

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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In the Matter of:)

Proposed Rulemaking on Storage Disposal)
of Nuclear Waste, 10 CFR Parts 50 and 51)

PR-50, 51
(44 FR 61372)

(Waste Confidence Rulemaking))

CONSOLIDATED STATEMENT OF THE STATE GROUP

I. INTRODUCTION

This consolidated Statement is submitted on behalf of the California Department of Conservation ("CDC"), California Energy Commission ("CEC"), Illinois, Massachusetts, Minnesota ("Minn."), Attorney General of the State of New York ("NYAG"), Ocean County and Lower Alloways Creek Township (New Jersey), Ohio, Wisconsin and Delaware, pursuant to the Commissions' Second Prehearing Memorandum and Order, dated November 6, 1981. The remaining participants consolidated in Group 3, listed on p. 7 of the Memorandum and Order, have not joined in this Statement.

There is no factual basis today for confidence either that nuclear waste will be safely disposed of by the necessary time frame or that it will be safely stored until it is disposed of safely. Furthermore, because a permanent, safe solution to the waste management problem will not be available when needed, both the California Energy Commission and the Attorney General of the State of New York support a policy of ceasing to issue new construction permits for

nuclear power plants until the technical, institutional, social and political barriers are significantly diminished.

II. THE COMMISSION MUST DETERMINE WHETHER OR NOT IT IS NOW CONFIDENT, ON THE BASIS OF EXISTING FACTS, THAT THERE WILL BE SAFE DISPOSAL OF NUCLEAR WASTE.

At issue is not whether radioactive wastes produced by nuclear facilities "can" be disposed of safely but whether they "will be" safely disposed by a specified date. 44 Fed. Reg. 61372-73 (October 25, 1979) (emphasis added).¹ The mere conclusory statements by DOE that there can be safe waste disposal are an insufficient basis for the NRC to conclude that it has assurance that wastes will be disposed of safely.

DOE has not met its burden of proving that a factual basis exists. Its filings consistently ignore past events, do not show reasonable facts existing today for assurance that waste disposal will occur, and instead speculate that disposal can, may, or should occur. The decision to abolish DOE makes DOE's position even more illusory.

In order to make a finding of confidence at this time, the Commission, among other things, would have to conclude,

1. At a minimum, the legal standard for the NRC to use is whether it has "reasonable assurance" that wastes will be disposed of safely. While participants have used differing phrases to describe this burden, all states joining in this filing agree that DOE's filings do not satisfy the "reasonable assurance" standard.

from facts existing today, that all technical and political-social ("Institutional") problems will truly be resolved by a specified date. However, there is no basis for reaching that conclusion. Indeed, even if safe disposal is technically feasible, in the sense that no known scientific principle would prevent its being achieved, nonetheless, the Commission could not find confidence because (i) many repository sites are needed but no site has been found which would be suitable, and questions are known to exist about the suitability of all the various regions and media under consideration; (ii) it is possible that technical solutions to outstanding problems will not be found by the specified date; and (iii) institutional problems could prevent the establishment of any repositories by the specified date.

Instead of discussing long-term safety, DOE frames its case in terms of whether it will succeed in getting one repository licensed by the NRC by the year 2007. But that question misses the point. First of all, many repositories will be needed, not only one. Secondly, even if a license is obtained, that does not assure establishment of a repository because public opposition could prevent it. Further, the mere existence of a license does not establish that the repository will function without accident for the necessary time period. Events at Three Mile Island, Brown's Ferry and Diablo Canyon demonstrate this point.

Actual facts, rather than beliefs, are required in determining confidence, particularly in view of the past

history of waste disposal efforts ("an unbroken history of failure"). (CEC SP 30; see also Illinois SP 4-5; Minn. SP, Dr. Abrahamson's comments 13-20.) Additionally, the nature of the problem--extremely long-term danger to many future generations--calls for the highest care in reaching conclusions in this proceeding.²

DOE and the industry groups say erroneously that because research is planned or in process we can be confident today that safe disposal will be achieved. However, for years government officials have misled the public with assurances that the technical solutions were at hand. The truth is that we do not know today whether the ongoing research will remove all obstacles; instead, it may fail to

