REMEDYING FUNDAMENTAL FLAWS IN THE NATION'S CIVILIAN RADIOACTIVE WASTE MANAGEMENT PROGRAM[1]

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Prepared for the
Secretary of Energy Advisory Board
Task Force on Civilian Radioactive Waste Management

Las Vegas, Nevada

May 1992

[1] This paper has been prepared at the invitation of Dr. Dan Metlay, USDOE. The contents of the paper were prepared as a professional courtesy, without funding, review, or approval of Clark County, Nevada, and represent only the personal opinion of the author.

1.0 INTRODUCTION

As the Task Force "Terms of Reference" notes in its opening sentence, "*The Department of Energy recognizes that the resolution of outstanding institutional issues, such as access to sites, social and economic impacts, and organizational design, its a critical to the ultimate success of the civilian radioactive waste management program as the resolution of outstanding technical issues.*" The mandate of the Task Force is to help USDOE resolve the outstanding social impediments to public acceptance of the proposed high-level nuclear waste repository. The cornerstone of this effort is an appraisal of the role of public trust and confidence in resolving these problems, how such trust can be created, sustained, or resuscitated in sufficient measure to achieve public acceptance.

There are essentially two sets of impediments to the successful siting of the nation's first high level nuclear waste repository, proposed for Yucca Mountain, Nevada: (1) addressing existing regulatory requirements (i.e., "technical" risks); and (2) public perception and political opposition (i.e., "social" factors). The U.S. Department of Energy (USDOE) argues that the technical risks posed by a 10-year exploratory drilling operation in the desert 90 miles from Las Vegas will be minimal. At the risk of grossly oversimplifying the technical impediments, the areas of critical concern at this time are: (1) groundwater travel time; (2) groundwater reactions to tectonic events; (3) the likelihood of tectonic events; (4) the likelihood of volcanic disturbance; and (5) Carbon-14 travel paths and times. It is widely argued that under existing regulatory requirements, the proposed repository could not be successfully sited in the U.S. I have not, in this paper, directly addressed these technical issues except to indicate that only by extending the function and operational duration of the site characterization process can the participating regulatory agencies and public be expected to resolve these issues in a publicly acceptable manner. The recommended programmatic changes, however, will have the "technical" advantage of allowing for considerable pre-emplacement heat dissipation, reduced volume requirements, and fewer engineered barriers, substantially enhancing the technical performance of the repository itself.

This paper focuses on what can be done to resolve the growing disparity between public expectations and federal actions with respect to the civilian radioactive waste management program, rather than on the so-called "technical" issues (in spite of fact that I see even these issues as fundamentally sociological). Specifically, this paper outlines actions that could be taken by Congress and USDOE to significantly enhance public trust and confidence in, and public acceptance of, the Office of Civilian Radioactive Waste Management (OCRWM) program objectives.

The members of this Task Force understand the difficulties involved in effecting change in a major federal bureaucracy. Early in the process of developing and evaluating alternative

recommendations for enhancing public trust and confidence, the committee encountered many of these impediments to change. It was soon evident that virtually any recommendation likely to result in meaningful change would necessarily entail corresponding changes in the institutional relationships, legally mandated requirements, regulatory processes, financial constraints, and/or the normative rules which sustain the operations of USDOE. It would not have been in the interests of the Secretary of Energy nor the Advisory Board for the Task Force to have become mired in attempts to overcome or restructure this bureaucracy. The Task Force, I believe correctly, has sought instead to develop recommendations which would achieve the Department's objectives of enhancing public trust and confidence in its civilian high-level nuclear waste program within the context of known structural and bureaucratic impediments.

In order for the Task Force's recommendations to be adopted, however, they must be straightforward and consistent as well as operationally, technically, economically, and politically feasible. In order for the Task Force to effectively support its recommendations it must have a complete vision of the future situation in which all of the recommendations have been successfully implemented. I have attempted, in this paper, to envision such a state and to make all of the recommendations consistent with that final outcome. While perhaps obvious, I should also note that the component recommendations are often inextricably linked to other components and, barring uniform implementation, could be expected to fail if required collateral changes were not implemented simultaneously.

The success or failure of the OCRWM high-level nuclear waste repository program in engendering sufficient public trust to sustain its programs will be determined on the basis of three issues: (1) empowerment; (2) mitigation; and (3) program design. Each of these is treated independently below (in Section 5.0), in spite of the fact that changes in all three must be achieved simultaneously and interactively.

First, however, some contextualizing information is presented on the target of these recommendations (Section 2.0), critical constraints on unilateral secretarial initiative (Section 3.0), and the historical and structural context of this task force (Section 4.0). The critical question to be asked with respect to the recommendations, however, is how the various key participants are likely to respond to the recommendations. Section 6.0 provides a synopsis of my assessment of the likely response of each of the participants. This is followed by notes on three related issues of relevance to the Task Force mission (Section 7.0). An abbreviated summary of the recommendations is presented in Section 8.0.

2.0 TARGET OF THE RECOMMENDATIONS

The Secretary has asked for bold and innovative solutions to the "problem" of trust and confidence in the civilian nuclear waste program (and associated defense and cleanup programs). It is important to recognize from the outset, however, that Secretary of Energy Watkins, the target or intended recipient of these recommendations, is structurally little more than the Administration's agent in implementing the will of Congress. He cannot, independently, change the law itself, nor any of the major regulatory constraints imposed on his program. His role is limited both temporally and politically. He can, however, exert considerable influence on Congress and could, single-handedly and by sheer force of will and character, dramatically alter the future of the program. If he feels sufficiently confident in the wisdom and accuracy of the Task Force's recommendations, he could present and defend before Congress a plan capable of surmounting critical impediments to successful resolution of the civilian nuclear waste problem.

3.0 CRITICAL CONSTRAINTS ON UNILATERAL SECRETARIAL INITIATIVE

It is Congress, and not the Secretary of Energy, that must ultimately decide what is to be done to remedy the fundamental flaws in the civilian nuclear waste repository program. In keeping with this reality, I have provided some suggestions for the other major program participants, how the proposed recommendations might be perceived. I would encourage the Task Force to frame their recommendations to the Secretary with the understanding that to be effective they must ultimately pass the test of Congressional approval.

4.0 HISTORICAL AND STRUCTURAL CONTEXT OF THE TASK FORCE AND ITS RECOMMENDATIONS

In this section information is presented as context for the recommendations which follow. It presents a minimum of information on the background of the trust issue for the formulation of the recommendations themselves.

