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RADIOACTIVE WASTE ISOLATION IN SALT:
PEER REVIEW OF OFFICE OF NUCLEAR WASTE ISOLATION'S
SOCIÖECONOMIC PROGRAM PLAN

by

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NOTICE TO READER

At the request of the Salt Repository Project Office, Argonne National Laboratory carried out a review of the ONWI Socioeconomic Program Plan. Argonne reviewers were asked to consider whether the plan was appropriate for program needs, if key activities were overlooked, whether the milestone timing and nature of deliverables were appropriate, which milestones were of high priority, and which could be eliminated or deferred.

The Socioeconomic Program Plan transmitted to ANL was developed prior to passage of the Nuclear Waste Policy Act of 1982, and hence, does not reflect appropriate provisions of the Act. The Plan is an internal administrative document of the socioeconomic related activities and how they are coordinated and conducted. It is not a policy document in that it is not used to determine or convey DOE policy. In this light many of the comments resulting from ANL review are not useful. The reviewers assumed this Plan stated policy and covered many activities that are presently a part of SRPO public outreach and state interactions.

The Socioeconomic Program Plan is being revised to reflect changes that resulted from passage of the NWPA.

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FOREWORD

Documents are being submitted to the Salt Repository Project Office of the U.S. Department of Energy (DOE) by Battelle Memorial Institute's Office of Nuclear Waste Isolation (ONWI) to satisfy major milestones of the salt host-rock portion of the Civilian Radioactive Waste Management Program. Some of these documents are being reviewed by multidisciplinary groups of peers to ensure DOE of their adequacy and credibility. Adequacy of documents refers to their ability to meet the U.S. Nuclear Regulatory Commission's separate subsystem-level standards enunciated in the 10 CFR Part 60 rule, and National Environmental Policy Act and Nuclear Waste Policy Act of 1982 (NWPAA) requirements. Credibility of documents refers to the validity of the assumptions, methods, and conclusions, as well as to the completeness of coverage.

Since late 1982, Argonne National Laboratory has been under contract to DOE to conduct multidisciplinary peer reviews of program plans and reports covering research and development activities related to siting and constructing a high-level nuclear waste repository in salt. The present report summarizes Argonne's review of ONWI's Socioeconomic Program Plan for the Establishment of Mined Geologic Repositories to Isolate Nuclear Waste dated February 4, 1982.

Argonne was requested by DOE to review the plan on January 27, 1983 (see App. A). Because ONWI did not transmit its analysis of the socioeconomic aspects of NWPAA to Argonne until April 20, 1983 (see App. A), the peer review panel did not meet until May 10, 1983. On June 27, 1983, Argonne was informed that the Table 2 milestones of the plan were being deleted and should not be reviewed (see App. A). At a meeting on July 13, 1983, DOE and ONWI staff expressed concern that the draft Argonne review report addressed both policy and administrative matters. In fact, the plan was reviewed on its own merit, and no attempt has been made to consider DOE policy separate from the content of the plan.

The review procedure involved obtaining written comments on the plan from two of Argonne's core peer review staff, and from one Argonne and two extramural experts in socioeconomic and public policy analysis. Reviewer comments were integrated into the present report by the review session chairman, with the assistance of Argonne's core peer review staff. Each of the peer review panelists concurred in the way in which his comments were represented in this report (see App. B), and a draft of the report was sent to DOE's Salt Repository Project Office on July 12, 1983.

PREVIOUSLY PUBLISHED REPORTS IN THE SERIES

"RADIOACTIVE WASTE ISOLATION IN SALT":

ANL/EES-TM-242 Peer Review of the Office of Nuclear Waste Isolation's Geo-
chemical Program Plan (Feb. 1984)

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SUMMARY OF RECOMMENDATIONS

The following recommendations have been abstracted from the body of this report. The Office of Nuclear Waste Isolation's Socioeconomic Program Plan for the Establishment of Mined Geologic Repositories to Isolate Nuclear Waste should be modified to:

1. Encourage active public participation in the decision-making processes leading to repository site selection. The course of action described by the plan is unlikely to convince local residents or leaders of communities near potential repository sites that they are real partners in the site selection process. A predictable consequence of this approach will be intransigent opposition and legal action that could delay the repository program for years.
2. Clearly define mechanisms for incorporating the concerns of local residents, state and local governments, and other potentially interested parties into the early stages of the site selection process. In addition, the Office of Nuclear Waste Isolation should carefully review the overall role that these persons and groups, including local pressure groups organized in the face of potential repository development, will play in the siting process. It should also determine how to turn this participation to the national advantage. Failure in this regard is likely to result in state vetoes of proposed repository sites, under the provisions of the Nuclear Waste Policy Act of 1982 (NWPA), and Congressional reluctance to override such vetoes.
3. Place significantly greater emphasis on using primary socioeconomic data during the site selection process, reversing the current overemphasis on secondary data collection, description of socioeconomic conditions at potential locations, and development of analytical methodologies. The consistent flavor of the plan is that

socioeconomic problems can be overcome by repairing the damage that development imposes when it finally occurs, rather than by taking socioeconomic considerations into account in selecting an appropriate site.

4. Include additional approaches to solving socioeconomic problems. For example, a reluctance to acknowledge that solutions to socioeconomic problems need to be found jointly with interested parties is evident in the plan. If applied together, the three approaches to socioeconomic problems proposed in the plan may offer a beginning point, but they are insufficient. Socioeconomic problems as complex as those associated with development of nuclear waste repositories cannot be solved in as simple a fashion as is suggested by the plan.
5. Recognize that mitigation mechanisms other than compensation and incentives may be effective. The plan relies on monetary mitigation mechanisms to solve problems to the exclusion of other techniques, an approach that appears more expeditious than well reasoned.
6. As soon as potential sites are identified, the U.S. Department of Energy (DOE) should begin discussing impact mitigation agreements with local officials and other interested parties. There should be ample opportunity for them to discuss with DOE the exact steps that will be taken to mitigate any adverse impacts well in advance of the President's designation of the first repository site.
7. Comply fully with the pertinent provisions of NWPA.

1 INTRODUCTION

Argonne National Laboratory's peer review of the Socioeconomic Program Plan for the Establishment of Mined Geologic Repositories to Isolate Nuclear Waste prepared by Battelle Memorial Institute's Office of Nuclear Waste Isolation (ONWI) included obtaining written critiques of the plan from two members of Argonne's core peer review staff and from one Argonne and two extramural experts in socioeconomic and public policy analysis. Reviewer comments were integrated into the present report by the review session chairman, with the assistance of the core peer review staff. Panelists did not contact ONWI personnel, and none of the panelists has been involved in any programs sponsored by the U.S. Department of Energy (DOE) or directed by ONWI such that their participation in the review could be construed as a conflict of interest.

The ONWI Socioeconomic Program Plan spells out DOE's approach to analyzing the socioeconomic impacts from siting, constructing, and operating radioactive waste repositories and discusses mitigation strategies. A problem-solving approach is proposed that addresses issue identification, impact assessment, design of mitigation efforts, and design of institutional and organizational structures to implement the program. This approach entails three basic tasks:

1. Socioeconomic impacts and assessments. This task includes evaluation of appropriate methods, data collection and analysis, and discrimination of the information needed to help interested parties understand the anticipated impacts.
2. Community development approach to impact mitigation, involvement of affected parties, and direct mitigation through compensation and incentives.
3. Monitoring and organizational analysis. This task requires design of a system to monitor the socioeconomic impact mitigation program and analysis of the socioeconomic aspects of institutional and organizational problems that are anticipated to arise in managing repository facilities. The focus will be on intergovernmental mechanisms needed to implement the waste isolation program.

