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- INFORMAL -

From Jorgenson

February 23, 1988

TO: Steven Kale, DOE/HQ

FROM: Max Blanchard, DOE/NV WHPO

SUBJECT: NNWSI PROJECT PEER REVIEW OF SZYMANSKI DOCUMENT

The following attachments represent a chronology of the peer review process currently being used to review the document prepared by Jerry S. Szymanski.

In answer to your specific question regarding our intent to involve and interact with Jerry in the review process, I have indicated on the attachments, and on the list below, where these interactions have been called out in the review documentation.

Please call me if you have additional questions (FTS 575-8939).

ATTACHMENTS

INTERACTIONS WITH AUTHOR

- |  |                  |
|--|------------------|
| 1. Letter, Blanchard to Szymanski, 11/2/87       |                  |
| 2. Letter, Blanchard to Spaeth, 11/10/87         | att. 2, p. 1     |
| 3. Letter, Spaeth to Blanchard, 11/24/87         |                  |
| 4. Letter, Szymanski to Gertz, 12/22/87          |                  |
| 5. Letter, Blanchard to Spaeth, 12/28/87         | att. 5, p. 1     |
| 6. Project Peer Review Plan, 1/4/88              | att. 6, p. 1 & 2 |
| 7. Letter, Gertz to TPOs, 1/20/88                |                  |
| 8. Letter, Gertz to Distribution, 1/27/88        |                  |
| 9. Letter, Voegele to Distribution, 2/8/88       | att. 9, p. 5     |
| 10. Informal letter, Jorgenson to Dist., 2/16/88 |                  |
| 11. Page 5 of Peer Review Procedure (QMP-03-01)  | att. 11, p. 1    |

NOV 02 1987

Jerry S. Szymanski, WMPO, NV

**COMPLETION OF GEOTECHNICAL CRITIQUE OF YUCCA MOUNTAIN (WMPO ACTION ITEM #88-315)**

As you know, Waste Management Project Office (WMPO) has always actively encouraged all viewpoints with respect to examining the viability of Yucca Mountain. The project attitude has always been consistent with the open policy of the Nuclear Waste Policy Act. For well over a year now, I have been aware of your interest in preparing a critique of Yucca Mountain's suitability.

During the process of preparing the Site Characterization Plan (SCP), you and I have had conversations of your concerns about the suitability of Yucca Mountain. The most focused of these conversations, as I recall, occurred in February 1987 and June 1987. During the conversations, I requested from you additional information so that I may better understand them and decide how to deal with them. During this time frame, Donald L. Vieth, the project director at that time, also requested detailed information from you about your views of Yucca Mountain.

Until now, I have not made a written request with respect to you completing your critique. However, with the consultative draft SCP nearing completion, I will have more time to devote to this subject. Therefore, I would like you to deliver the completed draft to me within the next week. If you are unable to complete it within this time frame, then provide a copy of all the draft material you have prepared for your critique, thus far, to me no later than Friday, November 6, 1987. This material will allow me to begin to understand how best to integrate any viable recommendations that your critique may contain into project activities. An approach that I am now considering is to solicit a geotechnical analyses from within the project using a multidiscipline team of experts. If there are controversial topics and/or unresolved questions that need resolution, perhaps a peer review, to be performed by engineers and scientists with national reputations but independent of the project, could be assembled.

Jerry S. Szymanski

-2-

NOV 02 1987

As with all project documentation that is pre-decisional and has not had the benefit of DOE management review, you are reminded not to provide a copy of your draft to anyone outside WMPO.

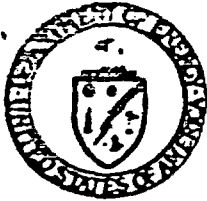
Original Signed By  
Maxwell B. Blanchard

Maxwell B. Blanchard, Chief  
Regulatory & Site Evaluation Branch  
Waste Management Project Office

WMPO:MBB-337

bcc:

D. L. Vieth, ESH, NV  
J. R. Truax, PIR, NV  
R. C. Anick, OCC, NV  
C. P. Gertz, WMPO, NV  
WMPO (R)  
WMPO (RF)  
MGR (RF)



# Department of Energy

Nevada Operations Office  
P. O. Box 98518  
Las Vegas, NV 89193-8518

NOV 10 1987 SAIC/T&MSS

NOV 11 1987

CCF RECEIVED

Michael E. Spaeth  
Technical Project Officer  
for NNWSI  
Science Applications International  
Corporation  
The Valley Bank Center, Suite 407  
101 Convention Center Drive  
Las Vegas, NV 89109

DEVELOP PLANS FOR ANALYSIS OF DOCUMENT PREPARED BY JERRY S. SZYMANSKI  
(WHPO ACTION ITEM #88-360)

Please develop a draft plan for a thorough technical review of the above mentioned document and present it to Waste Management Project Office by November 20, 1987. The plan should have two principle reviews:

1. Project Analysis and Recommendations - This review ought to include a multidiscipline team of senior project scientists drawing from the resources within the existing project participants (i.e., Sandia National Laboratories, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, U.S. Geological Survey, and Science Applications International Corporation). The analysis should include an evaluation of the data used, the interpretations made, the models described, and the processess proposed in the above document to be operating at Yucca Mountain. Assessments should be made of the viability of the conclusions and recommendations presented in the above document. During this time, discussions should occur between the author of the document, Jerry S. Szymanski, and the project review team to clarify topics and to seek answers to questions. Comparisons of the conclusions and recommendations should also be made with the Nevada Nuclear Waste Storage Investigations Project Site Characterization Plan, and if changes need to be made to the project plans, recommendations should be prepared about what the changes should be, and where in Chapters 1-8 they should occur.
2. Outside Peer Review - If there are unresolved issues at the completion of Item 1, then an outside peer review group of nationally recognized experts with background and experience in the appropriate science and engineering disciplines should be established to address them. In this instance, the peer review would be requested to assess the viability of the conclusions and recommendations that are unresolved and still exist in the subject document, as well as, the appropriateness of the report prepared from activity NO. 1 to address their resolution.