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2. Disposal of nuclear waste presents unique problems because never before has any society had to devise plans to assure safety so far in the future, and never before have government agencies had to devise regulations to assure such safety. Thus, it is more than natural to expect that errors will occur in the technology, and that the regulations themselves will be less than perfect. Indeed, the U.S. Geological Survey ("USGS") has noted that waste disposal "requires new and hitherto untried technology" which "typically" involves "initial failure of some components to perform as originally conceived, discovery of new problems to be resolved, and reconsideration of design concepts." USGS SP 5.* This view is in accord with that taken by the NRC in its draft technical criteria for regulating disposal, that building a repository "is a new human enterprise," and it is therefore "reasonable to expect that, whatever the care exercised and however advanced the techniques, mistakes will occur, improved technologies developed, better designs created, and operational procedures improved." 45 Fed. Reg. 31398, col. 2 (May 13, 1980). (* "SP" refers to the participants' Statements of Position and "CS" references the Cross-Statements of Position.)

do so, or even uncover new uncertainties or problems making the task still more difficult to achieve. Confidence cannot be predicated on hope or blind technological optimism. Until the research has been completed and has successfully resolved all the technical difficulties, it is premature even to talk about confidence.

III. THERE IS NO FACTUAL BASIS TODAY FOR CONFIDENCE THAT TECHNICAL BARRIERS TO THE SAFE DISPOSAL OF WASTE WILL BE SUCCESSFULLY OVERCOME.

- A. The scientific feasibility of isolating radioactive wastes from the biosphere for the extensive periods required to assure human safety has not been validated.

A key factor in the states' position that there is no present, reasonable assurance that technical barriers to safe waste disposal will be surmounted is the lack of scientific verification of the geologic repository concept. (CEC SP 6.) Actual assurance that geologic repositories can isolate radioactive wastes requires:

"[C]omparing the results of field experiments to the model predictions and modifying the models. . . . The experiments must, of course, be carried out under conditions representative of those inside a loaded repository; that is, in-situ. It is only under these circumstances that the isolation hypothesis can be validated and reasonable assurance achieved." (CEC SP 7; see also NYAG SP 60; Wisconsin SP 8; Delaware SP 6.)

None of the waste experiments to date have utilized a vigorous scientific hypothesis testing and model verification method, and certainly no in-situ test experiments have been performed which demonstrate verification of the

geologic repository concept (CEC SP 12; Appendix C; see also Wisconsin SP 3-4).

DOE admits that in-situ testing is necessary to assure adequate site characterization and verification and to verify the models used for performance assessment. (DOE CS II-143.) However, in this area as in others, DOE looks to additional "planned in-situ tests to provide sufficient data" (DOE CS II-140). DOE thus admits that concept feasibility has not been proven,³ and that its optimism that it will be shown is dependent upon successful completion of as-yet unperformed in-situ experiments.⁴

- B. The numerous gaps in present technical knowledge concerning permanent waste disposal prevent a finding of confidence at this time.

Every filing in this proceeding identified many generic uncertainties and data gaps in the technology for waste

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3. The IRG report recognized that concept feasibility for geologic repositories is unproven:

"The feasibility of safely disposing of high level waste in mined repositories can only be assessed on the basis of specific investigations at and determinations of suitability of particular sites." (Reference 13, CEC SP 8.)

4. DOE (and the industry) have adopted a systems approach to waste disposal--use of a series of natural and engineered barriers that supposedly provide a degree of isolation not possible for the natural systems alone. DOE fails to recognize that this approach is still hypothetical and needs to be scientifically verified with respect to the redundancy, effectiveness, and independence of a series of barriers that are still being conceptualized. (CEC SP 45.)

disposal. These gaps preclude assurance at this time that technical problems with waste disposal will be overcome. (NYAG SP 77-101; CEC SP 6-12; Appendices A, B and C; CDC SP 5-8; CDC CS 36-38.) It is impossible to even list all the existing data gaps in the limited space allowed for this summary. However, some of the most important data gaps and uncertainties are:

1. Waste-rock interactions--USGS has stated that "the uncertainties associated with hot wastes that interact chemically and mechanically with the rock and fluid system appear very high" (NYAG SP 79; CDC CS 3). DOE acknowledges that the effect of the heat emanating from the wastes on the surrounding rock of a repository is "a major unknown geologic factor (presenting) the most difficult engineering uncertainties." (NYAG SP 79.) One participant has described in detail the gaps in knowledge that prevent any understanding of the interaction of waste with host rock and the resulting lack of assurance that the physical, chemical, and thermal effects induced by the presence of the waste will not cause unmanageable disruptions. (NYAG SP 78-84.) It is simply not known if any site will be able to perform its function given the heat and radiation being emitted by the waste. (NYAG SP 78-84; see also CEC SP 10.)