This Task Force was formed and tasked to address what is evolving to be the critical issue not only for the civilian high-level nuclear waste repository, but also for the broader USDOE program and the U.S. nuclear industry as a whole. We are at an important nexus where the future role of nuclear energy itself is seen to hang in the balance. Simultaneously, we are at a crucial juncture in the evolving public policy assessment and implementation process, with all levels of government from local to national intimately involved in this issue. California and several other states will not allow construction of any new reactors until the high-level radioactive waste disposal problem is resolved. An

injunction has been imposed on WIPP. Idaho opposes future shipments to INEL. Rocky Flats, Hanford, Savannah River, and others, pose almost insurmountable technical and financial cleanup requirements, even if one assumes a booming economy in the future. Local governments near the proposed repository are asking hard questions regarding impacts to their present and future constituents. The apparent solution of the low-level radioactive waste problem is now on the brink of collapse, potentially triggering an increased concern with the high-level waste issue.

We must see that actual solutions to the nuclear waste problem are in their infancy. One hundred years ago, the problems we confront today simply could not have been envisioned. Indeed, the idea that large-scale impacts to the environment could result from ongoing human activity was not widely accepted as little as 30 years ago. However, it is not only erroneous but self-deceptive to assume that the experts involved in the decisions which have led to the current crises were any different than those of us participating in the current effort. If we have any advantage over our predecessors it is that we are painfully aware of the fact that the technological and sociological truths of 1980 and 1990 will be seen as primitive in future years. It is within this historical framework that this Task Force must consider recommendations intended to guide the Secretary of Energy's decisions affecting, by law, a time span covering the next 500 human generations. It is only reasonable that this task be approached with more than a little humility, if not reverence.

To step back for a moment, what have we learned from our predecessor experts? We have, if nothing else, learned that there are no "quick fixes." We have learned that we neither possess nor are likely in the foreseeable future to possess, the kind of scientific, technical, and sociological information to make irrevocable 10,000 or 100,000-year decisions.

The Secretary has asked, in a very genuine and candid manner, for bold and innovative solutions. This Task Force is in a position to provide the Secretary with the boldest of solutions -- to look into the future, to imagine how, where, and under what conditions the nation's nuclear wastes must be stored and then to characterize what steps will need to be taken at this point in the process to most efficiently achieve that objective. The first, and most important step is to recognize the solution as a *process*. While the goal of industry and the nation is to secure an all-inclusive "permanent" solution to a wide array of radionuclide problems, digging a very deep hole, packing in 70,000 tons of nuclear wastes and simply forgetting about it is precisely the approach and the attitude that created the cleanup problems we face today, as well as the crises in public trust and confidence in USDOE and government in general.

This presentation is not an acknowledgement that the repository will be constructed in southern Nevada. Many issues remain to be decided. USDOE has only just begun to characterize the site in earnest. In the process, Congress has once again proven that it is

the ultimate arbiter of the national interest and is capable of imposing its will on any particular state or issue. Ultimately, if the 49 other states decide, through Congress, that Nevada, as the proposed repository site, is to bear the long-term risks of the nation's nuclear power production, Nevada is very likely to end up bearing those risks. I believe it is only prudent to consider the implications of a continued process of siting a repository in southern Nevada.

Finally, I would note that an enduring solution to the "problem" of trust and confidence in the USDOE OCRWM program is not to be found in recommendations which address the "trustworthiness," "integrity," or "honesty," of present or future office holders or leaders, although these are all characteristics of positive public perceptions. The underlying "problem" can only be minimized (it cannot really be "solved") by a series of major shifts in the objectives of the OCRWM program. Any and all of the more focussed recommendations dealing with so-called "character" issues are particularistic, and certainly of only temporary efficacy.

5.0 RECOMMENDATIONS

Proposed recommendations fall into three major categories: empowerment, mitigation, and program design. These are discussed in turn in the following sections.

5.1 Empowerment

As discussed in prior meetings of the Task Force, a fundamental obstacle to the establishment of trust and confidence in the Department (or Congress for that matter) is the almost absolute disenfranchisement of the parties at risk. Unless and until this problem is remedied, USDOE will appear to be pursuing a policy of "might makes right" and fomenting the enduring hostility and opposition of the affected populations and state, local, and tribal governments. Inevitably, if the project is to ever succeed, the affected governments must be afforded sufficient political empowerment to effectively represent present and future affected populations -- i.e., to meet their own long-term fiduciary obligations. The critical objective is more long-term and involves a gradual or incremental increase in their oversight authority, participation in a broader array of decision-making contexts, at earlier points in the decision-making process, and at the highest decision-making levels. They must, above all, be assured that their participation is guaranteed and not subject to the annual Congressional appropriations process. The State of Washington's Tri-Party Agreement might serve as a model of an initial step in the process. If one were to adopt a sufficiently long-term perspective, the ultimate objective would necessarily be how best to insure eventual direct local authority over the site since, inevitably, it will be local

populations that bear all of the longer-term impacts and local authorities who will have to address them. Regardless of the issue under consideration, all roads lead to increased empowerment of affected parties.

5.2 Mitigation

The nuclear utilities, Congress, and USDOE must, as my son would say, "get real" on the issue of mitigation. Mitigation figures discussed to date are not of sufficient magnitude to be realistic. No one can seriously believe that a $50-100 million annual payment for storing all of the nation's commercial high-level nuclear waste reflects the actual benefit derived by the nation's utilities and remaining 49 states. To provide a sense of scale, a local businessman, Steve Wyne the owner of the Mirage Hotel in Las Vegas, is reputed to have earned $50 million in one month!

The utilities, I believe, stand ready to support a much higher "payment" provision. The fundamental problem, however, is that Congress, the wider American public and, to a large extent, the resident population of the State of Nevada (the current focus of USDOE siting efforts) tend to see such a payment as a "bribe." The payment will continue to be viewed as a "bribe" or unearned "pay-off" as long as the relationship between the sociotechnical, sociopolitical, and socioeconomic risks and the amount of the payment are seen to be out of balance. As it is now, the potentially affected populations of Nevada are being asked to accept all the risks of the nation's nuclear energy option, for the next 10,000 to 100,000 years, in exchange for mitigation funding at a level that is seen as a slap in the face.

In order to ensure the acceptability, over the long run, of such payments, everyone must see them as commensurate to the risks, and earmarked for those who will actually bear the risks. It is also fundamentally important to realize that risks will differ significantly from one phase of the project to the next. Obviously, from a public trust perspective, the adequacy of funding must be perceived as sufficient to ameliorate the standard and special effects of the repository program and to guarantee the affected state, local governments, and residents of the sincerity and commitment of the federal government (or utilities) to adequately protect the interests and future populations of the host site.

