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David Tiktinsky
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September 12, 1985

Mr. David Tiktinsky - SS 623
U.S. Nuclear Regulatory Commission
Division of Waste Management
Washington, D.C. 20555

CONTRACT NO. NRC-02-85-002
TASK ORDER NO. 001

SUBJECT: Trip Reports for Kick-off Meeting and NNWSI Technical Meeting

Dear David:

Enclosed are trip reports for the contract kick-off meeting held on 29 August 1985 and the NNWSI technical meeting on the ESF design held on 27-28 August 1985. I trust the format of these reports is satisfactory.

Sincerely,

Roger D. Hart
Roger D. Hart
Program Manager

RDH:dt
Enclosures

cc: Mr. John Greeves
Mr. Barry Bromberg
Office of the Director, NMSS - Program Support Branch
Document Control Room

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TRIP REPORT

DATE: 29 August 1985

LOCATION: Nuclear Regulatory Commission
Silver Spring, MD

PURPOSE: Kick-off Meeting, Contract D-1016
"Technical Assistance for Design Review"

ATTENDEES: Itasca R. Hart
J. Daemen (University of Arizona)

NRC J. Buckley
J. Pearring
D. Tiktinsky
N. Tanious
J. Peshel
D. Gupta
S. Bahadur

SUMMARY:

Dave Tiktinsky led a discussion on general procedures for performing the following items of the contract:

- task orders
- document reviews
- meeting preparation and attendance
- vouchers and travel
- monthly reports

Dave described these items in detail and passed out examples of a document review, trip report and position paper.

NRC team members from each of the three sites described the current situation of design reviews for their site:

Dave Tiktinsky	NNWSI
Jerry Pearring	SRPO (Salt)
John Buckley	BWIP

At present NNWSI has ongoing review work:

- Exploratory Shaft Facility Design Review
- Review of documents related to ESF Review

Jaak Daemen is coordinating this review effort.

Dates for technical review meetings for BWIP and SRPO have been tentatively set for early November 1985. Technical review meetings are anticipated for:

- Exploratory Shaft Facility Design and Construction
- Exploratory Shaft Test Plan
- Repository Design

Jerry Pearring believes that the data base for SRPO will most probably have to be based extensively on generic data, with limited specific material properties for the rock types of the Palo Duro Basin. He recommends we be aware that information from other sources (e.g., WIPP, ASSE) will be needed.

John Buckley noted that the Environmental Assessment final reports still have to be released by DOE. The latest information he has is that these reports may not be available for review until June 1986.

The following specific comments and concerns were raised at the meeting:

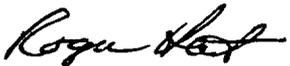
1. The Program Manager (R. Hart) at Itasca must be the focal point for all review work performed under this contract. The NRC staff must involve the Project Manager when allocating review work to ensure that there will be no conflict in staffing the effort.
2. Communication is extremely important to this contract. The NRC must keep Itasca informed of the latest developments in the review program. This is very important for providing sufficient preparation for technical review meetings.

Communication among the three site principal investigators and the NRC is also important. A discussion was held concerning the use of micro-computers to expedite the sending of draft versions of document reviews and letter reports. Itasca identified this means of communication in its proposal and will develop a method for establishing this system.

3. In order to provide a consistent and responsive level of effort for this program Itasca will assign a senior level engineer to assist the P.I.'s at the specific sites.
4. Immediate document upgrade is recognized as a concern in preparation for document reviews. Itasca presently is on the ONWI distribution list and will pursue joining other appropriate mailing lists. The NRC will supply Itasca with document lists and pertinent document reviews to assist Itasca in acquiring key reports.
5. A general discussion was held on the role of computational analysis in upcoming reviews. Roger Hart suggested that some education for the NRC on the choice and use of numerical models for rock mechanics and mining analyses may be warranted. This will help the NRC identify the most appropriate modeling effort needed to review a specific analysis. Itasca has performed training sessions for mining organizations to facilitate the use of modeling in practical mining situations. An analogous training session could be developed for the use of models in the review process.
6. The following items were identified to be supplied by the NRC to assist Itasca in preparation for review work:
 - NRC EA comments to DOE
 - Mission Plan
 - NRC document list
 - Selected BWIP documents

7. The following items were identified by Dave Tiktinsky as requiring immediate response by Itasca:

- Cost and technical proposal for Task Order 001
- Trip report on NNWSI Exploratory Shaft Facility review meeting, August 27-28, 1985
- Trip report on kick-off meeting, August 29, 1985


Roger D. Hart
Program Manager
September 11, 1985

COST BREAKOUT

Labor

Roger Hart, 8 hours @ \$44.96	\$ 359.68
Jaak Daemen, 4 hours @ \$55.00	220.00
TOTAL LABOR	<u>\$ 579.68</u>

Actual Expenses

Travel

Airfare

Hart (MSP-WDC)	\$ 522.00
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Misc. Travel Expenses	2.00
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Motel

Hart (1 night)	38.45
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Meals

Hart	5.50
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TOTAL EXPENSES	<u>\$ 567.95</u>
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TRIP REPORT

DATES: 27-28 August 1985

LOCATION: Nuclear Regulatory Commission
Silver Spring, MD

PURPOSE: Technical Meeting with DOE on ESF Design and Construction
for NNWSI Project

ITASCA

ATTENDEES: I. Farmer (University of Arizona), 8/27, 8/28
R. Hart, 8/28

SUMMARY:

This is the first meeting attended by Itasca personnel under Contract No. NRC-02-85-002. Our attendance was requested by Mr. Dave Tiktinsky in order for us to become familiar with the status of the NNWSI Project. Comments made in this summary are therefore constrained by lack of background. The following comments, provided by Dr. Farmer, summarize our initial impressions of the ESF Design and Construction plans.

