UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of	)	
	)	
PROPOSED RULEMAKING ON THE STORAGE AND DISPOSAL OF NUCLEAR WASTE	)	PR-50,51 (44 FR 61372)
	)	
(Waste Confidence Rulemaking)	)	July 3, 1980

STATEMENT OF POSITION OF THE AMERICAN NUCLEAR SOCIETY

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I

INTRODUCTION

A. Based Upon Scientific and Technical Evidence, it Is Established that Nuclear Waste Can Be Stored and Disposed of Without Danger to Man or His Environment

Based upon scientific and technical evidence, the Nuclear Regulatory Commission (NRC) can and should reach a finding of confidence that nuclear waste 1/ can be safely

1/ The American Nuclear Society (ANS) does not consider spent fuel to be waste. Spent fuel represents a significant national energy asset. The energy contained in the uranium and plutonium in commercial spent fuel through the year 2000 would be equivalent to about 20 billion barrels of oil. That amount of oil represents approximately eight years of import using the 1985 oil import rate given in the National Energy Plan. A national energy policy that supposedly stresses "conservation" and contemplates not using such a significant energy resource is incongruous at best.

For this reason, ANS, in advocating a finding that it is now technically feasible to dispose of spent fuel, does not reject the potential of reprocessing of spent fuel. In fact, ANS submits that a finding of confidence in the current proceeding is sufficient to provide the Commissioners with equal or greater confidence that processed, separated high-level waste can be disposed of safely and permanently.

stored and disposed of without danger to present and future generations of man or his environment.

The feasibility of the technology necessary for safe storage and disposal of radioactive waste has been demonstrated during the more than 20 years of federally sponsored research and development. Detailed study after study by prestigious scientific bodies and by government agencies have all consistently concluded that nuclear wastes can be stored and disposed of in a safe, efficient manner.

This Commission has found that there was reasonable assurance that methods of safe permanent disposal of high-level waste would be available when they were needed. 42 Fed. Reg. 34391, 34393 (July 5, 1977), pet. for rev. denied, Natural Resources Defense Council v. NRC, 582 F.2d 166 (2d Cir. 1978). In the absence of good cause to change this earlier conclusion, it should remain controlling.

Other countries with substantial nuclear power commitments (including France, the Federal Republic of Germany, and Sweden) have independently developed similar storage and disposal techniques and are proceeding with their implementation.

Thus, the American Nuclear Society (ANS) submits that a finding of confidence is justified by the results of such extensive research, development, testing, analytical and demonstration programs, as well as the review and evaluation of the results of these programs by numerous independent, authoritative groups, all of which have concluded that disposal is feasible. Indeed, the Statement of Position of the Department of Energy (DOE) and material in the data bank are alone sufficient for such a conclusion.

Added support is found in the two billion years of confirmatory evidence provided by the natural "reactor" in Gabon, Africa.

ANS's conviction is further reinforced by the knowledge and experience of its expert membership, which will, insofar as appropriate, be presented in detail at a subsequent evidential stage of this proceeding.

ANS will concentrate its participation in this hearing to the area of expertise of its members, the feasibility of waste storage and disposal. It will not address the timetable of such implementation, for this is primarily a political question dependent upon federal government commitment and financing and agency implementation. 2/

2/ The dates submitted by the Department of Energy for operation of disposal facilities are between 1997 and 2006. These dates are very conservative for the program, and could be implemented much sooner. The Commission should recognize that the schedule and milestones to meet these dates are controlled by policy decisions and legislative and administrative requirements for hearings, reviews, data collection procedures, and evaluations. A series of events including adoption of very conservative repository design approaches, and accelerated regulatory processes that would permit earlier dates for operation of geologic disposal facilities can and should be envisioned. Similarly, a series of political decisions, reductions in funding, and policy changes can be postulated that would result in even later operation of ultimate disposal facilities. The most important factor in public acceptance is the finding of confidence coupled with evidence that a positive program is in place to construct the first repository. Nevertheless, the longer the time schedule, the greater the likelihood of increased public skepticism and deterioration of public confidence.

B. ANS's Identity

ANS, an international organization of engineers and scientists, now in its 26th year, is a nonprofit scientific and educational organization. ANS currently has an individual membership of over 13,000 from some 1,600 organizations. ANS is governed by its officers and a Board of Directors elected by the individual membership.

To carry out its purposes, ANS has 16 separate technical divisions. The objective of each division is to provide means for furthering the science and art of that branch or scientific discipline. The disciplines range from groups addressing the nuclear power reactor oriented disciplines such as nuclear fuel cycle and waste management and disposal, radiation protection and shielding, reactor safety, and reactor operations to other disciplines such as controlled nuclear fusion, isotopes and radiation, environmental sciences, and alternative energy technologies and systems.

ANS filed a notice of intent to be a full participant in this proceeding on November 26, 1979, and has actively followed the progress of the rulemaking with a technical support committee of interested and technically qualified volunteers. This statement has been reviewed and unanimously approved by the Board of Directors as the Statement of Position of ANS.

C. This Proceeding Is of Major Importance to the Future of Nuclear Energy Development Because Past Government Indecision and Procrastination Has Contributed to Confusion and Fear of the American People on this Subject

ANS is convinced that this proceeding is of the utmost importance to future nuclear development in this nation. Skepticism about the safety of waste disposal is often used as a basis for the political expression of more generalized opposition to nuclear power and as an obstacle to the successful operation of the decision-making mechanism for nuclear power implementation. Thus, radioactive waste management and disposal has been the basis utilized by several states to try to establish a moratoria on nuclear power development. State laws have been enacted and other attempts have been made to condition construction of nuclear electric power generating facilities upon a "demonstration" of safe, effective waste disposal. This has not only impacted our energy production, but undermined the confidence of the people.

It is obvious that a high level of confidence in nuclear power depends on a public consensus that the nuclear industry and the government have workable institutions to manage nuclear waste. Unfortunately, nuclear waste disposal has suffered in the past from indecision by the federal government. This apparent lack of direction by the government with respect to nuclear waste disposal has raised unnecessary and unjustifie public apprehension.

This public misgiving s aggravated by the quality of much of the information circulated to the public abo the nuclear waste problem, a substantial amount of which can only be described as absurd technically and highly deceptive. For example, the spectre of a 250,000-year hazard has been raised without a hint of the inconsequential consequences of such hazards. As a result, misconception by the public is rife.