The solution to these issues, and any recommendation to the Secretary, should incorporate provisions for the creation, at both a State and local government level, of some form of a trust fund designed to ensure the long-term protection of the future residents of the affected state for the risks borne. We are not totally devoid of examples of such long-term mitigation strategies that have successfully encompassed this kind of uncertainty and time dimension. The nation's transportation trust funds and the nuclear waste fund itself provide examples of such provisions on the federal level, while the State of Alaska Permanent Fund

provides a useful example of how such a fund might operate on a state level. This is the kind of long-term security and independence that will be required for any state to feel confident that it had taken the moral and ethical precautions necessary to ensure the protection of its future residents.

5.3 Program Design Modifications

Perhaps the most significant technical flaw in the program, as recognized by both Congress and the USDOE, is the function of the Monitored Retrievable Storage (MRS) facility in relation to the proposed permanent repository. The problem is one of geographic location, financial feasibility, and programmatic linkage to the repository. The nuclear utilities vigorously sought, particularly during the NWPA amendments effort, to ensure the existence of a "fall-back" position in the event of some technical or political hang-up in the repository siting process. The objective of the nuclear utilities, as always, was to get the nuclear waste off their property as soon as practicable. The logic of an MRS was and is particularly attractive in the sense that such a facility might be capable of accepting wastes by the late 1990s, much earlier than the proposed repository.

As of this date, there are over twenty governmental entities (Native American tribal governments, counties, etc.) evaluating whether or not to vie for the proposed MRS site. Many $100,000 Phase I unconditional grants have been awarded to these governments in support of subsequent Phase II applications which can reach upwards of $3,000,000 each.[2]

Once again, the pressures of the moment seem to be overpowering logic. USDOE is attempting to meet its Congressional mandates as efficiently and effectively as it can under rather complex conditions and under massive political pressure to perform. When directed to shift its emphasis to siting the MRS, it shifts its emphasis regardless of the long-term consequences of the decision. The MRS cannot, or at least should not, be treated as a distinct or dissociated temporary solution to the overarching high level nuclear waste problem. While there is a possibility such a facility may one day become operational, its opening will in no way mark the end of the problem, but the beginning of new problems. To be sure, if an MRS is opened, it is likely to continue to hold the wastes for perhaps a decade longer than originally envisioned and, as a result, the process of characterizing and constructing a permanent repository will have gone vastly over budget and behind schedule.

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[2] One shudders at the idea of all 20-plus applicants seeking $3 million Phase II grants. Has the agency or nuclear waste negotiator considered the implications? How would the agency deal with equally attractive but unsupported (by state authorities) competing proposals? In spite of the rapidly approaching deadline, USDOE nevertheless contends that it will have located its prospective site by late 1992.

The MRS host community and state may have withdrawn its support of the facility, transshipments may have been blocked or terminated, and the economic and social costs of its continued operation will have soared exponentially.

As concern over the political, economic, and technical viability of the repository has increased, so has the pressure on USDOE to move forward on the MRS facility. On the other hand, just as the authors of the NWPAA envisioned, potential MRS hosts are profoundly concerned that, once an MRS has been established, the pressure to construct a repository will dissipate and the temporary storage facility will become a permanent one. This was the original intention of coupling the MRS to the permanent repository. In retrospect, it must be acknowledged that the entire notion was ill-conceived, a strategy designed solely to expedite the transshipment of used fuel rods off-site from nuclear power facilities -- it always had the makeshift appearance of a political compromise. Efforts are now underway in Congress to remove the linkage to the permanent repository, to require an MRS to be located "as near as possible" to the permanent repository, and other measures intended to circumvent perceived impediments to siting the MRS and permanent repository at Yucca Mountain.[3]

If it is assumed that the repository and the MRS are located in the same area, a number of technical, regulatory, planning, and financial implications can be derived. First, the issue of whether the MRS might ultimately evolve into a permanent repository is made moot. Second, the major additional funding (combined, single site, economies of scale, etc.), planning (simplified transportation requirements) and equipment (cask design, single versus multipurpose, etc.) questions are simplified. Third, the co-location assumption also leads one to reconsider the financial assumptions used in projecting total repository program costs. Regardless of one's political position on the issue, the technical logic of such an approach is difficult to argue.

The co-location assumption, however, raises a number of thorny issues. Does this not dramatically increase the risk posed by the repository? Does this not dramatically magnify existing perceptions of inequity in the repository program design? Does this not radically increase state and local government oversight responsibilities? These are all matters of debate.

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[3] Virtually every key safety and regulatory provision included in the NWPAA, as well as the regulatory underwriting of EPA, NRC, etc., is currently under attack by either Congress or the USDOE -- including those provisions which limit the permanent repository to no more than 70,000 tons of waste, changes which alter the established tectonic constraints, adjustments of the regulatory limits on C-14 release, and so on. The game is still in the first inning and the rules are undergoing major modifications. One can fairly assume that by the time the repository comes up for licensing few if any regulatory "fatal flaws" will remain to impede construction or operation.

5.3.1 Recommended Program Design Modifications

Specifically, it is proposed that program design modifications be made in three critical areas. These are: (1) replacing a monitored retrievable storage facility (MRS) with a temporary surface storage facility (TSSF); (2) shifting programmatic focus from permanent to temporary and from disposal to storage; and (3) adjusting project schedules. These topics are treated in turn in the following sections.

5.3.1.1 Replace Monitored Retrievable Storage with Temporary Surface Storage Facility

It is critical that this proposed programmatic change, if it is to be conveyed as a recommendation to the Secretary, be recognized as a profound change of course and appropriately titled. While the shift from an MRS to a TSSF will appear to some to be cosmetic or merely a semantic twist, it is not. The "intermediate" facility in the long-term waste storage process would no longer be a "Monitored Retrievable Storage" facility. This title, and concept it represented, was not only confusing, it was counter productive. The term "monitored," if carefully evaluated, never conveyed to the public a sense of security and confidence but rather juxtaposed the operation of the permanent repository as "unmonitored," "abandoned," and even "concealed." The term "retrievable" is a nice technical term intended to convey a sense of security in the fact that the wastes could be retrieved at some future date. But the image actually conveyed is perhaps more akin to the idea of storing something in one's garage. Sure, its retrievable, but under what conditions, when, and at what physical or economic cost? Retrievable really conveys the more the sense of the possibility than the likelihood of something being relocated or reacquired. The change in title corresponds with the change in function. The TSSF will be designed to provide surface storage of the used fuel rods until they have sufficiently cooled to be suitable for long-term storage (and, perhaps, ultimately disposal). It could be argued, I believe, that this technological change alone would result in billions of dollars in reduced engineering costs at the longer term facility.

