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Dr. Gary K. Jacobs
Environmental Sciences Division
Building 1505/Room 312
P.O. Box X
Oak Ridge National Laboratory
Oak Ridge, TN

Dear Dr. Jacobs:

SUBJECT: CONTRACT NO. NRC-50-19-03-01, FIN B-0287, ORNL NO. 41-37-54-92-4, "TECHNICAL ASSISTANCE IN GEOCHEMISTRY," DECEMBER (1985) MONTHLY PROGRESS REPORT

I have reviewed the December monthly progress report dated January 14, 1986. Based on my review, I have the following comments:

Task 1 BWIP Geochemical Technical Assistance

° Progress to date is satisfactory.

° Due to a lack of NRC travel money it does not appear that we will be able to have any kind of a BWIP meeting before April, unless it were held here (at NRC headquarters). I will pursue this possibility.

Task 2 Yucca Mountain Geochemical Technical Assistance

° Progress to date is satisfactory.

° There has been some preliminary discussion concerning a meeting with DOE/NTS on (1) solubility and (2) key radionuclides. Two documents need to be reviewed in order to determine whether such a meeting is necessary (See Task 4 - Short term T.A.).

Task 3 Salt Sites Geochemical Technical Assistance

° Progress to date is satisfactory.

° Attached for your information are the meeting notes from the SRP/NRC waste package meeting (enclosure 1).

Task 4 Short-Term Technical Assistance

° Progress to date is satisfactory.

OFC	:WMGT	:	:	:	:	:	:
NAME	:DJBrooks;mt	:	:	:	:	:	:
DATE	:86/02/	:	:	:	:	:	:

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° Attached for your information is the "Report of Review of the BWIP Corrosion Program by the Ad Hoc corrosion Panel" (enclosure 2).

° Enclosure 3 and 4 are short term T.A. assignments needed to support NNWSI. Please discuss the scheduling of this work with me.

Task 5 Project Management

° Progress to date is satisfactory.

° Please provide an up-to-date list of B-0287 products (see enclosure 5).

The action taken by this letter is considered to be within the scope of the current contract NRC-50-19-03-01/FIN B-0287. No changes to cost or delivery of contracted products is authorized. Please notify me immediately if you believe that this letter would result in changes to cost or delivery of contracted products.

Sincerely,

/S/

David J. Brooks
Geochemistry Section
Geotechnical Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

Enclosure:
As Stated

OFC	:WMGT	:	:	:	:	:
NAME	:DJBrooks;mt	:	:	:	:	:
DATE	:86/02/04	:	:	:	:	:

ATTACHMENT-2

Report of the Review of the BWIP Corrosion Program by the Ad Hoc Corrosion Panel

SUMMARY

The Ad Hoc Corrosion Panel, acting by request of DOE, reviewed the corrosion program of the BWIP project. The conclusions of the Panel are based on (1) materials prepared for the Panel by BWIP, (2) presentations by BWIP to the Panel, and (3) responses of BWIP to inquiries by the Panel.

The principal conclusions of the Panel are:

1. The BWIP management is highly-focused, mission- and success-oriented, and milestone driven. However, the corrosion program is not firmly directed to the need to meet regulatory criteria.

2. Success of the corrosion program's strong emphasis on the uniform corrosion of reference and back-up materials requires convincing and coherent demonstrations that localized corrosion phenomena can be excluded as failure modes in expected repository environments in the 300- to 1000-year time frame. A plan for such demonstrations was not evident.

3. Critical issues such as the identification of potential critical failure modes, the extrapolation of short-term data to long-term predictions, and the development of models based on well-understood mechanisms have not been adequately addressed. Therefore, there appears to be no firm basis for assessing the necessary quality and relevance of data.

4. The corrosion program includes consideration of most failure modes, but not in a comprehensive and integrated manner, nor with the emphasis that the various modes should command.

5. Inadequate attention has been given to the altered metallurgical structures that will occur in and near closure welds of the very thick sections of container material, and the likely increased susceptibility to failure by localized corrosion. Plans for back-up closure modes were not evident.