Although no specific guidance was provided to Argonne by DOE on the manner in which the review was to be conducted, the following questions were prepared by DOE to assist in the review process (see App. A).

1. Is the plan appropriate for program needs?

2. Have key activities been overlooked?
3. Are the timing of milestones and the nature of deliverables appropriate?
4. Which milestones have high priorities, which could be eliminated/deferred (1) now or (2) later, if budget restrictions are imposed?

Throughout its review, the Argonne panel referenced its comments on the ONWI Socioeconomic Program Plan to two documents: (1) 10 CFR Part 960, DOE's proposed rule entitled *Nuclear Waste Policy Act of 1982; Proposed General Guidelines for Recommendation of Sites for Nuclear Waste Repositories*, Fed. Reg., 48(26):5670-5682 (Feb. 7, 1983) and (2) Regulatory Guide 4.17, the U.S. Nuclear Regulatory Commission's (NRC's) guide entitled *Standard Format and Content of Site Characterization Reports for High-Level-Waste Geologic Repositories* (July 1982). These documents are referred to in the text as "10 CFR 960" and "Regulatory Guide," respectively.

2 ADEQUACY OF THE PLAN IN MEETING STATUTORY, ADMINISTRATIVE, AND REGULATORY REQUIREMENTS

2.1 STATUTORY REQUIREMENTS

Nuclear Waste Policy Act of 1982. The ONWI Socioeconomic Program Plan is not in compliance with the Nuclear Waste Policy Act of 1982 (NWPA), which is the current legal authority for the plan. The act reflects the decision to blend federal and state authority in reaching a decision on a repository site. Therefore, the act specifies the need to consult with government officials, to prepare environmental assessments and impact statements, to provide information, and to hold public hearings. The plan should be redrafted to be in precise compliance with pertinent provisions of NWPA.

A critical element of NWPA is the provision for state veto of a designated repository site. However, this veto can be overridden by Congress. The possibility of a state veto makes it imperative that state and local governments participate fully in the site selection process from the first recognition that a locality may contain a potential site. The siting process should ensure that state and local governments will endorse the selection in 1987 of the first nuclear waste repository site. In particular, socioeconomic issues must be dealt with responsibly if such bodies are to be persuaded that a repository location is satisfactory. Once a potential site has been identified, socioeconomic planning should proceed as though the site will be chosen for repository construction. This approach should permit DOE to inform local residents of the advantages and disadvantages of the location and should prevent uninformed exercise of the state veto.

Recent Supreme Court decisions suggest that Congress has now set the standards for repository siting decisions and that actions brought by states or private parties to the effect that different standards should be used will fail. Nonetheless, the veto power granted to the states requires that their interests be considered in activities under NWPA.

National Environmental Policy Act. The plan indicates that revisions of both the siting strategy and the National Environmental Policy Act (NEPA) implementation plan will be available for public comment before they are finalized, but procedures for incorporating outside comment are not described.

The plan also refers to Council on Environmental Quality (CEQ) regulations requiring implementation of mitigation programs. In light of Supreme Court emphasis that NEPA does not require specific environmental actions to be taken (see *Stryker's Bay Neighborhood Council v. Karlen*, 444 U.S. 223, 1980), the CEQ regulations may be based on uncertain legal

authority. Clearly, NWPA provides a more specific statutory mandate for mitigation.

Possible New Legislation. The plan states that mitigation of impacts may require additional state and local, as well as federal, legislation. However, the discussion does not indicate what type of legislation might be needed at what levels and to what extent state and local governments or individuals might be involved. Implementation is indicated in the plan as being accomplished through DOE actions and guidance, supported by ONWI and Office of Nuclear Waste Terminal Storage Integration (ONI) staff and subcontractor activities.

The plan should include a thorough survey of the legal structures of the communities near which repositories might be located. This survey should be a cooperative venture by federal, state, and local officials. Both existing laws and the ways in which necessary legal changes can be made should be reviewed.

If state legislation were needed to address impact mitigation concerns, it is conceivable that two years of lead time might be necessary. To change local ordinances, state statutes and ordinances sometimes require notices, public hearings, and a step-by-step amendment process, which may take six months or more to complete.

Other legal matters relevant to the plan are land use planning laws, state constitutional and statutory restrictions on government spending and subsidies to private developers, and opportunities for cooperation between state government and local units of government. It is important to encourage cooperation among the many units of government (e.g., counties, cities, school districts, and other special districts) that would be affected by a repository.

2.2 U.S. DEPARTMENT OF ENERGY ADMINISTRATIVE REQUIREMENTS

The ONWI Socioeconomic Program Plan would be improved by a tighter focus on the guidelines proposed in 10 CFR 960. Program activities relating to the provisions of 10 CFR 960.5-8 through 960.5-10 (population density and distribution, environmental protection, and socioeconomic impacts) should correspond to the relevant sections of the proposed guidelines.

The proposed DOE process for selecting a nuclear waste repository site uses technical considerations as the principal determinants of site location, provided that the socioeconomic impacts of development can at least be "accommodated by reasonable mitigation or compensation" (10 CFR 960.5-10). One way to make impacts easier to mitigate is to reduce the number of people affected, and DOE guidelines specifically favor sites with extremely low populations (10 CFR 960.5-8 and 960.5-8-1). However, this requirement

contradicts another guideline related to locally available labor (10 CFR 960.5-10). Clearly, DOE will not find a labor force of the size needed to construct and operate a nuclear waste repository in a sparsely populated location. When potential sites are compared, such contradictions will presumably be resolved. The plan should propose a means for dealing with such fundamental problems.

The issues listed in Table 1 of the plan are grouped into the three major tasks listed in Sec. 1 of this report. Although these issues are generally related to 10 CFR 960.5-8 through 960.5-10, they do not naturally separate into the three discrete task areas. The issues are intermingled and difficult to bound or define.

The many questions presented as "issues" in Table 1 illustrate the plan's undue emphasis on descriptive research on impacts. It is obvious, for example, that a nuclear waste repository will create a boomtown situation, that the population influx due to construction and operation will greatly increase the demand for community services, that cost of living increases will affect people on fixed incomes more than people whose incomes respond to inflation, and so forth. Rather than investing effort in answering these questions again -- when the necessary information is available from prior experience with energy facility development -- more attention should be paid to the last question in the second group, that is, "What is the role of the public in the waste management decision-making process?" That question should be asked formally and explicitly about several different publics, including residents of a host state, a host county, a potential host community, and a selected host community.

The plan should also acknowledge that issues will change over time as communities change and should provide for consideration of these changes. The objective should be to seek viable solutions to the problems that evolve from the issues, not to address the issues alone.

2.3 U.S. NUCLEAR REGULATORY COMMISSION REQUIREMENTS

The Regulatory Guide indicates that Chapter 2 of a site characterization report (SCR) should describe the decision mechanism used to evaluate environmental, legal, and institutional criteria. If this information is included in an environmental impact statement, it can be included in the SCR by reference. However, NWPA, which was signed into law in January 1983, postdates the Regulatory Guide, which was published in July 1982. The U.S. Department of Energy has indicated to Argonne that socioeconomic considerations will be included in the environmental assessments and that Sec. 2.0 of the Regulatory Guide no longer applies to the site characterization plans.