1. Areas of concern addressed by NRC personnel at this meeting may be expressed in four questions:
 - (a) Is the proposed mode of construction of the ESF the correct choice?
 - (b) Are the proposed characterization plans adequate?
 - (c) Are the proposed sealing and grouting plans and procedures adequate?
 - (d) Will the construction of the ESF compromise the proposed storage site?

2. Initial comments with regard to these questions are:
 - (a) Selection of a vertical mined shaft (ref. Tom Merson - Rationale for ES construction method) appears to be based on a number of arbitrarily selected criteria and sub-criteria - heavily weighted to site characterization and constructibility. Although a mined shaft has strong advantages for observation and sample collection, choice of some constructibility performance factors appears very subjective (i.e., shaft size) or strongly affected by the shaft bottom. If the shaft were 1300 ft. deep, drilling - with reduced peripheral rock damage - might appear a much stronger option. Has the possibility of a drilled shaft to 1300 ft. and a mined extension been considered?

 - (b) The possibility of an annulus of damaged rock of increased permeability around the shaft, induced by shaft sinking, and capable of transmitting surface water to the storage site, is a major regulatory consideration. It is probable that the stress redistributed in a horizontal plane by excavation will be insufficient to develop a classical "yield" or fracture zone above 1300 ft. - except in localized weak layers, and that stress related deformation will be limited to "elastic" relaxation. The most likely cause of a damaged annulus will be uncontrolled use of high explosives. If the conventional shaft sinking option is chosen, it may be useful to consider alternatives to high explosives - such as the filled explosives used in coal mining or mechanical digging equipment.

- (c) If the damage zone from conventional shaft sinking were considered a limiting factor, it would be possible using partial face tunnelling machines, to drive an inclined shaft at 1 in 4, which would significantly reduce damage compared with conventional excavation. It is surprising that this option has not, apparently, been considered. The availability of these relatively cheap machines, capable of tunnelling at 40-60 m/day would also be useful in tunnelling work at the storage level.
- (d) It is important to stress the very considerable damaging or loosening effect caused by explosives in peripheral rocks. Although this may not be deep seated, it can significantly affect the behavior of test excavations and of samples in unpredictable ways. In order to justify the validity of in-situ test data it may be important to consider the interaction between construction methods and their effect on peripheral rocks and the test interpretation.
- (e) The characterization testing plans appear adequate, although some questions may be asked about the geomechanics testing. Shaft convergence measured from inside the shaft is unsatisfactory, since radial deformation will occur ahead of the shaft bottom. Ideally inclinometers in vertical holes drilled from the 520 ft. level close to the shaft wall position are needed to assess deformation and permeability increase accurately. The same argument, with different orientation, applies to breakout room testing. Overcoring and slot-strength tests may be inhibited by the relatively low strength of the rock. Goodman jack type tests may be more satisfactory and hydrofracture should be considered.
- (f) In terms of characterizing the storage site area, the proposed 1500 ft. of drifting at the 1200 ft. level appears inadequate.
- (g) The grouting and sealing plans, procedures and performance analysis appear to be addressed adequately by DOE. There is, however, one query. The damage zone tuff was assumed to have a hydraulic conductivity of 10^{-3} cm/s compared with undisturbed tuff of 10^{-5} cm/s and the hydraulic conductivity of the shaft backfill was assumed to vary between 10 and 10^{-6} cm/s. Both of these hydraulic conductivity ranges are capable of treatment; 10 - 10^{-2} cm/s by cement grouting; 10^{-3} cm/s by bentonite/fine cement and 10^{-3} - 10^{-5} cm/s by chemical grouting. It would appear therefore that with adequate grouting the 500 year flood/landslide conditions could be contained.
- (h) The approach to sealing and grouting (ref. J.A. Fernandez and J.R. Tillerson ESP sealing concepts) appears unusual. Essentially a type or degree of sealing is assumed and its efficacy tested to resist a particular hydrological condition. In mining it is more usual to design a seal to resist an assumed hydrological condition. Possibly this approach was developed in earlier reports.



Roger D. Hart
Program Manager
September 11, 1985

COST BREAKOUT

Labor

Roger Hart, 8 hours @ \$44.96	\$ 359.68
Ian Farmer, 20 hours @ \$55.00	<u>1,100.00</u>
TOTAL LABOR	\$1,459.68

Actual Expenses

Travel

Airfare	
Farmer (Tucson-WDC)	\$ 860.00

Misc. Travel Expenses

Farmer, 8/26	10.25
8/28	9.45
Hart, 8/28	2.00

Motel

Farmer (2 nights)	76.90
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Meals

Farmer, 8/26	7.00
8/27	14.00
8/28	14.00
Hart, 8/28	<u>23.00</u>

TOTAL EXPENSES	\$1,016.60
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