AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT

1. CONTRACT ID CODE	PAGE OF PAGES
	1 3

2. AMENDMENT/MODIFICATION NO	3. EFFECTIVE DATE	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. *(If applicable)*
A059	See Block 16.c	28-07RW12152.02	QA:NA

6. ISSUED BY	CODE	7. ADMINISTERED BY *(If other than Item 6)*	CODE
U.S. Department of Energy 1551 Hillshire Drive, M/S 523 Las Vegas, NV 89134		U.S. Department of Energy 1551 Hillshire Drive, M/S 523 Las Vegas, NV 89134	

8. NAME AND ADDRESS OF CONTRACTOR *(No. Street, county, State and ZIP: Code)*	(✓)	9A. AMENDMENT OF SOLICITATION NO.
Booz-Allen & Hamilton. Inc 8283 Greensboro Drive McLean, Virginia 22102-3838		9B. DATED *(SEE ITEM 11)*
	X	10A. MODIFICATION OF CONTRACT/ORDER NO. DE-AC28-02RW12152
CODE / FACILITY CODE		10B. DATED *(SEE ITEM 13)* June 16, 2002

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

☐ The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers ☐ is extended, ☐ is not extended.

Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:

(a) By completing Items 8 and 15, and returning one (1) copy of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATA SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and data specified.

12. ACCOUNTING AND APPROPRIATION DATA *(If required)*

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13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.

(✓)	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: *(Specify authority)* THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES *(such as changes in paying office, appropriation date, etc.)* SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
X	D. OTHER Specify type of modification and authority) Unilateral modification IAW clauses FAR 52.232.22 " Limitation of Funds (APR 1984) .

E. IMPORTANT: Contractor X is not, ☐ is required to sign this document and return ____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION *(Organized by UCF section headings, including solicitation/contract subject matter where feasible.)*

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EXECUTED COPY

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER *(Type or print)*		16A. NAME AND TITLE OF CONTRACTING OFFICER *(Type or print)* Birdie Hamilton-Ray Contracting Officer	
15B. CONTRACTOR/OFFEROR *(Signature of person authorized to sign)*	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA BY *(Signature of Contracting Officer)*	16C. DATE SIGNED 12/18/06

TASK STATEMENT
Revised Task YM 04-02A
NATURAL ANALOG STUDY FOR THE YUCCA MOUNTAIN REPOSITORY

Background

The engineered barriers within a geological repository form an important part of the overall system that must guarantee safety over many thousands of years. Demonstrating with reasonable assurance that they will fulfill this function is a key part of the safety analyses done for licensing and this demonstration is based primarily on scientific experiments, analysis of results and extrapolations to long periods of time.

Supplementary to this technical approach, it is valuable to study the behavior of actual artifacts that have survived for long periods below the earth's surface. This kind of analogue evidence can provide a useful reality check on the scientific analyses – but its most important application may be in making it clear to a wider public that geological disposal can provide a benign environment in which manufactured objects can indeed survive for very long periods of time.

The value of work on this topic has been observed in the Yucca Mountain Project and it is a particularly powerful public communications tool in Japan at this time. Given the intensive public and political debate that is to be expected in the U.S.A. during the coming years, it would be valuable to assemble the available data; to evaluate its relevance to the specific case of burial in arid environments, such as that at Yucca Mountain; and to consider whether the inventory of archaeological analog examples could be expanded by a more focused review of the archaeological artifacts that are presently stored in major museums with collections of antiquities.

Objective

The prime objective of this task is to produce an overview document in the form of a catalog and illustrations, aimed at the public, in which examples are given of archaeological artifacts that have survived for long periods of time when buried in arid regions, to describe what has contributed to this longevity and to discuss the relevance to deep geological repositories. A typical example is provided by the results of extensive excavations at the ancient city of Kerma in the Sudan, where numerous artifacts have been preserved since the period of Nubian civilization some 4,000 years ago. These artifacts today are to be found primarily in the Museum of African Art in Washington, D.C.; the Pergamon Museum in Berlin; the British Museum in London; and the Louvre in France. Much of the excavation work was led by a Swiss team from Geneva.

Other relevant materials from Europe, North Africa and the Middle East are also well represented in major European museum collections and the scientific archaeological staff should be contacted to discuss possible examples. The focus will be on metallic artifacts, although other materials (cement, ceramics, organics) may also prove indirectly to be valuable illustrations.

Task Elements

The proposed program of work comprises the following elements:

- Evaluation of relevant archaeological analogue studies to date in waste disposal programs around the world,
- Specific review and summary of U.S. work, going back to Pacific Northwest Laboratories' studies 10-20 years ago, and including the 2002 overview of the U.S. Department of Energy, and the results of the recent workshop at the Electric Power Research Institute,
- Identification of key issues of relevance to the Yucca Mountain situation where analogs could be helpful,
- Study of the documented collections of the principal museums of Europe – most particularly of those mentioned above; identification of relevant (mostly metallic) artifacts from environments of relevance to Yucca Mountain,
- Contacts with selected members of academic archaeological teams familiar with potentially useful environments and materials,
- Scoping and planning for a documentary video on natural analogues, including the results of this study.
- Attend Waste Management '07 Conference to support release of "Radwaste Solutions" magazine with cover story article entitled "Archaeology of Arid Environments Points to Management Options for Yucca Mountain, which will be distributed to all conference attendees.

Deliverables

Final report of the study that provides:

- Illustrative documentation (photos, diagrams) providing easily understandable, supplementary justification for the public of the safety that deep underground disposal can provide
- Supporting documentary texts giving pointers to the underlying scientific issues and references, where available, to more detailed analyses.

- Formal proposal for funding for documentary video