3 CHANGES TO STRENGTHEN THE ROLE OF PUBLIC PARTICIPATION

The Argonne review panel concluded that the major weakness of the ONWI Socioeconomic Program Plan is the inadequate role of public participation in the decision-making process leading to repository site selection. The plan should encourage active public participation in the site selection process and provide well-defined mechanisms for incorporating public concerns into that process. The plan does neither. This weakness is, in the panel's view, likely to create a confrontational relationship between DOE and local residents and governments. Such confrontation is likely to lead to state vetoes of proposed repository sites as well as to litigation that could significantly delay development of repositories.

3.1 NEED FOR PUBLIC PARTICIPATION

Incorporation of the views of affected and interested states and localities into the site selection process is indicated as an integral part of the basic DOE and ONWI strategy. However, collection of data at other than the secondary level is not called for before a site is nominated, and provision for considering the views of interested parties is not indicated as an integral part of the process. The lack of public participation in site selection is sure to lend credibility to critics of the process. The time for public participation (e.g., negotiation with local officials over the terms and conditions for facility development) is when many possible localities are still being considered. Participation is meaningful only if the participants can actually influence the outcome.

The plan should give more weight to negotiation about socioeconomic impacts: in one instance citizen participation is presented as a one-way street (DOE informing local officials) and in another it is ruled out of the site selection process. For example, socioeconomic impacts will clearly result from the site selection process itself. To be suggested as a possible location for a nuclear waste repository imposes costs, anxieties, and various other impacts on a community. If these impacts are not taken into account in a negotiated and iterative siting process, individuals and groups may express their dissatisfaction in ways that could seriously interfere with the process.

Under the present plan, conflicts will probably not yield to mediation by the time DOE expects to use mediation. Discussions should begin as soon as states containing potential areas are identified and continue through the screening of potential locations and site selection. Lengthy, costly litigation is almost guaranteed if affected parties are not included until after the basic site selection process has been completed.

The role of socioeconomics in the site selection process should be clear. Important socioeconomic factors should be discussed during area,

location, and site investigation phases, and the level of required detail at each level of investigation should be indicated.

The expectation that socioeconomic concerns will matter more as the decision process focuses on more-specific locations is probably wrong. The major misapprehension of the plan is the belief that DOE can choose the right repository site on technical grounds and then "patch up" the socioeconomic problems. Widespread early understanding of the importance of socioeconomic concerns and of their effect on events -- and evidence of this understanding throughout the site selection process (such as generous, early grants to state governments to do their own impact assessments) -- is critical to the success of the nuclear repository program.

3.2 LEVEL OF LOCAL INVOLVEMENT

Site-specific work by affected states is mentioned in the plan, but involvement of broad-ranging interested publics is not. These publics consist of states, counties, municipalities, citizens in groups, citizens as individuals, the President, Congress, and governmental agencies.

States are the lowest level of local involvement included under DOE, ONWI, and ONI activities. Involvement with the states has been uneven, however, at least in the case of Utah, where the state initially sought a grant from DOE, then withdrew from the process, but may now be reinvolved. It is important in this context to recall that a state government is not the same thing as the people who reside in the state, and that state residents near a repository site are affected quite differently from state residents at some distance from the site. If DOE believes it is "interacting with a state" when it exchanges letters with the governor or state government officials, at least in this context, it is in for an unpleasant surprise.

Local participation is included through subcontractor analysis of appropriate local public participation in siting, issue analysis, and institutional studies to set priorities and to resolve public concerns raised throughout the siting process. The work by subcontractors to date has mostly involved studies at a distance from the sites (i.e., studies using secondary data) or studies that have not directly involved local residents in the work being done. The results of these studies are to be used by ONWI to recommend to DOE a total socioeconomic impact assessment and mitigation approach. Once again, studies, assessments, and methodology development are being conducted without the involvement of the concerned publics.

Once specific sites for the repositories are selected, DOE will attempt to gain the acceptance of individuals or groups using the information it has acquired through its studies. This approach seems to ignore the most critical element of the whole process -- the involvement of the people most likely to be affected by DOE programs to isolate nuclear waste.

Distinctions must be made between the current residents of a community and its future residents, because the people who live near a repository site now are likely to have very different attitudes about the new development than will those who arrive during the development process. Treating these two groups as though they were a "community" conceals these differences and makes it impossible to accomplish the tasks described in the plan in a useful way. Both ONWI and DOE must be aware that the in-migrants to the repository site will have very different attitudes than the original inhabitants. The plan should reflect this awareness.

3.3 INFORMED DECISIONS BY LOCAL RESIDENTS

Monitoring is recognized in the plan as one of the more effective ways of dealing with impacts, particularly because it is tied to adjustments in mitigation efforts. Change can be incorporated as it occurs, and programs can be adjusted to ensure that appropriate needs are being met. The monitoring and institutional considerations aspect of the plan is one of its strengths. How this process is carried out is of concern; specifically, who will be involved in developing and implementing this aspect of the plan?

A major function that must accompany monitoring is that of ensuring that those affected by the program understand what is occurring and its implications for their interests. This function provides for informed choices by local individuals. Surveys of a community's ability to cope with rapid growth usually show that a community with previous experience with such phenomena is better able to perceive and prepare for it than those without such experience.

Communities that have not experienced such growth often have little or no understanding of what they are attempting to address. In such cases, it is not sufficient to take the communities at their word and assume that they will be able to do what they believe they can. This is a most difficult area. On one hand, if DOE does not take them at their word, they will resent its arrogance. However, if DOE permits them to proceed uninformed, it will do them a disservice. Efforts must be made to ensure that local input is considered and that it is based on an accurate understanding of likely outcomes. It is not clear how this can be accomplished. If one goes into rural areas offering economic development that will bring dramatic changes in the local quality of life, it is critical that efforts be made to help local residents understand what is likely to happen, even if it means lobbying against DOE's immediate interests.

Proponents of actions that may have significant adverse impacts generally cannot resist citing the benefits of their proposed actions first. While this is understandable, it does not develop confidence in the project. It might help to acknowledge the negative aspects first. Also, the plan is unclear about the recipients of the benefits from development. Localities do

not receive benefits; localities are places in which people -- oldtimers and newcomers -- live, and it is the residents who experience benefits.

Employment of local residents is a commonly cited benefit from proposed projects. While it is an extremely attractive attribute to claim for a project, such an argument should be made cautiously. Local residents may not, for example, have the requisite skills for the available jobs. Union jurisdictions may dictate labor pools that do not include local residents. Programs requiring local hires may be illegal. Hiring local residents away from traditional lines of work may damage the existing economic structure of the area.

Contrary to what some of the peer review panelists believe, there is a strong possibility that local residents may well encourage development, with full knowledge of its potential impacts. If this is the case, the waste isolation program could be a boon locally.

3.4 STANDARD-OF-LIVING ISSUES

The expectation that "highly valued aspects of community life" can be conserved despite the construction and operation of a nuclear waste repository is unrealistic. If a nearly uninhabited area or a small rural community is transformed into a bustling small city, no amount of mitigation or impact assistance can alter the fact that the quality of life for those who live there now will be changed significantly. It is imperative that DOE understand that the mitigation measures it contemplates will be in response to wholesale destruction of a way of life in the location selected. These measures are not palliatives to correct minor glitches in a smooth development process.

It is equally important to distinguish at the outset between the current residents, who are few in number and will be greatly outnumbered by the in-migrants once this project begins, and the newcomers. An essential part of the socioeconomic program will be to persuade local residents that there are benefits from the repository. In this sense "conserving highly valued aspects of community life" could be amended to "conserving and enhancing."