The result of this combination of the indecisive handling of this question by the federal government and the deluge of misinformation by others is a nuclear phobia.

This proceeding can go far to eliminate that misapprehension by clearly defining the limited nature of the danger to the public caused by nuclear waste and by positively finding that the technology exists to assure that nuclear waste can be safely stored and disposed of without danger to mankind. To alleviate these concerns, expeditious, forthright action is required on the part of the federal government.

D. This Commission Can and Should Find that It Has Confidence that Radioactive Waste Can Be Disposed of Safely if One Such Method Is Found to Be Technically Feasible

The purpose of these proceedings is not to determine which of the various methods of disposal is the "best." It is not to find that there is a "perfect" method. Rather, it is to reaffirm the Commission's, and the public's, confidence that disposal is technically feasible, that there are grounds for reasonable assurance that nuclear waste can be isolated adequately from the biosphere. Thus, this Commission need only find that one method will be available for the safe disposal of nuclear wastes to justify a finding of confidence.

Options are available for the safe disposal of waste. Indeed, there are a number of solutions. Ironically, this diversity of approaches has over the years diverted government's focus away from a specific solution.

Even with the deep burial system, which has been consistently shown to be feasible, there are many choices. Indeed, the availability of a number of suitable geological media for waste disposal is preventing the selection of one which would be fully adequate. An approach that searches for the "best" site in the "best" medium could be unending; however, one that searches for an "acceptable" site for a first repository will have many other successful follow-up candidates.

Although there are some who advocate no action until the last technical detail is resolved or until unanimous agreement is gained among all scientists (a practical impossibility for any major technical effort), there is no logical or rational reason for such needless procrastination. An infinite number of questions related to waste management and disposal can be asked by imaginative minds. To answer all is impossible. Indeed, it is unnecesary because of our ability to provide engineering solutions to those problems. The real task is to select those questions that have practical importance, for some questions are not important. For example, it is not necessary to know the rate of dissolution of each nuclide if one can show that total dissolution would not cause an unacceptable hazard.

With present day understanding of phenomena and material properties involved in design of a mined geologic repository, it is possible to design a technically conservative system that does not infringe areas of data and technical uncertainty. We cite the Swedish KBS-II conceptual design and review as a prime example of such an approach.

E. Ongoing Research Is Not a Basis for Finding a Lack of Confidence

ANS recognizes that additional data are useful in specific technical areas and for specific sites and that a potential for improvement exists through development of advanced system concepts. ANS is convinced that conservative design approaches can accommodate these uncertainties.

However, research for possibly improved systems should not be equated with, or construed as, the absence of a highly suitable existing technology. Such technology is a reality. 3/ Based upon it, a repository for permanent disposal can be designed, safely constructed, operated, and sealed.

The potential for the future development of improved methods of dealing with radioactive wastes should not be ignored. Further research and development could be invaluable, while not impugning the validity of whatever short-term decisions are made.

3/ See Section III, infra. See also Letter from Karen D. Cyr, Counsel to NRC Staff to Marshall E. Miller, Esquire, dated March 28, 1980, with attached Bibliography of Databank Documents on Nuclear Waste Storage and Disposal.

A considerable research effort is now underway in areas such as the performance of the waste form, the integrity of the barrier, the interaction between waste and rock, migration of radionuclides, thermo-mechanical effects on geologic formations, and modeling of risk and consequences. These programs will assist in resolving technical questions such as materials performance and the influence of thermal generation from waste. This work is useful because a further understanding of these and similar subjects will likely allow further optimization of current conservative design approaches, resulting in a reduction in repository cost. It will also provide more definitive guidance for the relative comparison of geologic formations and potential sites within a given formation. Also, these programs will lead to more advanced disposal systems with improved design and performance, while applying the existing, sufficient technological base. This process of ongoing research is typical of any technological development.

II

THE RISKS FROM SPENT FUEL DISPOSAL MUST BE CLEARLY DEFINED SO THAT THE METHODS FOR PROTECTING THE PUBLIC CAN BE IMPLEMENTED EFFECTIVELY

The first step towards the resolution of the question of confidence is to determine what hazards exist because of spent fuels. For unless the problem is defined, how can a solution be judged to be adequate?

There is another compelling reason. It is to allow the public to place this problem in its proper perspective. Our people have been the victims of substantial misinformation and distortion of the truth. This prompted the Committee on Nuclear and Alternative Energy Systems to conclude and recommend:

> "geological disposal of nuclear waste must be clearly spelled out and vigorously publicized. The risks are those of chronic, dispersed, low-level radiation and are not comparable, for example, with risks from catastrophic reactor accidents." Final Report of the Comm. n Nuclear and Alternative Energy Systems, Energy in Transition 1985-2010, p. 317.

> "While it appears that adequate technical solutions to radioactive waste disposal exist (e.g., geological disposal), the implementation of a program will require overcoming several political and institutional barriers. The foremost of these barriers is misunderstanding by the public of the nature of the problem. As evidenced by local hostility in many places to i estigation of sites, it appears that the public is under the misapprehension that waste management poses local, high-intensity risks, rather than (at worst) widespread, low-intensity risks." Id., p. 316.

The definition of the potential hazard must begin with an analysis of the chemical composition of spent fuel, the unique nature of these components insofar as they pose a threat to man, and the duration of the hazard posed by each.

Spent fuel is the intact fuel assembly that has served its useful life in a nuclear reactor. Spent reactor fuel contains virtually all of the fission products and all of the hea'y isotopes formed by neutron absorption. Spent commercial fuel contains about 96 weight percent of the uranium

TABLE 5-14 Element Concentrations in Spent Light Water Reactor Fuel (grams per metric ton of heavy metal)[a]

