TO BE ARGUED ON SEPTEMBER 19, 2003

Case No. 02-1116

IN THE

United States Court of Appeals

FOR THE DISTRICT OF COLUMBIA CIRCUIT

STATE OF NEVADA, *et al.*,

Petitioners,

v.

UNITED STATES NUCLEAR REGULATORY COMMISSION,

Respondent.

PETITION FOR REVIEW FROM FINAL DECISIONS AND ACTIONS OF UNITED STATES NUCLEAR REGULATORY COMMISSION

PETITIONERS' FINAL OPENING BRIEF

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CERTIFICATE AS TO PARTIES, RULINGS, AND RELATED CASES

Pursuant to Circuit Rule 28(a)(1), Petitioners respectfully certify as follows:

(A) Parties and *Amici*: As this action involves the direct review of agency regulations, there were no proceedings before the district court. The parties, intervenors, and known *amici* before this Court are as follows:

- Parties: (1) State of Nevada, Petitioner
  (2) Clark County, Nevada, Petitioner
  (3) City of Las Vegas, Nevada, Petitioner
  (4) United States Nuclear Regulatory Commission ("NRC"), Respondent[1]
- Intervenors: The Nuclear Energy Institute ("NEI").
- *Amici*: None.

Because Petitioners are not corporations, associations, joint ventures, partnerships, syndicates, or other similar entities, Circuit Rule 26.1 does not require the filing of a disclosure statement.

[1] In addition to the above-listed parties, the NRC has claimed that the United States of America is an appropriate respondent in this case, and has included the United States as a respondent on its filings in this matter.

(B) Rulings Under Review: Petitioners seek review of the final rules issued by NRC, titled "Disposal of High-Level Radioactive Wastes in a Proposed Geologic Repository at Yucca Mountain, Nevada, 10 C.F.R. Part 63," published at 66 Fed. Reg. 55,732-55,816 (Nov. 2, 2001). A copy of these rules may be found in the Statutory/Regulatory Appendix that Petitioners have filed with this brief.

(C) Related Cases: The matters under review were not previously before this Court or any other court. While Petitioners do not believe that there are any cases pending before the Court that constitute "related cases" within the meaning of the Court's rules, Petitioners note that pending before the Court are two groups of cases, involving different respondents, that, like this case, generally concern issues relating to the proposed nuclear waste repository at Yucca Mountain, Nevada:

- *Nuclear Energy Institute, Inc. v. Environmental Protection Agency*, No. 01-1258 (consolidated with Nos. 01-1268, 01-1295, 01-1425, and 01-1426) (the "EPA Case");
- *State of Nevada, et al. v. United States Department of Energy*, No. 01-1516 (consolidated with Nos. 02-1036, 02-1077, 02-1179, and 02-1196) (the "Recommendations Case").

By order dated November 7, 2002, this Court directed that this case be heard in tandem with the EPA Case and the Recommendations Case, and that the Clerk calendar all three groups of cases for oral argument on the same day or the same week, and before the same panel, in September 2003.

TABLE OF CONTENTS

	Page
TABLE OF AUTHORITIES	vii
GLOSSARY	xiv
JURISDICTION	1
STATEMENT OF ISSUES	1
STATUTORY / REGULATORY APPENDIX	2
STATEMENT OF THE CASE	3
STATEMENT OF FACTS	5
A. NRC's "Waste Confidence" Review	5
B. NRC Addresses Waste Disposal Licensing	7
C. NRC's "Waste Confidence" Review – Round Two	8
D. DOE's 1980 Environmental Impact Statement	9
E. NRC's Technical Licensing Criteria	10
F. The Congressional Response	12
G. The NWPA	15
H. Original Repository Rulemaking	17
1. The NRC Licensing Rule	18
2 The DOE Siting Rule	23
I. The 1987 NWPA Amendments ("NWPAA")	24

J. The 1992 Energy Policy Act ("EnPA") 24

K. 1995-96: DOE Discovers Geologic Flaws at Yucca 27

L. NRC Radically Changes Course 30

M. The New Part 63 31

SUMMARY OF ARGUMENT 37

ARGUMENT 39

I. STANDARD OF REVIEW 39

II. PART 63 VIOLATES THE NWPA 42

A. Part 63 Unlawfully Permits Licensing of a Yucca Repository That Fails to Isolate Wastes Primarily by Geologic Means 42

B. Part 63 Violates the NWPA's "Multiple Barrier" Requirement 47

C. Rejection of Defense-in-Depth for Yucca is Arbitrary and Unreasonable 50

III. PART 63 UNLAWFULLY AUTHORIZES REPOSITORY CONSTRUCTION WITHOUT ANY FINDING OF COMPLIANCE WITH EPA'S YUCCA RULE 54

IV. PART 63 VIOLATES THE NWPA, THE AEA, AND NEPA BY PRECLUDING CONSIDERATION OF PEAK DISPOSAL RISKS, ARBITRARILY LIMITING COMPLIANCE TO 10,000 YEARS 57

A. The AEA 59

B. NEPA 61

C. NRC's Decision Is Arbitrary and Incompatible with its Statutory Duties 62

V. PART 63 ARBITRARILY APPLIES A LAX "REASONABLE EXPECTATION" STANDARD FOR REPOSITORY PERFORMANCE INSTEAD OF THE "REASONABLE ASSURANCE" STANDARD ADOPTED BY THE NWPA, THE AEA, AND EMPLOYED PERVASIVELY IN NRC'S REGULATIONS 66

CONCLUSION 75

TABLE OF AUTHORITIES

Cases	Page
ACLU v. FCC, 823 F.2d 1554 (D.C. Cir. 1987)	40
American Bankers Ass'n v. National Credit Union Admin., 271 F.3d 262 (D.C. Cir. 2001	41
Animal Legal Def. Fund v. Glickman, 204 F.3d 229 (D.C. Cir. 2000)	41
Board of Governors v. Dimension Fin. Corp., 474 U.S. 361 (1986)	40
Camp v. Pitts, 411 U.S. 138 (1973)	71
Carstens v. NRC, 742 F.2d 1546 (D.C. Cir. 1984)	67
* *Chevron U.S.A., Inc. v. NRDC*, 467 U.S. 837 (1984)	39, 40
* *FDA v. Brown & Williamson Tobacco Corp.* 529 U.S. 120 (2000)	39, 44
Flint Ridge Dev. Co. v. Scenic Rivers Ass'n, 426 U.S. 776 (1976)	61
Greyhound Corp. v. ICC, 551 F.2d 414 (D.C. Cir. 1977)	70
J.E.M. Ag Supply v. Pioneer Hi-Bred Int'l, 534 U.S. 124 (2001)	47
Minnesota v. NRC, 602 F.2d 412, 419 (D.C. Cir. 1979)	9
Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto Ins. Co., 463 U.S. 29 (1983)	41, 64
National Labor Relations Bd. Union v. FLRA, 834 F.2d 191 (D.C. Cir. 1987)	39
New England Coalition on Nuclear Pollution v. NRC, 727 F.2d 1127 (D.C. Cir. 1984)	64

Authorities upon which Petitioners chiefly rely are marked with asterisks

North Anna Envt'l Coalition v. NRC, 533 F.2d 655 (D.C. Cir. 1976) 66, 71

NRDC v. Browner, 57 F.3d 1122 (D.C. Cir. 1995) 41

NRDC v. EPA, 824 F.2d 1258 (1st Cir. 1987) 46

NRDC v. NRC, 582 F.2d 166 (2d Cir. 1978) 6

Oil, Chem.& Atomic Workers Int'l Union v. NLRB, 547 F.2d 598 (D.C. Cir. 1976) 70

Posadas v. National City Bank, 296 U.S. 497 (1936) 47

Power Reactor Dev. Co. v. International Union of Elec., Radio, & Machine Workers, 367 U.S. 396 (1961) 66, 71

Republican Nat'l Comm. v. FEC, 76 F.3d 400 (D.C. Cir. 1996) 70

Steadman v. SEC, 450 U.S. 91 (1981) 67

Time Warner Entertainment Co. v. FCC, 56 F.3d 151 (D.C. Cir. 1995) 40

Union of Concerned Scientists v. NRC, 735 F.2d 1437 (D.C. Cir. 1984) 61

Union of Concerned Scientists v. NRC, 824 F.2d 108 (D.C. Cir. 1987) 74

WLOS TV, Inc. v. FCC, 932. F.2d 993 (D.C. Cir. 1991) 70

Statutes

* National Environmental Policy Action §102(2)(C) 42 U.S.C. §4332(2)(C) 61

Atomic Energy Act, 42 U.S.C. §2011 *et seq.*

AEA §57c (42 U.S.C. §2077c) 60
AEA §181 (42 U.S.C. §2231) 67
AEA §189a (42 U.S.C. §2239a) 61

Energy Policy Act of 1992

EnPA §801(a)(1) 24, 25, 59
EnPA §801(a)(2) 25
EnPA §801(b) 55
EnPA §801(b)(1) 25
EnPA §801(b)(2) 25
EnPA §801(c) 58

Nuclear Waste Policy Act of 1982, as amended,
42 U.S.C. §10101 *et seq.*

NWPA §2(4) 16
* NWPA §2(18) 16, 44
NWPA §2(21) 16
NWPA §111(b)(1) 22, 67, 68
* NWPA §112(a) 16, 17, 45, 46
* NWPA §113(b)(1)(A)(iv) 45
* NWPA §113(c) 45, 46
NWPA §113(c)(3) 24, 45
NWPA §114(f)(4) 61
NWPA §114(f)(5) 61, 62
NWPA §119(a)(1)(A) 1
NWPA §119(c) 1
NWPA §121(a) 55
* NWPA §121(b) 55, 66
NWPA §121(b)(1)(A) 17
* NWPA §121(b)(1)(B) 17, 47