6. Decision-making processes appear to be held closely within the BWIP corrosion program management. Expertise from the outside, or from its contractors, is not generally utilized. The level of expertise in corrosion and metallurgy on the internal management staff appeared inadequate for the task.

7. BWIP corrosion management does not appear to seek or welcome external reviews of program planning activities, or of experimental results obtained under it. The attitude is generally

negative toward review panels, and the MCO system. Internal reviews, as presently constituted and which BWIP considers to be adequate and sufficient, are ineffective and not relevant.

8. There are no plans by BWIP for external review of data for licensing prior to submission to the NRC.

A. Introduction

An Ad Hoc Panel initially established to review the corrosion program of the Materials Characterization Center (MCC) was reconvened at the request of DOE to review the parts of waste repository programs concerned with the corrosion of metallic waste package components. This report concerns the review of the corrosion program of the Basalt Waste Isolation Project (BWIP).

The Ad Hoc Panel was initially established by the Chairman of the Materials Review Board (MRB) following a request by Joel C. Haugen, Manager of the Materials Integration Office (MIO) of the Chicago Operations Office of the U.S. Department of Energy (letter, J. C. Haugen to M. J. Steindler, July 11, 1984). In January 1985, the MIO requested that the Ad Hoc Panel also review the corrosion programs of the repository projects (letter, J. C. Haugen to M. J. Steindler, January 11, 1985).

The Panel met in Richland, Washington, on June 18 and 19, 1985, with staff members of the BWIP project. The Panel also met in executive session on the evening of June 18th and on September 23 and 24. This report largely follows the requests for specific information contained in the letters from DOE that served as the charter for the Panel.

B. Scope of the Review

The MIO request stated that it "has been directed by the Office of Geologic Repositories to examine the repository projects' corrosion programs using the same guidelines as for the ... (MCC) ... Review ... The basis of the review will be the criteria documents of the NRC (10 CFR 60) and the EPA (40 CFR 191). As for the MCC review, the repository programs should be reviewed to the same standards as given in the letter Haugen to Steindler, July 11, 1984."

The Panel was requested to respond to the following three questions:

1. Are all the corrosion mechanisms that are likely to be operative in the repository environments being addressed, either by the BWIP or included among the "key data" to be reviewed by the MRB?;

2. Are the tests being developed by the MCC and those proposed by the projects adequate to quantify the corrosion or penetration rates associated with those mechanisms?; and

3. Are the quality of the BWIP work and the MCC/project interactions adequate to assure development and review of "key data" of sufficient scope and quality to show compliance with NRC and EPA criteria?

Though the principal focus of the review was the above three questions, the review was not restricted solely to them. As in the MCC review, ancillary issues related to the overall performance of the project arose, were discussed and some are included in this report.

C. Results of the Review

The first part of the review responds to the three specific questions. The second part addresses ancillary issues and provides further detailed explanations considered germane to the review.

1. Responses to Questions

Q1. Are all the corrosion mechanisms that are likely to be operative in the repository environments being addressed, either by the BWIP or included among the "key data" to be reviewed by the MRB?;

The two parts of the question are considered separately.

Part 1: Are all the corrosion mechanisms ... being addressed ... by the BWIP ...?

The Panel concluded that all corrosion mechanisms are not being adequately addressed. While many corrosion mechanisms are being considered, the major effort of the program is aimed at general/uniform corrosion and is believed to be misdirected. BWIP is cognizant of other corrosion mechanisms but is exploring only some of those that they consider credible. The Panel concludes that the adequacy and the focus of the overall program relative to its objective is deficient.

The project's current focus on general corrosion appears to be motivated by two principal and related factors: the expected anoxic environment of the repository, and the selection of low carbon and low alloy steels as the reference and back-up candidates for construction of the metal components of the waste package. The key rationale for these selections was the evidence, obtained in the screening process, that localized corrosion might be avoided for service in reducing environments. The evidence to support the materials selection decisions was considered by the Panel to be generally weak, and the Panel expected considerable emphasis in current programs to generate data that corroborated these decisions. This emphasis was generally lacking.