The entire plan should follow Quality Management Policy 03-01 guidelines. If you have any questions about this topic, please contact me.

*Robert A. Leitch*  
for: Maxwell B. Blanchard, Chief  
Regulatory & Site Evaluation Branch  
Waste Management Project Office

8000-1111/6-00000

NOV 10 1987

Michael E. Spaeth

-2-

cc:

V. J. Cassella, HQ (RW-222) FORS  
J. L. Younker, SAIC, Las Vegas, NV  
M. D. Voegele, SAIC, Las Vegas, NV  
D. C. Dobson, WMPO, NV  
M. P. Kunich, WMPO, NV

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The complexity and diversity of the review team, and their commitments to other Project activities, will make it difficult to schedule the review. It is likely that the review could not be initiated before mid-January; the final report could probably be finished within three months of initiation of the review.

Maxwell B. Blanchard  
L87-TISD/DBJ-085  
November 23, 1987  
Page Two

Considering the other Project requirements placed on the review team members and other staff that may be involved in the review process, direction from your office is needed to define the priority of this activity relative to other Project activities. In addition, there are no funds identified in the T&MSS budget at present to hire consultants for the Project review, or to support an outside peer review if one is required. If the decision is made to conduct an outside peer review, direction from your office will be needed regarding the source of funding to support that review. Also, T&MSS has provided support to the preparation of this document, at WMPO's request, in word processing and graphics. Additional support will likely be needed to prepare the final document for formal review.

Because of the nature of the review and its potential impact on site characterization, the SCP, and licensing, it is suggested that the review be conducted under WBS 1.2.5, Regulatory and Institutional. Also, because of its potential to create changes to the SCP, which was developed under Quality Assurance Level II, the review of this document would most likely be given a Quality Assurance Level Assignment of II. If the review is authorized, a QA level will be assigned according to NNWSI Project administrative procedure AP5.2Q, assignment of quality levels.

After you have reviewed the enclosed draft plan, we will be happy to meet with your staff to discuss this issue. Please contact Mike Voegelé (ext. 8638) if you have questions regarding this material.

Sincerely,

SCIENCE APPLICATIONS  
INTERNATIONAL CORPORATION



Michael E. Spaeth  
Project Manager

MES:DBJ/riv

Enclosures:  
As stated

cc w/encl:  
W. V. Macnabb  
M. D. Voegelé  
J. E. Shafer



Department of Energy  
Post Office Box 98518  
Las Vegas, NV 89193-8518

DEC 22 1987

Carl P. Gertz, Project Manager, Waste Management Project Office, NV

TRANSMITTAL OF REPORT BY JERRY S. SZYMANSKI

Enclosed please find the report entitled, "Conceptual Considerations of the Death Valley Groundwater System with Special Emphasis on the Adequacy of this System to Accommodate the High-Level Nuclear Waste Repository."

Preparation of this report was requested by Donald L. Vieth, former director of the Nevada Nuclear Waste Storage Investigations Project.

*Jerry S. Szymanski*  
Jerry S. Szymanski  
Regulatory & Site Evaluation Branch  
Waste Management Project Office

VHPO:JSS-694

Enclosure:  
Report by Jerry S. Szymanski

THIS LETTER WAS TRANSMITTED TO  
C. GERTZ. CCs WERE DELETED AT  
C. Gertz's request.

By agreement with Jerry Szymanski,  
the copies will be distributed as  
soon as possible in conjunction with  
the peer review procedures.







# Department of Energy

Post Office Box 98518  
Las Vegas, NV 89193-8518

DEC 28 1987


Michael E. Spaeth  
Technical Project Officer  
for NNWSI  
Science Applications International  
Corporation  
The Valley Bank Center, Suite 407  
101 Convention Center Drive  
Las Vegas, NV 89109

INTERNAL PROJECT PEER REVIEW OF DOCUMENT PREPARED BY JERRY S. SZYMANSKI.  
(VMPO ACTION ITEM #88-673)

You are instructed to initiate an internal Nevada Nuclear Waste Storage Investigations Project (NNWSI) peer review of the enclosed report by Jerry S. Szymanski, as per the recommended Plan, which you submitted to the Waste Management Project Office (VMPO) on November 24, 1987, entitled: "Plan for Conducting a Technical Review of the Szymanski Document" (letter No. L87-TTSD/DEJ-085). The peer review process should begin as early in January 1988, as is feasible and should follow the project's own quality assurance procedures for peer review.

The VMPO requests that several changes be made to the membership of the internal project peer review group suggested in your letter. John Bredehoeft of the U.S. Geological Survey (USGS) should be removed from the list as he is not a member of the NNWSI Project, and would be more suitable for an external peer review. Dr. Bredehoeft's name should be replaced with the names of W. E. (Bill) Wilson, R. B. (Bob) Raup, and W. W. (Bill) Dudley of the USGS. In addition we ask that you add the name of D. C. (Dave) Dobson of VMPO to the review team.

Item 4 (page 3) of the Review Plan must be revised to include direct discussions with the author of the document to clarify any potential misunderstandings. Please submit a final version of the revised Plan along with a draft of the letter that shall be sent to potential members of the internal project peer review group to this office by January 4, 1988. If you have any questions or comments, please phone Bob Levich at 295-8946.

for:   
Maxwell B. Blanchard, Chief  
Regulatory & Site Evaluation Branch  
Waste Management Project Office

VMPO:RAL-767



ATTN: P.1  
~~ENCLOSURE~~\*

Rev. 1  
1/4/88

## PLAN FOR CONDUCTING A TECHNICAL REVIEW OF THE SZYMANSKI DOCUMENT

The technical review and evaluation of the subject document may be conducted in two parts: (1) a formal NNWSI Project peer review involving senior scientists selected from the Project participants and (2) if necessary, a formal outside peer review involving technical experts from outside the Project. The outside peer review will be necessary only if the Project review results in unresolved comments or issues either within the review team or between the review team and the author. Each of these reviews is discussed, in turn, below.