5 U.S.C. §556(d) 67

5 U.S.C. §706 41

42 U.S.C. §5842 8

Legislative History

H.R. REP. NO. 97-491, Part 1 15

H.R. REP. NO. 97-785, Part I (1982) 15

H.R. REP. NO. 102-1018 (1992) 65

H.R. REP. NO. 1156, Part 1 (1980) 12

H.R. REP. NO. 1156, Part 2 (1980) 14

H.R. REP. NO. 3809 15

H.R. REP. NO. 7418 ..... 12, 13

S. REP. NO. 548 (1980) 13

S. REP. NO. 96-871 (1980) 13

S. REP. NO. 97-282 (1981) 14

Regulations and Regulatory Materials

10 C.F.R. §2.732 66

10 C.F.R. §40.2(a) 58

10 C.F.R. Part 50 48

10 C.F.R. §50.35(a) 11

10 C.F.R. §50.40 (a) 11, 66

10 C.F.R. §51.109 62

10 C.F.R. Part 52 30

* 10 C.F.R. Part 60 ..... *passim*

10 C.F.R. §60.31(a) 66

10 C.F.R. §60.111(a)(1) 11

10 C.F.R. §60.111(c)(1) 11

10 C.F.R. §60.111(c)(2) 11

10 C.F.R. §60.111(c)(4)(ii) 11

10 C.F.R. §60.111(c)(4)(iii) 11

10 C.F.R. §60.113(a)(2) 22

10 C.F.R. §61.23 66

10 C.F.R Part 63 ..... *passim*

10 C.F.R §63.3(a) 56

10 C.F.R §63.3(b) 56

10 C.F.R. §63.31 55

10 C.F.R. §63.31(a)(2) 69

10 C.F.R. §63.31(a)(3)(iii) 56

10 C.F.R. §63.31(b) 73

10 C.F.R. §63.41 56

10 C.F.R. §63.101 56

10 C.F.R. §63.101(a)(1) 64

10 C.F.R. §63.101(a)(2) 69

10 C.F.R. §63.102(h) 49

10 C.F.R. §63.113 ..... 43, 49

10 C.F.R. §63.113(b) 49

10 C.F.R. §63.115 ..... 43, 49

10 C.F.R. §63.303 56

10 C.F.R. §63.304 ..... 69, 70

10 C.F.R. §63.304(4) 71

10 C.F.R. §63.305 63

10 C.F.R. §63.311 69

10 C.F.R. §63.312 63

10 C.F.R. §63.321(b) 69

10 C.F.R. §63.331 69

10 C.F.R. §63.341 ..... 57, 61

10 C.F.R. §72.40(a)(14) 66

10 C.F.R. §100.11 48

10 C.F.R. Part 960 17

10 C.F.R. §960.4-2-1(d) 24

40 C.F.R. Part 191 17

40 C.F.R. Part 197 54

40 C.F.R. §197.13 54

40 C.F.R. §1500.1(b) 62

40 C.F.R. §1502.9 62

42 Fed. Reg. 34,391 6

43 Fed. Reg. 53,869 7

44 Fed. Reg. 70,408 8

45 Fed. Reg. 31,393 ..... 10, 11, 49

46 Fed. Reg. 13,971 18

46 Fed. Reg. 35,280 ..... 18, 19, 57

48 Fed. Reg. 28,194 ..... *passim*

49 Fed. Reg. 34,658 9

49 Fed. Reg. 47,714 23

55 Fed. Reg. 38,474 9

60 Fed. Reg. 42,622 51

66 Fed. Reg. 32,074 ..... 57, 65

Other

Duke Power Co., 17 N.R.C. 1041 (1983)..... 66

Maine Yankee Atomic Power Co., 6 A.E.C. 1003 (1973)..... 74, 75

Northern States Power Co., 7 N.R.C. 41 (1978) 8

Pacific Gas & Elec. Co., 19 N.R.C. 571 (1984) 67, 73

GLOSSARY

ACNW – Advisory Committee on Nuclear Waste

AEA – Atomic Energy Act

APA – Administrative Procedure Act

DOE – United States Department of Energy

EIS – Environmental Impact Statement

EnPA – Energy Policy Act (1992)

EPA – Environmental Protection Agency

ERA – Energy Reorganization Act of 1974

FEIS – Final Environmental Impact Statement

JA – Joint Appendix

NAS – National Academy of Sciences

NEPA – National Environmental Policy Act (1969)

NRDC – Natural Resources Defense Council

NRC – United States Nuclear Regulatory Commission

NWPA – Nuclear Waste Policy Act of 1982. Citations to the NWPA in this brief are to the Public Law section rather than to the United States Code section. A copy of the NWPA, as amended, with cross-references to the Code sections (*e.g.*, NWPA §113 is codified at 42 U.S.C. §10133; NWPA §114 is codified at 42 U.S.C. §10134), is included in the statutory / regulatory appendix filed with this brief).

NWPAA – Nuclear Waste Policy Act Amendments of 1987.

SuppApp – Supplemental Appendix

JURISDICTION

This action challenges regulations ("Part 63") issued by the Nuclear Regulatory Commission ("NRC") pursuant to the Nuclear Waste Policy Act ("NWPA") on November 2, 2001. Jurisdiction derives from NWPA Section 119(a)(1)(A). This action was timely filed (April 11, 2002) under NWPA Section 119(c).[1]

STATEMENT OF ISSUES

(1) Whether Part 63 violates the NWPA by failing to require the Department of Energy ("DOE") to demonstrate to NRC that the repository's geologic setting forms the primary barrier for isolation of wastes buried at Yucca Mountain, Nevada ("Yucca");

(2) Whether Part 63 violates the NWPA's "multiple barrier" requirement that a repository function through the efficacious performance of independent barriers (natural and man-made) in a multiple-barrier containment system, consistent with NRC's traditional "defense-in-depth" philosophy for these barriers;

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[1] Respondent earlier filed a motion to dismiss arguing that its regulations are not covered by NWPA's judicial review provisions. The Court deferred consideration of jurisdictional issues, so Petitioners will respond in their reply brief to any jurisdictional arguments raised in Respondent's brief.

(3) Whether Part 63 violates the NWPA in failing to require that, before a construction authorization can be issued, there must be an NRC finding of compliance with relevant Environmental Protection Agency ("EPA") standards;

(4) Whether Part 63 Violates the NWPA, the Atomic Energy Act ("AEA"), and the National Environmental Policy Act ("NEPA") by precluding consideration of the period when radiation doses to individuals in the accessible environment from Yucca will be highest; and

(5) Whether Part 63 is arbitrary and capricious because it applies a lax "reasonable expectation" standard of proof for the repository's safety performance instead of the "reasonable assurance" standard pervasive in NRC's practice, implicit in the AEA, and adopted by the NWPA.

STATUTORY / REGULATORY APPENDIX

Pertinent statutes and regulations are compiled in a separately bound appendix hereto.

STATEMENT OF THE CASE

Petitioners challenge NRC regulations governing the licensing of the nation's permanent nuclear waste repository at Yucca. Those regulations, 10 C.F.R. Part 63, conflict with key provisions of the NWPA, AEA, and NEPA, and are also arbitrary and capricious.

With the NWPA, Congress answered this question: How are we to isolate highly radioactive waste from the human environment for the almost unimaginable time necessary for its toxic properties to diminish to safe levels? Based on the informed judgment of the scientific community and government agencies, Congress concluded the best course was to put the waste in packages as formidable as engineers could devise, *but*, as a mandate for longer-term assurance, bury it deep underground in isolating rock formations. Thus, the animating idea behind the NWPA was to dispose of waste through a sequence of multiple, independent "barriers," both man-made and natural, with the geologic barrier being the primary one.

Congress charged NRC with the responsibility, after a site suitable under the NWPA's standards was selected, to license construction and operation of the repository. Due to the expense of evaluating

several sites, in 1987 Congress focused the government's efforts to find a suitable site on Yucca, but Congress neither changed the relevant standards nor mandated that the Yucca site be licensed.

By the late 1990s, data from DOE's "site characterization" work showed that Yucca's physical characteristics would disqualify it from development as a repository. Faced with this prospect, both DOE and NRC decided to abandon their long-held views regarding the statutory and regulatory requirements applicable to any Yucca repository, and to adopt new, and much lower, standards.

In particular, NRC adopted new repository licensing rules applicable only to Yucca. Part 63 authorized the licensing of Yucca even if DOE cannot demonstrate that Yucca's physical characteristics will provide the primary waste isolation capability, or that the repository has incorporated multiple, independent barriers to prevent release of wastes. Instead, Part 63 allows Yucca to be licensed on the basis of an assessment of how effectively the "total" repository "system" will work; a license may be granted even though so-called engineered barriers would provide virtually all the protection against releases of wastes to the public and environment during the prescribed regula-

tory compliance period, discounting the hundreds of thousands of years they will remain lethal. Part 63 also unlawfully lowers the standard of proof that DOE must meet to demonstrate the repository's long-term safety, dropping the "reasonable assurance" standard that NRC has traditionally employed (and continues to employ in other contexts) and that is expressly contemplated by the NWPA, and substituting a vague, watered-down "reasonable expectation" standard. NRC's radical new approach to licensing irreconcilably conflicts with the clear commands of numerous statutory provisions, including the NWPA's requirements mandating primary geologic isolation of waste and the use of multiple independent barriers, and it is also arbitrary and capricious.

STATEMENT OF FACTS

A. NRC's "Waste Confidence" Review

In 1957, the National Academy of Sciences ("NAS") completed the nation's first comprehensive study of the management and disposal of high-level nuclear waste and spent fuel. SuppApp-1-2. The central recommendation of NAS for disposal, "deep geologic isola-

tion," became the cornerstone of every repository program in the world.

In 1977, a petition for rulemaking prompted NRC to grapple with disposal and its relation to nuclear plant licensing. In a move that threatened to jeopardize the nuclear option, the petitioner requested NRC to determine "whether radioactive wastes ... can be ... disposed of without undue risk to the public health and safety," claiming such review was required under the AEA. *See generally* 42 Fed. Reg. 34,391. NRC was also requested, absent a "definitive finding of safety," to refrain from granting further plant operating licenses.

NRC denied the petition on grounds it had "reasonable confidence" wastes could and would eventually be disposed of in geologic repositories. *Id.* Importantly, NRC committed that it "would not continue to license reactors if it did not have reasonable confidence that the wastes can and will in due course be disposed of safely." *Id.* On review, the Second Circuit upheld NRC's decision, expressly citing NRC's "confidence." *NRDC v. NRC*, 582 F.2d 166 (2d Cir. 1978).

B. NRC Addresses Waste Disposal Licensing

Against this "waste confidence" decision and a policy vacuum prevailing since the NAS report, NRC took matters into its own hands in 1978, announcing in a "Proposed General Statement of Policy" that it was considering establishing licensing criteria for "geologic high-level waste repositories." 43 Fed. Reg. 53,869.[2]

From this early look by NRC at repository licensing, two conclusions emerged. First, "the suitability of the site becomes crucial, for the integrity of the site itself is essential to assure containment of the radioactive materials...." *Id.* at 53,870. Second, consistent with its longstanding standard of proof under the AEA, NRC would permit DOE to construct the repository only upon a finding "that there is *reasonable assurance*" that "the site is suitable" and disposal will not pose an "unreasonable risk to the health and safety of the public...." *Id.* at 53,871 (emphasis added).

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[2] From the beginning, NRC was uncertain whether it had the statutory authority to license waste disposal by DOE. *See id.* at 53,870.

With no intervening action by Congress over the ensuing year, NRC issued a proposed repository licensing rule. 44 Fed. Reg. 70,408.[3] Only the procedural aspects of the rule were proposed, with technical criteria to follow. *Id.* at 70,411. The new rule was to be codified at 10 C.F.R. Part 60.

C. <u>NRC's "Waste Confidence" Review - Round Two</u>

When several utilities sought NRC approvals later in 1978 to expand spent fuel storage facilities on their reactor sites, opponents argued that, without a finding whether and when spent fuel could be transported off-site for safe disposal, NRC's NEPA reviews associated with the expansions would have to include impacts associated with long-term, possibly perpetual on-site storage. Relying on its 1977 "reasonable confidence" finding, NRC again rejected this argument. *Northern States Power Co.*, 7 N.R.C. 41 (1978).

On review, this Court ruled that NRC could make a generic "waste confidence finding" in a rulemaking proceeding, thereby

[3] NRC strained to resolve the uncertainty over its jurisdiction by simply interpreting its licensing authority over "storage" facilities as used in Sections 202(3) and (4) of the Energy Reorganization Act of 1974, 42 U.S.C. §5842(3), (4) ("ERA"), to include "disposal." *Id.* at note 1.

avoiding case-by-case litigation of disposal safety in reactor licensing. *Minnesota v. NRC*, 602 F.2d 412, 419 (D.C. Cir. 1979). NRC accordingly commenced a "Waste Confidence proceeding," eventually concluding that a geologic repository would be available in due course. 49 Fed. Reg. 34,658. NRC has since periodically updated its waste confidence decision to reflect actions by Congress and DOE. *See, e.g.*, 55 Fed. Reg. 38,474. NRC has never wavered from its commitment that it "would not continue to license reactors" if its confidence in the success, timeliness and safety of a geologic repository were eroded.

D. <u>DOE's 1980 Environmental Impact Statement</u>

In February 1980 the President ordered DOE to prepare a full Environmental Impact Statement ("EIS") so as to recommend a long-term national high-level waste disposal strategy. SuppApp-5. In the end, the solution proposed by DOE was disposal "in mined repositories in geologic formations," SuppApp-8, which would be so effective that "it is extremely improbable that wastes in biologically important concentrations would *ever* reach the human environment." SuppApp-6 (emphasis added). DOE emphasized that "[m]ultiple barriers are in-

tended to act independently to prevent waste migration and enhance isolation." SuppApp-9.