5.3.1.2 Shift Focus from Permanent to Temporary and from Disposal to Storage

The phrase and conception "permanent disposal" must be discarded. The utilities will not appreciate this idea, but it is both a morally and a technically appropriate shift in conception. The repository site, after all, is to be designed with a 100-year operational lifespan. This fact alone, one would have thought, would be sufficient to warrant consideration of fixing the site, at least until proven otherwise, as a very long-term storage facility rather than permanent "disposal" site. The only thing gained by the concept of

"permanent," and the concept of finally "sealing" the facility, is to somehow validate the irrevocability of the utility's contract with Congress. Even for the utilities, however, the enduring impediment imposed on the process by *a priori* inclusion of provisions to seal the repository far exceeds the benefit of retaining the concept. The entire program should be recast as a long-term retrievable high-level waste storage facility. If this recasting results in additional engineering costs, they will surely be less than a future reconfiguration or programmatic failure.

5.3.1.3 Adjust Time Lines and Project Scheduling

One critical, indisputable, and pervasive program design flaw is the role of rigid scheduling criteria whose origins date to the late-1970s and early 1980s. The MRS deadline, the 1998 waste acceptance deadline, the site characterization schedule, the licensing requirements, the site construction projections, the operational requirements, were all formulated to address the needs of certain participants. They were neither derived from a realistic assessment of the technical, political, and societal processes that would be involved, nor intended to provide sufficient flexibility to deal with real-world future conditions. None of the original programmatic deadlines will be achieved. Unfortunately, however, these deadlines and target dates remain on the books and continue to unrealistically contort the actions of USDOE, with predictable results. The proposed recommendations, if implemented by USDOE, would resolve this scheduling, timing, and sequencing problem by providing for a considerably extended site characterization process during which time civilian wastes would be stored in a TSSF.

I would urge the Task Force to ask: "What's the real rush to get the wastes underground? What's the big hurry, who's pushing, and why are they pushing to establish the repository as 'permanent' so far in advance of an adequate technical foundation? What's the point?" Certainly extending the period of surface storage cannot pose any real technical or risk consequences.

I am sure the members of this Task Force understand the fallacy of President Reagan's approach to the high-level nuclear waste problem. To paraphrase Mr. Reagan, "We created the problem. We are not going to pass it on to future generations. We are going to dispose of it here and now." *Twas brillig and the slithy tove. . .* This is precisely how our predecessors "solved" the earlier hazardous waste problems -- by digging a big hole and burying the stuff. Unless we are successful in building in long-term decision-making flexibility, and waste retrievability, we will simply be repeating the unintendedly short-sighted decisions of previous expert committees. There are simply too many technical, political, economic, and sociological uncertainties to confidently take irrevocable decisions at this point in our history. Just because our current knowledge base is inadequate to fully resolve

the long-term disposal problem does not mean we should simply do nothing. We must immediately acknowledge this fact and organize processes that will accommodate accelerated sociological and technological change.

5.3.2 Advantages of Program Design Modifications

In addition to dramatically enhancing public trust and confidence in the program, there are two important corresponding advantages: budgetary and technical. These are discussed in turn in the following sections.

5.3.2.1 Budgetary Advantages

The cost implications of the proposed programmatic changes, if implemented in the proposed fashion, and taken in their entirety, are intended to be neutral at worst. Again, it must be emphasized that financial impact should not be a driving force. This issue, however, particularly during times of economic insecurity, will inevitably rise to the surface as a consideration. The aggregate effect of the proposed changes is to: (1) extend the process of site characterization up to three-fold (to between 20-30 years rather than 10 years); (2) accelerate the construction timetable for the proposed TSSF; and (3) extend the TSSF and repository operational phases to nearly a century.

These changes would have a short-term ratcheting effect on the OCRWM budget, but probably less of an effect than recent Congressional wrenching. Anyone familiar with major federally initiated projects of this kind of dimension will immediately recognize the high public cost (as either a rate payer or a taxpayer, or both) of attempting to meet unrealistic timetables and schedules. Everyone must, by now, realize that the idea of a fully operational repository by the year 2010 is untenable.

A simplified but accurate analogy is the planning and construction of a fifty-story building. While it is perhaps possible to design and construct such a building in one year, the additional monetary and political costs of doing so would be prohibitive. It would require the builder to find ways of circumventing existing permitting requirements and review periods. It would require heavy-handed political manipulation, and perhaps a series of outright bribes to complete key tasks. Many additional operational costs would be incurred – overtime, benefits, insurance costs, etc. Foremen would have to press their workers and take more chances. The chance of accident would increase many fold. Quality assurance and control would be a certain casualty. The pressure to accept delivery of inferior products or services would be tremendous. True, the building would be erected but the financial costs would be staggering, inadequate quality control would continue to plague the ultimate

owners and occupants, and technical and political risks assumed in the process might ultimately mean the structure would have to be demolished. This is precisely the perspective of the nuclear utilities and the emerging view of Congress.

Congress is coming to recognize that we are now about a billion dollars into the repository project. If another two, three, or four billion into the project and it has to be dropped, where are we then? Have we carried out our fiduciary obligation to the taxpayer and ratepayer to the best of our ability? While nowhere near the scale of the savings and loan fiasco, the expenditure of $6 billion to dig and abandon a large hole in the desert would seriously alter history's view of USDOE's achievements. The utilities, on the other hand, are caught between a rock and a hard place. The money has been collected from their ratepayers. They desperately want the repository to be expeditiously constructed and safely operated, but are more than familiar with what it really takes to carry out a technically, politically, and operationally complex construction project. They also see the massive investment already incurred with little or no apparent progress and cannot avoid the vision of the entire process collapsing overnight in response to some technical, political, or programmatic failure, or some broader societal perception of the program, USDOE, or the issue itself. The nuclear utilities are accustomed to planning well into the future. They are not, however, accustomed to, or comfortable in, placing the viability of their entire enterprise in the hands of a federal agency already encumbered with almost unbearable load of historical baggage. Perhaps not at first, but ultimately, the utilities will see in the proposed recommendations the kernel conditions of a financial, political, and institutional framework capable of sustaining the operation of their desired facility through the year 2100 and beyond.

5.3.2.2 Technical Advantages

The proposed recommendations were formulated to address the fundamental problem of public trust and confidence in the OCRWM program. Those experts on the panel with technical backgrounds will no doubt recognize the profound engineering advantages of the proposed approach. First, locating the TSSF in the immediate vicinity of the majority of the reactors would offer considerable advantages. Or, if Congress is successful, a TSSF near the site of a future repository has other implications. Rather than storing, aggregating, or repackaging wastes for subsequent transshipment to a repository, where it would then have to be repackaged for permanent disposal, the waste could be handled in one general location. This would reduce the transportation modes, routes, regulatory requirements, etc., considerably. In essence, there would be no west-east transshipment of high-level wastes (as would be the case for an eastern MRS). Second, such a TSSF would have a significant effect on lowering the heat load imposed on the repository which, in turn, affects the storage cask design criteria, radionuclide release parameters, volume of storage capacity, and so on.