2. Hydrology--DOE admits that "knowledge of groundwater hydrology, is perhaps, the most important requirement for understanding the long-term behavior of a mined geologic

repository." (DOE SP II-76.) Nevertheless, little is known about water transport of radionuclides to the biosphere (CDC SP 15-17; CDC CS 13-15, 18, 20-21; CEC SP 10, 50-55). As USGS has said:

" . . . The need for such data severely taxes both the available data base and the technology for generating it. Most of the requisite data are presently unavailable; most of the available data have such large error limits that their usefulness in predictive models is limited." Circular 779, pp. 8-9.

3. Selection of geologic medium--While salt, shale, basalt, and granite are all under study as potential repository media, none have been shown to be technically capable of assuring safe isolation. Each medium under consideration is known to present serious, time-consuming, and possibly insurmountable problems which leaves the possibility of achievement within the requisite time frame speculative. (NYAG SP 84-92; CDC SP 9-10, 24-15; CDC CS 3, 6, 33-36; see also Delaware SP 5.)

4. Future climatic changes--It remains to be established that repositories can be located to withstand future climatic changes such as re-glaciation or significant increases in precipitation or surface erosion. (NYAG SP 47; CDC SP 12-13; CDC CS 10-12.)

5. Shaft sealing and borehole plugging--There is no established way to seal a repository so as to prevent radionuclide release to the biosphere for the necessary

period of time. (CEC SP 10; NYAG SP 99; CDC SP 19-23; CDC CS 25-29.) DOE has termed the sealing problem a "key unknown" (NYAG SP 99) but there is no consensus that the technology which is currently anticipated will provide adequate seals for even a few decades. (Id. 99.)

6. Monitoring--While DOE believes that a monitoring system should be developed to operate for a few centuries (NYAG SP 100), DOE's filings ignore the lack of equipment and methodology for monitoring the repository after closure. (Id.; DOE SP II-280; CDC SP 18-19; CDC CS 23-27.)

Given its lack of present knowledge,⁵ DOE basically contends that the mere existence of its waste program is grounds for assurance. DOE resorts to speculation that it will successfully overcome all of these technical barriers in the near future, despite the lack of scientific knowledge after 25 years of study. (DOE SP I-5; CEC SP 10-11, 46.) Such statements do not disguise that these are important, existing data gaps, and that there is no assurance at this time that these gaps will be successfully filled in the future. (CEC SP 46.) DOE's abolishment makes its representations regarding the future success of its waste program even emptier.

5. Other identified knowledge gaps include cannister degradation (CEC SP 50), waste form dissolution (CEC SP 52), reaction in the overpack region (CEC SP 53), rock mechanics (CEC SP 54), retrievability (CDC SP 23-24; CDC CS 30-32), seismic and tectonic activity. (NYAG SP 46; CEC SP 10), and waste packaging (Illinois SP 30.)

C. Necessary mathematical modeling of repository performance is undeveloped.

Because geologic and other scientific data are unavailable, DOE wants to use computer modeling to demonstrate the validity of the geologic waste concept and wants to have the Commission find confidence based on these models and on results of future modeling studies. There is no clear indication of whether modeling will be successful or whether it can be successfully achieved during the necessary time frame. (CDC SP 4.) And, there is no valid basis for assigning numbers to represent the probability of an earthquake, human intrusion, re-glaciation or other repository failure many years in the future. USGS, in its Preliminary Statement of April 15, 1980 (pp. 11-12), rejected reliance on models, and insisted on hard data from site-specific investigations. The models are not based on detailed site-specific information, and therefore, are not subject to verification. (CDC SP 20.) In any event, DOE concedes that even the models already cited will not be available for a number of years. (DOE SP II-203, 219, 222.) Simply having an extensive program for improvement of models is not evidence of confidence now that the far-field predictions will be more accurate. (CDC SP 20.)