### NNWSI Project Peer Review

The Project peer review will be conducted in accordance with NNWSI Procedure QMP-03-01 revision 0, Peer Review. Under this procedure the responsible WMPO Branch Chief, in this case the Regulatory and Site Evaluation Branch Chief, defines the type of peer review, selects the review team, initiates the review, and designates a chairman to conduct the review. The peer review process and results are documented in a formal report submitted to the WMPO Project Manager for approval. The report will include, among other things, the recommendations and comments from reviewers, the disposition of comments, and any rebuttal from the author.

The purpose of the Project peer review is to judge the technical adequacy of the document and to establish, as nearly as possible, a Project position on the merits of the conclusions and recommendations presented in the document. The review will include an evaluation of the data used, the interpretations made, the models described, and the processes proposed to be operating at Yucca Mountain. The conclusions and recommendations in the document will be compared to the plans for site characterization as outlined in the NNWSI Project SCP and Study Plans, and the peer review report will include recommendations for changes to the SCP and Study Plans based on the peer review.

The actual document review will require a period of six weeks to complete. ~~Three weeks will be allowed for the reviewers to initially review the document.~~ During the fourth week an informal review meeting will be held to encourage interactions among the various-disciplined team members and with the author, allowing the reviewers to become aware of different perspectives and interpretations of the document. A formal review meeting will be held the fifth week, and the sixth week will be used for the preparation of the draft final report of the review team. The final report will be completed within three months of the initiation of the review. It is likely that an additional follow-up meeting of the review team would be required during the preparation of the final report. A reference verification activity will be initiated before or during the first week to ensure that the citations in the review document are fair and accurate and that copies of referenced materials are available for reviewers before the informal meeting during the fourth week. The proposed review schedule is shown in Figure 1.

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Before the review process can be initiated, the author and his organization will verify that the document is ready for formal review and will submit the document, with a transmittal letter, to the WMPO Branch Chief. The following steps, based on QMP-03-01, define the process to be used to initiate, conduct, and conclude the Project peer review of the referenced document:

1. The Regulatory and Site Evaluation Branch Chief, WMPO, chooses the peer review team and delegates a peer review chairman. It is recommended that the review team consist of senior scientists, chosen from among the Project participants, who have expertise in the technical disciplines of geophysics, tectonics, thermodynamics, and mathematics, with strong backgrounds in geotechnical or hydrologic modeling, and familiarity with the Project SCP. It is also recommended that the peer review chairman have a broad technical background and a good understanding of the Project and the NRC and DOE regulations and guidelines.
2. The Branch Chief will send a notification letter to the peer review team members informing them of the objectives, procedures, and schedule of the review, and will provide the team members with copies of the referenced document, Procedure QMP-03-01, Document Review Sheets (DRSs), and any other information that may aid them in their review, such as Study Plans and sections of the SCP.
3. The reviewers will conduct a technical review of the document using the following criteria:
  1. Is the approach to the problem correct?
  2. Are the assumptions and limitations adequately stated?
  3. Are speculative statements clearly identified as such?
  4. Are the data accurate with respect to their published sources?
  5. Are the tables, figures, mathematical calculations, and results correct?
  6. Do the data support the interpretations and conclusions?
  7. Is the reasoning leading to the interpretations and conclusions sound and presented adequately and clearly?
  8. Are the technical discussions sound?
  9. Are the recommendations appropriate with respect to the interpretations and conclusions?

The reviewers will record their comments on Document Review Sheets provided with the review packages.

4. An initial informal review meeting will be conducted during the fourth week of the review process, at which time the reviewers comments and questions will be shared and discussed with the author and among the reviewers. The reference verification process will have been completed at this time, and references will be made available to the peer review team.

\*

-3-

5. During the fifth week of the review process, a formal review meeting will be held, chaired by the review chairman. All review comments will be addressed at this meeting, and the review team will reach a consensus regarding the comments and recommendations to be presented in the peer review report. Daily meeting minutes will be recorded. A peer review summary letter summarizing the comments and recommendations of the review team will be prepared by the chairman at the close of this meeting. The summary letter will be forwarded to WMPO for concurrence by the Branch Chief and approval by the Project Manager.
6. The Branch Chief will forward the summary letter to the document author, requesting a response to the letter by a certain date. When the response has been received, the Branch Chief will attempt to resolve the differences between the author and the reviewers. If resolution is not possible, the Branch Chief may request an outside peer review of the document or take other unilateral action to resolve disputes.
7. The Project peer review process will be documented in a formal report. The report will include or reference the details of the review, such as the date, names of reviewers, their affiliations and qualifications, meeting place, meeting minutes, the documents used in the review, the ~~notification letter, recommendations and comments from reviewers, the summary letter, and the disposition of responses from reviewers, including rebuttals.~~ Minority comments or disagreements among the peer should also be included. The report will be treated as a formal WMPO document that ~~requires the approval of the Project Manager.~~
8. The Branch Chief will send a copy of the peer review report to the reviewers, the author, and the WMPO QA files.

#### Outside Peer Review

If there are unresolved issues resulting from the Project peer review, the WMPO Branch Chief may elect to conduct an outside peer review of the subject document and the final report of the Project peer review. The outside peer review team will consist of nationally recognized experts, not associated with the Project, with backgrounds and experience in the technical disciplines of geophysics, tectonics, thermodynamics, and mathematics and with strong backgrounds in geotechnical or hydrologic modeling. This peer review team would be requested to assess the viability of the conclusions and recommendations that are unresolved and still exist in the subject document and the appropriateness of the final report of the Project peer review to address their resolution.