The inadequacies of the program include, for example, lack of attention to the following: stress corrosion cracking (SCC) in environments containing Cl^-, CO_3^{-2}, and S-containing species; hydrogen embrittlement; long-term metallurgical changes; crevice corrosion; intergranular attack; welding effects.

The Panel believes that it is incumbent on BWIP to demonstrate its presumption that low carbon steels do not suffer any form of significant localized corrosion in the

basalt repository environment which BWIP judged to be reducing. The Panel found the plan for accomplishing this demonstration not adequate. Some examples are as follows.

Studies of the effect of welding as related to localized corrosion phenomena do not appear to be part of the planned corrosion program even though thick metal sections are part of the current design for the waste package. Aggravating environmental factors that appear to be inadequately considered in the program include the presence of chlorides, carbonates, and sulfides. Stress corrosion cracking of steels due to carbonates has been observed at temperatures greater than 60°C; chlorides are known to induce hydrogen evolution through various corrosion reactions, and sulfur (in various forms) can have serious impacts on all forms of corrosion. Further, there is a possibility that the anoxic repository environment may be altered locally by the accumulation of corrosion products, especially in crevice locations, thus giving rise to altered local redox potentials.

Efforts are being made in the BWIP program to address the issues of environmental crack growth and pitting, and electrochemical measurements are being made to address pitting initiation, pitting propagation, and some corrosion mechanisms.

In summary, it is the conclusion of the Panel that while the BWIP corrosion program did address some of the important corrosion mechanisms, the program was not based on an evident thorough, comprehensive, or well-developed plan. The presentations have not convinced the Panel that a sound scientifically based philosophy exists with which to address the difficult questions of material selection, development of test methods, data extrapolation, and life prediction.

Part 2: Are all the corrosion mechanisms ... being addressed ... [or] included among the "key data" to be reviewed by the MRB?

The Panel concluded that little of the BWIP-related "key data" are to be reviewed by the MRB.

In its presentation, BWIP presented three classifications of data: (1) "licensing data" are all data generated for licensing purposes using BWIP-approved procedures, (2) "key data" are data generated on the most probable corrosion mode, defined by BWIP to be general corrosion for low carbon and low alloy steels, and (3) "MRB Review" data are data generated by the MCC in BWIP "benchmark" testing. Only those data designated by BWIP as MRB review data (which is likely to include only uniform corrosion data) will be submitted to the MRB. This includes data to be generated by

the following three test methods: MCC-105.1, Static Pressure Vessel Test; MCC-105.4, Flow-By Autoclave Test; and MCC-105.5, Air-Steam Test. The indicated test methods appear to be limited to uniform corrosion although qualitative information on pitting may also be obtained. Thus, most of the data that fall under the BWIP categories of licensing data and key data (which is likely to include data on localized corrosion) would not be reviewed by the MRB. The definitions provided by BWIP are contrary to the term "key data" in the context of the requests to the Panel by DOE.

Q2. Are the tests being developed by the MCC and those proposed by the projects adequate to quantify the corrosion or penetration rates associated with those mechanisms?

This questions is also divided into two parts.

Part 1: Are the tests being developed by the MCC ... adequate ...?

This part of the question, relating to the MCC, is not germane to the review of the Corrosion Programs of BWIP.

Part 2: Are the tests ... proposed by the project adequate ...?

The response of the Panel to this question is NO. The response is based on the observations that the issues such as reproducibility, ability to make quantitative extrapolations, the applicability and relevancy of the tests have not been addressed.

Q3. Are the quality of the project (BWIP) work and the MCC/project interactions adequate to assure development and review of "key data" of sufficient scope and quality to show compliance with NRC and EPA criteria?

Part 1: Are the quality of the project (BWIP) work ... adequate to assure ...?