DOE evaluated the length of time the geologic setting should be capable of containing wastes to ensure long-term safety, advocating an isolation target of *250,000 to 500,000 years* because of lethal long-lived isotopes like plutonium in spent fuel. SuppApp-11-12.

E. <u>NRC's Technical Licensing Criteria</u>

In 1980, NRC issued its "Technical Criteria for Regulating Geologic Disposal of High-Level Radioactive Waste," 45 Fed. Reg. 31,393, to accompany the procedural requirements of Part 60. NRC's early technical criteria provided the first view of what it believed were the *scientific* prerequisites to a repository that would, under the AEA, provide reasonable assurance of adequate protection of the public health and safety. Especially noteworthy is NRC's view of the role of engineered barriers, and the evaluation of physical site conditions, in assessing long-term repository performance.

> [F]or this final period it would be imprudent to rely on engineering to contain the emplaced wastes; and final protection is achieved by the ability of the geologic setting to inhibit migration of the wastes leached from the waste form in a controlled manner.

45 Fed. Reg. at 31,395.

After considering whether to evaluate the repository's natural and engineered isolation barriers independently, or as a "system," or both, NRC concluded, "It is evident that for a *geologic* repository, the geologic setting must be one barrier." *Id.* at 31,396 (emphasis added). But due to uncertainties in predicting performance over long periods, multiple barriers should function independently and - at least during the early years of repository operation - redundantly, to assure waste isolation. *Id.*

The traditional "reasonable assurance" standard was employed pervasively in the proposed criteria.[4] *Id.* at 31,400 (§§60.111(a)(1), (c)(1) and (c)(2)). DOE was to provide "reasonable assurance that the site exhibits properties which promote isolation ...," *id.* (§60.111(c)(4)(ii)), as well as "reasonable assurance that the hydrologic and geochemical properties of the host rock and surrounding confining units will provide radionuclide travel times to the accessible environment of at least 1000 years...." *Id.* (§60.111(c)(4)(iii)).

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[4] NRC had been applying this same standard for years in licensing reactors. *See* 10 C.F.R. §§50.35(a) and 50.40(a).

F. The Congressional Response

In 1980, Congress formulated proposed waste disposal legislation with H.R. 7418, offered by the House Science Committee, and with S. 2189 in the Senate Energy Committee.

In the House bill, DOE was to nominate demonstration sites "using criteria based on the principle that the primary means of preventing the release of waste to the biosphere are engineered barriers.... Primary reliance *on geology* which *can assure* that uncontained waste will be *completely isolated* from the biosphere is not required." H.R. REP. NO. 1156, pt. 1, at 17-18 (1980) (emphasis in original).

The view that engineered barriers were sufficient for isolation reflected the presumption at this time that *all* the wastes being buried would be reprocessed wastes from spent fuel, *not* the spent fuel itself. *Id.* at 25. The Committee pointed to "reduced geological requirements" for "repositories which are to be used only for reprocessed high-level wastes and which emphasize engineered barriers." *Id.* at 27. DOE opposed the bill on grounds that it was scientifically inappropriate to place primary reliance on engineered barriers *even for repositories without spent fuel*. *Id.* at 37.

Recognizing the nation's policy shift away from reprocessing, the Senate Energy Committee reported S. 2189, which proposed repositories for disposal of unreprocessed spent fuel. S. REP. NO. 548, at 11 (1980). In a separate bill, the Senate Environment Committee, at DOE's urging, emphasized both natural and engineered barriers, noting that:

> [i]n explaining this conservative, defense-in-depth approach to repository design, [DOE] states:
>
> > "The multibarrier concept requires that the success of the system be protected against deficient barrier performance or failure by using a series of relatively independent and diverse barriers that would not be subject to a common mode of failure. Barrier multiplicity is required both as a hedge against unexpected occurrences or failures and to provide an appropriate means for protecting against a wide variety of potentially disruptive events. Acceptable system performance must not be contingent on the performance of any non-independent barrier combinations."

S. REP. NO. 96-871, at 3-4 (1980).

In the summer of 1980, the House Interior Committee reported a revised version of H.R. 7418. Recognizing that "the option to reprocess spent nuclear fuel is presently foreclosed to the nuclear industry,"

the Committee concluded "it is necessary at this time to do preliminary planning on the basis of geologic disposal of spent fuel." H.R. REP. NO. 1156, pt. 2, at 2 (1980). The Committee explained:

> The form of the waste itself and engineered barriers will provide the first level of defense against release of radionuclides. But locating appropriate rock formations, and gathering data to adequately confirm their ability to provide protection over very long periods of time, are crucial elements of the repository development program.

Id. at 29.

This dramatic turnaround was the result of Congressional recognition that disposal of unreprocessed spent fuel presented a far more dangerous and longer-term risk. The Committee noted, for example, that some isotopes would need "to be isolated for at least 245,000 years." *Id.* at 13.

> [T]he ability of any man-made containers to endure for a quarter of a million years is obviated by the fact that the ultimate barrier which prohibits the release of any radioactivity into the biosphere is the geologic media itself.

Id. at 14. *See also id.* at 29.

In 1981, Senate committees reported a new bill containing provisions for "deep geologic repositories capable of accommodating either high-level nuclear waste or spent fuel." S. REP. NO. 97-282, at

6-7 (1981). This meant geologic isolation would remain the primary requirement for site suitability, a position codified in the April 27, 1982 House version of the nuclear waste bill, H.R. 3809. *See* H.R. REP. NO. 97-491, pt. 1, at 4 ("Such Guidelines shall specify detailed geologic considerations that shall be primary criteria for the selection of sites in various geologic media."), 50 (1982). This exact language persisted through numerous revisions of the proposed legislation and ultimately was incorporated into the NWPA.

Congress was explicit about the "essential elements of the program" it was codifying in the NWPA:

> Commitment to a waste disposal technology relying on primary geologic containment provided by a solid rock formation located deep underground, together with containment by engineered barriers including the form and packaging of the nuclear waste, which will provide safe containment of the waste without reliance on human monitoring and maintenance after an initial period of testing and subsequent closure of the repository.

Id. at 30. *See also* H.R. REP. NO. 97-785, pt. I, at 48 (1982).

G. The NWPA

The NWPA designated three agencies to share independent responsibilities for the assessment and potential development of the

repository. Those responsibilities included site characterization and selection by DOE, establishing radiological and health standards by EPA, and licensing the construction and operation of the repository by NRC.

The NWPA prescribed a two-step process leading to repository development. First, DOE would determine whether the site was suitable for an NRC license application under Sections 113 and 112, and second, NRC would confirm the site's suitability and assure compliance with licensing rules under Sections 114 and 121(b). Only then could NRC grant a construction permit.

Reflecting its history and purpose, the NWPA defines the "repository" as a system for "permanent deep geologic disposal." NWPA §2(18). "Candidate sites" are defined as areas "within a geologic and hydrologic system" that undergo DOE site characterization, NWPA §2(4), which, in turn, means DOE activities "undertaken to establish the geologic condition" of a candidate site. NWPA §2(21). Section 112(a), reflecting in large measure the precepts embodied in NRC's previously proposed Part 60 technical criteria, required DOE to establish guidelines for the selection of sites, which "shall specify de-

tailed geologic considerations that shall be primary criteria" for site selection. Moreover, "[s]uch guidelines shall specify factors that qualify or disqualify any site from development as a repository, including factors pertaining to ... hydrology, geophysics [and] seismic activity...." NWPA §112(a).

The NWPA required NRC to promulgate technical criteria for licensing Yucca, and that such criteria "shall provide for the use of a system of multiple barriers in the design of the repository." NWPA §121(b)(1)(B). These criteria were to govern successive DOE applications "for authorization to construct repositories," "for licenses to receive and possess ... [wastes] at such repositories," and "for authorization for closure and decommissioning of such repositories." NWPA §121(b)(1)(A).

H. Original Repository Rulemaking

DOE, NRC, and EPA each undertook to publish rules to discharge their obligations. *See* 10 C.F.R. Parts 960 and 60, and 40 C.F.R. Part 191, respectively.

1. The NRC Licensing Rule

Even while Congress was still considering proposed nuclear waste disposal legislation, NRC finalized its Part 60 repository licensing rule in February 1981. 46 Fed. Reg. 13,971. The technical standards NRC promulgated did not change materially from those proposed the previous year. Six months later, NRC proposed amendments to Part 60's technical criteria to require adherence by DOE to an overall performance standard for the repository. 46 Fed. Reg. 35,280. NRC cautioned that, although it would require adherence to an overall system standard, this would not obviate the need for DOE *also to satisfy* objective physical siting criteria and to demonstrate the efficacy of multiple independent waste isolation barriers in both the natural and the engineered contexts. *Id.* at 35,281. These and other physical site requirements were needed "to provide confidence that the wastes will be isolated at least as long as they are most hazardous." *Id.* In explaining the site's dominant role, NRC said it

> recognizes that at some point the design capabilities of the engineered system will be lost and that the geologic setting – the site – must provide the isolation of the wastes from the environment, and has translated this re-

> quirement into a performance objective for the geologic setting.

Id. at 35,282. Accordingly, NRC maintained independent "minimum performance objectives for each of the 3 major barriers of the repository" – the waste form itself, the waste package, and the geologic setting. *Id.* at 35,284. In its amended rule NRC defined "geologic setting" as "the spatially distributed geologic, hydrologic, and geochemical systems that *provide isolation* of the radioactive waste. " *Id.* at 35,286 (emphasis added). *See also* SuppApp-36. The "geologic setting acting alone" would provide the requisite isolation capability over the long term. SuppApp-28.

In every version of its proposed and final licensing rule, and in all versions of the rule over the next 18 years, NRC was clear that two distinct findings would be necessary before license issuance: (1) that the repository complied with generally applicable radiological protection standards for disposal that were to be promulgated by the EPA; and (2) that the repository afforded reasonable assurance of adequate protection of the health and safety of the public. *See, e.g.*, 46 Fed. Reg. at 35,281, 35,284, 35,288; SuppApp-20.

Following enactment of the NWPA, NRC promulgated a revised final rule, again as Part 60, to conform to the NWPA's requirements. 48 Fed. Reg. 28,194-95. In re-publishing its technical licensing criteria for repositories, NRC recognized it was now acting "as required by the [NWPA]."[5] *Id.* at 28,194.

In its final rule, NRC evidenced its deep understanding of the nature of a "geologic" repository as specified in the NWPA by revising the very definition of "geologic repository" in Part 60 so as "to bring the terminology into line with common usage." *Id.* at 28,205. "The new definition," NRC said, "includes only that portion of the geologic setting that provides isolation - not the entire geologic setting." *Id.* "The term, as defined, is considered to be synonymous with 'repository' as defined at Section 2(18) of the [NWPA]." *Id.*

In publishing Part 60, NRC also confirmed that NWPA Section 121(b)(1)(B) had attached a statutory imprimatur to its longstanding "multiple barrier" concept by providing that NRC's technical criteria

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[5] NRC stressed that it "regards the publication of these rules as constituting full compliance with Section 121(b)(1)(A) of the [NWPA], which requires promulgation of the Commission's technical criteria for geologic repositories." *Id.* at 28,195.

"shall provide for the use of a system of multiple barriers in the design of the repository...." *Id.* at 28,195 n.2 (quoting NWPA §121(b)(1)(B)). That requirement was implemented in new Part 60 "by a number of performance objectives and by more detailed siting and design criteria." *Id.* at 28,195. *See also id.* at 28,223. NRC made clear that multiple barriers were to be evaluated and to function independently, so as to provide the requisite "defense-in-depth." *Id.* at 28,195-96.

Notably, DOE had earlier urged NRC to adopt just a single "total system performance" criterion as the sole litmus test for repository licensing. SuppApp-30. In publishing the final Part 60, NRC said it "recognized arguments" such as DOE's but concluded that if it "were simply to adopt the EPA standard as the sole measure for performance, it would have failed to convey in any meaningful way the degree of confidence which it expects must be achieved in order for it to be able to make the required licensing decisions." 48 Fed. Reg. 28,196.