One reviewer found surprising the assertion that the proposed development "...can enhance standards of living and quality of life." Development in a sparsely populated area will cause social indicators (income, health, etc.) assesse. for the newcomers to be higher than the earlier values for the original residents, but this comparison is not meaningful. Standards of living for newcomers will probably be higher than those in their various original homes or they would not have moved, but the changes induced in the lives of original residents may well be so great that even if their scores on special indicators increase, one cannot expect that they will necessarily view themselves as better off. In fact, rural residents may well be outraged by DOE's assertion that they will be better off after a major development

completely transforms their lives, whether or not they think so, simply because a sociologist's measure of their standard of living is higher after the change. They may be even more outraged if they suspect that the main reason DOE cares about standards of living is to facilitate recruiting of in-migrants and to stimulate worker productivity.

The plan emphasizes collecting and processing quantitative data, an approach that does not deal well with the qualitative aspects of repository impacts. Quality-of-life issues are not really addressed. No distinction is made between indigenous populations, temporary in-migrants, and permanent in-migrants. People are not just numbers; these three "publics" will have different expectations, desires, and needs. The qualitative aspects must be addressed by the plan.

One of the probable outcomes associated with construction and operation of a repository is local inflation. Inflation illustrates how both positive and negative impacts may occur simultaneously. Higher salaries for repository workers may draw ranch hands away from agricultural operations or cause wages for ranch hands to increase to a point where ranching operations become less economic. Increased demand for local goods and services may result in higher prices. This may not be very important to the repository workers, as they will probably be receiving sufficient wages to keep them working, but the effects on other sectors of the local economy may be less satisfactory. Individuals on fixed incomes are usually cited as the most likely to be adversely affected by local inflation. They may not be sufficiently rewarded for their loss of purchasing power by greater choice in local goods and services. The question must be raised as to who is benefiting from development.

4 CHANGES TO IMPROVE MITIGATION PLANNING

4.1 FEDERAL MECHANISMS

The ONWI Socioeconomic Program Plan states that "there are presently no specific federal mechanisms to deal with the socioeconomic impacts associated with development and operation of a nuclear waste repository." While this may be true, there are several federal mechanisms available for providing such assistance. The dollar value of these programs can be very large, and the programs can form a significant component of the specific mitigation measures appropriate to a repository site. For example, the plan should describe the front-end financing available to affected states and communities for impact assessment. Some funding mechanisms are listed in *Framework for Community Planning Associated with Nuclear Waste Repository Siting*.^{*} Also, NWPA provides for federal funding related to socioeconomic impacts of repository siting, development, and operation, and the plan should be compatible with this legislation.

The plan also states that DOE is constrained in its ability to mitigate impacts, but the constraints are not identified. Impacted parties may feel that because DOE is responsible for the impact, it should be responsible for appropriate mitigation. Clarity as to the limits of DOE's ability to mitigate might avoid such misunderstandings. The plan should draw clear distinctions between what DOE can and cannot do.

It would be effective if DOE and an affected locality reached a firm understanding regarding impact mitigation during the location analysis phase. Failure to do so may lead the state to veto the site. Also, additional research might provide appropriate input with regard to grants in lieu of property taxes, grants to prepare impact assessments, and repository impact assistance. The plan should also provide for financing beyond the period of active repository operation. Impact mitigation should continue into the decommissioning period.

Finally, the plan should clearly describe how and to whom (state or local units of government) federal funds will be transferred. A clear path of accountability is needed to give credibility to proposals for funding related to impact mitigation.

^{*}Office of Nuclear Waste Isolation, *Framework for Community Planning Associated with Nuclear Waste Repository Siting*, Battelle Memorial Institute, Columbus, Ohio, draft report, ONWI-254 (Oct. 1981).

4.2 FORMS OF MITIGATION ASSISTANCE

Panelists expressed concern that monetary methods are relied on to solve problems to the exclusion of other techniques, an approach that appears more expeditious than well reasoned. While incentives and compensation are useful, mitigation can be accomplished through a whole range of techniques, such as carrying out a particular action in a different way or speeding or slowing aspects of the project.

A related change would be to modify the plan so that it does not rely so strongly on "mitigation after the fact." The current plan indicates that the repository site will be selected on the basis of technical criteria and convenience. Money will then be provided to mitigate socioeconomic impacts. Critics of the program may well label these mitigation measures as mere "band-aids for the local community."

The major cause of financial problems for boomtowns is state barriers to rational taxing policies. In many states, local governments are forbidden to issue bonds secured by taxes that will clearly be available in a year or two, such as taxes assessed on new worker housing. If towns and school districts could borrow rationally, they could provide the schools, police stations, fire houses, etc., that new development will require. If the states cannot be persuaded to relax such barriers, the federal government can respond by offering direct loans. Local government officials, of course, will argue for grants; federal taxpayers should be protected against such demands.

The plan states that "criteria are being established for evaluating alternative forms of compensation and siting incentives." Will these criteria be useful? Will DOE refuse to entertain a town's proposal of a mitigation mechanism because that form of mitigation does not meet the criteria created two years earlier? The criteria should be developed by the state and local governmental units involved, because the most important measure of a mitigation mechanism's value is whether the recipients like it. The U.S. Department of Energy should negotiate hard on the amount of mitigation but allow local units considerable leeway on the form.

It might prove helpful for DOE to draft legislation in the area of compensation and incentives. However, if this legislation were to be implemented by state or local governments, DOE would need to be extremely careful to avoid appearing to dictate local behavior. If the legislation were to be implemented at the national level, DOE should develop strong local support prior to initiating Congressional action. While references to legislation in the plan are limited to compensation and incentives, legislation drafted by DOE should include other mitigation methods. New forms of federal and local cooperation could be proposed. For example, methods could be developed to assure local governments of continuing support beyond the current budget cycle.

Impact mitigation problems are substantial and deserve serious consideration in mutually acceptable, well-considered, imaginative, and possibly unique ways. While such an open approach is difficult to program, manage, and budget, it might ultimately be the most cost-effective.

5 CHANGES TO IMPROVE MANAGEMENT PLANNING AND OVERALL QUALITY OF THE PLAN

The plan appears to reflect a policy of meeting legal requirements. A more effective overall policy would be to not only meet legal requirements, but to facilitate the siting and development process by anticipating potential socioeconomic problems and taking steps to avoid them. This policy would help ensure cooperation from various levels of government and from interest groups. In addition, the plan often focuses on issues, rather than on the solutions to problems.

Appendix A of the plan indicates the sequential phases that are to lead to selection of a repository site. The approach, while rational, has more the aspect of a geologic exploration than of a socially sensitive development program.

5.1 DATA COLLECTION AND METHODS DEVELOPMENT

Primary data are not considered until location studies are undertaken (App. A of the plan), which is the next-to-last step before detailed site characterization. To wait until the selection process has narrowed the areas being considered to those of 30 mi² or less before seeking direct information about the social and economic conditions of that area cannot lead to high levels of confidence among parties concerned about such matters.

By their nature, the secondary data being relied on are dated and possibly of questionable value relative to the importance of the issues being explored. Some of the data proposed for use may distort conditions and comparisons; for example, large Mormon families in Utah may bias per capita data and affect comparisons based on data from areas where family sizes are closer to the national average.

The measures presented are static, and projections of future conditions generally are not mentioned. It is presumed in the plan that the SEARS model will be the major means of generating images of the future. While the model may be very good, it may not be wise to rely on it as the sole source for estimates of future conditions.

Data about local (or even regional) attitudes, beliefs, and values are not given. "Social" does not appear as a socioeconomic dimension until the location studies phase, and here the data needs are limited to a "list of community organizations by type and size of membership."