D. There is no basis for confidence that sufficient sites will be found.

DOE says that as many as eight repositories would be needed if salt or shale is used as the medium. (DOE SP

II-289.) If ultimately eight sites are needed, dozens of sites meeting all the technical criteria must be located so that in-situ testing can begin. Such testing will likely discover problems with at least some of the sites. For example, the Salt Vault site in Lyons, Kansas was abandoned after a decade of testing, when it was finally found to be unsuitable. (NYAG SP 61.) Also, extra repository sites are needed in case of a need to quickly transfer the nuclear waste from an existing repository which has proven unsatisfactory.

There is simply no basis for confidence that dozens of sites meeting all the technical criteria will be found. The vague assumptions that the expanded National Waste Terminal Storage Program, because it includes a larger area for consideration, provides the confidence necessary to believe that the timetable will be met, is unacceptable. The site selection process has not even been properly started yet, and therefore, cannot possibly demonstrate confidence now that a repository will be available by 1997-2006. (CDC CS 33-36.) Indeed, DOE and USGS acknowledge that unknown deficiencies may exist in many of the regions under consideration and that knowledge about all the regions is insufficient to project the location of multiple suitable sites. (NYAG SP 65-67; NYAG CS 42-45.)⁶

6. Moreover, even if dozens of sites are found initially, many of them may be rendered unsuitable during in situ testing, because non-destructive testing methods have

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E. DOE has not shown, and does not even claim, that disposal will be safe for the necessary period.

Nuclear waste, as DOE admits, must be isolated for up to one million years. (NYAG SP 30.) However, DOE's filing predicts isolation for only 10,000 years, only 1 percent of the time for which isolation is needed for safety, by DOE's own admission. (NYAG SP 30.) Industry argues that nuclear waste will be truly hazardous for a mere few hundred years, ignoring that some elements have half lives of hundreds of thousands of years. In fact, a chart submitted by the utilities shows that spent fuel will be more toxic than uranium ore for about 40,000 years. (Doc. 3, p. 2-8 of UNWMG-EI SP.) Another source cited by industry says that some of the waste products remain hazardous for millions of years. (NYAG CS 10-11.) DOE has failed to provide any assurance that its program will provide protection for that period of time and, in fact, admits that it has no plans to ensure such isolation. (See also CDC SP 5-6.)

F. Environmental, site selection, and performance criteria for a repository are speculative as is a demonstration that the criteria can be met.

Several participants have pointed out that establishment of environmental, site selection, and performance

not been demonstrated. (NYAG SP 63-64.) And, sites surviving that hurdle may be breached during excavation, because there too non-destructive technology has not been developed. (NYAG SP 96.) Therefore, sites which are otherwise safe may be rendered unsuitable before a repository can be established.

criteria for a repository and demonstration that these criteria will be satisfied, are necessary for a reasonable assurance that safe waste disposal will be available. (Minn. SP 4; CDC SP 6; Illinois SP 2.) EPA has not yet published even its proposed environmental criteria for disposal of high-level wastes. (Id.) NRC has admitted that there is insufficient earth science knowledge to set forth general site acceptability criteria, and that therefore it may be necessary to determine suitability on an ad hoc basis for each tentative site. (Minn. SP 5.) While NRC has proposed technical criteria (46 Fed. Reg. 35280-96, July 8, 1981), the criteria are not yet final. The absence of final regulations and sites to compare them with precludes confidence at this time. NRC is also responsible for issuing performance standards. While the NRC has identified preliminary technical performance criteria (Minn. SP 6), DOE's filings ignore these requirements and provide no assurance that they will be met. (Minn. SP 7-11.)

IV. INSTITUTIONAL BARRIERS PREVENT A FINDING OF CONFIDENCE THAT THERE WILL BE WASTE DISPOSAL.

- A. Unresolved institutional issues are as great a hindrance to a finding of confidence as technical obstacles.