Each of these considerations, in turn, have significant cost reduction implications. The success of any of these approaches depends entirely on the trust and confidence of the potentially affected publics.

6.0 EFFECTS OF RECOMMENDATIONS, BY PARTICIPANT

In the following discussion I attempt to evaluate the proposed recommendations from the perspective of the key program participants. While I have tried to be alert to the possibility of adverse reaction, it was almost always the case that the hypothetical advantages of the proposal exceeded the hypothetical disadvantages regardless of the perspective. Only in the case of the State of Nevada, where the only totally acceptable solution is to locate the repository in some other state, do the proposed recommendations fail to address the primary impediments to long-term public acceptability. For each of the key participants (USDOE, NRC, EPA, DOD, Congress, State of Nevada, affected local governments, affected residents of southern Nevada, and the nuclear utilities), I have attempted to summarize the reasons I feel the proposed recommendations would address critical concerns.

6.1 Department of Energy

The Department of Energy appears to be moving in fits and starts in the direction of successful site characterization. In reality, it has barely gotten off the ground. With the key state environmental permits under their belts, the burden of progress now rests on entirely on USDOE shoulders. They can no longer argue that the State's activities are impeding their progress on the repository issue. Nevertheless, anyone who believes that the proposed MRS could therefore be successfully sited by late 1992 has been seriously misled. Under the current program design, the likelihood of an MRS accepting wastes by 1998, assuming everything went as planned, is remote at best. Certainly, everything will not go as planned and perhaps nothing will go as planned. There will be many twists and turns in negotiating with potential MRS host sites, in the process of characterizing the site, in Congressional directions, and in regulatory oversight. In fact, the pressure to achieve project milestones will, in and of itself, result in its own impediments. Regardless of appearances, the impediments to be imposed on the proposed repository have only just begun to emerge.

The Department of Energy, as a body of motivated and sincere professionals, must feel as if its operating at all times in a "crisis response" mode. The deadlines are unrealistic and the regulatory environment is unbelievably complex, vastly more complex than at passage of the original NWPA (in 1982). The administrative, regulatory, and technical uncertainties and risks are increasing rather than decreasing as the process proceeds.

In this environment, the chance of an administrative error or oversight is high, and one can be assured that any administrative or regulatory failure will inevitably result in legal action and extended delays. Again, assuming everything goes according to plan from USDOE's perspective, there remain a vast assortment of NRC, EPA, and other regulatory oversight entities whose procedures and processes are not subject to USDOE control. All of them will want more time. Everyone wants to be sure that they are doing the right thing during this process. Attitudes throughout government have changed and continue to change. Seabrook was the last reactor to slip in under the wire without adequate planning or "due diligence." Shoreham, on the other hand, serves as a permanent object lesson: remember to consider the consequences of programmatic failure in the decision to push ahead against public opposition! USDOE will find all of the proposed changes to be in their long-term interests.

6.2 Nuclear Regulatory Commission

Site characterization is barely underway and there are those in the NRC willing to state publicly that the repository cannot be licensed under existing NRC criteria. Something has to give. Either the regulations are changed or the repository may not be licensable anywhere in the U.S. But how will the larger "public" respond to the idea that if the repository can't meet existing regulations we simply change the regulations to allow the repository? Obviously, this fact poses a number of problems in relation to public trust and confidence in the process, and is one of the critical reasons why the NRC will strongly endorse the recommendations advanced in this paper. They need more time to evaluate the validity and defensibility of their regulatory criteria, they need more time to consider the role of engineered barriers, and they need more time simply to carry out their own due diligence and meet their own moral obligations.

6.3 Environmental Protection Agency

EPA officials will privately acknowledge that they see serious obstacles to the successful licensing of the proposed repository. Their concerns, like those of the public, center on the issue of uncertainty. At what level of scientific "certainty" will the agency be willing to sign off on the repository? There is already a serious concern that the repository may not be able to meet the Carbon-14 emissions criteria. What would happen, after 5-10 years of testing, if it seemed that the repository could not meet its 10,000-year performance requirements? At what point, and under what conditions, would the EPA step in and disqualify the site? What would satisfy the concerns of the EPA is a schedule of activities, review periods, and milestones which would allow them to confidently certify the site according to criteria they feel are appropriate, defensible, and publicly acceptable. As it is

now, there is a very high likelihood that the agency, or key members of the evaluation team, may simply balk in response to excessive pressure to sign off on the repository. This would result in serious inter- and intra-agency conflict.

6.4 Department of Defense

Certainly, neither USDOE nor the Department of Defense will see the idea of re-establishing the distinction between civilian and defense nuclear wastes as in their more narrowly defined interests. Both agencies have worked hard to insure that defense wastes would have space reserved in the proposed repository. Obviously, wastes that can meet waste form, storage, and transport requirements will ultimately be incorporated into the civilian waste program and deposited in the repository. Nevertheless, for the foreseeable future it is only prudent and in the interests of public trust and confidence to approach these very different problems independently. Future experts will wonder what late-twentieth century "experts" were thinking when they attempted to address both the civilian and defense wastes as a single technological, political, and storage issue? They will not be able to comprehend how, almost as an afterthought, we decided that the massive nuclear weapons waste issue could ever be "attached" to the civilian waste problem. Given the dimensions and complexity of the defense waste issue, it is much like forcing the civilian waste problem to bear the sociological burden of the entire nuclear weapons environmental disaster. This regulatory contortion, if not remedied, will continue to plague, if not prohibit, the successful implementation of the NWPAA.

6.5 Congress

Congress, in a last minute maneuver in late 1987, succeeded in radically restructuring the Nuclear Waste Policy Act. Instead of a methodical, balanced, more or less equitable, process of characterizing three sites and selecting the technically superior site, they elected to drop the Texas and Washington sites and limit their investigation to Yucca Mountain, Nevada. This action alone is estimated to have saved the nation $10-12 billion! As a result of this and subsequent actions, the relationship between Congress and the State of Nevada have eroded considerably with Congress increasingly adopting an "aggressive" attitude toward State. Thus, not only is the State being "forced" to endure site characterization, they are being sanctioned for their opposition. Few who read the local newspapers would question that this opposition has seriously affected the State and its residents. Congress, on the other hand, has been sullied by its attempts to subdue, by force of numbers, the State. It has attempted to strip the State of its environmental permitting authority. Rather than open a dialogue on the contentious issues, they have initiated a concerted effort on several fronts to gut the NWPAA of key protections. This issue and Congressional efforts to circumvent,

Setting aside for the moment these legitimate issues of equity, what are the key technical bases for the State's opposition to the repository? With little more that four days to prepare this paper, this will certainly not do justice to their position, but I would list the following as the critical areas of opposition: (1) socioeconomic and risk perception concerns; and (2) technical concerns.