Finally, NRC maintained its view that it was required to determine "with *reasonable assurance* that the proposed EPA standard has been satisfied." 48 Fed. Reg. at 28,197, 28,204 (emphasis added). In-

deed, reflecting NRC's practices and the early version of Part 60, the NWPA cited as its first "purpose" the establishment of repositories "that will provide a *reasonable assurance* that the public and the environment will be adequately protected from the hazards posed by high-level radioactive waste and such spent nuclear fuel ...." NWPA §111(b)(1) (emphasis added). According to NRC:

> The reasonable assurance standard is derived from the finding the Commission is *required to make* under the [AEA] that the licensed activity provide "adequate protection" to the health and safety of the public; the standard has been approved by the Supreme Court.

48 Fed. Reg. at 28,204 (citing *Power Reactor Dev. Co. v. Electrical Union,* 367 U.S. 396, 407 (1961)) (emphasis added).

NRC also retained a requirement in its rule that the geologic setting must exhibit sufficient isolation so that groundwater will take at least 1000 years to travel from the repository to the accessible environment along the fastest likely pathway. NRC called this standard "an essential component of the defense-in-depth concept as applied to waste disposal," and "an invaluable measure of the quality of the geologic setting." JA-3. *See* 10 C.F.R. §60.113(a)(2).

2. The DOE Siting Rule

In publishing its first siting rules pursuant to the NWPA in 1984, DOE, like NRC before it, carefully addressed the geologic requirements and the physical qualifying and disqualifying conditions recommended by NAS and the 1980 EIS and required to be specified by NWPA Section 112(a). 49 Fed. Reg. 47,714, 47,718. NRC concurred in DOE's draft regulations, but only upon DOE's promise to specify "that 7engineered barriers cannot constitute a compensating measure for deficiencies in the geologic media" during suitability evaluations. *Id.* at 47,719-20; SuppApp-46. EPA likewise made clear that DOE should "place primary importance on the capabilities of the natural barriers...." SuppApp-38-42; *see also* 49 Fed. Reg. at 47,727.

A key disqualifying condition specified by DOE – mirroring NRC's proposed Part 60 requirement – was that of groundwater travel time. As DOE explained, "The most likely mechanism for the release of radionuclides from a repository to the accessible environment is transport by groundwater." 49 Fed. Reg. at 47,732. Accordingly, like NRC, DOE specified that surface rainwater trickling through Yucca must take no less than 1000 years to descend from the repository

through the dry, "unsaturated" zone and into the water table and the accessible environment. 10 C.F.R. §960.4-2-1(d).

I. The 1987 NWPA Amendments ("NWPAA")

In 1987, Congress amended the NWPA to provide that Yucca would be the only site characterized. Significantly, Congress did not prejudge the site's physical suitability but made clear that "[i]f the Secretary [of Energy] at any time determines the Yucca Mountain site to be unsuitable for development as a repository," he was to terminate all activities and notify Congress. NWPA §113(c)(3). In the NWPAA, Congress did nothing to change the siting requirements enacted in NWPA Section 112(a) or any of the other statutory provisions confirming the primary role to be played by the repository's geologic setting and the need for multiple, independent barriers.

J. The 1992 Energy Policy Act ("EnPA")

With EnPA, Congress resolved a longstanding battle among DOE, NRC, and EPA over how EPA should establish standards for disposal of nuclear wastes. EnPA §801(a)(1). With EnPA, Congress did not alter in any way the provisions of the NWPA dealing with the importance of geologic considerations and multiple barriers. Indeed,

the House Committee which sponsored the legislation emphasized that "[t]he provisions of Section 801 address only the standards of the [EPA], and the comparable regulations of the [NRC], related to protection of the public from releases of radioactive materials.... The provisions of Section 801 are not intended to affect in any way the application of any other existing laws to activities at the Yucca Mountain site." SuppApp-66.

EnPA prescribed a sequence of events that was to occur to implement an EPA radiological standard for the Yucca repository. First, NAS was to study the issue and make a scientific recommendation to EPA. EnPA §801(a)(2). Second, EPA was to promulgate its radiological standard "based upon and consistent with" the NAS recommendation. EnPA §801(a)(1). Third, NRC was to "modify its technical requirements and criteria under section 121(b) of the [NWPA], as necessary, to be consistent with the [EPA standard]." EnPA §801(b)(1). EnPA required NRC's criteria likewise to be consistent with NAS recommendations. EnPA §801(b)(2).

In 1994 and 1995, NRC confirmed repeatedly that nothing in EnPA required it to change its approach to repository licensing, ex-

cept for applying EPA's dose limits instead of less stringent NRC limits. *See, e.g.*, SuppApp-83-91; SuppApp-100-01. Neither did EnPA change anything with respect to the NWPA's requirement for multiple barriers. In 1995, for example, NRC reaffirmed to Nevada that "a geologic setting that failed to meet the specified performance objective would not make the needed contribution to the Commission's confidence that the EPA standard would be satisfied, notwithstanding the use of excellent engineered barriers." SuppApp-107.

Through 1995, NRC continued to defend its "reasonable assurance" and "defense-in-depth" requirements and again admonished DOE not to let engineered barriers mask a poorly performing geologic setting. SuppApp-67-71; SuppApp-73; SuppApp-75-77; SuppApp-78-80. NRC also continued to defend its groundwater travel time requirement. SuppApp-115. This was necessary so that, "in the event our predictions are not successful of the performance as a whole, there will nonetheless be a certain redundancy in how the repository will perform." SuppApp-116. Applying a single performance criterion based on the EPA standard could, despite best intentions, leave too much uncertainty in actual repository performance and would fail to

guard against possible "catastrophic failure" of the engineered barriers, NRC concluded. SuppApp-117-31. "[E]xperience justifies this concern," NRC said, citing the single-performance-criterion failures of the Challenger space shuttle, the Hubble telescope, and the Voyager spacecraft. SuppApp-116-17.

K. 1995-96: DOE Discovers Geologic Flaws at Yucca

DOE had barely begun its site suitability studies at Yucca when it made a series of dramatic discoveries in 1995-96 that cast grave doubt on the ability of Yucca's natural setting to contain radioactive wastes. Ominous results were pouring in from studies in a tunnel DOE had bored deep into the Yucca unsaturated zone. Geologists discovered previously unsuspected "fast flow paths" of water through the mountain of less than 50 years. SuppApp-263; SuppApp-449; SuppApp-457.

After further studies, DOE's geologists confirmed that "it has become increasingly evident that flow along fast preferential pathways through fractures is a *significant* and *perhaps the dominant* flow regime in the unsaturated zone," leading to "*travel times of less than 50*

years from the land surface to the saturated zone."[6] SuppApp-452, 453 (emphasis added). Clearly, the site would not meet the groundwater travel time disqualifying condition in both DOE's Part 960 and NRC's Part 60, and would fail what DOE and NRC had believed was the litmus test of any geologic repository.

Faced with these alarming facts, DOE *cancelled* site suitability activities and placed its remaining efforts into developing a repository "system" design that could ostensibly meet the EPA's radiological protection standards through application of a single "total system performance" criterion by relying almost exclusively on engineered barriers. SuppApp-181; SuppApp-220; SuppApp-223; SuppApp-390; SuppApp-214. Recognizing this fundamental departure would require profound regulatory changes, DOE began lobbying NRC and EPA to retool their respective Yucca rules to focus on "system" performance analysis of the engineered barriers in the as-yet-uncharacterized natural setting and to require no independent qualifications related to site features. SuppApp-227; SuppApp-346;

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[6] DOE first conveyed this information to NRC as early as March 1995 in a joint meeting. SuppApp-145-46.

SuppApp-371; SuppApp-404; SuppApp-464; SuppApp-467; SuppApp-494; SuppApp-244-57.

No longer would the Yucca natural setting form the primary isolation barrier. Based on its newest performance analyses, the best DOE could hope for, DOE's Yucca Director told NRC, was that, "under certain assumptions, the natural system by itself *can contribute* to isolation of the radionuclides for a very long time." SuppApp-229. He warned both NRC and EPA that, in effectuating the desired changes to their regulations, "[p]romulgating a standard that cannot be implemented may result in the *de facto* rejection of the Yucca Mountain site...." SuppApp-237. *See also* SuppApp-250.

In revising its Yucca Program Plan to accommodate this sea change, DOE emphasized that "[i]t became increasingly clear that many of the expectations embodied in the [NWPA] could not be met." SuppApp-389. Now, "[w]e will concentrate our near-term design effort on the critical technology requirements of the engineered barriers." SuppApp-623. But no man-made contrivances can be built to last forever. Therefore, DOE urged NRC and EPA not to adhere to the NAS's recommendation, issued in 1996 pursuant to EnPA, that the

regulatory compliance period for Yucca could and should be in the range of one million years. Rather, "DOE recommends a timeframe of no longer than 10,000 years for quantitative compliance." SuppApp-250. The new rules must be "implementable," DOE told NRC. SuppApp-248.

L. NRC Radically Changes Course

For NRC, the seemingly fatal discoveries at Yucca meant more than just a threat to one of its core regulatory missions, employing a substantial and growing percentage of the agency's staff. It meant the possible undoing of NRC's "waste confidence"- and thus the possible cessation of power reactor licensing - at the very time when the industry and government were promising a "nuclear renaissance" in America with a new generation of advanced reactors. *See* 10 C.F.R. Part 52.

Thus, like DOE, NRC scrambled to retool. In June 1996, NRC's Executive Director emphasized to the Commission the need to "refocus" NRC's Yucca licensing regime to account for the "major events" over the past year, SuppApp-392, and to ensure development of "implementable standards." SuppApp-393. To that end, NRC would shift to "a simplified risk-informed regulation specific to Yucca Moun-

tain," *id.*, using a "systems perspective in the evaluation of DOE's waste containment and isolation strategy...." SuppApp-396.

NRC also proposed concurring with the 10,000-year abbreviated compliance period desired by DOE, even though its own Advisory Committee on Nuclear Waste ("ACNW")[7] agreed with NAS that restricting the timeframe to 10,000 years "was without technical or scientific justification," SuppApp-437, and even though NRC knew that, because of Yucca's rapid groundwater travel time, peak radiation doses to the accessible environment from the repository far exceeding any EPA limit would occur only *after* 10,000 years, following failure of still-undesigned engineered barriers, which were claimed by DOE to be capable of lasting 10,000 years. SuppApp-441-44.

M. <u>The New Part 63</u>

By March 1997, NRC's Executive Director Callan formally recommended to the Commissioners that NRC's repository licensing rules be changed for Yucca. SuppApp-471-83. The NRC Staff, he said, "seeks to identify simpler, more straight-forward, easy-to-implement

[7] The ACNW is an independent panel of eminent scientists that advises NRC on waste issues.

requirements." JA-26. Over the objections of ACNW,[8] Callan advocated a new regulatory regime in a memorandum to the Commissioners that became the rationale for Part 63. JA-24-51; SuppApp-496-98 (Commission approval of strategy). The new rule would require demonstration that post-closure performance is achieved using a "system of multiple barriers," but unlike Part 60, it would impose no quantitative requirements on the performance of individual repository systems or components, *i.e.*, there would be no minimum performance requirement, for example, for the site itself. JA-26.

The new rule would require NRC only to verify DOE's adherence to the EPA radiological standard through the "total system performance" of the repository. *Id.* In urging acceptance by the Commission of the new strategy for Yucca alone, Callan fretted over retaining the stricter repository safety standards in Part 60 for all "other" repositories:

> Retaining Part 60, unmodified, might pose some additional litigative risks, if the new criteria for Yucca Moun-

[8] SuppApp-487; SuppApp-501. ACNW took note of NRC's own assertion that it had long equated NWPA's multiple barrier requirement in Section 121(b)(1)(B) with the "quantitative subsystem approach" underlying Part 60. SuppApp-486.