There is no basis for confidence that institutional problems can be resolved. (NYAG SP 68-75; Ohio SP 15; Wisconsin SP 2; Minn. SP 5, and Dr. Abrahamson's comments 23-30.) The IRG report concluded that the resolution of social, political, and institutional concerns is necessary

to permit the orderly implementation of a nuclear waste program and that "resolution of institutional issues may well be more difficult than finding solutions to remaining technical problems." (IRG, p. 87; NYAG SP 68-69.) DOE has acknowledged that "less confidence can be placed in assessment of [institutional] impacts on the repository program" than technical issues (DOE SP III-87) and that it is "possible that unanticipated or unresolved issues of concern at the State or local level could cause prolonged perturbations in the schedule." (DOE SP III-31.) The states' submittals (and indeed, almost all non-industry and non-federal government filings) have pointed out that DOE's blithe conclusion that institutional concerns can be resolved ignores reality and presents no factual basis for confidence that they will be resolved.⁷

B. Institutional problems at the federal level are a significant obstacle precluding a finding of confidence.

The federal government's own handling of the waste disposal problem precludes finding assurance that waste disposal will be available. DOE, the lead federal agency

7. Virtually all the institutional factors cited by the states in their filings as precluding confidence that there will be safe storage of waste remain. President Reagan's support for reprocessing shows that, once again, a change in administrations has caused a change in the basic objectives of the nation's waste disposal program. Bitter struggles continue over the form and goals of waste disposal legislation, particularly with regard to state government and local participation in the program.

responsible for the waste disposal program, suffers from disjointed project management. (CEC SP 19-20.) DOE has failed to maintain a consistent program and objectives, due at least in part to the fact that the program is amenable to drastic change with each successive administration and that Congress has yet to take action to provide stability to the program. (Ohio SP 5-11.) The overall federal government management structure is inadequate (Wisconsin SP 4), characterized by a disorganized proliferation of decision-makers (at least six other agencies in the Executive Branch alone compete with DOE for jurisdiction over waste disposal) (CEC SP 20); disagreement among these decision-makers (CEC SP 21-22); and inefficient coordination of the decision-makers' activities. (Ohio SP 10; CEC SP 20.)⁸

In addition, there is the continuing institutional uncertainty in presidential input, as illustrated by the succession of presidents with differing waste management policies. (Ohio SP 6.) Congress, through its budgetary and statutory authority, is obviously also essential to timely implementation of an effective waste disposal solution. Jurisdiction in Congress over waste is split among numerous committees (Wisconsin SP 5) and no bill establishing a national program has passed. (Ohio SP 8-9.) Most importantly, significant changes in congressional

8. Participants have also pointed to the repeated failure of the AEC, ERDA, and now EPA and DOE to meet their own timetables. (Ohio SP 10; Vermont SP 2.)

membership occur regularly, causing an ever-changing set of goals (and legislation). DOE filings ignore these political obstacles. (Ohio SP 9.)

- C. State and local concerns over waste disposal and the federal government's consistent failure to deal with them prevent a finding of confidence.

As DOE itself acknowledges, the public is very concerned about the consequences of building repositories, and many state and local governments, through legislation⁹ or otherwise, have expressed opposition to accepting repositories. Every government effort to date to select particular sites has been opposed. Since dozens of candidate sites must be selected for testing and evaluation, the acknowledged public opposition creates doubt that repositories actually will be established. (NYAG SP 69-75; CEC SP 26-28; Ohio SP 13; Minn. SP 5.)

DOE's response is that it will engage in consultation with affected state and local governments and that objections therefore will disappear. (DOE SP V-19.) This approach, however, is naive, because discussions are not likely to override strong local objections to the siting of a repository. (NYAG SP 74; Ohio SP 15-16; Minn. SP, Dr. Abrahamson's comments, p. 30.) Moreover, DOE has

9. By October 1979, some 19 states had enacted bans or moratoria on the siting of a nuclear waste repository. (CEC SP 26.) Almost 40 states have either considered or taken some action concerning nuclear waste disposal. (Ohio SP 13.)

consistently failed to adhere to its purported policy of "consultation and concurrence." DOE's promise in its filings to deal with states is suspect, given its failure to even inform Wisconsin of its disposal plans for that state during this proceeding. (Wisconsin Supplemental Statement, dated October 10, 1980.) As Wisconsin says, DOE deliberately concealed from the state a report showing that the state was the primary candidate for exploration of granite formations. (Id.)

On an equally fundamental level is DOE's pervasive inability to deal with the concept of public trust and participation. DOE (and the NRC Working Group) continues to view the public as a special interest group whose support is desirable but unnecessary. DOE has no meaningful internal mechanism for instilling public confidence and this limitation will most likely effectively frustrate site selection and development. (Vermont SP 3.) DOE fails even to acknowledge the existence of a credibility problem, let alone begin the arduous task of dealing with it. (CEC SP 30.) Instead, DOE simplistically argues that the public should just accept whatever risks DOE determines should be accepted from radioactive wastes. (DOE SP II-14; NYAG SP 73.) Such an approach clearly does not present a factual basis for concluding that institutional barriers will be overcome. (Minn. SP 5-6.)