The Panel concluded that the data obtained on uniform corrosion of the alloys selected for candidate materials are of reasonably high quality for short-term tests. However, the quality may not be adequate for extrapolation to long-term performance in the absence of an extrapolation model based on mechanistic understanding. Further, some of the studies of pitting corrosion and crack growth appear to be sound. The absence of significant work on other localized corrosion phenomena and the lack of attention to metallurgical changes in and near welds prevented an evaluation of the quality of this part of the program.

The Panel does not believe that the effort on modeling and predictive studies is adequate. The bases of the models described by BWIP were derived from literature data that were obtained under conditions not obviously pertinent to the repository. Further, the models seem to lack a defensible mechanistic base and the Panel failed to find appropriate appreciation by the BWIP for the necessity of such a base.

The Panel noted that the BWIP program had, up to now, no persons directly assigned who were expert in statistics. Further, except for some of the contractors to BWIP, the project staff was perceived to be weak in expertise in the corrosion field.

Part 2: Are the quality of the ... MCC/project interactions adequate to assure ...?

The Panel posed questions to BWIP management concerning this point. The responses made it clear that the Panel would not be provided with answers. In the opinion of BWIP, the question was not part of the Panel's concerns.

The Panel, nevertheless, concluded that the MCC/BWIP project interactions are not adequate for the purposes stated in the question. The one significant interaction between BWIP and the MCC is the generation by the MCC of "benchmark" data for test procedures principally involving uniform corrosion. Other procedures and test data from BWIP will not be sent through the MCC/MRB system. In its current role with BWIP, MCC appears to be serving principally in the role of a contractor performing those services specifically requested by BWIP. Demonstration of compliance with NRC and EPA criteria did not appear to be a specific target of the program as evidenced by absence of sufficient attention to localized corrosion effects, absence of clearly defined performance targets, and absence of efforts at development and testing of meaningful models.

The Panel further observed that BWIP management (1) does not approve of the objectives and purposes of the MCO system, (2) does not intend to utilize this system for review of its procedures and data (with the possible exception of "benchmark" data already described), and (3) perceives no need for independent external review of procedures and data prior to submission to the NRC.

2. Other Issues and Observations

The Panel is aware that the scope of its activities, defined by the Haugen letter, could be narrowly interpreted as dealing only with answers to the three questions. It is the unanimous conclusion of the Panel,

however, that the topic of corrosion is of major importance to the repository performance and that this conclusion is shared by DOE. The Panel has, therefore, elected to provide ancillary comments that deal with issues related to the corrosion program and about which Panel members have great concern or strong feelings. These issues were developed in response to inquiries and discussions initiated by both the Panel and the project. In some instances, the ancillary comments represent an extension of observations summarized above.

a. Technical Issues

The following technical issues were identified by the Panel as issues that either (1) are not currently being adequately addressed, or (2) are being adequately addressed but not properly integrated into a thorough and self-consistent program.

1. Definition of Failure Modes

In its presentations, BWIP ranked probable failure modes in the following order of decreasing importance: uniform corrosion, pitting corrosion, intergranular attack, and environmentally assisted cracking (including stress corrosion cracking and hydrogen assisted effects). The Panel concluded that BWIP has not adequately established its basis for such a ranking.

Major deficiencies in the current program include but are not limited to inadequate attention to crevice effects due to varying degrees of contact of metal surfaces with packing material, the presence of hydrogen, particularly in occluded regions (due both to radiolytic decomposition of groundwaters and the corrosion process itself), and the possible degradation of weldments by various mechanisms previously mentioned.

The Panel believes the much enhanced emphasis by BWIP on general corrosion, compared to localized corrosion, is misplaced. While general corrosion will undoubtedly occur, the likelihood of failure by localized corrosion seems to the Panel to be greater than failure by general corrosion. Selection of carbon steels and low alloy steels, and the current corrosion program were based principally on the perceived lack of susceptibility to localized phenomena. The Panel believes that, for this approach to be credible, the program must be focused clearly and unequivocally on an adequate demonstration that failure by localized phenomena can be avoided. Although BWIP is addressing some of the forms of localized attack, the Panel concluded that the effort is not integrated to ensure a design that meets the objectives.