Socioeconomic and Risk Perception Concerns: While industry surveys have endeavored to demonstrate that opposition to the proposed repository is lower than State estimates, no one questions the existence of widespread public opposition to the repository. The State is legitimately concerned that activities and events in association with the repository, or even in the wider national and international context, could directly or indirectly result in serious adverse impacts on southern Nevada. The economic welfare of the entire state is balanced precariously on the national public's perception of Las Vegas as a convention site, as a recreational area, as a gaming destination, as a retirement area, etc. It would be difficult to argue, at least at this point in the process, that the proposed repository would positively enhance public perception of the attractiveness of southern Nevada. On the other hand, heightened media attention to the controversy, the hostility, the attempts to "sell Nevadans" on the "safety" of the repository, and so on, are perhaps the principal bases for increased insecurity and uncertainty in relation to the repository issue. Anything that would contribute toward reconciling the participants, toward establishing a genuine sense of equity in the process, would go a long way towards reducing public uncertainty, anxiety, and perceptions of risk.

If one were to carefully examine the elements of public opposition, it is my feeling they would cluster around the issue of uncertainty. This uncertainty, in turn, is associated not so much with concerns about site characterization and site construction, which -- for the next twenty years at least -- pose little or no radiological, emergency response, transportation, groundwater contamination, or other risks beyond those associated with a large mining operation, but with the issue of permanently depositing these wastes thousands of feet below the surface. It is in response to this issue that the public has expressed its greatest concern and uncertainty.[4] What will happen down there? How will it affect the water? How will it affect my children? Can we trust the government to protect us from possible contamination? The public can't feel certain about these things because it is obvious that all of the experts associated with the process agree that they cannot know whether or not the site will be safe or not until it has been fully characterized. But the public also feels that the decision to permanently dispose of the wastes at Yucca Mountain has already been made by the Congress and the Department of Energy and that the entire characterization process is little more than a charade in fulfillment of some nebulous regulatory

[4] There are, of course, public concerns also associated with the operations phase of the repository, particularly in the areas of health and safety, emergency response, transportation, and so on.

requirements. The public is confident, if nothing else, that its representatives have had little say in the outcome of the process and are at risk of having no input whatsoever (if Congress can successfully circumvent the State's permitting authority). Even if Congress drops, for the time being, its efforts to suppress the State's minimal existing role in the process, no one is arguing that the State or local governments will have any real authority or influence over the outcome of the site characterization process, the licensing process, the construction, operation, or closure of the facility. The residents of southern Nevada have been disenfranchised, stripped of any meaningful role in a process that will affect them and their progeny for hundreds of generations. Only by empowering the affected State and local governments can USDOE have any hope of countering a this growing discontent and hostility -- and the ultimate threat of programmatic failure.

Technical Concerns: The State of Nevada, in addition to its concerns with regard to actual current and future socioeconomic and public perception impacts, has a number of serious technical reservations with respect to the proposed repository. These concerns also focus on key areas of uncertainty. While the risk of an earthquake, flood, or volcanic eruption in the vicinity of the repository during the next 10 years is infinitesimal, what is the likelihood of such an event in the next 10,000 years? In the next 100,000 years? We are dealing in an area of relative probabilities and of permanent uncertainty. No self-respecting scientist will ever say a particular geologic event is impossible. But as a component of ongoing political debate, these scientific uncertainties acquire an unprecedented level of importance. The proposed recommendations are intended to strike directly at the issue of uncertainty by: (1) extending the duration of the technical studies from 10 to 30 years; (2) extending the corresponding regulatory oversight and permitting processes; (3) extending the surface storage and heat dissipation period; and (4) providing for enhanced public participation, and State and local government oversight.

The State has done everything within the limits of the law to ensure the protection of its residents. They have sought out, and to the best of their ability, critically examined every environmental, technological, sociological, and economic risk potentially associated with known or envisioned repository-related events or characteristics. This is precisely what they were and are morally and legally obligated to do. Their efforts to squeeze information out of the USDOE, to force early consideration of potential fatal flaws, to press the agency on each potential shortcoming is among the most important structural supports for the long-term viability of the program. Without such critical oversight, the program would be open to a more abrupt and potentially terminal public reaction to the project. All of the proposed programmatic changes are intended to resolve, minimize, or mitigate potential adverse perceptions and associated behavioral, economic, health, safety, and social impacts to the residents in the vicinity of potential sites.

It should be emphasized, however, that the intent here is really not focussed on the short-term problem of selecting a site for characterization but on what will ultimately need to be achieved in order to gain an enduring public trust and confidence in the program itself, i.e., public acceptability. If Yucca Mountain continues as the target site, regardless of its opposition or support, the proposed changes will ultimately have to be made to ensure public acceptability. The sooner they are implemented, of course, the better. The character of the implementation process, however, will determine in important ways whether the process is a winding painful course or a mutually satisfactory and publicly applauded process.

6.7 Local Governments

It is conceivable that the site characterization process now underway may ultimately lead to a repository in some form. While the paper does not explicitly assert that the impacts of the proposed repository will be negative or positive, the proposed impact mitigation fund would allow local governments to address the potential significant planning, impact avoidance, and impact mitigation requirements. It will ultimately fall to local affected governments to address these impacts. The proposed empowerment, mitigation, and programmatic changes will markedly improve the ability of local governments to meet responsibilities generated by such a facility.

6.8 Nuclear Utilities

For purposes of simplicity, I have included under the heading "nuclear utilities" not only the utilities who own nuclear reactors but the organizations that have evolved to represent their interests. These include, for example, the American Nuclear Energy Council (ANEC), the Edison Electric Institute (EEI), the National Association of Regulatory Utility Commissioners (NARUC), and many other associated organizations vitally concerned with the successful siting and public acceptance of the proposed repository.

The resolution of the commercial high-level nuclear waste issue is seen by the utilities as the single most important impediment to the "nuclear energy option" and until it is resolved there is little likelihood another nuclear reactor will be constructed in the U.S. What the utilities desperately seek is removal of the wastes from their reactor sites, and the proposed TSSF would be the most efficient of first steps to achieve their longer-term objective.