As mentioned in the plan, verification of methods and procedures is a reasonable activity, but even reasonable assurance that a method or procedure meets the evaluation criteria does not mean that it will work when applied to real situations. For example, a population projection routine may be accurate

enough in replicating historic data, say projecting 1980 population within 5% of the 1980 Census data, but that does not mean that a 1990 population projected with the same model will necessarily be within 5% of the actual 1990 population. More importantly, verification of a model or methodology does not always mean that concerned parties will have confidence in the model or its sponsor.

Similarly, what are the standards for impact assessment methods? The plan suggests that an absolute standard must be met. If no method exists to meet it, no assessment will be done. A better rule might be to identify the most suitable assessment methods for each type of impact, recognize that the "best available" methods will still have defects and shortcomings, and use them but with cautions about the remaining uncertainties.

5.2 CONSISTENCY OF DATA AND METHODS

Consistency of socioeconomic characterization across projects may be convenient for making comparisons but is inappropriate if it hinders proper characterization. The variables may not be uniformly important, and efforts to make them so could distort the characterizations. This criticism also applies to the issue of comparability of analyses across sites. In this instance, analyses that might best represent sites or locations may not be exactly alike, as similar data may not be available or might not capture salient features of one or another of the sites. This aspect of the plan portrays DOE as being more interested in serving its own interests than in satisfying the curiosity of the people who can bring the entire repository project to a halt if they do not trust the federal government.

5.3 COORDINATION OF ACTIVITIES

The plan needs to provide for coordination of contractor activities. The role of ONI is not clearly defined. The scopes of activities of contractors who have been preparing ONWI socioeconomic documents are not described in the plan.

In general, the plan would be a more credible planning document if ONWI were to relate statutory requirements, milestones, and contractor work. This aspect of planning is absent from the plan. The responsibilities of each participant, and the interrelationships between them, should be clearly delineated. To this end, Fig. 6 is of little help.

5.4 SCHEDULING

Milestone charts (see Fig. 7) should be updated to reflect NWPA, and their presentation should be clarified. The use of bars to delineate periods of activity is an effective and easy-to-understand device.

The plan might also address the possibility of delays or changes in the milestone schedule. How does backing up and slowing activity affect the management of the plan? Will using socioeconomic data in the site selection process, as dictated by NHPA, affect program management?

5.5 QUALITY ASSURANCE AND REVIEW

The discussion of quality assurance and review is not persuasive. The text states that ONWI will do a good job but falls short of assuring that the problems that arise will be corrected. The program objectives are to address issues, attain interaction, and design ways to mitigate adverse impacts. Nowhere does the plan indicate what assurances might be given that the issues, interactions, and mitigation methods will be implemented; that they will work; or that something will be done if they do not work.

The review process can be criticized for not being clearly delineated and for not ensuring competent, rigorous review. No commitment is made to abide by recommendations made as a result of either quality assurance or review activities.

The plan has received altogether too much internal and not nearly enough external review. There are no provisions for review by, for example, the National Municipal League, National Association of Counties, National Conference of State Legislators, National Governor's Association, etc. Nor is there provision for review by the environmental organizations that are the natural allies of local opposition groups, and, hence, important early contacts.

5.6 GENERAL OBSERVATIONS

The decision-making process and socioeconomic tasks should be clearly and concisely described. Mechanisms for obtaining external input and incorporating it into the plan should be explained.

The "Project Organization" section of the plan should be revised to reflect NHPA and the role of the NHPA project office. Both Fig. 3 (NHTS Elements and Program Management Structure) and Fig. 4 (Planned Activities) are obsolete because of NHPA requirements. Requirements concerning environmental assessments and environmental impact statements should be clear, and those individuals having access to the decision-making process should be identified.

Finally, the content of the report needs to be more tightly organized and stripped of "padding." Sections 1 and 2 should either be condensed greatly or eliminated from future drafts of the plan. This material is so distracting that the focus on socioeconomic is lost. Some of this material might be appropriately relegated to an appendix.

6 PAGE-BY-PAGE COMMENTARY

On pages 1-2 the footnotes or references indicated by superscript numbers in parentheses are never explained in the report.

On pages 10-11 confidence in the Nuclear Waste Terminal Storage program goals, socioeconomic issues, and early participation of state and tribal governments and local people are mentioned, but these items are difficult to track through the balance of the plan.

On page 11 it states that the siting strategy and revised NEPA implementation plan will be available for public comment before being finalized, but the effect the comments may have and the content of either the strategy or the plan are not mentioned.

On page 14 it states that DOE is constrained in its ability to mitigate impacts, but there is no explanation of what those constraints are.

On page 15 there is some question about the meaning of the word "resolution." In particular, it should be clear whether socioeconomic concerns could be important enough to cause abandonment of the "technically best" site for, say, a second-best site where it will be more expensive to provide the same physical protection of the environment and the public, but where the social costs of development will be substantially less.

On page 22 studies, assessments, and methodologies are being developed without clear involvement of the concerned publics.

On page 23 the state as an entity is not the same thing as the people in it, and the people near the site will be quite differently affected than people at some distance from the site. The comment concerning mitigation being in hiatus suggests that study of impacts is proceeding while study of how to mitigate them is not.

On page 25 the socioeconomic problems associated with transportation of nuclear waste are of great importance. Limiting the discussion of such problems to coordinating with the Transportation Technology Center is insufficient. A socioeconomic program plan should discuss socioeconomic issues across all activities related to isolation of nuclear waste and across levels of interest as well.

On page 27 verification of methods and procedures is a reasonable activity, but to be relatively sure that a method or procedure meets the evaluation criteria does not mean that it will work when applied to real situations. More importantly, verification of a model or methodology doesn't necessarily mean that concerned parties will have confidence in the model or its sponsor.

On page 29 community development and planning is purported to incorporate the needs of the residents and the preferences of state and local officials (but not the preferences of residents) and is to be conducted in conjunction with state and local officials and DOE. The resulting community planning document will serve as the primary instrument used by the states and communities to assist in local impact management. This process may include residents and other interested parties, but the plan is not explicit in this regard.

On page 30 proposing mitigation discussions leading to mediation sounds good, but given the existing schedule, such discussions won't begin until the sites have been selected. Mediation is not a cure for a bad situation, but a mechanism to improve the negotiation process. This plan gives little weight to the need for negotiation in resolving socioeconomic impact issues.

In Appendix A of the plan the measures presented are static, with few projections of future conditions. It is presumed that the SEARS model will be the major means of generating images of the future. Data about attitudes, beliefs, and values are not listed. "Social" does not appear as a socioeconomic dimension until the location studies are undertaken, and even then the data needs are limited to a "list of community organizations by type and size of membership."

Some of the proposed measures may not be appropriate for all potential sites. Also, the issue of comparability of analyses across sites must be raised. The analysis that best represents a particular site or location may not be the best choice for a different site or location. For example, similar data may not be available or a particular approach may not capture the salient features of one or another of the sites.

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APPENDIX A

**U.S. DEPARTMENT OF ENERGY CORRESPONDENCE
CONCERNING PEER REVIEW**

**Department of Energy
National Waste Terminal
Storage Program Office
505 King Avenue
Columbus, Ohio 43201**

January 27, 1983

Dr. Wyman Harrison
EES-362
Argonne National Laboratory
Argonne, Illinois 60439

Dear Wyman:

PEER REVIEW OF ONWI SOCIOECONOMIC PROGRAM PLAN

Enclosed is a copy of the subject report which we request be reviewed in accordance with Work Package #ANL 053 00 83. The enclosed memorandum to me from Linda McClain of my staff outlines the items that we wish the reviewers would focus on. Linda has asked that your reviewers familiarize themselves with the socioeconomic provisions of the Nuclear Waste Policy Act of 1982. If you have any questions about this activity please contact me.