The Panel noted that the reference design of the waste package and its emplacement is relatively new and that the design influences the basis and nature of the corrosion program. The expected ten-year BWIP program for testing of some of the corrosion mechanisms appears to conflict with the stated schedule of submission of a license application unless DOE does not expect to provide adequate corrosion data in such an application. This conflicting situation is exacerbated by the lack of early attention to potentially important failure mechanisms, including those that affect the closures.

2. Characterization of the Environment

The Panel observed that BWIP has made a significant effort to characterize the repository environment. However, recognition should be made in planning tests that the bulk environment may not be representative of the environments adjacent to regions of potential localized attack. The local environments may not always be reducing since corrosion products may accumulate, particularly in locations such as crevices, and change the local redox potentials. Thus, the Panel concluded that a safer and more conservative approach would include in the testing the bounding of expected conditions at somewhat higher oxidizing potentials than anoxic conditions would indicate.

The characterization has also revealed the presence of several chemical species known to have potential damaging effects to metallic components: some sulfur compounds, arsenic, chlorides, and carbonates. The Panel failed to find inclusion of these species in the planning of the corrosion testing program. The Panel notes that carbonates are capable of inducing SCC and chlorides may induce hydrogen evolution through corrosion reactions. The potential for producing hydrogen embrittlement may be aggravated by the presence of arsenic and some sulfur compounds.

3a. Materials Selection

The BWIP basis for materials selection was corrosion resistance, fabricability including container closure, availability, and cost. The process of materials selection included literature surveys, and early screening studies. On this basis, BWIP selected low carbon steel as the reference material, and low alloy steel, OFHC copper, and 90Cu-10Ni cupronickel as the back-ups. BWIP stated that all candidate materials display acceptable corrosion resistance under anoxic conditions. Further, the evidence available to BWIP suggested that localized corrosion could be avoided for service in reducing environments.

Higher alloys were considered by BWIP to have certain drawbacks: e.g., nickel alloys were susceptible to pitting, titanium to hydriding, and stainless steels to stress corrosion cracking.

BWIP cited five principal references as constituting the basis for materials selection. Three of these are publicly available through the National Technical Information System (NTIS), and one was provided to the Panel by BWIP for this review. The evidence contained in the four available references to support the materials selection decision was considered by the Panel to be generally weak, and the Panel expected considerable emphasis in current programs to generate data that corroborated the decisions. This emphasis was generally lacking.

3b. Uniform Corrosion

The uniform corrosion program uses the conventional approach of exposure of the material to be tested to a relevant environment, followed by weight measurements after different periods of exposure with a planned maximum period of about ten years. It would be useful to include in situ electrochemical polarization measurements as a check against corrosion weight-loss measurements and to detect possible changes of mechanism with time and temperature.

The most significant gaps in the program are the lack of sound advanced planning on determinations of mechanisms and the development of adequate models. For example, data obtained to date indicate marked changes in corrosion rates of low carbon steel at differing temperatures. These data imply a change of mechanism. Development of a systematic methodology to understand the mechanism has not been undertaken. The Panel believes that, lacking this fundamental basis, the data is not adequate for use in extrapolating performance to the repository and its time scale.

4. Pitting and Crevice Corrosion

The work in the area of pitting corrosion using electrochemical procedures was judged by the Panel to be one of the better activities in the current corrosion program. It was noted by the Panel that this was one area in which there is mechanistics consideration. However, it is not clear to the Panel how the information on pitting and/or mechanisms

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* Available from NTIS: PNL-2990 (1979), PNL-3198 (1980), PNL-3483 (1980).
Provided by BWIP: RHO-BWI-ST-15 (1981).
Not publicly available: BWIP SD-RE-TRP-011 (1982).

determined in this activity is to be used for design, modeling, and extrapolation, i.e., how it is to be integrated into the corrosion program as a whole.

