FY87</u>	<u>FY88</u>	<u>FY89</u>
<u>PRIOR:</u>	0	0	0	0
<u>OPERATING:</u>	233	233	233	0
<u>FOLLOW-ON:</u>	0	0	0	0

DATES PREVIOUSLY APPROVED BY WMRG: Not ApplicableSCOPE OF WORK:

The work involves an assessment of existing technology for sealing of penetrations, e.g., shafts and boreholes into the repository (i.e., in salt) and the sealing of formations surrounding the salt (e.g., anhydrites, sedimentary rocks, shale, clay, limestone, etc., in bedded salt formations).

Seal material, emplacement techniques and required equipment shall be studied and evaluated as well as laboratory and field characterization procedures. The sealing materials and the overall sealing systems technology (i.e, including emplacement effects) and the performance assessment of sealing systems in mined geological repositories in salt will be studied. The work also includes a literature search and study of sealing techniques currently employed in mining in salt.

USER NEED:

This project will provide an independent source of information which NMSS/DWM needs to make licensing decisions about the disposal of HLW in salt. In particular, the results of the proposed research will provide a level of confidence on the effectiveness of salt sealing technology. It will provide the NRC with the information to evaluate DOE documents and in its development of guidance provided for DOE (user need letter from Joseph Davis, Director, NMSS, to Robert Minogue, Director, RES dated July 23, 1984).

PRODUCTS:

The contractor will submit quarterly technical reports and monthly financial reports. A camera ready copy of annual technical reports will be submitted in the NUREG/CR format. Technical reports covering the results of all task will also be written in the NUREG/CR format. The schedule of the technical reports will be determined when the contract is awarded.

CONTINUATION OF PROJECTS:

RES research project FIN B6627, "Rock Mass Sealing and Support," is scheduled to end by the close of calendar year 1985. While that research studied sealing boreholes in basalt and granite, the host rock in this project (FIN D-1192) will be salt.

PRIOR AND CURRENT RELATED NRC PROJECTS:

FIN D-6627 (See above)

JUSTIFICATION FOR SOURCE SELECTED AND DISCUSSION OF ALTERNATIVES:

Provided in letter to division of contracts form Division of Radiation Programs and Earth Sciences, RES, September 1985 (copy attached).

NRC OFFICE/REGION COORDINATION:

The user office and the other offices will be informed of the research results by NUREG reports, research summaries, and research information letters (RIL's).

INTERAGENCY COORDINATION AND INTEREST:

Contractor personnel will keep abreast of DOE's plans and actions in sealing in salt. DOE will be informed of NRC research results through distribution of NUREG reports.

SEP 17 1985

DISTRIBUTION:

Subj.	FCostanzi
Rdgg ✓	EConti
Cir.	KGoller
Chron.	DRoss
CPrichard	RMinogue
RGrill	Gustave

MEMORANDUM FOR: Kellogg Morton, Chief
Technical Contracts Branch
Division of Contracts, ADM

FROM: Enrico Conti, Deputy Director
Division of Radiation Programs
and Earth Sciences, RES

SUBJECT: MAINTENANCE OF ESSENTIAL RESEARCH CAPABILITY AT ACADEMIC
AND NONPROFIT INSTITUTIONS IN THE HLW RESEARCH PROGRAM

Attached, for your review is the documentation related to the RES need to maintain essential research capability established at academic and nonprofit institutions in the HLW Research Program, as discussed with you and your staff on August 21, 1985.

The academic and nonprofit institutions currently performing contract research in HLW for the Office of Research, constituting an essential research and engineering capability for the office are the University of Arizona and Battelle Columbus Laboratories.

We will be initiating procurement actions for each of these contracts using the attached justification. In addition, there are other areas where such capability may be crucial to the integrity of our licensing capability. We anticipate identifying up to three or more institutions in these critical areas for which we will be using this justification.