Element	Concentrations					
	After 30 days	After 90 days	After 150 days	After 1 year	After 3 years	After 10 years
^{3}H	0.075	0.074	0.074	0.071	0.064	0.043
Kr	383	383	382	381	378	369
Xe	5,580	5,590	5,590	5,590	5,590	5,590
Rb	341	341	341	342	346	355
Cs	2,830	2,810	2,800	2,750	2,630	2,380
Sr	932	921	914	903	877	794
Ba	1,410	1,420	1,440	1,490	1,610	1,850
Y	486	482	480	477	477	477
La	1,300	1,300	1,300	1,300	1,300	1,300
Ce	2,890	2,830	2,790	2,690	2,570	2,550
Pb	1,210	1,220	1,230	1,230	1,230	1,230
Nd	3,910	3,950	3,990	4,090	4,200	4,230
Pm	113	109	104	88.8	52.3	8.2
Sm	824	829	834	849	885	926
Eu	194	192	191	189	184	172
Gd	111	113	113	116	122	136
Te	1.9	1.9	1.9	1.9	1.9	1.9
Dy	1.1	1.1	1.1	1.2	1.2	1.2
U	954,000	954,000	954,000	954,000	954,000	954,000
Np	500	500	500	500	501	504
Pu	9,090	9,090	9,080	9,050	8,960	8,700
Am	137	145	153	182	274	532
Cm	47.2	44.8	42.9	38.7	33.9	26.5
Zr	3,770	3,760	3,760	3,760	3,790	3,870
Nb	32.0	21.7	12.9	1.5	0.002	
Mo	3,480	3,520	3,540	3,560	3,560	3,560
Tc	863	863	863	863	863	863
Ru	2,400	2,360	2,340	2,300	2,240	2,220
Rh	371	386	391	394	394	394
Pd	1,320	1,340	1,350	1,390	1,460	1,480
Ag	62.6	62.4	62.3	62.1	61.8	61.8
Cd	88.2	88.4	88.4	88.7	88.9	89.0
In	1.2	1.2	1.2	1.2	1.3	1.3
Sn	53.9	53.7	53.5	53.2	53.1	53.1
Sb	17.9	17.8	17.7	16.9	14.4	11.1
Se	53.3	53.3	53.3	53.3	53.3	53.3
Te	583	582	582	583	585	589
Br	15.7	15.7	15.7	15.7	15.7	15.7
I	276	277	277	278	278	278

[a]Isotopic mixtures, including radioactive and stable nuclides. Assumptions: 3.3 percent enriched uranium fuel; burnup, 34,000 MWd/metric ton of heavy metal; specific power, 29.5 MWe/metric ton of U_3O_8.

Source: H. O. Haug, *Calculations and Complications of Composition, Radioactivity, Thermal Power, Gamma and Neutron Release Rates of Fission Products, and Actinides of Spent Power Reactors' Fuels* (Karlsruhe, Federal Republic of Germany: Reactor Research Institute, 1974).

TABLE 5-15 Radioactivity of Selected Nuclides in Spent Light Water Reactor Fuel (curies per metric ton of heavy metal)[a]

Nuclide	Half-life	Radioactivity After 30 days	After 90 days	After 150 days	After 1 year	After 3 years	After 10 years
Fission Products							
^{3}H	12.3 years	727	720	713	690	616	415
^{85}Kr	10.8 years	11,400	11,300	11,200	10,800	9,490	6,060
$^{131}Xe^{b}$	12.0 days	2,600	104	3.2	—	—	—
^{133}Xe	5.3 days	37,300	14	—	—	—	—
^{134}Cs	2.1 years	250,000	237,000	224,000	184,000	93,300	8,750
^{136}Cs	13.0 days	12,800	522	21	—	—	—
^{137}Cs	30.0 years	111,000	110,000	110,000	108,000	103,000	87,900
$^{137}Ba^{b}$	2.6 min	103,000	103,000	103,000	101,000	96,600	82,200
^{89}Sr	52.1 days	464,000	209,000	93,800	5,340	0.3	—
^{90}Sr	28.1 years	78,900	78,600	78,300	77,200	73,500	61,800
^{140}Ba	12.8 days	277,000	10,800	417	—	—	—
^{90}Y	64.0 hours	78,900	78,700	78,300	77,200	73,500	61,800
^{91}Y	59.0 days	642,000	316,000	156,000	12,400	2.2	—
^{140}La	40.2 hours	319,000	12,400	480	—	—	—
^{141}Ce	32.3 days	716,000	198,000	55,000	553	—	—
^{144}Ce	284 days	1,020,000	880,000	760,000	450,000	75,500	150
$^{144}Pr^{b}$	17.3 min	1,020,000	[illegible]	760,000	450,000	75,500	150
^{143}Pr	13.7 days	287,000	13,800	[illegible]	—	—	—
^{147}Nd	11.1 days	87,900	2,070	49	—	—	—
^{147}Pm	2.6 years	104,000	101,000	96,400	82,500	48,600	7,630
^{93}Zr	1.5×10^{6} years	1.9	1.9	1.9	1.9	1.9	1.9
$^{93}Nb^{b}$	13.6 years	0.2	0.2	0.2	0.2	0.4	0.9
^{95}Zr	65.2 days	973,000	513,000	271,000	27,300	11	—
$^{95}Nb^{b}$	90.0 hours	20,700	10,900	5,750	580	0.2	—
^{95}Nb	35.0 days	1,250,000	852,000	508,000	58,100	24	—
^{99}Tc	2.1×10^{5} years	15	15	15	15	15	15
^{103}Ru	39.5 days	710,000	249,000	86,900	2,020	—	—
$^{103}Rh^{b}$	57 min	711,000	249,000	86,900	2,020	—	—
$^{106}Ru^{b}$	1.0 year	524,000	468,000	418,000	278,000	70,000	560
^{106}Rh	30.0 s	524,000	468,000	418,000	278,000	70,000	560
^{129}I	1.7×10^{7} years	0.1	0.1	0.1	0.1	0.1	0.1
^{131}I	8.0 days	65,600	375	2	—	—	—
Actinides							
^{234}U	2.5×10^{5} years	0.7	0.7	0.7	0.7	0.8	0.8
^{236}U	2.4×10^{7} years	0.3	0.3	0.3	0.3	0.3	0.3
^{237}U	6.7 days	39,500	86	2.7	2.5	2.3	1.6
^{238}U	4.5×10^{9} years	0.3	0.3	0.3	0.3	0.3	0.3
^{236}Pu	2.8 years	0.4	0.4	0.3	0.3	0.2	—
^{238}Pu	88.9 years	2,970	3,010	3,030	3,070	3,060	2,900
^{239}Pu	24,400 years	323	323	323	323	323	323
^{240}Pu	6,760 years	485	[illegible]	485	485	486	487
^{241}Pu	14.6 years	108,000	107,000	106,000	103,000	94,000	67,400
^{242}Pu	3.8×10^{5} years	1.5	1.5	1.5	1.5	1.5	1.5
^{241}Am	433 years	105	134	162	260	575	1,460
^{243}Am	7,650 years	20.2	20.2	20.2	20.2	20.2	20.2
^{242}Cm	163 days	32,000	24,800	19,200	7,710	352	7.7
^{244}Cm	18.1 years	2,820	2,810	2,790	2,730	2,520	1,930
Sum, Fission Products		1.06×10^{7}	6.14×10^{6}	4.38×10^{6}	2.24×10^{6}	806,000	325,000
Sum, Actinides		1.89×10^{5}	1.39×10^{5}	1.32×10^{5}	1.18×10^{5}	101,000	74,600
TOTAL		1.08×10^{7}	6.28×10^{6}	4.51×10^{6}	2.36×10^{6}	907,000	400,000

[a] Assumptions: 3.3 percent enriched uranium fuel; burnup, 34,000 MWd/metric ton of heavy metal; specific power, 29.5 MWe/metric ton of UO_2.
[b] Nuclides in metastable states that can decay into more stable form by emission of a gamma ray.