The outside peer review will be conducted under Procedure QMP-03-01 and will follow a format similar to that for the Project peer review. The WMPO Branch Chief will choose the review team and initiate the review process as described above. This review will also result in a final report that will be treated as a formal WMPO document.

FAXED

JAN 20 1988

Thomas O. Hunter, SNL, 6310, Albq., NM  
Donald T. Oakley, LANL, Los Alamos, NM  
Michael E. Spaeth, SAIC, Las Vegas, NV  
Larry R. Hayes, USGS, Denver, CO

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS (NNWSI) PROJECT PEER REVIEW IN  
ACCORDANCE WITH OMP 03-01, REV. 0, OF A DOCUMENT PREPARED BY JERRY S. SZYMANSKI

The Waste Management Project Office (WMPO) is in the process of developing a project peer review of a document prepared by Jerry S. Szymanski of WMPO. A preliminary review of this document suggests that the project review team should ideally consist of members with geotechnical and hydrologic modeling experience; strong backgrounds in geophysics, thermodynamics, and mathematics; as well as familiarity with the NNWSI Project Site Characterization Plan.

The following members of your staff have tentatively been identified as peer reviewers of this document. In some cases, two individuals have been specified by "or." Although WMPO prefers comments from both scientists, we would be satisfied with the participation of either. However, only one necessarily needs to attend the review meetings.

USGS - Wilson or Dudley  
Raup or Fox  
Galloway  
Snow (SAIC)  
WMPO - Dobson or Blanchard

LANL - Vaniman or Cederberg  
SNL - Tierney, Klavetter, Sinnock  
SAIC - Voegelé or Jorgenson  
Hardin or Frazier  
Chesnut

If, for some reason, it is not possible for the person on your staff tentatively named as a peer reviewer to participate, please immediately submit the name of an alternate for my consideration.

Distribution

-2-

JAN 20 1988

Please distribute the enclosures of this letter to the persons on the above list that you accept as peer reviewers. Do not distribute enclosures to any other persons for review until we have mutually agreed about their participation.

ORIGINAL SIGNED BY  
CARL P. GERTZ

Carl P. Gertz, Project Manager  
Waste Management Project Office

WMPO:MBB-958

Enclosures:

Ltr. Blanchard to Distribution  
Dtd. 1/20/88, w/encls.

cc w/o encls:

V. J. Cassella, HQ (RW-222) FORS  
Ralph Stein, HQ (RW-23) FORS  
M. P. Kunich, WMPO, NV  
M. B. Blanchard, WMPO, NV  
J. S. Szymanski, WMPO, NV

bcc w/encl:

V. J. Cassella, HQ (RW-222) FORS  
Ralph Stein, HQ (RW-23) FORS  
M. P. Kunich, WMPO, NV  
W. R. Dixon, WMPO, NV  
L. P. Skousen, WMPO, NV  
James Blaylock, WMPO, NV



# Department of Energy

Nevada Operations Office

P. O. Box 98518

Las Vegas, NV 89193-8518

JAN 27 1988

## Distribution

### WASTE MANAGEMENT PROJECT OFFICE (WMPO) POLICY ABOUT JERRY SZYMANSKI'S DRAFT REPORT

Several WMPO staff members have made inquiries about the above topic, as a result of the intensive newspaper and television coverage during the last few days. In order to provide the staff with adequate background about this topic, an enclosure has been prepared to provide factual information that has been mistakenly, in some cases, reported by the media.

*Carl P. Gertz*  
 Carl P. Gertz, Project Manager  
 Waste Management Project Office

WMPO:MBB-995

#### Enclosures:

1. Draft Response to the State of Nevada  
 Comments on Report by Mr. Szymanski
2. Summary of DOE Technical Response about  
 Report by Mr. Szymanski
3. Matrix Correlating Conclusions and Recommendations  
 in Szymanski's Report with Activities Description  
 in the SCP
4. Letter to TPOs from Gertz, WMPO:MBB-958,  
 dtd 1/20/88
5. Letter to Project Peer Review from  
 Blanchard, WMPO:DCD-946, dtd 1/20/88
6. Letter to Gertz from Szymanski, WMPO:JSS-694,  
 dtd 12/22/87
7. Letter to Blanchard from Spaeth, L87-TISD/DBJ-985,  
 dtd 11/24/87
8. Letter to Spaeth from Blanchard, WMPO:MBB-389,  
 dtd 11/10/87
9. Letter to Szymanski from Blanchard, WMPO:MBB-337,  
 dtd 12/2/87

#### cc w/encls:

V. J. Cassella, HQ (RV-222) FORS  
 Ralph Stein, HQ (RV-23) FORS  
 N. C. Aquilina, MGR, NV  
 D. T. Schueler, DHGR, NV

JAN 27 1993

## Distribution--Memorandum dated

Victoria L. Davis, WMPO, NV  
Catherine E. Hampton, WMPO, NV  
Mitchell P. Kunich, WMPO, NV  
Maxwell B. Blanchard, WMPO, NV  
Richard V. Barton, WMPO, NV  
Uel S. Clanton, WMPO, NV  
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Eric L. Lundgaard, WMPO, NV  
William D. Shipley, WMPO, NV  
Vinfred A. Wilson, WMPO, NV  
Sharon A. Carter, WMPO, NV  
James Blaylock, WMPO, NV



## ITEM 1

January 20, 1988

**DRAFT DOE RESPONSE TO STATE OF NEVADA COMMENTS ON REPORT BY MR. SZYMANSKI ABOUT THE ADEQUACY OF THE POTENTIAL REPOSITORY SITE AT YUCCA MOUNTAIN**

The DOE Yucca Mountain repository program is open to the views of all persons who are willing to present them for consideration. This includes alternative interpretations of existing data as well as differing ideas about the processes operating at the Yucca Mountain site.