I would begin by noting that, contrary to the general assumption, the nuclear utilities are not really intellectually or morally committed to idea of a deep geologic repository. This option was merely the most acceptable of several alternative disposal techniques under

consideration during the period preceding passage of the NWPA. In point of fact, the nuclear utilities "couldn't care less" whether the materials are stored on the surface, buried deep below the surface, dumped along a deep ocean or subduction trench, or shot into space, just so long as title to the wastes and the wastes themselves are removed from the premises. Their concern is, always has been, and always will be long-term liability. This is the principal driving force behind the original Act and the continuing basis of utility pressure on USDOE to take possession of the waste (i.e., under their "contract" with Congress to begin acceptance in 1998). The nation, as represented by Congress, agreed to assume this long-term liability in exchange for creation of a nuclear waste fund sufficient to cover costs of constructing and operating such a repository.

The nuclear utilities will recognize in the attached recommendations a profound benefit. As the primary vested parties in the effort to locate a repository, they are keenly aware of and concerned with the rapid degeneration of societal trust in government and, in particular, with the more accelerated decay of public trust and confidence in USDOE's civilian nuclear waste repository program. They are exceptionally uncomfortable with the notion that current tectonic parameters may make it impossible for the repository to be licensed by the NRC or that the Carbon-14 release limitations cannot be achieved at the proposed repository site nor, perhaps, by any site in the nation. They are even more concerned, however, with the immediate possibility that the program could be terminated as a result of Congressional, social, institutional, political, or legal impediments arising out of public perceptions of USDOE. Certainly, the utilities have options as, after all, they have a contract. In reality, however, they can only threaten to sue Congress for its failure to implement its agreement, because there is little realistic chance that they could legally impel Congress to do anything. Even if they could, it is unlikely they would conceive of this as a good long-term strategy.

The nuclear utilities will immediately see the proposed TSSF, in spite of its radically altered mission and duration, as well as the more methodical and extended permanent repository site characterization process, as a decided advantage over the current program. The utilities absolutely will see the mitigation provisions as appropriate, acceptable, and worthy of support before Congress. The utilities have done everything within their powers -- socially, politically, publicly, privately -- to convey the point that Congress acted independently in specifying the $50-100 million "payment" provisions in the Act. They may be strong advocates of the concept of a permanent, managed, mitigation trust fund specifically configured to mitigate the standard and special impacts of the proposed TSSF and potential future permanent repository. In fact, such a fund would be the source of considerable security on the part of the utilities as investment in the integrity of the process and in the long-term public health, safety and socioeconomic viability of a storage facility -- something the utilities desperately seek and have no real way to insure.

No one seriously considered the "payment" provisions in the NWPA as satisfactory. The State of Nevada has always seen the provision as a "bribe," the authors of the original legislation saw the payment provision as a bribe, the Congressmen who voted the Act into law saw the provision as a bribe, the general public sees the provisions as a bribe, and the potentially affected residents of southern Nevada will see such a payment as a bribe. The notion is antiquated and counterproductive. Any annual funding deemed appropriate by Congress, in order to endure and be deemed acceptable to all parties, must be seen as appropriate in form and amount to the potential long-term mitigation requirements imposed on the affected parties. In the beginning, these requirements will be quite high but concentrated in the areas of risk perceptions and socioeconomic impacts. The issue has become highly politicized and will require a considerable counterbalance merely to establish a level playing field. These needs will change as wastes begin to be shipped to the TSSF (planning, training, emergency response, transportation, etc.) and as characterization proceeds. The value of this fully funded, enduring, trust fund in achieving an acceptable public resolution of the civilian high-level waste solution, however, cannot be overemphasized.

7.0 NOTES ON RELATED ISSUES

There are three related issues that I wish to touch upon. These are defense wastes, surrogate organizations, and the national security argument. These are considered, in turn, in the following sections.

7.1 Defense Wastes

It is my opinion that the Task Force should not have been asked to simultaneously address the defense waste and environmental restoration programs together with the OCRWM program. The effort to simultaneously treat these three very different kinds of problems can do little but confuse the issue and result in nebulous conclusions and recommendations. The events leading to the inclusion of defense wastes under the auspices of the OCRWM program date back over a decade while the environmental restoration issue was only at the last minute lumped into the overall Task Force mandate.

One does not need to be an expert to see that the bulk of the civilian nuclear "wastes" are simply compressed, partially consumed, virtually permanent sources of energy. It does not take much imagination to think that future generations will seek to mine the permanent geological repository for these permanent sources of energy.

The defense wastes derived from the production of nuclear weapons, on the other hand, are composed of a wide assortment of physical components, in a vast array of mixtures, combinations, and permutations and "stored" in decaying single- and double-shelled tanks, in pits, in grout, glass, and perhaps thousands of cubic miles of contaminated subsurface. The public perception burden associated with these wastes -- for those that have or can make such distinctions -- is of a very different nature than for commercial fuel rods. It is neither reasonable or responsible for OCRWM to have be tasked by Congress with resolution of these problems in association with those of commercial fuel rods. This problem, tacked on by Presidential fiat, looms as one of the more intractable problems to be addressed by our children's children. We do not now have the technological or financial capacity to actually resolve this problem, nor are we likely to possess such a capability by the time the repository is slated to be opened. It is difficult to even imagine that the defense waste problems will be "resolvable."

While the recommendation derived from the physical differences between civilian and defense wastes is not likely to be received with open arms, it is nevertheless critical for the longer-term public trust and confidence in the overall USDOE waste management program, that wastes derived from nuclear weapons production be treated as a distinct problem. Ultimately, it is true, some of the derived waste forms will appropriately find their way to the repository, but the vast majority of these wastes -- at least in volume -- will never be moved from Hanford, Rocky Flats, etc. The recommendation would therefore be that the Secretary seek Congressional approval to dissociate and postpone treatment of the defense waste issue pending resolution of a specified list of technical problems (e.g., waste form, volume, storage medium, transport modalities, etc.). The Secretary would be requesting a directive from Congress that said, in effect, he is not to consider storage of defense wastes at the repository until these issues are first resolved and satisfactorily defended before Congress. This would free USDOE to concentrate on the civilian waste issue, the design and construction of a civilian waste repository, and the establishment of regulatory parameters for the storage of such wastes. The technical benefits of this action alone on the program, and on public trust and confidence, would be profound.

7.2 Surrogate Organizations

Given the potentially insurmountable obstacles to establishing long-term public trust in an agency that must bear responsibility for what has come to be recognized as over 50 years of nuclear-waste related mismanagement, it should come as no surprise that one of the solutions under consideration is shifting the responsibility from USDOE to an alternative organization. The Task Force has raised and reconsidered virtually the entire range of organizations considered by Congress in formulating the NWPA of 1982. The Task Force has considered private for-profit contractors, non-profit corporations, alternative federal

agencies, and quasi-governmental corporations. The members of the Task Force appeared to lean in favor of the idea of a government-constituted corporation, such as a COMSAT type of organization. Such a solution appears to resolve a number of vexing problems -- the transfer would be relatively straightforward, federal authority and responsibility would be retained, the independence of the organization could be maintained, or at least argued, and the recent efficacy of such organizations appears to have been demonstrated.