Source: H. O. Haug, *Calculations and Complications of Composition, Radioactivity, Thermal Power, Gamma and Neutron Release Rates of Fission Products, and Actinides of Spent Power Reactors' Fuels* (Karlsruhe, Federal Republic of Germany: Reactor Research Institute, 1974).

originally charged to the reactor as fresh fuel, 3 weight percent fission products, and 1 weight percent of transuranics and daughters. Two tables (Tables 5-14 and 5-15) from Energy In Transition 1985-2010 which list the various elements, their concentration in spent light water reactor fuel, their radioactivity, and their half-life are included herein.

Two major classes 4/ of radioactive nuclides are present in spent fuel:

1. Fission products: Fission products are the nuclei produced when a heavy nucleus is fissioned. The bulk of the radioactivity after about six months is associated with only a few radionuclides that decay to stable elements over a period of a few hundred years. These fission products produce primarily beta-gamma radiation and are the major source of the heat generated during the first few hundred years of any management and disposal period. A few fission products have half-lives of millions of years, but these constitute a minute fraction of the initial amount of radioactivity.

2. Actinide elements: These consist of uranium which has not undergone fission, uranium and transuranic nuclides formed by neutron capture, and their decay products. Actinides generally have longer half-lives than fission

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4/ In addition, carbon 14 and other less important radioactive isotopes created by neutron activation of materials may be present in the wastes.

products and thus generate considerably less heat per unit time.

Radioactive wastes can also be distinguished based on the nature of their radiation:

1. Beta and gamma emitters: The greatest contribution to beta-gamma radiation comes from fission products. A second source consists of nuclides formed by neutron activation--*i.e.*, by neutron absorption in fuel, cladding, or the surrounding structures. A small contribution comes from heavy nuclides 5/ a few of which decay by beta-gamma rather than alpha emission. With a few exceptions (*e.g.*, I-129 with a half-life of 17 million years, Tc-99 with a half-life of 200,000 years, Zr-93 with a half-life of 1.5 million years, and Cs-135 with a half-life of 2 million years) the fission product emitters have half-lives of approximately 30 years or less. Their radioactivity is reduced to very low levels within about 500 years. The longer lived fission products constitute only 0.00001 weight percent of the fission products of typical commercial reactors.

The emissions of short-lived beta and gamma rays in spent fuel present a significant potential hazard to the biosphere because of their ability to travel relatively longer

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5/ Heavy isotopes are any chemical elements with an atomic number greater than 82 on the periodic chart, *i.e.*, elements heavier than lead. These elements include the set referred to as actinides (elements heavier than, and including, actinium) and as transuranics (elements heavier than uranium).

distances; also, they present a significant problem of containment in a repository because of their high heat generation rate.

2. Alpha emitters: The primary sources of alpha radiation are the transuranic isotopes produced in the fuel by neutron absorption and their decay products (called daughters). These alpha emitters include primarily isotopes of neptunium, plutonium, americium, curium, and their daughter products. The range of half-lives for alpha-emitting isotopes is comparable to that for beta-gamma emitters, but the decay of a beta-gamma emitter generally leads directly to a stable isotope whereas the decay of an alpha-emitter generally leads to another alpha-emitting isotope.

The Commission must first distinguish between the hazard presented by the more rapidly decaying highly radioactive fission product content of the waste and the hazard presented by the longer-lived radionuclides. Next, the significance of this distinction must be related to the overall goal of the waste disposal program--to assure prevention of public health and safety effects that might result through possible radioactive contamination of air or water.

Such an analysis leads to the conclusion that of the phenomena of radioactive decay, the requirements for the waste disposal system are quite different in the short term (less than 1,000 years) than in the long term. Once decay occurs for elements with less than 30 years half-life decay, the total hazard potential of the system will have dropped tremendously. At that point its capability of contaminating water or air is comparable to that of the ore body from whence the fuel which produced the waste came.

For this reason the main thrust of this hearing should concentrate on the effectiveness of containment during the early years of disposal, at the most 1000 years, but more likely about 500 years.

We submit that the hazard to man from spent fuel has been blown out of all proportion by misleading information. The Commission now should clarify the true and trivial nature of the risks after 500, or at the most, 1000 years which are, at worst, a minor contributor to natural background radiation.

Finally, in evaluating the nature of the risk to the people, spent fuel should be equated with risk from other toxic materials that are naturally found in our earth or that are routinely disposed of in modern society, such as arsenic and barium. Such a comparison will give the public a more realistic picture of the true nature of the problem of spent fuel disposal; imparting a sense of proportion that the country is in danger of losing.

III

RADIOACTIVE WASTES CAN BE DISPOSED OF IN A MANNER THAT WILL PROTECT MAN AND HIS ENVIRONMENT

A. Mined Geologic Disposal Is a Technically Feasible Method for Safe Disposal of Such Wastes

Once the true risks of radioactive waste are defined, there is convincing evidence, in numerous studies, actual tests, and in nature itself, that those risks can be controlled by underground burial in mined geologic repositories. Such a disposal method will accomplish the primary objective of waste disposal: the isolation of radioactive waste from the biosphere in such a way as to assure that it will pose no significant threat to public health and safety.

Because DOE's statement has described a mined geologic disposal facility in detail, we will not belabor this presentation by an in-depth treatment of the technicalities of such a facility.

Based on scientific and technical evidence, the mined geologic disposal repository method is effective. It establishes a set of engineered and natural barriers to the environment, which may include but does not necessarily require all of the following:

1. A high-integrity waste form with low leachability.
2. A canister within which the waste is placed.
3. A backfill material, surrounding the canister, that could absorb or immobilize any waste that might leak.