The DOE has been aware of Mr. Szymanski's views about the Yucca Mountain site for some time. He has discussed his views with various technical staff supporting the DOE, and was asked in mid-year of 1987 to prepare a written analysis so that his ideas could be understood and reviewed by peers. We are currently putting this report through the standard technical review process used for all DOE-sponsored publications. The quality assurance plan for the DOE repository program requires this review process.

One of the goals of the technical review of Mr. Szymanski's report will be to determine the viability of the data used, the interpretations made, and the processes proposed. Results of this technical review will help the DOE determine if the priorities recommended for site characterization activities should be adopted.

After the DOE technical review, if unresolved issues remain, we currently plan to assemble a panel of outside scientists and engineers to conduct an independent technical analysis of Mr. Szymanski's report, as well as to examine the DOE's technical review comments. All of these analyses will be open to scrutiny by the State of Nevada, the Nuclear Regulatory Commission and the public.

The four recommendations for high-priority site investigations made by Mr. Szymanski are already contained in the consultation draft of the Site Characterization Plan for the Yucca Mountain site, released on January 8, 1988, and were also contained in earlier drafts of the document. The DOE's goal is to ensure that site characterization at the Yucca Mountain site is thorough and comprehensive so that the suitability of the Yucca Mountain site to contain and isolate radioactive waste can be carefully and openly analyzed by all interested parties.

## Item 2

January 20, 1988

**SUMMARY OF DOE TECHNICAL RESPONSE ABOUT REPORT BY MR. SZYMANSKI ON THE  
ADEQUACY OF THE POTENTIAL REPOSITORY SITE AT YUCCA MOUNTAIN**

**SUMMARY OF CONCLUSIONS IN REPORT BY MR. SZYMANSKI**

The report written by Mr. Szymanski states that "three conclusions seem to be reasonable and warranted at this time (pages 5-1 to 5-7):

i. Examination of the extensive data base ....reveals that this flow field is considerably different than the flow system currently envisaged by the NRESI Project. The conceptual model of this flow system.....is far too simple and much too far removed from reality. Simply stated this conceptual model ignores completely the volcano-tectonic setting of the Yucca Mountain site...

ii. Conceptualization of hydrologic processes operating in the vadose zone of the two phase flow field developed in the deforming fractured medium yields a completely different picture than the one currently envisaged by the NRESI Project. Two issues of fundamental importance ....are: a)the mechanism of flow in the vadose zone; and, b)the temporal stability of the water table, including its short and long term aspects, and involving both climatic and tectonic factors. Two other issues of fundamental importance are .... a)the chemistry of the interstitial pore water in the vadose zone; and, b)the spatial and temporal distribution of heat flow through the vadose zone....

iii. The conceptual model of the flow field, indicated by the currently available data from the Yucca Mountain site, points toward serious limitations of this site to effectively isolate radionuclides from the biosphere. These limitations are greater by far than those currently recognized by the NRESI Project.... "

## ITEM 2

page 2

## TENTATIVE DOE RESPONSE TO CONCLUSIONS IN THE REPORT BY MR. SZYMANSKI

A preliminary analysis by the DOE of these conclusions suggests that Mr. Szymanski believes that the DOE has not adequately considered the possibility that the water table could drastically rise during the lifetime of the repository, thus exposing the repository to flooding.

The potential repository at the Yucca Mountain site would be located between 550 and 1100 feet above the water table in dry, unsaturated rock. Thus, the suitability of this site for a repository is highly dependent on the amount of water present to contact the radioactive waste and the rate at which that water moves through the unsaturated rock to reach the underlying water table.

A vast quantity of geological information has been obtained about the region surrounding the Yucca Mountain site through both the DOE repository program and the nuclear test activities at the Nevada Test Site. Despite many years of intensive study by hydrologists from major national laboratories and the U.S. Geological Survey, data currently available indicate that such drastic changes in the water table position are unlikely. However, in order to assure that all possibilities have been explored, the DOE has described extensive field studies in the consultation draft of the Site Characterization Plan to determine if there is any reason to believe that a future repository at the Yucca Mountain site could be flooded during the period important for waste isolation.

The immediate action the DOE has planned for Mr. Szymanski's report is to conduct the same type of technical review that is ordinarily performed on all DOE-sponsored technical reports. It should be noted that Mr. Szymanski's report develops an extensive theoretical framework for his models, and often relies on complex mathematical reasoning to support his theories. If, as a result of the technical review, unresolved issues remain, then the DOE expects to conduct an outside peer review using independent scientists and engineers who will analyze both the recommendations from the DOE's technical review as well as Mr. Szymanski's document.

January 22, 1968

**MATRIX CORRELATING CONCLUSIONS AND RECOMMENDATIONS IN THE REPORT BY JERRY SZYMANSKI WITH ACTIVITIES AND STUDIES IN THE CONSULTATION DRAFT OF THE SITE CHARACTERIZATION PLAN FOR THE YUCCA MOUNTAIN SITE**

The attached matrix was prepared by summarizing the conclusions and recommendations in section 5.1 of the report by Mr. Szymanski. The first column in the matrix refers to the subsection of section 5.1 where the conclusion or recommendation can be found. The second column briefly summarizes the key element of the conclusion or recommendation made by Mr. Szymanski. The third and fourth columns provide page numbers and brief text from the Site Characterization Plan for the Yucca Mountain site, indicating where our interpretations of Mr. Szymanski's conclusion or recommendation are addressed. In some cases, the concern expressed in Mr. Szymanski's conclusion or recommendation is directly addressed in the Site Characterization Plan. In other cases, the concern is addressed by general studies or activities designed to investigate topics of broader scope, but which includes the concern expressed in Mr. Szymanski's report.