While I would admit that the short-term positive effect would be significant, such a solution would nevertheless ultimately fail. The fundamental problems that must be addressed by this organization are inextricably enmeshed in a complex latticework of agency relationships -- NRC, EPA, Department of Defence, Congressional mandates, etc. The on-the-ground tasks to be implemented will be difficult enough to accomplish under current structural and administrative relationships, much less after the introduction of a new quasi-governmental agency. Unlike COMSAT and other such organizations, this proposed organization, in order to carry out its very complex mandate, would require literally thousands of highly specialized administrative and technical staff, the primary source for which would be the USDOE (or its sister agencies). Again, while this might work over the short-term -- the entity would be given considerable tolerance and support in the early years -- it is doomed to fail in the long-term. Unlike COMSAT, which was filling an administrative vacuum, the proposed surrogate would be assuming a vast array of historical liabilities, risks, and public perception problems. It would be fighting to dissociate itself from USDOE. It would be fighting to counter the perception that it was no more than a shell for activities of USDOE. The failure of contractors such as Westinghouse and General Electric to insulate USDOE from its historical responsibilities at Hanford is, in my opinion, a better analogue to what could be expected by shifting responsibility for the repository to some quasi-governmental surrogate. Clearly, the use of private or non-profit corporations would be even less viable. The veil need only be penetrated once for the public to see that the edifice was only smoke and mirrors.

If, for purposes of debate, USDOE can never sustain the level of trust required to maintain public confidence in the program, and the range of public, private, and quasi-government surrogates are unlikely to fare better in the long-term, what possible alternatives remain? In order to respond to this question, we must project out twenty or thirty years to conjure up a picture of an organization and set of relationships which must necessarily exist in order for the program to be considered viable. Will this organization continue to be at odds with the host State? What is the role of public participation and local government oversight in a process that will need to be sustained for the next 10,000 years? Again, this kind of projective exercise is necessary if we are to understand the critical fact: once the wastes are emplaced, the long-term risks of high-level nuclear waste storage will have been transferred from the 110 reactors and other sources to the residents of southern Nevada. How many permutations and transitions will the AEC/DOE/OCRWM go through in the next twenty

years, one hundred years, one thousand years? Does anyone truly imagine that we have seen the end of these administrative changes? What assurance do the residents of southern Nevada have that the U.S. government will stand ready to mitigate some future environmental, economic, or sociological disaster in relation to the repository? What examples do we cite of such effective mitigation? Hanford, Rocky Flats, Savannah River? The most basic of facts is that it will be the local inhabitants that will bear any and all future risks of the repository and it is they who must be empowered to monitor, technically oversee, and legally enforce measures instituted for their protection. In the case of the repository, it is the entire federal government that is transitory. If this is the truth, what structural and procedural changes need to be implemented, and at what point in the process?

There is a moral imperative here. If we take the "long-term" view, the U.S. government has only a 216-year history, the State of Nevada a 128-year history, while the proposed repository is to operate for 100 years and be demonstrably safe for 10,000 years! Recent international events and trends (USSR, United Europe, Yugoslavia, etc.) the emergent "new world order," internationalism, etc., should underline the basic transience of nations. The relationship between the buried wastes and the populations of southern Nevada, however, will remain unchanged for the next 10,000 years. Assuming no change in the population of Clark County over this entire period, we are knowingly subjecting 500 million future residents to persisting concerns and perceptions, if not actual technical risks. This inexorable fact should give one pause. Never in the history of our species has one generation been able to intentionally impose such environmental risks on so large and temporally distant a population.

Ultimately, authority over and responsibility for the proposed repository will be transferred -- either intentionally, or by default -- to the affected local populations. The principal measure of the efficacy of the Secretary of Energy's Advisory Board Task Force on Civilian Radioactive Waste Management will be in its ability to acknowledge this fact, accelerate the active participation of these populations, and legitimately empower their representatives.

7.3 National Security Argument

While on somewhat of a tangent to the thrust of these recommendations, I cannot avoid offering a few comments on the issue of "national security" as a basis for arguing the urgent importance of immediate permanent subterranean disposal for the nation's high-level wastes. The nation's utilities strongly supported, if not propounded, this concern in order to argue against extended on-site storage. They could not very well have argued that co-locating all of the high-level wastes at one surface site was tactically superior to 100+ surface storage sites scattered throughout the U.S. Even at the height of the cold war this argument was

fatally and embarrassingly flawed. The Soviets could have had very little tactical or logical basis for targeting a surface nuclear waste storage facility 100 miles from the nearest population. True, they could have created a major environmental disaster which would have degraded the planet's environment for millennia, but as a tactical consideration its value was always negligible. A strike on Seabrook or any number of eastern seaboard reactors would have been infinitely more devastating. As a target of terrorism, the argument would be equally if not more difficult to sustain. The technical difficulties involved in "detonating" the stored casks alone would be incentive enough to strike some other target. Certainly any and all of the nation's operating commercial reactors would provide technically and operationally more attractive targets. Assuming current geopolitical conditions and trends, neither concern appears to hold water and should not be accepted as arguments against expanding the function and extending the operational lifespan of the proposed Temporary Surface Storage Facility.

8.0 SUMMARY OF RECOMMENDATIONS

8.1 Empowerment

- The State of Nevada and affected local governments must be legally, politically, administratively, financially and socially empowered to participate in planning decisions at the earliest possible point in the process, with respect to the current repository program.

- An intergovernmental TSSF and repository licensing commission should be established to evaluate issues associated with the proposed sites.

- Measures should be instituted to insure that the participation of affected parties (State and local governments) is guaranteed for the duration of the program and not subject to the annual Congressional appropriations process.

8.2 Mitigation

- Creation of an Impact Mitigation Trust Fund (IMTF).

- IMTF funded by an amount, adjusted for inflation, appropriate to the risk to be borne by the affected entities.

- Appropriations language, permanent assignment of rights to specified proceeds from the Nuclear Waste Fund, or direct utility contracts which guarantee that future payments to the IMTF are not subject to the whims of a future Congress.

8.3 Program Design

- Eliminate concept and function of Monitored Retrievable Storage (MRS) system. Replaced by a Temporary Surface Storage Facility (TSSF) designed to serve permanent technical requirement (minimum 30-year surface storage).

- Modify the NWPA to replace Permanent Geological Repository concept with an Extended Subsurface Storage Facility (ESSF). Substitute the current 50-year retrievability requirement with a 100-year retrievability requirement.

- Extend site characterization and associated regulatory processes from 10 to 30 years.

- Eliminate defense wastes from the Office of Civilian Radioactive Waste Management program.