The approach used in the work involves measurement of the corrosion potential to determine whether excursions of this potential above the critical pitting potential occur. No plans have been revealed to establish the accuracy of the pitting potential determinations, to determine whether the pitting potential changes over long periods, and to ascertain, if possible, whether a system exhibiting a corrosion potential below the measured pitting potential will not pit. Also, the results of this work show a tendency toward pitting of low carbon and low alloy steels at relatively active potentials that seem to be at variance with the assessments (in the materials screening process) that the likelihood of pitting is low. It is not clear how project management intends to use this information.

The Panel concluded that the attention given to crevice corrosion is inadequate. The Panel felt that extensive opportunities for crevice corrosion exist because of the potential for uneven contact of packing material with metallic components. BWIP stated that crevice corrosion is being addressed by pitting corrosion experiments. The Panel noted, however, that crevice initiation occurs by a different mechanism than pit initiation and should be addressed separately.

5. Stress Corrosion

The Panel concluded that a reasonable start has been made in the area of stress corrosion, but the effort has not been coordinated into a systematic and thorough corrosion program. The effort is directed toward establishing whether there exists a threshold of stress intensity below which the rate of crack growth is acceptably low and, if so, how it varies with changing environmental conditions. It is not clear at this time how the data obtained from this effort are to be used by program management.

6. Long-Term Metallurgical Changes

Long-term metallurgical changes may be important during the canister lifetime even in simple metallurgical structures such as mild steel. Among these are solute segregation to interfaces, modification of the metallurgical structure in the vicinity of the weld, and redistribution of the hydrogen in solid solution in response to the residual stress patterns in the vicinity of the closure and in response to the (modest) thermal gradient which will exist

in the container walls. All of these point towards the importance of local failure modes, particularly in the vicinity of the closure.

It is not clear to the Panel that these phenomena are being properly addressed.

7. Radiation Damage and Hydrogen Effects

BWIP recognizes the importance of potential effects of the radiation field on corrosion mechanisms. BWIP is relying on the shielding of the very thick walled container to reduce or eliminate radiation effects. While the thick shields may be effective in essentially eliminating radiation effects on uniform corrosion, it is likely that even the reduced radiation levels will affect localized corrosion at the tips of cracks, crevices, or pits initiated by other mechanisms. Further, such radiation levels can produce species that lead to hydrogen damage, especially in reducing environments that have high hydrogen fugacities.

The Panel concludes that the BWIP program relating to radiation damage is deficient in several of the above areas.

8. Closure of the Container

The Panel found little evidence that the corrosion problems exacerbated by, for example, residual stresses, changes in metallurgical structure, crevices associated with welding or other closure modes, are being addressed or considered.

Because of the metallurgical properties and residual stresses of the heat affected zone, this area is likely to be the most susceptible region of the waste package to failure. The Panel found no evidence that the fusion and heat affected zones are being tested for corrosion resistance or other failure modes. The Panel observed that other closure modes are not being considered, even though potential corrosion rates or hydrogen embrittlement susceptibility at welded closures may be intolerably high.

9. Modeling and Extrapolation

The Panel concluded that several of the models and extrapolation methods currently being used by the BWIP project for preliminary assessment are simplistic, not defensible from a mechanistic point of view, and may yield misleading results. The Panel does not underestimate the difficulty of extrapolating to the very long periods associated with repository disposal by utilizing short-term

data. However, appreciation on the part of the BWIP project for the difficulties associated with life prediction appeared to be lacking.

Modeling and extrapolation for life prediction require at least a minimal understanding of the mechanisms by which degradation processes proceed. The Panel did not see much evidence that work leading to the improvement of such understanding, either from the point of view of mechanisms or degradation modes, is in progress or planned.

10. Data Quality and Quality Assurance

The Panel noted that presentations in the area of Quality Assurance (QA) were extensive. The QA system is concerned with the details of methods, procedures, and documentation of the data production process. The Panel also noted that these elaborate and extensive quality assurance measures do not address the question of applicability, relevancy, and general utility of the data being obtained. The Panel observed that there is a risk that obsession with QA measures may result in (1) an unwarranted degree of comfort in data quality (and a subsequent neglect of adequate program planning), and (2) a stifling of scientific virtuosity and initiative. Preoccupation with QA may be a factor in the judgments that the Panel has made relative to program management. The Panel also concluded that the significant resources expended on QA did not appear to be commensurate with the modest apparent benefits that could be expected from such expenditures.