Sincerely,

M. B. Blanchard
Director, Site Exploration and
Related Geoscience Research
NWTs Program Office

NPO:MBB:ksw

Enclosures: 1) Memorandum, McClain to Blanchard, dated 1/21/83
2) Letter, Goldsmith to Neff, dated 11/3/82
3) ONWI Socioeconomic Program Plan

cc: L. McClain, NPO - with enclosures
M. Blanchard, NPO - with enclosures
R. Wunderlich, NPO - with enclosures

GS# 235-83

**Department of Energy
National Waste Terminal
Storage Program Office
505 King Avenue
Columbus, Ohio 43201**

January 21, 1983

M. B. Blanchard, Director, Site Exploration Office, DOE-NWTS Program Office

REVIEW OF ONWI SOCIOECONOMIC PROGRAM PLAN (ONWI-276)

I have reviewed the subject plan, and suggest the following points be used to guide the peer review of this plan:

- Is plan appropriate for program needs?
- Are there key activities that have been overlooked?
- Is the timing of milestones and nature of deliverables appropriate?
- Which milestones have high priorities, which could be eliminated/deferred:
 - 1) now
 - 2) if budget restrictions are imposed

The plan is in need of updating to include activities associated with the exploratory shaft and salt site selections. In addition it needs to be compatible with requirements specified in the Nuclear Waste Policy Act of 1982. For example, Section 116(2)(A)&(B) enables States to receive Grant monies for impact mitigation, and preparation of a report of any likely economic, social, public health and safety, and environmental impacts, to be submitted to Congress after completion of site characterization activities. What, if any thing, should we provide to the State to assist them in this activity? Under the Act we are also required to provide States timely and complete information regarding determinations and plans. What socioeconomic material should this include that is not presently in the Plan? The ANL reviewers could provide suggestions along these lines that might be helpful to ONWI and NPO in updating the Plan.

Linda K. McClain
Project Manager
Site Exploration Office
NWTS Program Office

NPO:LKM:ksw

GS# 227-83

**Department of Energy
National Waste Terminal
Storage Program Office
505 King Avenue
Columbus, Ohio 43201**

April 20, 1983

Wyman Harrison
EES - 362
Argonne National Laboratory
Argonne, Illinois 60439

Dear Dr. Harrison:

SOCIOECONOMIC ASPECTS OF NWPA

The attached information may be helpful to the team reviewing the ONWI Socioeconomic program plan. Their comments regarding this analysis of the NWPA would also be helpful to us.

Sincerely,

M. B. Blanchard
Director, Site Exploration and
Related Geoscience Research
NWTs Program Office

NPO:LKM:ksw

Enclosure: Letter, Goldsmith to Neff, dated 2/10/83

GS# 439-83

BATTELLE Project Management Division
505 King Avenue
Columbus, Ohio 43201

February 10, 1983

J. O. Neff, Program Manager, NPO

SOCIOECONOMIC ASPECTS OF NUCLEAR WASTE POLICY ACT

The following information was prepared to provide an analysis and initial recommendations on the socioeconomic aspects of the Nuclear Waste Policy Act of 1982. This analysis has been prepared with the review of ONWI legal staff.

Many of the considerations raised in this report will require further research, and future ONWI methodology development with DOE input. This future work is part of the community development program that was initiated with the Framework for Community Planning (ONWI-254).

Stanley Goldsmith
Manager

SG:SIG/jp

In triplicate

Attachment

WBS# 1.3.3.2.3

NUCLEAR WASTE POLICY ACT OF 1981--
SOCIOECONOMIC IMPACT ASSISTANCE

INTRODUCTION

The recently enacted Nuclear Waste Policy Act of 1982 established a mechanism to provide financial assistance to various potentially affected States and Indian tribes.* This analysis will address the implications of the Act on the socioeconomic program, particularly impact assistance, in establishing the first salt nuclear waste repository site.

The Act provides a program for state and local impact assistance with 3 major program elements

1. Grants in Lieu of Property Taxes
2. Grants to Prepare Impact Assistance Request
3. Funds for Repository Impact Assistance.

All funds to be expended under the Act are to come from the Nuclear Waste Fund. The following analysis will describe the three program elements and present policy approaches for DOE consideration and additional socioeconomic program needs not specified in the legislation. A schedule following the Act provisions is also provided.

1. Grants in Lieu of Property Taxes

Act Reference: Section 116(c)(3)

Summary: The DOE shall make yearly grants to the appropriate taxing jurisdiction equal to the tax on the real property and other industrial activities during (1) site characterization activities, (2) construction of a repository, (3) operation of a repository. These payments would continue until activities at the site are terminated.

*Subsequent references to state involvement includes similar involvement of affected Indian tribes.

Analysis

The Nuclear Waste Policy Act stipulates that the payments will be based on the assessed valuation applied to similar industrial property in that jurisdiction. It appears that this amount could be substantially greater than the previous Atomic Energy Act requirements. The type of real property interest (e.g. fee simple or lease) by DOE may affect the level of grants required; further analysis of this is necessary. The legislative authority to make payments in lieu of property taxes was established under the Atomic Energy Act of 1954 (42 USC 2208). This statute allows the Department of Energy to make such payments to a county, township, school district, or village if the land obtained for DOE activities is within the taxing jurisdiction. The statute requires the Department of Energy to compute its payment in lieu of taxes by applying the current tax rate to the assessed valuation of the property at the time and in the condition it was acquired by the government, unlike the provisions in the Nuclear Waste Policy Act.

Funds are paid only to the jurisdiction in which the site is located. Payments are not authorized to nearby counties or towns that may have impacts associated with site activities. Funds received from the DOE are not earmarked for specific community projects; local officials are allowed to spend the funds as they see fit or as required by state law.

DOE Considerations

1. If possible, an appropriate assessed valuation that reflects the activities at the site should be negotiated. The value of the property could vary each year depending on the site development. A jurisdiction may not have the legal authority to re-appraise the taxable value of DOE property on an annual basis without also undertaking the costly reappraisal of all property. It would therefore be advantageous to negotiate a tax payment agreement based on the anticipated site development schedule. This could be renegotiated at the end of each site phase - site characterization, repository construction, and operation.

2. These grants should be taken into consideration when evaluating additional assistance needs. The local jurisdiction may not agree with this approach, arguing that tax payments are not impact payments. However, the tax grants do affect, favorably, the fiscal ability of the jurisdiction to handle potential impacts; there are precedents for this approach in other tax grant arrangement, i.e., Oak Ridge, Tennessee and Richland, Washington.
3. It would be appropriate for DOE to encourage an agreement between the state and local officials to earmark these payments for specific impact-related projects. Distribution should not be left entirely to the discretion of local officials. This approach would reduce the impact payments required under repository assistance.
4. The termination of property tax grants within one year of termination of activities at the site appears to reinforce the intent of the legislation that these grants should not be viewed strictly as a tax payment. It is being paid because of activities at the site, and is related to the impact of those activities.

2. Grants to Prepare Impact Assistance Request

Act Reference: Section 116(c)(1)B

Summary: The DOE shall make grants to states containing sites nominated by the Secretary in the Fall, 1983. These grants will be provided to the states to (1) review activities and determine economic, social, public health and safety, or environmental impacts; (2) develop impact assistance request; (3) monitor, test, or evaluate site characterization activities; (4) inform residents of activities; (5) request information and make comments to the Secretary.