The attached matrix is a first draft and is currently being review by technical staff. It will be corrected and a revised version will be provided as soon as it is available.

1-21-88  
JLY

-----draft-----

**MATRIX CORRELATING CONCLUSIONS AND RECOMMENDATIONS IN REPORT BY J. SZYMANSKI  
WITH ACTIVITIES/STUDIES IN THE SCP/CD ADDRESSING THE CONCERNS**

**REPORT  
Pg. #**

**CONCLUSIONS/RECOMMENDATIONS**

**SCP SECTION/PAGE #**

**STUDY OR ACTIVITY**

**5-1(i)**

Model of flow system ignores volcano-tectonic setting of site

Act. #8.3.1.2.1.3.3,  
pg. 8.3.1.2-103, point #4:  
test impacts of future  
tectonic activity on  
saturated hydrologic  
system.

8.3.1.2.1.4: Regional hydro. system-  
synthesis and modeling

8.3.1.8-68 - 8.3.1.8-89  
(pg. 79 - effect of strain  
changes on water-table  
elevation; pg. 82 - effects  
of faulting on water table  
elevation; pg. 87 - effects  
of stress/strain on hydrologic  
rock properties.

8.3.1.8.3.1: Analysis of effects of  
tectonic processes & events on  
flux rates over repository

pg. 8.3.5.13-41: scenario for  
direct radionuclide releases  
due to volcanism.

pg. 8.3.5.13-47: scenario for  
fault-related changes in water  
table level.

pg. 8.3.5.13-48: scenario for  
fault/volcanic related changes  
in rock properties.

CONCLUSIONS/RECOMMENDATIONS

SCP SECTION/PAGE #

STUDY OR ACTIVITY

5-3(ii)-  
5.5

Short term and long term instabilities  
in the water table are possible

pg. 8.3.5.13-49150:cases for  
satur. zone flow paths or  
gradients being impacted by  
fault/volcanic activity.

pg. 8.3.1.2-168:Solitario  
Canyon horizontal borehole  
study:Objective "to evaluate,  
locally the hydrogeologic  
significance of fault-  
related features..."

8.3.1.2.2.3:Char. of percol. in  
unsat. zone

8.3.1.2.1.4.4,  
pg. 8.3.1.2-103-105:Reg. 3-D  
hydrologic modeling [pg. 105,  
3rd para. -  
"...Future movement along faults  
in the vicinity of Yucca Mt.  
could change hydraulic  
properties so as to either  
impede or enhance ground-water  
flow. The impact of such  
changes will be evaluated  
using the model."

8.3.1.2.1.4:Reg. hydro. system

8.3.1.2.3, pg. 8.3.1.2-293:  
last para. recognizes water-  
level responds to "seismic  
events".

8.3.1.2-301 to 305:new water  
table monitoring holes  
planned.

8.3.1.2-306: pt. #6 -  
Determine ...extent ground-  
water system responds to  
hydraulic stress...

8.3.1.2.3.1:Char. of site saturated  
ground-water flow system

ATT. 8, p. 8

CONCLUSIONS/RECOMMENDATIONS

SCP SECTION/PAGE #

STUDY OR ACTIVITY

5-5(iii) Site has serious limitations  
-5-7 with regard to effective isolation  
of waste: most important are potential  
for rise of water table; possible  
rapid ground water travel times;  
possible gaseous transport to  
surface; and potential for water  
chemistry to be different than  
expected.

pg. 8.3.5.13-48:discussion of  
possible "sudden leakage across  
Solitario Canyon fault" and  
rises in water-table.

Water-table rise:

8.3.1.6-pgs. 68-70, [pg 70-  
effect of strain changes on  
water table elevation; pg.62-  
effects of faulting on water  
table elevation; pg. 87-effects  
of stress/strain on hydraulic  
rock properties.]

pg. 8.3.5.13-48:consideration  
of abrupt alterations of  
conditions controlling hydraulic  
head - i.e.-"sudden leakage across  
the Solitario Canyon fault"

Rapid ground-water travel  
times:

8.3.1.2-265:effect of faults  
on flow paths and rates.

8.3.1.2-271:water ages will  
be determined to verify flow  
paths and travel times.

8.3.1.2.2.6:Char. of flux  
within Paintbrush near Ghost  
Dance fault

8.3.1.2.2.8:Hydrochem. charact-  
eristics of unsat. zone

CONCLUSIONS/RECOMMENDATIONS

SCP SECTION/PAGE #

STUDY OR ACTIVITY

pg. 8.3.1.2-260:2nd para. 4,  
..will consider "flow through  
structures/fractures (faults and  
fractured zones).

8.3.1.2.2.10:Unsat. zone system  
analysis and integration

8.3.5.12-3:current concepts  
include "continuous flow  
through fractures or faults";  
see also 8.3.5.12-15/16:disc.  
of possibility of rapid flow  
through fractures.

8.3.5.13-3: scenarios for rise in  
water table, increased flux, or  
changes in rock properties that  
could potentially impact repository  
barriers.

Gaseous transport:

pg. 8.3.1.2-267 to 271:char.  
of gas-phase movement in  
unsat. zone.

8.3.1.2.2.7:Char. of gas-phase  
movement in unsat. zone

8.3.5.13-36:gas-phase releases  
nominal & disturbed cases.

pg. 8.3.1.3-129 - 131:  
Gaseous radion. transport  
calculations and measurements

8.3.1.3.8.1.1:Gaseous radion.  
transport calc. & measurem.