Original Signed By

Enrico F. Conti, Deputy Director
Division of Radiation Programs
and Earth Sciences, RES

Attachment:
Documentation

RES Files	Return *
Subject File No.	2711

OFC: WMB:dm	:WMB:SL	:WMB:BC	:DRPES:DD	:	:	:
NAME: CPrichard	:RGrill	:FCostanzi	:EConti	:	:	:
DATE: 9/17/85	9/17/85	: 9/17/85	: 9/17/85	:	:	:

SEP 17 1985

Under 6.302(a)(2)(ii) of the Federal procurement regulations, non-competitive procurement is justified if there is a need "to establish or maintain an essential engineering, research, or development capability to be provided by an educational or other non-profit institution or a Federally funded research and development center". Much of the NRC research program in high level radioactive waste is currently being conducted by several educational and non-profit institutions. These organizations are conducting work essential to the capability of NRC to license and regulate high level nuclear waste. This particular essential research capability is not available at the DOE national laboratories. There is a pressing need to maintain the availability of this research and engineering capability to the NRC regulatory program. This justification explains why this capability is essential and how it can be maintained.

The high-level waste management regulatory program at the Nuclear Regulatory Commission must be carried out in a manner which avoids the appearance of, or actual conflict of interest concerning NRC responsibilities for health and safety in the nuclear waste management area. The sole licensee in high-level nuclear waste management will be the U. S. Department of Energy. The NRC must endeavor to carry out its responsibilities in ways which do not give rise to potential conflict-of-interest problems with respect to DOE.

This is a particularly urgent concern for the regulatory research program at NRC. NRC information needs on which to base regulatory decisions cover a variety of highly specialized disciplines within the general fields of geology, geohydrology, chemistry, and engineering. NRC requires the development of technical reports, models, field and laboratory test results, and other deliverables to assist the regulatory staff at NRC. In addition, during the licensing process for high-level nuclear waste geologic repositories, NRC will require the services of research organizations which have produced the above deliverables to consult with the NRC staff, to review relevant technical materials, and to be available for expert witness testimony in public hearings. NRC must fill these needs through available contractual support.

DOE, as the entity with the responsibility to develop and manage HLW geologic repositories, has many information needs in the very same specialized disciplines. To fill these information needs, DOE must also rely on contractor support, and presently does utilize a large number of academic and non-profit contractors as well as for-profit contracting firms.

The results of the startup of the high-level waste geologic repository program is that a very limited pool of expertise in a few highly specialized disciplines is being subjected to vastly increased demands for its services. NRC is experiencing considerable difficulty in arranging for the services of this pool of expertise. It must be borne in mind that, because of conflict-of-interest concerns, it is not practical for NRC to utilize the same contractors as does DOE. This would create the potential for having the technical information presented as part of the DOE license applications being reviewed by the same organizations responsible for developing the information. Another potential concern would involve situations where the same research organization could be called upon for expert testimony in the hearings by both NRC and DOE. They would be testifying about research conducted by their organization, not just as general expert witnesses.

Several educational and non-profit organizations have been conducting contract research in the waste management area for the NRC Office of Research for several years. They are organizations possessing the requisite knowledge and skills in research and engineering in the types of disciplines needed for regulatory oversight of the high-level waste program. To date, these organizations have performed capably for NRC and have not been under contract to do any similar research for DOE. It is crucial to maintain the essential engineering and research capability to be provided by these educational and non-profit institutions in order for NRC to carry out its regulatory responsibilities in the U.S. high-level radioactive waste program. The loss of the expertise provided by these organizations would severely handicap the NRC regulatory program. A lack of support by NRC would result in a loss of key personnel to other organizations doing contract research for DOE or for these organizations to take on DOE contract work. Either event would render these organizations incapable of assisting NRC's waste management program in the future. This is clearly a case in which the provisions of 6.302-3(a)(2)(ii) of

the procurement regulations apply -- non-profit procurement needed to establish and maintain an essential engineering, research, or development capability to be provided by an educational or other non-profit institution.

If the Office of Research should utilize the competitive procurement process for HLW research contracts of this type, the essential capability of the academic and nonprofit institutions performing this contracted research is likely to be lost. With competitive procurement, it is probable that these academic and nonprofit institutions would undergo a period where NRC was not supporting them. This would result in the organizations accepting contract funding from DOE. This action would bring into being the afore-mentioned conflict of interest problems, and result in a loss of an essential capability to the NRC HLW program.