Analysis

This provision requires that DOE provide grant monies to states containing candidate sites so that they can determine potential social and economic impacts of a repository. The legislation requires the state to submit their analysis to the Secretary of Energy when site characterization activities are completed. It is to be done before the site is recommended to the President for a repository. The analysis will then serve as a basis for the state's impact assistance request.

DOE Considerations

1. Guidelines are not given in the Act on the level of detail or categories to be included in the state's impact analysis. Such guidelines should be established between DOE and the state, so that the impact analysis being prepared by both entities can be compared and evaluated. This should be accomplished in written agreements made according to Section 117(c).

2. The amount of grant money to be made available for this analysis should be based on (a) the level of funds expended by DOE in analyzing socioeconomic impacts at that site, (b) the state's use of extensive socioeconomic data already collected by DOE at the site.
3. A presentation on the DOE's approach and technical analysis of socioeconomic impacts should be made to the state technical staff to assist in establishing the grant amount (No. 2) and in reaching a better understanding of potential impacts before the impact funding stage.

3. Impact Assistance for Repository Impacts

Act Reference: Section 116(c)(2)(A & B)

Summary: DOE shall provide technical and financial assistance to the state for repository impacts following construction authorization. DOE must seek to enter into a binding agreement with the state on the amount of the assistance and procedure to be followed in providing such assistance.

Analysis

Under this provision, the state selected for a repository can seek financial and technical impact assistance from DOE. In order to receive these payments the state must submit an evaluation of social, economic, public health, safety and environmental impacts to the Secretary of Energy. Once an NRC construction authorization is issued (1990) the DOE must negotiate a binding agreement with the state which establishes the amount of assistance to be provided. This assistance would begin within 6 months following the NRC construction authorization and following the initiation of construction activities at the site.

DOE Considerations

1. A process and specific procedures to negotiate an impact funding agreement need to be established. Current methods used to reach impact agreements for private and public projects would be helpful. The use of an impact management committee and a defined mediation process is recommended.
2. Funds should be earmarked for specific impact needs or specified localities on an agreed timetable. This will help assure that impact needs are met and that repository operation and construction progress will not be affected.

3. A yearly payment schedule should be agreed upon for repository construction and repository operation (as long as impacts are identified).
4. A monitoring program will be needed (involving DOE, the state, localities) to evaluate mitigation results and to overview the administration of funds. Scheduling of payments and validation of need should also be reviewed.
5. There is no provision for pre-construction planning funds--capital budgeting, community planning, facility design work--as provided in the Trident Submarine Impact legislation.
6. The problem of up-front financing has not been resolved. Impact funds are made available when construction begins. In order to mitigate community impacts, necessary facilities need to be constructed 1-2 years before the repository construction begins. Specific site needs will have to be analyzed before recommendations are developed.
7. Impact assistance is to be terminated at the end of the operation phase. Therefore no impact assistance is available during decommissioning when workers will be leaving the community for other jobs. It may not be possible for the community to pay operation and maintenance costs for facilities built for a population that has declined. It would be advisable to plan for this need during the operation phase.

TEF Impact Assistance

No socioeconomic impact assistance is designated for the TEF. The level of impacts will be dependent on the number of workers brought in to work at the facility.

June 27, 1983

Dear Mr. Winter:

SOCIOECONOMIC PROGRAM PLAN PEER REVIEW

Sincerely,

Thomas A. Baillienf

Thomas A. Baillieu
Acting Director,
Site Exploration Office
NWTS Program Office

NPO:LKM:ksw

Enclosure: Work packages

CC: ~~Mr. Garrison~~ Garrison, AIL - with encl. GS# 590-83

BATTELLE Project Management Division
3601 King Avenue
Columbus, Ohio 43201

May 26, 1983

M. B. Blanchard, Director, Site Characterization
and Geoscience Research Division, NPO

**MILESTONE UPDATE OF THE SOCIOECONOMIC PROGRAM PLAN
AND OTHER REVISION PLANS**

In a meeting held on May 13 with L. McClain and L. Casey of your staff and S. Gray, ONWI, it was determined that the socioeconomic work packages will be used for program review, instead of a separate milestone listing previously contained in the socioeconomic program plan. Table 2 - Socioeconomic Task Milestones - will be deleted from the Program Plan. The current socioeconomic work packages are attached.

In addition, the socioeconomic program plan will be updated and revised during FY 83. Argonne National Laboratory review comments will be used in preparing the revision. A draft revised plan is scheduled for 7/30/83; the final is planned for 9/30/83. S. Gray will be working with your staff and Argonne reviewers on the revised plan.

A handwritten signature in dark ink, appearing to read "Stanley Goldsmith", is written over a horizontal line. The signature is fluid and cursive.

Stanley Goldsmith
Manager

SG/SIG:bs

Attachment

In triplicate

WBS# 3.2.3

SOCIOECONOMIC EVALUATION AND MITIGATION

FIGURE 2. GANTT CHART OF THE SOCIOECONOMIC EVALUATION AND MITIGATION ELEMENTS OF THE ACT

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APPENDIX B

CONCURRENCE SHEET

APPENDIX B

CONCURRENCE SHEET

I concur that the Argonne National Laboratory report on ONWI's Socioeconomic Program Plan fairly represents my comments, where incorporated, to the peer review panel.

David F. Fenster

Wyman Harrison

Michael O'Hare

Richard C. Winter

Donald N. Zillman

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APPENDIX C

CREDENTIALS OF PEER REVIEW PANEL MEMBERS

David F. Fenster

City College of the City University of New York: B.A., History (1967)

University of Illinois: M.A., History (1968)

Queens College of the City University of New York: M.S., Geology (1975)

Certified Professional Geologist (No. 4668), American Institute of

Professional Geologists

Certified Professional Geologist (No. 85), State of Indiana

Mr. Fenster joined the staff of the Geoscience and Engineering Group of the Energy and Environmental Systems Division of Argonne National Laboratory in 1982. He is currently Technical Project Manager and member of the multidisciplinary core peer review panel of the technical data base for the salt host-rock portion of the National Waste Terminal Storage program. He also served as a technical reviewer for parts of Argonne's Lake Superior regional report related to siting high-level radioactive waste repositories in crystalline rocks.

Prior to coming to Argonne, Mr. Fenster was a Project Geologist with Dames & Moore, Park Ridge, Ill. He had been with Dames & Moore since joining the staff of the Cranford, N.J., office in 1974. During his tenure with Dames & Moore, Mr. Fenster acquired extensive experience in seismotectonics, structural geology, radioactive and hazardous waste disposal, regional geology, engineering geology, hydrogeology, and general geologic field mapping. For example, Mr. Fenster was Principal Investigator for Stratigraphy for the Generic Environmental Impact Statement concerning disposal of radioactive waste in bedded salt, granitic rocks, and argillaceous formations for Oak Ridge National Laboratory. He also worked on a revised draft (unpublished) of a national-screening-level, site selection investigation for high-level radioactive waste isolation in crystalline rocks.

Mr. Fenster also worked on geologic investigations related to nuclear power plant siting and licensing. He is familiar with U.S. Nuclear Regulatory Commission review and licensing procedures, having worked on early site reviews, preliminary safety analysis reports, final safety analysis reports, and detailed fault investigations.

Mr. Fenster has published on high-level radioactive waste repository siting, midcontinent tectonics, and structural geology in the Northeast, and has worked on over 30 consulting reports. He is a member of five professional societies, including the Association of Engineering Geologists.