Chemistry changes:

pg. 8.3.1.2-248:hydrochem.  
tests in exploratory shaft

8.3.1.2.2.4:Char. of Yucca Mt.  
percolation in unsat. zone-  
explor. shaft facility



**REPORT**  
**pg. 8**

**CONCLUSIONS/RECOMMENDATIONS**

**SCP SECTION/PAGE #**

**STUDY OR ACTIVITY**

pg. 8.3.1.8-95:Assessm.  
of change in rock geochem.  
properties due to igneous  
activity.

8.3.1.8.4.1:Assessm. of effects  
tectonic processes/events on  
rock geochem. properties

pg. 8.3.1.8-96:Assessm.  
of degree of mineral change  
along fault zones in  
10,000 years

pg. 8.3.1.8-98:Assessm. of  
mineral change in controlled  
area resulting from tecton.  
induced water table changes

pg. 8.3.1.2-301-305:Site  
potentiometric-level  
evaluation

8.3.1.2.3.1.2:Site potentie.  
level evaluation

pg. 8.3.1.2-338:Saturated  
zone hydrologic system synth.  
and analyses. [All reasonable  
data to be assimilated into  
a description of flow system.]

8.3.1.2.3.3:Sat. zone hydrologic  
system synthesis & modeling

pg. 8.3.1.5-96:Studies of  
calcite and opaline silica  
vein deposits {Objective is  
to determine ages, distrib.,  
origin, and paleohydrologic  
significance of calcite/  
opaline deposits along faults  
at Yucca Mt.

8.3.1.5.2.1:Char. of Quaternary  
regional hydrology;  
Act. 8.3.1.5.2.1.5:Studies of  
calcite and opaline silica vein  
deposits

Att. 8, p. 11

5-8(i) Data on water table at Yucca Mt. should be  
examined to determine frequency and  
magnitude of instabilities  
evaluation

5-8(ii) Calcite-silica-sepiolite deposits at the  
Yucca Mt. site should be investigated  
completed and conclusively; should be both  
surface and subsurface and include  
radiometric age determinations.

REPORT  
pg. #

CONCLUSIONS/RECOMMENDATIONS

Must establish if flooding of the repository is an "anticipated event"

5-8(iii) Chemistry of water in vadose zone should be investigated to establish if perched water exists and if present, does it have different chemistry from fracture water

SCP SECTION/PAGE #

pg. 8.3.5.13-15:Case C(2) covers "foreshortening" of unsaturated zone".

pg. 8.3.5.13-48:discusses effect of changed offset along faults on water table and effects of sudden leakage across Solitario Canyon fault on water table position.  
pg. 8.3.5.13-50:covers offsets on faults causing perched aquifer or rise in water table.

pg. 8.3.1.2-248:Hydrochem. tests in the explor. shaft facility

pg. 8.3.1.2-266:Hydrochem. char. of the unsat. zone.  
pg. 8.3.1.2-269:activity on aqueous-phase chemical investigations. Objective is to "design and implement methods for extracting pore fluids from unsat. zone tuff units"

pg. 8.3.4.2-46:Composition of vadose water from the package environment. [Test will extract pore water from tuff and fluid composition will be determined.]

STUDY OR ACTIVITY

8.3.1.2.2.4:Char. of Yucca Mt. percolation in the unsat. zone-explor. shaft facility

8.3.1.2.2.8:Hydroch. char. of the unsat. zone

8.3.4.2.4.1:Char. chemical & mineralogical changes in the postemplacement environment

REPORT

2. 1

8(iv)

CONCLUSIONS/RECOMMENDATIONS

Known perched waters occurring in the vadose zone of the Death Valley flow system should be investigated to determine the origin of water forming the features.

SCP SECTION/PAGE #

pg. 8.3.1.2-83:Regional potentiometric level studies. [Objective:to reliably estimate flow directions and gradients.]

pg. 8.3.1.2-95:Regional hydro-chemical tests and analyses. [Samples to be collected from springs to establish evidence of possible flow paths and evolutionary history of ground-water.]

STUDY OR ACTIVITY

8.3.1.2.1.3:Char. of regional ground-water flow system

8.3.1.2.1.3:Char. of regional ground-water flow system



Science Applications International Corporation

L88-TTSD/DBJ-005  
WBS #1.2.3.1  
QA Level II

February 8, 1988

TO: Distribution

SUBJECT: Contract #DE-AC08-87NW10576  
Summary of February 1, 1988 Telecon Regarding Peer Review of the  
Szymanski Document

Enclosed is the summary of the conference call of February 1, 1988, regarding the peer review of the document prepared by Jerry S. Szymanski, DOE/WMPO.

Questions regarding the enclosure or the peer review in general can be addressed to Dave Dobson (WMPO) at FTS 575-8945, or Dave Jorgenson (SAIC) at FTS 575-8610.

Sincerely,

SCIENCE APPLICATIONS  
INTERNATIONAL CORPORATION

A handwritten signature in cursive script that reads "Michael Voegele".

Michael D. Voegele, Manager  
Project Technical Integration,  
Analysis & Evaluation Department

MDV:DBJ:rlv

Enclosure:  
As stated

SAIC/T&MSS

FEB 09 1988

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Multiple Addressees

L88-TISD/DAJ-005

February 8, 1988

Page Two

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Stephen Metta, SAIC, Las Vegas, NV  
S. J. Brocoun, HQ (R&W-233) FORS

D. Jorgenson  
February 5, 1988

# SZYMANSKI DOCUMENT REVIEW

## SUMMARY OF CONFERENCE CALL February 1, 1988

### Purpose

The purpose of the 9:00 a.m. (PST) conference call was to (1) review the plan for conducting the NWSI Project Peer Review of the document, "Conceptual Considerations of the Death Valley Groundwater System with Special Emphasis on the Adequacy of this System to Accommodate the High-Level Nuclear Waste Repository," authored by J. S. Szymanski (DOE/WMPO); (2) identify the reviewers from the Project participants and WMPO, and identify the points of contact at the participant organizations; and (3) to establish a preliminary date for the first meeting of the review team.