11. Leadership, Management, and Review Processes

The Panel concluded that BWIP management of the Corrosion Program is decisive, albeit myopic, and exercises a strong control. The management process is highly focused, mission- and success-oriented, and milestone driven. The Panel believes that these attributes are not necessarily synonymous with success.

It appeared to the Panel that decision-making processes related to program planning may be held too closely within the Richland organization; corrosion expertise available from the outside or even from within its own contractor operations are not generally utilized. The level of expertise of BWIP in corrosion appeared to be relatively low, considering the importance of the topic to the success of the repository program.

Further, it appears to the Panel that BWIP management does not seek or welcome external independent reviews of its program planning activities, or of the experimental results

obtained under it. The Panel was told that the project has been subjected to multiple external reviews and that these reviews are generally perceived to be an impediment to meeting milestones. In addition, a BWIP Review Committee selected by DOE is to meet every six months, and among other things, reviews the Corrosion Program and management decisions related to it. The Panel learned that this Committee contains no persons recognized as corrosion experts or material scientists and has never reviewed the BWIP corrosion program. The Panel questioned the effectiveness of such a review process.

The Panel thus concluded that there is no acceptance by BWIP management that external review is necessary.

The Panel learned that the funds supporting the corrosion program are believed adequate by BWIP management. At the indicated level of funding, the Panel believes these funds should have allowed BWIP to do much better at developing plans, procedures, and a data base for the task at hand.

The Panel views the intense adherence to milestones and the consequent success-driven program management as potentially hazardous to the timely development of the high-quality data and substantiation of models that will be needed for licensing. This concern was amplified in the discussions with BWIP management on the issues of examining phenomena that arose during experiments but were not described in the governing statement of work. The Panel concludes that the subcontractors who are part of the BWIP program should be provided with more extensive opportunities to explore potentially pertinent phenomena and ideas that may be important to the program.

The Panel concludes that the consequences of the management deficiencies are reflected in the absence of coordinated program plans that guide the program with technically significant principles. In addition, the absence of outside review allows BWIP to feel satisfied with the current technical activity and direction, even though it appeared to the Panel that the major technical problems are not being addressed. Thus, the expenditure of resources appears to the Panel to be highly inefficient and unlikely to satisfy the technical requirements for demonstrating compliance with regulatory criteria in a timely fashion.

ATTACHMENT -3

SHORT-TERM TECHNICAL ASSISTANCE TASK ORDER NUMBER 31

FIN NO/CONTRACTOR: B0287/ORNL REQUEST DATE: February 4, 1986

CONTRACT TITLE: T.A. in Geochemistry

TASK TITLE: Document Review ("Solubility Experiments for the NNWSI Project" - LA 10560-MS)

ESTIMATED LEVEL OF EFFORT: 1 staff week

REQUESTED COMPLETION DATE: Call to discuss

PRODUCT DESCRIPTION: Letter Report

TASK DESCRIPTION:

Review with respect to the logic of the approach, information needs and methods. Also, review should provide input into determining potential agenda items (if this were to be a subject of a DOE/NRC meeting)(document attached).

SHORT-TERM TECHNICAL ASSISTANCE TASK ORDER NUMBER 32

FIN NO/CONTRACTOR: B0287 REQUEST DATE: February 4, 1986

CONTRACT TITLE: T.A. in Geochemistry

TASK TITLE: Document Review (An Assessment of Important Radionuclides in Nuclear Waste - LANL10414-MS)

ESTIMATED LEVEL OF EFFORT: 1 staff week

REQUESTED COMPLETION DATE: Call to discuss

PRODUCT DESCRIPTION: Letter Report

TASK DESCRIPTION:

Review with respect to logic and completeness. Also, review should provide input into potential agenda items (if this were to be a subject of a DOE/NRC meeting) (document attached).