Wyman Harrison

University of Chicago: S.B., Geology (1953), after three years of undergraduate work at Stanford University

University of Chicago: S.M., Geology (1954)

University of Chicago: Ph.D., Geology (1956)

Registered Geologist (No. 2476), State of California

Certified Professional Geologist (No. 134), American Institute of Professional Geologists

Dr. Harrison is Associate Director for Geoscience and Engineering at Argonne National Laboratory's Energy and Environmental Systems Division. He directs a 25-person group that performs analytical and experimental studies related to management of energy and mineral resources and to development and deployment of related technologies. Major activities of the group include (1) acquisition of geophysical and geotechnical data bases, (2) analysis of the data of geoscience to support the design and deployment of energy technologies, and (3) development of physical and mathematical models of geophysical/geotechnical systems.

Dr. Harrison's group recently completed comprehensive surveys of the geoscience data on crystalline rock complexes in the northeastern and Lake Superior regions of the United States to help assess their potential as possible sites for repositories for high-level radioactive waste. Dr. Harrison has conducted numerous other geological and geotechnical studies at Argonne, ranging from estimating petroleum resources of the Soviet Union to determining near-shore circulation in Lake Michigan.

From 1971 to 1975, Dr. Harrison was Professor of Geography (Associate Department Chairman) at the University of Toronto, where he specialized in geophysical studies related to the siting of supertanker ports and slope stability in sedimentary terrains. Prior to that, he was Associate Director for Physical, Chemical, and Geological Oceanography at the Virginia Institute of Marine Science and a Professor of Marine Science at the University of Virginia. Dr. Harrison was Director of Environmental/Science Services Administration's (now National Oceanic and Atmospheric Administration's) Land and Sea Interaction Laboratory from 1964 to 1968. Before that he was on the faculty of Dartmouth College's Department of Geology and a geologist with the Indiana Geological Survey.

An author of over 100 papers, reports, reviews, and books, Dr. Harrison was made Senior Scientist at Argonne in 1976.

Michael O'Hare

Harvard College: A.B., Architectural Science (1964)

Harvard College: S.B., Structural Engineering (1968)

Harvard University: M. Arch., Architecture (1968)

Harvard University: Ph.D., Division of Engineering and Applied Physics (1973)

Michael O'Hare has been a lecturer in public policy at the Kennedy School of Government, Harvard University, since 1981. During 1981 he served as Assistant Secretary of Environmental Affairs for Policy, Commonwealth of Massachusetts. From 1979 to 1981 he served as Director of Policy and Management Analysis, Executive Office of Environmental Affairs, Commonwealth of Massachusetts. Professor O'Hare taught in the Department of Urban Studies and Planning, Massachusetts Institute of Technology, from 1971 to 1979, being promoted to Associate Professor in 1976. Prior employment experience includes Junior Fellow at Harvard University (1968-1971); staff member at Arthur D. Little Co. (1967-1968), and designer with Skidmore, Owings and Merrill, Inc. (1967).

Professor O'Hare's professional interests include environmental and public policy, environmental analysis and design, cultural policy and planning, institutional planning and management, and planning and design. Several recent research projects include civil service and personnel reform in state government, state land use and acquisition policy, social and economic consequences of western energy development and facilities siting, and hazardous waste and municipal solid waste management and policy.

Professor O'Hare has more than 28 professional publications. He is a coauthor of a recent book (1983) entitled *Facility Siting and Public Opposition*. Other titles that are specifically relevant to this project include: *The Country Mouse and the City Mouse*; *Improve the Use of Information in Environmental Decision Making*; *Information Management and Public Choice*; *Compensation for Development Impacts*; *Managing Social and Economic Impacts of Energy Developments*; *Fair Compensation and the Boomtown Problem*; *Not on My Block, You Don't -- Facilities Siting and the Strategic Importance of Compensation*; and *Predicting the Local Impacts of Energy Development -- A Critical Guide for Forecasting Methods and Models*.

Mary W. Tissue

Beloit College: B.S., Geology (1961)

Yale University: M.S., Geology (1963)

Ms. Tissue has been employed since 1979 as a technical editor for the Energy and Environmental Systems Division of Argonne National Laboratory. From 1981 through 1983, she was part of a research team that gathered geologic information on the crystalline rocks of the northeastern and north-central United States, with a view to assessing their suitability as sites for repositories for high-level radioactive waste. Other projects have involved the editing of reports, journal articles, conference papers, and proposals on such topics as transportation, decision analysis, particulate control, industrial process energy conservation, economics of gasohol, chemistry of synthetic fuel process waters, environmental studies of ocean thermal electric conversion, recycling, petroleum geology and resource assessment, and socioeconomic impact of energy development.

Prior to accepting a position at Argonne, Ms. Tissue worked as a technical writer and marketing assistant for an instrument company and as an editor for the Metals Research Laboratory of what was then the Olin-Mathieson Chemical Corporation.

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Richard C. Winter

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Mr. Winter joined the staff of the Energy and Environmental Systems Division of Argonne National Laboratory in 1980, where he is currently Assistant Section Manager for the Economics and Social Science Section and Socioeconomic Program Manager. He is also project manager and principal investigator for (1) the Tennessee-Tombigbee Corridor Study, the socioeconomic modeling portion of the Hydrocarbon Resources Development Environmental Impact Statement of the U.S. Army Corps of Engineers in Mobile, Alabama; and (2) the policy analysis portion of the Minority Energy Research Data and Policy Analysis Program for the U.S. Department of Energy. He is serving in a similar capacity for the socioeconomic analysis concerning potential tar sands development for the Utah State Office of the Bureau of Land Management. Mr. Winter also served as principal investigator and project manager for a study of the difference in potential impact in a rural area from operation of a coal gasification plant or a coal-fired electric power plant of comparable size.

From 1977 to 1980, Mr. Winter was a student, instructor, and research associate at the University of Michigan, where he participated in a technology assessment of coal-based energy technologies, assisted in the development and socioeconomic analysis of long-term coal-use scenarios, led a study of the potential impacts of increasing levels of atmospheric carbon dioxide, and facilitated public participation forums concerning coal use. He also taught graduate and undergraduate planning courses.

Prior to 1977, he was the planning director for a multicounty, multi-community planning agency he founded in northeastern Wyoming, an economist and planner for the Bureau of Land Management, and supervisor of the community planning portion of the Wyoming State Planning Office. From 1966 to 1970, Mr. Winter was a county-level land use planner in California.

Mr. Winter has published on socioeconomic impact assessment models, potential socioeconomic effects of atmospheric carbon dioxide, and the U.S. Army Corps of Engineers' efforts to help communities deal with change.

Donald N. Zillman

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Donald Zillman has been Professor of Law and Director of the Energy Law Center at the University of Utah since 1979. From 1977 to 1979, he was Professor of Law at Arizona State University. During the past six years, he has also been Special Assistant Attorney General for the State of Arizona (1978) and Visiting Professor of Law, School of Law, University of Southampton, United Kingdom (1979). He served as Associate Professor of Law, Arizona State University (1974-1977) and was a Visiting Associate Professor, University of Utah Law School (1976). Other experience includes U.S. Army, Judge Advocate General's Corps (1970-1974); Staff Attorney, Defenders, Inc. (1970); and Law Clerk to Honorable James M. Carter, U.S. Court of Appeals for the North Circuit (1969-1970).

Professor Zillman's professional interests include energy and military law, solar legal and institutional issues, and legal issues surrounding nuclear energy center development. He has coauthored four books, 20 journal articles, and three staff studies. Relevant titles include: *Energy Law; Legal Aspects of Solar Energy Development; Energy Law -- Defining a Discipline; Geothermal Energy and National Energy Policy; and Study of Legal Issues Involved in Nine-Unit Nuclear Energy Center Near Green River, Utah.*