4. Extremely long transit time for any credible pathway from the repository deep below ground (on the order of tens of hundreds of thousands of years).

5. A variety of minerals through which the waste must travel to reach the biosphere, any one of which might absorb the waste or chemically react and immobilize it.

6. The further dilution of an already dilute waste product in any waterway that it might enter.

Studies and experience have established that mined repository disposal can be engineered with current technology so that safe performance does not depend on any particular barrier and in most instances can be fully achieved by one barrier acting independently of the others. This defense-in-depth approach gives a high degree of assurance of success.

B. Successful Tests of Disposal Facilities in this Country, in Other Nations, and Nature Itself, Proves that Radioactive Wastes Can Be Disposed of Safely

A specific design in a specific location with specific materials and components and system dimensions and procedures is not necessary for a finding of confidence by the Commission. But, the fact that a specific design for a specific site exists and has been developed, and has been favorably evaluated by independent scientific review, and the characteristics and conditions confirmed by measurements, is convincing evidence that wastes can be safely disposed of so as not to injure man or his environment. Such evidence is found in the following:

1. Specific site tests conducted by the U.S. Department of Energy.

2. Detailed design and siting studies performed outside the United States by other nations. Foremost among such studies are the detailed design and siting studies conducted in Sweden under the KBS Project, establishing that waste disposal is feasible.

Since the DOE statement fully sets forth the American experience, it will not be repeated here in detail. However, we point out that such tests have indeed established the feasibility of waste disposal.

A test and demonstration program called Project Salt Vault produced technically sound results and, together with subsequent projects over the past ten years, has provided the technological bases for the high-level waste management program now being implemented by DOE. About four million curies of radioactivity contained in packaged spent fuel assemblies were emplaced, monitored, and later removed from a salt mine. The work was highly successful and produced valid data proving that heat would be conducted from the emplaced waste according to the analytical models. As summarized in the published report of the results:

> "With the completion of this experiment, it can be concluded that most of the major technical problems pertinent to the disposal of highly radioactive wastes in salt have been resolved. Project Salt Vault successfully demonstrated the feasibility and safety of handling highly radioactive materials in underground environment." (Emphasis added.)

Numerous short-term demonstration programs and related research and development efforts have been carried out in support of commercial nuclear waste disposal. Despite the adverse publicity related to the Lyons, Kansas project, spent fuel elements were successfully emplaced within this bedded salt formation for a two-year test period; 6/ other programs where spent fuel assemblies are currently being emplaced in granite at the DOE's Nevada Test Site; 7/ and a Near Surface Test Facility being constructed in volcanic basalt on the Hanford, Washington Reservation. 8/

Considerable experience has been derived from deep burial of intermediate-level commercial nuclear waste in salt formations within the Federal Republic of Germany. 9/

The Swedish KBS project is decisive evidence that radioactive wastes can be disposed of safely. The scientific and technical bases for vitrified high-level waste disposal has been documented in four volumes (KBS-I), and the bases for spent fuel disposal has been documented in two

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6/ Conceptual Design Report, Federal Repository, Lyons, Kansas, KE-NWTSR-71, Kaiser Engineers, Inc. (December 1971); available from the National Technical Information Service, Springfield, Virginia 22161.

7/ NTS Terminal Waste Storage Program Plan for FY 1978, Nevada Operations Office, U.S. Department of Energy, Las Vegas, Nevada; available from the National Technical Information Service, Springfield, Virginia 22161.

8/ Basalt Waste Isolation Program Annual Report--Fiscal Year 1978, RHO-BWI-78-100, Rockwell Hanford Operations, Richland, Washington (October 1978); available from the National Technical Information Service, Springfield, Virginia 22161.

9/ Gera, F. and J. Olivier, "OECD Countries Pursue Geological Disposal," Nuclear Engineering International, pp. 35-37 (Jan. 1978).

volumes (KBS-II), and a hundred primary scientific references. In addition, the project has been the object of several independent peer reviews, including most recently a review by a Subcommittee of the Committee on Radioactive Waste Management (CRWM) of the American National Academy of Sciences. National Academy of Sciences, A Review of the Swedish KBS-II Plan for Disposal of Spent Nuclear Fuel (January 1980), which documents should be made a part of this record.

It is the position of ANS that the two-volume documentation of the KBS-II project, the supporting scientific papers, and the independent scientific reviews of the KBS-II provide an adequate and independent basis for a finding of confidence by the Commission. We urge that this project be reviewed and considered in detail in these proceedings.

We call the KBS II study to the attention of the Hearing Officer and Commission as an example of one way in which spent nuclear fuel can be isolated from the biosphere, with reasonable technical assurance. This is by no means represented as a "best" solution, but only one technically sound solution. Of course, it is not the only adequate design, and further engineering work could produce very different sound designs.*

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* The main reservation often expressed regarding KBS II is that over 100,000 tons of copper and approximately 10,000 tons of lead are used as barrier material to dispose 9,000 tons of uranium and 63 tons of plutonium. While the quantity of copper and lead is large, the economic value (in today's prices) is less than 10% of the value of the uranium and plutonium. This raises again the question of advisability of spent fuel burial from a resource conservation viewpoint, but does not impugn the technical feasibility of the approach.

In addition, the detailed nature of the design, the specific siting conditions and the specific technical and scientific judgments discussed in the KBS-II review are illustrative of (1) the benefit of site specific studies and specific adaption of designs to the site specific environment, and (2) the benefit of adoption of a conservative reference design for technical and judicial review proceedings.

ANS has reviewed, and endorsed, the findings of the National Academy of Sciences. The Academy's review of the KBS project was confined to the evaluation of the technical data to support two key elements of the KBS-II disposal, a plan judged to be crucial to the overall functioning of the waste isolation system. The two elements reviewed in detail were:

1. The long-term stability of the copper canisters enclosed in a bentonite overpack under a specific range of physical and chemical conditions; and

2. The availability of a deep geologic disposal site in granite with the requisite dimensions, stability, groundwater properties, and the necessary stability to maintain these characteristics.