> tain are perceived to be less stringent than generic criteria that remain in force, and which still could be applied ... to another site.

Id.

Though affirming significant risks from a repository may well extend beyond 10,000 years, JA-29, Callan urged adoption, for "policy" reasons, SuppApp-537, of the 10,000-year cutoff that DOE desired "to facilitate implementation" by DOE. JA-29. In the proposed new rule, the groundwater travel time requirement and other physical disqualifying conditions were altogether eliminated. The Commission promptly approved the new strategy.[9] SuppApp-496-98.

Callan also confirmed to the Commissioners that the proposed new rule, Part 63, "is not needed for compliance with statutory direction compelling consistency with site specific environmental standards [under EnPA] for repository performance after permanent closure."[10] SuppApp-524. NRC, itself, in publishing its final rule, admit-

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[9] Callan retired from NRC and is now employed as a DOE Yucca advocate.

[10] NRC's Chairman later confirmed this view in a letter to Nevada. SuppApp-544.

ted that, "[i]t is true the EnPA did not direct the NRC to develop a new rule specific to Yucca Mountain to replace its general rule for licensing geologic repositories." JA-133.

Nevertheless, NRC went forward with a proposed rule in February 1999, JA-52, a move met with skepticism by the ACNW.[11] Though NRC had ignored the NAS's recommendation that the regulatory compliance period for Yucca not be arbitrarily cut off at 10,000 years, NRC now seized on the NAS's suggestion that imposing subsystem performance requirements on the repository "might result in a suboptimal [engineered] design,"[12] to justify the wholesale abandon-

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[11] ACNW members objected to NRC's abandonment of defense-in-depth, SuppApp-564-66, and to the acknowledged fact that peak doses to humans, rising well beyond the EPA's proposed regulatory limit, were projected by DOE to occur after the 10,000-year cutoff. SuppApp-557-62. One ACNW member called NRC's requirement that multiple barriers be identified but not quantified for minimum performance a mere "body count" in the licensing process. SuppApp-571.

[12] In fact, however, NAS worried that the subsystem performance standards in Part 60 *may not be stringent enough* by underemphasizing certain pathways for radionuclide migration that will be present at Yucca. JA-22-23. This, NAS said, could cause designers to overemphasize efforts to mitigate release along one pathway over another. Indeed, NAS recognized in its 1995 report commissioned under EnPA that subsystem performance standards are *required by the*

ment of geologic primacy and physical qualifying conditions for the site. SuppApp-54 (quotation omitted). Departing from 21 years of its conclusions that requiring an overall system performance standard and subsystem performance standards were consistent, NRC now called such dual requirements "incompatible."[13] JA-55.

NRC's final Yucca Rule, Part 63, was issued on November 2, 2001, only days before DOE issued its new Yucca siting rules. JA-129. The final rule abandoned yet another bedrock NRC precept – that of "reasonable assurance," in favor of a watered-down "reasonable expectation" that the repository would meet disposal safety standards. JA-137. NRC also closed the door on the troubling peak dose issue,

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NWPA. JA-22. And nothing in the NAS report remotely suggests that application of a single system performance criterion would justify abandonment or de-emphasis of geologic isolation, which NAS called the major reason for selecting geologic disposal. *See, e.g.*, JA-18.

[13] This stunning reversal in NRC's core licensing ideology for Yucca is best exemplified by contrasting NRC's own views, before and after, of what was most important for a construction permit. In 1983, NRC scoffed at using the EPA standard as the sole measure of repository performance, saying applying it alone would "fail[ ] to convey in any meaningful way" what is expected to demonstrate repository safety. 48 Fed. Reg. at 28,196. By 2001, NRC called reliance solely on the EPA standard "the essence of NRC's licensing process." JA-136.

positing that "there is no standard that must be met with respect to these peak dose calculations and that there is no finding that the NRC must make with respect to these peak dose calculations nor may they be the subject of litigation in any NRC licensing proceedings for a repository at Yucca Mountain." JA-157.

With Part 63 preceded by EPA's Part 197, the transformation of the Yucca regulatory framework was complete. Only five months earlier, EPA had completed an analysis of the new regulatory regime for Yucca and candidly admitted that the surprise discovery of fast water flow paths through the Yucca geologic setting was *the* precipitating factor in the regulatory changes imposed by the agencies. SuppApp-626-40. "The evolution of repository design and performance has been characterized by greatly augmented contribution of engineered barriers to performance and greatly diminished contributions of the natural barriers," EPA noted, an evolution it said occurred "relatively abruptly" in 1996-97. SuppApp-646-47. EPA characterized the new approach as "extreme reliance on engineered barriers," SuppApp-648, since site characterization had revealed that "performance expectations for the natural system would not be achieved." SuppApp-667.

SUMMARY OF ARGUMENT

In the NWPA, Congress unambiguously mandated a "system" for the "permanent deep geologic disposal" of nuclear waste. Congress required that the "geologic medium" form the primary barrier keeping waste from people and the environment over the millennia. Reflecting the long-established and universally accepted concept of defense-in-depth, the NWPA also mandated that NRC's licensing regulations require that any repository employ "multiple" independent barriers.

Part 63 simply cannot be squared with these clear statutory commands, as it authorizes a Yucca repository to be licensed on the basis only of "total system performance." Part 63 thus flouts Congress' command that Yucca's geology form the primary isolation barrier and that the repository constitute a genuine multiple barrier system.

Part 63 also conflicts with federal law, and is arbitrary and capricious, in numerous other respects. Contrary to the commands of the NWPA, Part 63 authorizes the issuance of a construction authorization for a Yucca repository in the absence of a finding that the re-

pository will satisfy applicable radiation standards established by the EPA. While Part 63 requires DOE to calculate, and to include in its environmental impact statement, so-called "peak" radiation doses emanating from the repository after 10,000 years, it authorizes NRC to ignore such calculations in its actual licensing decision and forecloses the parties in any licensing proceedings from raising such calculations as a litigable issue. This wholly arbitrary feature of Part 63 is unlawful under provisions of NWPA, the AEA, and NEPA protecting public health and safety.

Moreover, apparently recognizing that Yucca's serious flaws would render it unlicensable under the NRC's traditional licensing standards, NRC chose to solve this "problem" by watering down those standards. Part 63 thus unlawfully lowers the standard of proof DOE must meet to obtain a license, abandoning the "reasonable assurance" of safety standard NRC has traditionally recognized as implicit in the authority granted to it under the AEA and NWPA, and adopting instead a lax and indecipherable "reasonable expectation" standard. Part 63 is also arbitrary in that it imposes, without explana-

tion, radically different and weaker standards for the issuance of a repository license for Yucca than for any other repository in America.

ARGUMENT

I. STANDARD OF REVIEW

Petitioners challenge numerous provisions of Part 63 as violative of federal statutes, as arbitrary and capricious, or both.

Petitioners challenge Part 63 as conflicting with the NWPA, the AEA (made applicable by the NWPA), and NEPA. These challenges present questions of pure statutory construction, subject to *de novo* review. *See National Labor Relations Bd. Union v. FLRA*, 834 F.2d 191, 197-98 (D.C. Cir. 1987). In addressing such challenges, the Court must determine if NRC exercised "its authority in a manner that is inconsistent with the administrative structure that Congress enacted into law." *FDA v. Brown & Williamson Tobacco Corp.* 529 U.S. 120, 125 (2000) (internal quotation omitted). The issue here does not "center[] on the wisdom of the agency's policy," but on whether NRC made "a reasonable choice within a gap left open by Congress." *Chevron U.S.A., Inc. v. NRDC*, 467 U.S. 837, 866 (1984). "Regardless of how serious the problem an administrative agency seeks to address, ... [a]nd

although agencies are generally entitled to deference in the interpretation of statutes that they administer, a reviewing 'court, as well as the agency, must give effect to the unambiguously expressed intent of Congress.' " *Brown*, 529 U.S. at 126-27 (quoting *Chevron*, 467 U.S. at 842-43).

Because, with respect to Petitioners' claims that Part 63 conflicts with federal statutes, Congress has "directly spoken to the precise question at issue," NRC's construction of these statutes – to the extent it has even attempted any construction – is entitled to no deference. *Chevron*, 467 U.S. at 842. The fact that Congress has directly spoken to the precise question at issue is evident from numerous provisions of the NWPA. Especially significant for the issues in this case is the fact that the NWPA specifically defines the key term "repository" in terms of the geologic isolation of this highly toxic waste. As this Court has said, "In the face of a clear statutory definition, ... there is no occasion for deference." *Time Warner Entertainment Co. v. FCC*, 56 F.3d 151, 190 (D.C. Cir. 1995). *See also Board of Governors v. Dimension Fin. Corp.*, 474 U.S. 361, 368 (1986); *ACLU v. FCC*, 823 F.2d 1554, 1568 (D.C. Cir. 1987); *Chevron*, 467 U.S. at 842.

Furthermore, the "unambiguously expressed intent of Congress" is not limited to examination of the statutory text, but involves "traditional tools of statutory construction," *NRDC v. Browner,* 57 F.3d 1122, 1125 (D.C. Cir. 1995) (quotation omitted), including examination of legislative history, *id.* at 1127, and the broader "context" of the relevant words, *American Bankers Ass'n v. National Credit Union Admin.,* 271 F.3d 262, 267 (D.C. Cir. 2001).

Ironically, the key statutory commands at issue here, especially the primacy of geologic considerations and of multiple, independent waste isolation barriers, were originally derived by Congress, in large part, from NRC itself, which, was the first agency to grapple with the challenges of long-term, secure waste disposal. Thus Congress "directly spoke to the precise question" here by codifying NRC's original, and, until recently, longstanding judgment concerning the requirements for safe disposal of nuclear waste.

Finally, in the few circumstances where Petitioners' challenge does not implicate matters of statutory interpretation, this Court's review is governed by the traditional "arbitrary and capricious" standard under the APA, 5 U.S.C. §706. *See Motor Vehicle Mfrs. Ass'n v.*

State Farm Mut. Auto Ins. Co., 463 U.S. 29 (1983). *See also Animal Legal Def. Fund v. Glickman*, 204 F.3d 229, 234 (D.C. Cir. 2000) (identifying an overlap between *Chevron* step two and the traditional arbitrary and capricious test). Indeed, even if the text, structure, and legislative history of the NWPA lacked clarity, for almost two decades after the NWPA was passed, NRC interpreted and implemented the statute so as to effectuate the primacy of geologic considerations and of multiple, independent waste isolation barriers. NRC's eleventh-hour break with its consistent prior position in Part 63 illustrates the unreasonableness of its new interpretation.

II. PART 63 VIOLATES THE NWPA

A. Part 63 Unlawfully Permits Licensing of a Yucca Repository That Fails to Isolate Wastes Primarily by Geologic Means

Because it includes no requirement that the geologic setting independently provide some minimum waste isolation capability, Part 63 effectively authorizes NRC to license a "site" primarily on the basis of the perceived waste isolation capability of man-made packages. In short, Part 63 reduces to an afterthought the hydrogeologic characteristics of the Yucca site.

To be sure, Part 63 does require DOE to "identify" and "describe" the individual capabilities of the various isolation barriers, including geologic barriers, and to delineate their technical bases. 10 C.F.R. §63.115. However, Part 63 includes no legal or regulatory requirement as to how effective any of those barriers must be, alone or in relation to one another. Rather, Section 63.115 is intended merely to provide NRC with "insights" for use in evaluating DOE's total system performance assessment. *See* JA-155-56. Similarly, while Sections 63.113 and 63.115 require the repository to rely on "multiple barriers," including engineered and natural barriers, the rule does not establish any real requirement governing the *extent* of any such reliance on any individual barrier, let alone require that Yucca's natural features provide independent or primary waste isolation capabilities. Thus, if the geologic setting retained wastes from failed packages for only one day, this 24-hour isolation could presumably nevertheless establish the required "multiplicity."