V. THERE IS NO BASIS FOR CONFIDENCE THAT SAFE DISPOSAL WILL BE IMPLEMENTED BY A GIVEN DATE.

Even if it could be said with confidence that safe disposal will be achieved ultimately, there is no basis for confidence that it will be achieved by any given date. This is because there is no way of knowing when, if at all, the required number of repository sites meeting all the technical requirements will be found, verified through in-situ testing, and accepted by state and local governments. It also cannot be known when, if at all, ongoing research will furnish satisfactory answers with respect to the existing data gaps or known technical problems. DOE itself, in commenting on a report issued by the General Accounting Office in June 1979 on the need for spent fuel storage facilities, said that it was not then possible to develop specific time frames for the final disposal of spent fuel. (NYAG SP 36.) The American Nuclear Society says that the timing of waste disposal is a "political question" and that under certain political assumptions--such as "reductions in funding, and policy changes"--the date of implementation would be later than is projected by DOE in this proceeding. (ANS SP, p. 3 and fn.)

USGS also recognizes that no date can be estimated. In its Statement of Position, as in its Preliminary Statement of April 15, 1980, USGS points to all the research that must still be done in so many areas, and says it is "unable to estimate when [waste] disposal will be available" because

such prediction "will be imprecise and premature until many of the key issues identified in this Statement have been addressed." (USGS SP 4, 29.) "From a technical standpoint," adds USGS, estimating a date for waste disposal is impossible because "new and hitherto untried technology" will be needed, and initial failures are therefore likely. (Id. at 5.) "How much time should be allowed for such contingencies is not clear." (Id.) Estimating a date is also impossible, says USGS, because of institutional unknowns. (Id.)

VI. THERE IS NO BASIS FOR CONFIDENCE THAT NUCLEAR WASTE CAN BE SAFELY STORED FOR THE NECESSARY PERIOD.

Long-term storage, for the indefinite period until and if safe disposal becomes available, is no answer.¹⁰ It could be decades, or even centuries or more, before safe disposal is achieved, and there is no basis for confidence that nuclear waste can be safely stored for that period of time. To the contrary, a report prepared for the Tennessee Valley Authority ("TVA") has said about techniques for storing spent fuel:

"[S]ince operating experience for more than 20 years is not available, a very long passage of time (i.e., several decades or longer) also may make the fuel assemblies less reliable by weakening the cladding, which means that the current methods for storing these assemblies are interim measures."

10. Ohio has pointed out cost, safety, and institutional concerns raised by storage at AFR facilities. (Ohio SP III.)

(Appendix to the TVA SP 10.) Therefore, until it is known when disposal will be available it cannot be said that nuclear waste will be safely stored until that date.

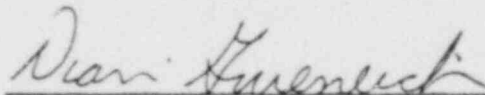
While storage in this country has not so far resulted in any calamitous accident, NRC records demonstrate that there have been many mishaps already, some of which led to releases of radioactivity. These are discussed at NYAG SP 105-107 and demonstrate the frequency of mechanical failure and human error at storage facilities. On at least one occasion, storage of nuclear waste did result in a major release of radioactivity. An Oak Ridge study concluded that this occurred in the Soviet Union and required the removal of the population from an area of from 38 to 380 square miles. (Id. 107-108.) Therefore, the fact that no major accident has yet occurred in the United States is reason to be thankful, but not reason to be confident that storage will be safe for an indefinite period of time.

VIII. CONCLUSION

The Commission should rule that it does not have confidence at this time that nuclear waste will be safely disposed of by a specific date, and that it also does not have confidence that such waste will be safely stored until safely disposed of. Any other conclusion would be based on hope or speculation rather than fact, and would be unjustified, arbitrary and capricious.

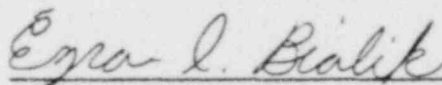
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