The findings of the Subcommittee of the Committee on Radioactive Waste Management of the National Academy of Sciences, insofar as they apply to this hearing were as follows:

> "The KBS-II Plan, like some other waste-isolation plans, uses a sequence of engineered barriers and natural geologic barriers to limit the escape of radionuclides. The plan is unique in placing major reliance on an engineered

barrier consisting of thick-walled copper canisters surrounded by overpacks of bentonite clay. In the Subcommittee's judgment the effectiveness of this barrier to contain the radionuclides in spent fuel rods for hundreds of thousands of years has been adequately demonstrated, and the required properties for the less easily verifiable geologic barriers are therefore less stringent than in other disposal plans.

"The Subcommittee agrees that the available technical data are adequate to support the conclusion in the KBS-II Plan that radionuclides will not escape at unacceptable rates from a repository built as specified in the KBS-II report, provided that construction is well engineered and a proper site is used.

"The principal bases for the Subcommittee's judgment, together with the principal remaining uncertainties, are listed below. Numbers following an item indicate sections of the report in which the item is discussed in detail.

"1. <u>The canisters</u>: Methods of manufacture have been shown to be currently available, and both experiment and theory have demonstrated that the canisters will have sufficient mechanical strength and corrosion resistance to survive in the designed repository environment for hundreds of thousands and probably more than a million years. (V.1 to V.4).

"2. <u>The overpack</u>: Extensive research on bentonite clay has shown fairly convincingly that this material can protect the canisters against mechanical disturbance and corrosive attack by groundwater. Additional research under repository conditions, however, is needed to ensure that compacted bentonite plus loose bentonite filler can be placed tightly around the canisters and that the compacted bentonite will hydrate uniformly without developing cracks or channels of rapid groundwater flow. (IV.6).

"3. <u>Existence of repository sites</u>: The existence of at least one site in Swedish bedrock that meets the minimum criteria of dimension and low groundwater movement, though not conclusively demonstrated, is reasonably assured, and it can be inferred from available geologic data that other equally good or better sites, exist in Sweden. Actual location and definitiion of such sites, however, will require additional exploration and ground testing. (IV-1).

"4. Stability of sites: Despite doubts by a very few Swedish geologists, there is substantial evidence that over large parts of Sweden the bedrock is tectonically stable, so that a well chosen repository site is in little danger of damage from either slow rock movement or rapid dislocations accompanying earthquakes. Observations of the effects of past glaciation in Scandinavia indicate that possible renewed glaciation will cause no damage to a well-constructed repository or damage too slight to pose a threat to the post-glacial biosphere. (IV.4 and IV.5).

"5. Quantity, movement, and chemical composition of groundwater: Much exploratory work and many analyses have shown that the quantity of groundwater moving through a properly chosen site will be small and that its chemical composition will stay in the range in which the amount of corrosion of the canisters will be small. (IV.2).

"6. Temperatures in a repository: Well based calculations indicate that the temperatures of the canister surfaces will be kept below 80°C by the planned pre-disposal aging of the waste and its spacing in the repository. Temperatures will be low enough so that their effect on corrosion of the canisters and on the properties of the bentonite will be negligible. The rise in temperature in the rock around a repository is expected to be below the level that might cause damage either by setting up convection cells in groundwater or by changing the fracture hydrology of the rock. Additional experimental work on the effects of heat is desirable; such experiments are underway at Stripa. (IV.2, IV.3, V.3).

"7. Repository closing: It has been demonstrated fairly convincingly that the planned bentonite seals and backfill for shafts, tunnels, and boreholes after a repository is filled will be adequate to prevent channeling of groundwater. Nevertheless, the Subcommittee thinks that this is the weakest part of the KBS-II Plan. In the United States the sealing of the openings into a repository is regarded as a difficult operation. Additional work on the emplacement and testing of the bentonite seals is needed. (VI.3).

"8. Canister failure: If unexpectedly rapid corrosion or a flaw in a canister should permit groundwater to come in contact with spent fuel rods, escape of dissolved nuclides will be greatly retarded by the insolubility of the uranium oxide pellets and by sorption and ion exchange on bentonite and on mineral surfaces in the rock through which the groundwater moves. The retardations, plus effects of dilution and dispersion, is expected to ensure that concentrations in moving groundwater will not reach unacceptable levels. This conclusion is supported by extensive experimental work designed to simulate conditions that would exist near a ruptured canister. Additional research under repository conditions is clearly needed, but members of the Subcommittee, with one exception, think that the work accomplished to date plus the unlikelihood of canister failure is sufficient to ensure adequate containment of radionuclides. (VI.1 and VI.2).

"9. Criticality: Calculations show clearly that danger from attainment of critical configurations by the fissile isotopes carried by groundwater is virtually negligible. (VI.[illegible] <u>Review of the Swedish KBS-[illegible] Plan for Disposal of Spent Nuclear Fuel</u>, National Academy of Sciences, 19[illegible].

The Swedish KBS-II spent fuel disposal plan, the associated technical and scientific documents, related studies of spent fuel disposal in granite at the Climax

Mine at the Nevada Test Site, and related studies in granite in Colorado, taken together provide a thorough and well reviewed body of scientific and technical evidence that provide a basis for confidence that safe disposal of spent fuel in mixed geologic repositories can be accomplished.

Perhaps the most impressive demonstration is that of nature itself. In Gabon, Africa, a naturally occurring nuclear chain reaction almost two billion years ago created several tons of nuclear waste over tens of thousands of years. Despite the fact that this waste was in an area of moving water and was not subject to any unusual geologic conditions, almost all plutonium and other transuranic elements and many of the fission products remained essentially immobilized. Nature, therefore, has already supplied confirmatory evidence of the defense in depth provided by multiple naturally occurring barriers.

C. Numerous Studies by Prestigious Scientific Groups and by Government Agencies Have Consistently Concluded that Radioactive Wastes Can Be Disposed of Safely

In light of the numerous studies of nuclear waste disposal and the conclusion that waste can be disposed of safely, it is astounding that this Commission finds it necessary to again retrace the well-traveled path. True, there is much concern on the part of the public with regard to this problem, but it is well recognized that such public confusion is to a great extent the product of constant restudying of this question by the government, and its failure to act to solve the problem.

Because of the quality and depth of past studies that have considered this problem and the consistency of their conclusion that there are feasible solutions, we submit that these studies support a finding of confidence.