In these respects, Part 63 irreconcilably conflicts with the choice Congress made, when it enacted the NWPA, to dispose of the Nation's lethal radioactive waste in a deep *geologic* repository in which

the geologic setting would provide the primary means for waste isolation.[14] "Regardless of how serious the problem an administrative agency seeks to address, ... it may not exercise its authority in a manner that is inconsistent with the administrative structure that Congress enacted into law." *Brown,* 529 U.S. at 125 (citation and internal quotation omitted). Here, NRC has overstepped the bounds of the authority granted it by Congress by ignoring the NWPA's extensive attention to geologic considerations.

Numerous provisions of the NWPA make this clear. At the heart of the statute, Congress defined "repository" as

> any system licensed by the [NRC] that is intended to be used for, or may be used for, the *permanent deep geologic disposal* of [waste]....

NWPA §2(18) (emphasis added). *Cf.* 48 Fed. Reg. 28,205. By enabling DOE to build a repository for waste isolation that is neither "permanent" nor "geologic," NRC has redefined "repository" to mean a sys-

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[14] Notably, NRC's notice of proposed rulemaking for Part 63 paid lip service to the concept that "[g]eologic disposal of [waste] is *predicated* on the expectation that a portion of the geologic setting will act as a barrier ... and thus, contribute to the isolation of radioactive waste." JA-61 (emphasis added). *See also id.* (referring to the "natural barriers *implicit* in a geologic setting") (emphasis added).

tem of man-made waste packages that just happens to be placed underground.

Likewise, NWPA Section 112(a) provides that "geologic considerations" are to be the "primary criteria for the selection of sites," and NWPA Section 113(c)(3) makes clear that DOE might determine the Yucca "site to be unsuitable," which would be impossible unless the site itself, without engineered barriers, could fail to meet disposal safety requirements. Thus, Sections 112 and 113 emphasize the central importance of a site's physical characteristics to determining its suitability. It would make little sense for Congress to require that DOE focus on a site's physical characteristics in analyzing the site's suitability, only to be indifferent to whether NRC reduced such characteristics to an afterthought in any subsequent licensing proceedings.

Equally important, Section 113(c) requires DOE to confine its Yucca "site characterization" activities to those DOE considers "necessary to provide the data required for evaluation of the suitability of such site for an application to [NRC]." Section 113(b)(1)(A)(iv) requires this site characterization to be conducted in accordance with "the criteria to be used to determine the suitability" of the site "devel-

oped pursuant to section 112(a)." Since Section 112(a) makes geologic considerations "primary," such considerations must also be primary in DOE's site characterization, and, under Section 113(c), in DOE's evaluation of whether, based on the characterization, the Yucca site is suitable for an application to NRC. It follows that geologic considerations must likewise be "primary" in NRC's evaluation of DOE's application, or it would have made no sense for Congress to have required DOE to make this *the* primary factor in determining whether the application should be filed.

The legislative history of the NWPA leaves no doubt about the primacy of geologic isolation. As discussed, *supra* at Sections A through F, the legislative effort originated from the proposed action recommended by DOE in its 1980 EIS — deep geologic isolation — itself reflecting the approach adopted by NRC in its first version of Part 60. Thus, the First Circuit was correct to conclude in 1987 that "Congress ordered that these highly dangerous wastes be placed underground with the intent that the surrounding geologic formations would be the major component of the containment mechanism." *NRDC v. EPA*, 824 F.2d 1258, 1279 (1st Cir. 1987).

Neither the NWPAA nor EnPA made any substantive changes to any of the provisions of the NWPA, discussed above, emphasizing the role of natural barriers in any repository. Any reliance by NRC on the NWPAA or EnPA for its radical about-face therefore ignores the "cardinal rule ... that repeals by implication are not favored," *Posadas v. National City Bank*, 296 U.S. 497, 503 (1936). *See also J.E.M. Ag Supply v. Pioneer Hi-Bred Int'l*, 534 U.S. 124, 136-37 (2001).

Against the clear language and history of the NWPA, NRC offered nothing in the nature of statutory analysis to defend its abandonment in Part 63 of geologic isolation. Neither when it proposed nor when it adopted Part 63 did NRC even attempt to discuss, let alone reconcile with its new regulation, the NWPA provisions establishing Congress' unambiguous commitment to primary geologic isolation. NRC's silence speaks volumes.

B. Part 63 Violates the NWPA's "Multiple Barrier" Requirement

NWPA Section 121(b)(1)(B) requires NRC's Yucca licensing criteria to "provide for the use of a system of multiple barriers in the design of the repository." The phrase "multiple barriers" was well

known to Congress, since NRC had used the term for decades and it was a featured requirement in NRC's repository regulations when Congress passed the NWPA. Congress knew that, from the beginning of nuclear regulation, NRC had applied a "defense-in-depth" philosophy to the licensing of all nuclear facilities. This philosophy required a multiple-barrier approach to provide substantial redundancy in preventing release of radioactive materials above unacceptable amounts. As early as 1971, NRC's "General Design Criteria for Nuclear Power Plants," 10 C.F.R. Part 50, Appendix A, imposed separate and stringent requirements on nuclear reactor cores and related control systems, the primary coolant systems surrounding the cores, and the reactor containments surrounding the primary coolant systems. Moreover, NRC established an overall dose limit that had to be met even assuming each of the multiple barriers failed at least in part. 10 C.F.R. §100.11.

While Congress was considering the NWPA, NRC had already indicated in its "Technical Criteria for Regulating Geologic Disposal of High-Level Radioactive Waste," that its "'defense-in-depth' approach ... would prescribe minimum performance standards for each

of the major elements of the geologic repository, in addition to prescribing the EPA standard as a single overall performance standard." 45 Fed. Reg. at 31,393.

Though Part 63 requires "multiple barriers, consisting of both natural barriers and an engineered barrier system," 10 C.F.R. §§63.113 and 63.115, the only specific requirements applicable to these "multiple barriers" are that they be identified and justified, §63.115, that each barrier's capability in the disposal performance assessment be established, §§63.102(h), 63.115, that the geologic barrier be "important," §63.102(h), and that "working in combination" the barriers meet dose limits applicable to the entire repository system, §63.113(b). Missing is any specific requirement for any barrier to provide any degree of protection that is substantially independent of the others, *i.e.*, there is no requirement that any of the barriers provide for safety redundancy. Congress' command that "multiple barriers" be used is deprived of any vitality and meaning if it is read, as NRC suggests in Part 63, to permit the mere identification of successive barriers in the repository system, with no minimum requirements as to their independence or efficacy.

C. Rejection of Defense-in-Depth for Yucca is Arbitrary and Unreasonable

Even if the NWPA were less clear on the meaning of "multiple barriers," NRC's rejection of the phrase's traditional meaning just for Yucca is unreasonable. NRC says it adopted this new approach for Yucca because (1) "DOE is provided flexibility ... to use its available resources effectively to achieve the safest repository without unnecessary constraints"; (2) "estimates of subsystem performance are subject to many, if not all, of the same sources of uncertainty as are estimates of overall system performance," and "it is questionable, therefore, whether the subsystem criteria in part 60, or any other criteria, could provide truly independent assurance of total system performance"; and (3) recent improvements in performance assessment "obviate ... the need to prescribe arbitrary, minimum performance standards for subsystems." JA-155.

These reasons are individually and collectively arbitrary and unreasonable. Reason 1, DOE "flexibility," is a red herring. Even assuming *arguendo* that the subsystem performance criteria in Part 60 are unduly constraining, giving DOE "flexibility" does not require

abandonment of defense-in-depth. Rather, DOE could have been required to develop different or self-selected subsystem performance criteria, so long as defense-in-depth is ultimately demonstrated. The issue is not the efficacy of particular subsystem performance criteria, but why, in view of the NWPA's "multiple barrier" requirement and the defense-in-depth requirement applicable to all other nuclear facilities and to *all other geologic repositories* under Part 60, NRC eliminated the need for *any* independent (*i.e.*, genuine) multiple barriers solely for Yucca.[15]

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[15] As recently as 1995, NRC affirmed it would apply defense-in-depth to the licensing of repositories, notwithstanding advances in quantitative methods and risk assessment. In its Final Policy Statement, "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities," NRC concluded:

> Defense-in-depth is a philosophy used by NRC to provide redundancy for facilities with "active" safety systems, *e.g.*, a commercial nuclear power, as well as the philosophy of a multiple barrier approach against [radioactive] fission product releases. Such barrier principles are *mandated by the [NWPA]*, which provides redundancy for a geologic repository to contain and isolate nuclear waste from the human environment.

60 Fed. Reg. 42,622 (emphasis added). In 1998, accounting for further advances in quantitative risk assessment, NRC issued Regulatory Guide 1.174 (SuppApp-29-34), which again reaffirmed NRC's de-

Reason 2, that it is "questionable" whether any barriers could provide "truly independent assurance," is equally specious. The defense-in-depth philosophy has always recognized the interdependence of subsystems, but it has never required that each barrier offer a fully or "truly independent" assurance of safety. If that were the case, defense-in-depth would be unnecessary. For example, in a reactor, the performance of the reactor's concrete containment after an accident depends in part on the performance of the primary system barrier (how much radioactivity will be released from the reactor vessel into the containment). What is required is genuine redundancy, so if one barrier fails to perform as expected, another might do as well or better than expected, with the result that overall confidence in the safe performance of the system is achievable. By the same token, it would not be genuine "defense-in-depth" for a reactor containment to be made of cardboard, though it would technically constitute a "barrier."

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fense-in-depth philosophy (§2.2.2.1) through application of multiple independent barriers.

Likewise, the multiple independent barrier approach applies under Part 60 to all other repositories even though NRC recognized, when it was promulgated, that "the performance appropriate to a particular barrier is greatly dependent upon design features and site characteristics." 48 Fed. Reg. at 28,196. It is especially inappropriate for NRC to reject any separate requirements for the performance of the geologic setting as a barrier on grounds NRC may never have confidence the setting will provide *perfect* isolation, or will operate to isolate wastes without being influenced by the performance of other barriers, such as the waste form. Failing to require the geologic setting to meet some minimum reasonable performance standard is akin to allowing it to serve as a reactor's cardboard containment: It may technically exist as a "barrier," but its presence is ultimately immaterial and it provides for no safety redundancy.

This leaves only Reason 3 - that recent improvements in quantitative methods and performance assessment for Yucca "obviate ... the need to prescribe arbitrary, minimum performance standards for subsystems to build confidence in a system's overall performance." This is merely an *ipse dixit*. Apart from NRC's apparent prejudgment

of the sufficiency of DOE's yet-to-be-filed license application (it's bound to be so quantitatively sophisticated we can relax our standards), all Reason 3 really says is that NRC has taken a preliminary look[16] at what DOE is doing and, with no adjudicatory analysis, concluded that the NWPA's multiple barrier requirement can be discarded. The multiple barrier approach is characterized by NRC as "arbitrary" (though NRC does not say why), when it is NRC's abandonment of a pervasively accepted and decades-old safety philosophy with no real rationale that is the quintessence of arbitrariness.

III. PART 63 UNLAWFULLY AUTHORIZES REPOSITORY CONSTRUCTION WITHOUT ANY FINDING OF COMPLIANCE WITH EPA'S YUCCA RULE

EPA's Yucca rule, 40 C.F.R. Part 197, Subpart B, establishes public safety and environmental radiation standards for disposal at Yucca. The EPA rule provides that "NRC implements this subpart B. The DOE must demonstrate to NRC that there is a reasonable expectation of compliance with this subpart before NRC may issue a license." 40 C.F.R. §197.13.

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[16] DOE has publicly stated it will not be ready to finalize and submit its application until December 2004 at the earliest.