The following Project personnel participated in the conference call:

WMPO: Blanchard, Dobson  
SAIC: Voegele, Chesnut, Hardin, Frazier, King, Cullen, Ziegler, Jorgenson  
USGS: Wilson, Raup, Dudley, Stuckless, Galloway  
LANL: Vaniman, Canepa  
SNL: Sinnock, Klavetter, Bingham

### Peer Review Plan

Questions regarding the peer review process were addressed. The peer review will follow the procedure described in QMP-03-01. The following points clarifying the review process were discussed and approved:

- o Document Review Sheets (DRSs) will be used to formally document reviewers comments. For convenience, the DRSs may contain notations referring to review comments written on separate sheets attached to the DRSs. In this case, a DRS will serve as a cover sheet and "index" for the attached review comments.
- o The participant organizations may submit a single set of review comments and DRSs. However, the DRSs must identify the individual reviewers, and each comment must be readily traceable to the specific reviewer who originated the comment. It is expected that reviewers will stand behind their review comments; minority viewpoints must be included in the final peer review report.
- o Draft review comments should be prepared for the first review meeting. Formal comments, using DRSs, should be prepared for the second review meeting.

- o Verification of the document's references is underway, and is expected to be completed before the first review meeting.
- o Copies of the document's references will be made available by February 5, 1988. A package of references will be sent to each of the participant review coordinators.

#### Reviewers

The following have been designated as reviewers of the document. The review coordinator at each of the participating organizations is indicated by an asterisk.

WMFO: \*Dobson  
Blanchard

SAIC: \*Jorgenson  
Hardin  
Chesnut  
Cullen  
King  
Frazier

USGS: \*Wilson  
Dudley  
Fox  
Galloway  
Snow  
Swolfs  
Stuckless

LANL: \*Vaniman  
Crowe  
Eggert  
Travis  
Janecky

ENL: \*Simnock  
Klavetter  
Barr  
Borns

Review Meetings

Conference call: February 19, 1988, at 2:00 p.m. (PST). (Phone number will be FAXed later.) The purpose of this call is to check on the progress of the review, establish the date of the first review meeting, and determine who will attend the meetings (the review meetings are not intended to include all the reviewers).

First review meeting: tentative date, March 1, 1988. The purpose of this meeting is to (1) informally discuss the document among the review team members; and (2) interact with the author to clarify assumptions, analyses, and conclusions in the document, and to better understand the author's philosophy and point of view.

Second review meeting: (no date set). This will be the formal review meeting. Review comments will be discussed with the intent of developing a Project position on the document. The format for the peer review report will be determined, and writing assignments for the report will be made at this meeting.

Additional review meetings may be required, especially as the peer review report nears completion.

NOTE: DOE/OGR has asked to be represented at the review meetings and conference calls. Until further notice, the OGR representative will be Steve Brocoun.



- INFORMAL INPUT -

DATE: 2/16/88  
TO: Distribution  
FROM: Dave Jorgenson, SAIC (FTS 575-8610)  
SUBJECT: Second Conference Call to Discuss the Internal Project Peer Review  
of the Document Prepared by Jerry S. Szymanski

The second conference call to discuss the internal peer review of the Szymanski document is scheduled for Friday, February 19, at 1:00pm PST (the original time of 2:00pm was changed to accomodate DOE/HQ participation). The phone number you should call to get in on the conference is FTS 575-6081 (non-FTS is 702-295-6081).

The purpose of the conference call is to check on the progress of the reviews, to address remaining questions you may have regarding the review process, to decide on the date of the first peer review meeting, and to decide who will be attending that meeting.

Note that this conference call announcement is addressed only to the review coordinators. It is up to the coordinator at each participating organization to decide who to include in the conference call.

Distribution:

Dave Vaniman, LANL  
Scott Sinnock, SNL  
Bill Wilson, USGS  
Dave Dobson, WMPD  
Max Blanchard, WMPD  
Ralph Katy, Western  
Cady DOE/HQ  
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L. Hayes, USGS  
D. Oakley, USGS  
T. Hunter, SNL  
M. Spaeth, SAIC  
S. Broucum, DOE/HQ

"INFORMAL INPUT"

5.2.5 If there is to be no review meeting the WMPD Branch Chief shall collect the recommendations and comments from the reviewer(s). He shall assign an individual who will prepare a summary letter for concurrence by the Branch Chief and approval by the Director, WMPD.

5.2.6 The WMPD Branch Chief shall submit the peer review summary letter to the organization that originated the document for disposition that will include the recommendations and comments from the reviewer(s) and that will request a response by a given date. The organization may either respond by agreeing with the recommendations and comments and stating the actions to be taken, may respond with alternates and subsequent actions to be taken based on the alternates, or may respond by disagreeing with the recommendations and comments.

5.2.7 When the response has been received from the organization, the Branch chief shall resolve, if possible, the differences between the organization and the reviewers. If that is not possible the Director, WMPD, may take unilateral action to resolve a dispute. All disputes must be resolved and the resolution actions shall be documented.

5.2.8 The Branch Chief shall monitor actions agreed upon by the organization to assure that all actions are completed.

### 5.3 Peer Review Documentation

5.3.1 A peer review process shall be documented by preparing and issuing a formal report. The report should either include or reference the details of the review such as the date, the names of reviewers, their affiliations and qualifications, the meeting place, the meeting minutes (if a meeting is used), the organization documents reviewed, the notification letter, the recommendations and comments from the reviewers, the summary letter, and the disposition of responses from reviewers including rebuttals from the organization. The report should be treated as a formal WMPD document that has the approval of the Director, WMPD.

\*