In 1979, the Committee on Nuclear and Alternative Energy Systems of the National Research Council concluded:

> "No insurmountable technical obstacles are foreseen to preclude safe disposal of nuclear wastes in geological formations. All necessary process steps for immobilizing high- and low-level wastes have been developed, and there are no technical barriers to their implementation. Geological emplacement can be carried out with standard mining techniques. There is still some controversy about the assured integrity of the backfill.
>
> "The main problems with geological waste disposal are site-specific: characterizing sites that exhibit a high degree of stability, transmit water only by pore flow, and offer no ready access to groundwater. Storage of waste at such sites would engender much smaller risk to the public than that of routine emissions from the rest of the fuel cycle. Routine emissions from the nuclear fuel cycle are generally recognized to present very small risks to health." Final Report of the Comm. on Nuclear and Alternative Energy Systems, Energy in Transition, 1985-2010, p. 221.

The federal government has reviewed in depth the technology required to dispose of high-level wastes, with the help of approximatley 200 experts from national laboratories, industry, and universities. This extensive technology is documented in great detail in an authoritative report which concludes that:

"The information contained in this document shows that all technologies needed to manage radioactive wastes from the back-end of the commercial light-water fuel cycle are commercialized, available, or under development; there are no gaps." (Emphasis added.) U.S. Energy Research and Development Administration, Alternatives for Managing Wastes from Reactors and Post-Fission Operations in the LWR Fuel Cycle (ERDA 76-43) (May 1976).

After extensive analysis, the Study Group on Nuclear Fuel Cycles and Waste Management of the American Physical Society concluded:

"For all LWR fuel cycle options, safe and reliable management of nuclear waste and control of radioactive effluents can be accomplished with technologies that either exist or involve straight-forward extension of existing capabilities ... Effective long-term isolation for spent fuel, high-level or transuranic waste can be achieved by geologic emplacement." Report to the American Physical Society by the Study Group on Nuclear Fuel Cycles and Waste Management, Review of Modern Physics 50:1, Part II (Jan. 1978), pp. S5-S6.

The concepts of subsurface storage have been endorsed by the Committee of Radioactive Waste Management, National Academy of Sciences, for over twenty years.

The following studies by the National Academy of Sciences also support this conclusion:

(1) National Academy of Sciences/National Research Council, Final Report of the Committee on Nuclear and Alternative Energy Systems, Energy in Transition 1985-2010 (1979).

(2) National Academy of Sciences, Division of Earth Sciences, Committee on Waste Disposal, The Disposal

of Radioactive Waste on Land, NAS-NRC Publication 519 (1957).

(3) National Academy of Sciences, Committee on Radioactive Waste Disposal, Geologic Criteria for Repositories for High-Level Radioactive Wastes (August 3, 1978).

(4) National Academy of Sciences/National Research Council, Report of the Committee on Radioactive Waste Management, Solidification of High-Level Radioactive Wastes (1979).

The study "Nuclear Power Issues and Choices" (January 1977) sponsored by the Ford Foundation, reached the following conclusion on the adequacy of waste disposal technology:

> "We are convinced that nuclear waste and plutonium can be disposed of permanently in a safe manner. If properly buried underground in geologically stable formations, there is little chance that these materials will re-enter the environment in dangerous quantities."

The International Nuclear Fuel Cycle Evaluation Working Group 7 (INFCE), concluded:

> "Employing technology as assumed, the management and disposal of radioactive wastes from any of the fuel cycles studied can be carried out with a high degree of safety and without risk to man or the environment." INFCE/WC.7/27/Rev., Sept. 20, 1979. Waste Management & Disposal for Selected Nuclear Fuel Cycle, pp. 14-15.

In 1977, Canada's Department of Energy, Mines and Resources commissioned a group of independent experts to study the long-term storage of radioactive wastes. This study was completed in August, 1977, and the results published in a report entitled "Management of Canada's Nuclear Wastes."

The study group recommended that the Canadian government develop a draft plan that should be submitted for federal provincial discussions that would lead to its adoption as a national plan. The group concluded that the prospects were good for the safe, permanent disposal of reactor wastes and irradiated fuel since they foresaw no environmental or health impacts once these radioactive materials have been placed in carefully selected repositories.

The DOE, in its recent Draft Environmental Impact Statement (EIS) on the Management of Commercially Generated Radioactive Waste, stated:

> "Thus far, the deep geologic disposal option has been discussed in detail, and the data indicate that no major obstacles exist to the successful development of this option in a safe, cost-effective and timely manner.... The hazards of geologic isolation have also been studied and qualitatively characterized using hazard indices and consequences analysis. This work has suggested that the risks of geologic isolation are acceptable. U.S. Department of Energy, Draft Environmental Impact Statement for the Management of Commercially Generated Radioactive Waste, DOE/EIS-0046-D, Washington, D.C. (Apr. 1979), pp. 1.23, 3.1.64.

The actual tests and the numerous studies establish that the disposal of nuclear waste is feasible and requires only that the government act to utilize the knowledge already possessed and to continue to develop improved techniques for solving the problem.

IV

RADIOACTIVE WASTES AND SPENT FUEL CAN BE, AND IN FACT HAVE BEEN, SAFELY STORED FOR DECADES

The second issue in waste confidence rulemaking is the technical and scientific basis for confidence in the interim (up to 100 years) storage of spent fuel elements. To the degree that storage of spent fuel is practical and technically supported, interim fuel storage adds an additional degree of confidence that a final waste disposal method will be developed and implemented by providing a margin for additional scientific evaluations, regulatory reviews, stepwise construction, and validation. In addition, to the degree that interim fuel storage is technically practical and feasible, the issue of the precise timing and availability of specific facilities becomes a less substantive issue in the waste confidence proceeding. The statement of position with respect to interim storage of spent fuel is summarized below.

A. Radioactive Wastes Have in Fact Been Safely Stored for Decades

The most conclusive proof that radioactive wastes can be safely stored is the undisputed fact that they have been so stored for decades.

United States

Substantial quantities of nuclear waste have been generated in both commercial and defense nuclear activities. The defense-related waste has been chemically separated, handled, and stored on an interim basis for more than 30 years without hazard to the public.

Storage of spent fuel from nuclear power reactors in water basins has long been an accepted practice, having been employed for more than 20 years. Presently all operating light water reactor nuclear power plants have some or all of its spent fuel stored in the water basin located at the plant site. The technology of water pool storage is well developed. The low-level radioactive waste that is generated in spent fuel pool cooling water is readily confined and presents little potential hazard to the health and safety of the public.

In summary, there is no evidence, either by visual observation, by radiation monitoring of pool water and air, or by metallurgical or nondestructive examination, that Zircaloy-clad water reactor fuel is degrading during pool storage, including fuel with up to 20 years of pool residence. Continued storage of spent fuel at reactor sites should be acceptable, even if such storage should be required for a period beyond the time of expiration of the reactor operating license.