NWPA Section 121(b) provides that NRC "shall, by rule, promulgate technical requirements and criteria that it will apply ... in approving or disapproving ... applications for authorization to construct repositories...." Building on this instruction, EnPA Section 801(b) provides that, within one year after EPA's Yucca rule is issued, NRC "shall, by rule, modify its technical requirements and criteria under section 121(b) of the [NWPA], as necessary, to be consistent with the [EPA] Administrator's standards" promulgated under NWPA Section 121(a).

In sum, Congress required NRC to issue technical requirements and criteria "to be consistent with" EPA's Yucca rule, and this requires NRC to find, before issuance of a construction authorization, that there is a reasonable expectation of compliance with EPA's dose standards for disposal. NRC's rule fails to require this finding.

NRC's criteria for issuing a repository construction authorization are established in 10 C.F.R. §63.31. Under this section, NRC is required to make only one finding relevant to disposal safety before it issues a construction authorization: "That there is a reasonable expectation that the [wastes] can be disposed of without unreasonable

risk to the health and safety of the public." There is no requirement for NRC to find that DOE's application complies with EPA's rules. Likewise, there is no requirement for any NRC finding that DOE's application complies with EPA's Yucca rule even as incorporated into 10 C.F.R. Part 63.[17] Instead, NRC substitutes only the negligible requirement that, in making the necessary "no unreasonable risk" finding, NRC "shall *consider* whether the site and design comply with the performance objectives and requirements contained in subpart E of this part." 10 C.F.R. §63.31(a)(3)(iii) (emphasis added). Subpart E, as well as Subpart L referred to therein, contain the radiological dose limits of the EPA Yucca rule. Clearly, NRC has unlawfully reserved for itself the discretion to authorize repository construction even in the face of authoritative evidence that it will not comply with NRC's own (and EPA's) safety requirements.

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[17] Although 10 C.F.R. §63.303 provides that "DOE must demonstrate that there is a reasonable expectation of compliance with this subpart [subpart L, which includes the EPA dose standards] before a license may be issued," Part 63 consistently uses "license" to refer only to the second NRC authorization to receive waste and begin disposal, rather than to the first NRC authorization to *construct* the repository. *See, e.g.*, 10 C.F.R. §§63.3(a), (b), 63.41, 63.101.

IV. PART 63 VIOLATES THE NWPA, THE AEA, AND NEPA BY PRECLUDING CONSIDERATION OF PEAK DISPOSAL RISKS, ARBITRARILY LIMITING COMPLIANCE TO 10,000 YEARS

Due to unexpectedly rapid groundwater travel times now known to exist in the Yucca geologic setting, peak radiation doses to the accessible environment indisputably will occur after the engineered barriers fail. *See, e.g.,* SuppApp-577-84; 66 Fed. Reg. at 32,096. Thus, even in DOE's repository performance models - which optimistically presume engineered barriers remain intact for 10,000 years - the highest doses (well beyond EPA limits) occur after 10,000 years, *id.,* when at some point the engineered barriers will inevitably fail. 46 Fed. Reg. at 35,282.

Part 63 requires DOE to calculate the peak radiation dose occurring from repository emissions after 10,000 years, and it requires DOE to include the results of this peak dose assessment in its Final Environmental Impact Statement ("FEIS") for Yucca. However, "[n]o [AEA] regulatory standard applies to the results of this analysis." 10 C.F.R. §63.341. The consequences of this missing standard are made clear in the rule's preamble, where NRC states twice not only that

"there is no [AEA] standard that must be met with respect to these peak dose calculations," but also that "there is no finding that the NRC must make with respect to these peak dose calculations nor may they be the subject of litigation in any NRC licensing proceedings." JA-157.[18]

Thus, Part 63 indicates not only that future generations suffering the greatest health risks will have no regulatory limit in place to protect them, but also that the very subject of "peak dose" is categorically forbidden in any hearing, as if the mere mention of it would offend the Commission's sensitivities.[19] NRC reached this result even

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[18] NRC's arbitrary cessation of its oversight of DOE at Yucca after closure stands in irreconcilable contrast with DOE's apparent perpetual obligation under EnPA Section 801(c) to "continue to oversee" the site to "prevent any activity that poses an unreasonable risk of ... increasing the exposure of individual members of the public to radiation beyond allowable limits." Under Part 63, NRC will be legally absent precisely when this tragic circumstance occurs. It is ironic that DOE must remain under "perpetual" NRC license when it assumes custody of disposal sites containing far less hazardous low-level wastes from uranium mill tailings. *See* 10 C.F.R. §40.2(a).

[19] NRC's noble assurances that Part 63's purpose is "to ensure that future generations will be adequately protected," and that "waste shall be managed in such a way that predicted impacts on the health of future generations will not be greater than the relevant levels of impact that are acceptable today," JA-146, therefore ring hollow.

though: (1) it knew "it is feasible to calculate performance of the engineered and geologic barriers making up the repository system for periods much longer than 10,000 years,"[20] JA-157; (2) it was advised by both the NAS and its own ACNW that arbitrarily restricting the timeframe to 10,000 years was "without technical justification," SuppApp-437; and (3) NRC knew that peak doses beyond 10,000 years would likely exceed its and EPA's radiation dose standards. SuppApp-441-44; SuppApp-577-84.

A. The AEA

NRC rationalized the exclusion from proceedings of the repository's period of greatest risk by contending that, for periods approaching a million years, "during which significant climatic and even human evolution would almost certainly occur," it is "beyond the limits of scientific analysis" and "all but impossible to make use-

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[20] NAS clarified that calculations reasonably could be done for periods on the order of a million years. JA-11, 18. And EnPA, which requires EPA to set the radiological standards for Yucca and NRC to adopt those standards, specifies only that those standards shall prescribe *"the maximum"* dose, with *no* time constraints imposed. EnPA §801(a)(1).

ful and informed assumptions about human behaviors and exposure pathways." JA-157.

But since Part 63 actually requires a calculation of peak dose, it is hard to fathom how peak dose is "beyond the limits of scientific analysis." NAS discredited precisely this assertion, finding such assessments feasible "for much longer times" than 10,000 years notwithstanding climate and other long-term natural and human changes. JA-11. Surely NRC saw some meaning in making a peak dose calculation, for why else would NRC have required one? And if that calculation is meaningful at all, it must have *some* bearing on whether the waste can be disposed of without unreasonable risk to future generations.

The AEA requires that there be no unreasonable risk to the health and safety of the "public," AEA §57c, 42 U.S.C. §2077c, and there is no basis in the AEA to protect one group of the "public" at a site (those living before 10,000 years) and ignore another at the same site (those living after 10,000 years). NRC's refusal to allow any party to contest DOE's peak dose calculation, or even to propose its own (perhaps more meaningful) calculation, contravenes that statutory

duty and is contrary to this Court's holding in *Union of Concerned Scientists v. NRC*, 735 F.2d 1437 (D.C. Cir. 1984), that under the AEA NRC cannot entirely exclude a material safety issue from a licensing hearing.

B. NEPA

NRC's categorical exclusion of any evidence challenging DOE's peak dose calculation also violates NEPA, including its cornerstone requirement that agency assessment of environmental factors "not be shunted aside in the bureaucratic shuffle." *Flint Ridge Dev. Co. v. Scenic Rivers Ass'n*, 426 U.S. 776, 787-88 (1976). Part 63 requires that DOE's peak dose calculation be included in DOE's FEIS supporting the project. 10 C.F.R. §63.341. Under NEPA Section 102(2)(C), 42 U.S.C. §4332(2)(C), this FEIS must be considered in the "existing agency review processes." That process here includes the NRC hearing mandated by AEA Section 189a, 42 U.S.C. §2239a. While Section 114(f)(4) of the NWPA modifies the NEPA process for repositories by providing that DOE's FEIS "shall, to the extent practicable, be adopted by the [NRC]," this adoption requirement does not amend Section 189a of the AEA. *See* NWPA §114(f)(5) ("Nothing in this Act

shall be construed to amend or otherwise detract from the licensing requirements of the NRC").

Thus, the adoption requirement does not affect the right of any party in the AEA-required licensing hearings to argue, with supporting evidence, that significant new information renders the DOE statement inadequate under NEPA. Indeed, NRC's own NEPA regulations vindicate that opportunity. 10 C.F.R. §51.109; *see also* 40 C.F.R. §1502.9 (Council on Environmental Quality NEPA regulations). By precluding any party from arguing with supporting evidence that significant new information renders DOE's peak dose calculation inadequate, Part 63 prospectively disables NRC from complying with its own NEPA procedures and violates the NEPA requirement that the FEIS must be considered, and be litigable, in the NRC hearing. *See* 40 C.F.R. §1500.1(b).

C. NRC's Decision Is Arbitrary and Incompatible with its Statutory Duties

Since NRC conceded that the performance of the repository system *can* be calculated feasibly for periods greatly exceeding 10,000 years, it follows that the timing, nature and quantity of releases of ra-

dioactive material from the repository can also be calculated for these lengthier periods. The only truly speculative part of the dose calculation is the question of "human behaviors and exposure pathways" far into the future, and NRC is correct that projecting human behavior over many tens of thousands of years is "beyond the limits of scientific analysis."

But as human history illustrates and NAS confirms, the same is also true for periods of *well under 10,000 years.* JA-21. Yet, NRC provided for a mandatory dose limit applicable to that period, and it allowed the hearing to include expert testimony about doses over that duration. It did so even though it recognized that certain critical aspects of *this* dose calculation were speculative. JA-151, 154. NRC avoided speculation and needless litigation with respect to dose calculations within the 10,000-year period by specifying in the rule that the human biosphere is assumed to be identical 10,000 years from now to as it is today, and by postulating who the "reasonably maximally exposed individual" must be for purposes of calculating the dose and estimating whether the 10,000-year dose limit will be met. 10 C.F.R. §§63.312, 63.305.

If compliance with the NRC's 10,000-year dose limit "support[s] a finding of no unreasonable risk [under the AEA]," 10 C.F.R. §63.101(a)(1), even though the dose calculation to support such a compliance finding must depend on speculative assumptions about human activity such as those described, why would a similar calculation going beyond 10,000 years based on similar assumptions be immaterial to NRC's duty under the AEA and NWPA to protect public health and safety? NRC fails to explain its abrogation of these duties, and its rule is thus also arbitrary and unreasonable. *See State Farm*, 463 U.S. at 43, 48; *New England Coalition on Nuclear Pollution v. NRC*, 727 F.2d 1127 (D.C. Cir. 1984). Indeed, the only rational explanation for NRC's having restricted analysis to 10,000 years is political rather than scientific: Longer-term analyses of Yucca would likely, if not certainly, show the repository as failing to protect human health – at least as calibrated by EPA's radiation dose limits.

EPA's Yucca rule makes similar assumptions, and similarly provides for no dose limit applicable beyond 10,000 years. But Nevada is also challenging EPA's Yucca rule. Moreover, that rule does not imply that exclusion of peak doses should be a *fait accompli* before

the NRC. Nothing prevented NRC, if required for adequate protection of public health and safety, from imposing more stringent requirements or filling gaps in EPA's Yucca Rule.[21] NRC's failure to do so, and its refusal to allow any consideration by any party of doses beyond 10,000 years, under any set of assumptions, was arbitrary and capricious and violative of the AEA, the NWPA (requiring adherence to the AEA), and NEPA.[22]

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[21] EnPA's legislative history is clear that "the provisions of [EnPA] section 801 are not intended to limit the Commission's discretion in the exercise of its authority related to public health and safety." H.R. REP. NO. 102-1018, at 4446 (1992). In publishing its Yucca rules, EPA recognized substantial criticism of its own period of performance and confirmed NRC was free "to impose additional requirements in its implementation efforts," including its traditional reasonable assurance requirement. 66 Fed. Reg. 32,074, 32,101.

[22] NRC's exclusion from the proceedings of evidence about peak dose due to these uncertainties is disingenuous in view of NRC's rejection of the reasonable assurance standard so as to account for precisely such uncertainty. *See* Section V, *infra*.

V. PART 63 ARBITRARILY APPLIES A LAX "REASONABLE EXPECTATION" STANDARD FOR REPOSITORY PERFORMANCE INSTEAD OF THE "REASONABLE ASSURANCE" STANDARD ADOPTED BY THE NWPA, THE AEA, AND EMPLOYED PERVASIVELY IN NRC'S REGULATIONS

NRC is required by NWPA Section 114(d) to consider DOE's license application for Yucca "in accordance with the laws applicable to such applications." Those "laws" include the AEA, made applicable by NWPA Section 121(b). NRC's consistent practice requires a license applicant subject to the AEA to bear the burden of proof. *See, e.g.*, 10 C.F.R. §2.732; *Duke Power Co.*, 17 N.R.C. 1041 (1983). The degree of proof required is that there be "reasonable assurance" of safety. *See, e.g., Power Reactor Dev. Co. v. International Union of Elec., Radio, & Machine Workers*, 367 U.S. 396, 407 (1961); *North Anna Envt'l Coalition v. NRC*, 533 F.2d 655 (D.C. Cir. 1976); 10 C.F.R. §§50.40(a) (reactors and other nuclear facilities), 60.31(a) (high-level waste disposal facilities other than Yucca), 61.23 (low-level waste disposal facilities), and 72.40(a)(14) (spent fuel).

Moreover, the NWPA itself adopted this standard, noting that one of its fundamental purposes was to "provide a reasonable assur-

ance that the public and the environment will be adequately protected from the hazards posed" by nuclear waste. NWPA §111(b)(1).

As this Court stated in *Carstens v. NRC*, 742 F.2d 1546, 1557 (D.C. Cir. 1984), "the courts have long accepted the Commission's definition of its statutory mandate to 'provide adequate protection to the health and safety of the public' as requiring not a risk-free environment, but a 'reasonable assurance' " of safety. (Citations omitted.) Thus, "reasonable assurance" is not some substantive rule derived from NRC rulemaking power under the AEA, but is rather NRC's interpretation of what is *required* by the AEA.

Contested hearings are common under the AEA, and in those hearings the "reasonable assurance" standard is the legal equivalent of the familiar "preponderance of the evidence" standard for the burden of persuasion in civil actions. *Pacific Gas & Elec. Co.*, 19 N.R.C. 571, 577 (1984). The Supreme Court has confirmed that the Administrative Procedure Act, 5 U.S.C. §556(d), made applicable to NRC actions by AEA §181, 42 U.S.C. §2231, also establishes a preponderance-of-the-evidence standard for the burden of persuasion. *Steadman v. SEC*, 450 U.S. 91 (1981).

Not surprisingly, therefore, when NRC first proposed technical standards for licensing repositories under Part 60 in 1981, and continuing for two decades thereafter, "reasonable assurance" was the required standard of proof. *See* Sections B, E, and H, *supra*. NRC was adamant when it published Part 60 that

> [t]he "reasonable assurance" standard is derived from the finding the Commission is *required* to make under the [AEA] that the licensed activity provide "adequate protection" to the health and safety of the public; the standard has been approved by the Supreme Court. *Power Reactor Development Co. v. Electrical Union*, 367 U.S. 396, 407 (1961). This standard, in addition to being commonly used and accepted in the Commission's licensing activities, allows the flexibility necessary for the Commission to make judgmental distinctions with respect to quantitative data which may have large uncertainties....

48 Fed. Reg. 28,204 (emphasis added).

Part 60's technical criteria, issued in 1983 with yet additional reasonable assurance requirements, 48 Fed. Reg. 28,194, likewise reflected NRC's understanding of what Congress intended with "reasonable assurance" when it enacted the NWPA only six months earlier. *See* NWPA §111(b)(1).

However, when NRC learned of flaws discovered by DOE in Yucca's geology that raised grave doubts whether the reasonable as-

surance standard could be met, SuppApp-248, NRC responded by seeking to change its rules to accommodate the result DOE desired.

Part 63 marks the culmination of NRC's retooling to enable construction authorization notwithstanding DOE's adverse site discoveries. In abandoning "reasonable assurance," NRC substitutes a feeble "reasonable expectation" standard for the burden of proof of disposal safety.[23] 10 C.F.R. §§63.31(a)(2), 63.101(a)(2), 63.311, 63.321(b), 63.331. Not only is this an overt violation of the AEA's adequate protection requirement and the NWPA's adoption of a reasonable assurance standard; it is also a markedly changed statutory construction by NRC, made applicable conveniently only for Yucca.

The new standard removes any real requirement of proof, substituting a vague "standard" that appears to mean whatever suits NRC's purposes at the time. "Reasonable expectation" is not even defined, though Section 63.304 says it may be identified by virtue of

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[23] EPA's Part 197 provides for a similar "reasonable expectation" standard. However, NRC said it did not feel compelled to adopt EPA's standard, but instead reached its own conclusion under independent authority. JA-136-67. Neither EnPA nor Part 197 precluded NRC from imposing stricter standards to meet adequate protection requirements. *See* note 21, *supra*.

four equally vague "characteristics," described as (1) "requires less than absolute proof"; (2) "[a]ccounts for the inherently greater uncertainties in making long-term projections of the performance" of Yucca; (3) "[d]oes not exclude important parameters from assessments and analyses simply because they are difficult to precisely quantify to a high degree of confidence"; and (4) "[f]ocuses performance assessments ... on the full range of defensible and reasonable parameter distributions rather than relying only upon extreme physical conditions and parameter values."

"[T]his Court emphatically requires that administrative agencies adhere to their own precedents or explain any deviations from them." *Greyhound Corp. v. ICC*, 551 F.2d 414, 416 (D.C. Cir. 1977). Agency action that departs from prior precedent without adequate explanation, or which treats similar applicants differently without adequate explanation, is arbitrary and capricious. *Oil, Chem. & Atomic Workers Int'l Union v. NLRB*, 547 F.2d 598 (D.C. Cir. 1976); *WLOS TV, Inc. v. FCC*, 932. F.2d 993 (D.C. Cir. 1991); *Republican Nat'l Comm. v. FEC*, 76 F.3d 400 (D.C. Cir. 1996). Of course, an agency may rationally depart from precedent if it provides an adequate and con-

temporaneous justification, *Camp v. Pitts*, 411 U.S. 138 (1973), and if the departure is not, as here, contrary to one of the expressly articulated central purposes of a federal statute.

In scuttling the traditional standard of proof solely for Yucca, NRC failed to articulate a rational explanation for its departure. The four "characteristics" of "reasonable expectation" are in fact illusory. Two of them can be summarily dismissed: NRC itself dispelled the notion that its traditional reasonable assurance standard "compels focus on extreme values" or calls for a licensing decision other than on the basis of the "full record before it," JA-136-37, thus eliminating the fourth characteristic in Section 63.304(4). Likewise, the first characteristic, that reasonable expectation does not require "absolute proof," does not distinguish it at all from reasonable assurance, because neither the courts nor NRC has ever implied that reasonable assurance requires "absolute" proof, which is impossible in any event. *See, e.g., Power Reactor Dev.*, 367 U.S. at 414; *North Anna*, 533 F.2d at 667.

The only "characteristics" that might arguably distinguish "reasonable expectation" from "reasonable assurance" are the second and

third – that, unlike reasonable assurance, the reasonable expectation standard (2) "accounts for the inherently greater uncertainties in making long-term projections" and (3) "does not exclude important parameters from assessments and analyses simply because they are difficult to quantify to a high degree of confidence."

But these distinctions, on reflection, are likewise legally illusory. In the case of "uncertainty," NRC is free to evaluate the available evidence and to give it whatever weight its inherent uncertainty suggests. NRC says the reasonable expectation standard somehow gives it "the necessary flexibility" to account for such uncertainty. But NRC fails to explain why flexibility would be lost if its reasonable assurance standard were applied. The distinction gains vitality only if, as here, "flexibility" is really a covert grant of authority to lower the standard of *safety, i.e.,* requiring the applicant to meet only those expectations it thinks it can meet rather than those NRC believes, based on all the available evidence, will assure adequate protection of the public.

Likewise, application of reasonable assurance would not require exclusion of parameters and assessments simply because they

are difficult to quantify. In 1983, NRC concluded that its reasonable assurance standard, even as applied to Yucca, in fact "allows the flexibility necessary for the Commission to make judgmental distinctions with respect to quantitative data which may have large uncertainties." 48 Fed. Reg. 28,204. What changed? Compounding this mystery, NRC offers no explanation why reasonable assurance was and remains an appropriate standard to judge whether there is too much uncertainty to grant a license for every repository other than Yucca.[24] This dichotomy between Parts 60 and 63 is the epitome of arbitrariness.

Moreover, if, as NRC has held, "reasonable assurance" equates to the familiar preponderance of the evidence test in a contested licensing hearing, *Pacific Gas & Electric Co., supra,* and "reasonable expectation" is something less, this implies NRC can issue a Yucca construction authorization based on less than the preponderance of evidence that the project is safe. Or, on a far scarier note, this could

[24] Part 63 has its own internal dichotomy as well. NRC failed to explain why it retained the reasonable assurance standard in Part 63 for protection of the common defense and security but abandoned that standard for protection of health and safety. *See* 10 C.F.R. §63.31(b).

equally well imply that NRC can issue a Yucca construction authorization in the face of a preponderance of evidence that the project is actually *unsafe*.

Finally, NRC's irrational and insufficient explanation, considered against the backdrop of NRC's intensive interactions with DOE, compels the inference that NRC abandoned reasonable assurance for Yucca simply because it feared Yucca would not otherwise make the grade. Why else would NRC be concerned about whether it had "flexibility to account for the inherently greater uncertainties"? This novel concept of an AEA safety standard – one based on what the applicant is prepared to prove based on his efforts to date rather than on what is required for safety – is itself an extraordinary departure from everything NRC has ever concluded about the meaning of "no unreasonable risk" and "adequate protection" in the AEA context, and in fact it contravenes the AEA. *Union of Concerned Scientists v. NRC*, 824 F.2d 108, 117 (D.C. Cir. 1987); *Maine Yankee Atomic Power Co.*, 6 A.E.C. 1003, 1006-07 (1973) ("[T]he quantum of protection to, or endangerment of, public health and safety is not dependent likewise

upon how much benefit will be obtained from the activity. In the present context, a ... facility is no safer because it is needed....").

In sum, a safety standard adopted solely because the sole entity subject to it will have little difficulty in complying is no "safety" standard at all.

CONCLUSION

Whatever the outcome of Petitioners' claims in this Court against DOE and the President concerning Yucca, which the Court has agreed to hear in tandem with this action, and of Respondent DOE's claims of mootness in that consolidated case, this Court should not hesitate here to apply the law strictly in the manner Congress intended, since it is ultimately NRC's rules that will ensure the long-term *safety* of any repository actually constructed at Yucca, and the integrity of the licensing process for that repository.

WHEREFORE, Petitioners respectfully request this Court to vacate Part 63 as being arbitrary, capricious, and violative of law, and to remand the rule to NRC for further proceedings consistent with the Court's instructions.

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CERTIFICATE OF COMPLIANCE

Pursuant to FRAP 32(a)(7)(C), I hereby certify that this brief complies with the type-volume limitation of FRAP 32(a)(7)(B) and Circuit Rule 32(a)(2). In reliance on the word count of the word-processing system used to prepare this brief, I hereby certify that the portions of this brief subject to the type-volume limitation contain 13,797 words.

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I, the undersigned, hereby certify that a true and correct copy of "Petitioners' Final Opening Brief" was served this 6th day of June, 2003, via First Class U.S. Mail, postage prepaid to the following individuals:

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