Sweden

Sweden has developed a plan (called the KBS-II Plan) for the storage and disposal of spent fuel. This plan calls for a sequence of engineered barrier and natural geologic barriers to limit the escape of radionuclides. The spent fuel is stored for 40 years before emplacement in a repository. 10/

10/ National Academy of Sciences, A Review of the Swedish KBS-II Plan for Disposal of Spent Nuclear Fuel (Jan. 1980).

Swedish investigators have also intentionally drilled into a fuel rod to determine the amount of radioactive gas which would be released if a fuel rod failed during underwater handling operations. The actual gas release was extremely small. 11/

Canada

Canadian spent fuel surveillance includes a program to periodically examine selected Zircaloy nuclear fuel rods. Some of the fuel has been stored since 1962. Based on the absence of detectable cladding deterioration, the investigators suggested that water storage of the fuel over a period of 50 years should present no problem.

The Canadian investigations include looking for potential degradation mechanisms under fuel storage conditions. One such investigation is on the possibility that fission product iodine would cause Zircaloy cladding to degrade on the interior surface. To date, these studies suggest that cladding failure from this source is unlikely. 12/ Canadian investigators have also concluded that water-filled pools are a safe and acceptable means for storing spent fuel for the interim period. 13/ Besides having stored fuel in water-

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11/ U.S. Department of Energy, Statement of Position of the United States Department of Energy, DOE/ER-0007, p. IV-71.

12/ DOE/ER-0007, pp. IV 59-60.

13/ Morgan, W. W., Report by the Committee Assessing Fuel Storage, AECL 5959/1 (Nov. 1979).

filled pools for over 30 years, Canada is also conducting tests using air cooling. 14/

Federal Republic of Germany (FRG)

The FRG has an ongoing spent fuel surveillance program which to date has shown no evidence of cladding deterioration. This program has been in effect for six years. 15/ After five years' storage, reports have been published which indicate that there was no visible leaching of exposed UO_2 at defects in the fuel cladding. 16/

United Kingdom (UK)

The UK, in support of the data base developed for the Windscale reprocessing hearings, made metallurgical examinations on a variety of Zircaloy-clad spent fuels. Although some mild corrosion of ferritic steel mandrels on Zircaloy-clad SGHWR fuel was observed, no evidence of pool-induced corrosion or other degradation was found from either a Canadian Zircaloy-clad fuel bundle or BWRE Zircaloy-clad fuel rods. 17, 18/

Such actual safe storage of radioactive waste is itself conclusive proof justifying the Commission's finding of confidence that storage is possible.

14/ Mayman, S. A., Canadian Experience with Wet and Dry Storage Concepts, AECL-6191 (July 1978).

15/ DOE/ER-0007, p. IV-60.

16/ Johnson, Jr., A. B., Behavior of Spent Nuclear Fuel in Water Pool Storage, BNWL-2256, p. 50 (Sept. 1977).

17/ DOE/ER-0007, p. IV-61.

18/ Johnson, Jr., A. B., BNWL-2256, p. 52.

B. Studies Conducted by Government and Private Scientists Have Concluded that Radioactive Wastes Can Be Safely Stored

Extensive studies on the environmental acceptability of spent-fuel storage have been completed which conclude that such storage is feasible. Both DOE and NRC have assessed the environmental impact of storing spent nuclear fuel. The NRC, in the final EIS concluded that "the storage of LWR spent fuel in water pools has an insignificant impact on the environment, whether such pools are at reactor sites or away therefrom." 19/ DOE also concluded that "the technology of water pool storage is well developed ... radioactive waste that is generated is readily confined and presents little potential hazard to the health and safety of the public." 20/

Conclusions from studies of several independent evaluators have concluded that storage of spent fuel in water for many decades is feasible. The results of these studies have been in general agreement as shown by the following quotations:

> "The favorable storage experience, demonstrated technology, successful handling of fuel with reactor induced defects, benign storage environments, and corrosion-resistant materials offer sufficient bases to proceed with expanded storage capacities and extended fuel storage until questions regarding

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19/ Department of Energy, Study on Spent Nuclear Fuel Storage, Vol. 1, March 1980.

20/ U.S. Nuclear Regulatory Commission, Final Generic Environmental Impact Statement - Handling and Storage of Spent LWR Fuel, NUREG-0575, Aug. 1979.

fuel reprocessing and final storage of nuclear wastes have been resolved. Some surveillance is justified to detect degradation if it becomes significant. Surveillance programs are already underway in several countries." A. B. Johnson, Jr., Nuclear Tech. 43, pp. 165-173.

"Degradation mechanisms such as general corrosion, local corrosion, stress corrosion, hydrogen embrittlement, and delayed hydrogen cracking are not expected to produce degradation to any significant extent for 50 years. The risk of continued degradation of fuel that was defective when put into storage is shown to be small. The manageability of high burnup fuel is good and there is extensive experience and well developed routines for such handling ..." G. Vesterlund and T. Olsson, BNWL-TR-320, May 1978, English Translation of RB78-29, Degradering Meckanismen Vid Bessanglayering Och Hantering au Utbrant Kraftveaktorbransle.

C. Summary and Conclusion on Spent Fuel

Spent fuel can be stored safely either at reactor or away-from-reactor storage sites in an environmentally acceptable manner. Such storage can be accomplished over time periods which will allow for provision of a geological or other suitable repository.

CONCLUSION

ANS, based on its independent review of the statements and references of DOE, generally endorses and supports the statement of position of DOE in this proceeding.

ANS, based on the scientific and technical evidence, concludes that NRC must find that:

(1) Spent nuclear fuel from licensed facilities can be disposed of in a safe and environmentally acceptable manner;

(2) The Federal government's plans for establishing geologic repositories are an effective and reasonable means for developing a safe and environmentally acceptable disposal system;

(3) Spent nuclear fuel from licensed facilities can be stored in a safe and environmentally acceptable manner on-site or off-site until disposal facilities are available; and

(4) Sufficient additional storage capacity for spent nuclear fuel from licensed facilities can be provided as needed.

Having made these findings, the Commission should promulgate a rule providing that the safety and environmental implications of spent nuclear fuel remaining on site after the anticipated expiration of the facility licenses involved need not be considered in individual facility licensing proceedings.

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Respectfully submitted,

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